VENOCO, INC

Oil Spill and Gas Contingency Plan

Santa Clara Unit

Carpinteria Oil and Gas Processing Plant
Casitas Pier
Carpinteria and Ventura Pipelines
Platforms Gail and Grace and associated Subsea Pipelines

INTRODUCTION

This Plan has been prepared to meet the requirements of the:

- Oil Pollution Act of 1990 (OPA '90)
- California Senate Bill 2040

Applicable Minerals Management Service (MMS) regulations are 30 CFR Part 254, Subpart B and C. Applicable EPA regulations are 40 CFR Part 112 and Appendices A through F. Applicable DOT/PHMSA regulations are 49 CFR Part 194. The applicable State regulations are Title 14 CCR 817.02, 817.03 and 820.01.

The Plan is designed to assist Venoco personnel and its contractors in responding rapidly and effectively to emergency incidents.

Each plan holder is required to read the Plan and have a thorough understanding of the response procedures and resources (both internal and external) that can be mobilized for a response incident. Personnel named on the response team should review their roles and responsibilities as described in Appendix D of this Plan.

In addition to the Oil Spill and Gas Contingency Plan, the following documents include information that may be useful in a sustained response:

- Cleans Seas Regional Resource Manual.
- Area Contingency Plan Los Angeles/Long Beach (Northern & Southern Sector).

PLAN FORMAT

The Plan includes the following components:

1. Basic factual information about the facilities, the product, and company contacts (Section 1).
2. Procedural information required in an emergency (Section 2).
3. Supporting information about the facility and tools to assist the response team in carrying out their activities (Appendices A through T).

RESPONSE PROCEDURES AND RESPONSE TOOLS

Topic	Details	Plan Reference
Facility Information	Facility information and information often required in reporting an incident	Section 1.1
	Map and facility diagrams	Appendix A
Response Team	Personnel assignments	Section 2.1
	Telephone numbers for Venoco personnel, contractors, facilities	Table 2-10
	Duty sheets for the Spill Response Operating Teams (IIRT and SIRT)	Appendix D
	Forms to used by the team	Appendix C
Telephone Directory	Telephone directory includes telephone numbers and addresses for: 1. Venoco SIRT phone numbers 2. IIRT facility phone numbers 3. Response contractors and cooperatives 4. Adjacent operators 5. Regulatory agencies 6. Emergency services 7. Waste management services 8. Outside services and resources	Tables 2-10 through 2-17
Emergency Notification and Reporting Procedures	Immediate notification procedures and reporting requirements	Section 2.2
	Telephone numbers of agencies and adjacent operators	Tables 2-13 and 2-14
Immediate Response Procedures and Strategies	Immediate response procedures and checklists for specific emergencies and response strategies for sensitive areas	Sections 2.3, 2.4, and 2.5
	Evacuation plan	Section 2.6
	Supporting information on sensitive resources	Appendix M
	Information on mechanical and non-mechanical response techniques	Appendices I, J and K
Response Resources	Response equipment	Appendix F
	Communications plan	Appendix L
Site Safety	Site safety and health plan	Appendix O
	Site safety plan and characterization forms	Appendix C
	Decontamination procedures	Appendix P
Waste Management and Disposal Plan	Waste regulations, minimization, storage, treatment, transportation, and disposal	Appendix N

Topic	Details	Plan Reference
OSPR Supplement	Additional requirements	Appendix Q
DOT/PHMSA Supplement	Additional requirements	Appendix R
EPA Supplement	Additional requirements	Appendix S
Definitions and Acronyms	Definition of terms and common acronyms	Appendix T
California Dispersant Plan	2008 California Dispersant Plan and FOSC Checklist	Appendix U

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BOOK #	NAME	LOCATION
1	Venoco QI	Corp Office (2)
2	HES Manager	Corp Office
3	SCU Safety Advisor	Corp Office
4	Operations Manager	Corp Office
5	Carpinteria Plant Supervisor	Office
6	Carpinteria Plant	Control Room
7	Carpinteria Plant	Pipeline Office
8	Platform Gail/Grace Supervisor	Office
9	Platform Gail	Control Room
10	Platform Grace	Control Room
11	Venoco Central Files	Central Files
12	USCG	SB Marine Detachment
13	Oil Spill Program Administrator	BSEE
14	Oil Spill Prevention Specialist	CA OSPR
15	Emergency Manager	SBC OEM
16	HES Plans	Ventranet
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REVISION	DATE	DESCRIPTION OF REVISION
0	5/9/08	New Plan
1	11/2008	Various - Administrative
2	1/29/09	Appendix F
3	2/2009	Section 2 - SIRT
4	1/2010	Section 1, Page 2 & Section 2, Pages 3 & 32
5	5/28/2010	Biennial review and update for BOEM approval. Revised sections include Cross Reference, App F, App H, App I, App J, App M, App N, App P, App S
6	8/2011	Approval of biennial review
7	6/2012	Clean Seas OSRV change - Appendices F, H & I

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Table CR-1. EPA Cross Index For 40 CFR Part 112, Appendix F.

Section	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
1.1	**Emergency Response Action Plan**	Section 2 Appendix C	
1.2	**Facility Information**		
1.2.1	Name and location	1.1	
1.2.2	Latitude and longitude	1.1	
1.2.3	Wellhead protection area	1.1	
1.2.4	Owner/operator	1.1	
1.2.5	Qualified Individual	1.1	
1.2.6	Date of oil storage startup	1.1	
1.2.7	Current operation	1.1	
1.2.8	Date and time of expansion	Not applicable	
1.3	**Emergency Response Information**		
1.3.1	Notification list and forms	2.1, 2.2, 2.5, Appendix C	
1.3.2	Response equipment list	Appendix F	
1.3.3	Response equipment testing and deployment	B.2.1, B.2.2, B.3.1	
1.3.4	Personnel	2.1, Appendix D, K.1, K.2	
1.3.5	Evacuation plans	2.6	
1.3.6	Qualified Individual's duties	2.1.3	
1.4	**Hazard Evaluation**		
1.4.1	Hazard identification	S.1.1	
1.4.2	Vulnerability analysis	S.1.2	
1.4.3	Analysis of potential for spill	S.1.3	
1.4.4	Facility reportable oil spill history	S.1.4	
1.5	**Discharge Scenarios**		
1.5.1	Small and medium discharge	S.3.1, S.3.2, S.4	
1.5.2	Worst case discharge	S.3.3, S.4	
1.6	**Discharge Detection Systems**		
1.6.1	Discharge detection by personnel	2.0, B.2, B.3, S.2	

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Table CR-1. EPA Cross Index For 40 CFR Part 112, Appendix F.

Section	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
1.6.2	Automated discharge detection	B.3	
1.7	**Plan Implementation**		
1.7.1	Response resources	2.2, 2.3, 2.4, 2.5, Appendix F, H.1, H.2, H.3, K.1, K.2, K.3, S.5	
1.7.2	Disposal plans	Appendix N	
1.7.3	Containment and drainage planning	A.2.2.4	
1.8	**Self-Inspection, Drills/Exercises, and Response Training**		
1.8.1	Facility self-inspection	B.2, Appendix C	
1.8.2	Facility drills/exercises	K.1, K.3, K.4.2, Appendix C	
1.8.3	Response training	K.1, K.2, K.4.1, Appendix C	
1.9	**Diagrams**	Appendix A	
1.10	**Security**	A.2.2.6	
2.0	**Response Plan Cover Sheet**		
2.1	General information	1.1	
2.2	Applicability of substantial harm	1.2	
2.3	Certification	1.2	
3.0	**Acronyms**	Appendix T	

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Table CR-2. OSPR Cross Index For Title 14 CCR 817.02.

Section 817.02	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
(a)	**Introductory Material**		
(1)(A)	Name and address of facility	1.1	
(1)(B)	Name, address and phone of owner/operator	1.1	
(1)(C)	Name, address and phone of correspondence contact	1.1	
(1)(D)	Certification statement	1.3	
(1)(E)	Copy of COFR	After title page (front of plan)	
(2)	Qualified individual	1.1, 2.1.3	
(3)	Agent for service of process	1.1	
(4)	Copy of OSRO contract	Appendix G	
(b)	**Facility Description**		
(1)(A)	Design and operations	1.1, A.2, A.3, A.4, A.5, A.6, A.7	
(1)(B)	MSDS	Appendix E	
(1)(C)	Oil transfer procedures	A.3, B.3	
(1)(D)	Facility hours of operation	1.1	
(1)(E)	Lease field description	1.1	
(2(A)	Map and site topography	A.7	
(2)(B)	Vicinity map	A.7	
(2)(C)	Hydrographic and climatic conditions	A.6.2	
(2)(D)	Geographic features	A.7	ACP: 9812.1, 9812.3, 9812.4
(2)(E)	Logistic resources	Table 2-3, Table 2-14, Table 2-17	ACP: 5000, 5200, 5300, 5400, 5900
(2)(F)	Shoreline access	Appendix I	ACP: 9812.5
(c)	**Prevention Measures**		
(1)(A)	History of significant spills	Q.3.1	
(1)(B)	Risk and hazard analysis	Q.3	
(1)(C)	Hazard evaluation method	Q.3.2	

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Table CR-2. OSPR Cross Index For Title 14 CCR 817.02.

Section 817.02	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
(1)(D)	Results of risk and hazard analysis	Q.3.2	
(1)(E)	Supporting documentation	Q.3.2	
(2)(A)	Trajectory analysis	Q.4.1	
(2)(B)	Areas impacts, toxicity, persistence, seasonal sensitivity	Table I-2, Appendix M, Q.5	
(3)(A)	Maps of environmentally sensitive areas	Figure M-1, Appendix M	ACP: 9812, 9813, 9814, 9841, 9842
(3)(B)	Maps of economically and culturally sensitive resources	Appendix M	ACP: 9812, 9813, 9814, 9841, 9842
(4)(A)	Required prevention measures, inspection and maintenance	B.2	
(4)(B)	Spill prevention/reduction measures	B.3	
(4)(C)	Clear communications in transfer	B.3	
(4)(D)	Protection from flooding	B.3.6	
(5)	Other prevention measures	B.3	
(d)	**On-Water Containment and Recovery**		
(1)(B, E)	Reasonable worst case discharge	Q.6.1	
(2)	Persistence and emulsification factors, and response planning volume	Q.6.2, Q.6.3, Q.8	
(3)	Response capability standards	Q.6.4	
(4)	Non-cascadable equipment	Q.6.5	
(5)	On-water equipment and services	B.2.5, K.2, H.3, H.4, H.5, Appendix F, Appendix G	
(6)	On-water response and recovery strategies	2.3, 2.4, 2.5, I.2, I.4, Appendix J	
(e)	**Shoreline Protection and Cleanup**		ACP: 3210, 3220, 3230
(1)	Shoreline response planning volume	Q.7.1, Q.8	

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Table CR-2. OSPR Cross Index For Title 14 CCR 817.02.

Section 817.02	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
(2)	Shoreline protection equipment and services	H.4, H.5, Appendix F, Appendix G	
(3)	Reserved		
(4)	Shoreline protection and cleanup strategies	2.3.3.5, 2.3.3.6, I.3, I.4, Appendix M	
(f)	**Response Procedures**		
(1)	Response organization (ICS)	2.1, Appendix D	
(2)	Establishment of command sites	2.3.3.1	
(3)	Cleanup stages chart	Figure I-1	
(4)	Provision of emergency services	2.4, Table 2-15	
(5)	Methods/equipment to minimize a spill	2.3.1, 2.3.2, 2.3.3	
(6)	Methods, equipment, and procedures for communication	2.3.3.1, Appendix L	
(7)	Post-spill review	1.7.2	
(8)	Access/contamination control	Appendix P	
(9)	Site safety plan	Appendix C, Appendix O	
(g)	**Notification Procedures**		
(1)	List of contacts	2.5	
(2)	Immediate notification	2.2	
(3)	Call-out procedure	2.2.1	
(4)	Checklist for reported information	Appendix C	
(5)	Reporting not delayed	2.2, Appendix C	
(6)	Updating report of spill	2.2.2, Appendix C	
(h)	**Temporary Storage and Waste Management**		ACP 3240, 3250
(1)	ID sufficient temporary storage	N.7, Appendix F	
(2)	ID party to maintain recovered oil/oily waste	N.2.3, N.7	
(3)	ID site criteria to select temporary storage sites	N.7.3	

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Table CR-2. OSPR Cross Index For Title 14 CCR 817.02.

Section 817.02	Description	Location/Title[1]	
		VENOCO OSGCP	ACP
(4)	ID permits required	N.4, N.7.1	
(5)	Methods to expedite permitting process	N.7.1	
(i)	**Oiled Wildlife Care Requirements**		ACP 3600
(1)	Utilize OWCN	2.3.3.8, M.4	
(2)	Or ID procedures	Not applicable	
(j)	**Training**		
(1)	Response training	K.1, K.2.2, K.2.4	
(2)	Operational risk reduction training	K.2.1	
(3)	Safety training	K.2.1, K.2.2	
(4)	Record Maintenance	K.4.1	
(k)	**Drills and Exercises**		
(1)	Drills and exercises program	K.3	
(2)	Training as creditable drills	K.3	
(3)	Equipment deployment drill requirement	K.3	
(4)	Design of drills	K.3	
(5)	Record maintenance	K.4.2	

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Table CR-3. DOT/PHMSA Cross Index For 49 CFR Part 194

Section	Description	VENOCO OSGCP
194.103	Significant and substantial harm: operator's statement	1.4
194.105	Worst case discharge	R.2
194.107	General response plan requirements:	
	(a) Resource planning requirements	Entire Plan
	(b) Language requirements.	Entire Plan
	(c) Consistency with NCP and ACP(s)	1.6
	(d) Each response plan must include:	
	(1) Core Plan Contents	
	(i) An information summary as required in 194.113	1.1
	(ii) Immediate notification procedures	2.2
	(iii) Spill detection and mitigation procedures	2.3.2, Appendix B, R.1.6
	(iv) The name, address, and telephone number of the oil spill response organization, if appropriate.	2.5
	(v) Response activities and response resources	2.3, 2.4, Appendix F, I, and J
	(vi) Names and telephone number of federal, state, and local agencies which the operator expects to have pollution control responsibilities or support	Tables 2-3, and 2-14
	(vii) Training procedures	K.1, K.2
	(viii Equipment testing	K.3
	(ix) Drill types, schedules, and procedures	K.3
	(x) Plan review and update procedures	1.7
	(2) An appendix for each response zone	Appendix R
194.109	Submission of state response plans	Entire Plan
194.113	Information summary	
	(a) Core plan information summary	
	(1) Name and address of operator	1.1, R.1.4.1
	(2) Description each response zone	R.1.4.3
	(b) Response zone appendix information summary	
	(1) Core plan information summary	1.1
	(2) Name, telephone of qualified individual available on 24-hour basis	1.1, R.1.4.2

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Table CR-3. DOT/PHMSA Cross Index For 49 CFR Part 194

Section	Description	VENOCO OSGCP
	(3) Description of response zone	R.1.4.3
	(4) List of line sections for each pipeline	R.1.4.4
	(5) Significant and substantial harm determination	1.4, R.1.4.5
	(6) Type of oil and volume of WCD	R.1.4.6, R.2
194.115	Response resources	R.1.4.9, Appendix F, G and H
194.117	Training	Appendix K, R.1.9
194.121	Response plan review and update procedures	1.7
App. A	Guidelines for the preparation of response plans	
	Section 1 Information summary	1.1
	Section 2 Notification procedures	2.2, R.1.5
	Section 3 Spill detection and on-scene spill mitigation procedures	2.3, Appendix B, R.1.6
	Section 4 Response activities	2.3, 2.4 Appendix I, J, N, and P
	Section 5 List of contacts	2.5
	Section 6 Training procedures	K.1, K.2, K.4.1, R.1.9
	Section 7 Drill procedures	K.3, K.4.2
	Section 8 Response plan review and update procedures	1.7
	Section 9 Response zone appendices	See Entire Plan

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1.1 FACT SHEET

Name Of Facility:	**Santa Clara Unit**
Location of Facility:	Carpinteria Oil & Gas Processing Plant and Casitas Pier are located in Carpinteria, CA. The Carpinteria Pipeline extends from the plant to the DCOR Rincon Facility at the eastern boundary of Ventura County. The Ventura Pipeline extends from there eastward to the city of Ventura. Platforms Gail and Grace are located approximately 10 miles offshore in the Santa Clara Unit in the Santa Barbara Channel. **Venoco Corporate Office Santa Clara Unit**: **Address**: 6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013 **Carpinteria Oil & Gas Processing Plant**: **Latitude**: 34°23' N **Longitude**: 119°31' W **Township, Range, Section**: T 4 N, R 25 W, Section 33 On Dump Road, southeast of the City of Carpinteria **Rincon Station**: 5775 West Pacific Coast Highway Ventura, CA (10 miles northwest of the city) **Platform Gail:** **Lease OCS-P-0205** **Latitude**: 34°07'33" N **Longitude**: 119°24'01" W **Platform Grace:** **Lease OCS-P-0217** **Latitude**: 34°10'46" N **Longitude**: 119°28'04" W
Telephone Number Of Facilities:	Carpinteria Plant: (805) 745-4516 Platform Gail: (805) 745-4572 Platform Grace: (805) 745-4545

Name, Address, Telephone Number Of Owner / Operator:	**Venoco, Inc.** 6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013 (805) 745-2100 (805) 745-1406 (fax) **Ellwood Pipeline** 6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013 (805) 745-2100 (805) 745-1406 (fax)

IIRT:

Carpinteria Facilities and Pipelines:

Name And Telephone Number Of Qualified Individual (QI):	**Doug Taylor** (805) 745-4527 (work)
Name and Telephone Number Of Designated Alternate (Alternate QI):	**Facility Person-In-Charge (PIC)** (805) 745-4516 (work)

Platforms Gail and Grace:

Name And Telephone Number Of Qualified Individual (QI):	**Tony Martinez** (805) 745-4572 / 4545 (work) **Scott Bing** (805) 745-4572 / 4545 (work)
Name and Telephone Number Of Designated Alternate (Alternate QI):	**Doug Hatano** (805) 745-4572 / 4545 (work) **Steve Crawford** (805) 745-4572 / 4545 (work)

SIRT:	
Name And Telephone Number Of Qualified Individual (QI):	**Ian Livett** (805) 745-2284 (work)
Name and Telephone Number Of Designated Alternate (Alternate QI):	**Donn Schmohr** (805) 745-2161 (work)
Name, Address, Telephone Number To Whom Correspondence Should Be Sent:	**Keith Wenal** 6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013 (805) 745-2259 (work)
Name, Address, Telephone Number Of Agent For Service Of Process:	**Terry Anderson** 6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013 (805) 745-2253 (work) (805) 745-1816 (fax)

Site Characteristics:

Carpinteria Facilities & Pipelines are located in the cities of Carpinteria and Ventura and on unincorporated lands of the counties of Santa Barbara and Ventura. The components are:

- Carpinteria Oil & Gas Processing Plant including Storage Tank 861
- Casitas Pier
- Carpinteria & Ventura Pipelines including Breakout Tank 887

The Carpinteria Oil & Gas Processing Plant is on a 55-acre site south of U.S. Highway 101 and north of the railroad right-of-way. The plant is just east and south of downtown Carpinteria. To the east is the Carpinteria Bluffs Public Open Space and to the west is Tar Pits City Park. To the north is the Clean Seas Yard. Elevations on the plant site range from approximately 65 feet above sea level along the east-central pad of the property to 40 feet above sea level in the southwestern corner.

Access From Los Angeles to the Carpinteria Oil & Gas Processing Plant:

- Highway 101 North and Exit Casitas Pass
- Left on Casitas Pass to Carpinteria Avenue
- Left on Carpinteria Avenue to Dump Road
- Right on Dump Road

Site Characteristics (continued):

Casitas Pier is immediately south of the plant and the Union Pacific Rail Road right-of-way. The foot of the pier is on a coastal bluff approximately 600 feet south of the southwest corner of the plant site. The pier is 720 feet long and extends into about 21 feet MLLW water depth.

Carpinteria Pipeline System is a 6-mile-long, 10-inch O.D. pipeline that carries crude oil from Tank 861 at the Carpinteria Plant to Rincon Station. The pipeline right-of-way lies alongside and parallel to the Union Pacific Railroad tracks and U.S. Highway 101 for a considerable distance. The pipeline passes by the unincorporated village of La Conchita (about 12 miles west of Ventura) before it climbs up to the Rincon Station that sits 580 feet above sea level. Rincon Station is an oil breakout tank (Tank 887) and metering facility on the crude oil pipeline between Carpinteria and Ventura adjacent to the DCOR Rincon Onshore Storage Facility (ROSF).

Ventura Pipeline Facility begins at the Rincon Station Breakout Tank 887. Oil flows from the tank by gravity through a 14-mile-long, 22-inch O.D. buried pipeline in a southwesterly direction to the Crimson Marine Terminal in the Ventura Harbor. A 2.9-mile section of a 12-inch pipeline branches off the 22-inch line just east of the Ventura River and terminates at the Crimson facility off Ottawa Drive near Ventura Avenue. There is an inactive 1500-foot section of 8-inch pipeline originating at the facility that runs down Mohawk Avenue and terminates at the Crimson Terminal located off of School Canyon Road near Ventura Avenue.

Platforms Gail and Grace are located in the Santa Clara Unit, which is north of Anacapa Island in the east end of the Santa Barbara Channel. Platform Gail lies 9.9 miles offshore with a water depth of 739 feet. Platform Grace lies 10.5 miles offshore with a water depth of 318 feet. Access is gained via crew boat out of Casitas Pier or alternatively out of Port Hueneme. Two pipelines carry oil and one pipeline carries gas from Platform Gail to Platform Grace approximately 6 miles away. From Platform Grace one pipeline transports oil and one pipeline transports gas to the Carpinteria Plant approximately 16 miles away.

Date Of Oil Storage Startup: Tank 861: 1960

Size Of the Oil & Gas Processing Plant: 55 acres

Number Of Aboveground Storage Tanks: 1 (Tank 861)

Largest Aboveground Storage Tank (gal): 9,114,000

Maximum Oil Storage Capacity (gal): 9,053,730 (maximum shell capacity)

Maximum Volume of Oil Stored (gal): 7,001,400

Current Operations:

The Carpinteria Oil & Gas Processing Plant operates on two 12-hour shifts, seven days per week. The Plant receives oil and gas by a pipeline bundle from Platforms Gail and Grace. The pipeline bundle makes landfall immediately east of the Casitas Pier, which is just south of the Plant. Oil is sent directly to Tank 861 for storage. The gas, which was stripped of H_2S at the platform (to less than 5 ppm), is further treated at the Plant to remove condensate. NGLs are blended back into the 10-inch crude oil line leading to Tank 861. Oil is shipped via the Carpinteria Pipeline to the Rincon Station once a day during off-peak hours from 0000-to-0600. Normal pumping rate is about 650-to-700 bbl/hr.

Three injection points along the Carpinteria Pipeline with separate LACT meters are: La Conchita (500 bph, Pacific Operators Offshore Inc.); Rincon Island (85 bph, Greka); and Dos Cuadras (950-to-1200 bph, DCOR). The pipeline operates normally between 220 and 300 psig (maximum operating pressure of the pipeline is set at 620 psig).

At Rincon Station, the pipeline is routed through a receipt LACT and terminates in Breakout Tank 887.

Ventura Pipeline ships from Tank 887 to the Crimson Facility and the Crimson Marine Terminal. Two injection points along the line include the Occidental Padre Canyon at MP 3.622 is active (575 bph) and the Greka (Santa Fe Lease) injecting 85-110 bph (batch). The 22-inch line to Crimson Marine Terminal normally operates between 220 and 250 psig (MOP is 285 psig). The 12-inch branch to the Crimson Facility normally operates between 70 and 250 psig (MOP is 285 psig).

Casitas Pier is used to transfer equipment, supplies, and personnel to the platforms A crew boat (twice per week) and crane (once per week) are fueled by a contracted, fuel truck service. The fuel truck holds 4,000 gallons of diesel fuel. Capacity of the crane tank is 75 gallons. The crew boat takes on approximately 2,000-to-2,500 gallons each time.

Current Operations (continued):	Platform Gail is a three-deck, drilling and production platform with 36 well slots. During production, water is separated from the oil on the platform. Oil with less than 1% water is delivered to the pipelines after metering. Water is also removed from the gas before delivery to the pipeline. Hydrocarbon condensate separated on the platform is commingled with the oil and sent to shore. Platform Grace is a two-deck, drilling and production platform with 48 wells slots. Currently producing from one well.
Throughput:	**Carpinteria Pipeline**: 1,290 bbl/hr **Ventura Pipeline**: 650 bbl/hr **Platform Gail**: • 2,200 mmscfd (gas from M-29 non-DOT pipeline from Platform Gail to Platform Grace and M-1 DOT pipeline from Platform Grace to Carpinteria Plant, average) • 1831 bbl/day (oil from M-30 non-DOT pipeline from Platform Gail to Platform Grace, average) • 1831 bbl/day (oil from M-28 non-DOT pipeline from Platform Gail to Platform Grace, average) • 9242/1855 bbl/day (oil from M-2 DOT 12/10-pipeline Platform Grace to Carpinteria Plant) **Platform Grace**: Currently producing from one well at approximately 100 bbls per day.
Characteristics Of Processed Crude:	Gravity, API 26.2 Specific Gravity 0.90 Dispersibility See Appendix J.2.3.2
BOENRE Worst Case Discharge:	3,776 bbl
OSPR Reasonable Worst Case Discharge:	61,207 bbl
EPA Worst Case Discharge:	7,001,400 gal
DOT/PHMSA Worst Case Discharge:	61,207 bbl
Facility Distance To Navigable Waters:	0 – ¼ mile
Wellhead Protection Area:	Not Applicable
Standard Industrial Classification / NAICS:	1311 / 211
Dun And Bradstreet Number:	80-912-4894

1.2 EPA Certification

APPLICABILITY OF SUBSTANTIAL HARM
Does the facility transfer oil over-water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?
Yes [X] No [ ]
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and, within any storage area, does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground storage tank plus sufficient freeboard to allow for precipitation?
Yes [ ] No [X]
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?
Yes [X] No [ ]
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance such that a discharge from the facility would shutdown a public drinking water intake?
Yes [ ] No [X]
Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in the amount greater than or equal to 10,000 gallons within the last 5 years?
Yes [ ] No [X]

CERTIFICATION
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining information, I believe that the submitted information is true, accurate, and complete.
Signature:
Name: Keith Wenal
Title: Manager – Health, Environment and Safety
Date: 11/5/2011

1.3 OSPR CERTIFICATION

CERTIFICATION
I certify to the best of my knowledge and belief under penalty of perjury and the laws of the State of California, that the information contained in this contingency plan is true and correct and that the plan is both feasible and executable.
Signature:
Name: Keith Wenal
Title: Manager – Health, Environment and Safety
Date:

1.4 RSPA CERTIFICATION

Statement of Potential for Significant and Substantial Harm from a Worst Case Discharge from Santa Clara Unit (including Breakout Tank 887)
A worst case release from the oil pipeline could potentially cause significant and substantial harm to the environment, as defined by the Oil Pollution Act of 1990 and 49 CFR 194.5. In addition, this plan is being submitted to DOT/RSPA because the line falls within the category in 49 CFR 194.101(a). The line does not fall within the exemption in 49 CFR 194.101(b)(2)(ii) because in the potential event of a worst case discharge occurring, that discharge could impact navigable waters within 4 hours after the initiation of such a discharge.

Venoco Inc. has obtained the necessary private personnel and equipment, through contract or other means, to respond to a worst-case discharge or a substantial threat of a worst-case discharge to the maximum extent practicable.

Signature of the Qualified Individual:

I Livett 11/08/2011

Ian Livett Date

1.5 PURPOSE

The Oil Spill and Gas Contingency Plan (OSGCP) for the Santa Clara Unit provides spill prevention and response guidelines for use by Venoco, Inc. (herein referred to as Venoco) and its contractors in operations and in response to an emergency incident. These response guidelines are not intended to supplant the use of common sense or actions not specifically mentioned in this plan, but necessary to mitigate a problem. Depending on the incident, each response may require different or modified approaches or sequences of events to reach the primary objective of the company; that is, to ensure the safety of life, protection of the environment, and protection of property.

1.6 SCOPE OF THE PLAN

The OSGCP for the Santa Clara Unit has been prepared to meet the requirements of the Oil Pollution Act of 1990 (OPA 90). OPA 90 amended §311 of the Clean Water Act to augment federal response authority, increase penalties for unauthorized spills, expand the federal response framework, and provide greater emphasis on preparedness and response activities.

This OSGCP addresses spill/emergency incidents at the Santa Clara Unit. The Plan addresses the following regulations that pertain to oil spill/emergency preparedness and response:

- 30 CFR Part 254, Subpart B and C (MMS).
- 40 CFR Part 112.20 and 112.21 (EPA).
- 49 CFR Part 194 (DOT/PHMSA).
- Title 14, Division 1, Subdivision 4, Chapter 2, Subchapter 3, Section 815-817 (State of California, OSPR).

At the front of The Plan are two tabbed sections: the **User's Guide** that summarizes the organization of the Plan and the **Cross-Reference** that provides a reference to applicable regulations. An Emergency Response Action Plan (provided as a separate volume) serves as the field response manual required by the State of California.

The OSGCP for the Santa Clara Unit:

- Is consistent with the current National Contingency Plan (40 CFR Part 300) and will be revised as necessary to be consistent with the 11th District USCG Los Angeles/Long Beach Area Contingency Plan (Northern/Southern Sector) and EPA Region IX Regional Contingency Plan.
- Identifies a Qualified Individual and Designated Alternate with full authority to implement removal actions and ability to communicate immediately with appropriate federal authorities and responders.
- Identifies and ensures availability of resources to remove, to the maximum extent practicable, a worst-case discharge.

- Describes training, announced and unannounced drills, and response actions for facility personnel.
- Is updated periodically.
- Is to be resubmitted for approval of each significant change.

1.7 PLAN REVIEW AND UPDATE PROCEDURE

1.7.1 Plan Maintenance

The Health, Environment and Safety Manager maintains the OSGCP for the Santa Clara Unit. Each recipient of the plan is encouraged to submit recommendations for corrections, additions, or revisions to the HES Manager.

For State compliance, the plan will be resubmitted for review to conform with the date set under OPA 90 (i.e., every five years). If no changes are required, Venoco will send responsible agencies a letter stating that the plan remains valid as submitted.

Revisions or amendments to the OSGCP will be submitted to responsible agencies for information or approval under the following conditions:

- There is a change that significantly reduces response capabilities.
- There is a significant change in the worst case discharge scenario.
- There is a change in the type of oil handled, stored or transported.
- There is a change in the facility's configuration that significantly affects the information in the plan.
- There is a relocation or replacement of the pipeline that substantially affects the information included in the OSGCP, such as results in a change to the worst case discharge volume.
- There is an extension of an existing or construction of a new pipeline.
- There is a change in the name(s) or capabilities of the oil spill removal organization named in the plan.
- There is a change in the Qualified Individual and/or Designate Alternate.
- There is a change in ownership
- There is a change in personnel and/or telephone numbers.
- There is a change in spill/emergency response procedures.
- There is a significant change in the Area Contingency Plan.
- There is a change in the regulations.
- There is a change that significantly affects implementation of the plan.
- Five years have elapsed from the date of approval of responsible agencies.

The OSGCP will be revised within 15 days of a change listed above. Plan holders will be provided revisions via an update notice. If no changes are required, Venoco will send responsible agencies a letter stating that the plan remains valid as submitted.

1.7.2 Post-Incident/Drill Critique and Update

In order to improve the response program to benefit from lessons learned during actual incidents and during drills, key members of the response organization will evaluate the effectiveness and efficiency of an incident or drill response. Revisions to the OSGCP will be made, as necessary. In the case of an actual spill, Venoco management will submit the review to the OSPR Administrator within 90 days following completion of the response cleanup.

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EMERGENCY RESPONSE ACTION PLAN

Santa Clara Unit

Carpinteria Oil and Gas Processing Plant
Casitas Pier
Carpinteria and Ventura Pipelines
Platforms Gail and Grace and associated Subsea Pipelines

2.1 RESPONSE ORGANIZATION

Venoco, Inc has organized it's an emergency response organization using the structure of the Incident Command System (ICS). The organization consists of two interrelated response teams, an Initial Incident Response Team (IIRT) and a Sustained Incident Response Team (SIRT). Diagrams of the response teams are shown in Figure 2-1 and 2-2. Duty Sheets for the response organization are included in Appendix D of the Santa Clara Unit OSGCP. The primary response equipment owned and operated by Venoco and stationed at Platforms Gail and Grace (boom boat, ocean boom, skimmer, marker buoys) will be immediately deployed for initial spill response. Venoco's response to an incident is organized around the Venoco Emergency Management System (VEMS) functions in a response to:

- Mobilize resources to control and contain an incident with rapid, responsible and effective actions.
- Minimize damage, injury and environmental effects from the incident.
- Manage information accurately for tactical and strategic decisions.
- Maintain a positive relationship with government agencies, the media and the public.

2.1.1 Initial Incident Response Team

The Venoco Operator-In-Charge at the scene heads the IIRT as the Incident Commander (IC). The minimum elements of the ICS are three positions: IC, Safety and Operations. The IIRT consists of all facility personnel on site at the time of detection of the incident. Clean Seas provides the primary response.

The IIRT is responsible for containment and cleanup if:

- The spill source has been controlled.
- The IIRT has adequate resources to handle the incident.

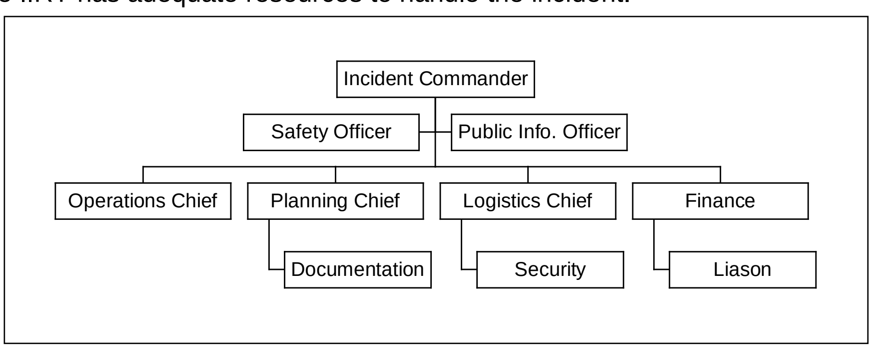

Figure 2-1. Organization of Initial Incident Response Team (IIRT)

2.1.2 Sustained Incident Response Team

The Sustained Incident Response Team is organized into five functional sections: Command, Operations, Planning, Logistics, and Finance and is activated to the level necessary, if:

- The spill requires additional responses not available to the IIRT.
- The source remains uncontrolled.
- The spill threatens to go or goes offsite.
- The spill threatens the ocean.
- The exact nature of the incident is unclear.

The IC of the IIRT serves initially as the Incident Commander until relieved by the IC of the SIRT. Each Section Chief calls up team members of his/her section as appropriate. The SIRT (see Figure 2-2) includes Clean Seas, which is responsible for on-water containment, recovery and cleanup and shoreline protection, and NRC provides shoreline cleanup. The primary and alternate IC IIRT and team members of the SIRT, including response times, are provided in Table 2-1.

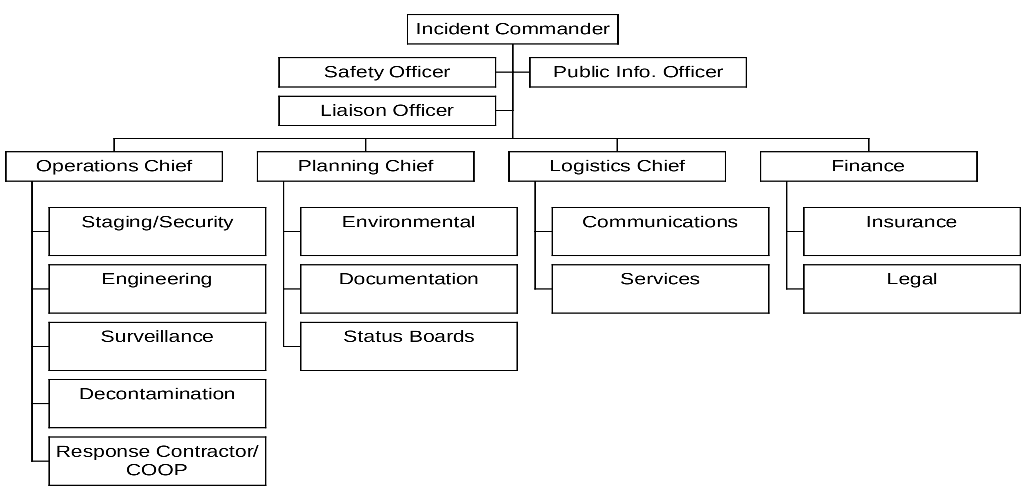

Figure 2-2. Organization of Sustained Incident Response Team (SIRT)

Table 2-1. IIRT Incident Commander And Sustained Incident Response Team

Position	Primary/Alternate	Location	Response Time
IIRT Incident Commander	(P) Person-In-Charge	Platform Gail/Grace Carpinteria Plant	Immediate
SIRT Incident Commander	(P) Ian Livett (A) Donn Schmohr	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Deputy Incident Commander	(P) Keith Wenal (A) Larry Huskins	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Safety Officer	(P) Alan Stetler (A) Walt McCarty	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Liaison Officer	(P) Pat Corcoran (A) Bruce Carter	Carpinteria Office Carpinteria Office	30 minutes 60 minutes
Public Information Officer	(P) Lisa Rivas (A) Steve Greig	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Operations Section Chief	(P) Jeff MacDonald (A) Joe Hollis	Ellwood Onshore Facility Oxnard	30 minutes 90 minutes
Staging Unit Leader	(P) Peter Spangelo (A) Vincent Eccleston	Carpinteria Office Bakersfield Office	30 minutes 2 hours
Surveillance Unit Leader	(P) Clean Seas (A) Clean Seas	Carpinteria Carpinteria	30 minutes 30 minutes
Decontamination Unit Leader	(P) NRC Environmental (A) NRC Environmental	Ventura Ventura	60 minutes 60 minutes
Planning Section Chief	(P) Joel Toreja (A) Dan Taimuty	Carpinteria Office Carpinteria Office	45 minutes 30 minutes
Environmental Unit Leader	(P) John Garnett (A) Tony Stebleton	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Documentation Unit Leader	(P) Martha Saavedra (A) Melanie Delgado	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Status Boards Unit Leader	(P) Tony Soriano (A) Mark Hooper	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Logistics Section Chief	(P) George Ramsey (A) Doug Taylor	Carpinteria Plant Montalvo	45 minutes 45 minutes
Communications Unit Leader	(P) IT Helpdesk	Carpinteria Office	45 minutes
Services Unit Leader	(P) Tiffany Tapp (A) Matt Ott	Carpinteria Office Carpinteria Office	45 minutes 45 minutes

Table 2-1. IIRT Incident Commander And Sustained Incident Response Team

Position	Primary/Alternate	Location	Response Time
Finance Section Chief	(P) Mike Howell (A) Joe Dunn	Carpinteria Office Carpinteria Office	45 minutes 45 minutes
Legal Advisor	(P) Brian Donovan (A) Don Zrehigian	Denver Carpinteria Office	6 hours 30 minutes
Claims / Insurance Unit Leader	(P) Mike Howell (A) Joe Dunn	Carpinteria Office Carpinteria Office	30 minutes 30 minutes
Wildlife Branch	(P) Morgan Nagatani (A)	Carpinteria Office	30 minutes
Call Center Reps	(P) Jenifer Parkes (A) June Spaeth	Carpinteria Office Carpinteria Office	30 minutes

2.1.3 Qualified Individual (QI) and Designated Alternate

The QI/Designated Alternate is responsible for the implementation of this plan. The QI will immediately notify the State IC of this transfer of responsibilities and authorities. Venoco's QI and Designated Alternate are English-speaking representatives, located in the U.S., available on a 24-hour basis, and capable of arriving at the facility in a reasonable period of time (no more than 12 hours). They are familiar with the plan and trained in the responsibilities and authorities of the QI/Designated Alternate. They are knowledgeable in:

- Applicable Federal and State OSHA standards in emergency response operations.
- How to implement the OSGCP.
- Requirements of the National Contingency Plan and Area Contingency Plan as required by OPA 90.
- Spill prevention and response provisions and procedures of the plan.
- Resources committed or that could potentially be committed for an incident.
- Procedures for obtaining or obligating funds for response activities and persons to contact who could expedite such actions.
- Ability to assess the need for additional resources and to make call-outs and contractual agreements.
- Ability to act as liaison between the facility and the State IC and FOSC.

Responsibilities and authority of the QI/Designated Alternate include:

- Implement the OSGCP for the Santa Clara Unit.
- Ensure internal and external notifications are made.
- Assume role of IC of the response team.
- Initiate communication with the FOSC and State IC. Continue to act as liaison with federal, state, and local officials.
- Obligate either directly or through prearranged contracts any funds/monies required to carry out all necessary or directed response activities.
- Develop strategic objectives and direct overall response operations.
- Approve all response plans for the company and the ordering/release of resources.
- Assess the possible hazards to human health and environment due to the release.
- Assess and implement prompt removal actions to contain and remove the substance released.
- Coordinate rescue and response actions.
- Review and approve of press releases.

2.2 NOTIFICATION AND REPORTING PROCEDURES

2.2.1 Notification Procedures

An important step in emergency response is the notification of others involved in the incident. Notification is essential to:

- Comply with local, state and federal regulations.
- Activate the response organization.
- Alert Company management.
- Inform third parties (adjacent operators, community) of an incident.
- Obtain assistance and cooperation of regulatory agencies.
- Mobilize response resources.

Venoco has in place a set of well-defined internal and external notification procedures (provided in Table 2-2SCU). These notification procedures establish a clear order of priority for notification and, in the event of an incident, must be followed to completion. **If the responsible person is unable to notify a person listed, then the responsible person must make the notifications (if any) for that person (see Table 2-2SCU).**

The form "Spill Response Notification Form" (Appendix C) will be used to provide accurate oil spill incident information for the initial and follow-up notifications to federal, state, and local agencies. Copies of this form will be kept in the offices of the IIRT and SIRT ICs and designated alternates and the Liaison Officer.

Initial notifications will not be delayed pending collection of all information on the form. All required government agency notifications will be made as soon as possible after the discovery of the spill or threatened discharge of oil. Follow-up notifications will be made by the Liaison Officer as directed and approved by the Incident Commander.

2.2.2 Agency Notification and Reporting Requirements

A summary of agency notification and reporting requirements is provided in Table 2-3.

TABLE 2-2SCU: INITIAL EMERGENCY NOTIFICATION PROCEDURES

Responsible Person	Notification Made	Telephone Number
Incident Observer	1. Facility Supervisor or Person-In-Charge (PIC)	745-4516
IIRT IC (Facility Supervisor or Person-In-Charge)	1. Activate IIRT and notify SIRT IC based on assessment of situation	Table 2-3
Do not delay if calling Clean Seas and/or NRC Envir. Provide the following information if known: • Time of event • Location • Type of oil event • Release volume (est.) • Current isolate, contain, control measures	2. (911) – Santa Barbara County Emergency Response 3. Clean Seas to assist or standby (if spill threatens ocean) 4. NRC for terrestrial spill 5. **If oil threatens or enters navigable waters (including creeks, ocean)** **or** **If spill to land (>1 bbl) or offsite emergency call:** National Response Center CA Office of Emergency Services	911 or (805) 683-2724 if using cell (805) 684-3838 If no answer: (805) 684-4719 800-337-7455 (24-hr) (800) 424-8802 (800) 852-7550
SIRT IC	1. Operations Section Chief	Table 2-10
	2. Planning Section Chief	Table 2-10
	3. Logistics Section Chief	Table 2-10
	4. Finance Section Chief	Table 2-10
	5. Liaison Officer	Table 2-10
	6. Safety Officer	Table 2-10
	7. Public Information Officer	Table 2-10
	8. Emergency Ops Coordinator	Table 2-10
Operations Section Chief	Operations staff as needed	Table 2-10
Logistics Section Chief	Logistics staff as needed	Table 2-10
Finance Section Chief	Finance staff as needed	Table 2-10

TABLE 2-2SCU: INITIAL EMERGENCY NOTIFICATION PROCEDURES

Responsible Person	Notification Made	Telephone Number
Planning Section Chief	Planning staff as needed	Table 2-10

Note:

Personnel safety and response considerations always take precedence over notification procedures.

Notifications must be followed to completion. If the responsible person is unable to notify a person noted, then the IC must make the notification (if any) for that person.

Verbal notification of the public if affected may be necessary. VENOCO will rely on public law enforcement agencies for assistance.

Each notification of Company personnel should be logged in the Telephone Log with the following information (See Appendix C for an Agency Telephone Log):

1. Time of notification
2. Team member's name
3. Assigned duty location
4. Estimated arrival at the prescribed duty location

Other agency notifications may be required, IIRT IC must review Table 2-3 and assign notifications to Liaison Officer or other appropriate person. (For agency phone numbers see Table 2-14).

Table 2-3. Agency Notification and Reporting Requirements

(Note: For agency telephone numbers, see Directory, Table 2-14)

Agency	Particulars	Verbal Report	Written Report
National Response Center	Notify for any discharge on or threatening navigable waters, including surface water and drainages, and shorelines.	Immediately	None required.
CA Emergency Management Agency (Cal-EMA)	Notify immediately of any release of 1 bbl (42 gallons) or more to land or any amount to State waters.	Immediately	
	Notify of any significant release of hazardous materials with offsite impacts	Immediately	Written report, using form found in Title 19 CCR, Section 2705 for releases of extremely hazardous or CERLA-listed substances over the RQ within 30 days.
United States Coast Guard – Long Beach and Santa Barbara	Notify for any discharge that occurs on or may impact marine waters Long Beach office jurisdiction is from Point Conception to the north, to the San Diego/Orange County lines to the south. USCG requests to be notified.	Immediately if determined necessary	None required.
United States EPA – Region IX	Notify for any spill that has impacted surface waters of the U.S., or any spill on land that threatens surface waters of the U.S.	Immediately, if determined necessary (NRC should be notify).	For a facility with an SPCC Plan, provide a written report within 30 days of the spill for any spill >1,000 gallons or when 2 spills, meeting the verbal reporting requirements, occur within a 12-month period.
PHMSA/Dept. of Transportation	Notify NRC if the failure of a pipeline system results in the release of oil ***and*** any of the following occurs: (1) fire or explosion not intentionally set by the operator; (2) loss of 5 gal or more hazardous liquid or CO_2 ; (3) a fatality; (4) bodily harm to any person, such as loss of consciousness, necessity to carry person from scene, necessity for medical treatment, or disability which prohibits normal activities beyond the day of the accident; (5) estimated property damage, including cost of cleanup, value of lost product, and all property damage exceeding $50,000; (6) pollution to body of water or shoreline	Call NRC to satisfy	File Accident Report (DOT Form 7000-1) no later than 30 days after discovery of accident

Table 2-3. Agency Notification and Reporting Requirements

(Note: For agency telephone numbers, see Directory, Table 2-14)

Agency	Particulars	Verbal Report	Written Report
Service (Bureau of Safety and Environmental Enforcement (BSEE)	Notify District Manager if over 1 bbl and if involves pipeline notify Office of Facilities, Safety & Enforcement	Immediately if >1 bbl	Written report to within 15 days
NOAA/National Marine Fisheries	Call for a release >100 bbl or significant impacts to marine wildlife	Immediately	If requested.
CA Dept. of Fish and Game (OSPR)	Call for releases 1 bbl (42 gallons) or more that impact or threaten inland waters, protected habitats and/or marine waters extending 3 miles from shore.	Immediately	No specific report required. Report submitted to State OES is used. State OES will submit report to DFG/OSPR.
CA Dept. of Transportation "CalTrans"	Call – CalTrans has the responsibility to contain, identify, and clean up hazardous substance spills that occur on highways.	CHP should notify.	None required.
CA Division of Oil, Gas, and Geothermal Resources (DOGGR)	Oil spill; Fire, serious injury, significant gas or water release associated with production or drilling operations.	Promptly to Cal-EMA Promptly to District office	None required. DOGGR utilizes the OES report and may make inquiries of their own, if further information is required.
CA State Lands Commission	All spills or leakage of oil or liquids pollutants to State waters from production or drilling operations.	Immediately to USCG & Cal-EMA Promptly to CSLC 24hr	Submit written report to CSLC.
CA Highway Patrol	Notify of any spill to a CA highway.	Immediately	None required.
CA Occupational Safety and Health Administration (Cal-OSHA)	Call Cal-OSHA in the event of any fatalities or serious injuries resulting in overnight hospitalization or unconsciousness.	As soon as practicable, but no longer than 8 hours after knowledge of the incident.	None required.
California Regional Water Quality Control Board	Notify for produced water spill >10 bbl (420 gallons) or as required by CA OES. RWQCB oversees cleanup and remediation activities.	Upon request of CA OES	The RWQCB utilizes the CA OES report. Provide RWQCB with the CA OES case number.
State Fire Marshal Pipeline Safety Division	Notify of every pipeline break, explosion or fire regardless of magnitude of incident. Excluded from this requirement are breaks resulting in <5 bbl (210	CA OES should notify	None required.

Table 2-3. Agency Notification and Reporting Requirements

(Note: For agency telephone numbers, see Directory, Table 2-14)

Agency	Particulars	Verbal Report	Written Report
	gallons) spilled from crude oil pipeline in rural areas or in-plant pipeline breaks.		
Santa Barbara County Energy	Notify of any incident or release, whether considered an emergency or not.	Immediately	Spill Response Notification Form (Information on Discharge).
Santa Barbara County Fire Department / 911	Notify for any emergency posing a threat to life, environment, or property	Immediately	SBC CAER Form <u>if not an emergency</u> within 1 business day.
Santa Barbara County APCD	Notify of any failure or malfunction of air pollution control or related equipment resulting from an emergency incident.	Within 4 hours of next business day.	Written report within 7 days.
City of Goleta	Notify of any incident or release, whether considered an emergency or not.	Immediately to city manager / planning & environmental services director	Spill Response Notification Form (Information on Discharge)

2.3 RESPONSE PROCEDURES

2.3.1 Objectives

Venoco's operational goal for the Santa Clara Unit is zero spillage of oil. To achieve this goal, Venoco is committed to utilizing equipment and systems that comply with government rules and regulations and/or meet industry standards, and to adhering to sound operational and maintenance procedures. To ensure response preparedness, all employees associated with operations at its facilities are required to be familiar with this plan and must participate in specified training and oil spill simulation exercises.

The primary objectives in responding to any spill are to:

- Save lives and prevent injuries to personnel.
- Minimize environmental impacts.

Although response actions vary depending on the incident, general priorities have been assigned to response actions for satisfying these objectives. A summary of these priorities is provided in Table 2-4.

2.3.2 Initial Detection Procedures

Early detection of spilled oil and as immediate a response after the discovery are critical in ensuring the health and safety of personnel and in minimizing the effects on the environment.

An Initial Detection and Response Action Checklist for any facility employee detecting a spill is provided in Table 2-5. Notifying the Facility Supervisor will result in the activation of the IIRT and subsequent activation of the SIRT for a sustained response.

Table 2-4. General Priorities For Spill Response Actions.

PRIORITY	Action
1	**Assess the situation.** If safe: • Identify source of release and its potential toxic or combustible nature. • Sound alarm, warn people, and evacuate if required.
2	**Save lives and prevent injuries.** • Dial 911 to report a serious injury or fire, and obtain assistance as needed. • Don required PPE if necessary. • Assist in evacuation of person(s). • Provide first aid.
3	**Initiate response actions when deemed safe.** • Take immediate actions to try to stop the flow of oil, and contain it if it can be done safely and quickly. • Report the event to the Facility Supervisor. • Notify Clean Seas to assist or stand by. • Activate the IIRT. • Control the effects of the incident. • Set up (a) command post(s). • Initiate activation of SIRT for a sustained response if needed.
4	**Assess situation and make required notifications.** • Report circumstances to Facility Supervisor as soon as possible: - Direction of spill flow. - General extent of release. - Status of shutdown. - Status of ignition sources, potential of fire. • Notify the required agencies, as appropriate. Notify adjacent operators as necessary.
5	**Minimize damage to the environment.** • Identify and protect sensitive resources and habitats. Deploy equipment and personnel as needed. • Over-respond and stand down if necessary. • Mobilize and deploy additional manpower and equipment from private contractors and public agencies.
6	**Clean up the affected area.** • Prepare and submit cleanup and restoration plans for government approval. • Implement plans effectively and efficiently.
7	**Submit report forms.** • Prepare and submit all spill report forms, as required by the Company and/or agencies, in a timely manner, and consistent with state and federal regulations.

Table 2-5. Initial Detection Action Checklist for Any Facility Employee Detecting a Spill.

Check Off (Y)	Initial Actions
Minor Spill Strategy	
	1. Assess the situation. • Identify source of release and its potential toxic or combustible nature. • Sound alarm and/or warn people to stay clear of release site. • Evacuate site, facility, or field if necessary.
	1. Call 911 if necessary, to report a serious injury or fire, and obtain assistance as needed.
	2. Try to stop the flow of oil and contain it, if it can be accomplished safely. Don PPE as required.
	3. Notify one of the following persons in the order listed, until one of them is reached: • IIRT IC (Facility Supervisor) or Designated Alternate IIRT IC. • SIRT IC or Designated Alternate SIRT IC. And report the following information, if known: • Personnel safety. • Type of spill, potentially toxic or combustible gas. • Location and extent of spill. • Estimated quantity of spilled material. • Direction of spill flow. • Status of response actions.
	5. Notify appropriate Venoco personnel and government agencies.
	6. Over respond. Stand down as necessary.
Spill Less Than 5 Barrels (210 Gallons)	
	Items #1 through 6 above.
	7. Should spill threatens or reaches waters, notify Clean Seas and/or NRC for onshore spill if necessary.
	8. Focus response on control.
	9. Assist Clean Seas with Site Characterization and Site Safety Plan.
	10. Assist in deploying containment boom and/or absorbent boom and equipment.
	11. Continue cleanup operations until no visible sheen is apparent.
Spill 5-to-10 Barrels (210-to-420 Gallons)	
	Items #1 through 11 above.
	12. Call out necessary cooperative and contractor equipment.
	13. Continue to assess environmental conditions that influence spill path.
	14. Continue cleanup with mobilized equipment.
	15. Use absorbent boom and pads to remove traces of oil sheen.

Table 2-5. Initial Detection Action Checklist for Any Facility Employee Detecting a Spill.

Check Off (Y)	Initial Actions
Major Spill	
	1. Ensure personnel safety
	2. Take appropriate actions to prevent explosion and fire.
	3. Stop the flow of oil, if possible.
	4. Assess the size, type, direction, and speed of spill.
	5. Notify as necessary (**Refer to Tables 2-2SCU and 2-3**): • Venoco personnel (activation of SIRT) • Clean Seas and NRC • Government agencies
	6. Assist Clean Seas with Site Characterization and Site Safety Plan.
	7. Assist in equipment deployment and cleanup operations.
	8. Alert onshore operations to maintain stand-by status. If warranted, advise SIRT IC to request authorization to use chemical dispersant.
	9. Assist on-site containment efforts upon arrival of shore-based, backup equipment.

2.3.3. Initial Spill Response Procedures

2.3.3.1 Establishing A Command/Communications Post And Staging Area

Initial Platform spill response actions by Platform personnel will be to notify platform personnel and OSRO of a spill; deploy marker buoys for spill tracking; launching the boom boat and deploy boom to contain the spill; and deploy skimming equipment to the platform crew boat for oil recovery.

Venoco onshore management would establish its Command Post in the building at the Clean Seas Yard. The layout and telephone numbers for the Command Post are provided in Table 2-10 and Table 2-11. A major spill may require larger or additional facilities or staging areas. In such a case, the exact location for establishing command and communications posts and staging areas may not be definable until the area of impact is known.

The Command Post at Clean Seas would be established to serve as the primary location for the SIRT staff activities and the various meetings and briefings held throughout response operations. This location offers the following features and/or can accommodate the following:

- Proximity to both onshore and offshore facilities.
- Sufficient size to allow response personnel to operate effectively and comfortably.
- Adequate room for conferences, Unified Command meeting, and media briefings.

- Situation Room to post maps/charts to track the spilled oil, response equipment, sensitive resource areas, personnel, phone numbers, etc.
- Secure phone and fax lines.
- Security.
- Office support systems (e.g. facsimile machine, copier, telephone lines, VHF/UHF radio, base communication station, etc.).
- Communications systems (e.g., landline phone system, radios and base station, pagers, cellular phones).

Field Command Post

A Field Command Post may also be established at the scene of the incident. The primary function of the field Command Post is to conduct all activities that are directed toward reduction of the immediate hazard, including recovery and cleanup operations.

Staging Areas

In a major spill response, numerous staging areas may be required to support containment and cleanup operations. Staging areas would need to be equipped with machinery necessary to unload/load response equipment and supplies to vessels, trucks, etc. Personnel at staging areas would need to establish inventory control systems to track equipment use. In selecting a suitable staging area, the following criteria should be considered.

- Direct access to impacted areas.
- Road access.
- Proximity to populated areas or environmentally sensitive areas.
- Adequate lighting.
- Security.

2.3.3.2 Determining The Properties Of The Spill

Once the spill source is identified, the properties of the spilled product should be determined. Pertinent data are contained in Material Safety Data Sheets and laboratory analyses performed for Venoco. Critical properties, which may need to be considered in determining response strategies, include:

- API Gravity
- Flash Point
- Lower Flammability Limit (Lower Explosion Limit)
- Pour Point

- Solubility
- Specific Gravity
- Viscosity
- Wax Content

2.3.3.3 Assessing Environmental Conditions

Determining the environmental factors that could affect a spill is important in the planning and implementation of an effective response strategy. Critical information includes:

- Oceanographic Conditions
- Meteorological Conditions
- Biological Setting
- Economic and Cultural Resources (see Appendix M, Section M.3)
- Sensitive Natural Resources (see Appendix M)

2.3.3.4 Monitoring And Predicting Spill Size And Movement

Estimating Spill Volume On Water

In the event of sizeable spill, a rough estimate of the spill's total volume provides the Incident Commander with preliminary data to plan and initiate the cleanup response. Generating this estimate early in the response aids in determining:

- The equipment and personnel needed.
- The amount of oil that may reach shorelines and/or sensitive areas.
- The requirements for temporary storage and disposal of recovered materials.

A rough estimate of spill volume can be generated from observations of the oil slick's size and thickness. Definitions of the appearance of oil on water are provided below.

Appearance	Description
Sheen	The oil is visible on water as a silvery sheen or with tints of color (rainbow colors). This is the thinnest thickness of oil.
Dark Colors	The oil is visible with dark colors; it will still have traces of rainbow colors but is not black or dark brown.
Black/Dark Brown	Fresh oil after the initial spreading will have a black or very brown color. This is the greatest thickness of non-emulsified oil.
Mousse	This is a water-in-oil emulsion that is often orange to rust colored. It is very thick and viscous and may contain 30% oil.

Aspen Helicopter services are provided by Clean Seas is located at the Oxnard Airport. The travel distance to Holly/Grace/Gail would be much less. Ellwood is 45 miles at 100 kts air speed and travel time is 20 minutes. Our total time to respond would be 1.5 to 2.5 hourSpill factors may be used to estimate the volume of oil contained in a spill. Whenever possible, these factors should be compared to volumes estimated from the source of the spill (e.g. piping volume, tank capacity). Exact calculations of the volume of a spill are not possible by visual observations of the spill on the surface of the water. For this reason, the spill volumes should be rounded off to avoid the appearance of a very accurate determination.

The spill factors and an example of the estimating procedures are provided below.

Estimating Spill Size Using Spill Factors			
Appearance Of Oil On Water	**Assumed Thickness**	**Factor**	
		Gal/Sq. Yd.	**Bbl/Sq. Nmi**
Sheen	0.0003	0.000066	6.3
Dark Colors	0.002	0.00044	42.0
Black/Dark Brown	0.1	0.022	2100.0
Mousse	1.0	0.066	6300.0

Estimating Procedures:

1. Estimate dimensions (length and width) of each part of the spill in yards or nautical miles (1 nmi = 2,000 yd) for each of the colors.
2. Multiply each of the areas calculated in Step 1 by the appropriate spill factor (above). Add the individual parts together. The answer is the estimated volume of the spill in gallons or barrels. Spills that are calculated to be less than 1 gallon should be reported to be less than 1 gallon rather than a decimal amount. For larger spills, round up.

Example:

A spill has created a sheen with rainbow colors that is estimated to be 1 nmi long (2,000 yd) by an average of 30 yd wide. There is a second area of black oil that is 200 yd long by 60 yd wide.

Calculation:

Area One = 2000 yd x 30 yd x 0.000066 gal/sq. yd = 3.96 gal = 4 gal

Area Two = 200 yd x 60 yd x 0.022 gal/sq. yd = 264 gal

Total Volume = Area One + Area Two = 4 + 264 = 268 gal

Volume in Barrels = 268/42 = 6.38 = 6.4 bbl

Monitoring And Predicting Spill Movement

The movement of spilled oil on water would depend primarily on the effects of wind and the surface currents present near the spill site. Surface currents will dominate slick movement unless the winds are strong. Strong winds will cause the slick to move approximately 3% of the wind speed in the same general direction. When currents and strong winds are absent, slick spreading will dictate slick movement. However, even if only weak winds or surface currents are present, they will dominate slick movement.

Utilize the following resources for monitoring and predicting oil spill movement:

Small Spills*:*

- Use visual observations by personnel from the facility, vessels, and/or vehicles, depending on discharge location and access. Use handheld radios/cellular phones to communicate. Use tracker buoys or stationary vessels in the slick to track oil spills in poor visibility or at night.
- Utilize the Vector Method to predict spill movement (see below) to predict slick movement.

Vector Method To Predict Slick Movement
On-scene personnel can generate field estimates of oil spill movement using the vector addition method. Slick movement can be predicted by adding the vectors of the two main motive forces influencing open water slick movement, surface currents and winds. To predict slick movement, follow these steps: 1. Estimate the direction and speed of the wind and current. 2. Calculate the "wind component", using 3% of the wind speed. 3. Starting from the center of the slick location (A), draw a line representing the speed and direction of the current (B). 4. Starting from the center of the slick location (A), draw a line representing the wind (C). 5. Starting from (B), draw a line parallel to the wind vector (C), to (D), which is the same length and angle as the wind vector (the distance from A to C). 6. Draw a line from (A) to (D), which gives the direction and speed of the slick movement ("resultant vector").

Larger Spills

- Observe the spill from aircraft.
- Use aircraft equipped with mounted sensor systems and/or contact NOAA for satellite imagery to track the spill.
- Notify and coordinate with the NOAA Scientific Support Coordinator and Trajectory Analysis (see Directory, Table 2-14 for telephone number) to predict spill movement with assistance from NOAA's Oil Spill Simulation Model (OSSM) and / or GNOME (General NOAA Oil Modeling Environment) Model.

Since most oils are lighter than water, most spilled oils will float on the water's surface in the form of a slick. Depending on surface currents, winds, and physical boundaries, a slick can spread into several shapes. In the absence of physical boundaries, a slick may appear circular, elliptical or triangular in shape. A circular slick is formed when there are no significant surface currents or winds; whereas an elliptical slick is formed by moderate surface currents and winds. High winds and strong currents will create a more triangular-shaped slick. Each type of slick will widen and spread as it moves away from its source. Wave action, usually caused by winds, can increasingly distort these shapes and eventually divide the slick into smaller streamers or windrows of oil separated by sheen.

NOAA's OSSM relies on four input components; namely, tides of the region, meteorological forecast data from the National Weather Service, a Monte Carlo simulation equation, and weathering and evaporation data from the slick. Information, supplemented by on-scene observations, including approximate locations of the oil slick during various time intervals, makes it possible to project spill movement onto a digitized map of the area. Different simulations are possible as real time conditions change. Maps can be obtained via fax or through direct access to NOAA trajectory analysis.

NOAA's GNOME is a trajectory model that can:

1. Estimate the trajectory of spills by processing information that is provided about wind and weather conditions, circulation patterns, and the oil spill one wishes to simulate.
2. Predict the trajectories that can result when there is uncertainty in current and wind observations and forecasts.
3. Use weathering algorithms to make simple predictions about the changes the oil will undergo while it is exposed to the environment.
4. Be updated quickly and re-run with new data.
5. Provide trajectory output (including uncertainty estimates) in a geo-referenced format that can be used as input to GIS (geographic information system) programs.

GNOME can create and display a "spill movie", showing how the oil is predicted to move and spread across the water. The Diagnostic Mode is the most advanced mode of the model. A Location File (Santa Barbara Channel) can be used to help set up the model. Conditions other than those included in GNOME can be specified. For training contact:

- GNOMEWizard@hazmat.noaa.gov

2.3.3.5 Identifying Response Priorities

Three response priorities that must be addressed during the planning process include: the protection of life and health, the protection of the environment, and the protection of property. Anyone observing a spill should take action or contact the necessary qualified person to take emergency action to stop the flow at the source if it can be done safely and quickly.

Fire and explosion are potential dangers during petroleum product spills. Although flammability varies dramatically with the spilled product and the circumstances, it is essential that all reasonable steps be taken, as soon as possible to minimize the chance of accidental ignition of the spilled products (e.g., extinguish open flames, cease all operations which vent oxygen/enriched oxygen mixtures, arc welders, grinders, etc., shut off electric circuits that might create a fire hazard).

Resources in this plan that may be used to define **initial** response priorities include:

Resource	SCU OSGCP Reference
General priorities of spill response	Table 2-4
Response checklists	Section 2.4
Oil spill response flow chart	Figure I-1
Response resources for worst case discharge over time	Table H-6

In the event of a spill resulting from fire/explosion, the response priorities would be to ensure personnel safety, to activate all fire suppression systems, and to make the necessary notifications. If spilled oil is burning, response contractors would be forced to let it burn, in the interest of safety. Spilled oil (not burning) could only be contained and recovered when responders were not in danger from fire/explosion.

Neighboring resources that require protection or specific response strategies may include:

- Nearby population center.
- Properties at risk (e.g., beaches, harbors, parks).
- Potentially affected industrial activities (e.g., water intakes).
- Economic and cultural resources.
- Biological resources (e.g., sensitive habitats, commercial and recreational fish/shellfish stocks, wildlife, plant life).
- Other marine-dependent uses (e.g., mariculture, navigation).

Resources in this plan and the ACP that may be used to identify and prioritize sensitive resources that may be threatened or impacted by the spill and to identify protection strategies include:

Resource	SCU OSGCP Reference/ACP
Trajectory analysis showing possible affected coastal resources. The analysis only provides a possible indication of affected resources. NOAA can run a trajectory analysis with real time data providing greater predictive value.	Appendix H.6
ACP maps and site summary sheets provide protection strategies and sensitive areas are mapped and prioritized according to an environmental sensitivity ranking.	ACP 2006: Section 9812, 9813, 9814
NOAA ESI maps ranking various shoreline types in order of increasing potential for long-term oil persistence and biological damage. Maps provide seasonal information on sensitive biological resources and identify human use resources.	Appendix M.5, Figure M-1
Review of sensitive environmental, economic, and cultural	Appendix M

resources in the surrounding area.	

2.3.3.6 Selecting Response Options

Every spill is different. In addition, oil properties and ambient conditions that influence the effectiveness of any response option change continuously throughout an incident. No response option (i.e., mechanical or non-mechanical) should be ruled out in advance. Alternative technologies, such as dispersants and *in-situ* burning, need to be evaluated very early in the response effort if they are to be feasible options. Information on response techniques may be found in the Santa Clara Unit OSGCP, Appendices I & J.

Response Technique	Reference
Mechanical Methods Of Response	
Open-Water and Cleanup Strategies	SCU OSGCP: Appendix I.2
Shoreline Response and Cleanup Strategies	SCU OSGCP: Appendix I.3
On-Land Response and Cleanup Strategies	SCU OSGCP: Appendix I.4
On-Land Cleanup Techniques	SCU OSGCP: Appendix I.4.3
Creek Response and Cleanup Strategies	SCU OSGCP: Appendix I.5
Non-Mechanical Methods Of Response	
Dispersants	SCU OSGCP: Appendix J.2
In-Situ Burning	SCU OSGCP: Appendix J.3
Bioremediation	SCU OSGCP: Appendix J.4
Shoreline Cleaning Agents	SCU OSGCP: Appendix J.5

The use of alternative response methods will be considered when the preferred recovery methods and cleanup techniques are considered inadequate and the environmental benefit of an alternative technique outweighs any adverse effects. For an instantaneous release, a very narrow window-of-opportunity exists for dispersants/*in-situ burning*. For an ongoing release, the window may be somewhat larger. Therefore, consideration and approval by the RRT would be sought almost immediately from the onset of the incident if mechanical methods were considered inadequate. Information forms would be completed by Planning and provided to the UC for subsequent review by the RRT. A decision guide and information forms required to be completed for dispersant use and for *in-situ* are found in the Area Contingency Plan. Response contractors would be alerted that approval is being sought and to standby.

Once response options have been identified, it is imperative that the type, size, and amount of specific response equipment and supplies, as well as the numbers and types of personnel necessary to support the operation, be identified and mobilized.

Do not delay. Plan ahead. Over-respond and stand down if necessary. Do not get behind on the curve.

2.3.3.7 Developing A Waste Management Plan

Venoco's waste management practices include:

- Proper classification of wastes to ensure regulatory compliance with respect to handling, treatment, temporary storage, transport, and disposal of wastes.
- Waste minimization to the extent technically and economically feasible.
- Reuse and recycling of wastes whenever appropriate and practicable.
- Evaluation of all legally appropriate and available waste handling and disposal methods prior to disposing wastes to land, the least preferred method.

Waste Management Issue	SCU OSGCP Reference
Waste minimization 1. Debris avoidance 2. Selection of PPE 3. Recovered oil/oily waste 4. Sorbents recycle/reuse 5. Petroleum-contaminated soil recycle/reuse	Appendix N.2 and N.3
Regulatory definition of wastes	Appendix N.4
Waste characterization	Appendix N.5
Temporary storage 1. Methods 2. Siting and pre-identified sites 3. Contractor capacities to accommodate worst case discharge	Appendix N.7 Table N-1 Appendix N.7.3 Appendix F
Quantifying recovered hydrocarbons according to State regulations	Appendix N.8
Initial treatment of temporarily stored materials	Appendix N.9
Transportation requirements	Appendix N.10

Waste Management Issue	SCU OSGCP Reference
Disposal options 1. Crude oil 2. Decanting water separated from recovered oil at sea 3. Contaminated debris 4. Oiled animal carcasses	Appendix N.11
Documentation	Appendix N.12

2.3.3.8 Developing A Wildlife Rehabilitation Plan

Venoco will use the California Oiled Wildlife Care Network (OWCN) to meet wildlife care requirements. The phone number to notify the OWCN to respond or standby is included on the directory of this plan. Additional information on wildlife care and rehabilitation is found in Appendix M.4 of the Venoco Santa Clara Unit OSGCP.

2.4 RESPONSE CHECKLISTS AND STRATEGIES

2.4.1 Response Checklists

Prioritized emergency response procedures in checklist format are provided for the following incidents

- Table 2-6: Tank Overfill / Failure Response Checklist
- Table 2-7: Piping Rupture/Leak Response Checklist
- Table 2-8 Explosion and/or Fire Response Checklist
- Table 2-9 Other Equipment Failure Response Checklist

2.4.2 Response Strategies For Sensitive Areas (ACP 2008: Sec 9812, 9813, 9814)

A number of sensitive and unique marine and coastal habitats occur along Southern California, including the Channel Islands in the Santa Barbara Channel (see Figure M-1). The ACP provides maps, resource information, and site-specific response strategies for sensitive areas. OSPR and NOAA have also prepared an Environmental Sensitivity Maps Index (ESI) Atlas for California. These maps include information on:

- Shoreline Habitat Types.
- Human Use Features (e.g., access, water intake).
- Sensitive Biological Resources (including seasonal data).

Copies of the ESI maps applicable to the facilities and pipelines (based on the trajectory analysis) are made available during spill response. Additional information on sensitive natural, cultural and economic resources is also found in Appendix M.

Table 2-6. Tank Overfill / Failure Response Checklist.

Actions To Be Taken	Responsible Person[1]	Complete (Time/Initial)
Assess situation/ take command – EXERCISE CAUTION.	Facility Supervisor	
Verify personnel safety.[2] If person down, notify Facility Supervisor and rescue or evacuate threatened person, if safe to do so. Maintain communications with person-in-charge.	Person Discovering Victim	
Call 911 to report a serious injury or fire and obtain assistance as needed.	Person Discovering Situation or Facility Supervisor	
Shut down source of oil to tank. Switch to backup if possible.	Operations Personnel	
Verify closure of isolation valves on suspected system and stop leak if applicable and can be done safely.	Operations Personnel	
Eliminate all ignition sources.	Operations Personnel	
Brief and assign operations personnel to the immediate response.	Facility Supervisor	
Notify Clean Seas to assist or standby and/or activate NRC.	Facility Supervisor	
Monitor area with gas detectors to determine vapor area.[2]	Operations Personnel	
Inspect equipment.	Operations Personnel	
Notify agencies.	Facility Supervisor / Liaison	
Notify company management of situation.	Facility Supervisor	
Determine need for additional response resources.	Facility Supervisor	
Notify SIRT IC or Designated Alternate to activate SIRT, if necessary.	Facility Supervisor	
Document all actions.	All Personnel	

[1] Or other qualified personnel. During PM hours, Night Operator is the responsible person.
[2] Appropriate personal protective equipment (PPE) must be worn.
[3] Facility Supervisor or designee.

Table 2-7. Piping Rupture/Leak Response Checklist.

Actions To Be Taken	Responsible Person[1]	Complete (Time/Initial)
Assess situation/ take command – EXERCISE CAUTION.	Facility Supervisor	
Verify personnel safety.[2] If person down, notify Facility Supervisor and rescue or evacuate threatened person, if safe to do so. Maintain communications with person-in-charge.	Person Discovering Victim	
Call 911 to report a serious injury or fire and obtain assistance as needed.	Person Discovering Situation or Facility Supervisor	
Stop release if can be done safely. • If applicable, direct operator to shut down pump(s) and close valves to source, if not already stopped. Verify that source is stopped. • ESD if necessary.	Facility Supervisor	
Notify Platform Supervisor, if applicable.	Facility Supervisor	
Eliminate all ignition sources.	Operations Personnel	
Brief and assign operations personnel to the immediate response.	Facility Supervisor	
Notify Clean Seas to assist if spill to water or to standby or to activate NRC.	Facility Supervisor	
Monitor area with gas detectors to determine vapor area.[2]	Operations Personnel	
Inspect equipment.	Operations Personnel	
Notify agencies.	Facility Supervisor	
Notify company management of situation.	Facility Supervisor	
Determine need for additional response resources.	Facility Supervisor	
Notify SIRT IC or Designated Alternate to activate SIRT, if necessary.	Facility Supervisor	
Ensure safety of personnel involved in response activities	Safety Officer	
Document all actions.	All Personnel	

1 Or other qualified personnel. During PM hours, Night Operator is the responsible person.
2 Appropriate personal protective equipment (PPE) must be worn.
3 Facility Supervisor or designee.

Table 2-8. Explosion And/Or Fire Response Checklist.

Actions To Be Taken	Responsible Person[1]	Complete (Time/Initial)
Take the following actions as appropriate: • Identify source and shut down if can be done safely • Sound alarm • Start firewater or deluge system if can be done safely • Notify Facility Supervisor or acting Facility Supervisor	Person Observing Fire and/or Explosion	
Assess situation/ take command – EXERCISE CAUTION.	Facility Supervisor	
Verify personnel safety.[2] If person down, notify Facility Supervisor and rescue or evacuate threatened person, if safe to do so. Maintain communications with person-in-charge.	Person Discovering Victim	
Call 911 to for fire, explosion, imminent threat, or serious injury and obtain assistance. Provide: • Your name, company, and phone number • Type and size of emergency • Location of emergency • Number and types of injuries	Person Discovering Situation or Facility Supervisor	
Take the following actions as appropriate. • Perform ESD. • Stop pumps • Close valves • Start firewater or deluge system if not already done • Isolate fire and/or explosion source	Facility Supervisor	
Direct personnel to report to safe briefing area for possible evacuation.	Facility Supervisor	
Notify response contractors as needed.	Facility Supervisor	
Notify SIRT IC or Designated Alternate to active SIRT if necessary.	Facility Supervisor	
Notify agencies.	Facility Supervisor	
Notify company management of situation.	Facility Supervisor	
Determine need for additional response resources.	Facility Supervisor	

Table 2-8. Explosion And/Or Fire Response Checklist.

Actions To Be Taken	Responsible Person[1]	Complete (Time/Initial)
Brief Fire Department upon arrival.	Facility Supervisor	
Enter all actions on Incident Event Log and required forms (e.g. Accident Report and Information on Discharge) as appropriate.	Facility Supervisor	
Document all actions.	All Personnel	

[1] Or other qualified personnel. During PM hours, Night Operator is the responsible person.
[2] Appropriate personal protective equipment (PPE) must be worn.
[3] Facility Supervisor or designee.

Table 2-9. Other Equipment Failure Response Checklist.

Actions To Be Taken	Responsible Person[1]	Complete (Time/Initial)
Assess situation/ take command – EXERCISE CAUTION. Determine, if safe: • Source of release • Type of release • Quantity of material released • Whether equipment alarm functioned properly • Status of shutdown • Fire potential • Potential ignition sources	Facility Supervisor	
Verify personnel safety.[2] If person down, notify Facility Supervisor and rescue or evacuate threatened person, if safe to do so. Maintain communications with person-in-charge.	Person Discovering Victim	
Perform ESD if applicable.	Operations Personnel	
Eliminate all ignition sources.	Operations Personnel	
Stop release if safe to do so.	Operations Personnel	
Brief and assign operations personnel to the immediate response.	Facility Supervisor	
Notify Clean Seas to assist if spill to water or to standby or to activate NRC.	Facility Supervisor	
Monitor area with gas detectors to determine vapor area.[2]	Operations Personnel	
Inspect equipment.	Operations Personnel	
Notify SIRT IC or Designated IC to active SIRT if necessary.	Facility Supervisor	
Notify agencies.	Facility Supervisor	
Notify company management of situation.	Facility Supervisor	
Determine need for additional response resources.	Facility Supervisor	
Document all actions.	All Personnel	

[1] Or other qualified personnel. During PM hours, Night Operator is the responsible person.
[2] Appropriate personal protective equipment (PPE) must be worn.
[3] Facility Supervisor or designee.

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2.5 DIRECTORY OF CONTACTS

This directory includes the following lists of contacts:

- Table 2-10 Venoco SIRT & Facility phone numbers
- Table 2-11: IIRT & Facility phone numbers
- Table 2-11a: Clean Seas Yard
- Table 2-12 Response Contractors and Cooperatives
- Table 2-13 Offshore Operators, Utilities & Rail Road
- Table 2-14 Regulatory Agencies
- Table 2-15 Emergency Services
- Table 2-16 Waste Management Services
- Table 2-17 Outside Services and Resources

Table 2-10. Venoco SIRT and Facility Phone Numbers

SIRT

Assigned Position	Pri/Alt	Name	Office	Home	Fax	Cell/Pager
Communications	Pri	Bobby McWhorter	745-2107		745-1846	
	Alt					
Decon/Haz Waste	Pri	NRC	800-337-7745		310 763-9076	
	Alt	NRC	310 763-1423		310 763-9076	
Documentation	Pri	Nicole Ling	961-2305		961-2349	
	Alt	Martha Saavedra	745-2159		745-1816	
Emerg. Ops Coor.	Pri	Josephine Carioti	745-2250		745-1176	
	Alt					
Engineering	Pri	George Ramsay	745-2133		745-2217	
	Alt	Chris Fox	745-2257		745-2217	
Environmental	Pri	Tony Stebleton	745-2162		745-1176	
	Alt	RMA	985-781-0804			
Finance/Claims	Pri	Mike Howell	745-2137			
	Alt					
Incident Commander	Pri	Ian Levitt	745-2196		745-1816	
	Alt	Donn Schmohr	745-2161			
Legal	Pri	Brian Donovan	303-600-2911			
Liaison	Pri	Pat Corcoran	745-2264		745-1176	
	Alt	Bruce Carter	745-2184			
Logistics	Pri	George Ramsey	745-2133		805-745-2217	
	Alt	DougTaylor	745-4527		684-4484	
Operations	Pri	Jeff MacDonald	961-2301		961-2349	
	Alt	Joe Hollis	745-2232			
Planning	Pri	Joel Toreja	745-2132		745-2217	
	Alt	Dan Taimuty	745-2178			
Public Info Officer	Pri	Lisa Rivas	745-2164		745-1406	
	Alt	Steve Greig	745-2255		745-1406	
Resources Unit	Pri	Tony Soriano	745-2254		745-1406	
	Alt	Mark Hooper	745-2174		745-1176	
Safety	Pri	Alan Stetler	745-2283		745-1176	
	Alt	Walt McCarty	745-2260		961-2349	
Services	Pri	Tiffany Tapp	745-2113			
	Alt	Matt Ott	745-2124			
Situation Unit	Pri	Bob Zahner	745-2122		745-1476	
	Alt	Jodi Robins	745-2153			
Staging	Pri	Derek Paulgaard	745-2146			
	Alt	Peter Spangelo	745-2171			
Support Branch	Pri	NRC	800-337-7745			
	Alt	NRC Tom Hale	1-805-667-8424			
Surveillance	Pri	Clean Seas	684-4719		684-0484	
	Alt	Clean Seas	684-4719		684-0484	
Wildlife Branch	Pri	Morgan Nagatani	745-2186		745-1176	
	Alt					

Note: All numbers "805" area code unless specified.

Table 2-11. IIRT & Facility Phone Numbers

IIRT				
PERSON/FACILITY	**TITLE**	**HOME**	**OFFICE**	**CELLULAR**
Daniels, Art	Operator		(805) 745-4516	
Enlow, Chris	Operator		(805) 745-4516	
Hardisty, Jon	Facility Operator		(805) 745-4516	
Hodge, Iren	Pipeline Operator		(805) 745-4520	
McBeath, Seth	Crane Mechanic		(805) 745-4511	
Neathery, Tim	Pipeline Operator		(805) 745-4522	
Taylor, Doug	Operations Supervisor		(805) 745-4527	
Wingate, Lynn	Crane Operator		(805) 566-2971	
Young, Chuck	Roustabout		(805) 745-4516	
Carpinteria Facility	(805) 745-4516			
Mechanic Shop	(805) 745-4529			
I & M Shop	(805) 745-4527			
Instrumentation	(805) 745-4527			
Maintenance Supervisor	(805) 745-4512	Fax (805) 658-3445		
Casitas Pier	(805) 566-2971			
Platform Gail			(805) 745-4572	
Platform Grace			(805) 745-4545	
ECI			(805) 648-5123	
Speed's			(805) 925-1369	

Table 2-11a. Clean Seas Yard

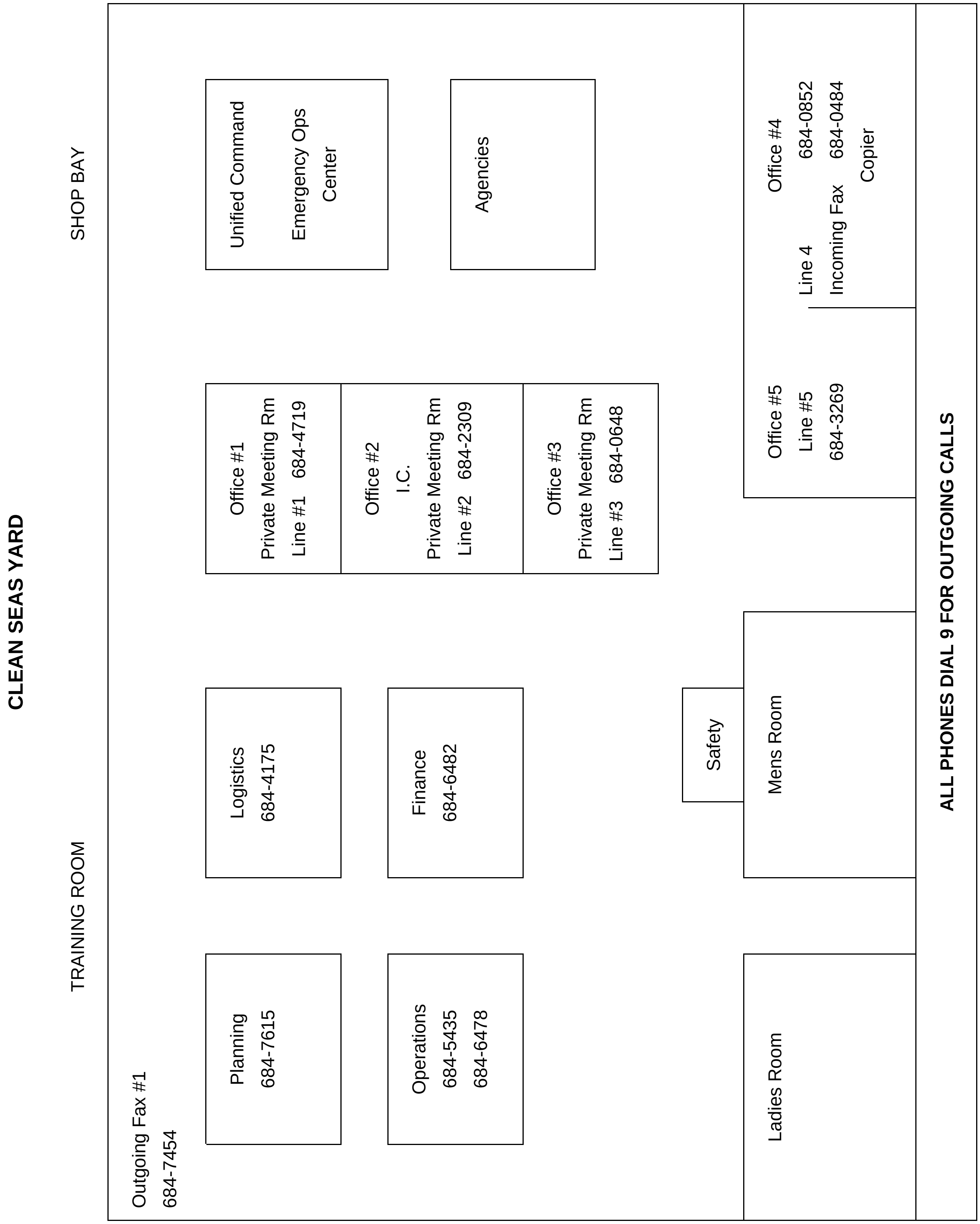

Table 2-12. Response Cooperative and Contractors.

Company	Contact	Telephone
Clean Seas, LLC. 990 Cindy Lane #B Carpinteria, CA 93013	Ike Ikerd Kyle Hansen	**(805) 684-3838 (24-hour)** (805) 684-2650 (fax) (805) 684-4719 (yard) (805) 684-0484
NRC Environmental Services Inc. **3284 North Ventura Avenue** **Ventura, California 93001**	Tom Hale	**(800) 337-7455 (24 –hour)** (562) 432-1304 (Office)
Ship Services (contracts to MSRC) 971 South Seaside Terminal Island, CA 90731		(310) 645-7745

Table 2-13. Offshore Operators, Utilities, & Rail Road.

Facility	Operator	Telephone
A	DCOR	(805) 585-1079
B	DCOR	(805) 585-1069
C	DCOR	(805) 585-1059
Habitat	DCOR	(805) 564-4972
Henry	DCOR	(805) 585-1099
Hillhouse	DCOR	(805) 585-1089
Hogan	POOI	(805) 643-1195
Houchin	POOI	(805) 643-1195
Carpinteria Sanitation District		(805) 684-7214
Carpinteria Sewer District		(805) 684-2310
Southern California Gas		(800) 427-2000 (805) 681-8093 (24-hr)
Carpinteria Valley Water District		(805) 684-2816
Edison Co.		(800) 611-1911 (805) 963-3671
Amtrak		(800) 872-7245
Union Pacific Railroad		(800) 870-8777

Table 2-14. Regulatory Agencies.

Jurisdiction	Agency	Telephone
Federal	**National Response Center** Washington, D.C.	(800) 424-8802 (24-hour)
	United States Coast Guard Marine Safety Office Los Angeles/Long Beach 1001 South Seaside Avenue Building 20 San Pedro, CA 90731	(310) 833-1600 (24-hour)
	United States Coast Guard Marine Safety Detachment 111 Harbor Blvd. Santa Barbara, CA 93101	(805) 962-7430
	Environmental Protection Agency Region 9 75 Hawthorne Street San Francisco, CA 94105	(800) 424-8802 (24-hour)
	Bureau of Safety and Environmental Enforcement (BSEE) California District Office 770 Paseo Camarillo Camarillo, CA 93010	(805) 389-7775 (24-hour)
	Flight Service Station Hawthorne, CA	(800) 992-7433
	National Marine Fisheries Service Joe Cordero Marine Mammals 501 West Ocean Blvd., Suite 4200 Long Beach, CA 90802-4213	(562) 980-4017 (spill >100 bbl)
	National Oceanic and Atmospheric Administration (NOAA) Channel Islands National Marine Sanctuary 113 Harbor Way Santa Barbara, CA 93109	(805) 966-7107
	NOAA Injury Assessment Coordinator (John Cubit) 501 West Ocean Blvd., Suite 4470 Long Beach, CA 90802	(562) 980-4081
	NOAA Scientific Support Coordinator Jordan Stout Alameda, CA	(510) 437-5344 (office) (510) 437-5345 (fax) (800) 759-8888, PIN 579-8818 (pager) (206) 321-3320 (cellular)
	NOAA Trajectory Analysis 7600 Sandpoint Way NE Bin C15700 Seattle, WA 98115	(206) 526-6317 (office) (206) 526-6329 (fax) (206) 526-4911 (24-hr, HazMat Duty Officer)

Table 2-14. Regulatory Agencies.

Jurisdiction	Agency	Telephone
	National Weather Service Oxnard	(805) 988-6610
	U. S. Department of Transportation PHMSA East Building, 2nd Floor 1200 New Jersey Ave, SE Washington, D.C. 20590	(202) 366-4433 (202) 366-3666 (fax) **Western Region Office:** (720) 963-3160 (720) 963-3161 (fax)
	U.S. Fish and Wildlife Service Endangered Species Recovery 2493 Portola Road, Suite B Ventura, CA 93003	(805) 644-1766
State	**Emergency Management Agency** 2800 Meadowview Road Sacramento, CA 95832	(800) 852-7550 (24-hour)
	California Coastal Commission 45 Fremont Street, Suite 2000 San Francisco, CA 94105-2291	(415) 201-5792 (pager, primary number for spill reports) (415) 904-5240 (office) (415) 904-5400 (fax)
	Cal-EPA Dept. of Toxic Substance Control 1011 N. Grandview Avenue Glendale, CA 91201	(818) 551-2816 (800) 698-6942 (waste alert report)
	CHP (California Highway Patrol) 6465 Calle Real Goleta, CA 93117	(805) 967-1234
	CalOSHA 1655 Mesa Verde, Suite 150 Ventura, CA 93003	(805) 654-4581
	Caltrans 3999 State Street Santa Barbara, CA 93105 District 7 950 County Square Drive Ventura, CA 93009	 (805) 568-1250 (916) 653-3442 (24-hour) (805) 650-7179
	Department of Fish and Game 4665 Lampson Avenue, Suite C Los Alamitos, CA 90720	(562) 342-7100 (805) 654-6281 (spill affecting wildlife)
	Department of Fish and Game/OSPR Ms. Lisa Curtis 1700 “K” Street, Suite 250 Sacramento, CA 95814	(916) 445-0045 (24-hour) (916) 445-9326 (916) 324-8829 (fax)

Table 2-14. Regulatory Agencies.

Jurisdiction	Agency	Telephone
	Division of Oil and Gas and Geothermal Resources 5075 S. Bradley Road, Suite221 Santa Maria, CA 93455 1000 S. Hill Road, Suite 116 Ventura, CA 93003	 (805) 937-7246 (805) 654-4761 (805) 654-4765 (fax)
	Governor's Office Gerry Brown State Office Building Sacramento, CA 95814 LEPC (Emergency Planning) Region 1	 (916) 445-2841 (562) 795-2900 (562) 795-2877 (fax)
	Regional Water Quality Control Board 895 Aerovista Place, Suite 101 San Luis Obispo, CA 93401	(805) 549-3147
	State Fire Marshall Pipeline Safety Division 3950 Paramount Blvd. Lakewood, CA 90712	(562) 497-9100
	State Lands Commission Minerals Resource Management ARCO Towers 200 Oceangate, 12th Floor Long Beach, CA 90802-4471 7394 Calle Real, Suite C & D P.O. Box 1237 Goleta, CA 93117 Marine Facilities Inspection and Management ARCO Towers 200 Oceangate, Suite 900 Long Beach, CA 90802	 (562) 590-5201 (24-hour) (805) 685-8502 (562) 499-6348
	University of California at Santa Barbara Henry Yang Chancellor's Office 5221 Cheadle Hall Santa Barbara, CA 93106	(805) 893-2231

Table 2-14. Regulatory Agencies.

Jurisdiction	Agency	Telephone
	State Parks Channel Coast District 1933 Cliff Drive Santa Barbara, CA 93109 Central Dispatch for all State Parks - SURCOM	(805) 968-1033 (951) 443-2964 or 911 and have Sheriff contact (emergencies)
County	**Santa Barbara County** Emergency Center Fire / Sheriff 4410 Cathedral Oaks Rd. Santa Barbara, CA 93111	9-1-1 (805) 683-2724 (on cellular and/or for admin. Reporting)
	Santa Barbara County Office of Emergency Management (OEM)	(805) 681-5526
	Santa Barbara County APCD	(805) 961-8800
	Santa Barbara County Energy Division 30 E. Figueroa St., 2nd Floor Santa Barbara, CA 93101	(805) 568-2040
	Ventura County APCD	(805) 654-2797
	Ventura County Environmental Health	(805) 654-2813
	Ventura County Fire	(805) 389-9710
	Ventura County Sheriff 800 S. Victoria Ventura, CA 93009	(805) 654-2311
City	**Carpinteria** City Hall	(805) 684-5405
	Carpinteria Fire Department	(805) 684-4591
	Carpinteria /Summerland Police Department	(805) 684-4561
	City of Goleta - Mayor	(805) 961-7500
	City of Goleta – City Manager	(805) 708-0045 (cell)
	City of Goleta – Planning and Environmental Services Director	(805) 415-5812 (cell)
	City of Santa Barbara - Mayor	(805)564-5321
Harbor	**Santa Barbara Harbor Master** **Channel Islands – Harbor Patrol**	(805) 564-5531 (805) 385-6693

Table 2-15. Emergency Services.

Location	Hospital	Telephone
Goleta	Goleta Valley Cottage Hospital 351 S. Patterson Avenue Santa Barbara, CA 93111	(805) 967-3411 (Medivac Helo Pad)
Santa Barbara	Santa Barbara Cottage Hospital Pueblo at Bath Santa Barbara, CA 93105	(805) 682-7111
Ventura	Community Memorial Hospital 147 N. Brent Ventura, CA 93003	(805) 652-5032
Oxnard	St. John's Regional Medical Center 1600 N. Rose Avenue Oxnard, CA 93033	(805) 988-2500
Sherman Oaks	Sherman Oaks Burn Center 4929 Van Nuys Blvd. Sherman Oaks, CA	(818) 981-7111

Table 2-16. Waste Management Services.

Service	Company	Telephone
Disposal (Class I)	Chemical Waste Management Kettleman Hills Facility 35251 Old Skyline Blvd. Kettleman City, CA 93727	(559) 386-9711
Disposal ((Class I / II)	Clean Harbors 2500 W. Lokern Buttonwillow, CA Clean Harbors (Service Center) 1820 West 48th Street Los Angeles, CA 90058	(800) 544-7199 (323) 277-2500
Disposal (Class III)	Ventura Regional Sanitation Dist.[1] Toland Road Sanitary Landfill 3500 N. Toland Road Santa Paula, CA	(805) 525-8217
Lab	BC Laboratories 4100 Atlas Court Bakersfield, CA 93308	(661) 327-4911 (661) 327- 1918 (fax)
Recycling (batteries)[2]	Kinsbursky Bros. Inc. 1314 N. Lemon Street Anaheim, CA 92801	(714) 738-8516
Storage/Transport	Ecology Control Industries (formerly IT Corp.) 20846 Normandie Avenue Torrance, CA 90402	(310) 320-2555 (24-hour)
Storage/Transport	OST Trucking 2951 N. Ventura Avenue Ventura, CA 93002	(805) 643-9963
Storage Tank	Baker Tank	(805) 525-1710
Vacuum Trucks	Gallighen Inc. Speed's Oil Tool Ecology Control	(805) 648-2413 (805) 925-1369 (805) 648-5123

[1] Able to accept non-hazardous oilfield wastes, wastewater, and tank bottoms.

[2] Hazardous wastes sent to a recycling facility must be accompanied by a hazardous waste manifest. In most cases, a waste sample must be sent to the recycler for analysis prior to shipment.

Table 2-17. Outside Services and Resources.

Service	Company	Telephone
Absorbent	Cleveland Cotton	(805) 321-1050
Air Transport (Emergency)	Aspen Helicopters Inc. 2899 W. 5th Street Oxnard, CA	(805) 985-5416
Air Transport (Emergency)	Petroleum Helicopters 302 Moffat Place Goleta, CA 93117	(805) 964-0684
Ambulance	Gold Coast Ambulance Service Ventura, Ca	(805) 647-2087
Auto Rental	Avis Rent A Car	(800) 831-2847
Auto Rental	Dollar	(800) 800-4000
Auto Rental	Enterprise Rent A Car	(800) 736-8222
Auto Rental	Hertz Rent A Car	(800) 654-3131
Bus Charter	Melni Bus Service, Inc. 622 Anacapa Santa Barbara, CA 93101	(805) 963-2084
Chemicals	Chemtrec	(800) 424-9300
Consultants: Air / Environmental / Safety	Reese-Chambers Systems P.O. Box 8 Somis, CA 93066	(805) 386-4343 (805) 386-4388 (fax)
Consultants: Environmental	Goldberg Environmental Services 2922 Paseo Tranquillo Santa Barbara, CA 93105	(805) 687-6046 sparkink@verizon.net
Corexit EC9527A, EC9500A	Nalco 7701 Highway 90A Sugar Land, TX 77478	(281) 263-7000
Equipment Rental	United Rentals 3665 Market St. Ventura, CA	(800) 877-3687 (805) 644-7310
Equipment Rental	Bud’s Equipment Rental (heavy equipment)	(805) 684-4173
Equipment Rental	Carpinteria Valley Lumber	(805) 684-2183
Excelsior	Republic Supply Co.	(805) 643-6158
Media: Newspapers	Santa Barbara News-Press	(805) 564-5200
Media: Newspapers	Ventura County Star	(805) 650-2900
Media: Radio	KCAQ	(805) 289-1400
Media: Radio	KEYT 1250	(805) 963-7824
Media: Radio	KSPE	(805) 965-1490
Media: Radio	KVEN	(805) 642-8595
Media: Television	KEYT	(805) 882-3933
Media: Television	KABC	(323) 644-7777

Table 2-17. Outside Services and Resources.

Service	Company	Telephone
Media: Television	KSBY	(805) 963-7883
Motel	Holiday Inn 450 E. Harbor Blvd. Ventura, Ca	(805) 648-7731
Motel	Seaward Inn 2094 E. Harbor Blvd. Ventura, CA	(805) 653-5000
Motel	Best Western Carpinteria Inn 4558 Carpinteria Avenue Carpinteria, CA	(805) 684-0473
Motel	Best Western Pepper Tree Inn 3850 State Street Santa Barbara, CA	(805) 687-5511
Operations	California Conservation Corps. 1719 24th Street Sacramento, CA Contact: Lin McNamara Can provide up to 200 workers	(916) 341-3160 (statewide, 24-hour emergency dispatch)
Operations	A.J. Diani Construction 295 N. Blosser Road Santa Maria, CA 93454	(805) 925-9533
Portable Pumps	Bud's Rental	(805) 684-4173
Portable Toilets	Fence Factory Rentals	(888) 713-3623
Portable Toilets	JW Enterprises 1689 Morse Avenue Ventura, CA 93001	(800) 350-3331
Security	Bomar Security Santa Barbara	(805) 683-4898
Security	Dial Security Oxnard, CA	(805) 485-0528
Trailer Rental	GE Capital Modular Space 1444 S. Willow Avenue Rialto, Ca	(800) 523-7918
Trailer Rental	William Scotsman Mobile Offices	(800) 782-1500
Truck Rental	Ryder	(800) 467-9337
Truck Rental	U Haul Carpinteria Santa Barbara	 (805) 684-9661 (805) 965-2600
Wildlife Care	California Oiled Wildlife Care Network Mike Ziccardi	(530) 752-4167 (916) 998-8131 (530) 792-7803 (pager) if no response, call OSPR dispatch (916) 445-0045

2.6 EVACUATION PLAN

2.6.1 Introduction

Three forms of emergency evacuation may be applicable to the Santa Clara Unit; namely:

- Shelter-In-Place.
- Immediate Evacuation.
- Staged Evacuation.

Each incident will require individual assessment and evaluation, and the use of common sense. The Incident Commander or person-in-charge will assess whether:

- The situation is beyond control.
- The situation is likely to worsen.
- The outcome of the event is predictable.
- There is current danger to personnel.
- The conditions for evacuation are acceptable.
- Sheltering-in-place a preferred action.

2.6.2 Sheltering-In-Place Procedures

Sheltering-in-place may be a preferred response to a fire or other toxic release emergency where there is little time to evacuate. The Incident Commander (I.e., the person-in-charge, which may be the Facility Supervisor or Operator) is responsible for the sheltering-in-place decision. Refer to Table 2-18 for the Shelter-In-Place Checklist.

Table 2-18: Shelter-In-Place Checklist For Incident Commander / Person-In-Charge.

Actions To Be Taken	Complete (Time/Initial)
Sound the alarm.	
Assess situation: • Fire. • Toxic release. • Heavy smoke cloud. • Explosion threat.	
Shut off source of supply/”ESD” if needed.	
Determine the need for shelter-in-place. (In most cases, the emergency will be over before evacuation can be completed.)	
Determine the location of the shelter-in-place, based on circumstances of incident: • Production Office. • Vehicle. • Other designated sheltering location.	
Announce verbally and/or by radio: • The nature of the incident. • Sheltering-in-place location. • Special precautions.	
If sheltering-in-place: • Close exterior door. • Shut off ventilation systems, if not automatically done. • Extinguish open flames and other ignition sources. • Proceed to interior room of building (if applicable). • Determine further instructions. • Do not smoke.	
If sheltering in a vehicle: • Close all doors, windows, and vents. • Do not drive through vapor cloud. • Do not run heater or air conditioner. • Do not start engine; turn off running engine. • Do not smoke. • Do not get out or open doors and windows to assess situation. • Await further instruction.	
Make necessary notifications (see Section 2.2SCU). Mobilize outside resources, if needed.	
Stay in contact with sheltered personnel via radio or telephone, if apart.	
Refer to other checklists as necessary.	

2.6.3 Evacuation Procedures (For Platforms Gail/Grace refer to the Offshore Platform Emergency Evacuation Plan)

Two forms of evacuation applicable to the Carpinteria Plant facility are:

- **Immediate Evacuation**. Involves little or no warning and requires all personnel to vacate an area or the facility as quickly as possible to escape dangers associated with the emergency.
- **Staged Evacuation**. Involves anticipated circumstances that may pose a risk to facility personnel. Examples of this type of evacuation include forecasted very severe weather, an approaching toxic vapor cloud, bomb threat, fire, etc. Such incidents often permit early evacuation of nonessential personnel by routine transportation means.

The Incident Commander or Person-In-Charge (or designee) will direct the evacuation. When notified of an emergency by the sounding of the alarm:

- Plant personnel will stop work and shut off any potential sources of ignition prior to leaving the work site and walking to one of the safe briefing areas: Production Office, Guard Kiosk (Main Gate #1), or Rear Gate (Gate #2).
- A headcount will be taken at the safe briefing areas and receive further instructions given. At the Rear Gate, information will be relayed via the guard speaker system.
- The Incident Commander or Person-In-Charge will check roll call against roster of scheduled personnel, evaluate the situation, form a Site Safety Plan and ensure that:
    1. 911 is called and proper help is summoned.
    2. Gail, Grace, Clean Seas, Casitas Pier, Pipeline and City of Carpinteria are notified of the emergency.
    3. Security Officer or designee/Operator #2 stops traffic entering the plant and Plant Guard is informed of the emergency.
    4. Pier Guard is directed to stop traffic except for emergency response vehicles from proceeding down Dump Road.
    5. Operations Officer or designee/Mechanic meets and briefs responding agencies at the Guard Kiosk (Main Gate).
    6. Operations Officer guides emergency responders only after receiving the Incident Commander’s go ahead.

- If persons are missing, the Incident Commander or Head Operator/designee may organize a search and rescue mission, if it can be accomplished safely and if the delay does not endanger other personnel.
- If necessary, the Security Officer will assign staff positions to notify neighboring properties as necessary. If an emergency occurs that requires evacuation of the public, the local police and fire departments will be contacted and the evacuation will be conducted under the supervision of these authorities.

Evacuation Plans are posted at:

- Production Office
- Guard Kiosk (Gate #1)
- Mechanics Shop Office
- LTS Gai Tronics Phone
- Ingersoll Rand Gai Tronics Phone
- Ferricat CTN Phone
- Glycol Reboiler Gai Tronics Phone
- Rear Gate Speaker (Gate #2)

2.6.4 Evacuation Of Injured Personnel

Onsite personnel who are tending to injured persons are required to ensure that those injured persons are safely evacuated to a shelter or assembly area. For locations and phone numbers for area hospitals, refer to Table 2-15 of this plan.

ATTACHMENT 2-1

IDENTIFICATION OF SAFE HAVENS

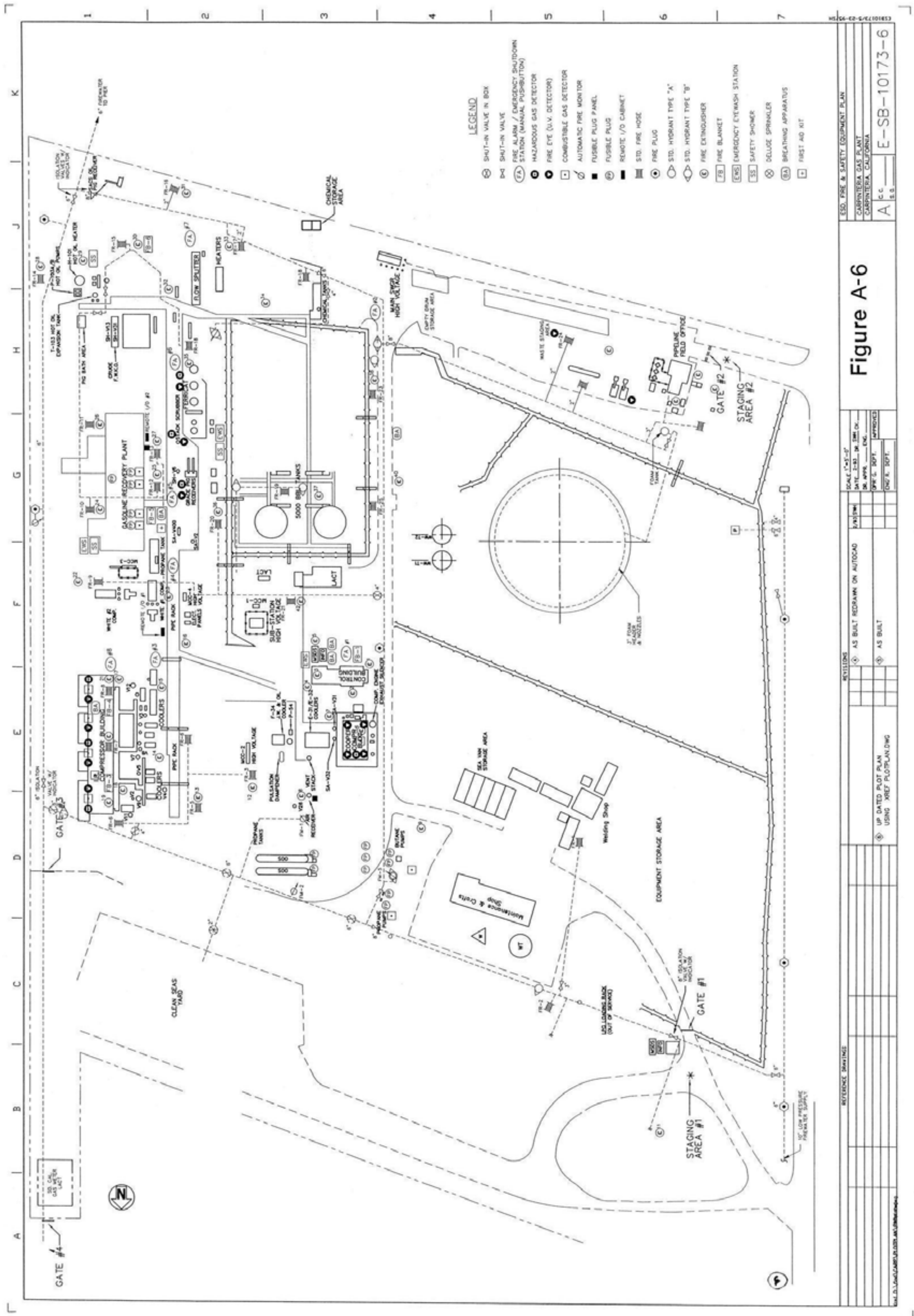
Figure A-6
E-SB-10173-6
LEGEND
GATE #1
GATE #2
GATE #3
GATE #4
STAGING AREA #1
STAGING AREA #2
EQUIPMENT STORAGE AREA
GASOLINE RECOVERY PLANT
COMPRESSOR BUILDING
CONTROL BUILDING
CLEAN SEAS YARD
LACT

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A.1 INTRODUCTION

This Oil Spill and Gas Contingency Plan addresses the following facilities:

- Carpinteria Oil & Gas Processing Plant
- Carpinteria and Ventura Pipelines
- Casitas Pier
- Platforms Gail and Grace and associated subsea pipelines

The locations of these facilities are shown in Figures A-1, A-2, and A-9 at the end of this appendix.

A.2 CARPINTERIA OIL & GAS PROCESSING PLANT

A.2.1 Facility Operation

The Carpinteria Oil & Gas Processing Plant handles oil and natural gas produced from Venoco-operated, OCS Platforms Gail and Grace in the Santa Barbara Channel. The crude oil and gas arrive via separate 10-inch buried pipelines. Crude oil is metered and sent directly to Tank 861 for storage. The gas, which was stripped of H_2S at the platform, is further treated at the Plant to remove condensate. The NGLs are blended back into the 10-inch crude oil line leading into Tank 861. Oil is shipped via the Carpinteria Pipeline to the breakout Tank 887 at Rincon Station. Shipping takes place once per day during off-peak hours (0000 to 0600). Normal pumping rate is approximately 650-to-700 barrels per hour. The plant operates on two 12-hour shifts, seven days per week. The truck loading rack is out-of-service. Refer to Figure A-3 for plant layout at the end of this appendix.

A.2.2 Facility Specifics

A.2.2.1 Normal Daily Throughput

The plant originally had a maximum throughput of 25,000 barrels of oil per day (BOPD). However, much of the oil processing has been idled or removed since the State platforms were decommissioned. The plant currently handles 3,000-to-4,000 barrels of oil per day.

A.2.2.2 Hydrocarbons Handled

The characteristics of the oil processed at the Carpinteria Oil & Gas Processing Plant are summarized on the Material Safety Data Sheet (MSDS) found in Appendix E of this plan. Sockeye oil is Group 3 oil with an average gravity of 26.2º API and a corresponding specific gravity of 0.90.

A.2.2.3 Crude Oil Tank and Vessel Inventory

Table A-1 provides an inventory of all oil-bearing tanks located at the plant. Tank 861 is the only crude oil storage tank (166,700 bbl) and it stands together with two 900-bbl slop oil tanks (T1 and T2) within a secondary containment area.

Table A-1. Oil-Bearing Tanks.

Tank I.D.	Volume (bbl)	Content
Tank 861 (maximum shell capacity)	215,565	Crude oil
T1 Slop Tank (maximum shell capacity)	1,000	Water and oil (~5%)
T2 Slop Tank (maximum shell capacity)	1,000	Water and oil (~5%)
Diesel Fuel Tank (UST)	429	Out-of-service
Lube Oil Tank	12	Gas engine oil
Mineral Spirits Tank	6	Mineral spirits

A.2.2.4 Containment And Drainage

All facility equipment except for the most northern sections of the NGL pump and shipping line is locate within secondary containment areas consisting of coated earthen berms and concrete curbs. There are three separate containment areas, each with the capacity to contain the contents of the largest tanks plus sufficient freeboard to allow for precipitation and runoff (refer to Figures A-3 and A-6 at the end of this appendix).

Figure A-8 (at the end of this appendix) shows the existing drainage system at the Carpinteria Plant. Potential drainage or spillage in the main equipment areas is trapped or diverted to the containment areas. Outlets from the containment areas are via pipes with locked gate valves.

A number of oil collection sumps and floor drains serve to capture small spills and leaks from oil and gas processing equipment throughout the plant. Sumps/drains at the pig catcher, pig washer, glycol/Therminol process slab, NGL separation slab, lube oil tank slab, and both compressor buildings flow to slop tanks T1 and T2. Oil collected in these tanks is pumped manually to Tank 861.

A.2.2.5 Fire Protection System

The plant is protected by a fire-fighting system of fire hydrants, extinguishers, and deluge system located at strategic locations (see Figure A-6 at the end of this appendix).

A.2.2.6 Plant Security

A six-foot-high, chain link fence surrounds the plant property. Gates are kept locked. The plant is manned 24 hours per day, seven days a week.

A.3 CARPINTERIA AND VENTURA PIPELINES

Three injection points along the Carpinteria Pipeline with separate LACT meters are: La Conchita (500 bph), Pacific Operators Offshore, Inc.); Rincon Island (85 bph, Greka); and Dos Cuadras (950-to-1200 bph, DCOR). The pipeline operates normally between 220 and 300 psig (maximum operating pressure of the pipelines is set at 620 psig).

At Rincon Station, the pipeline is routed through a receipt LACT and terminates in Breakout Tank 887.

Ventura Pipeline ships from Tank 887 to the Shell-Crimson Facility and the Crimson Marine Terminal. Two injection points along the line include the Occidental Padre Canyon at MP 3.622 is active (575 bph) and the Greka (Santa Fe Lease) injecting 85-110 bph (batch). The 22-inch line to Crimson Marine Terminal normally operates between 220 and 250 psig (MOP is 285 psig). The 12-inch branch to the Crimson Facility normally operates between 70 and 250 psig (MOP is 285 psig).

A.4 CASITAS PIER

Casitas Pier is located immediately south of the Carpinteria Plant and the Union Pacific Rail Road. The pier is 720 feet long and extends into about 21 feet MLLW water depth. A crew boat is fueled two times per week and a crane is fueled once per week by a fueling truck that carries approximately 4,000 gallons of diesel.

A.5 PLATFORMS GAIL AND GRACE AND ASSOCIATED SUBSEA PIPELINES

Platforms Gail and Grace are located in the Santa Clara Unit, which is north of Anacapa Island in the east end of the Santa Barbara Channel. Platform Gail lies 9.9 miles offshore in a water depth of 739 feet on Lease OCS-P-0205. Platform Grace lies 10.5 miles offshore in a water depth of 315 feet on Lease OCS-P-0217.

Platform Gail, a three-deck drilling and production platform, was installed in 1987 and began production in 1988. There are 36 well slots. During production, water is separated from the oil on the platform. Oil with less than 1% water content is transported via two 8.6-inch (O.D.), approximately 6-mile-long, pipelines to Platform Grace and from Platform Grace to the Carpinteria Oil and Gas Processing Plant via a 12.75/10.75 (O.D.), approximately 15-mile-long, pipeline. Hydrocarbon condensate separated on the platform is commingled with the oil and sent to shore. Water is also removed from the gas before being transported via an 8.6-inch (O.D.) pipeline to Platform Grace. Gas production is sweet and any H_2S is removed prior to shipping the gas to shore. The vapor recovery system and acid gas compression facilities on Platform Gail minimize flaring and venting of gas. Separated produced water, deck drainage and other water discharges is treated and cleaned before discharge into the ocean, in accordance with NPDES permit conditions.

Platform Grace was installed in 1979 and began production in 1980. There are 48 well slots on the platform.

A. 6 AREA CHARACTERISTICS

A.6.1 Surrounding Area

The Carpinteria Oil & Gas Processing Plant is located on a 55-acre site south of U.S. Highway 101 and east and south of the City of Carpinteria. The plant site slopes gently to the west with elevations ranging from about 65 feet above sea level along the east-central pad of the property to about 40 feet in the southwestern corner. No natural stream channels are found on the property. The nearest riparian habitat is Carpinteria Creek located more than 1,000 feet to the northwest. To the east is Carpinteria Bluffs Open Space and to the west is Tar Pits City Park. To the north is the Clean Seas Yard.

The depth of the ocean adjacent to the onshore facilities ranges from approximately 12 feet near the shoreline to over 300 feet at Platform Grace and 700 feet at Platform Gail (NOAA Chart Point Dume to Purisima Point). There are no navigational hazards in the immediate offshore vicinity. Coastal access and staging are available at the Clean Seas yard and the Casitas Pier. Information on navigational hazards is found in Section 201.4.2 of the Clean Seas Regional Resource Manual. Additional shoreline information (e.g. substrate type, sensitive resources, and access) is found in Appendix M of the Santa Clara Unit OSGCP.

A.6.2 Seasonal Hydrographic and Climatic Conditions

The general climate of Southern California is classified as a Mediterranean type, having warm dry summers and mild, wet winters. The controlling synoptic feature is a semi-permanent high-pressure system located over the eastern Pacific Ocean, called the Pacific High. The Pacific High migrates and changes in intensity seasonally. During the summer, storm systems are deflected to the north, and during the winter they can reach Southern California.

Winds

- The general wind flow pattern over Southern California is northwesterly throughout the year. Wind speed averages five to ten knots from a westerly component in the afternoon and early evening hours, with winds of 17 knots or greater occurring less than two percent of the time. The local prevailing winds are from the west-northwest.
- Southern California coastal areas are also occasionally affected by Santa Ana winds during the fall and winter. These winds typically have speeds of 15 to 25 mph and relative humidities of 30% or less, and the accompanying temperatures are generally 5°F warmer than the monthly average. In areas downwind of canyons and mountain passes, these winds can be especially severe.

Temperature

- Sea surface temperatures range from about 55°F to 62°F with slightly greater ranges in shallows near shore.
- Temperatures are mild along the narrow coastal plain, with small daily and annual ranges. Temperatures below freezing are rare as those in excess of 100 ºF. Maximum temperatures in July average in the upper 60's or low 70's along the coast. In January, the minimum temperatures average in the mid 40'' along the coast.

Precipitation

- Rainfall along the coast averages about 15 inches annually, with most rain occurring between November and April. Summers are usually very dry.
- Operations at sea report the occurrence of precipitation averaging 6% of the time in winter to only 1% of the time in summer.

Humidity, Clouds, and Visibility

- During the spring and summer months, upwelling of cold ocean coastal waters produces fog along the coast. Low stratus clouds may form as a result of moisture being trapped below temperature inversions produced in the lower atmosphere as a result of subsidence motion. In the general area offshore, visibility of less than one-half mile occurs about 3.5% of the time annually. There are daily low clouds and late night/early morning fog. The area averages about 70 cloudy days a year.
- Over the ocean, the diurnal variation in humidity is small, about 4 per cent. Mean relative humidity is about 80 per cent. Along the coast, relative humidity varies between 50 per cent during the day to over 80 percent at night.

Tides

- Tides along the coast from Santa Barbara to Point Mugu (eastern Santa Barbara Channel) are mixed diurnal and semi-diurnal.
- There are usually two high tides and two low tides each day. The mean tidal range in the eastern Santa Barbara Channel is about 4 feet, with extremes during spring tides of 6.5 feet.

Ocean Currents

- Currents in the eastern Santa Barbara Channel have speeds generally under 0.5 knots, with 1 knot about the highest expected.
- Davidson Period – December to February: Current is a nearshore, northbound current opposing the prevailing southeasterly California Current along the west coast.

- Upwelling Period – March to June: Upwelling occurs as Coriolis Force transports surface waters of the southeasterly current offshore.
- Oceanic Period – July to December. Southward flows associated with the California Current dominate.

Ocean Waves

- Wind blowing from the northern semicircle, from 270° True to 090° True, are prevented by the mountains from generating appreciable wind waves near shore.
- The Channel Islands to the south also have a sheltering effect, preventing strong winds from developing a fully arisen sea in the Channel.
- The sector from 220° True to 260° True is open to the Pacific and presents no impediment to generation of wind waves.
- In the western part of the channel, waves higher than 6 feet occur about 20% to 40% of the time, occurring with greater frequency from December through May.
- In the eastern part of the channel, waves higher than 6 feet occur about 5% to 14% of the time.
- Wind waves greater than 6 feet high near shore are expected to have a significantly lower frequency of occurrence because of the sheltering effect of the topography. Swells reaching the nearshore area from the southwest would not be diminished by the land topography.

Weather

The National Weather Service (NWS) is a line office within NOAA. They are responsible for providing up-to-date weather information in response to oil spills. NWS can provide such information as:

- Wind direction.
- Wind speed.
- Air and sea temperatures.
- Direction and height of sea and swell.
- Weather forecasts.

The telephone number for the Oxnard station is provided in Table 2-14.

A.6.3 Access, Command Post and Staging Areas

The primary access route to the Carpinteria Oil & Gas Processing Plant and the Platforms Gail/Grace (via Casitas Pier) is provided from U.S. Highway 101). Venoco has preidentified the following command post/staging area sites for the Carpinteria Facilities & Pipelines and Platforms Gail/Grace:

- Command and Communications Post. Clean Seas Command Post located at the Clean Seas Yard in Carpinteria.
- Staging Area. Clean Seas Yard and/or Carpinteria Oil & Gas Processing Plant.

A.7 DIAGRAMS

Facility diagrams include:

- Figure A-1. Regional Map.
- Figure A-2. Local Map.
- Figure A-3. Layout Of Carpinteria Plant.
- Figure A-4. Route Of Carpinteria And Ventura Pipelines.
- Figure A-5. Pipeline System Flow Diagram.
- Figure A-6. Carpinteria Plant, including Fire and Safety Equipment.
- Figure A-7. Tank 887, Containment and Grading.
- Figure A-8. Existing Drainage at Carpinteria Facilities.
- Figure A-9. Santa Clara Unit Location.
- Figure A-10. Platforms Gail and Grace.
- Figure A-11. Platform Gail to Grace Pipeline.
- Figure A-12. Platform Grace to Shore Pipelines.

Figure A-1
Regional Map

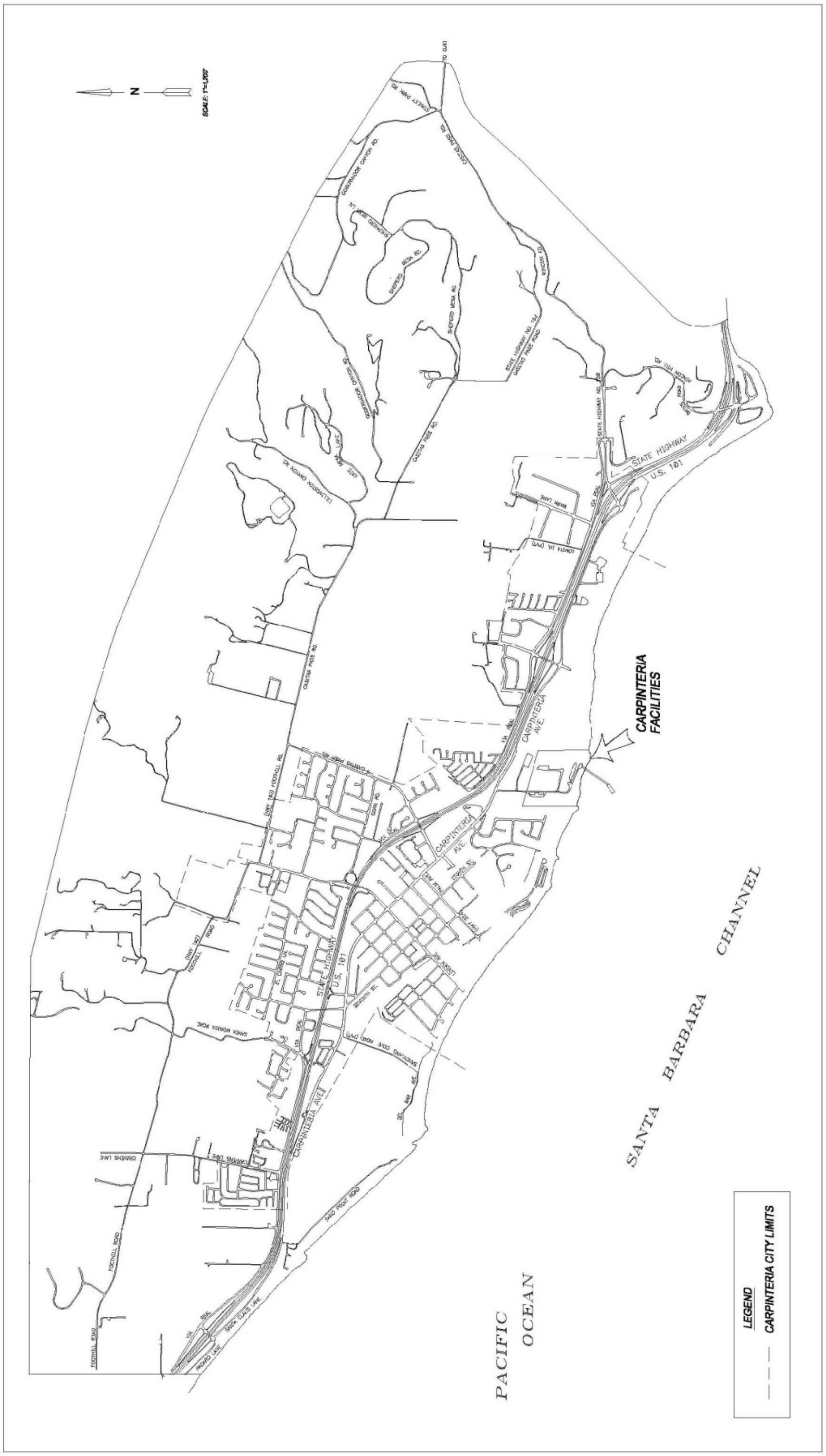


Figure A-2
Local Map

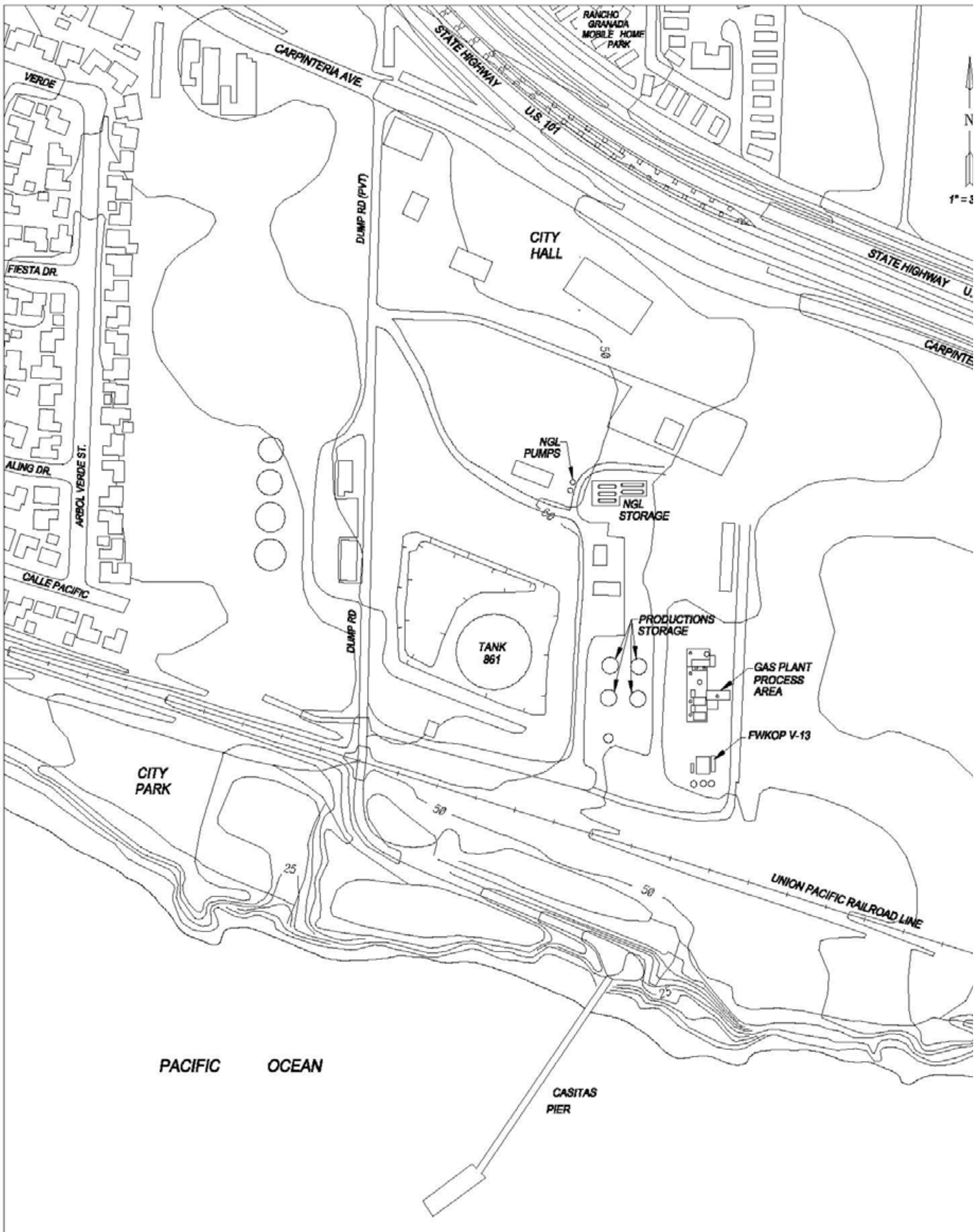


Figure A-3
Layout of Carpinteria Plant

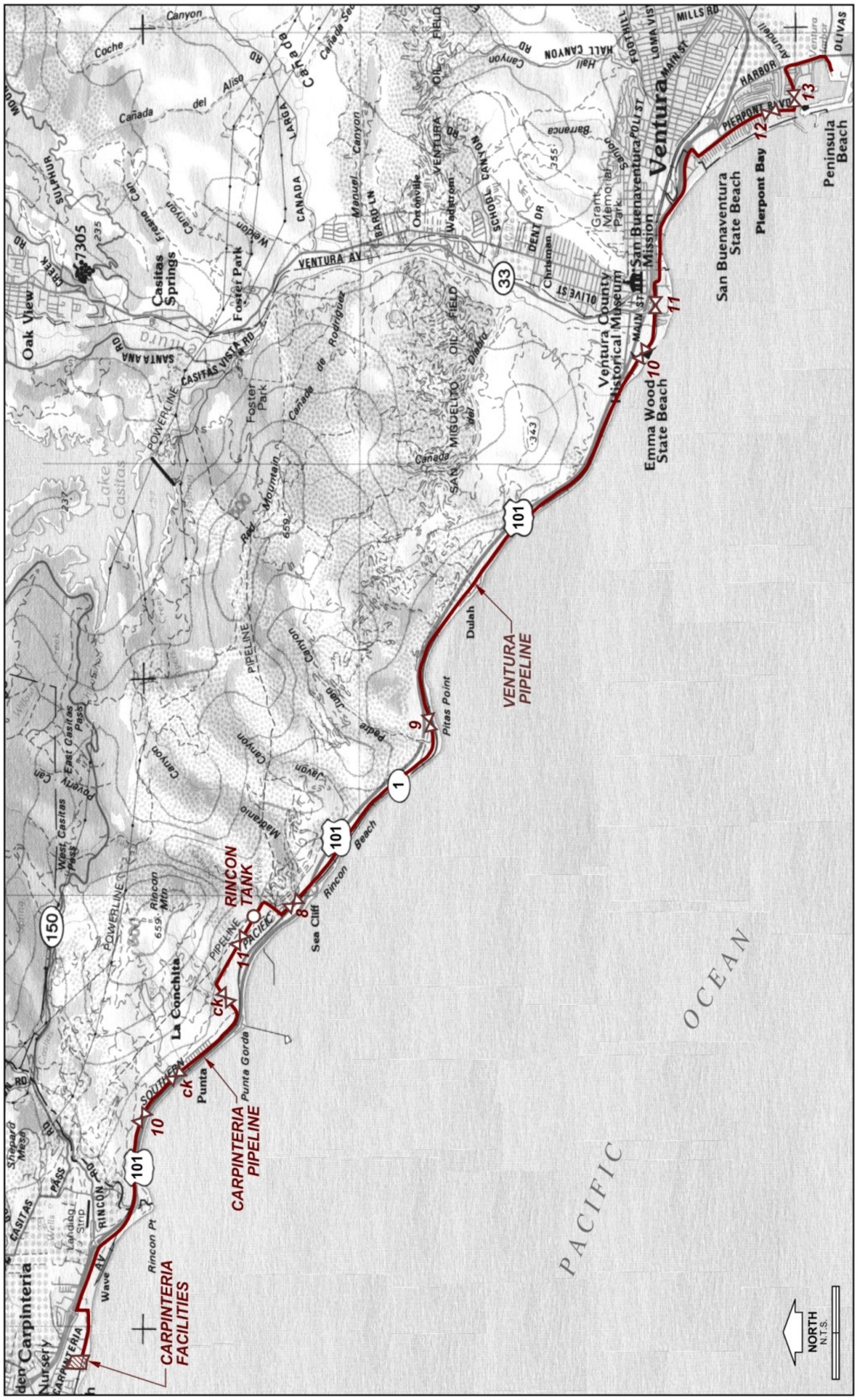


Figure A-4
Route Of Carpinteria And Ventura Pipelines

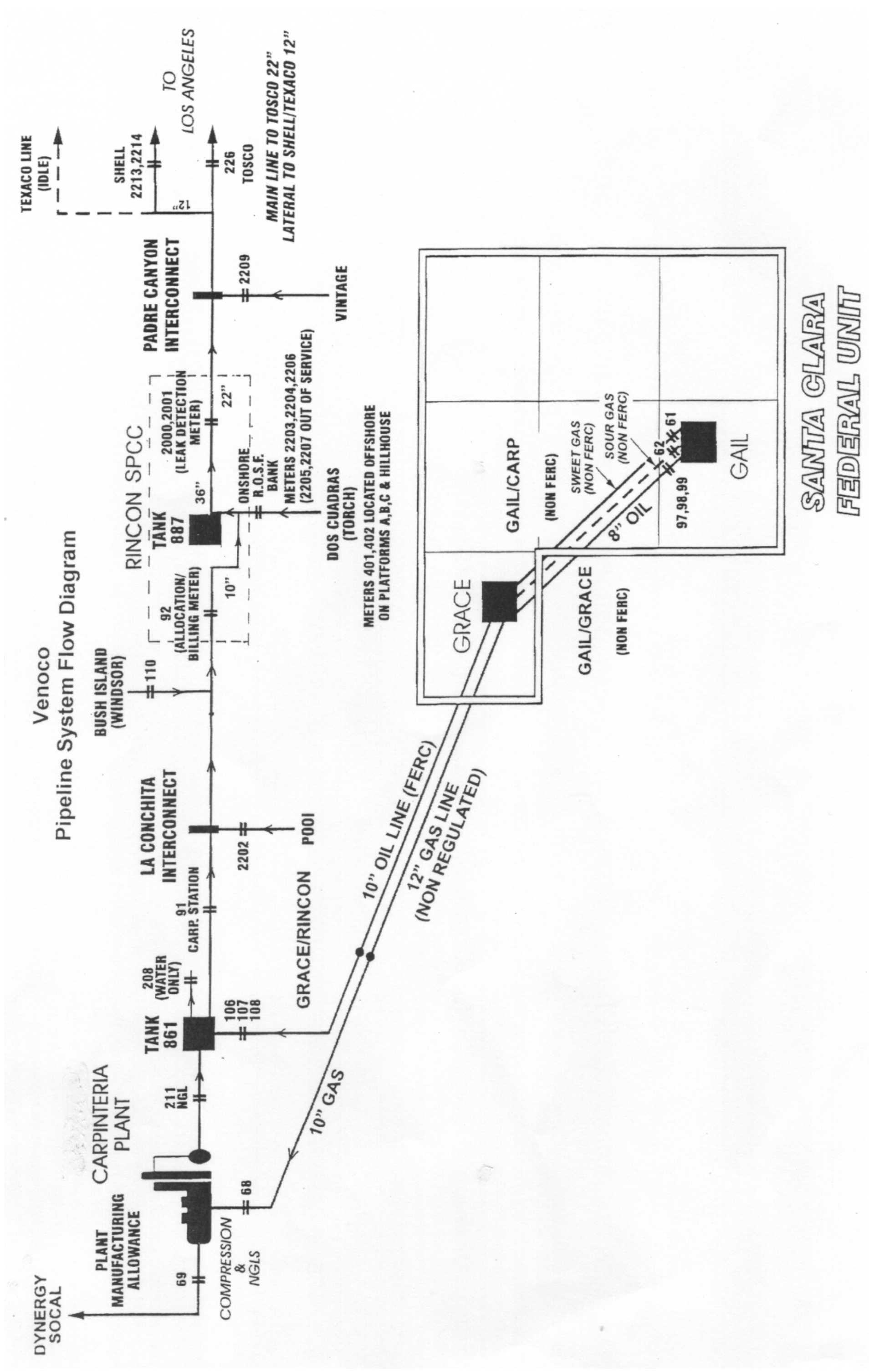
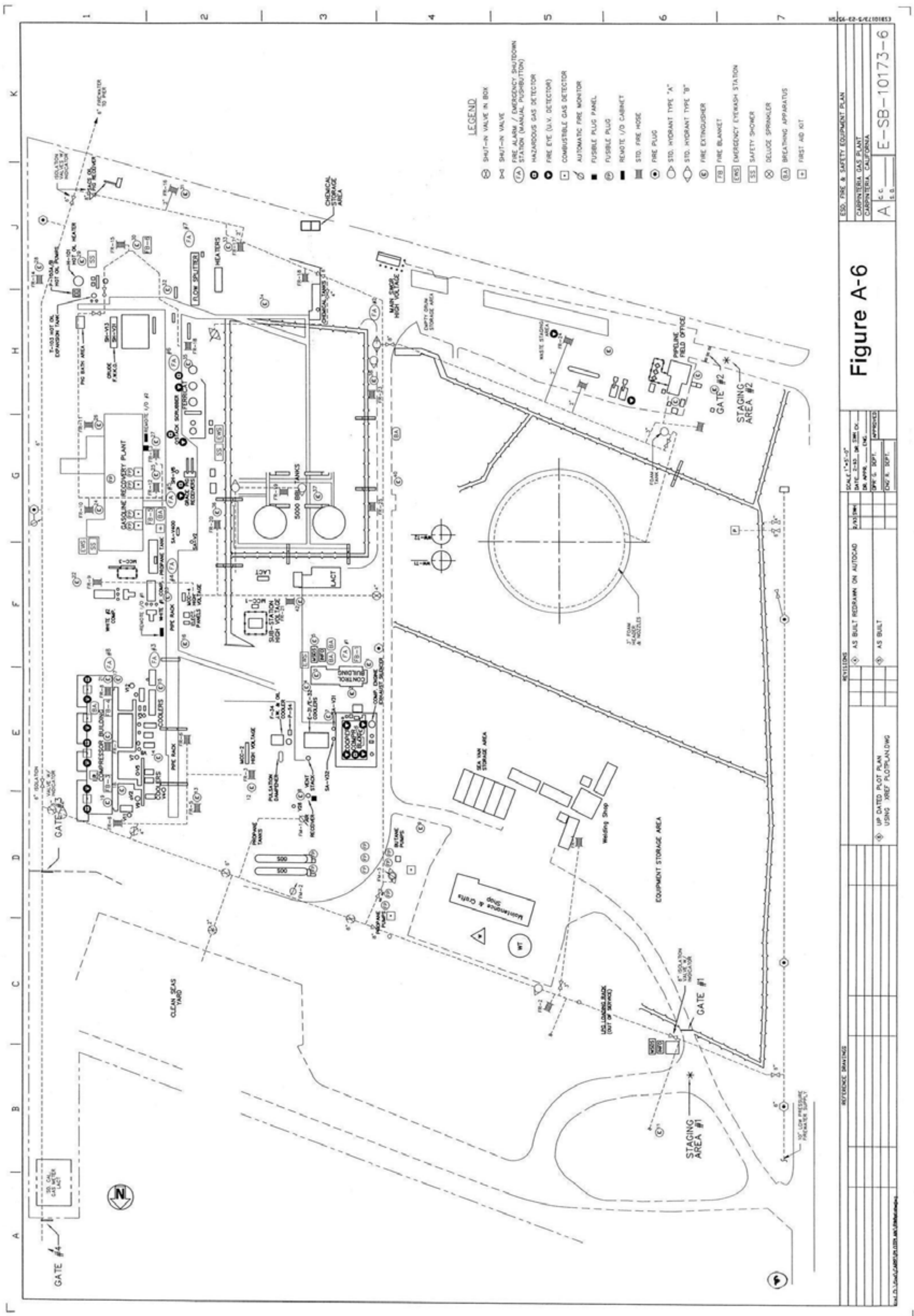
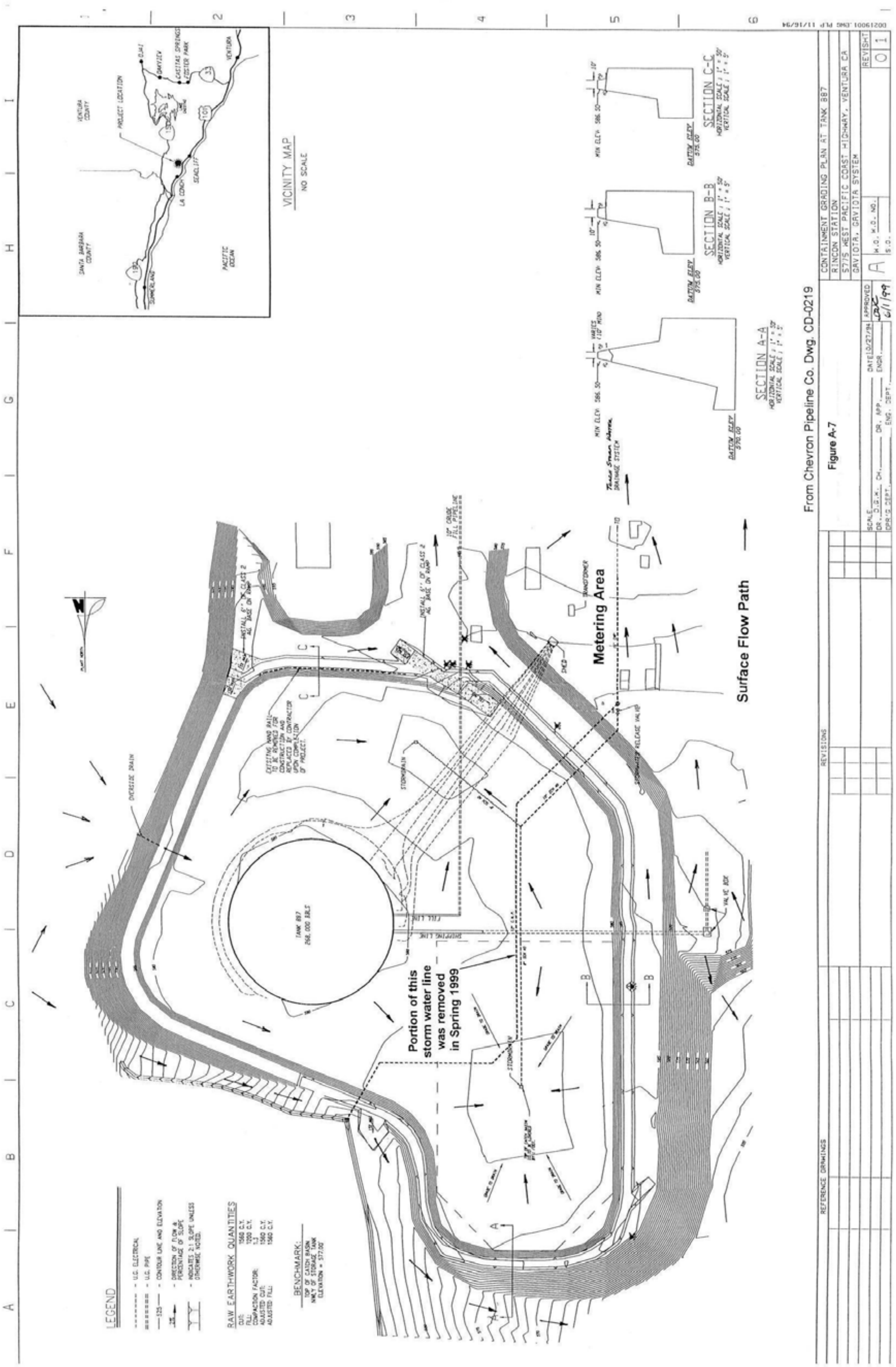


Figure A-5
Pipeline System Flow Diagram


LEGEND
CHEMICAL STORAGE AREA
GASOLINE RECOVERY PLANT
5000 BBL TANKS
COMPRESSOR BUILDING
CONTROL BUILDING
LACT
EQUIPMENT STORAGE AREA
Welding Shop
Maintenance & Crafts Shop
CLEAN SEAS YARD
PIPELINE FIELD OFFICE
GATE #1
GATE #2
GATE #3
GATE #4
STAGING AREA #1
STAGING AREA #2
Figure A-6
E-SB-10173-6


From Chevron Pipeline Co. Dwg. CD-0219
Figure A-7
Metering Area
Surface Flow Path
Portion of this storm water line was removed in Spring 1999
VICINITY MAP
NO SCALE
SECTION A-A
SECTION B-B
SECTION C-C
LEGEND
RAW EARTHWORK QUANTITIES
BENCHMARK:
CONTAINMENT GRADING PLAN AT TANK 887
RINCON STATION
5775 WEST PACIFIC COAST HIGHWAY, VENTURA CA
GAVIOTA, GAVIOTA SYSTEM
REVISIONS
REFERENCE DRAWINGS

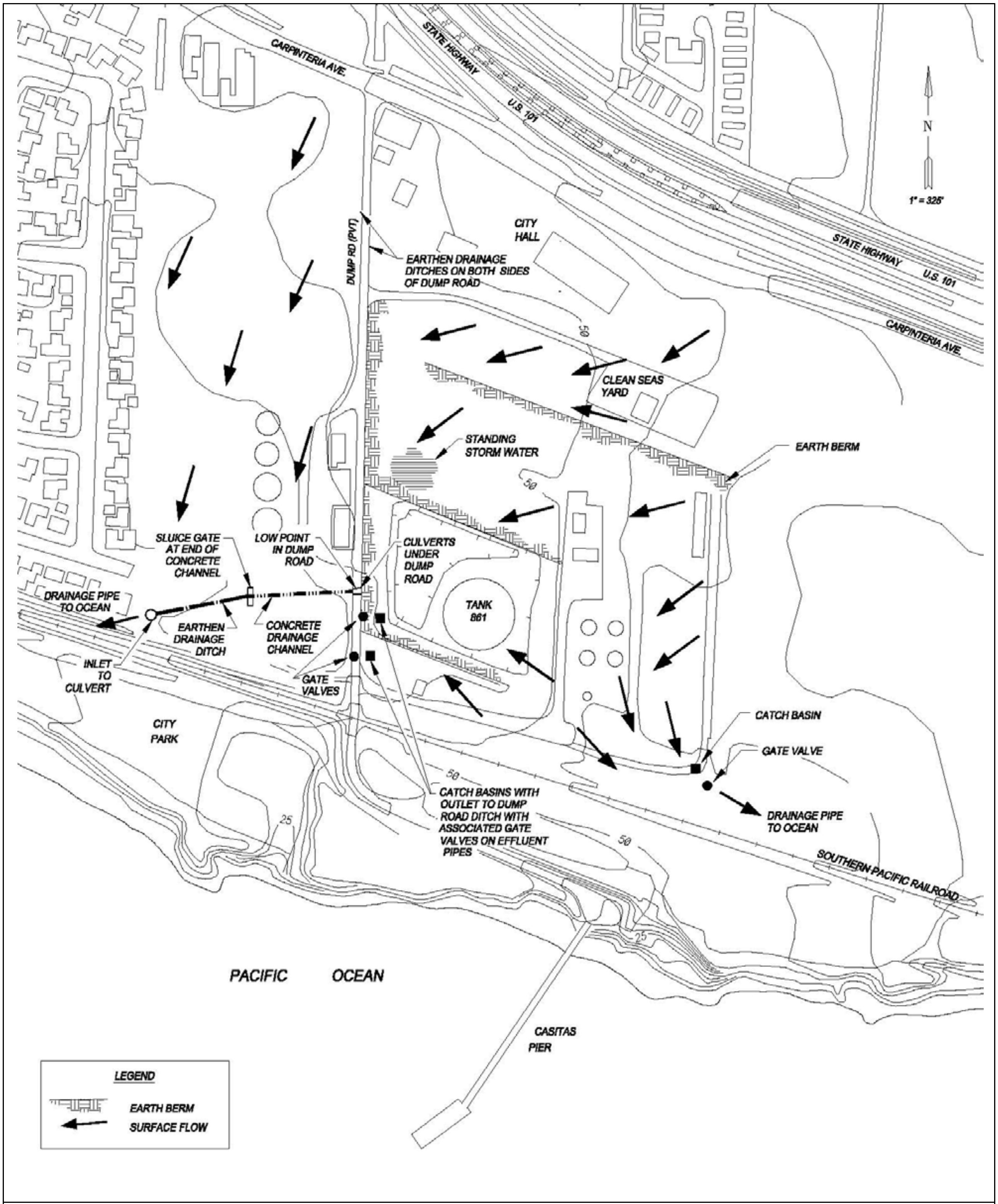
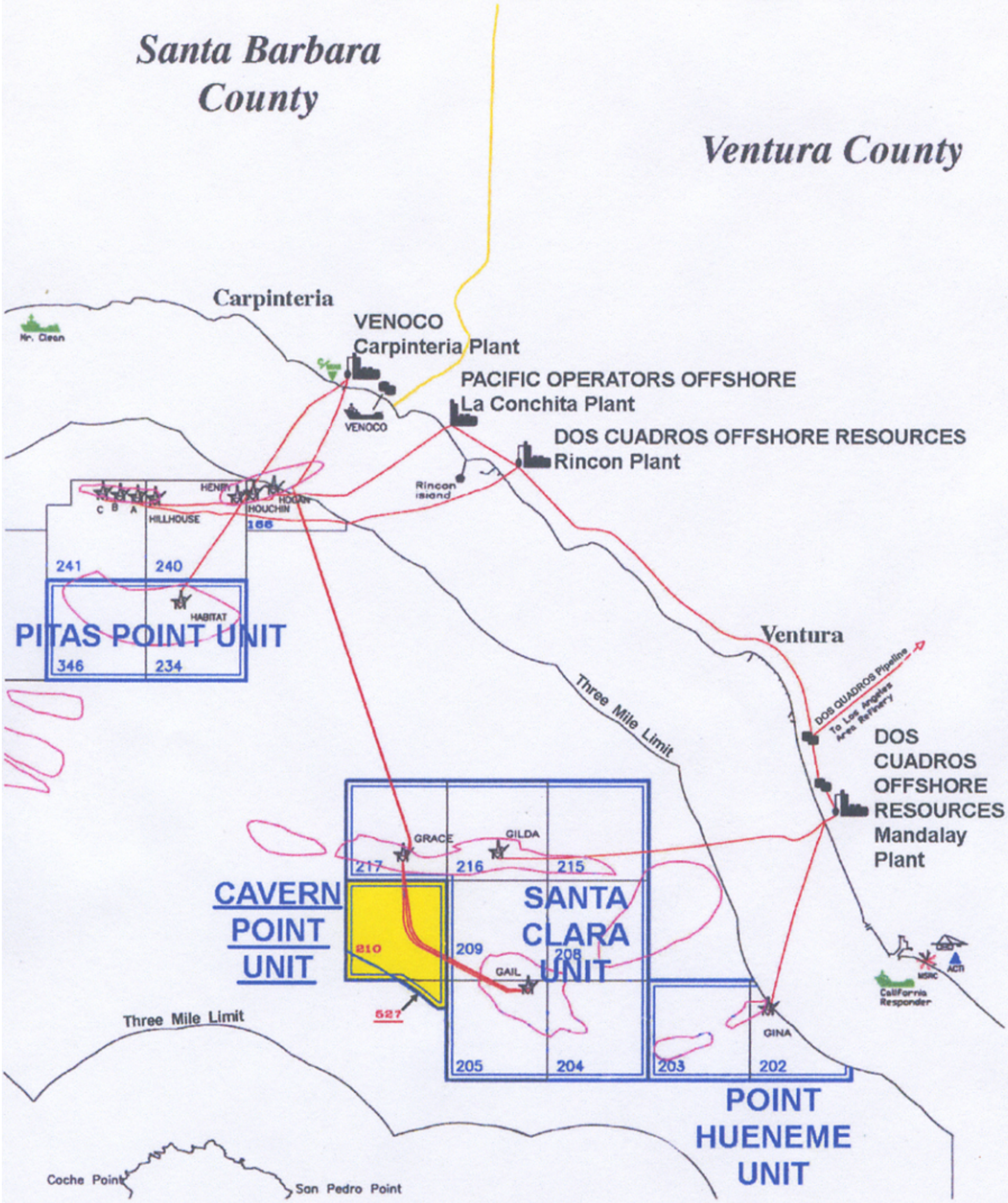


Figure A-8
Existing Drainage at Carpinteria Facilities



From: BUREAU OF OCEAN ENERGY MANAGEMENT,REGULATION, AND ENFORCEMENT (BOEMRE), May 2004

Figure A-9
Location of the Santa Clara Unit

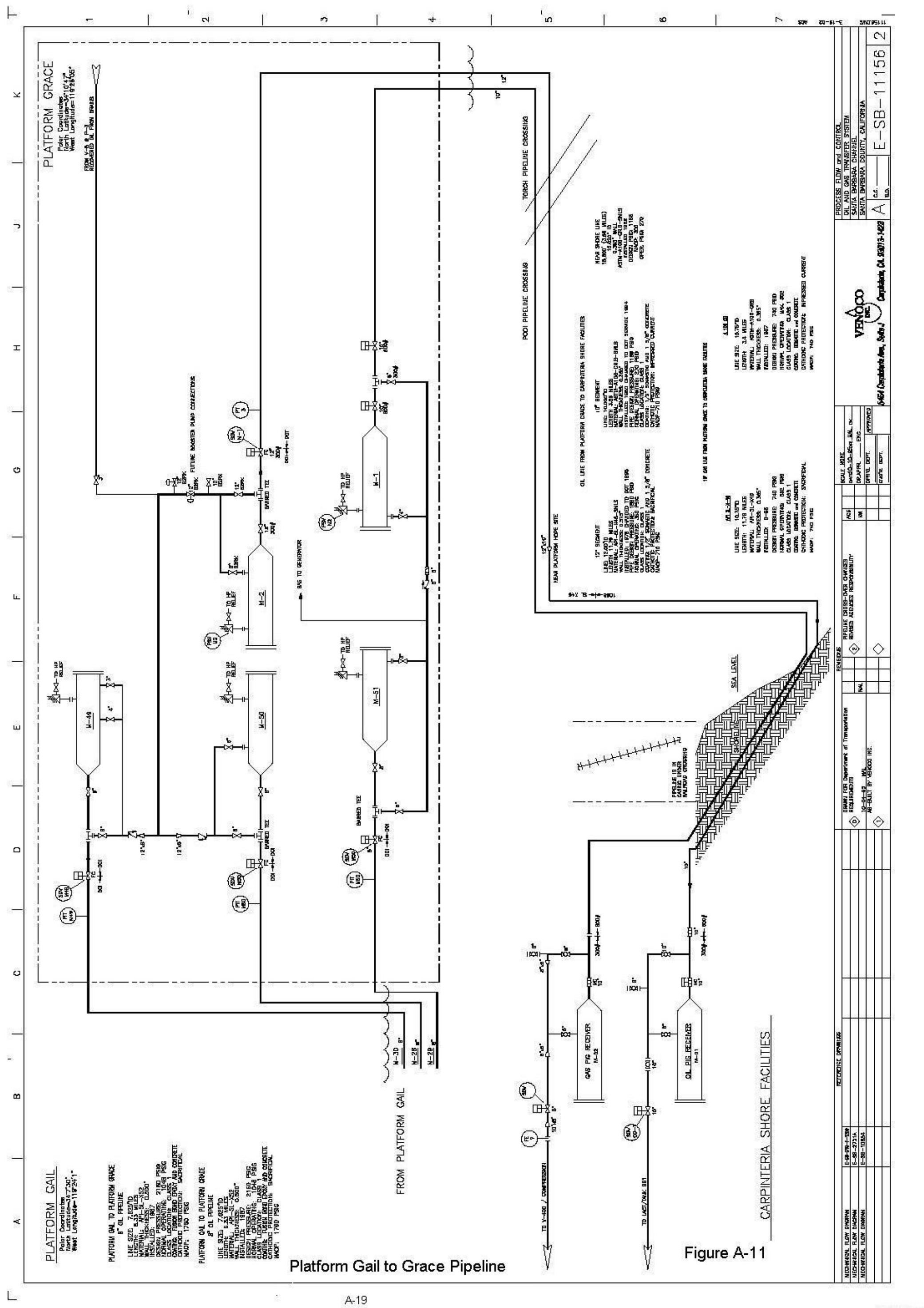
Platform Gail

Platform Grace

Photo Source: BOEM (formerly) BUREAU OF OCEAN ENERGY MANAGEMENT,REGULATION, AND ENFORCEMENT (BOEMRE) web site

Figure A-10

Platforms Gail and Grace



Platform Gail to Grace Pipeline

Figure A-11

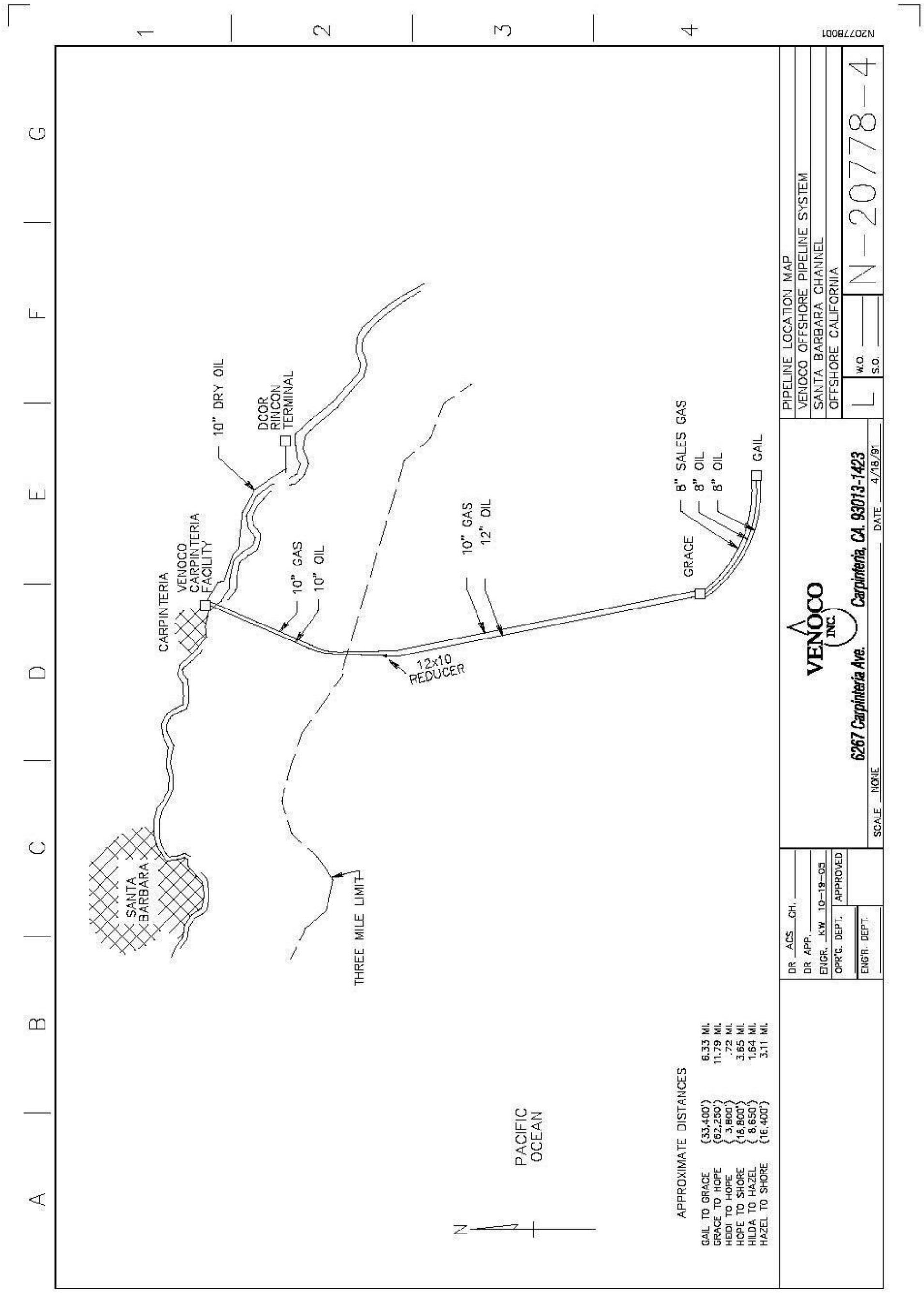


Figure A-12 Pipelines Platform Grace To Shore

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B.1 INTRODUCTION

Venoco personnel inspect and maintain the Santa Clara Unit accordance with:

- Company procedures.
- Industry practice.
- State, federal and local rules and regulations.

Personnel are trained to detect leaks and to identify potential problems, such as corrosion, cracks, pressure settings or other irregularities that could potentially lead to a spill.

B.2 INSPECTION AND MAINTENANCE

B.2.1 Carpinteria Plant

Elements of the inspection and maintenance program are summarized in Table B-1.

Table B-1. Frequency and Procedures for Inspecting, Testing, and Maintenance.

Procedure	Frequency
Visual inspection of pipelines	Daily walk-arounds
Visual inspection of secondary containment	Daily walk-arounds
Visual inspection of process vessels and tanks	Daily walk-arounds
Inspection of vacuum and pressure relief valves	Annually
Fugitive emissions testing of valves, flanges and potential emission points	Quarterly
Maintenance and replacement of plant components	Annually
Corrosion coupon program	Ongoing
Shutdown and alarms	Monthly

Operators' Daily Walk-Arounds

The Operator's Daily Walk-Around encompasses routine inspections of process areas, drainage, containment systems, and piping. Operators' daily surveillance routines include visual examination of valves, pipelines, storage vessels, containment areas, and catch basins for indications of a leak or conditions that could possibly lead to one. All valves, flanges and piping are examined by operating personnel as a routine and continuous part of their daily operations. Personnel look for accumulations of oil or product, corrosion, and other evidence of stored material seepage on valves or seals. Maintenance or repairs are made immediately if conditions are discovered that could lead to an oil discharge. The typical decision-making criteria and repair or replacement equipment options are outlined below.

Inspection Decision-Making Criteria	Repair Or Replacement Options
• Severity of leak • Condition of pipe and surrounding pipe • Location of pipe • Critical nature of operation • Type of service of line (e.g., oil, gas, water) • Available materials and resources to replace line	• Clamp or weld patch on line; then if appropriate: - Schedule replacement of a section of the line for a later date, **or** - Replace the section of line now, **or** - If integrity of the entire piping system is in question, hydrotest line and/or replace additional pipe within system.

Inspection and Maintenance Schedule for Process Vessels and Pressure Safety Valves

The inspection of process vessels and equipment is an important element of the discharge prevention activities conducted at the Plant. Process vessels and their accessories are periodically inspected by certified inspectors for signs of corrosion. The inspector will put the vessel on a maintenance schedule depending on its age and condition. Vessels are also routinely inspected on daily walk-arounds by Venoco personnel. Any evidence of exterior deterioration is reported to the appropriate supervisor. Valves are kept greased and oiled to ensure proper operation. Flanges and many of the valves receive a detailed and documented inspection quarterly in association with the Plant's Fugitive Emissions Program. Vacuum and pressure relief valves are inspected annually by authorized/certified personnel. Any condition that requires repair is reported to the appropriate supervisor immediately.

In addition to the periodic inspections described above, the process area is visually inspected on a daily basis for signs of leaks or conditions that could cause a leak, during the operator's regular rounds. Operating personnel are careful to look for drip marks, discolorations, puddles containing stored materials, corrosion, cracks, and conditions which can indicate a leak has occurred or has the potential to occur. Foundations and supports are inspected for cracks, discolorations, and puddles containing stored material, settling gaps between any vessel and its foundations, and other signs of damage.

Pipeline Inspection and Maintenance

Plant areas where piping and pipelines are located, including pipelines that contain hydrocarbons near controlled drainage leading offsite, are inspected on daily walk-arounds. Any indication or evidence that a leak or rupture has occurred or has the potential to occur is reported and immediate action is taken to address the situation. This may require the shutdown of the affected portion of the facility. Leaking gas pipelines and other pipelines containing liquid hydrocarbons would be shut-in and not returned to service until repaired or replaced.

Damage Criteria for Pipeline Replacement

Pipelines and equipment that have been damaged or appear to be damaged would be repaired or replaced if it is determined that the equipment or damaged line could not be operated safely or risked spilling hydrocarbons.

Integrity Testing of Carpinteria Plant Pipelines

Pipelines in the plant that require replacement undergo an integrity test prior to being installed. The segment of line being replaced is capped on each end and hydrostatically tested with water to a pressure exceeding operating pressure; thereby effectively minimizing the risk of spilling hydrocarbons from newly installed lines. In addition, all wet welds on repaired pipelines or segment being replaced are x-rayed to ensure the integrity of the line.

Other Scheduled Plant Maintenance

Pipelines and vessels in hydrocarbon service, which are found during scheduled maintenance to be leaking or in a condition that could cause a leak are shut-in and not returned to service until repaired or replaced.

Testing of Plant Alarms/Shutdowns

All alarms, including the alarms on the NGL bullets and vessels and the shutdown/alarms on the critical process vessels and equipment at the Plant receive documented monthly inspections to ensure operability. The checklist used for these inspections provides information concerning the type of shutdown/alarm (i.e., level alarm high, level alarm low, pressure shutdown high, etc.) and the location of the particular device. The Safety Analysis Function Evaluation Chart in the Plant Operations Manual shows what happens when one of these shutdowns/alarms occurs. Depending on the specific device and equipment, this may range from a simple process alarm to the shutdown of a series of valves and equipment.

Corrosion Protection Program for Pipelines

The Company maintains an active corrosion monitoring and protection program on the gas line coming into the Plant and the oil line to Tank 861. Corrosion coupons are installed in the following locations:

Pipeline From Platforms Gail and Grace	Location of Corrosion Coupons
Incoming gas line	Downstream of the pig receiver
Incoming oil line	Immediately upstream of the LACT

In addition to the corrosion coupons, all pipelines are cathodically protected. The insulating flanges for the cathodic protection on the active oil and gas lines are located just upstream of the pig receiver barrel. A deep well anode bed with 12 cells generates voltage on the lines that exceed the minimum NACE standard.

Containment and Drainage Inspection and Maintenance

Secondary containment and drainage area inspection and maintenance programs at the Plant include annual, quarterly, and other regular inspections of various facility components, along with routine, daily inspections. Surveillance by the facility operators during rounds consists of visual inspection of containment areas, road ditches, drainage ditches, and catch basins.

Field drainage ditches and road ditches are inspected daily as part of the operator's normal surveillance routine. The facility operator visually examines each bulk storage tank for signs of leakage in the bolted seams or leakage around the gravel ring tank pad. Any leak is immediately reported to their supervisor who takes the appropriate action to correct the problem.

Catch basins are checked daily. If any oil is present, the source of the spill is located and repaired, and the catch basin is cleaned as necessary. The appropriate supervisor is responsible for the proper maintenance of all catch basins located within the unit.

During daily surveillance routines, the facility operators visually examine the aboveground valves and flowlines on their rounds. Line pressure on the oil pipeline is monitored from the Control Building. With this type of monitoring, spills are usually detected promptly.

Storage areas, including chemical drums, chemical storage areas, engines, tanks, drip pans, and pipelines are routinely inspected by the facility operators for signs of spills or leaks.

B.2.2 Rincon Station Tank 887 And Associated Equipment

The following table summarizes the inspection and maintenance program for Breakout Tank 887.

Type of Inspection	Frequency
Visual inspection of tanks, berms, valves, piping, pumps, ditches, sumps, and storm-water drains.	Periodically
Routine in-service external visual inspection of tank.	Monthly
Tank high-level alarm test and fugitive emissions testing	Quarterly
Inspection of all above-ground facilities. Testing of safety and relief valves. In-service external inspection of tank and floating-roof seals.	Annually
Comprehensive in-service external visual and ultrasonic inspection of tank.	5-Year
Internal corrosion, tank bottom plate thickness and settlement.	When taken out-of-service for cleaning
Visual inspection for evidence of oil prior to rainwater draining to ROSF. Ensure valves are closed and locked after draining.	During rainwater discharges

Buried piping is protected by an impressed current cathodic protection system that is periodically monitored according to DOT requirements. Buried piping is wrapped for corrosion protection as well as at the ground surface interface. The tank bottom of Tank 887 is also cathodically protected with an impressed current system.

B.2.3 Carpinteria And Ventura Pipelines

The measures taken for facility pipelines are also applied to the larger, shipping pipelines. A complete description of the inspection and maintenance program is provided in Venoco's **Operations & Maintenance Manual for the Ventura Pipeline System** (includes both pipeline systems).

Cathodic Protection

The level of protection attained by the cathodic protection system is tested annually by reading pipe-to-soil voltage potentials. The pipe is considered adequately protected if the pipe-to-soil voltage potential of at least 0.85 volt negative is maintained.

SCADA Monitoring

The pipelines are continuously monitored by an automatic SCADA System (Supervisor Control and Data Acquisition) in the Carpinteria Plant Control Room, which is manned 24 hours per day, 7 days per week. This leak detection system continuously compares delivery and receiving rates using turbine meters.

Valve Inspection Program

All mainline block valves must be actuated for operability twice each year. This is in accordance with federal code and company policy.

B.2.4 Platforms Gail and Grace and Associated Subsea Pipelines

All valves, flanges and piping are examined by operating personnel as a routine and continuous part of daily operations. Personnel look for accumulations of oil or product, corrosion, and other evidence of stored material seepage on valves or seals. The decision-making criteria and repair or replacement options outlined above for the Carpinteria Plant are also employed offshore. Maintenance or repairs are made immediately if conditions are discovered that could lead to an oil discharge. Inspection and maintenance records are maintained at the platforms and in District files for the life of the pipe, equipment or vessel.

The subsea pipelines have been overdesigned with heavy pipe and are carefully examined for deterioration. A complete description of Venoco's inspection and maintenance program for the Santa Clara Unit liquid pipeline system is found in the **Operations and Maintenance Manual – Oil**. The program includes:

- External cathodic protection program and surveys
- Internal corrosion control program
- Valve maintenance program
- Hydrostatic or electronic integrity testing program
- Inspection by flyover or boat

All records are maintained on the platform.

B.2.5 Oil Spill Response Equipment

Equipment on cooperative vessels is inspected monthly and maintained by Clean Seas. Records are kept in the Clean Seas office in Carpinteria and are available to agencies upon request. The records include a maintenance schedule and list of replacements or repairs.

In a trailer at the southeast corner of the Carpinteria facility is spill response equipment and materials, including sorbent, boom, personal protective equipment and hand tools. DCOR maintains oil spill response equipment at ROSF.

Refer to Appendix F for equipment lists for Venoco, Clean Seas, and NRC (onshore contractor).

B.3 OTHER SPILL PREVENTION MEASURES

B.3.1 Casitas Pier

The crew boat and crane are fueled by a contracted fuel truck service. The attendant conducting the fueling ensures that over-filling of fuel tanks does not occur.

B.3.2 Carpinteria Plant

Surge Control, Overfill Protection, and Other Leak/Prevention and Minimization Measures

- The gas line from the OCS platforms has a slug catcher, which provides protection from liquid hydrocarbon surges from condensates that could come in with the gas stream.
- In the Gas Plant, vessels containing liquid hydrocarbons have level controllers and level alarms which sound in the Operator's office. If liquids in these vessels reach a level that activates the alarm and the alarm is not responded to by Plant personnel within several minutes, then the Emergency Shut-Down System ESD would automatically be activated and immediately (within about 10 seconds) close the necessary valves to isolate the vessel.
- Level controllers on vessels containing liquid hydrocarbons are tested once per month.
- Although it is possible that a liquid hydrocarbons release could occur through the PSV valves on vessels, the system is designed to route flow to connecting vessels before any release through the PSV would occur.
- Back-pressure is applied to the incoming crude oil line when crude oil is not being transferred from the OCS platforms, so that any leak or line rupture can be detected by the SCADA System described above.
- As appropriate, pipelines in the Gas Plant are protected by pressure relief valves from spills that might otherwise occur from thermal expansion of pipes during periods of non-use. These PSV valves route flow to a knockout drum.
- Procedures for minimizing post-residual drainage from leaking or ruptured pipelines would result in the activation of resources to respond to the incident and may involve the use of buckets, vessels, a vacuum truck, portable pumps, hoses and other resources as needed.

Means of Relieving Pressure Due to Thermal Expansion in Pipelines

Plant pipelines that may experience thermal expansion during periods of non-use are protected from over-pressure by relief valves that route to a knockout drum.

ESD Automatic Shutdown

The Carpinteria Gas Plant has an ESD System, which provides automatic control over shutdown of plant pipelines and process equipment. This system is actuated on pressure, temperature, and level thresholds that vary with equipment type, service, and location in the Plant, and they are set at levels near the lower operating limits of the respective plant process areas. When activated, the ESD valves operate automatically to shutdown plant processes as appropriate.

The time from the moment the Operator initiates activation of the ESD, or the ESD is automatically activated, to the moment of complete valve closure is 2-to-10 seconds on average and a maximum of 20 seconds. If an alarm is activated and not responded to within 5 minutes, then the ESD system will shut-in that section of the Plant automatically.

Process pumps are not automatically shutdown; however, they are centrifugal pumps and would not overpressure the line or equipment.

Visual Displays of System Status

Plant processes are monitored by a computerized system, which displays operating information on video display screens. The screens show flow diagrams of the Plant, alert the Operator to any active alarms, and report the conditions of all bypass switches in the Plant. Critical pressure levels, flow rates, and liquid levels are also displayed.

LACT Meters

The LACT Meters (Lease Automatic Custody Transfer) at the Plant are routinely monitored by plant personnel as part of the normal operation of the plant. The readings from these meters, particularly the gas LACT downstream of the NGL bullets can indicate whether there is a leak in the line or other condition that could result in the loss of the line's contents.

B.3.3 Rincon Station Tank 887

Tank 887 is equipped with low-, high, and high-high level alarms on Tank 887. The tank is monitored by the SCADA system (refer to B.2.3, SCADA Monitoring).

There is a 35-bbl, steel sump that collects spills from outgoing meters, incoming meters, pig receiver, and pig launcher. The contents of this sump are automatically pumped into the outgoing 22-inch pipeline. The sump has a high-level alarm that is transmitted to the ROSF. Operators at ROSF are instructed to notify Venoco in the event of a high-level sump alarm.

B.3.4 Carpinteria And Ventura Pipelines

The events and conditions that may pose a substantial threat of a worst case discharge, and the procedures to eliminate or mitigate those situations, are described in the VPS – Hazardous Liquid Pipeline Procedures – PSOM Procedures. The SCADA system continuously monitors and controls pressure and flow rates in the pipeline. If the system detects high or low pressures that are in excess of specifications, the pipeline is automatically shut down. Shutdown also occurs if abnormal changes in flow volume occur. The line is examined to determine the cause of the observation and the situation is corrected as necessary, before the restarting the flow.

Communication Procedures (during operations)

Details of the pipeline operations for the Carpinteria and Ventura Pipeline System are provided in the VPS – Hazardous Liquid Pipeline Procedures – PSOM Procedures. Injections of other pipelines into the Carpinteria and Ventura Pipelines are automatic; no prior notification is required. The system is monitored from the Carpinteria Plant Control Room.

Abnormal conditions (e.g., too high or low pressure) are detected automatically and responses are also automatic (e.g., pumps shutting down, relief valves opening). If necessary, those responses can be conducted manually. Direct, verbal communications with the Operators of the other pipelines are not necessary.

B.3.5 Platforms Gail and Grace and Associated Subsea Pipelines

1. The Operations Supervisor continually assesses the information contained in the Platform Reports to ensure safe operations.
2. Daily checks include monitoring pipeline pressure, visually inspecting pumps, LACT, and pig trap areas.
3. Monthly checks include actuating shutdown valve and observing action and checking safeties high and low for proper operation.
4. There are well defined normal and emergency shutdown procedures.
5. If there is an abnormal change in flow rate or pressure that can not be explained after checking with onshore and offshore operators, then the Operations Supervisor must be notified and shutdown procedures initiated.
6. Safety hazards, unsafe equipment or conditions, malfunctions or breakdown of equipment and machinery, mechanical failure, or operational errors are recorded in the Platform Log. Any serious problem is rectified as necessary.
7. There is redundancy in the communication systems – paging, cellular phones, mobile radios.
8. The platforms are equipped with drainage collection systems in areas where spills can occur. Decks have sidewall rims/curbs.
9. There are well-defined procedures for searching for a suspected leak and reporting an abnormal operating parameter.

B.3.6 Other Measures

Flooding Protection

The Carpinteria facility is well drained with runoff drainage away from plant process areas and toward two containment areas (East and West). The Plant therefore is not subject to flooding although some localized pooling may occur in the containment areas during periods of heavy rain. When this occurs, the rainwater is drained offsite through two manually-operated valves. Personnel carrying out this duty are trained to closely check the water and not to open the valves if the water is contaminated with hydrocarbons. These valves are kept closed and locked when not in use.

At the Rincon Station, rain water that collects within the diked area of Tank 887 is drained to the DCOR storm water drainage system by a Venoco Operator. Rainwater that collects on the tank roof is also drained to the system. Roof drain valves are locked in the close position when not in use.

Most of the pipeline is buried, running parallel to raised beds for railroad and highway, which have culverts to allow runoff flow. Flows along this portion of the pipeline would not be great enough to cause any erosion and pipeline exposure concerns. The portion of the pipeline most at risk from flooding and induced erosion would be that under the Ventura River. The Ventura River Line Displacement Operating Procedure in the VPS – DOT Hazardous Liquid Pipeline Procedures – PSOM details the steps to be taken when the Ventura Flood Control District determines that the segment at risk should be temporarily emptied of oil. The steps include notification of other Operators that inject into the pipeline system, timing of valve operations, loading the scraper, and displacing the oil with water.

Alcohol and Drug Testing Programs

Venoco's Substance Abuse and Drug Testing program consists of four types of testing for drug and/or alcohol abuse. They are:

Type of Testing	Components
Post Offer / Pre-Employment	• Employment is contingent upon the candidate successfully passing a DOT Five Drug Panel Test. • Should the candidate test positive, the offer of employment is revoked.
Post-Accident In The Workplace	• Venoco tests (within 32 hours of the accident) each employee in a safety- or risk-sensitive position whose performance may have contributed to the accident, or whose performance cannot be completely discounted as a contributing factor to the accident. • Employees are prohibited from consuming alcohol within 8 hours after an accident unless testing has already been performed. • Venoco may decide not to test, but this decision will be based on the

Type of Testing	Components
	best information available after the incident.
Random	• Venoco randomly tests a minimum of 25% of employees in safety- and risk-sensitive positions for evidence of alcohol or substance abuse each year. • A computer-based random number generator is used for the employee selection process. • Employees selected for random testing must report to the testing site within 30 minutes, plus travel time, of notice.
Reasonable Cause	• Conducted when there is reasonable cause to believe an employee in a safety- or risk-sensitive position is using, may be using, or has used a prohibited drug or alcohol. • The decision to test shall be based on reasonable observations of physical, behavioral and/or performance indicators. • Required observations are made by a supervisor who has received the Company-designated training on the physical, behavioral and/or performance indicators of probable alcohol misuse or substance abuse and confirmed by way of observation or conversation with a second qualified supervisor or manager. • If it is determined that there is reasonable cause, then Venoco arranges travel for the employee to the test site and back to work.

Security Measures

The Carpinteria Plant is surrounded by chain-link fencing (approximately 6 ft high). Entry gates are locked and access is by key pad entry. Unused outlet valves on Tank 861 are locked in a closed position. Oil shipping pumps are locked when not in use. Lighting is located throughout the Plant to assist in spill detection and response and to reduce the risk of vandalism. Similar measures are in place at the Rincon Station. During normal business hours, visitors must enter and sign in at the DCOR Office.

A concrete valve box is placed around each mainline valve where possible. These boxes are routinely inspected to determine that these valve protective facilities are well maintained and suitable to provide protection for the valve against vehicles, work equipment, or vandalism. All the valve boxes have padlocks that are kept in proper working order for quick access by the operators. Padlocks not in proper working order are replaced as soon as possible.

Valves on secondary containment areas are kept closed and locked.

Training

Spill Prevention and Safety Meetings are held periodically. These meetings cover various topics including Venoco's safety and environmental standards, emergency operating procedures, personnel safety, and spill response procedures. This training is distinct from and in addition to response training. Spill prevention and safety meetings focus on reviewing operational procedures, including preventing overfilling, reducing the risk of spills during transfer operations, detecting leaks in pipes and tanks, and visually inspecting tanks and pipelines. In addition, Venoco uses these meetings to address any spill that may have occurred and to review the cause and circumstances of the incident in terms of “lesson learned.”

This appendix includes the following forms:

- Spill Response Notification Form: Onshore, Offshore OCS
- Telephone Log
- Site Safety Plan
- Site Characterization
- Tailgate Safety Meeting
- SPCC Facility Inspection
- Qualified Individual Notification Drill Evaluation Form
- Spill Management Team Tabletop Exercise Evaluation Form

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SPILL REPORT AND NOTIFICATION FORM – CA ONSHORE

**** Do not delay reporting pending additional information****

REPORTING PARTY					
Reporter's Name:					
Position:					
Phone Numbers:	Day:		Evening:		
Company:					
Address:					
Were Materials Discharged?		Y ☐ N ☐	Confidential?	Y ☐ N ☐	
Calling for Responsible Party?		Y ☐ N ☐			
RESPONSIBLE PARTY					
Company:	Venoco, Inc.				
Contact:	Ed O'Donnell				
Address:	6267 Carpinteria Ave				
	Carpinteria, CA 93013				
Phone:	(805) 745-2100				
RELEASE DESCRIPTION					
Source and Cause of Release:					
Date of Release:		Time of Release:			
Incident Address/Location:					
Nearest City:		Distance to City:			
Latitude:		Longitude:			
MATERIAL					
Type of Material:					
Discharged Quantity:		Bbl or Gal.			
Discharged to Water?	Y ☐ N ☐	Quantity:		Bbl or Gal	
Description of Slick:					
Size of Slick:					
Direction of Movement:					
RESPONSE ACTION					
Actions taken to isolate, contain and control release:					
IMPACTS					
Number of Injuries:		Number of Deaths:			
Were there any evacuations?	Y ☐ N ☐	Number evacuated:			
Was there any damage?	Y ☐ N ☐	Est. Damage in Dollars:			
Medium Affected:	Water Land Air	Other:			
Description of Medium Affected:					
WEATHER AND WATER CONDITIONS					
Temperature:	°	Air	°	Water	
Wind:	mph from the				
Current:	knots to the				

NOTIFICATIONS:			
AGENCIES:			
☐	National Response Center	Report #:	Time Reported:
☐	United States Coast Guard	Report #:	Time Reported:
☐	Minerals Management Service (MMS)	BOEMRE	Time Reported:
	State/Local Response Agency(s)		
☐	911		Time Reported:
☐	CA OES		Time Reported:
☐	CA DOGGR		Time Reported:
☐			Time Reported:
☐			Time Reported:
☐			Time Reported:
INTERNAL:			

SPILL REPORT AND NOTIFICATION FORM – OFFSHORE OCS

**** Do not delay reporting pending additional information****

REPORTING PARTY					
Reporter's Name:					
Position:					
Phone Numbers:	Day:		Evening:		
Company:					
Address:					
Were Materials Discharged?	Y ☐ N ☐		Confidential?	Y ☐ N ☐	
Calling for Responsible Party?	Y ☐ N ☐				
RESPONSIBLE PARTY					
Company:	Venoco, Inc.				
Contact:	Ed O'Donnell				
Address:	6267 Carpinteria Ave				
	Carpinteria, CA 93013				
Phone:	(805) 745-2100				
RELEASE DESCRIPTION					
Source and Cause of Release:					
Date of Release:		Time of Release:			
Incident Address/Location:					
Nearest City:		Distance to City:			
Latitude:		Longitude:			
MATERIAL					
Type of Material:					
Discharged Quantity:		Bbl or Gal.			
Discharged to Water?	Y ☐ N ☐	Quantity:		Bbl or Gal	
Description of Slick:					
Size of Slick:					
Direction of Movement:					
RESPONSE ACTION					
Actions taken to isolate, contain and control release:					
IMPACTS					
Number of Injuries:		Number of Deaths:			
Were there any evacuations?	Y ☐ N ☐	Number evacuated:			
Was there any damage?	Y ☐ N ☐	Est. Damage in Dollars:			
Medium Affected:	Water Land Air	Other:			
Description of Medium Affected:					
WEATHER AND WATER CONDITIONS					
Temperature:	°	Air	°	Water	
Wind:	mph from the				
Current:	knots to the				

VENOCO, INC

NOTIFICATIONS:			
AGENCIES:			
☐	National Response Center	Report #:	Time Reported:
☐	United States Coast Guard	Report #:	Time Reported:
☐	Minerals Management Service (MMS)		Time Reported:
☐			Time Reported:
☐			Time Reported:
☐			Time Reported:
☐			Time Reported:
☐			Time Reported:
☐			Time Reported:
INTERNAL:			

VENOCO **TELEPHONE LOG**		
Person Making Calls		
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	

VENOCO **TELEPHONE LOG**		
Person Making Calls		
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	
TO / FROM *(circle one)*	*Time*	*Business Discussed*
	Date	
Person Contacted	*Followup Required?* Yes No	
Phone No.	*Fax No.*	

VENOCO, INC

SITE SAFETY PLAN

Incident Information: Location:__________________ Date:__________ Time:____________ Site Supervisor:______________________ Federal:________ State:____________ Brief Description of Incident: __________________________________	***Monitoring:*** Spilled Product:______________________ O_2 Level:___________________________ LEL:______________________________ H_2S (ppm):_______ Benzene (ppm):______ Other: __________________________________
Personal Protection: ☐ Tyvek Suit ☐ Respirator ☐ Rain Slicker ☐ Safety Glasses ☐ Rubber Gloves ☐ Goggles ☐ Work Vest ☐ Duct Tape ☐ Hard Hat ☐ Barrier Cream ☐ Face Shield ☐ Sun Screen ☐ Steel–toed Rubber Boot ☐ Steel–toed Rubber Shoe	***Communication:*** Command Post #:_____________________ Working Radio Frequency:_______________ Safety Officer #:______________________ Other:______________________________ Other:______________________________ Other:______________________________ Other: ______________________________
Physical Hazards: ☐ Overhead ☐ Terrain ☐ Confined Space ☐ Biological ☐ Trip/Fall ☐ Atmosphere ☐ Noise ☐ Crane Operations ☐ Burn ☐ Heavy Equipment ☐ Cut ☐ Electric ☐ Other/Comments:___________________	***Emergency Evacuation Plan:*** Evacuation/Alarm Signal:________________ Evacuation Assembly Location:___________ Ambulance Co.:________ Phone:__________ Hospital/Clinic:_________ Phone:__________ Address:_____________________________ __________________________________ __________________________________
Location of Safety & Health Plans Required: **<u>Safety/Health Plan</u>** **<u>Location</u>** Respiratory Protection ___________ Personal Protection ___________ Health/Safety Training ___________ Confined Space Program ___________ Monitoring Program ___________ Instrument Calibration Logs ___________	***Site Description:*** Wind:_________ Direction:__________ Temp.:_________ Humidity:__________ Sun %:_________ Rain:____________ Fog:_________ Sea State:_________ Ground (wet/dry):_____________________ Other: __________________________________
Decontamination Procedures (Zone Control)	
Print Name:__________________________ **Signature**:___________________________ **Date**:________________ **Faxed**:________________	☐ Attach Tailgate Meeting Form ☐ Attach MSDS

SITE CHARACTERIZATION
Procedure Check-Off List
☐ **Brief Description of Incident**:
☐ **Location**:
☐ **Date and Time**:
☐ **Type of Product**:
☐ **MSDS Available Location**:
☐ **Oxygen Reading**:
☐ **Benzene**: 1 ppm-PEL, 5ppm-STEL, 1000 ppm-IDLH APR Respirator-10PPM; SCBA-10 ppm or greater
☐ **Hydrogen Sulfide**: 10 ppm-PEL, 15ppm-STEL, 300 ppm-IDLH 10-to-50 ppm Leave Area; 50 ppm or greater Don SCBA
☐ **Lower Explosive Limit**: Alarm at 10, Explosive Atmosphere when meter reads 30
☐ **Comments**:

TAILGATE SAFETY MEETING

Location:

Date: **Time**:

Supervisor: **Type of Work:**

Protective Clothing / Equipment Required:

- ☐ Hard Hat
- ☐ Safety Glasses
- ☐ Ear Plugs
- ☐ Tyvek
- ☐ Rain Gear
- ☐ Goggles
- ☐ Nomex Coveralls
- ☐ Safety Belt or Harness
- ☐ Respirator (Specify)____
- ☐ Gloves (Specify)____
- ☐ Boots (Specify)____

Job Safety Comments:

Physical Hazards:

Chemical Hazards:

TAILGATE SAFETY MEETING

"Print" Name	Company	Emergency Contact	Signature

		No.	

Meeting Conducted By (Print):	***Signature:***
Supervisor or Captain (Print):	***Signature:***

Venoco Inc.
Annual SPCC Facility Inspection

Location: ______________________ Date: __________

Inspector: ______________________

Valves & Piping	Yes/No or Status	Comments/Corrective Action	Further Action Req'd?
Piping/Flange/Fitting leaks			
Piping corrosion			
Piping wrapped at soil surface			
Piping supports in place			
Valve leaks			
Pump seal leaks			
Safety & Relief valves tested			
Crash posts, vehicle barriers, curbs in place			
DOT inspections performed			
Significant inspection results:			
Drainage Ditches/Sumps			
Ditches fee of oil			
Slab drains functional			
Sump pumps operational			
Sump alarms operational			
Containment Areas			
Walls/berms intact			
Drainage valves closed/locked			
Standing oil/water			
Tanks			
Monthly/Annual inspections performed			
Other inspections performed/planned			
Significant inspection results:			
Alarms/Level Controls properly set			
Portable tanks properly located			
Security			
Fences and gates intact			
Locks/Keypad entry operational			
Lighting operational			
Oil shipping pump controls locked			
Training			
Annual spill prevention briefing held			
Training records on file			

Overall Observations / Recommended Corrective Actions & Preventative Measures

____

____

____

____

____

QUALIFIED INDIVIDUAL NOTIFICATION DRILL EVALUATION FORM	
1. Facility:	
Location of Exercise:	
Date of Exercise:	
Time of Exercise:	
2. Objectives Evaluated:	
a. Was timely contact made with QI?	☐ **Yes** ☐ **No**
b. Elapsed time (in minutes):	
c. Was notification procedure effective?	☐ **Yes** ☐ **No**
3. Corrective Action – *if necessary*	
Explain:	
Target Complete Date:	
Responsible Person:	
4. Approved By:	
Title:	
Date:	

SPILL MANAGEMENT TEAM TABLETOP EXERCISE EVALUATION FORM		
Venoco, Inc.		
Date of Exercise: **Time of Exercise**:		
Qualified Individual:		
Emergency Scenario:		
Is this drill announced?	☐ **Yes**	☐ **No**
Check below if components are covered in this exercise.		
Organizational Design		
1. Notifications	☐ **Yes**	☐ **No**
2. Staff Mobilization	☐ **Yes**	☐ **No**
3. Ability to operate within the response management system	☐ **Yes**	☐ **No**
Operational Response		
4. Discharge control	☐ **Yes**	☐ **No**
5. Assessment of discharge	☐ **Yes**	☐ **No**
6. Containment of discharge	☐ **Yes**	☐ **No**
7. Recovery of spilled material	☐ **Yes**	☐ **No**
8. Protection of economically and environmentally sensitive areas	☐ **Yes**	☐ **No**
9. Disposal of recovered product	☐ **Yes**	☐ **No**
Response Support		
10. Communications	☐ **Yes**	☐ **No**
11. Transportation	☐ **Yes**	☐ **No**
12. Personnel support	☐ **Yes**	☐ **No**
13. Equipment maintenance and support	☐ **Yes**	☐ **No**
14. Procurement	☐ **Yes**	☐ **No**
15. Documentation	☐ **Yes**	☐ **No**
Objectives		
Exercise of the Spill Management Team in the review of:		
1. Knowledge of the response plan	☐ **Yes**	☐ **No**
2. Proper notifications	☐ **Yes**	☐ **No**
3. Communications system	☐ **Yes**	☐ **No**
4. Ability to access OSRO	☐ **Yes**	☐ **No**
5. Coordination of organization/agency personnel in response	☐ **Yes**	☐ **No**
6. Coordinate response within National Response Sys. infrastructure	☐ **Yes**	☐ **No**
7. Access ACP for location of sensitive areas, resource available and other information as applicable	☐ **Yes**	☐ **No**
Corrective Action – *If Necessary*		
Completion Date:		
Approved:		
Title:	**Date:**	

Incident Commander
Immediate Response
1. Report to the Command Center. 2. Obtain information and assess magnitude of the incident. 3. Formulate initial response plan. 4. Activate SIRT. 5. Schedule on-scene briefings, planning sessions, and Unified Command meetings. 6. Ensure safety of all personnel. 7. Keep Venoco management informed of the incident and actions taken. 8. Maintain communications with incident observers. 9. Ensure all appropriate agencies are notified. 10. Meet and brief responding agency representatives. 11. Document all actions.
Continuing Response
1. Direct and manage overall response effort, including Command Staff and Section Chiefs. 2. Direct with assistance from Liaison Officer, Planning and Operations Section Chiefs, report preparation: Incident Assessment, Incident Status Reports, Incident Action Plans, Victims List, and final written report on response operations. 3. Formulate strategic decisions related to response. 4. Meet and brief agency officials on response effort. 5. Approve media briefings and activities of visitors (public, government, media). 6. Approve reports to Management and serve as their representative throughout the incident. 7. Document all actions.
Pre-Emergency Planning
1. Review and approve pre-emergency planning activities. 2. Review response team assignments. 3. Determine appropriate emergency authorization guidelines. 4. Keep apprised of Clean Seas' capabilities. Keep apprised of available contractor assistance. Develop mutual agreements as appropriate. 5. Develop initial response team briefing agenda.

Public Information Officer
Immediate Response
1. Activate staff as required. 2. Assist in contacts with government representatives. 3. Monitor media coverage and respond appropriately with approved statements. 4. Advise IC on external implications of activities. 5. Serve as spokesperson as appropriate. 6. Prepare and release regular press statements after approval by IC and Legal Advisor. 7. Provide recommendations on communication priorities. 8. Establish and distribute media guidelines to SIRT members. 9. Coordinated communications with local, state, and federal representatives. 10. Document all actions.
Continuing Response
1. Provide assistance in obtaining agency approvals. 2. Coordinate release of information to government representatives and the media. 3. Provide a liaison with agency public information representatives and other government officials. 4. Establish and activate a Joint Information Center. 5. Ensure updated information is provided to the media and the public. 6. Document all actions.
Pre-Emergency Planning
1. Develop and maintain contacts with government, community, and media representatives. 2. Develop and maintain staffing plan. 3. Ensure staff training. 4. Prepare guidelines for effective public affairs program. 5. Keep apprised of “sensitive” issues. 6. Provide media training annually for the response team. 7. Identify potential media centers, communication needs, and equipment requirements. 8. Maintain media contact list, and contract for news clipping and video service.

Liaison Officer

Immediate Response

1. Activate staff as required.
2. Establish and maintain contacts with government representatives and community organizations.
3. Advise IC on external implications of activities.
4. Serve as spokesperson as appropriate.
5. Provide recommendations on communication priorities.
6. Document all actions.

Continuing Response

1. Coordinate visits by agency and community representatives with IC.
2. Coordinate release of information to government representatives and the media.
3. Provide a liaison with government officials and community representatives.
4. Together with Legal Advisor, assist Planning Section Chief in obtaining necessary government approvals and permits.
5. Coordinate Company response efforts with Regional Response Team (RRT) or any other committee formed by the agency representatives during the response.
6. Manage the assignment of volunteers and arrange with Logistics to provide support services for volunteers, as needed.
7. Document all actions.

Pre-Emergency Planning

1. Develop and maintain contacts with government and community representatives.
2. Develop and maintain staffing plan.
3. Ensure staff training.
4. Keep apprised of “sensitive” issues.

Safety Officer
Immediate Response
1. Report to field location(s) and ensure adherence to all safety rules and regulations. 2. Prepare Site Specific Safety Plan and Site Characterization. 3. Activate Safety staff. 4. Mobilize safety equipment. 5. Advise the IC of any casualties/injuries and required first aid assistance. 6. Provide safety observations to Operations Section. 7. Set up first aid stations and provide first aid. 8. Liaison with public safety providers. 9. Establish a hazard safety zone and evacuate/keep out all non-essential personnel. 10. Document all actions.
Continuing Response
1. Prepare safety-related reports for submission to the IC. 2. Issue Safety Bulletins/Messages to response personnel. 3. Coordinate safety effort with agency representatives (Fire, Police, Emergency Rescue). 4. Continuously monitor activities and report any unsafe conditions or operations to the Operations Section Chief. 5. Work with Services to ensure contractor personnel have the required OSHA or special training. 6. Provide fire extinguishers at prescribed locations around the hazard zone. 7. Ensure availability and usage of appropriate PPE and safety equipment. 8. Implement Decontamination Procedures. 9. Command search and rescue operations, as needed. 10. Contact medical centers/hospitals to alert them of incident and potential number of injuries. 11. Inspect and control sanitation problems and ensure safe provision of drinking water and food. 12. Document all actions.
Pre-Emergency Planning
1. Keep apprised of federal and state safety rules and regulations. 2. Develop safety training and inspection programs. 3. Maintain list of safety contractors and inventory for safety and PPE equipment. 4. Develop supply and services checklist.

Operations Section Chief
Immediate Response
1. Report directly to IC. 2. Direct all response operations. 3. Establish Field Command Post at incident site 4. Activate field operations staff and determine additional staffing requirements. 5. Work with Planning on Shoreline Protection Plan. 6. Coordinate pre-cleanup of beaches threatened by spill to minimize disposal needs. 7. Work with Planning on Beach Cleanup Plan. 8. Determine if non-related operations need to be shut down. 9. Work with other Section Chiefs to determine priority of response effort, resource requirements, and allocation of resources. 10. Keep IC informed of response actions. 11. Document all actions.
Continuing Response
1. Coordinate response effort of Onshore and Offshore groups. 2. Manage all containment and cleanup operations. 3. Provide daily progress reports to IC. 4. Ensure safety procedures are followed. 5. Evaluate effectiveness of response operations; adjust resources as necessary. 6. Document all actions.
Pre-Emergency Planning
1. Review and approve pre-emergency planning activities. 2. Maintain staffing plan. 3. Develop status reports to be provided to IC. 4. Ensure appropriate training for staff. 5. Keep informed of Clean Seas' and response contractor's capabilities and staffing.

Staging / Security Unit Leader
Immediate Response
1. Locate and establish staging areas for onshore and offshore operations. 2. Establish layout of each staging area. 3. Provide security for response personnel, facilities, and staging areas. 4. Work with Services to provide the required supplies and services. 5. Documents all actions.
Continuing Response
1. Assess need for additional sites. 2. Work Services to ensure supplies and services as provided as requested. 3. Establish check-in/check-out system for resources entering or leaving staging areas. 4. Prepare in-advance a list of needed resources, including lead times. 5. Keep Operations informed of resource status changes. 6. Demobilize staging area(s) when requested. 7. Evaluate security needs continually. 8. Implement security measures as expeditiously as possible. 9. Coordinate security measures with local law enforcement agencies. 10. Maintain a Visitor's Log at the Command Post. 11. Document all actions.
Pre-Emergency Planning
1. Identify potential staging areas. 2. Develop procedures for handling resources in staging areas. 3. Develop Demobilization Plan. 4. Maintain up-to date list of security services, including material and equipment needs and lead times.

Engineering Unit Leader
Immediate Response
1. Organize and direct damage control operations. 2. Conduct initial investigation of the upset condition. 3. Assess damage/impact to affected facilities and implement engineering solutions as necessary. 4. Coordinate engineering activities with response operations. 5. Work with Safety Officer to maximize safety of engineering personnel. 6. Document all actions.
Continuing Response
1. Ensure engineering personnel have necessary resources. 2. Provide general technical assistance as needed. 3. Assist response team members in determining need for technical specialists. 4. Work with Finance to execute contracts. 5. Work with Planning to ensure technical services comply with Company requirements. 6. Coordinate review of solicited and unsolicited proposals for technical work. 7. Inform Planning of "new ideas" that have technical merit or technical services that may improve the efficiency or effectiveness of response operations. 8. Document all actions.
Pre-Emergency Planning
1. Maintain a list of technical services and technical specialists. 2. Keep informed of technical developments. 3. Plan for damage control operations.

Surveillance Unit Leader

Immediate Response

1. Report to the Operations Section Chief.
2. Organize and direct surveillance operations in association with Venoco's offshore response contractor.
3. Provide surveillance information to Operations.
4. Work with Logistics to obtain need resources.
5. Document all actions.

Continuing Response

1. Ensure personnel have necessary resources.
2. If needed, work with U.S. Coast Guard and FAA to restrict sea and air space.
3. Coordinate surveillance operations with Planning.
4. Coordinate activities with surveillance by government agencies.
5. Document all actions.

Pre-Emergency Planning

1. Maintain a list of surveillance services and resources.
2. Keep informed of technical developments.

Decontamination Unit Leader
Immediate Response
1. Work with Safety to implement Decontamination Plan. 2. Develop and implement Waste Management Plan, including quantifying the amount of liquid hydrocarbons recovered. 3. Work with Logistics to obtain needed resources. 4. Document all actions.
Continuing Response
1. Ensure personnel have necessary resources. 2. Monitor temporary storage, transportation, disposal, and recycling of wastes. 3. Arrange for Company-approved contractors/laboratories to sample and test wastes. 4. Arrange for Company-approved contractors to transport wastes to approved disposal sites. 5. Document all actions.
Pre-Emergency Planning
1. Maintain a list of Company-approved waste management contractors. 2. Keep informed of all applicable state and federal regulations concerning waste management. 3. Review and update Decontamination Procedures and Waste Management and Disposal Plan as needed.

Planning Section Chief
Immediate Response
1. Coordinate with Operations Section Chief and IC to develop an initial Incident Response Plan. 2. Contact other Section Chiefs to determine situation and support requirements. 3. Document all actions.
Continuing Response
1. Continue to develop and update action plans (Refer to Sections 2.3.3.6-2.3.3.10). 2. Effectively monitor, track, and determine spill trajectory using all available applicable methods (Refer to Sections 2.3.3.6-2.3.3.7) 3. Coordinate follow-up checks with other staff members to ensure all agencies and individuals receive required reports. 4. Obtain approval for alternate remediation strategies (Refer to Appendix J.2 and J.3) 5. Ensure status boards are maintained. 6. Ensure work requests are used by response personnel. 7. Coordinate documentation of all aspects of the response effort. 8. Coordinate tracking of response personnel with Services Unit Leader. 9. Document all actions.
Pre-Emergency Planning
1. Support IC pre-emergency planning activities. 2. Research and define operations/activities that require federal, state, and/or local permits. 3. Maintain a roster of personnel and equipment contractors that may be contacted on a 24-hour basis to support a response.

Environmental Unit Leader
Immediate Response
1. Manage all environmental issues. 2. Seek and obtain necessary permits and approval from appropriate government and trustee agencies such as California DFG, U.S. FWS, and National Marine Fisheries. 3. Provide assistance in obtaining permits and approvals for dispersant use, *in situ* burning and/or waste disposal. 4. If necessary, obtain permits to use certain types of equipment and vehicles in restricted areas. 5. Collect initial baseline environmental information. 6. Document all actions.
Continuing Response
1. Work with Trustee agencies to ensure retrieval, cleaning and rehabilitation of affected wildlife. 2. Monitor response plans and activities, and advise Planning Section Chief of permit requirements (Refer to Section 2.3.3.6-2.3.3.10). 3. Monitor compliance with permit requirements. 4. Assist Planning in developing mitigation measures. 5. Collect area environmental information and continually assess damage/potential damage to environment (Refer to Appendix M and ACP 2008, Sections 9812, 9813, 9814). 6. Provide liaison between Company and CA Department of Fish and Game / OSPR. 7. Advise Operations on potential effects of operations to the environment and/or sensitive resources (Refer to Appendix H, I, and J). 8. Arrange for resources from Logistics and volunteers from Liaison, as requested by Trustee Agencies. 9. Arrange for consultants to document the effect of the spill on sensitive resources. 10. Document all actions.
Pre-Emergency Planning
1. Maintain a list of environmental consultants. 2. Research and define operations/activities that require federal, state, and/or local permits. 3. Review Dispersant Use Plan, *In Situ* Burning Plan, and sensitive resource database. 4. Keep current on wildlife cleaning and rehabilitation techniques.

Documentation Unit Leader
Immediate Response
1. Provide “real time” documentation of ongoing response. 2. Publish and distribute frequently incident status chronology based on event logs during the response. 3. Contact Section Chiefs to ensure effective and proper documentation. 4. Ensure documentation of meetings with agency representatives. 5. Use still photography and video to document the incident. 6. Document all actions.
Continuing Response
1. Ensure IC has good written records available to him at all times. 2. Continue to publish and distribute incident status chronology. 3. Maintain files of all correspondence, reports, data sheets, etc. 4. Arrange for collection of news clippings and other information provided by media. 5. Provide duplication services to personnel. 6. Arrange for packing and storing of incident files for legal, analytical, and historical purposes. 7. Coordinate all documentation and prepare Final Incident Report. 8. Provide administrative support as needed.
Pre-Emergency Planning
1. Develop documentation procedures for the response team. 2. Obtain and maintain audio recording, still photography and video equipment. 3. Maintain a list of still photographers and video consultants. 4. Maintain documentation supplies.

Status Board Unit Leader
Immediate Response
1. Receive information only from Command and Section Chiefs. 2. Assist and maintain Information Center at the Incident Command Center. 3. Maintain status boards. 4. Post information from IIRT before transition to SIRT. 5. Document all actions.
Continuing Response
1. Maintain accurate and complete incident files. 2. Ensure response team is aware of information by timely postings on status boards. 3. Provide a liaison with agency public information representatives and other government officials. 4. Document all actions.
Pre-Emergency Planning
1. Prepare and format status boards. 2. Ensure adequate supplies. 3. Ensure staff training.

Logistics Section Chief
Immediate Response
1. Activate logistics/services organization. 2. Ensure safety of all responders. 3. Coordinate establishment of Field Command Posts with Operations. 4. Ensure delivery of response equipment, material and supplies. 5. Document all actions.
Continuing Response
1. Provide transportation, food and lodging services. 2. Coordinate with Operations and Planning/Environmental to obtain beach access. 3. Coordinate communications (radios, phones, facilities). 4. Evaluate security needs with IC and Operations Section Chief. 5. Maintain daily file of all equipment used and inform IC of deficiencies. 6. Coordinate logistics of demobilization. 7. Document all actions.
Pre-Emergency Planning
1. Review pre-emergency planning activities. 2. Maintain staffing plan. 3. Develop status reports to be provided to IC. 4. Ensure staff training. 5. Develop logistics action plan that identifies supplies and services needed and possible sources, including private enterprise, cooperatives, and in-house. 6. Keep supply and services list up-to-date. 7. Identify companies with which to maintain basic ordering agreements.

Communications Unit Leader
Immediate Response
1. Implement Communications Plan. 2. Locate and obtain Mobile Communications Vehicle. 3. Arrange for additional radios, telephones, facsimiles, and PCs as necessary. 4. Document all actions.
Continuing Response
1. Maintain an inventory of radio distribution and call signs. 2. Track distributed communications equipment. 3. Ensure operability of the communications network. 4. Install and test communications equipment. 5. Maintain and repair communications equipment. 6. Establish and manage communications and messaging center. 7. Document all actions.
Pre-Emergency Planning
1. Develop a Communications Plan for supplementing existing communications. 2. Review and upgrade emergency notification system as necessary. 3. Maintain up-to-date list of suppliers and services.

Services Unit Leader
Immediate Response
1. Manage contracted services for the response effort. 2. Implement staffing program. 3. Ensure equipment and materials, transportation and facilities are provided for the response effort. 4. Coordinate deployment of contract manpower with Operations and Finance Section Chiefs. 5. Document all actions.
Continuing Response
1. Arrange for first aid, medical services and transportation for injured or ill response personnel. 2. Develop distribution plan for personnel, equipment, material, and supplies. 3. Provide food and potable water for response personnel. 4. Provide fuel and lubricants delivery to support operations. 5. Provide portable sanitary facilities and arrange for regular maintenance. 6. Identify and if necessary secure services for fabrication. 7. Implement regular inspection and maintenance of response equipment. 8. Provide contract manpower for response and continued operations as needed. 9. Maintain a current file of all available personnel and their location. 10. Establish personnel recruiting office if needed. 11. Assist in making travel and lodging arrangements. 12. Work with Finance on payroll requirements for contract labor. 13. Maintain records for contracted transportation services and ensure their compliance with transportation-related standards and regulations. 14. Work with agencies to establish transportation routes. 15. Ensure necessary materials and supplies are on-hand to keep equipment operational. 16. Gather and post status information on equipment and personnel. 17. Develop a schedule for movement and delivery of equipment, material and supplies to the response. 18. Evaluate adequacy and maintenance of facilities and make modifications as needed. 19. Ensure facilities comply with Building and Safety Codes. 20. Work with Staging / Security Unit Leader to ensure security of facilities. 21. Document all actions.
Pre-Emergency Planning
1. Keep up-to-date list of services needed and service providers for response operations.

Finance Section Chief
Immediate Response
1. Activate support staff. 2. Prepare and approve contracts and expenditures for response. 3. Advise IC of expenditures. 4. Document all actions.
Continuing Response
1. Coordinate activities of staff. 2. Oversee family support protocol in the event of an injury or death to a Company employee or contractor. 3. Communicate essential cost information to appropriate personnel. 4. Provide cost forecasts for response operations to IC. 5. Ensure Work Requests are being used by section personnel. 6. Document all actions.
Pre-Emergency Planning
1. Maintain staffing plan, including contract labor sources.

Claims and Insurance Unit Leader

Immediate Response

1. Activate support staff.
2. Notify other Accounting/Auditing supervisors.
3. Establish Claims Center/Phone Number if necessary.
4. Document all actions.

Continuing Response

1. Coordinate activities of staff.
2. Maintain accounting of response expenditures.
3. Ensure Accounting and Auditing is staffed as needed.
4. Review requests for personnel and equipment, contracts, invoices, rental agreements, etc.
5. Communicate essential cost information to appropriate personnel.
6. Continually audit material billings and manpower.
7. Provide qualified claims adjusters to investigate claims of damage.
8. Handle inquiries from insurance companies and accompany claims adjusters on tour of site.
9. Work with insurers on settlements as a result of an injury or death.
10. Work with Services to develop Procurement Plan.
11. Develop and implement Cost Accounting Program.
12. Review, negotiate, and process contracts.
13. Develop and administer a cash account and payroll system.
14. Document all actions.

Pre-Emergency Planning

1. Develop procedures to receive, review, and process damage claims.
2. Maintain staffing plan, including contract labor sources.
3. Develop Cost Accounting Program.
4. Maintain list of existing contracts and basic ordering agreements.

Legal Advisor

Immediate Response

1. Activate staff and estimate additional staff required.
2. Advise IC and Section Chiefs of legal sensitivities and required documentation that may be required in potential lawsuits and insurance claims.
3. Lead investigative team to determine the cause of the incident and collect data that may be needed for future legal activity.
4. Review documentation responsibilities with the response team.
5. Review contracts as needed.
6. Provide consultation as necessary.
7. Coordinate legal activities.
8. Document all actions.

Continuing Response

1. Review appropriateness of submitted documentation.
2. Review claims and contracts as needed by Finance Section.
3. Provide legal approval of all reports provided to government agencies.
4. Coordinate legal activities.
5. Document all actions.

Pre-Emergency Planning

1. Review and approve pre-emergency planning activities.
2. Maintain staffing plan and appropriate training.
3. Develop documentation program.
4. Identify law firms with oil spill experience to provide assistance during an incident.
5. Keep apprised of all applicable rules and regulations.
6. Coordinate with Staging / Security to develop a plan for investigating/documenting the cause of the incident.
7. Provide consultation as necessary.

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Material Safety Data Sheets (MSDSs) are kept on file at the Carpinteria Oil & Gas Processing Plant, on the platforms, and are readily available to the Command Center. Following this page, are the MSDSs for:

- Crude Oil - Sweet
- Crude Oil - Sour
- Natural Gas – Sweet

E.1 CHARACTERISTICS OF SOCKEYE OIL

The tables below present specifics of a sample of both Sockeye Comingled and Sockeye crude oil as reported from Emergencies Science Division sponsored by the United States Minerals Management Service. Database Revision Date: March 11, 1999.

Table E-1: **Sockeye**
Origin: California, USA

API Gravity			26.2

Equation(s) for Predicting Evaporation

- Sockeye: %Ev = (2.14 + 0.045T)ln(t) Sockeye Sour: %Ev = (1.32 + 0.045T)ln(t) Sockeye Sweet: %Ev = (2.39 + 0.045T)ln(t) Where %Ev = weight percent evaporated; T = surface surface temperature (°C); t = time (minutes)

Flash Point (°C)

Evaporation		
(volume %)		
0		-17
13		57
22	>	90

Reid Vapour Pressure (kPa)

21

Density (g/mL)

Temperature	Evaporation		
(°C)	(volume %)		
0	0		0.9081
15	0		0.8965
0	13		0.9277
15	13		0.9166
0	22		0.9374
15	22		0.9264

Pour Point (°C)

Evaporation	
(volume %)	
0	-12
13	-3
22	3

Dynamic Viscosity (mPa·s or cP)

Temperature	Evaporation		
(°C)	(volume %)		
0	0		114
15	0		45
0	13		601
15	13		163
0	22		3723
15	22		628

Emulsion Formation

Temperature	Evaporation	
(°C)	(volume %)	
0	0	yes
15	0	yes
0	13	yes
15	13	no
0	22	no
15	22	yes

Emulsion Water Content (weight %)

Temperature	Evaporation	
(°C)	(volume %)	
0	0	88
15	0	90
0	13	67
15	22	69

Chemical Dispersibility (volume %)

Corexit EC9500A	20
Corexit EC9527A	5
Dasic LTS	0
Enersperse 700	5

Hydrocarbon Groups (weight %)

	Evaporation	
	(volume %)	
Saturates	0	48
Aromatics	0	31
Resins	0	13

Asphaltenes	0	8
Waxes	0	6
Saturates	13	44
Aromatics	13	32
Resins	13	15
Asphaltenes	13	9
Waxes	13	5
Saturates	22	39
Aromatics	22	34
Resins	22	15
Asphaltenes	22	11
Waxes	22	5

Adhesion (g/m^2)

Evaporation		
(volume %)		
0	31	SD = 4
13	30	SD = 5
22	44	SD = 5

Volatile Organic Compounds (ppm)

	Evaporation	
	(volume %)	
Benzene	0	1040
Toluene	0	2290
Ethylbenzene	0	1190
Xylenes	0	4080
C3-benzenes	0	6870
Total BTEX	0	8610
Total BTEX + C3-benzenes	0	15470
Benzene	12	90
Toluene	12	650
Ethylbenzene	12	780
Xylenes	12	2900
C3-benzenes	12	6540
Total BTEX	12	4420
Total BTEX + C3-benzenes	12	10970
Benzene	22	0
Toluene	22	40
Ethylbenzene	22	0
Xylenes	22	40
C3-benzenes	22	750
Total BTEX	22	80
Total BTEX + C3-benzenes	22	830

Surface Tension (mN/m or dynes/cm)

Temperature	Evaporation	
(°C)	(volume %)	
0	0	28.1
15	0	27.8
0	13	29.1
15	13	29
0	22	NM
15	22	29.6

Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)

Temperature	Evaporation	
(°C)	(volume %)	
0	0	18.3
15	0	16.8
0	13	19.8
15	13	17.2
0	22	NM
15	22	19.6

Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)

Temperature	Evaporation	
(°C)	(volume %)	
0	0	21.7
15	0	19.1
0	13	20.9
15	13	20.8
0	22	NM
15	22	21

Metal Content (ppm)

	Evaporation		
	(volume %)		
Aluminum	0	<	5
Barium	0	<	0.3
Cadmium	0	<	0.5
Calcium	0		33.7
Chromium	0	<	1.5
Cobalt	0	<	1
Copper	0	<	0.6
Iron	0		3.6
Lead	0	<	3
Magnesium	0	<	1
Manganese	0	<	0.3
Mercury	0	<	15
Molybdenum	0		2
Nickel	0		42.2
Selenium	0	<	15

Strontium	0		0.2
Tin	0	<	15
Titanium	0		2
Vanadium	0		125
Zinc	0	<	0.6
Barium	13	<	0.3
Chromium	13	<	1.5
Copper	13	<	0.6
Iron	13		7.9
Lead	13	<	3
Magnesium	13	<	1
Molybdenum	13		1.1
Nickel	13		49.3
Titanium	13		3.4
Vanadium	13		139
Zinc	13	<	0.6
Barium	22	<	0.3
Chromium	22	<	1.5
Copper	22	<	0.6
Iron	22		11.5
Lead	22	<	3
Magnesium	22		1
Molybdenum	22		1.5
Nickel	22		60.7
Titanium	22		2
Vanadium	22		173
Zinc	22	<	0.6

Non-Metal Content (weight %)

	Evaporation	
	(volume %)	
Sulphur	0	2.29
Sulphur	13	2.67
Sulphur	22	2.87

Aqueous Solubility (mg/L)

Room temperature	Fresh water		27.64

Acute Toxicity of Water Soluble Fraction (mg/L)

Test Organism				
Daphnia magna	48h LC50		12.1(a)	

(a) results based on GC purge-and-trap analysis

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Crude Oil – Sweet
Synonyms: Sweet Crude – Sweet Oil – Petroleum
Generic Name: Petroleum
Chemical Family: Petroleum Hydrocarbon

Responsible Party: VENOCO Inc.
6267 Carpinteria Ave
Suite 100
Carpinteria, California
93013-1423

For further information contact the Safety Department
8am - 4pm Pacific Time, Mon - Fri: 805-745-2100

EMERGENCY OVERVIEW

Emergency Telephone Number:
888-836-6261

Health Hazards: Contains and liberates poisonous hydrogen sulfide gas. Crude oil is a probable skin cancer hazard. Benzene, component, is a cancer hazard. Harmful if inhaled. Overexposure to components may cause damage to the blood and peripheral nervous system. Use ventilation adequate to keep exposures below recommended limits. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards: Flammable liquid and vapor. Keep away from heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment).

< Physical Form: Liquid
< Appearance: Brown to dark black
< Odor: Hydrocarbon-rotten egg

NFPA HAZARD CLASS: Health: 2 (Moderate)

Flammability: 3 (High)
Reactivity: 0 (Least)

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% Weight	EXPOSURE GUIDELINE Limits	Agency	Type
Crude Oil (Petroleum) CAS# 8002-05-9	100	(See: Oil Mist, If Generated)		
Toluene CAS# 108-88-3	0-20	50 ppm	ACGIH	TWA-SKIN
		200 ppm	OSHA	TWA
		300 ppm	OSHA	CEIL
		500 ppm	OSHA.	10 min. peak; once per 8-hr shift
Xylenes CAS# 1330-20-7	0-20	100 ppm	ACGIH	TWA
		150 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
Ethyl Benzene CAS# 100-41-4	0-20	100 ppm	ACGIH	TWA
		125 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
n-Hexane CAS# 110-54-3	0-1.4	50 ppm	ACGIH	TWA-SKIN
		500 ppm	OSHA	TWA
Cyclohexane CAS# 110-82-7	0-1.5	100 ppm	ACGIH	TWA
		300 ppm	OSHA	TWA
Hydrogen Sulfide CAS# 7783-06-4	Varies (<1)	10 ppm	ACGIH	TWA
		15 ppm	ACGIH	STEL
		20 ppm	OSHA	CEIL
		50 ppm	OSHA	10 min. peak; once per 8-hr shift
Benzene CAS# 71-43-2	0-2	0.5 ppm	ACGIH	TWA-SKIN
		2.5 ppm	ACGIH	STEL-SKIN
		1 ppm	OSHA	TWA

	5 ppm	OSHA	STEL
Oil Mist, If Generated	5 mg/m3	ACGIH	TWA
CAS# None	10 mg/m3	ACGIH	STEL
	5 mg/m3	OSHA	TWA

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Contains benzene. If exposure concentrations exceed the 0.5 ppm action limit, OSHA requirements for personal protective equipment, regulated areas and training may apply (29CFR 1910.1028). Also see Section 4.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Contact may cause mild eye irritation including stinging, watering and redness.

Skin: Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.

Inhalation (Breathing): Low to moderate degree of toxicity by inhalation.

May contain or liberate poisonous hydrogen sulfide – see Other Comments section below.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose, throat and digestive tract, nausea, vomiting, diarrhea, transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, and fatigue), coughing, runny nose, shortness of breath, chest pain, blurred vision, abdominal pain, muscle weakness, irregular heartbeats (arrhythmias), pulmonary edema (accumulation of fluids in the lungs), breathing difficulties, respiratory failure, convulsions, coma and death.

Cancer: Skin cancer hazard. A component is a known human cancer hazard (see Sections 11 and 14).

Target Organs: No data available for this material. Overexposure to components may cause injury to the blood elements and peripheral nervous systems (see Section 11). There is limited evidence from animal studies that overexposure may cause injury to the liver, kidney, sense of hearing, thyroid, central nervous system and male reproductive system.

Developmental: Potential hazards to the fetus (see Section 11).

Other Comments: This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

This material may contain polynuclear aromatic hydrocarbons (PNAs) which have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to an exaggerated sunburn, and is temporary in duration if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions (pimples) and possible skin cancers.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin, respiratory (asthma-like), hearing, blood, liver, kidney, thyroid, male reproductive and peripheral and central nerve disorders.

Exposure to high concentrations of this material may increase the sensitivity of the heart to certain drugs. Persons with pre-existing heart disorders may be more susceptible to this effect (see Section 4 - Note to Physicians).

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away form exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Wipe material from skin and remove contaminated shoes and clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops, seek medical attention.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Note To Physicians: This material may contain or liberate hydrogen sulfide. In high doses hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. If unresponsive to supportive care, nitrites may be an effective antidote.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

Federal regulations (29CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: <100^{o}F
OSHA Flammability Class: Flammable Liquid
LEL: 0.9 / UEL: 7.0
Autoignition Temperature: No data

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters. Carbon dioxide can displace oxygen.

Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: Long-duration fires involving crude oil stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11 or API 2021). For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons downwind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate absorbent material. Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is make into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Section 2 and 8). Wash thoroughly after handling. Do not wear contaminated clothing or shoes. Use good personal hygiene practice.

Before working on or in tanks which contain or have contained this material, refer to OSHA Regulations, ANSI Z49.1 and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. In a tank, barge, or other closed container, the vapor space above materials that contain hydrogen sulfide (H2S) may result in concentrations immediately dangerous to life and health (IDLH). Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area “No Smoking or Open Flame.” Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: Wear a positive pressure air supplied respirator in situations where there may be potential for airborne exposure to H2S above exposure limits (see Section 2). H2S has poor warning properties, and appropriate air purifying cartridges are not commercially available. A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where H2S is not detected, and airborne concentrations of hydrocarbons are expected to exceed exposure limits. Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impermeable to the specific material handled is advised to prevent skin contact and possible irritation (see glove manufacturer literature for information on permeability).

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point: <100^{o}F
Flammable/Explosive Limits (%): LEU: 0.9 / UEL: 7.0
Autoignition Temperature: No data
Appearance: Brown to dark black
Physical State: Liquid
Odor: Hydrocarbon-rotten egg
pH: No data
Vapor Pressure (mm Hg): <12 psig
Vapor Density (air=1): >1
Boiling Point: Varies
Freezing/Melting Point: No data
Solubility in Water: Negligible
Specific Gravity: 17.0-40.0

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions of storage and handling. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 & 7).

Incompatible Materials: Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield carbon dioxide, carbon monoxide, hydrogen sulfide, other organic compounds and sulfur oxides.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Crude Oil (CAS# 8002-05-9)

Carcinogenicity: Chronic application of crude oil to mouse skin resulted in an increased incidence of skin tumors. IARC concluded in its Crude Oil Monograph that there is limited evidence of carcinogenicity in animals, and that crude oil is not classifiable as to its carcinogenicity in humans (Group 3). It has not been listed as a carcinogen by NTP or OSHA.

Developmental: Dermal exposure to crude oil during pregnancy resulted in limited evidence of developmental toxicity in laboratory animals. Decreased fetal weight and increased resorptions were noted at maternally toxic doses. No significant effects on pup growth or other developmental landmarks were observed postnatally.

Toluene (CAS# 108-88-3)

Target Organ(s): Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

Developmental: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

Xylene (CAS# 1330-20-7)

Target Organ(s): A six week inhalation study with xylene produced hearing loss in rats.

Developmental: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

Ethylbenzene (CAS# 100-41-4

Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC. Ethyl benzene has not been listed as a carcinogen by NTP, or OSHA.

Target Organ(s): In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilio foci, hypertrophy, necrosis), thyroid (hyperplasia) and pituitary (hyperplasia).

n-Hexane (CAS# 110-54-3)

Target Organ(s): Excess exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene (CAS# 71-43-2)

Carcinogenicity: Benzene is an animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

Target Organ(s): Prolonged or repeated exposures to benzene vapors has been linked to bone marrow toxicity which can result in blood disorders such as leukopenia, thrombocytopenia, and aplastic anemia. All of these diseases can be fatal.

Developmental: Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body weight and increased skeletal variations in rodents. Alterations in hematopoeisis have been observed in the fetuses and offspring of pregnant mice.

12. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001), benzene (D018) and possibly reactivity (D003). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restriction in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Petroleum Crude Oil
Hazard Class or Division: 3
ID #: UN1267
Packing Group: I

14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of **SARA 313** and 40 CFR 372:

COMPONENT	CAS NUMBER	WEIGHT %
Hydrogen Sulfide	7783-06-4	>1
Toluene	108-88-3	0-20
Xylenes	1330-20-7	0-20
Ethyl Benzene	100-41-4	0-20
n-Hexane	110-54-3	0-1.4
Cyclohexane	110-82-7	0-1.5
Benzene	71-43-2	0-2

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of **California Proposition 65** (CA Health & Safety Code Section 25249.5):

COMPONENT	EFFECT
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant
Various Polycyclic Aromatic Hydrocarbons	Skin Cancer

This material has not been identified as a carcinogen by NTP or OSHA. Crude oil has been identified as a Group 3 carcinogen by IARC.

EPA (CERCLA) Reportable Quantity:
----None----

15. DOCUMENTARY INFORMATION

Issue Date: 09/27/04
Previous Issue Date: None

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.** This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Crude Oil – Sour
Synonyms: Sour Crude – Sour Oil – Petroleum
Generic Name: Petroleum
Chemical Family: Petroleum Hydrocarbon

Responsible Party: VENOCO Inc.
6267 Carpinteria Ave
Suite 100
Carpinteria, California
93013-1423

For further information contact the Safety Department
8am - 4pm Pacific Time, Mon - Fri: 805-745-2100

EMERGENCY OVERVIEW

Emergency Telephone Number:
888-836-6261

Health Hazards: Contains and liberates poisonous hydrogen sulfide gas. Crude oil is a probable skin cancer hazard. Benzene, component, is a cancer hazard. Harmful if inhaled. Overexposure to components may cause damage to the blood and peripheral nervous system. Use ventilation adequate to keep exposures below recommended limits. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards: Flammable liquid and vapor. Keep away from heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment).

< Physical Form: Liquid
< Appearance: Brown to dark black
< Odor: Hydrocarbon-rotten egg

NFPA HAZARD CLASS: Health: 2 (Moderate)

Flammability: 3 (High)
Reactivity: 0 (Least)

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% Weight	EXPOSURE GUIDELINE Limits	Agency	Type
Crude Oil (Petroleum) CAS# 8002-05-9	100	(See: Oil Mist, If Generated)		
Toluene CAS# 108-88-3	0-20	50 ppm	ACGIH	TWA-SKIN
		200 ppm	OSHA	TWA
		300 ppm	OSHA	CEIL
		500 ppm	OSHA.	10 min. peak; once per 8-hr shift
Xylenes CAS# 1330-20-7	0-20	100 ppm	ACGIH	TWA
		150 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
Ethyl Benzene CAS# 100-41-4	0-20	100 ppm	ACGIH	TWA
		125 ppm	ACGIH	STEL
		100 ppm	OSHA	TWA
n-Hexane CAS# 110-54-3	0-1.4	50 ppm	ACGIH	TWA-SKIN
		500 ppm	OSHA	TWA
Cyclohexane CAS# 110-82-7	0-1.5	100 ppm	ACGIH	TWA
		300 ppm	OSHA	TWA
Hydrogen Sulfide CAS# 7783-06-4	>1	10 ppm	ACGIH	TWA
		15 ppm	ACGIH	STEL
		20 ppm	OSHA	CEIL
		50 ppm	OSHA	10 min. peak; once per 8-hr shift
Sulfur CAS# 7704-34-9	>1	Not Established		

Benzene CAS# 71-43-2	0-2	0.5 ppm	ACGIH	TWA-SKIN
		2.5 ppm	ACGIH	STEL-SKIN
		1 ppm	OSHA	TWA
		5 ppm	OSHA	STEL
Oil Mist, If Generated CAS# None		5 mg/m3	ACGIH	TWA
		10 mg/m3	ACGIH	STEL
		5 mg/m3	OSHA	TWA

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Contains benzene. If exposure concentrations exceed the 0.5 ppm action limit, OSHA requirements for personal protective equipment, regulated areas and training may apply (29CFR 1910.1028). Also see Section 4.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Contact may cause mild eye irritation including stinging, watering and redness.

Skin: Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.

Inhalation (Breathing): Toxic. May be harmful if inhaled. Contains and liberates poisonous hydrogen sulfide – see Other Comments section below.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose, throat and digestive tract, nausea, vomiting, diarrhea, transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, and fatigue), coughing, runny nose, shortness of breath, chest pain, blurred vision, abdominal pain, muscle weakness, irregular heartbeats (arrhythmias), pulmonary edema (accumulation of fluids in the lungs), breathing difficulties, respiratory failure, convulsions, coma and death.

Cancer: Skin cancer hazard. A component is a known human cancer hazard (see Sections 11 and 14).

Target Organs: No data available for this material. Overexposure to components may cause injury to the blood elements and peripheral nervous systems (see Section 11). There is limited evidence from animal studies that overexposure may cause injury to the liver, kidney, sense of hearing, thyroid, central nervous system and male reproductive system.

Developmental: Potential hazards to the fetus (see Section 11).

Other Comments: This material may contain or liberate hydrogen sulfide, a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure. Effects of overexposure include irritation of the eyes, nose, throat and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats, convulsions, respiratory failure, and death.

This material may contain polynuclear aromatic hydrocarbons (PNAs) which have been known to produce a phototoxic reaction when contaminated skin is exposed to sunlight. The effect is similar in appearance to an exaggerated sunburn, and is temporary in duration if exposure is discontinued. Continued exposure to sunlight can result in more serious skin problems including pigmentation (discoloration), skin eruptions (pimples) and possible skin cancers.

Allergic skin responses after repeated contact with sulfur have been reported but are not common.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin, respiratory (asthma-like), hearing, blood, liver, kidney, thyroid, male reproductive and peripheral and central nerve disorders.

Exposure to high concentrations of this material may increase the sensitivity of the heart to certain drugs. Persons with pre-existing heart disorders may be more susceptible to this effect (see Section 4 - Note to Physicians).

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away form exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Wipe material from skin and remove contaminated shoes and clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops, seek medical attention.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Note To Physicians: This material may contain or liberate hydrogen sulfide. In high doses hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. If unresponsive to supportive care, nitrites may be an effective antidote.

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

Federal regulations (29CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: <100°F
OSHA Flammability Class: Flammable Liquid
LEL: 0.9 / UEL: 7.0
Autoignition Temperature: No data

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: Long-duration fires involving crude oil stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11 or API 2021). For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons downwind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate absorbent material. Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is make into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharge. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Section 2 and 8). Wash thoroughly after handling. Do not wear contaminated clothing or shoes. Use good personal hygiene practice.

Before working on or in tanks which contain or have contained this material, refer to OSHA Regulations, ANSI Z49.1 and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. In a tank, barge, or other closed container, the vapor space above materials that contain hydrogen sulfide (H_2S) may result in concentrations immediately dangerous to life and health (IDLH). Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area “No Smoking or Open Flame.” Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: Wear a positive pressure air supplied respirator in situations where there may be potential for airborne exposure to H2S above exposure limits (see Section 2). H2S has poor warning properties, and appropriate air purifying cartridges are not commercially available. A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where H2S is not detected, and airborne concentrations of hydrocarbons are expected to exceed exposure limits. Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: The use of gloves impermeable to the specific material handled is advised to prevent skin contact and possible irritation (see glove manufacturer literature for information on permeability).

Eye/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point: <100°F
Flammable/Explosive Limits (%): LEU: 0.9 / UEL: 7.0
Autoignition Temperature: No data
Appearance: Brown to dark black
Physical State: Liquid
Odor: Hydrocarbon-rotten egg
pH: No data
Vapor Pressure (mm Hg): <12 psig
Vapor Density (air=1): >1
Boiling Point: Varies
Freezing/Melting Point: No data
Solubility in Water: Negligible
Specific Gravity: 17.0 to 40.0

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions of storage and handling. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 & 7).

Incompatible Materials: Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield carbon dioxide, carbon monoxide, hydrogen sulfide, other organic compounds and sulfur oxides.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Crude Oil (CAS# 8002-05-9)

Carcinogenicity: Chronic application of crude oil to mouse skin resulted in an increased incidence of skin tumors. IARC concluded in its Crude Oil Monograph that there is limited evidence of carcinogenicity in animals, and that crude oil is not classifiable as to its carcinogenicity in humans (Group 3). It has not been listed as a carcinogen by NTP or OSHA.

Developmental: Dermal exposure to crude oil during pregnancy resulted in limited evidence of developmental toxicity in laboratory animals. Decreased fetal weight and increased resorptions were noted at maternally toxic doses. No significant effects on pup growth or other developmental landmarks were observed postnatally.

Toluene (CAS# 108-88-3)

Target Organ(s): Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.

Developmental: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

Xylene (CAS# 1330-20-7)

Target Organ(s): A six week inhalation study with xylene produced hearing loss in rats.

Developmental: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions.

Ethylbenzene (CAS# 100-41-4

Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC. Ethyl benzene has not been listed as a carcinogen by NTP, or OSHA.

Target Organ(s): In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilio foci, hypertrophy, necrosis), thyroid (hyperplasia) and pituitary (hyperplasia).

n-Hexane (CAS# 110-54-3)

Target Organ(s): Excess exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene (CAS# 71-43-2)

Carcinogenicity: Benzene is an animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

Target Organ(s): Prolonged or repeated exposures to benzene vapors has been linked to bone marrow toxicity which can result in blood disorders such as leukopenia, thrombocytopenia, and aplastic anemia. All of these diseases can be fatal.

Developmental: Exposure to benzene during pregnancy demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased body weight and increased skeletal variations in rodents. Alterations in hematopoeisis have been observed in the fetuses and offspring of pregnant mice.

12. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001), benzene (D018) and possibly reactivity (D003). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restriction in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Petroleum Crude Oil
Hazard Class or Division: 3
ID #: UN1267
Packing Group: I

14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of **SARA 313** and 40 CFR 372:

COMPONENT	CAS NUMBER	WEIGHT %
Hydrogen Sulfide	7783-06-4	>1
Toluene	108-88-3	0-20
Xylenes	1330-20-7	0-20
Ethyl Benzene	100-41-4	0-20
n-Hexane	110-54-3	0-1.4
Cyclohexane	110-82-7	0-1.5
Benzene	71-43-2	0-2

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of **California Proposition 65** (CA Health & Safety Code Section 25249.5):

COMPONENT	EFFECT
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant
Various Polycyclic Aromatic Hydrocarbons	Skin Cancer

This material has not been identified as a carcinogen by NTP or OSHA. Crude oil has been identified as a Group 3 carcinogen by IARC.

EPA (CERCLA) Reportable Quantity:
----None----

15. DOCUMENTARY INFORMATION

Issue Date: 09/27/04
Previous Issue Date: None

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Natural Gas- Sweet
Generic Name: Natural Gas
Chemical Family: Petroleum hydrocarbon mixture

Responsible Party: VENOCO Corporation
Responsible Party: VENOCO Inc.
6267 Carpinteria Ave
Suite 100
Carpinteria, California
93013-1423

For further information contact the Safety Department
8am - 4pm Pacific Time, Mon – Fri: 805-745-2100

EMERGENCY OVERVIEW

Emergency Telephone Number:
888-836-6261

Health Hazards: Use with adequate ventilation.

Physical Hazards: Flammable gas. Can cause flash fire. Gas displaces oxygen available for breathing. Keep away from heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment). Do not enter storage areas or confined space unless adequately ventilated.

< Physical Form: Gas
< Appearance: Clear, colorless
< Odor: Odorless to petroleum odor

NFPA HAZARD CLASS:	Health:	1 (Slight)
	Flammability:	4 (Extreme)
	Reactivity:	0 (Least)

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% Weight	EXPOSURE GUIDELINE Limits	Agency	Type
Methane CAS# 74-82-8	<88	1000 ppm	MSHA	TWA
Ethane CAS# 74-84-0	<8	1000 ppm	MSHA	TWA
Propane CAS# 74-98-6	<3	2500 ppm 1000 ppm 1000 ppm	ACGIH OSHA MSHA	TWA TWA TWA
Nitrogen CAS# 7727-37-9	<2	1000 ppm	MSHA	TWA
Butane CAS# 106-97-8	<1	800 ppm 500 ppm	ACGIH MSHA	TWA TWA
Carbon Dioxide CAS# 124-38-9	<1	5000 ppm 30000 ppm 5000 ppm 5000 ppm	ACGIH ACGIH OSHA MSHA	TWA STEL TWA TWA

Note: This material is a natural product. Therefore, composition can vary.

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Eye: Not expected to be an eye irritant.

Skin: Skin contact is unlikely. Skin absorption is unlikely.

Inhalation (Breathing): Asphyxiant. High concentrations in confined spaces may limit oxygen available for breathing. See signs and symptoms.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Signs and Symptoms: Light hydrocarbon gases are simple asphyxiants which, at high enough concentrations, can reduce the amount of oxygen available for breathing. Symptoms of overexposure can include shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting, and are reversible if exposure is stopped. Continued exposure can lead to hypoxia (inadequate oxygen), cyanosis (bluish discoloration of the skin), numbness of the extremities, unconsciousness and death. High concentrations of carbon dioxide can increase heart rate and blood pressure.

Cancer: No data available

Target Organs: Inadequate data available for this material.

Developmental: Limited data – see statement in Other Comments, below.

Other Comments: High concentrations may reduce the amount of oxygen available for breathing, especially in confined spaces. Hypoxia (inadequate oxygen) and respiratory acidosis (increased carbon dioxide in blood), during pregnancy may have adverse effects on the developing fetus. Exposure during pregnancy to high concentrations of carbon monoxide, which is produced during the combustion of hydrocarbon gases, can also cause harm to the developing fetus.

Pre-Existing Medical Conditions:
Exposure to high concentrations of this material may increase the sensitivity of the heart to certain drugs. Persons with pre-existing heart disorders may be more susceptible to this effect (see Section 4 – Note to Physicians).

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: First aid is not normally required. However, it is good practice to wash any chemical from the skin.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Note To Physicians: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash Point: Not applicable
OSHA Flammability Class: Flammable gas
LEL: 3.8 / UEL: 17.0
Autoignition Temperature: No data

Unusual Fire & Explosion Hazards: This material is flammable and may be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback, or explode. May create vapor/air explosion hazard indoors, outdoors, or in sewers. If container is not properly cooled, it can rupture in the heat of a fire. Closed containers exposed to extreme heat can rupture due to pressure buildup.

Extinguishing Media: Dry chemical or carbon dioxide is recommended. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8). Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. If this cannot be done, allow fire to burn. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Stay away from ends of container. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8). Notify fire authorities and appropriate federal, state, and local agencies. Water spray may be useful in minimizing or dispersing vapors (see Section 5).

7. HANDLING AND STORAGE

Handling: The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Section 2 and 8). Use good personal hygiene practice.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: Wear a positive pressure air supplied respirator in oxygen deficient environments (oxygen content <19.5%). A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: Not required based on the hazards of the material. However, it is considered good practice to wear gloves when handling chemicals.

Eye/Face: While contact with this material is not expected to cause irritation, the use of approved eye protection to safeguard against potential eye contact is considered good practice.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed. Self-contained respirators should be available for non-routine and emergency situations.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Flash Point: Not applicable
Flammable/Explosive Limits (%): LEL: 3.8 / UEL: 17.0
Autoignition Temperature: No data
Appearance: Clear, colorless
Physical State: Gas
Odor: Odorless to petroleum odor
pH: Not applicable
Vapor Pressure (mm Hg): No data
Vapor Density (air=1): No data
Boiling Point: No data
Freezing/Melting Point: No data
Solubility in Water: No data
Specific Gravity: 0.82 (Air=1) @ 60^{o}F
Heat Value (BTU): BTU @ 14.696 psia @ 60^{o}F (dry) = 1005

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions of storage and handling.

Conditions To Avoid: None Known.

Incompatible Materials: Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: None Known.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

No definitive information available on carcinogenicity, mutagenicity, target organs or developmental toxicity.

12. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material is subject to the land disposal restriction in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

13. TRANSPORT INFORMATION

DOT Proper Shipping Name / Technical Name: Natural Gas
Hazard Class or Division: 2.1
ID #: UN1971

14. REGULATORY INFORMATION

This material contains the following chemicals subject to the reporting requirements of **SARA 313** and 40 CFR 372:

--None--

Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of **California Proposition 65** (CA Health & Safety Code Section 25249.5):

--None Known--

This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

EPA (CERCLA) Reportable Quantity: --None--

15. DOCUMENTARY INFORMATION

Issue Date: 09/27/04
Previous Issue Date: None

16. DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. **HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY**

PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

This appendix includes the following equipment lists:

- Venoco, Inc.
- Clean Seas
- NRC Environmental Services Inc. (NRC)

Onsite Equipment List For Venoco, Inc	
Equipment	**Location**
Carpinteria Facilities & Pipelines	
Boots	Gang Trucks
Chemical Resistant clothing	Sea-Trains
Goggles	Safety Locker
First Aid Kits	Company Vehicles, Lunch Room
SCBAs and Respirators	Control Room and other locations
Gas Monitoring Equipment (Portable)	Control Room, S & R Office
Two-way Radios (5)	Throughout Facility
MSDS Sheets	Control Room, Guard Shack, F.S. Shop
Fire Extinguishers and Hoses	Throughout Plant
High Pressure Water System	Throughout Plant
Portable Pumps and Hoses	Control Room, Gang Trucks
Plastic Sheeting	Sea-Train, Gang Trucks
Absorbent Materials	Sea-Train, Gang Trucks
Shovels, rakes, and other hand tools	Sea-Train, Gang Trucks
Platform Gail	
1500 ft, 32-in Kepner Sea Curtain (or equivalent) with hydraulic reel	Platform
32’ boom boat – “Boomer”	Platform
Marking buoys (10)	Platform
Modified Walosep skimmer with 15-bbl (maximum) oil and water storage capacity, diesel engine power pack/pump, hoses, connectors	Platform
240 ft 3M sorbent boom (or equivalent)	Platform
15 bales (100 pieces) 3M sorbent pads 18” x 18” (or equivalent)	Platform

Onsite Equipment List For Venoco, Inc	
Equipment	**Location**
2 sea anchors	Boom boat
Base radio station and 3 hand held sets (minimum)	Platform office
Platform Grace	
240 ft 3M sorbent boom (or equivalent)	Platform
15 bales (100 pieces) 3M sorbent pads 18” x 18” (or equivalent)	Platform
4 sea anchors	Platform
Base radio station and 3 hand held sets (minimum)	Platform office
Marking buoys (5)	Platform
750 ft Expandi 4300 Boom	Platform
Crewboat (normally stationed at Carpinteria Pier)	
2-way communication system	On vessel
Crane	On vessel

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

MARINE CONTAINMENT AND RECOVERY PLATFORMS

OSRVs / SRVs /OSRB

Bin Location	Type	Model	Warehoused	Quantity / Capacity	Manufacturer
OCEAN SCOUT	Vessel	65' x 22' OSRV	Santa Barbara Channel	1	na
	Boom - Ocean	43" Kepner Reel Pack	OCEAN SCOUT	1500'	Kepner
	Boom - Sweep	LAMOR	OCEAN SCOUT	40'	Eng. Fabrics Corp.
	Storage -TSC	Internal Tanks	OCEAN SCOUT	215	NA
	LAMOR Skimmer	3 Chain Brush	OCEAN SCOUT	3710 edrc	Lamor
	LAMOR Skimmer	3 Chain Brush	OCEAN SCOUT	3710 edrc	Lamor
	FLIR Camera	M-Series	OCEAN SCOUT		
	Absorbent Boom	8"	OCEAN SCOUT	5 @ 40'= 200'	3-m
	Dispersant	9500	OCEAN SCOUT	250 gallons	Nalcool
	Inagrated Dispersant System	Application System	OCEAN SCOUT	2	NA
	Site Entry Kit	4 gas/benzene chip	OCEAN SCOUT	1	Industrial Sc./Draeger
	Tracking Buoy	RDF	OCEAN SCOUT	2	Fastrack
	Radios	P 400	OCEAN SCOUT	4/ 158.445 + VHF marine	Motorola
	Radios	VHF Base	OCEAN SCOUT	1/ 158.445 + VHF marine	Motorola
	Radios	VHF Mobile	OCEAN SCOUT	Marine	Motorola
	Cell # 805 455-5503	NA	OCEAN SCOUT	1	
	Computer w/ Brdbnd crd.	na	OCEAN SCOUT	1	Dell /ATT

OSRVs / SRVs /OSRB (continued)

Bin Location	Type	Model	Warehoused	Quantity / Capacity	Manufacturer
OCEAN GUARDIAN	Vessel	65' x 22' OSRV	Santa Barbara Channel	1	na
	Boom - Ocean	43" Kepner Reel Pack	OCEAN GUARDIAN	1500'	Kepner
	Boom - Sweep	LAMOR	OCEAN GUARDIAN	40'	Eng. Fabrics Corp.
	Storage -TSC	Internal Tanks	OCEAN GUARDIAN	215	NA
	LAMOR Skimmer	3 Chain Brush	OCEAN GUARDIAN	3710 edrc	Lamor
	LAMOR Skimmer	3 Chain Brush	OCEAN GUARDIAN	3710 edrc	Lamor
	FLIR Camera	M-Series	OCEAN GUARDIAN		
	Absorbent Boom	8"	OCEAN GUARDIAN	5 @ 40'= 200'	3-m
	Dispersant	9500	OCEAN GUARDIAN	250 gallons	Nalcool
	Inagrated Dispersant System	Application System	OCEAN GUARDIAN	2	NA
	Site Entry Kit	4 gas/benzene chip	OCEAN GUARDIAN	1	Industrial Sc./Draeger
	Tracking Buoy	RDF	OCEAN GUARDIAN	2	Fastrack
	Radios	P 400	OCEAN GUARDIAN	4/ 158.445 + VHF marine	Motorola
	Radios	VHF Base	OCEAN GUARDIAN	1/ 158.445 + VHF marine	Motorola
	Radios	VHF Mobile	OCEAN GUARDIAN	Marine	Motorola
	Cell # 805 455-5503	NA	OCEAN GUARDIAN	1	
	Computer w/ Brdbnd crd.	na	OCEAN GUARDIAN	1	Dell /ATT

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

OSRVs / SRVs /OSRB (continued)					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
CLEAN OCEAN	Vessel	145' x 36' OSRV	Santa Barbara Channel	1	na
	Boom - Ocean	60" Reel Pack	CLEAN OCEAN	1500'	Kepner
	Boom - Ocean	43" SPI auto-boom	CLEAN OCEAN	3000'	Oil Stop
	Boom - Sweep	20/40 Sea Sentry	CLEAN OCEAN	120	Eng. Fabrics Corp.
	Storage -TSC	Internal Tanks	CLEAN OCEAN	1,400	NA
	Skimmer	4 Chain Brush	CLEAN OCEAN	4952 edrc	Lamor
	Skimmer	4 Chain Brush	CLEAN OCEAN	4952 edrc	Lamor
	Skimmer	GT-185	CLEAN OCEAN	1,371 edrc	Pharo Marine
	Skimmer	GT-185	CLEAN OCEAN	1,371 edrc	Pharo Marine
	Boat	RHIB	CLEAN OCEAN	7 Meter	Willard Marine
	Transfer Pump	DOP 250	CLEAN OCEAN	629 bph	Desmi
	Transfer Pump	DOP 250	CLEAN OCEAN	629 bph	Desmi
	Transfer Pump	DOP 250	CLEAN OCEAN	629 bph	Desmi
	Transfer Pump	DOP 250	CLEAN OCEAN	629 bph	Desmi
	Hydraulic Power Unit	DA50	CLEAN OCEAN	1 / 50 gpm	Diesel America
	Absorbent Boom	8"	CLEAN OCEAN	10 @ 40'= 400'	3-m
	Dispersant	9527	CLEAN OCEAN	1100 gallons	Nalcool
	Dispersant Spray Arms	Distribution System	CLEAN OCEAN	2	NA
	Site Entry Kit	4 gas/benzene chip	CLEAN OCEAN	1	Industrial Sc./Draeger
	Tracking Buoy	DFB	CLEAN OCEAN	2	Fastrack
	Radios	P 400	CLEAN OCEAN	4/ 158.445 + VHF marine	Motorola
	Radios	VHF Base	CLEAN OCEAN	1/ 158.445 + VHF marine	Motorola
	Radios	VHF Mobile	CLEAN OCEAN	Marine	Motorola
	Cell # 805 455-5501	NA	CLEAN OCEAN	1	
	Computer w/ Brdbnd crd.	na	CLEAN OCEAN	1	Dell /ATT
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
TIDE MAR VII	Barge	160' x 39' OSRB	Santa Barbara Channel	1	NA
	Storage -TSC	Internal Tanks	TIDE MAR VII	7,840 bbls	NA
					Desmi
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
CLEAN SWEEP	Vessel	32' x 11' SRV	Santa Barbara Channel	1	Kvickak Marine
	Boom	26" Sweep Boom	Ventura Harbor	30'	Lamor
	Storage -TSC	Internal Tanks	Ventura Harbor	29 bbls	Kvickak Marine
	Skimmer		Ventura Harbor	3710 edrc	Lamor
	Site Entry Kit	4 gas/benzene chip	Ventura Harbor	1	Industrial Sc./Draeger
	Radios	VHF Base	Ventura Harbor	1/ 158.445 + VHF marine	Motorola
	Radios	VHF Mobile	Ventura Harbor	Marine	Motorola

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

MARINE BOOMING / SUPPORT VESSELS					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
AJAX	Boat	32' x 8'	Carpinteria Support Yard	1	WorkBoats N.W.
COMET	Boat	32' x 8'	Santa Barbara Harbor	1	WorkBoats N.W.
SEA ARK	Boat	21' x 7.5'	Carpinteria Support Yard	1	Sea Ark Boats

OCEAN BOOM					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity (Feet)**	**Manufacturer**
CS Yard Building #2	Boom - Ocean	43" SPI auto-boom	Carpinteria Support Yard	3000	Oil Stop
CS Yard Conex # 40-1	Boom - Ocean	43" Solid Foam	Carpinteria Support Yard	1500	CCB company
CS Yard Conex # 40-2	Boom - Ocean	43" Solid Foam	Carpinteria Support Yard	1500	CCB company
CS Yard Conex # 40-3	Boom - Ocean	43" Solid Foam	Carpinteria Support Yard	1500	CCB company
			Total Boom in Feet	7500	

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

STORAGE - Towable Storage Bladders, Rigid Hull Dracones & Portable Land based

Bin Location	Type	Model	Warehoused	Quantity / Capacity	Manufacturer
CS Yard	Storage - TSB	Kepner 120	Carpinteria Support Yard	3 @120 bbls =360 bbl	Kepner Plastics
CS Yard	Storage - TSB	Kepner 590	Carpinteria Support Yard	1 @590 bbl	Kepner Plastics
CS Yard	Storage - TSB	Kepner 28	Carpinteria Support Yard	4 @ 28 bbl = 112 bbl	Kepner Plastics
CS Yard	Storage - TSB	Dunlop Dracone	Carpinteria Support Yard	1 @ 140 bbl	Dunlop UK.
CS Yard	Storage - Rigid Dracone	Eagle alum barge	Carpinteria Support Yard	4 @ 100 bbl = 400 bbl	Eagle Marine
CS Yard	Storage - Rigid Dracone	Eagle alum barge	Carpinteria Support Yard	4 @ 100 bbl = 400 bbl	Eagle Marine
CS Yard 10 /TRKTD 2	Storage - Portable Land	FASTANK	Carpinteria Support Yard	12 @ 57 bbl = 684 bbl	FASTANK
			Total (Non OSRV/SRV) Temporary Storage	**2686 bbl**	

SKIMMERS - Open Ocean, Nearshore & Inland

Bin Location	Type	Model	Warehoused	Capacity/EDRC	Manufacturer
Building #2	Weir	Terminator	Carpinteria Support Yard	3017	Desmi
Building #2	Weir	Terminator	Carpinteria Support Yard	3017	Desmi
CONEX # 20-2	Oleophilic Brush	2 Brush	Carpinteria Support Yard	2472	Lamor Corp.
CONEX # 20-2	Oleophilic Brush	2 Brush	Carpinteria Support Yard	2472	Lamor Corp.
CONEX # 20-2	Oleophilic Brush	2 Brush	Carpinteria Support Yard	2472	Lamor Corp.
CONEX # 20-3	Oleophilic Brush	2 Brush	Carpinteria Support Yard	2472	Lamor Corp.
CONEX # 20-3	Oleophilic Brush	5 Brush	Carpinteria Support Yard	6182	Lamor Corp.
CONEX # 20-3	Oleophilic Brush	5 Brush	Carpinteria Support Yard	6182	Lamor Corp.
Building #2	Weir	GT-185	Carpinteria Support Yard	1371	Pharo Marine
Building #2	Weir	GT-185	Carpinteria Support Yard	1371	Pharo Marine
Building #2	Weir	GT-260	Carpinteria Support Yard	3019	Pharo Marine
Building #2	Drum/Weir	Roto-30	Carpinteria Support Yard	3017	Roto-Trading
Building #2	Drum/Weir	Roto-30	Carpinteria Support Yard	3017	Roto-trading
			Total EDRC Recovery	**40081**	

PUMPS - Transfer & Offloading

Bin Location	Type	Model	Warehoused	Capacity / BPH	Manufacturer
CS Yard FT	Pump	FRAMO TK150	Carpinteria Support Yard	36000	Frank Moen
CS Yard FT	Pump	FRAMO TK150	Carpinteria Support Yard	36000	Frank Moen
CS Yard FT	Pump	DOP 250	Carpinteria Support Yard	629	Desmi
Building #2	Pump	Master	Carpinteria Support Yard	125	Desmi
Building #2	Pump	Master	Carpinteria Support Yard	125	Desmi
Building #2	Pump	Master	Carpinteria Support Yard	125	Desmi
			Total Pumping Capacity	**73004**	

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

SHORELINE PROTECTION BOOM -Inland / Nearshore					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity (Feet)**	**Manufacturer**
HARBOR TRAILER #2	Boom	20"	Carpinteria Support Yard	1500	Kepner
HARBOR TRAILER #4	Boom	18"	Carpinteria Support Yard	1100	American Marine
HARBOR TRAILER #5	Boom	20"	Carpinteria Support Yard	1500	Kepner
HARBOR TRAILER #6	Boom	20"	Carpinteria Support Yard	1500	Kepner
HARBOR TRAILER #8	Boom	20"	Carpinteria Support Yard	1500	Kepner
HARBOR TRAILER #10	Boom	20"	Carpinteria Support Yard	1500	Kepner
HARBOR TRAILER #11	Boom	20"	Carpinteria Support Yard	1500	Kepner
20' CONEX # 20-1	Boom	10"	Carpinteria Support Yard	3000	Oil Stop
40' CONEX #40-11	Boom	30"	Carpinteria Support Yard	1200	American Marine
40' CONEX # 40-4	Boom	30"	Carpinteria Support Yard	2800	Kepner
40' CONEX # 40-5	Boom	30"	Carpinteria Support Yard	3300	Kepner
40' CONEX # 40-6	Boom	30"	Carpinteria Support Yard	1300	Kepner
40' CONEX # 40-7	Boom	20"	Carpinteria Support Yard	5000	Kepner
40' CONEX # 40-9	Boom	20"	Carpinteria Support Yard	4600	Kepner
			Total Shoreline Boom	**31300**	

SHORELINE PROTECTION Skiffs w 15 to 30 hp outboards					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity**	**Manufacturer**
SKIFF TRAILER # 1	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	4	N.A.
SKIFF TRAILER # 2	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	4	N.A.
SKIFF TRAILER # 3	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	1	N.A.
SKIFF TRAILER # 4	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	1	N.A.
SKIFF	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	1	N.A.
SKIFF	Skiffs-alum.	16' w/outboard	Carpinteria Support Yard	1	N.A.

HYDRAULIC POWER UNITS					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
Building #2	Hydraulic Power Unit	DA45	Carpinteria Support Yard	2 / 45 gpm	Diesel America
	Hydraulic Power Unit	DA33	Carpinteria Support Yard	2 / 35 gpm	Diesel America
	Hydraulic Power Unit	DA30	Carpinteria Support Yard	4 / 30 gpm	Diesel America
	Hydraulic Power Unit	DA10	Carpinteria Support Yard	5 / 10 gpm	Diesel America

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

MOTOR POOL - Trucks, Cranes, Forklifts and Trailers					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
SUPPORT YARD	Crane Truck	Ford 800	Carpinteria Support Yard	1 / 12 TON CRANE	Ford Moter Co.
	Stake Bed Truck	Ford 550	Carpinteria Support Yard	1	Ford Moter Co.
	Stake Bed Truck	Ford 350	Carpinteria Support Yard	1	Ford Moter Co.
	Passenger 4x4 Dually	Ford 350	Carpinteria Support Yard	1	Ford Moter Co.
	Passenger	Expedition	Carpinteria Support Yard	1	Ford Moter Co.
	Passenger	F150	Carpinteria Support Yard	2	Ford Moter Co.
	Passenger	Ranger	Carpinteria Support Yard	1	Ford Moter Co.
	ATV	Big Bear	Carpinteria Support Yard	1	Yamaha
	ATV	Big Bear	Carpinteria Support Yard	1	Yamaha
	Forklift	V330	Carpinteria Support Yard	1 / 33,000 lbs	Caterpiller
	Forklift	Wiggens m8	Carpinteria Support Yard	1 / 8,000 lbs	Wiggens
	Mobile Ops fld. Office	22' Attitude	Carpinteria Support Yard	1	Southwind
	Open Deck Trailer	18' Texas Trl.	Carpinteria Support Yard	1	Texas Trailer co.

PPE, HANDTOOLS & ABSORBENT MATERIAL Boom, Pads and Snare					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	**Manufacturer**
RESPONSE Trl. # 3	Absorbent Boom	8"	Carpinteria Support Yard	8400'	3-M
HARBOR TRAILER #7	Absorbent Boom	8"	Carpinteria Support Yard	1200'	3-M

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

PORTABLE RESPONSE SUPPORT TRAILER

40' CONEX # 40-12

Beach Clean-up

	Quantity
Rakes	15
Shovels Flat	15
Shovels Round	15
Pitch Forks	4
Plastic Buckets	15
18" Wire Flags	1000

Decon

	Quantity
Hand Cleaner	10
First Aid Kits	10
5 Gallon Water Bottles	5
Tables	5
Stackable Chairs	20
Dish Pans	6
Gatoraid	6
Kiddie Pools	4
Hudson Sprayer	2
Short Handle Brushes	12
Long Handle Brushes	18
Eye Wash Station	1
Pallets	3
Barrier Fence	6

PPE

	Quantity
Gloves	3000
Tyvec	1000
Rain Gear	250
Rubber Boots	300
Hip Waders	10
Safety Glasses	200
Barrier Cream	6
Back Braces	24
Sun Screen	300
Sun Screen	300

Miscellaneous

	Quantity
Rags	10 cs
Tie Wraps	400
Trash Bags	4000
Work Vests	250
Traffic Cones	25
Wooden Stakes	100
Duct Tape	20 rolls
Chem Lights	100
Tarps	6
Visqueen	2 rolls
Sand Bags	1000
Bike Flags	100
1/4" Line	1200'
6" PVC Pipe	20'
1/2" Line	600'

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

AERIAL DISPERSANT SUPPORT TRAILER & SUPPLIES

Bin Location	Type	Model	Warehoused	Quantity / Capacity	Manufacturer
LAY-DOWN	Dispersant	COREXIT 9527	Carpinteria Support Yard	7150	Nalcol
LAY-DOWN	Dispersant	COREXIT 9500	Carpinteria Support Yard	9900	Nalcol
			Total Shoreside	**17050**	

RESPONSE Trl. # 1	**Item**	**Quantity**	**Item**	**Quantity**
	250 gal. Simplex sprayer	1	ear muffs	2
	24 gal containers	6	hard hats	4
	2 gal. gas cans (empty)	2	tyvek suits	1
	box paper rags	1	disinfection wipes	1
	tool kit	1	reflective vests	4
	sorbent pads	2	push squeegee	1
	8" sorbent boom	1	½ x 20' lines	4
	½ liter drinking water	18	extension cords	2
	first aid kit	1	goggles	2
	1500 watt floodlights	2	5 Gal. Buckets	30
	35 gal trash can	1		
	5 gal plastic buckets	11	MSDS for 9527 & 9500	
	hand truck	1		
	25' hose w/camlock fittings	2		
	folding chairs	4		
	folding tables	2		
	brooms	2		
	tarp	1		
	easyup tent	1		
	55 gal trash bags	1		
	duct tape	2		
	eyewash station	1		
	plastic sheeting	1		
	face shields	2		
	safety glasses	2		
	master pump	1		
	fire extinguisher	1		
	spill absorbent material	2		

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

RESPONSE Trl. # 2	Item	Quantity	Item	Quantity
	250 gal. Simplex sprayer	1	hard hats	4
	24 gal containers	6	tyvek suits	1
	2 gal. gas cans (empty)	2	disinfection wipes	1
	box paper rags	1	reflective vests	4
	tool kit	1	push squeegee	1
	sorbent pads	2	½ x 20' lines	4
	8" sorbent boom	1	extension cords	2
	½ liter drinking water	18	goggles	2
	first aid kit	1	5 Gal. Buckets	30
	1500 watt floodlights	2		
	35 gal trash can	1	MSDS for 9527 & 9500	
	5 gal plastic buckets	11		
	hand truck	1		
	25' hose w/camlock fittings	2		
	folding chairs	4		
	folding tables	2		
	brooms	2		
	tarp	1		
	easy-up tent	1		
	55 gal trash bags	1		
	duct tape	2		
	eyewash station	1		
	plastic sheeting	1		
	face shields	2		
	master pump	1		
	fire extinguisher	1		
	spill absorbent material	2		

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

PERSONNEL DECONTAMINATION SUPPORT TRAILER SUPPLIES				
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**
Harbor Trailer # 4	Portable Decon Pool	NA	Carpinteria Support Yard	1 / 20"x 40'
	Folding Tables	NA	Carpinteria Support Yard	2 / 24" x 72"
	heavy tarps	NA	Carpinteria Support Yard	3
	chairs	NA	Carpinteria Support Yard	6
	41 gal plastic trash can	NA	Carpinteria Support Yard	3
	easy-up tent	NA	Carpinteria Support Yard	1
	fishtote	NA	Carpinteria Support Yard	1
	short handle brush	NA	Carpinteria Support Yard	1 case
	sorbent pads	NA	Carpinteria Support Yard	2 bales
	sorbent boom	NA	Carpinteria Support Yard	2 bales
	sorbent roll	NA	Carpinteria Support Yard	1 roll
	degreaser	NA	Carpinteria Support Yard	10 gal
	hand cleaner	NA	Carpinteria Support Yard	4 gal
	kiddy pools	NA	Carpinteria Support Yard	4
	hudson sprayers	NA	Carpinteria Support Yard	4
	plastic trays	NA	Carpinteria Support Yard	4
	Rakes	NA	Carpinteria Support Yard	5
	round shovels	NA	Carpinteria Support Yard	5
	pitch forks	NA	Carpinteria Support Yard	2
	plastic buckets	NA	Carpinteria Support Yard	5
	4"x 5' PVC Pipe	NA	Carpinteria Support Yard	1
	sand bags	NA	Carpinteria Support Yard	100
	hard hats	NA	Carpinteria Support Yard	10
	gloves	NA	Carpinteria Support Yard	100 pr
	tyvek suits	NA	Carpinteria Support Yard	48
	rubber boots	NA	Carpinteria Support Yard	48 pr
	safety glasses	NA	Carpinteria Support Yard	24
	sun screen	NA	Carpinteria Support Yard	1 bx
	work vest	NA	Carpinteria Support Yard	10

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

PERSONNEL DECONTAMINATION SUPPORT TRAILER SUPPLIES (continued)					
Bin Location	**Type**	**Model**	**Warehoused**	**Quantity / Capacity**	
	rain suits	NA	Carpinteria Support Yard	5	
	rags	NA	Carpinteria Support Yard	3 cs	
	zip ties	NA	Carpinteria Support Yard	1 bag	
	trash bags	NA	Carpinteria Support Yard	2 bx	
	traffic cones	NA	Carpinteria Support Yard	10	
	duct tape	NA	Carpinteria Support Yard	8 rolls	
	¼" manila rope	NA	Carpinteria Support Yard	600'	
	visqueen	NA	Carpinteria Support Yard	1 roll	
	barrier tape	NA	Carpinteria Support Yard	3 rolls	
	water	NA	Carpinteria Support Yard	1 cs	

CLEAN SEAS, LLC
2012 RESPONSE EQUIPMENT LIST

SURVEILLANCE, AERIAL TRACKING and DISPERSANT APPLICATION PLATFORMS (Contracted Resources)

Surveillance and Aerial Tracking

Clean Seas has been utilizing aerial platforms to assess marine oil spills, track and control marine oil spill response vessels since the early 1970's. ASPEN HELICOPTER Inc. has responded by contract to Clean Seas beginning in 1982 and has easily responded to over 70 spill response call-outs ranging from one day to multiple day events. ASPEN HELICOPTER Inc. brings state of the art technology via GPS tracking, on-site logistical and mechanical support. ASPEN HELICOPTER Inc. has trained on numerous occasions with Clean Seas AERIAL DISPERSANT SPRAY BUCKETS from Oxnard Airport and remote LZ throughout Clean Seas Response Area.

Below is a Table listing available Helicopter and Fixed Wing Aircraft available to Clean Seas:

Helicopter	Fixed Wing
Bell 206 L-III (Long Ranger)	2-Partenavia P68-C (High wing survey)
Bell 206 B-III (Jet Ranger)	1-Partenavia P68- OBS (Observer)
Bell 212 Medium Twin Helicopter	2-Piper Chieftain PA-31-350 (all weather)

Radio Directional Tracking Buoys

Type	Manufacter	Location	Quantity	Model
Tracking Buoy	DFB	CLEAN OCEAN	2	Fastrack
Tracking Buoy	DFB	MR CLEAN III	2	Fastrack
Tracking Buoy	DFB	Support Yard (Carp)	2	Fastrack

NRC Environmental Resources

Long Beach COTP Zone

TRANSPORTATION

LIGHT DUTY TRUCKS (FLAT BEDS AND BELOW)

LT. VEHICLES TO 1 TON, 2W

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #	LICENSE #
1159	Truck 1T	Ford F-250 toolbox	David McDaniel	Long Beach	Quarterly	1FTNX20F42ED34734	7F87525
1172	Truck 1T	Ford F-250 toolbox	Jon Victoria	Long Beach	Quarterly	1FTNW21P54EC51049	7L32938
1173	Truck 1T	Ford F-350 toolbox	Aaron Smith	Long Beach	Quarterly	1FTNX21P44EC34305	7K62663
1183	SUV	Ford Explorer	Aimee Wilson	Long Beach	Quarterly	1FMZU62K14ZA29727	5FIH504
1194	Truck 1T	Ford F-350 utility bed	Don Parker	Long Beach	Quarterly	1FDXF46P95EA52984	7U29666
1206	Truck 3/4 T	Ford F-150	Akio Usuda	Long Beach	Quarterly	1FTRF12215NA09925	7476227
1207	Expedition	Ford SUV	Frank Garrett	Long Beach	Quarterly	1FMPU165X5LA26201	5LZU73
1038	Truck 1T	Ford F-350, lifgate	Yard	Long Beach	Quarterly		
1056	Truck, 1T	1997 Ford F250, fuel caddy	Yard	Long Beach	Quarterly	1FTHX25F6VEA77120	7L14267
1068	Truck 1T	Ford F-250 toolbox	Jose Salgado	Long Beach	Quarterly	1FTHX25F3EC36868	5R16811
1071	Truck 1T	Ford F-250 toolbox	Yard	Long Beach	Quarterly	1FTHX25F2VEC67030	5P51923
1099	Van	Chevy, AstroVan	Jose Mancia	Long Beach	Quarterly	1GCDM19W5XB150235	5Z77899
1103	Suburban	Chevrolet SUV 2500	T.Roloff	Long Beach	Quarterly	3GNGK26J6XG234855	5NMD541
1117	Van	Ford	Yard	Long Beach	Quarterly	1FBSS31F3YHA23829	4JPH287
1123	Truck 3/4T Ford F-250	Ford F-250, extracab, fuel caddy/t-boxes	Marine Use	Long Beach	Quarterly	1FTNX20F8YEE09671	7U36227
1133	Truck, 1T	Ford F-250, 4x4, crewcab/t boxes	John Farelas	Long Beach	Quarterly	1FTNX21F3YEE13142	6F64594
1208	Truck 1 T	Chevrolet	Juan Delgado	Long Beach	Quarterly		
1210	Truck 1 Ton F-350	Ford F-350, crewcab, fuel caddy, t/boxes	Ray Sanchez	Long Beach	Quarterly		8G26614
1214	Truck 1 Ton F-250	Ford F-250 crewcab, fuel caddy, t/boxes	David Ramos	Long Beach	Quarterly		

LT. VEHICLES TO 1 TON, 4W

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #	LICENSE #
1094	Truck 1T	Ford F-250 crewcab, fuel caddy/t-boxes	Ernie Villarreal	Long Beach	Quarterly	1FTSW31F1XEB88231	7L14396
1121	Truck 1T Ford F-250	Ford	Yard	Long Beach	Quarterly		
1130	Excursion F-350	Ford F350 SUV	Justin Peters	Long Beach	Quarterly	1FMSU41F1YEE02028	4MW5849
1170	Truck 1T Ford F-350	F-350, crew cab 4x4	Will Canto	Long Beach	Quarterly		
1191	Truck 1T Ford F-350	Ford F-350, crewcab, 4x4	Ken Woodhall	Long Beach	Quarterly		
1124	Truck 1T	F250, crewcab	Chris Barrientos	Long Beach	Quarterly	1FTNX20F6YEE09670	7Z35526
2114	ER Rig - Support Ambulance	Navistar E440	Yard	Long Beach	Quarterly	1HTSLABM5TH286331	7R19293

SUPER DUTY/UTILITY/BOX BED

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #	LICENSE #
1008	Truck 1 1/2 T	Ford Super Duty, fuel caddy/press wash	Yard	Long Beach	Quarterly	2FDLF47M6NCA18154	6D07702
1122	1999 Flat Bed Crew/Gear Truck - F450	Ford F-450 Quad Cab stakebed no lift	Yard	Long Beach	Quarterly	1FDXW46FXXEE53776	7K91878
1147	1999 Flat Bed Gear Truck - F450	Ford F-450 Single Cab stakebed w/liftgate	Yard	Long Beach	Quarterly	1FDXF46FXXEE19966	8E28742
1197	Flat Bed Crew/Gear Truck - F550	Ford F550 - 4x4	Yard	Long Beach	Quarterly		
1201	Flat Bed Crew/Gear Truck - F550	Ford F550 - 4x4 w/lift gate	Yard	Long Beach	Quarterly		
2101	Flat Bed Crew/Gear Truck - F550		Yard	Long Beach	Quarterly		
2118	Flat Bed Crew/Gear Truck - F550	Ford F550 - 4x4 w/lift gate	Yard	Long Beach	Quarterly		
1059	Truck 1 1/2T	Ford, stakebed	Yard	Long Beach	Quarterly		
1076	HAZMAT Response Unit	Chev/step van	Yard	Ventura	Quarterly		5R16811
1113	Flat Bed Gear Truck	Ford F-550, stakebed, 4x4	Riverside Satellite Site	Long Beach	Quarterly		
1167		Ford Utility Bed	Juan Ortiz	Long Beach	Quarterly		
2143	26,000 GVWR Flatbed Truck	Freightliner, Pressure Washer/Air Comp.	Yard	Long Beach	Quarterly	1FV3HJAC81HG81068	6D92586

HEAVY DUTY TRUCKS/TRAILERS

HEAVY TRUCKS/TRACTORS (REQUIRING CDL/DOT)

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #	LICENSE #
2011	Tractor w/ pump	Freightliner	Yard	Long Beach	Quarterly	2FUYDSYBXNV478075	9A38662
2035	Tractor w/ pump	Freightliner	Yard	Long Beach	Quarterly	2FUYDSB4NV478072	9A02707
2036	Tractor w/ wet kit and pump						
2040	Tractor	Freightliner	Yard	Alameda	Quarterly	2FUYDSBINV478076	9B01840
2093	Tractor Roll Off	Volvo	Yard	Long Beach	Quarterly	4VGTDAJF4VN856419	7L79403
2115	Box Van	Freightliner FL70	Yard	Long Beach	Quarterly	1FVGHJAAXXHA55929	5U60324
2073	Tractor w/ wet kit	Freightliner	Yard	Long Beach	Quarterly		
2076	Tractor w/ wet kit	Peterbuilt	Yard	Ventura	Quarterly	1XPCD69XXRD361132	9B99770
2078	Tractor w/ wet kit	International	Yard	Long Beach	Quarterly	2HSFMAER3WC042697	

DUMP/BIN TRUCKS

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #	LICENSE #
2052	Dump Truck	Ford L 9000, 14 yd.	Yard	Long Beach	Quarterly	1FDZU90V3RVA45571	6A27280
2053	Dump Truck	Ford LTL 9000, 14yd.	Yard	Long Beach	Quarterly	1FDZU90LXPVA36927	4T18472
2061	Rocket Launcher Truck	Freightliner, with bin					
2071	Rocket Launcher Trailer	ESP					
3293	Rocket Launcher Trailer	2001 ESPG	Yard	Long Beach	Quarterly	1E9RS482711229172	4GY5832

FLATBED/UTILITY/CARGO

ID#	Identification	Specification	Storage	Home Base	Maintained	VIN #/SN	LICENSE #
3226	Trailer, Backhoe	Trail King	Yard	Long Beach	Quarterly	1TKC026224M115336	4EX1616
3372	Trailer, Backhoe	Trail King	Yard	Long Beach	Quarterly	1TKC026266M035783	4JY7124
3274	Carson End Dump Tailer	20' Carson	Yard	Long Beach	Quarterly	4HXDT122X7C122452	4HS9039
2001	Utility Dry Van Trailer	48x102	Yard	Long Beach	Quarterly	1UYVS2533PC925106	1VL4840
2065	Trailer, Spill Response	48x102	Yard	Long Beach	Quarterly		
3364	48' HAZ Waste Storage Trailer	48' Great Dane Trailer	Yard	Long Beach	Quarterly	1GRAA9628HS098716	4EL5124
3365	48' HAZ Waste Storage Trailer	48' Utility Trailers Van	Yard	Long Beach	Quarterly	1UYV22531WP644607	4HH2254
48117	Trailer, Spill Response	48x102	Yard	Ventura	Quarterly		
48117	Trailer, Spill Response	Fruehauf, 40'	Yard	Long Beach	Quarterly		
3056	Trailer, Spill Response	TRLMO 40'	Yard	Long Beach	Quarterly		
3058	Trailer, Spill Response	Fruehauf 45'	Yard	Long Beach	Quarterly		
3059	Trailer, Spill Response	Pines	Yard	Long Beach	Quarterly		
3093	Trailer, Spill Response	18',Dico, 1200' boom	Yard	Long Beach	Quarterly	4AGEU28D8NC016378	1VT4073
3101	Trailer, Spill Response, Carson 12' (mini me)	Carson 12'	Yard	Long Beach	Quarterly		
3111	Trailer, tilt bed	18'	Yard	Long Beach	Quarterly		
3117	Trailer, Boom/Skimmer/MTR	Pace 28'	Yard	Long Beach	Quarterly		
3118	Trailer, (2) Lund Skiffs/sorbents						
3120	Trailer, Incident Command, 24' pace trailer	24' Pace Trailer	Yard	Long Beach	Quarterly		
3126	Trailer, boom	Carson 20'	Yard	Long Beach	Quarterly		
3127	Trailer, boom	Big Tex, 20'	Yard	Long Beach	Quarterly		
3128	Trailer, boom	Carson 20'	Yard	Long Beach	Quarterly	16VCX2026X1D17590	4EX8100
3145	Trailer	Soughton, 48 x102	Yard	Long Beach	Quarterly		
3146	Trailer	53'	Yard	Long Beach	Quarterly		
3164	Roll-Off Trailer	ESP	Yard	Long Beach	Quarterly		
3176	Trailer Land Response	20' Pace Trailer	Riverside Satellite Site	Long Beach	Quarterly		
3177	Trailer, Technical Response	20' Pace Trailer	Yard	Long Beach	Quarterly		
6070	Trailer, Underground Response	SPCNS, boom, sandbags 18'	Yard	Long Beach	Quarterly		1AG5966
6071	Trailer, sorbents	Big Tex, sorbent, 20'	Yard	Long Beach	Quarterly		
6081	Trailer, boom Big Tex 20'	Big Tex, 20'	Yard	Long Beach	Quarterly		
OBR-1	40' Incident Command	40' trailer		Luisiana	Quarterly		
3278	Trailer, boom	40' trailer	Yard	Ventura	Quarterly	1S12E9489FD271732	4GC4548
6078	Trailer, Boston Whaler #6493	Boat trailer	Yard	Long Beach	Quarterly		
9162	Guzzler Ramps, Trailer	Ramps used for Guzzler	Yard	Long Beach	Quarterly	CA1022376	SE586096

NRC Environmental Resources

Long Beach COTP Zone

ROLL OFF BINS

ID#	Identification	Specification	Each (bbl)	Total (bbl)	Storage	Home Base
3259	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
3260	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
3261	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
3262	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
104	Roll off bin	30y	20 yard	20 yard	West Lot	Long Beach
100	Roll off bin	30y	20 yard	20 yard	West Lot	Long Beach
101	Roll off bin	30y	20 yard	20 yard	West Lot	Long Beach
103	Roll off bin	30y	20 yard	20 yard	West Lot	Long Beach
106	Roll off bin	18y	20 yard	20 yard	West Lot	Long Beach
106a	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
3236	Roll off bin	20y	20 yard	20 yard	West Lot	Long Beach
5901	Roll off bin	40y OT	40 yard	Dry Strg	West Lot	Long Beach
5902	Roll off bin	40y OT	41 yard	Dry Strg	West Lot	Long Beach

Total bins	13

NRC Environmental Resources

Long Beach COTP Zone

VAC TRUCKS AND TANKAGE

VACUUM TRUCKS/TRAILERS

ID#	Identification	Specification	Recovery BPD	Efficiency	EDRC	Liquid Storage bbls	Storage	Home Base	Maintained
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
SubVT	Vacuum Trailer	Certified, 120 bbl	3,430	10%	343	120	Vendor/TT	Long Beach	Use/Quarterly
2125	Vacuum Trailer	2002 Freightliner, 35 bbl	3,430	20%	686	35	Yard	Long Beach	Use/Quarterly
3035	Vacuum Trailer	Non Spec, 120 bbl	3,430	20%	686	120	Trailer	Long Beach	Use/Quarterly
3163	Vacuum Trailer	Pioneer, 130 bbls	3,430	20%	686	130	Trailer	San Diego	Use/Quarterly
3165	Vacuum Trailer	Pioneer, 120 bbls	3,430	20%	686	120	Trailer	San Diego	Use/Quarterly
3166	Vacuum Trailer	Certified, 120 bbl	3,430	20%	686	120	Trailer	Ventura	Use/Quarterly
3034	Vacuum Trailer	Certified, 120 bbl	3,430	20%	686	120	Trailer	Long Beach	Use/Quarterly
2069	Vacuum Truck	International, 70bbl	3,430	20%	686	70	Vehicle	Long Beach	Use/Quarterly
2039	Vacuum Truck	Guzzler 4816, Air Mover	3,430	20%	686	70	Vehicle	Long Beach	Use/Quarterly
3105	Vacuum Trailer	Petro Steel, 20bbl	2200	20%	225	20	Trailer	Long Beach	Use/Quarterly
3012	Vacuum Tailer	Certified, 130 bbl	3,430	20%	686	130	Trailer	Long Beach	Use/Quarterly
2081	Jetter						Vehicle		Use/Quarterly

Total EDRC	**8,457**
Total Liquid Storage BBL	**1,655**

TANKAGE / BARGES

ID#	Identification	Specification	Each (bbl)	Total (bbl)	Efficiency	Derated	Storage	Home Base	Maintained
	Barge Tankage	WT-30, 260x55x18	30,000	30,000	50%	15,000	Moorage	Long Beach	Quarterly
D919254	Barge Tankage	Foss 208, 208x50x13	16,530	16,530	50%	8,265	Moorage	Long Beach	Quarterly
589536	Barge Tankage	VBS 102, 195x35x12	10,100	10,100	50%	5,050	Moorage	Long Beach	Quarterly
589535	Barge Tankage	VBS 101, 195x35x18	10,100	10,100	50%	5,050	Moorage	Long Beach	Quarterly
506077	Barge Tankage	WT 25, 230x52x15	24,600	24,600	50%	12,300	Moorage	Long Beach	Quarterly
	Barge, Deck	Various					Moorage	Long Beach	Quarterly
	Portable Tank	Baker, 7 24hr response tanks	155	1,085	50%	543	Vendor	Southgate	Quarterly
	Portable Tank	Baker, 50 24hr response tanks	500	25,000	50%	12,500	Vendor	Southgate	Quarterly
	Portable Tank	Baker, 10 12hr response tanks	155	1,550	50%	775	Vendor	Southgate	Quarterly
	Portable Tank	Baker, 30 12hr response tanks	500	15,000	50%	7,500	Vendor	Southgate	Quarterly
ORB 5	Aluminum Barge	200 bbl	200	200			Ship Services L.A.	Long Beach	Quarterly

Total Derated BBL	**66,983**

NRC Environmental Resources

Long Beach COTP Zone

DECONTAMINATION / SALVAGE

1", 2", 3" DIAPHRAM PUMPS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
4125-1	Pump, air diaphram	Wilden 3", M-15	240 gpm	Pump Trailer	Long Beach	Use/Annual
4125-2	Pump, air diaphram	Wilden 3", M-15	240 gpm	Pump Trailer	Long Beach	Use/Annual
4125-3	Pump, air diaphram	Wilden 3", M-15	240 gpm	Pump Trailer	Long Beach	Use/Annual
4125-4	Pump, air diaphram	Wilden 3", M-15	240 gpm	Pump Trailer	Long Beach	Use/Annual
4133	Pump, air diaphram	Wilden, 2", M-8	158 gpm	MTR Trailer #3117	Long Beach	Use/Annual
4125-5	Pump, air diaphram	Wilden 3", M-15	240 gpm	NRC Response Vessel	Long Beach	Each Use
4074	Pump, air diaphram	Wilden 2" acid	100 gpm	Riverside Satellite Site	Long Beach	Each Use
4213	Pump, air diaphram	Versamatic 1" acid	35 gpm	Pump Container	Long Beach	Each Use
4164-1	Pump, air diaphram	2"	260gpm	Marine Trailer #3117	Long Beach	Use/Annual
N/A	Pump, air diaphram	Wilden 2" Stainless	260gpm	Pump Container	Long Beach	Use/Annual
4164-3	Pump, air diaphram	2"	260gpm	N/A	Long Beach	Use/Annual
TBD	Pump, air diaphram	Wilden 2" Aluminum	260gpm	Marine Trailer #6070	Long Beach	Use/Annual

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
4167-1	Pump, trash	4", QP		Container# 1	Long Beach	Use/Annual
4167-2	Pump, trash	4", QP		container#1	Long Beach	Use/Annual

Pump Strainers

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
TBD	Eaton 2" Strainer	**2" SS**		MTR Trailer 3117	Long Beach	Use/Annual
TBD	Eaton 2" Strainer	**2" SS**		Truck 2143	Long Beach	Use/Annual

PRESSURE WASHERS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
5022	Steam/Pressure Washer	Mulsbary, trailered, 6000 psi, hot	6000psi	Trailer, Yard	Long Beach	Use/Annual
5032	Steam/Pressure Washer	Mulsbary, trailered, 6000 psi, hot	6000psi	Trailer, Yard	Long Beach	Use/Quarterly
5037	Pressure washer trailered single	Socus, hot, 3000 psi	3000 psi	Trailer	Long Beach	Each Use
5038	Pressure Washer trailered dual	Steam-x, 6000 psi	6000 psi	Trailer	Long Beach	Each Use
5044	Pressure washer trailered dual	2x2,200gal w/hose			Long Beach	Quarterly
5059	Pressure washer trailered dual	2x2,200gal w/hose			Long Beach	Quarterly
5041	Pressure washer trailered single	steam-x 3000 psi	3000 psi	trailer	Long Beach	Each Use
3353	PW 5083/5084 trailered dual	Alkota 5355J	2999 psi	Trailer, Yard		
3354	PW 5092/5093 trailered dual	Alkota 5305E & 4405F	3000 psi	trailer	Long Beach	Each Use
3355	PW 5094/5095 trailered dual	Ramteq CH Series	3000 psi	Riverside Satellite Site	Long Beach	Each Use
5088	Pressure Washer Hand Cart	Alkota 3305X4	3000 psi	Yard	Long Beach	Each Use
5089	Gas Powered PW Hand Cart	Honda Excell	2800 psi	Yard - Container #10	Long Beach	Each Use
5090	Gas Powered PW Hand Cart	Honda Excell	2800 psi	Yard - Container #10	Long Beach	Each Use
5091	Gas Powered PW Hand Cart	Honda Excell	2800 psi	Yard - Container #10	Long Beach	Each Use
5085	PW Hand Cart Mounted	All American Dominator Series	3000 psi	Yard	Long Beach	Each Use
5086	PW Hand Cart Mounted	All American Dominator Series	3000 psi	Yard	Long Beach	Each Use
5087	PW Hand Cart Mounted	All American Dominator Series	3000 psi	Yard	Long Beach	Each Use
5096	PW Truck Mounted on 2143	Landa MFG	3000 psi	Yard	Long Beach	Each Use
5097	PW Truck Mounted on 2143	Karcher	3000 psi	Yard	Long Beach	Each Use

COMPRESSORS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
7179	Compressor	Ingersoll/Rand 185CFM	185 CFM	Trailer	Long Beach	Each Use
7180	Compressor	Ingersoll/Rand 185CFM	185 CFM	Trailer	Long Beach	Each Use
LB	Blower	Horn		Warehouse	Long Beach	
LB	Blower	Copus, 150CFM	150CFM	Warehouse	Long Beach	
LB	Blower	Copus 150CFM	150CFM	Warehouse	Long Beach	

GENERATORS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
7025-1	Generator	3.7KW	3.7KW	Yard	Long Beach	Use/Quarterly
7025-2	Generator	3.7KW	3.7KW	Haz Response Trailer #1076	Long Beach	Use/Quarterly
7024	Generator	Honda 7.5KW	7.5KW	Spill Response Trailer	Long Beach	Use/Quarterly
7020	Generator	Kubota, 7.5 KW, diesel	7.5 KW	Yard	Long Beach	Each Use
9087	Light Tower			Yard	Long Beach	Use/Quarterly
9107	Light Tower			Yard	Long Beach	Use/Quarterly

NRC Environmental Resources

Long Beach COTP Zone

BOOM / VESSELS

CONTAINMENT BOOM

ID#	Identification	Specification	Boom Length (ft.)	Home Base	Storage	Inland/Ocean
6312	Boom 8x12	Am. Marine	600	Foss 208 - Long Beach		Ocean
6312	Boom 8x12	Am. Marine	600	San Pedro Barge - Long Beach		Inland
6312	Boom 8x12	Am. Marine	600	WT 25 - Long Beach		Inland
6312	Boom 8x12	Am. Marine	600	WT 30 - Long Beach		Inland
6312	Boom 8x12	Am. Marine	1,200	FMC - Long Beach		Inland
6312	Boom 8x12	Am. Marine	1,500	Response Trailer 2066 - Anaheim	Kinder Morgan in Orange	Inland
6312	Boom 8x12	Am. Marine	1,600	Vessel Jonathan - Long Beach	Jonathan unit jon-1	Inland
6312	Boom 8x12	Am. Marine	1,800	Vessel 27' Monark Long Beach	Monark unit 6241	Inland
6312	Boom 8x12	Am. Marine	2,000	Trailer 3126 - Long Beach	Long Beach-green trailer	Inland
6312	Boom 12x18	Am.Marine	2,000	Trailer 2065 - Long Beach	Long Beach	Ocean
6313	Boom 42"	42" Containment System	2,000	Trailer 604 - Ventura	Ventura	Ocean
6313	Boom 42"	42" Containment System	2,000	Trailer 3278 - Long Beach	moved from long beach to ventura 6-4-07	Ocean
6313	Boom 42"	42" Containment System	2,000	Trailer 228844 - Long Beach	Long Beach	Ocean
6313	Boom 42"	42" Containment System	2,000	Trailer 31063 - Ventura	moved from long beach to ventura 6-4-07	Ocean
6313	Boom 42"	42" Inflatable Open Ocean Boom	2,500	Ship Services - Long Beach	Ship Services	Ocean
516	Sorbent Boom	Sorbents storage	0	Trailer 435 - Long Beach	Long Beach	
6312	Boom 8x12	Am. Marine	4,900	Trailer 3145 - Long Beach	Long Beach	Inland
6312	Boom 8x12	Am. Marine	2,000	Trailer 6081 - Ventura	Ventura	Inland
6312	Boom 8x12	Am. Marine/orange	800	Marine Response/MTR Trailer #3117	MTR trailer #3117 Long Beach	Inland
6312	Boom 8x12	Am. Marine	2,000	Trailer 3128 - Ventura	Port Hueneme	Inland
6312	Fence boom 24"	Seacor Environmental	3,500	Trailer #Keeb	Ventura	
6312	Boom 6x12	am. Marine	625	MTR trailer 6070	Long Beach	
		Total Boom Length (ft.)	35,625			

SKIFFS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
6365-1	Skiff	Lund, 16'	20 knts	Trailer #3118	Long Beach	Use/Quarterly
6365-2	Skiff	Lund, 16'	20 knts	Trailer #3118	Long Beach	Use/Quarterly
6365-3	Skiff	Lund, 16'	20 knts	Trailer #3118	Long Beach	Use/Quarterly
6365-4	Skiff	Lund, 16'	20 knts	Trailer #3118	Long Beach	Quarterly
6380-1	Skiff	Valco, 12'		Trailer #6030	Long Beach	Use/Quarterly
6380-2	Skiff	Valco, 12'		Trailer #6030	Long Beach	Use/Quarterly
6380-3	Skiff	Valco, 12'		Trailer #6030	Long Beach	Use/Quarterly
6380-4	Skiff	Valco, 12'		Marine Response/MTR Trailer #3117	Long Beach	Use/Quarterly
6380-5	Skiff	Valco, 12'		Deckboat #6005	Long Beach	Use/Monthly
6380-6	Skiff	Valco, 12'		Deckboat #6005	Long Beach	Use/Quarterly
6243-1	Skiff	McGregor 10'		Rack Marine Yard	Long Beach	Use/Quarterly
6243-2	Skiff	Klamath12'		Rack Marine Yard	Long Beach	Use/Quarterly
6243-3	Skiff	Klamath12'		Rack Marine Yard	Long Beach	Use/Quarterly
6243-4	Skiff	Klamath12'		Rack Marine Yard	Long Beach	Use/Quarterly
		Total Support Vessels	**14**			

VESSELS

ID#	Identification	Specification	Capacity/Speed	Storage	Home Base	Maintained
6005	Response Vessel 28'	Deckboat	18 knts	Moorage	Long Beach	Use/Quarterly
6030	Skimming Vessel 27'	Marco	18 knts	Moorage	Long Beach	Use/Monthly
6493	Response Vessel 22'	Boston Whaler	20 knts	Trailer	Long Beach	Use/Quarterly
6481	Response Vessel 27'	Grady White	30 knts	Trailer #6484/Shoreline Village	Long Beach	Use/Quarterly
6771	NRC Response	Kvichak 32'	15 knts	Moorage	Long Beach	Use/Quarterly
6010	18' Seasled	Munson	30 knts	Moorage	Long Beach	Use/Monthly
6241	Response Vessel 28'	Monark	30 knts	Moorage	Long Beach	Use/Monthly
6242	18' Seasled	Munson	30 knts	Moorage	Long Beach	Use/Monthly
JON-1	Workboat	Jonathan		Moorage	Long Beach	Use/Quarterly

Total Response Vessels	**9**

VESSEL TRAILERS

ID#	Identification	Specification	Storage	Home Base	Maintained
6346	Trailer	Big Tex	Long Beach	Long Beach	Quarterly
6207	Trailer, boat	EZ Loader, general utility	Long Beach	Long Beach	Quarterly
6078	Trailer, boat	EZ Loader, for boston whaler 6493	Long Beach	Long Beach	Quarterly
6030	Trailer, boat	Big Tex, skiffs, 18'	Long Beach	Long Beach	Quarterly
6069	Trailer, boat	EZ Loader	Long Beach	Long Beach	Quarterly
3118	Trailer, boat	Big Tex, skiff, 18'	Long Beach	Long Beach	Quarterly
6484	Trailer, boat	Sea Lion, for grady white 6481	Long Beach	Long Beach	Quarterly

NRC Environmental Resources

Long Beach COTP Zone

SKIMMERS

ID#	Identification	Specification	Recovery BPD	Efficiency	EDRC	Storage	Home Base
6375	Brush/Drum Skimmer	Aqua-Guard/RBS-10	3600.00	95%	3,420	Trailer #3117	Long Beach
6303	Brush/Drum Skimmer	Aqua-Guard/RBS-20	7200.00	95%	6,840	NRC Response #6771	Long Beach
5465	Skimmer	CASCADE-5465	27325	20%	5,465	Ventura Yard, flatbed trailer #364	OST Ventura
PT 2	Skimmer	Crucial ORD-XP-347	1735	20%	347	OSRV Patriot II	Long Beach
4149	Wier Skimmer	Foilex 150	5,280	20%	1,056	Barge Ship Services	Long Beach
4767	Wier Skimmer	Foilex Mini	5,280	20%	1,056	Trailer #3117	Long Beach
6030	Belt Skimmer Vessel	Marco / 1C	4,971	74%	3,679	Moorage NRCES dock	Long Beach
MEG 3	Wier Skimmer	Megator 3	3,600	20%	720	Trailer #3117	Long Beach
RMOP-1	Rope Skimmer	OMI Mark	240	20%	48	Yard	Long Beach
RMOP-2	Rope Skimmer	OMI Mark	240	20%	48	Yard	Long Beach
RMOP-3	Rope Skimmer	OMI Mark	240.00	20%	48	Yard	Long Beach
RMOP-4	Rope Skimmer	OMI Mark	240	20%	48	Yard	Long Beach
RT-70	Drum Skimmer	Roto Drum 70	10,560	92%	9,715	Trailer #353	Long Beach
6178-1	Disc Skimmer	Vikoma/Kebab 600 E	1,370	20%	274	Container #3047	Long Beach
6178-2	Disc Skimmer	Vikoma/Kebab 600 E	1,370	20%	274	Container #3047	Long Beach
6304	Disc Skimmer	Vikoma/Komara 12K	2,400	95%	2,280	Yard	Long Beach
4150	Wier Skimmer	Foilex 150	5,280	20%	1,056	Trailer #353	Long Beach
6359-1	Wier Skimmer	Douglas Skimpac	2,400	95%	2,280	Ventura	Ventura
6359-2	Wier Skimmer	Douglas Skimpac	2,400	95%	2,280	Yard	Long Beach
	Total EDRC BPD	**40,934**					

NRC Environmental Resources

Long Beach COTP Zone

HAZMAT / COMMUNICATION

MONITORING EQUIPMENT

ID#	Identification	Specification	Storage	Home Base	Maintained	Date Acquired
8085	Arizona Instruments	Jerome Meter		Mercury Meter	Dispatch	11/1/2003
	BRAUN	Digital Ear Thermometer	N/A	Digital thermometer (QTY 4)	Safety Office	11/1/2003
8052-1	BW Technology	Gas Alert Clip	H304-H039051	single gas personal clip (H2S)	Dispatch	11/1/2003
8052-2	BW Technology	Gas Alert Clip	H304-H039045	single gas personal clip (H2S)	Dispatch	11/1/2003
8052-3	BW Technology	Gas Alert Clip	H304-H039049	single gas personal clip (H2S)	Dispatch	11/1/2003
8052-4	BW Technology	Gas Alert Microclip	KA106-008882	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-5	BW Technology	Gas Alert Microclip	KA106-0028009	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-6	BW Technology	Gas Alert Microclip	KA106-009106	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-7	BW Technology	Gas Alert Microclip	KA106-0028132	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-8	BW Technology	Gas Alert Microclip	KA106-008877	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-9	BW Technology	Gas Alert Microclip	KA106-008936	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-10	BW Technology	Gas Alert Microclip	KA106-0020442	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-11	BW Technology	Gas Alert Microclip	KA106-0011933	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-12	BW Technology	Gas Alert Microclip	KA106-0020386	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-13	BW Technology	Gas Alert Microclip	KA106-0012627	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8052-14	BW Technology	Gas Alert Microclip	KA106-0011348	Multi-gas personal clip (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8069-1	Lumidor / Zellweger Analytics	Micro Max Plus	2214	4 gas meter (CO, H2S, O2, LEL)	Maciel	11/1/2003
8069-2	Lumidor / Zellweger Analytics	Micro Max Pro	10794	4 gas meter (CO, H2S, O2, LEL)	Dispatch	11/1/2003
8069-3	Mine Safety Appliances (MSA)	Passport		PID	Dispatch	11/1/2003
	OMRON Healthcare, Inc.	HEM-637	N/A	Wrist blood pressure monitor w/ intellisense (QTY 4)	Safety Office	11/1/2003
8069-4	RAE Systems	Mini RAE	110-009650	PID	Dispatch	11/1/2003
8069-5	RAE Systems	Mini RAE	110-009671	PID	Woodhall	11/1/2003
8069-6	RAE Systems	Multi RAE	095-518535	4 gas meter (CO, H2S, O2, LEL) + PID	Garrett	11/1/2003
8069-7	RAE Systems	Multi RAE	095-513115	4 gas meter (CO, H2S, O2, LEL) + PID	Dispatch	11/1/2003
8069-8	RKI Instruments	Eagle	E44060	4 gas meter (CO, H2S, O2, LEL)	Dispatch	11/1/2003
8069-9	RKI Instruments	Eagle	E44063	4 gas meter (CO, H2S, O2, LEL)	Dispatch	11/1/2003
8069-10	RKI Instruments	Eagle	E44054	4 gas meter (CO, H2S, O2, LEL)	Woodhall	11/1/2003
8069-11	RKI Instruments	Eagle	E07064	4 gas meter (CO, H2S, O2, LEL)	Safety Office	11/1/2003
8069-12	RKI Instruments	Eagle	E47107	4 gas meter (CO, H2S, O2, LEL)	Dispatch	11/1/2003

SAFETY EQUIPMENT

ID#	Identification	Specification	Storage	Home Base	Maintained	Date Acquired
9086	Allegro	8300 Vest	N/A	Vortex cooling vests (QTY 20)	Dispatch	
9085-1	DBI/Sala	Tripod - 8000010		9 ft. Aluminum Tripod; can withstand up to 5,000 lbs. of	Yard Container	
9085-2	DBI/Sala	Tripod - 8000010		9 ft. Aluminum Tripod; can withstand up to 5,000 lbs. of	Yard Container	
9085-3	DBI/Sala	Tripod - 8000010		9 ft. Aluminum Tripod; can withstand up to 5,000 lbs. of	Yard Container	
9066-1	Draeger	Hazmat Kit	N/A	Complete hazmat kit	Dispatch	
9066-2	Draeger	Hazmat Kit	N/A	Complete hazmat kit	Dispatch	
9066-3	Draeger	Hazmat Kit	N/A	Basic hazmat kit	Dispatch	
9066-3	Draeger	Hazmat Kit	N/A	Simultest kit	Dispatch	
	Guardian Equipment	AquaGuard G1540	N/A	Gravity-flow eye wash, 16 gallon portable	Yard Container	
8069-13	Industrial Scientific Corp.	ATX-612	0105377-105	4 gas meter (CO, H2S, O2, LEL)	Creighton	
	Lakeland Industries, Inc	LK-TK640W Level A Suits	N/A	(4) XL wide view front opening suits w/ Hansen pass thr	Yard Container	
	Lakeland Industries, Inc	LK-TK640W Level A Suits	N/A	(3) XXL wide view front opening suits w/ Hansen pass th	Yard Container	
	Lakeland Industries, Inc	LK-TK640W Level A Suits	N/A	(3) XXXL wide view front opening suits w/ Hansen pass	Yard Container	
	Lakeland Industries, Inc	TK-497 Level A Training Su	N/A	(2) XL Level A training suits	Safety Storage	
	Lakeland Industries, Inc	TK-497 Level A Training Su	N/A	(2) 2XL Level A training suits	Safety Storage	
	Lakeland Industries, Inc	TK-497 Level A Training Su	N/A	(2) 3XL Level A training suits	Safety Storage	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-110603	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080304	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-102914	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-110568	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080268	2015psi/5min	Underground	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080316	2015psi/5min	Underground	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080331	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080341	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	J20979	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-071142	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-110560	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-071188	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080251	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-102872	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-071155	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-080334	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-071159	2015psi/5min	Yard Container	
7112	Lifeair Respiratory Systems	L-505 EEBA	S/N-071120	2015psi/5min	Yard Container	
SCBA 30	SCOTT Health & Safety	SCBA	WK368213	2216psi/30min - Spare Cylinder	Yard Container	
SCBA 30	SCOTT Health & Safety	SCBA	WK389665	2216psi/30min - Spare Cylinder	Yard Container	
SCBA 30	SCOTT Health & Safety	SCBA	T209649	2216psi/30min - Spare Cylinder	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA	OP14826	4500psi/60min - Spare Cylinder	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA	OP16530	4500psi/60min - Spare Cylinder	Yard Container	
SCBA 30	SCOTT Health & Safety	SCBA Air Pack 2.2	WK398327	2216psi/30 min	Yard Container	
SCBA 30	SCOTT Health & Safety	SCBA Air Pack 2.2	T226984	2216psi/30 min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	OP49993	4500psi/60min	Tech.Rescue	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	OP46983	4500psi/60min	Tech.Rescue	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	OP46991	4500psi/60min	Tech.Rescue	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	OP48663	4500psi/60min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	OP46980	4500psi/60min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	59300060	4500psi/60min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	29701064	4500psi/60min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	5821822	4500psi/60min	Yard Container	
SCBA 60	SCOTT Health & Safety	SCBA Air Pack 4.5	8801159	4500psi/60min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A27401	2216psi/5 min	Tech.Rescue	

7112	SCOTT Health & Safety	Ska Pak	A33890	2216psi/5 min	Tech.Rescue	
7112	SCOTT Health & Safety	Ska Pak	A071514	2216psi/5 min	Tech.Rescue	
7112	SCOTT Health & Safety	Ska Pak	A33970	2216psi/5 min	Tech.Rescue	
7112	SCOTT Health & Safety	Ska Pak	A05098	2216psi/5 min	Tech.Rescue	
7112	SCOTT Health & Safety	Ska Pak	A27312	2216psi/5min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A076693	2216psi/5min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A33996	2216psi/5min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A33981	2216psi/5min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A33906	2216 psi/5min	Yard Container	
7112	SCOTT Health & Safety	Ska Pak	A27252	2216psi/5min	Yard Container	
	TSI Incorporated	Portacount Plus 8200	80248010	respirator fit testor	Safety Office	
7090	Cascade Air System		yard trailer			

MISCELLANEOUS ITEMS

ID#	Identification	Specification	Storage	Home Base	Maintained	Date Acquired	
3104	ATV trailer	hauls 6 x 4's	South Yard	Long Beach	N/A	91/1997	
A4134	Burning Unit	Oxygen/Acetylene	South Yard	Long Beach	N/A	1/15/2003	
A4135	Chipping Gun	Pneumatic	Cont #11	Alameda	N/A	1/15/2003	
A4136	Chain Saw	Gas, 18"	1130 (Excursion)	Long Beach	N/A	1/15/2003	
A4137	Chain Saw	Small Drills, Saws, Etc.	Yard Container	Long Beach	N/A	1/15/2003	
A4138	Sawzall (2)	Various	Yard Container	Long Beach	N/A	1/15/2003	
A4140	Hand Tools	Various	Cont. #3	Long Beach	N/A	1/15/2003	
4998	Truck mounted winch	Electric, 10,000 lb. capacity	Shop	Long Beach	Quarterly	1/15/2003	
9067	Wire Feeder - Welder	Portable Welding Unit	Ken Woodhall	Long Beach	N/A	1/15/2003	
6392	Decon Pool	20' x 100'	Yard	Long Beach	Quarterly	11/1/2003	
6392	Decon Pool	25"x50"	Yard	Long Beach	Quarterly	4/25/2007	
6392	Decon Pool	25'x50'	Yard	Long Beach	Quarterly	11/1/2003	
9080	ATV	Honda, 4x4	Yard	Long Beach	Quarterly	11/1/2003	
9081	ATV	Honda, 4x5	Yard	Long Beach	Quarterly	11/1/2003	
9082	ATV	Honda, 4x6	Yard	Long Beach	Quarterly	11/1/2003	
9163	Backhoe	2008 Joh Deere	Yard	Long Beach	Quarterly	9/8/2008	
9070	Backhoe	John Deere 710	Yard	Long Beach	Quarterly		
9165	Compact Track Loader	John Deere CT322	yard	Long Beach	Quarterly	9/8/2008	
9709	Vactor Ramps	15 Ton	Yard	Long Beach	Quarterly	1/15/2003	
NBMI-001	Boom Inflator	Leaf Blower	Cont #11	Long Beach	Quarterly	1/15/2003	
A9711	Multi-Purpose Saw	14" 2-Cycle	Con't #10	Alameda	Quarterly	1/16/2003	
9712	Chop Saw		Shop	Long Beach	Quarterly	1/15/2003	
6491	Water Buffalo	200 gal water trailer	Yard	Long Beach	Quarterly	Jun-06	
	Ratchet Straps	2"X27'	Yard Container	Long Beach	Quarterly		
	Roto Hammer	Hitatchi	Yard Container	Long Beach	Quarterly		
	Belt Sander	Black & Decker	Yard Container	Long Beach	Quarterly		
	18V Cordless Drill	Miluawkee	Yard Container	Long Beach	Quarterly		
9138	Forklift	Komatsu 25	Yard	Long Beach	Quarterly		
9137	Forklift	Caterpillar 40	Yard	Long Beach	Quarterly		
9135	Stainless Steel Tote, 350 Gal.	DOT 57 Design PSIG 9.5	Yard	Long Beach	Quarterly		
9136	Stainless Steel Tote, 350 Gal.	DOT 57 Design PSIG 9.6	Yard	Long Beach	Quarterly		

Certificates for contractual services follow this page.

- NRC contract
- Clean Seas Certificate: Venoco, Inc.
- Clean Seas Certificate: Carpinteria Plant to Rincon Pipeline System
- Clean Seas Certificate: Ventura Pipeline System

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MSA # VM 08114

MASTER SERVICE AGREEMENT
Covering Well Services and General Services for the Onshore and Offshore Areas of the United States of America

EFFECTIVE DATE: November 25, 2008

CONTRACTOR: NRC Environmental Services Inc

__ a Washington corporation
__ a division of ______________
__ a __________ limited liability company
__ a partnership
__ doing business as ______________

COMPANY: Venoco, Inc.

a Delaware corporation

Contractor's Representative

Name: Tom Hale (805-331-0126)
Title: NRC Manager

Physical Address
Pier D, Berth D47
Long Beach, California 90802

P.O. Box Address (if any)
____
____

Telephone: (562) 432-1304
Facsimile: (562) 432-1826
E-mail: thale@nrces.com

Company's Representative

Name: Greg Sobanski
Title: Contracts/Purchasing Coordinator

Physical Address
370 17th Street, Suite 3900
Denver, CO 80202

P.O. Box Address (if any)
____
____

Telephone: (303) 626-8300
Facsimile: (303) 626-8315
E-mail: greg.sobanski@venocoinc.com

CONSPICUOUS AND FAIR NOTICE

BOTH PARTIES AGREE THAT THIS STATEMENT COMPLIES WITH THE REQUIREMENT, KNOWN AS THE "EXPRESS NEGLIGENCE RULE," TO EXPRESSLY STATE IN A CONSPICUOUS MANNER TO AFFORD FAIR AND ADEQUATE NOTICE THAT THIS AGREEMENT HAS PROVISIONS REQUIRING ONE PARTY (THE INDEMNITOR) TO BE RESPONSIBLE FOR THE NEGLIGENCE, STRICT LIABILITY, OR OTHER FAULT OF ANOTHER PARTY (THE INDEMNITEE).

BOTH PARTIES REPRESENT TO EACH OTHER (1) THAT THEY HAVE CONSULTED AN ATTORNEY CONCERNING THIS AGREEMENT OR, IF THEY HAVE NOT CONSULTED AN ATTORNEY, THAT THEY WERE PROVIDED THE OPPORTUNITY AND HAD THE ABILITY TO SO CONSULT, BUT MADE AN INFORMED DECISION NOT TO DO SO, AND (2) THAT THEY FULLY UNDERSTAND THEIR RIGHTS AND OBLIGATIONS UNDER THIS AGREEMENT.

Initial Here

Contractor:

NRC Environmental Services

By: [signature]

Its: General Manager

Tax I.D. No.: 91-1572532

Company:

Venoco, Inc.

By: [signature]

Its: VP Sac Basin Ops.

Initial Here

CERTIFICATE OF CONTRACTUAL SERVICES

CLEAN SEAS, LLC

Issued to:

VENOCO, INC.

as a Member of Clean Seas, LLC for activities involving oil production and/or transportation of oil to facilities in or near the marine waters within the Clean Seas' Area of Response in accordance with the current Clean Seas Operating Agreement. The contractual services provided shall remain in effect from January 1, 2010, until properly terminated, or December 31, 2010, whichever shall first occur.

CLEAN SEAS, LLC
Carpinteria, California

By: G. E. Ikerd

Name: G.E. Ikerd

Title: General Manager

Dated: December 15, 2009

CERTIFICATE OF CONTRACTUAL SERVICES

CLEAN SEAS, LLC

Issued to:

VENOCO, INC.

CARPINTERIA PROCESSING PLANT TO RINCON PIPELINE SYSTEM

as a Shore Based Facility requested to be covered by Venoco, Inc., who is a Member of Clean Seas, LLC with activities involving the production and/or transportation of oil in or near the marine waters to facilities in the Clean Seas' Area of Response in accordance with the current Clean Seas Operating Agreement. The contractual services provided shall remain in effect from January 1, 2010 until properly terminated, or December 31, 2010 whichever shall first occur.

CLEAN SEAS, LLC
Carpinteria, California

By: G. E. Ikerd

Name: G.E. Ikerd

Title: General Manager

Dated: December 15, 2009

CERTIFICATE OF CONTRACTUAL SERVICES

CLEAN SEAS, LLC

Issued to:

VENOCO, INC.

VENTURA PIPELINE SYSTEM

as a Shore Based Facility requested to be covered by Venoco, Inc., who is a Member of Clean Seas, LLC with activities involving the production and/or transportation of oil in or near the marine waters to facilities in the Clean Seas' Area of Response in accordance with the current Clean Seas Operating Agreement. The contractual services provided shall remain in effect from January 1, 2010 until properly terminated, or December 31, 2010 whichever shall first occur.

CLEAN SEAS, LLC
Carpinteria, California

By: G. E. Ikerd

Name: G.E. Ikerd

Title: General Manager

Dated: December 15, 2009

H.1 INTRODUCTION

This Appendix includes information and analysis on the following topics:

- Calculations for the worst case discharge per Bureau of Safety and Environmental Enforcement (BSEE) requirements.
- Planning volumes and resource requirement analyses, a three-tiered analysis (including response in adverse weather conditions).
- Procurement and response times for OSROs.
- Trajectory and offsite consequence analyses.

H.2 WORST CASE DISCHARGE

The worst case discharge has been calculated in accordance with 30 CFR §254.47.

H.2.1 Volume

The worst case discharge for Platforms Gail, Grace, and associated pipelines, has been calculated to be 3,776 bbls and is from Platform Gail. The worst case discharge from Grace was calculated to be 2595 bbls. The details associated with this calculation are presented below.

H.2.2 Discussion of Calculations

The worst case scenario was calculated from two potential locations, Platform Gail and Platform Grace. The worst case discharge is the sum of the following:

1. The maximum capacity of the oil storage tanks, flowlines, processing vessels, and diesel on board the platform.
2. The volume of oil calculated to leak from a rupture of a subsea pipeline.
3. The daily production from an uncontrolled blowout of the highest capacity well.

Item 1 (storage) is included in tables for each of the platforms.

Item 2 for pipelines has been calculated using the BSEE Pipeline Oil Spill Volume Estimator. The default values for pipeline roughness (0.00015 ft.), heat transfer coefficient (10 BTU/ft3 h °F), and gas density (0.06 lb/scf) has been used in the modeling. The water cut has been assumed to be 0%. The temperature of the seawater has been assumed to be 50°F. The diameter of the release point has been assumed to be equal to the diameter of the pipeline. In all cases it has been assumed that a release would be detected and the pumps shutdown within two minutes. This allots 1 minute 15 seconds for detection and 45 seconds for closure.

Item 3 the worst case discharge was determined based on the highest capacity well on recent production rates. Reservoir characteristics, casing and production tubing sizes, historical production and reservoir pressure data were considered under a 30 day uncontrolled release scenario.

Platform Gail

Platform Gail discharge includes the maximum capacity in the facilities on the platform, the worst case discharge volume of oil that would leak from the pipeline at Gail, and the daily production volume from an uncontrolled blowout of the highest capacity well at Gail. (E-5 is a static, non-flowing well). In the unlikely event of an uncontrolled blowout of the highest capacity well at Gail lasting for 30 days, Clean Seas maintains skimming and storage resources many times the daily rate. The sum of these discharges is 3,725 bbls for Platform Gail (see Table H -1).

Table H-1. Gail Worst Case Discharge Summation

Discharge Component	Volume (barrels)	Description
Platform vessels and piping	2,068	
Diesel storage	890	
Highest capacity well	650	E - 5
Pipelines at Gail	168	M-28 and M-30
Total	3,776	

Maximum Capacity of oil storage tanks, vessels, and flowlines is estimated at 2,068 barrels of oil as summarized in Table H-2. Diesel is stored in two areas consisting of 290 and 600 bbl. The highest flow rate well is E-5 which produced 650 barrels of oil per day.

Table H-2. Platform Gail Vessels And Piping

Vessel		Diameter (feet)	Length (feet)	Vessel Volume (barrels)	Per Cent Water Cut	Oil Volume (barrels)
T-1	Slop Tank			300	0	300
T-2	Slop Tank			300	0	300
T-22	Oil Skimmer			40	0	40
T-42	Drain Receiver			51	0	51
	6 Separators			60	0	60
V-1		6.5	20	118	50	59
V-2		3.5	15	26	50	13
V-3		6.5	20	118	50	59

Table H-2. Platform Gail Vessels And Piping

Vessel		Diameter (feet)	Length (feet)	Vessel Volume (barrels)	Per Cent Water Cut	Oil Volume (barrels)
V-4		3.5	15	26	50	13
V-5		3.5	15	26	50	13
V-6		12	40	806	50	403
V-7		12	40	806	50	403
V-8				225	0	225
V-13				20	0	20
V-53		4.5	12	34	50	17
Total Vessel Volume				2,955	50	1,477
Add for lines, etc.			20	591	0	591
Total Product				3,546		2,068

Platform Gail to Platform Grace Pipelines – Table H-3 presents information on the pipelines. The two pipelines between Platform Gail and Platform Grace are essentially identical and therefore, the modeling conducted is applicable to both. The pipeline was separated into the following three segments for modeling purposes: Platform Gail riser, Platform Grace riser, and the sea bottom pipeline connecting the two risers. All pipeline segments have an inside diameter (ID) of 7.625 in. Each segment is described below.

- Platform Gail Riser has a total length of 864 ft, with 125 ft being above sea level.
- Platform Grace Riser has a total length of 443 ft, with 125 ft being above sea level.
- The length of the pipeline between the two platforms is 32,419 ft. The pipeline is 739 ft below sea level at Platform Gail and 318 ft at Platform Grace.

Table H-3. Pipeline Data

Start Location	End Location	Pipeline	Nominal Size	OD in.	Wall (inches)	PL ID in.	Length (miles)	Length (feet)	Area (sq. in.)	Volume (cu. ft)	Volume (bbls)	Volume (bbl/mile)
Gail (M-28)	Grace	Oil	8	8.625	0.5	7.625	6.14	32,419	45.66	10,280	1,831	298
Gail (M-30)	Grace	Oil	8	8.625	0.5	7.625	6.14	32,419	45.66	10,280	1,831	298
Grace	Carpinteria	Oil	12/10	12.75/ 10.75	.375/ .365	12.00/ 10.00	11.77/ 3.62	62,150/ 19,013	119.73/ 78.85	51,895/ 10,419	9242/ 1855	785/ 515

The fluid properties used in the modeling are as follows:

- Flow rate – 5,786 bbl/day
- Gas density – 0.06 lb/scf (default)
- Oil density – 7.35 lb/gal
- Gas-to-oil ratio (GOR) – 5 scf/bbl
- Water cut – 0%
- MAOP – 1,390 psi

Three release locations were modeled to determine the worst-case release. The three locations and the release sizes calculated by the model at each of the locations are presented below.

- The intersection of Platform Gail riser and seafloor pipeline (depth 739 ft) – 84 bbl
- The intersection of Platform Grace riser and seafloor pipeline (depth 318 ft) – 22 bbl
- The midpoint between the two platforms (depth 528 ft) – 21 bbl

Thus, the worst-case release for each Platform Gail to Platform Grace pipeline is 84 bbl. For both, the worst-case release is the sum, 168 bbl.

Platform Grace

When in production, Platform Grace discharge includes the maximum capacity in the facilities on the platform, the worst case discharge volume of oil that would leak from the pipeline at Grace, and the daily production volume from an uncontrolled blowout of the highest capacity well at Grace. There are no flowing wells on Platform Grace. The sum of these discharges is 2,685 bbls for Platform Grace (see Table H-4). In the unlikely event of an uncontrolled blowout lasting 30 days of the highest capacity well at Grace, Clean Seas maintains skimming and storage resources many times the daily rate.

Table H-4. Grace Worst Case Discharge Summation

Discharge Component	Volume (barrels)	Description
Platform vessels and piping	1,557	
Diesel storage	636	
Highest capacity well	110	A-08
Pipelines at Grace	292	M-28, M-30 and Grace to shore
Total	2,595	

Anticipated maximum production on Platform Grace is 110 bbls; maximum capacity of oil storage tanks, vessels, and piping is estimated at 1,557 barrels of oil. There is 636 bbl of diesel storage on Platform Grace. Grace has no active wells capable of flowing. Grace pipeline volumes are calculated to be 292 barrels of oil.

Table H-5. Platform Grace Vessels and Piping

Vessel		Dia (feet)	Length (feet)	Width (feet)	Height (feet)	Vol (cu. feet).	Vol[1] (barrels)
E-03	Preheat Exchanger Prod. "A"	15	3.0			113.1	10
E-05	Wet Oil Heat Exchanger "A"	15	2.5			77.7	6.9
TK-03 A	Dirty Oil Tanks	8		14	16	1,792.0	159.6
TK-03 B	Dirty Oil Tanks	8		14	16	1,792.0	159.6
TK-11	Dirty Oil Tanks	8		14	16	1,792.0	159.6
TK-16	Diesel Storage Tank	33		10	11	3,575.0	636.7
V-01	Production Separator A	15	6.0			480.6	42.8
V-03	Production Separator B	15	6.0			480.6	42.8
V-04	Test Separator "B"	10	4.0			142.4	12.7
V-08	Surge Tank	14	10.0			1,361.1	242.4
V-05	Well Clean-up Separator	12	4.0			151	13.4
V-23		5	5.0			130.9	23.3
Piping		0.4	6000				47
TOTAL VOLUME							1556.8
[1] Volumes represent the application of 50% water cut.							

Platform Grace to Carpinteria Pipeline – Table H-3 presents information on the pipeline. This pipeline was separated into the following four segments for modeling purposes:

- Platform Grace Riser – This pipeline has an ID of 12 inches and a total length of 443 ft, with 125 ft being above sea level.
- 12-inch ID pipeline from the Platform Grace Riser to the 10-inch ID pipeline – This pipeline has a length of 62,550 ft. This pipeline is 318 ft below sea level at Platform Grace and 135 ft where it connects to the 10-inch pipeline.
- 10-inch ID pipeline that runs from the 12-inch ID pipeline to the shoreline – This pipeline segment has a length of 17,592 ft. This pipeline is 135 ft below sea level at its connection with the 12-inch ID pipeline and 0 ft at the shoreline.
- 10-inch ID pipeline from the shoreline to the Carpinteria facility – This pipeline segment has a length of 1,000 ft. It reaches an elevation of 55 ft at the Carpinteria facility.

The fluid properties used in the modeling are as follows:

- Flow rate – 7,786 bbl/day (maximum production for preceding 12 months and anticipated maximum production from Grace)
- Gas density – 0.06 lb/scf (default)
- Oil density – 6.68 lb/gal
- Gas-to-oil ratio (GOR) – 5 scf/bbl
- Water cut – 0%
- MAOP – 740 psi

Three release locations were modeled to determine the worst-case release. The three locations and the release sizes calculated by the model at each of the locations are presented below.

- Intersection of Platform Grace riser and seafloor pipeline (depth 318 ft) – 86 bbl
- Intersection of the 12-inch and 10-inch ID pipeline segments (depth 135 ft) – 103 bbl
- Near the shoreline (depth 1 ft) – 124 bbl

Thus, the worst-case release for the Platform Grace to Carpinteria facility pipeline is 124 bbl.

H.3 RESOURCE REQUIREMENT ANALYSIS

Determination of the planning volumes for on water/onshore recovery and the quantity of response resources necessary for the three-tiered response to a worst case discharge is provided in Appendix Q for OSPR, Appendix R for DOT/PHMSA and Appendix S for EPA. Venoco is a member of Clean Seas, which has sufficient response resources to meet both the Federal and State response thresholds. Clean Seas is committed to maintaining its equipment in good working order such that it can perform according to specifications. In addition, Clean Seas has access to additional offshore resources which may be cascaded into its area from other cooperatives. Venoco also maintains a contract with NRC Environmental Services (NRC) for onshore response, which will be activated, as needed.

In the event of a spill from Venoco's facilities, primary response would come from Clean Seas' Southern OSRV capable of deploying boom within one hour. Clean Seas can initiate recovery within two hours of discovery of a spill. Its skimmer can be deployed in 5-to-6-foot seas, and can operate in 8-to-10-foot seas and 20-knot winds. Venoco would further rely on Clean Seas to provide secondary and tertiary oil spill response.

H.4 TRANSPORTATION OF REQUIRED EQUIPMENT, PERSONNEL AND OTHER RESOURCES TO THE SPILL SITE

H.4.1 Personnel

- Company personnel on the response team will arrive by personal or Company vehicles or aircraft if out of the region.
- CS, NRC and other contract cleanup companies will arrive by personal vehicle, Company vehicle, or aircraft and rental vehicles.

H.4.2 Equipment

- CS, NRC and other contract cleanup companies' response equipment will be transported (towed) to the spill site by trucks. The equipment is strategically stationed within their spheres of influence.
- OSRVs will provide all on-water transportation to the spill site, if necessary. 2 CS' Southern OSRVs are moored in Ventura Harbor, and 1 SRV is moored at Santa Barbara Harbor. These vessels have extensive oil spill response equipment onboard. Trained personnel operate and deploy equipment from the vessel.

H.4.3 Transportation During Adverse Environmental Conditions

Adverse environmental conditions (i.e., weather, sea state, tides, wind currents) are not expected to affect the effort most of the year. Mild, wet winters and warm dry summers typify the climate. Winds are normally light to moderate. The currents along the West Coast are dominated by the southward flowing California Current with a mean speed of about 0.2-to-0.5 knots. Waves are usually less than 2 feet high and have periods of less than 9 seconds. Winter waves tend to be 6 feet or less.

During adverse weather periods when sea states, tides, winds, and/or currents are adverse, the transportation of personnel and equipment may be hampered or halted altogether. The presence of debris or other obstacles in the water and along the shoreline could restrict response efforts. The decision to deploy personnel and equipment in inclement weather will ultimately rest with the Unified Command with input from the Captains of the OSRVs and the Safety Officer.

While waiting for the adverse environmental condition(s) to subside, the Incident Commander and response personnel will prepare and plan for response operations. Activities may include monitoring the status of the spill, staging equipment and/or personnel at strategic areas that are safe to access, protecting sensitive areas that may be impacted, if safe to do so, and removing debris from potential impact areas.

H.5 PROCUREMENT AND RESPONSE TIMES FOR OIL SPILL RESPONSE ORGANIZATIONS (ACP 2008: Sec 5210.1)

Estimated procurement and response times for Clean Seas (CS) are provided in Table H-6. The Company, together with CS, has the necessary resources to provide the required three-tiered response to a worst case discharge. The times are approximate. Actual response times may vary due to sea/current conditions or activities engaged in at the time of the spill notification call (e.g. resupply, refueling, training, minor maintenance). Response times are based on average vessel speed of 26 knots, and one OSRV crewed 24/7/365 ready to respond within 5 minutes of call out. Mobilization times for equipment and personnel of other response contractors are included in Section 5210.1 of the ACP. An equipment list is included in Appendix F of this Plan.

Table H-6. Estimated Procurement and Response Times for Clean Seas.

OSRO	Location	Procurement Time for Containment Recovery, and Storage Equipment	Procurement Time for Equipment Transportation Vessels	Equipment Loadout Time	Travel Time to Deployment Site	Equipment Deployment Time
CS	Carpinteria	5-to-10 minutes	Included in equipment procurement	0-to-2.0 hours	1.0-to-2.0 hours	≤0.5 hours
Notes: Times provided are best estimates and may vary depending on weather and other circumstances. Procurement for equipment and vessel(s) is made with a single call to the OSRO.						

NRC branch office in Ventura allows them to respond efficiently in the event of an incident. Venoco will activate NRC to provide shoreline cleanup services.

NRC has response equipment stockpiled from Eureka to San Diego along the coast and through the Central Valley. Extensive resources in Southern California are positioned in Long Beach and San Diego, CA.

A description of all oil spill transfer and disposal equipment is list in Section F for Clean Seas and NRC.

A breakdown of NRC response personnel by job category is provided below. These numbers are estimates and may vary from time-to-time.

NRC RESPONSE PERSONNEL			
Position	**Number**	**Position**	**Number**
Incident Commander	3	Supervisor	19
Project Manager	11	Equipment Operator	22
Logistics	4	Foreman	14
Administrator	10	Technician	150
Operations Section Chief	6	Laborer	175

H.6 OIL SPILL TRAJECTORY MODELING USING GNOME

Oil Spill trajectory modeling was conducted using the NOAA GNOME model. GNOME is unique among trajectory models because it allows the user to see the uncertainty in each trajectory. For example, weather forecasts may be wrong in the wind speed, direction, or timing. GNOME takes this into account and provides two solutions to an oil spill scenario: (1) a “best guess” or forecast trajectory and (2) a “minimum regret” or uncertainty trajectory.

The “best guess” solution shows the model result with all of the input data assumed to be correct. However, models, observations, and forecasts are not always perfect. Consequently, GNOME has incorporated an understanding of uncertainties that can occur. The second solution allows the model to predict other possible trajectories that are less likely to occur, but which may have higher associated risks. GNOME calls the trajectory that incorporates these uncertainties the “minimum regret” solution because it gives the user information about areas that could be impacted if different input data were specified.

Both trajectories are represented by “splots”, which are statistically independent pieces of the modeled pollutant. They appear as small “pollutant particles” on a map when the spill trajectory is run. The “best guess” trajectory is represented by black “splots”; the “minimum regret” trajectory is represented by red “splots.”

Santa Barbara Channel (SBC) is a coastal area where the circulation is constantly changing. The local winds are highly variable, and the channel is located within the Southern California Bight, where cold, upwelled water meets warmer water from farther south. The current field here is complex, with eddies and meanders on the scale of 30 mi (50 km). As a result, currents along the southern islands and northern continental coast can often flow in the opposite directions or even at right angles to one another.

Oceanographers have defined three distinct circulation patterns that can occur within the Santa Barbara Channel:

1. UPWELLING STATE

The upwelling state is named for the upwelling of cold (approximately 11°C) subsurface waters near Pt. Conception that often accompanies this state. The upwelling state occurs primarily in spring, although it has also been observed in other seasons. In terms of the conceptual models of the momentum balance, the upwelling state occurs when strong (>10 m/s), persistent (several days or more), upwelling favorable (equatorward) winds overwhelm any poleward, along-shelf pressure gradient.

Currents: The most characteristic feature of the resulting flow field is southward flow at the western entrance to the SBC, which continues eastward from San Miguel to Santa Cruz and out the eastern SBC entrance. However, even during upwelling, the flow can be weakly (10 cm/s) westward on the mainland coast of the SBC. While there can be a cyclonic (counterclockwise) recirculation in the western channel during upwelling, the southern limb of the circulation is almost always stronger than the northern limb. Weaker velocities tend to occur in the eastern SBC over the broad shelf between Port Hueneme and Santa Barbara and in the SMB within 5 km of the coast. Within the SMB, the strongest (20 cm/s) velocities are observed over the 100 m isobath between Purisima Pt. and Pt. Arguello, where strong southward velocities are observed. Very weak velocities (<10 cm/s) are often observed within 5 km of the shore in San Luis Obispo Bay and between Pt. Sal and Purisima Pt. During upwelling, velocity fluctuations (relative to the mean upwelling state) are strongest southwest of Pt. Conception. This may be an expression of the tendency for an upwelling jet to fluctuate in direction and speed during upwelling. The weakest fluctuations are found over the northeast SBC shelf between Santa Barbara and Ventura, as well as the above-mentioned nearshore regions (within 5 km) of the SMB coast.

Winds: During upwelling, the wind field tends to show strong velocities (10 m/s) from the northwest (to the southeast) south of Pt. Conception at NDBC 46054. Within the SMB, winds are generally onshore and equatorward. Within the eastern SBC, winds can be relatively weak.

Sea-Surface Temperatures: When available, satellite sea-surface temperature images often show cold water (11-12°C) between Pt. Arguello and Pt. Conception. Cooler water can be seen spreading southward from Pt. Conception past San Miguel Island and eastward from San Miguel towards the eastern entrance to the SBC.

2. CONVERGENT STATE

The convergent state is named for the convergence of southward flow west of Pt. Arguello with westward flow south of Pt. Conception. The convergent state occurs primarily in summer, although it has also been observed in other seasons. In terms of the conceptual models of the momentum balance, the convergent state tends to occur when upwelling favorable winds and a strong poleward, along-shelf pressure gradient exist.

Currents: The most characteristic feature of the resulting flow field is a strong cyclonic recirculation in the western SBC with about equal strength in the northern and southern limbs of the recirculation. During the convergent state, velocities in the western SBC are often 40 cm/s or more, up to 70 cm/s. While northwestward flow at the eastern entrance to the SBC often occurs during the convergent state, northeastward flow directly across the eastern entrance to the SBC can also occur. The convergent synoptic state averages are accompanied by southward flow in the SMB near the shore and off-shelf flow further away from the coast. The combination of westward flow at the northeast SBC entrance and southward flow along the SMB coast is associated with convergence and offshore flow southwest of Pt. Conception. Relative to the upwelling state, stronger velocities are observed in the western SBC and in most of the SMB. The highest velocity fluctuations are observed at the western entrance to the SBC. The lowest velocity fluctuations are again found between Santa Barbara and Ventura and in San Luis Obispo Bay.

Winds: In the convergent state, the wind field can resemble the upwelling wind field, although this is not diagnostic; weak winds sometimes accompany the convergent state, but not always. The average winds at NDBC 46054 during convergence are nearly equal to those observed in upwelling, above 7 m/s from the northwest (to the southeast).

Sea-Surface Temperatures: In the convergent state, satellite sea-surface temperature images often show warm water (17-20°C) extending from the eastern SBC north and westward along the mainland coast. South of Pt. Conception, this warm water turns south and, in exceptionally clear images, a counterclockwise recirculation of warm water can often be discerned. Cold, upwelled waters are still present between Pt. Conception and Pt. Arguello, often with tongues of cold water reaching westward or southwestward.

3. RELAXATION STATE

The relaxation state is named for the time periods when winds off Pt. Conception "relax" from their usual equatorward direction. The relaxation state occurs primarily in fall and early winter. In terms of the conceptual models of the momentum balance, the relaxation state occurs when poleward, along-shelf pressure gradients overwhelm upwelling favorable or weak winds.

Currents: The most characteristic feature of the resulting flow field is a strong westward flow (>50 cm/s) through the SBC and into the SMB. Flow in the SMB is strongest along the mainland coast. Cyclonic recirculation in the western SBC is often present, but with a northern limb strengthened with respect to the southern limb. Poleward flow continues out the western entrance to the SBC into the SMB. Within the SMB, the strongest poleward averages are found offshore of the 100 m isobath, where there is generally an offshore, in addition to poleward, component of flow. Closer to shore in the SMB, the flow velocity averages are weaker poleward flow and, in some nearshore locations, southward flow.

The highest velocity fluctuations occur west of Pt. Conception in the region where the westward flow from the SBC is turning poleward into the SMB. A secondary maximum in the western SBC occurs where recirculating cyclonic flow rejoins the westward flow along the mainland coast. The lowest velocity fluctuations are again found between Santa Barbara and Ventura and in San Luis Obispo Bay.

Winds: Winds during relaxation tend to be either weak and variable or poleward. That is, weak or northwestward winds are usually seen at NDBC 46054 at the western entrance to SBC.

Sea-Surface Temperatures: Satellite sea-surface temperature images during relaxation will often show warm water (17-20°C) extending from Pt. Conception northwestward into the SMB.

Example Runs

The worst case release of 6,500 bbls was used as the release size for all the modeling runs. All releases were assumed to occur from the mid-point of the two platforms which is 34º 09.17’ N and 119º 26.03’ W. To be conservative, all releases were assumed to be non-weathering oil.

Three runs were made, one for each of the circulation patterns. Constant wind speed and directions were used based on the most likely case for each of the circulation patterns as presented below. Each scenario was run for 72 hours. In the event of an actual spill, GNOME can be run real time using real time data.

- Upwelling – 10 m/s from NW
- Convergent – 7 m/s from NW
- Relaxation – 1 m/s from NW

The results of each of the scenarios are presented by circulation pattern in the following subsections.

H.6.1 Upwelling

All of the oil moved to the SE a off of the map.

H.6.2 Convergent

The oil moved to the SE with 1,100 bbls reaching the shoreline before leaving the map area. The results of the modeling are shown in Figure H-1.

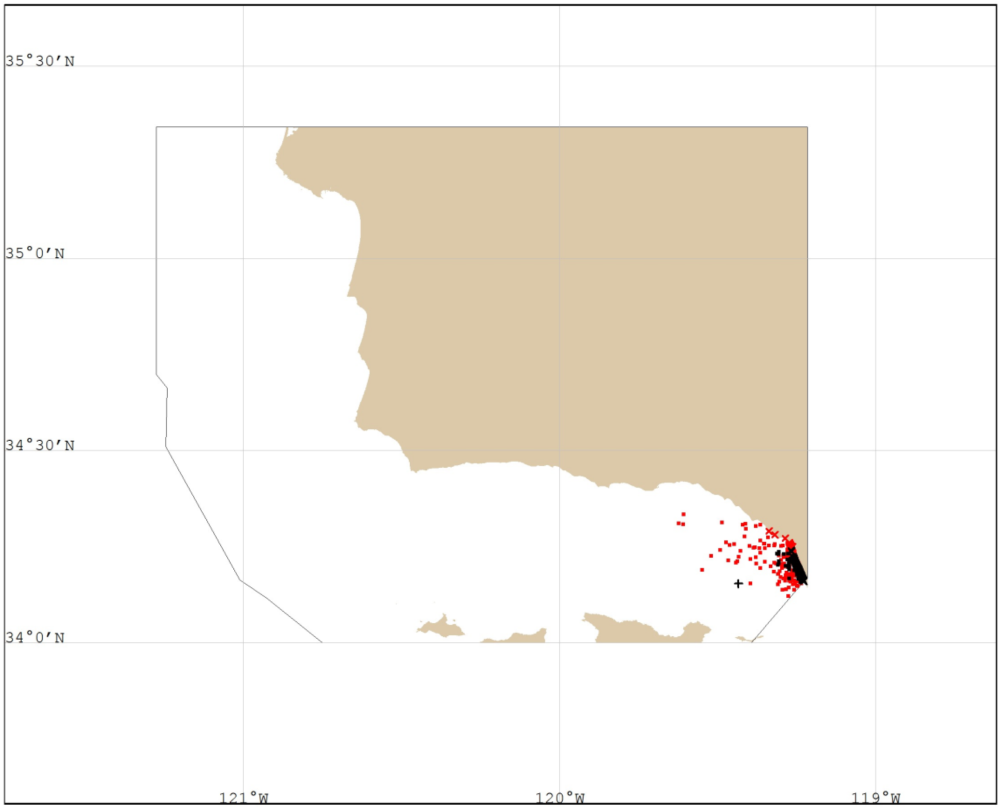
H.6.3 Relaxation

Because of the low speed, the majority of the oil remained on the water after 72 hrs. Figure H-2 presents the results of this modeling run.

Estimate for: 11:00 10/23/05
Prepared: 11:50 10/20/05

Prepared by:
Contact Phone:

This trajectory was created using climatological currents from a GNOME Location File, and is unlikely to represent conditions existing at any particular time at the depicted location. Use Location Files only to create spill scenarios for training and educational purposes, not for actual spill response.



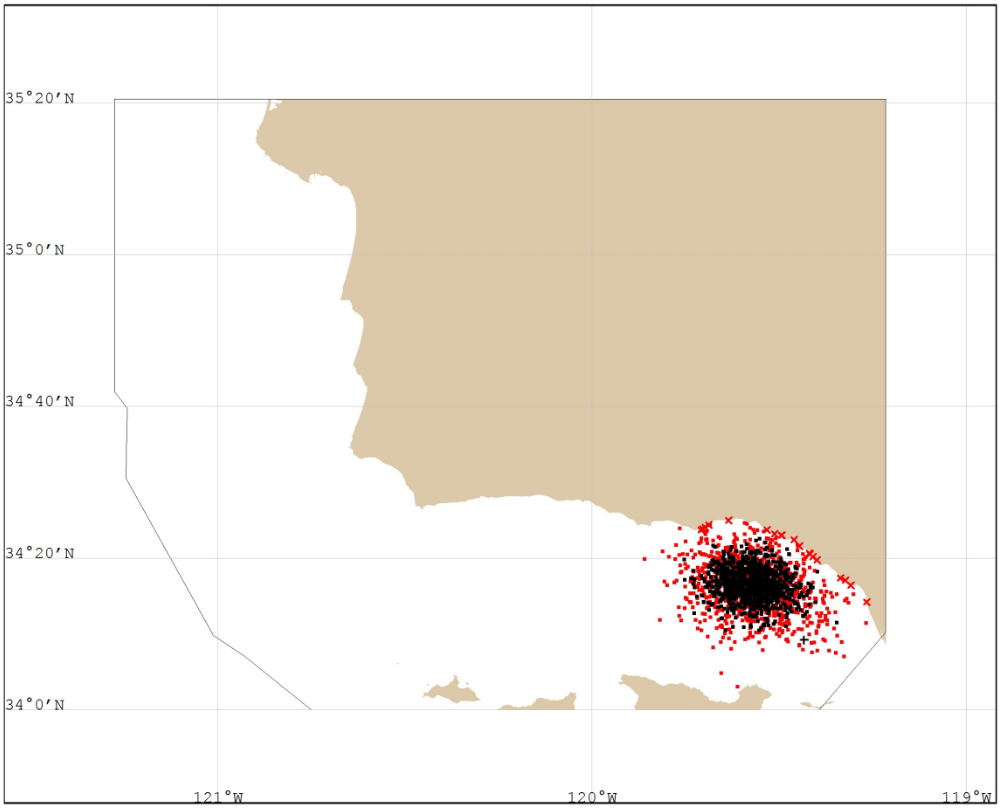
Santa Barbara Channel Currents:Convergent Wind: Constant 7 meters / sec from NW Number of Spills: 1	Black Splots: Best Guess, Red Splots: Uncertainty Splot Mass Balance Totals (Best guess): Released: 6500 barrels Evaporated and Dispersed: 0 barrels Beached: 1105 barrels Off Map: 5044 barrels Floating: 351 barrels

Figure H-1 GNOME Results for Convergent Circulation

Model Mode: Standard
Estimate for: 11:00 10/23/05
Prepared: 11:30 10/20/05

Scenario Name: Venoco 6,500 bbl Release - Rela
Prepared by:
Contact Phone:

This trajectory was created using climatological currents from a GNOME Location File, and is unlikely to represent conditions existing at any particular time at the depicted location. Use Location Files only to create spill scenarios for training and educational purposes, not for actual spill response.



Santa Barbara Channel Currents:Relaxation Wind: Constant 1 meters / sec from NW Number of Spills: 1	Black Splots: Best Guess, Red Splots: Uncertainty Splot Mass Balance Totals (Best guess): Released: 6500 barrels Evaporated and Dispersed: 0 barrels Beached: 0 barrels Off Map: 0 barrels Floating: 6500 barrels

Figure H-2 GNOME Results for Relaxation Circulation

H.7 BOEMRE OIL SPILL RISK ANALYSIS (OSRA) (OCS Report BOEMRE 2000-057; ACP 2008: Sec 9800 through 9842)

Results of the OSRA: Pacific Outer Continental Shelf Program were reviewed to identify land segments and resources on the California coast and nearby islands most likely to be impacted by an oil spill from Platforms Gail and/or Grace (referred to in the report as launch point PF6 and 8, respectively) and the pipelines from Platform Gail to Grace and Grace to Carpinteria (referred to in the report as launch point PL3 and 6, respectively). Two sets of land segments were used in the study; the second set is referenced in this analysis (see Figure H-3). These land segments were defined by the U.S. Geological Survey 7.5 Minute Quad series maps, beginning with the southern U.S. border (Imperial Beach) and proceeding northward (Soberanes Point) and correspond closely to the maps in Section 9800 of the ACP. A cross reference index land segment numbers, USGS quad names, and ACP map numbers in the potential impact area, refer to Table H-16.

The BOEMRE study provided probabilities that specific land segments will be contacted by an oil spill starting at Platforms Gail and Grace, and the Pipelines from Gail to Grace and Grace to Carpinteria within 3, 10, and 30 days in each of the four seasons. These seasonal average probabilities (see Tables H-8 through H-15) are most useful in identifying segments and resources at risk for each of the four primary seasonal periods.

Tables H-8 through H-15 show non-zero probabilities for locations on most of the Channel Islands. Oceanographic and wind conditions create seasonal differences in the possible distributions of oil spills. These tables summarize many runs of the model and include platform and pipeline releases; a single oil spill would not necessarily impact every area cited.

Figure H-3. BOEMRE Land Segments

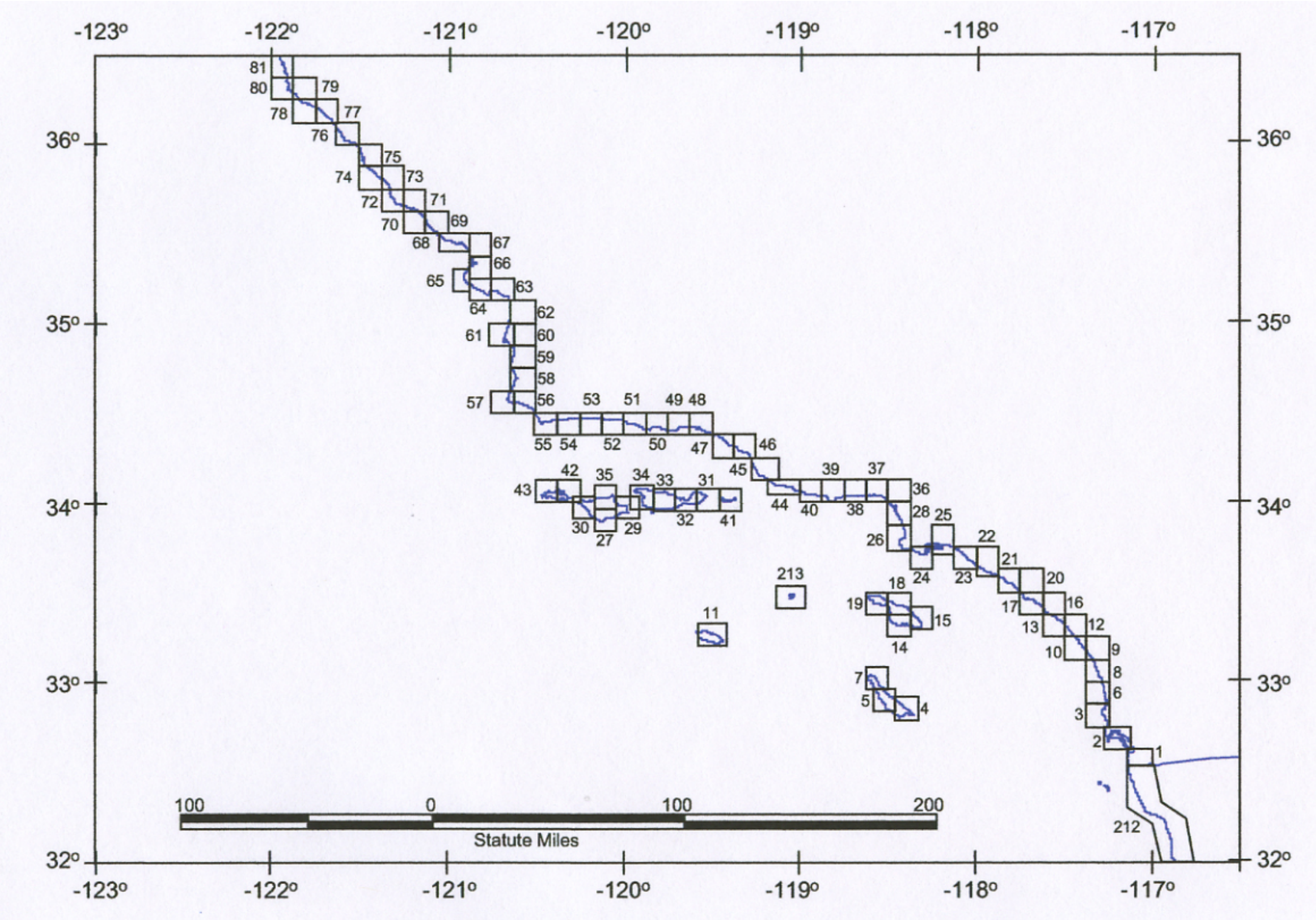


Table H.-8. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Platform Gail (PF 6) and Platform Grace (PF 8) in the Winter Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8
7						1
11					1	
14					3	2
18					2	
19			1	1	3	3
27						1
29					1	1
31	1	2	4	6	6	8
32		1	3	3	4	4
33			2	1	2	1
34			1		1	
35			1	1	1	1
41	29	13	33	31	35	33
42						1
43				1		2
44			1	1	2	1
45			1	3	1	4
50		1	1	1	1	2
52				1		1
53			1	1	1	2
54			1	2	2	3
55				1		1
213					2	2
Note: blank cells = less than 0.5 percent chance						

For the platform launch points, the Winter Scenario resulted in greater than one percent probabilities on several of the offshore islands: San Clemente, San Nicholas, Santa Catalina, Santa Barbara, Anacapa, Santa Cruz, Santa Rosa and San Miguel; and along the mainland from Point Mugu to Oxnard, Goleta and from Tajiguas to Point Conception. The highest probabilities occurred on Anacapa Island.

Table H-9. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Pipeline Gail to Grace (PL 3) and Pipeline Grace to Carpinteria (PL 6) in the Winter Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6
11					1	1
14					1	2
15					1	1
18					1	
19			1		3	
27						1
29			1		1	3
30					1	
31	3		6	2	8	4
32			2	2	3	4
33			1	2	1	3
34			1	1	1	1
35			1		1	
41	23	2	39	13	40	18
42					1	1
43			1		1	1
44			1	1	1	1
45				5	1	6
46				1		1
47		1		2		2
48		1		1		2
49		1		2		3
50		3	1	6	1	7
52				2		2
53			1	1	2	3
54			1	2	2	4
55			1	1	1	3
213					1	1
Note: blank cells = less than 0.5 percent chance						

For the pipeline launch points, the Winter Scenario resulted in greater than one percent probabilities on several of the offshore islands: San Nicholas, Santa Catalina, Santa Barbara, Anacapa, Santa Cruz, Santa Rosa and San Miguel; and along the mainland from Point Mugu to Goleta and from Tajiguas to Point Conception. The highest probabilities occurred on Anacapa Island.

Table H-10. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Platform Gail (PF 6) and Platform Grace (PF 8) in the Spring Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8
2					1	
4					3	3
5					1	1
7			1		7	6
14					7	9
15					1	
17					1	1
18			1	1	13	14
19			3	3	19	17
21					1	2
22					1	1
44			1	1	1	1
45	1	1	1	2	3	3
213			2	1	3	1
Note: blank cells = less than 0.5 percent chance						

For the platform launch points, the Spring Scenario resulted in greater than one percent probabilities on several of the offshore islands: San Clemente, Santa Catalina, and Santa Barbara; and along the mainland at Point Loma, Dana Point, from Laguna Beach to Newport Beach, and from Point Mugu to Oxnard. The highest probabilities occurred on Santa Catalina Island.

Table H-11. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Pipeline Gail to Grace (PL 3) and Pipeline Grace to Carpinteria (PL 6) in the Spring Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6
4					3	1
5					1	1
7					6	5
14				1	9	6
17					1	1
18			1		11	7
19					20	16
21					2	1
22					1	1
27			4	2		
41			1		1	
44			1	1	1	1
45	1	6	1	15	1	15
46		1		2		2
47		1		2		2
49				1		1
213			1		1	1
Note: blank cells = less than 0.5 percent chance						

For the pipeline launch points, the Spring Scenario resulted in greater than one percent probabilities on several of the offshore islands: San Clemente, Santa Catalina, Santa Barbara, Anacapa, and Santa Rosa; and along the mainland from Point Mugu to Pitas Point and Santa Barbara. The highest probabilities occurred on Santa Catalina Island.

Table H-12. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Platform Gail (PF 6) and Platform Grace (PF 8) in the Summer Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8
4					1	1
5					1	1
7					2	2
14					1	1
15					1	1
18					7	7
19					4	3
22					1	
23					1	1
24					4	3
26					9	10
28					30	29
36					1	1
37					1	1
38					1	1
39			1	1	3	3
40			6	8	7	9
44			8	9	8	9
45			1	1	1	1
Note: blank cells = less than 0.5 percent chance						

For the platform launch points, the Summer Scenario resulted in greater than one percent probabilities on two of the offshore islands: San Clemente and Santa Catalina, and along the mainland from Newport Beach to San Pedro, Redondo Beach to Venice, Beverly Hills to Triunfo Pass, and from Point Mugu to Oxnard. The highest probabilities occurred at Venice.

Table H-13. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Pipeline Gail to Grace (PL 3) and Pipeline Grace to Carpinteria (PL 6) in the Summer Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6
5					1	1
7					4	1
14					1	2
15					1	2
18					8	4
19					4	4
22					1	
23					2	2
24					4	2
26					9	7
28					31	12
36					1	1
37					1	1
38					1	1
39			1		2	2
40			5	8	7	9
44			6	26	6	26
45		3	1	9	1	9
Note: blank cells = less than 0.5 percent chance						

For the pipeline launch points, the Summer Scenario resulted in greater than one percent probabilities on two of the offshore islands: San Clemente and Santa Catalina, and along the mainland from Newport Beach to San Pedro, Redondo Beach to Venice, Beverly Hills to Triunfo Pass, and from Point Mugu to Oxnard. The highest probabilities occurred at Venice and Point Mugu.

Table H-14. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Platform Gail (PF 6) and Platform Grace (PF 8) in the Autumn Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8	Launch Pt PF 6	Launch Pt. PF 8
30			1	1	8	9
31	1		4	3	7	6
32			1	1	5	3
33				1	2	3
34					3	4
35				3	14	14
38					1	
39						1
41	1	1	5	3	7	5
42			1	1	6	6
43			1	4	8	9
47					3	1
49				1		1
50			1	2	7	8
51				1		1
52			1	2	3	3
53			1	1	2	2
54			1	1	3	2
55			1	1	2	2
Note: blank cells = less than 0.5 percent chance						

For the platform launch points, the Autumn Scenario resulted in greater than one percent probabilities on two of the offshore islands: Anacapa, Santa Cruz, Santa Rosa annd San Miguel, and along the mainland from Malibu Beach to Point Dume, Pitas Point, and from Santa Barbara to Point Conception. The highest probabilities occurred at Santa Rosa Island.

Table H-15. Conditional Probabilities (Expressed as Percent Chance) that an Oil Spill Starting at Pipeline Gail to Grace (PL 3) and Pipeline Grace to Carpinteria (PL 6) in the Autumn Season Will Contact a Certain Land Segment Within 3, 10, and 30 Days.

Land Segment	Contact Within 3 Days		Contact Within 10 Days		Contact Within 30 Days	
	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6	Launch Pt PL 3	Launch Pt. PL 6
11						1
30			1	3	9	8
31	1		5	3	7	5
32			1	1	4	5
33				1	2	5
34					5	5
35			1	5	15	12
39					1	
40						1
41	1		4	1	5	1
42			2	3	6	4
43			3	8	9	10
44						1
47					1	1
49			1	1	1	2
50			1	5	7	9
51			1	1	1	1
52			1	4	2	4
53			1	2	2	2
54			1	3	3	3
55				1	1	1
Note: blank cells = less than 0.5 percent chance						

For the pipeline launch points, the Autumn Scenario resulted in greater than one percent probabilities on three of the offshore islands: San Nicolas, San Clemente and Santa Catalina, and along the mainland from Point Dume to Triunfo Pass, and Point Mugu, Pitas Point and from Santa Barbara to Point Conception. The highest probabilities occurred at Santa Rosa Island.

Table H-16 lists all segments with non-zero probabilities of contact within 30 days and lists the 2008 ACP site numbers to assist responders in quickly assessing this information.

Table H-16. Land Segments Showing Non-Zero Probabilities of Contact From an Oil Spill Originating From Platforms Gail and Grace and the Pipelines Between Gail and Grace and Grace to Carpinteria.

BOEMRE Land Segment Number	2008 ACP Operating Division	U.S.G.S. 7.5' Quad Name
4	Outside boundaries	San Clemente Island South
5	Outside boundaries	San Clemente Island Central
7	Outside boundaries	San Clemente Island North
11	No operational division	San Nicolas Island
14	No operational division	Santa Catalina Island South
15	No operational division	Santa Catalina Island East
18	No operational division	Santa Catalina Island North
19	No operational division	Santa Catalina Island West
21	LA County, Div. D	Laguna Beach
22	LA County, Div. B	Newport Beach
23	LA County, Div. A	Seal Beach
24	LA County, Div. G	San Pedro
26	LA County, Div. E	Redondo Beach
27	Channel Islands Div. BB	Santa Rosa Island South
28	LA County, Div. D	Venice
29	Channel Islands Div. BB	Santa Rosa Island East
30	Channel Islands Div. BB	Santa Rosa Island West
31	Channel Islands Div. CC	Santa Cruz Island D
32	Channel Islands Div. CC	Santa Cruz Island C
33	Channel Islands Div. CC	Santa Cruz Island B
34	Channel Islands Div. CC	Santa Cruz Island A
35	Channel Islands Div. BB	Santa Rosa Island North
37	LA County, Div. A	Topanga
38	LA County, Div. B	Malibu
39	LA County, Div. A/B	Point Dume
40	LA County, Div. A	Triunfo Pass
41	Channel Islands Div. DD	Anacapa Island
42	Channel Islands Div. AA	San Miguel Island East
43	Channel Islands Div. AA	San Miguel Island West
44	Ventura County, Div. H	Point Mugu
45	Ventura County, Div. E, F, G	Oxnard
46	Ventura County, Div. C, D	Ventura
47	S.B. County Div. S, T	Pitas Point
48	S.B. County Div. S, T	Carpinteria
49	S.B. County Div. R	Santa Barbara
50	S.B. County Div. P	Goleta

Table H-16. Land Segments Showing Non-Zero Probabilities of Contact From an Oil Spill Originating From Platforms Gail and Grace and the Pipelines Between Gail and Grace and Grace to Carpinteria.

BOEMRE Land Segment Number	2008 ACP Operating Division	U.S.G.S. 7.5' Quad Name
51	S.B. County Div. M, N	Dos Pueblos Canyon
52	S.B. County Div. K	Tajiguas
53	S.B. County Div. I	Gaviota
54	S.B. County Div. H	Sacate
55	S.B. County Div. G	Point Conception
213	No Operational Division	Santa Barbara Island
Note: Analysis of the environmentally and economically sensitive areas that could be potentially impacted by as spill as indicted by the BOEMRE OSRA is found in Appendix M of this Plan.		

I.1 INTRODUCTION (ACP Sec 3000 - 3230)

The feasibility of effectively implementing containment and recovery techniques is generally dependent on the size of the spill, the type of spill material, available logistical resources, implementation time, and environmental conditions in the spill area. The procession of each major stage of spill response operations from spill discovery to completion is shown in Figure I-1.

Venoco personnel and spill response equipment on the Platforms are the primary responders to an oil spill on Platforms Gail & Grace. Venoco relies on Clean Seas' for secondary response offshore and NRC Environmental Services Inc. (NRC) onshore, their equipment and expertise to contain and recover spilled oil. Equipment lists and contractual agreements are provided in Appendix F and G, respectively.

The Area Contingency Plan (ACP), Section 3000, provides a description of various oil containment, recovery and removal methods available to the Unified Command System (UCS) during a spill response. Utilizing cooperative/contractor-owned equipment, the following methods for containing spilled oil and removing it from the environment will be used, if it is safe to do so.

I.2 OPEN-WATER RESPONSE AND CLEANUP STRATEGIES (ACP Sec 3210 & 3230)

Should a spill occur from a platform, pipeline, or crew/supply vessel, rapid containment is vital to minimize the spread of oil. Containment booms that can be rapidly deployed are available from Clean Seas (see Appendix F for a listing of CS' equipment). Once a spill reaches the ocean, it will generally move in the direction of the wind and/or current. The spill could move offshore or along the shoreline.

I.2.1 Open-Water Cleanup

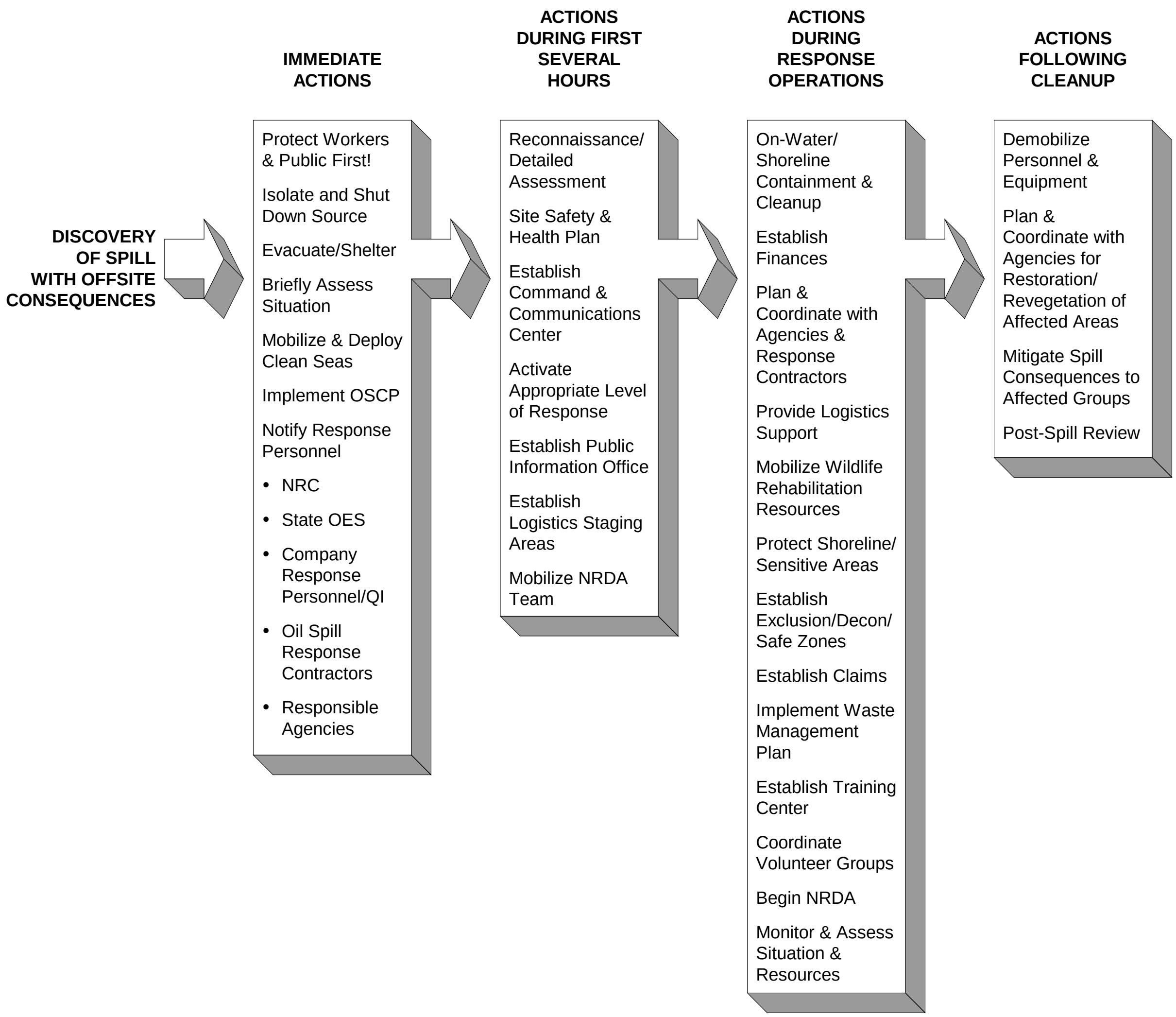
Oil removal/recovery in open water is accomplished through the use of skimming devices. Once the oil is contained, CS will provide the expertise and personnel for open water oil recovery. CS OSRVs the Clean Ocean, Clean Sweep, Ocean Scout and Ocean Guardian with associated Boom Support Vessels provide containment and recovery of the oil.

I.2.1.1 Open-Water Cleanup for Contained Spills

A floating skimmer placed inside the boomed area best cleans a spill that is fully contained by booms. The oil will tend to concentrate against the boom in the direction of the wind and current. The skimmer should be placed in this area and continually moved to skim the thickest area. When skimming becomes inefficient (after most of the spill has been removed, or for small spills; that is, spills less than one barrel), sorbent booms, pads, or rolls may be used. Loose sorbent materials should be avoided.

Figure I-1. Oil Spill Response Flowchart.

Note: Response actions implemented will depend on the magnitude and extent of the spill incident



I.2.1.2 Open-Water Cleanup for Uncontained Spills

Uncontained spills form slicks which will continue to spread and move freely according to prevailing winds and currents. The primary method of recovering large, uncontained spills involves the use of deploying ocean boom. The boom is deployed in 1000' "U" shaped sections by boom boats directed by CS overflights. The boom boats collect and hold the oil until the CS skimming vessels arrive.

The skimming barriers are deployed in a "U" shape from both sides of the response vessel, with the outer ends of the barriers attached to outrigger booms. The booms are fixed to the rails of the vessel and secured by guy wires fore, aft, and vertically to a mast at the center of the vessel. Skimming speeds should not exceed 1-to-1.5 knots to avoid entrainment of oil under the barrier. Skimming should begin on the downwind side of the slick and move across the slick, staying on the downwind side.

Skimming equipment that can be used for open water skimming of uncontained spills, with booms, is available from CS' response vessels or storage locations.

I.3 SHORELINE RESPONSE AND CLEANUP STRATEGIES (ACP Sec 3210 & 3240)

I.3.1 Areas of Potential Impact (ACP Sec 3810 & 9813)

Potential spill trajectories and spill pathways are discussed in Appendix H.

I.3.2 Shoreline Protection

The ability to predict the direction and rate of movement of spilled oil is critical to identifying sensitive resources that may be impacted and determining the type of shoreline protection strategies to implement.

The Planning Section is responsible for providing response operations with daily information on:

- Probable beach impact area(s).
- Protective booming to provide protection of sensitive resource areas.
- Wildlife sensitivity areas.
- Debris removal.
- Special access and equipment deployment requirements.
- Protective booming installations and maintenance.

Table I-1 summarizes the applicability and resource requirements for the following shoreline protection techniques:

- Diversion booming.
- Exclusion booming.
- Containment booming.
- Sorbent booms/barriers.
- Beach berming.
- Beach sumps.

The 11th Coast Guard District has developed specific plans and procedures for the placement of booms to protect sensitive areas. Additional information on sensitive areas is also provided in Appendix M.

In the event that an area or areas is/are threatened as a result of a spill, Venoco will rely on the expertise of CS to plan and implement shoreline protection response. The Company understands that all response efforts are subject to approval of the Unified Command which includes, in addition to Venoco, the Federal On-Scene Coordinator, the State On-Scene Commander (DFG/OSPR), and the Local Government Incident Commander.

Table I-1. Applicability and Resource Requirements for Shoreline Protection Techniques.

Response Technique	Applicability	Resource Requirements
Diversion Booming	• Low energy shorelines in currents exceeding one knot • Deflect/divert oil to/away from shoreline	• Curtain boom (approx. 1,500 ft, length depends on width of approaching slick and/or area of shoreline to be protected) • Boom deployment boat (shallow draft) • Anchor, tension cables, hand tools • Sorbents and plastic bags • 9 people
Exclusion Booming	• Entrance to harbors, marinas, breakwaters, inlets	• Curtain boom (1,000-to-1,500 ft) • Boom deployment boat (20 ft) • Anchor, tow lines, hand tools • Truck • Sorbents and plastic bags, pump and storage tanks • 9 people
Containment Booming	• Open water to surround approaching oil slick	• Containment boom • Boom deployment and tending boats • Anchor, tow lines, hand tools • Skimmer, pump and storage tanks • 9 people
Sorbent Booms/ Barriers	• Entrance to wetlands • Control entrance of oil into wetlands and movement of oils within wetlands	• Sorbent boom/barrier (4 times as long as width of the waterway when currents present) • Small boat • Fencing, pipe supports, cable sorbent, hand tools, plastic bags • 6 people
Beach Berming	• Mid-intertidal zone of a beach • Prevent spread of oil contamination to backshore areas • Only effective for 1 or 2 tidal cycles	• Motor grader • Bulldozer • Hand tools • 3 people
Beach Sumps	• Shoreline with some long shore drift, wave NRC on cannot be extreme, small tidal range • Prevent oil migration down beaches	• Backhoe • Vacuum truck • Tank truck • Hand tools, suction hoses • 3 people

I.3.3 Shoreline Cleanup (ACP Sec 3240)

Once a shoreline area is affected by spilled oil, it will be necessary to determine the most effective cleanup technique to use, while at the same time minimizing secondary environmental impacts. The technique selected will depend on a number of factors, including:

- Safety considerations
- Characteristics of the oil (e.g., degree of emulsification, weathering).
- Type of shoreline affected.
- Degree and extent of oiling of the affected shoreline.
- Accessibility of the shoreline.
- Sensitivity of the shoreline.

Both the ACP and Clean Seas provide guidance on the types of cleanup techniques that could be applied to shorelines. The extent (in miles) of the different shoreline types from Santa Barbara to Port Hueneme, and Santa Cruz and Anacapa Island are summarized in Table I-2 and illustrated graphically in the maps in Appendix M.

Table I-2. Shoreline ESI Type Summary.

Area Name	Total Miles	ESI Type[1] (Statute Miles)									
		1	2	3	4	5	6	7	8	9	10
Santa Barbara	9.0	0.6	1.4	3.7	1.4	1.0	0.9	0.0	0.0	0.0	0.0
Carpinteria	13.3	0.5	0.8	6.2	0.0	0.8	4.2	0.0	0.2	0.6	0.0
White Peak Ledge	3.2	0.0	0.9	0.9	0.0	0.6	0.8	0.0	0.0	0.0	0.0
Pitas Point	9.7	0.0	0.0	4.4	0.0	2.0	3.3	0.0	0.0	0.0	0.0
Ventura	13.3	0.0	0.0	1.3	3.5	4.8	3.3	0.0	0.4	0.0	0.0
Oxnard	17.0	0.0	0.0	0.0	8.1	0.0	3.5	0.0	5.3	0.1	0.0
Point Mugu	14.9	0.2	0.0	0.0	10.2	0.0	3.5	0.0	0.0	1.0	0.0
Mainland Subtotal	80.4	1.3	3.1	16.5	23.2	9.2	19.5	0.0	5.9	1.7	0.0
Santa Cruz Island	78.2	37.5	17.4	0.0	5.8	11.4	5.5	0.0	0.7	0.0	0.0
Anacapa Island	11.9	7.4	2.3	0.0	0.0	0.2	2.0	0.0	0.0	0.0	0.0
Island Subtotal	90.1	44.9	19.7	0.0	5.8	11.6	7.5	0.0	0.7	0/0	0.0
Total Miles	170.5	46.2	22.8	16.5	19.0	20.8	27.0	0.0	6.6	1.7	0.0

[1] Types:		Persistence Potential
1	Exposed Wave-cut Cliffs, Seawalls, and Piers	Low
2	Exposed Wave-cut Platforms	Low
3	Fine to Medium-grained Sand Beaches	Low
4	Coarse-grained Sand to Gravel Beaches	Moderate
5	Mixed Sand and Gravel (or Shell Beaches	Low
6	Gravel Beaches and Rip-rap Structures	High
7	Exposed Tidal flats	Moderate
8	Sheltered Rocky Shores and Sheltered Manmade Structures	High
9	Sheltered Tidal Flats	Moderate
10	Salt Marshes	Very High

Reference: Based on OSPR Guidance Document.

DFG/OSPR has also prepared a matrix (see Table I-3 below) showing the shoreline cleanup techniques to be used on the various shoreline types.

Table I-3. Cleanup Techniques and Shoreline Types.

Cleanup Technique[2]	ShorelineTypes[1]									
	1	2	3	4	5	6	7	8	9	10
1. No NRCon	P	P	X	X	X	X	A	X	A	A
2. Manual Debris Removal	P	A	R	R	R	R	P	R	P	P
3. Passive Collection (sorbents)	R	R	R	R	R	R	R	R	R	R
4. Debris Removal with Heavy Equipment	X	X	A	A	A	P	X	A	X	A
5. Trenching (recovery wells)	X	X	P	P	P	P	X	X	X	X
6. Sediment Removal	X	X	S	P	P	P	X	X	X	X
7. Cold Water Flooding (deluge)	A	A	A	A	A	A	A	A	A	A
8. Cold Water Washing	X	X	X	X	X	X	X	X	X	X
(a) Low Pressure (<50 psi)	A	A	X	P	P	A	X	A	X	P
(b) High Pressure (50-100 psi)	A	X	X	P	P	A	X	X	X	X
9. Warm Water Washing (ambient to 90°F)	A	A	X	P	P	A	X	A	X	X
10. Hot Water Pressure Washing (>90°F)	A	X	X	X	X	P	X	X	X	X
11. Slurry Sandblasting	A	X	X	X	X	P	X	X	X	X
12. Vacuum	A	A	A	A	A	A	A	A	A	A
13. Cutting Vegetation[3]	X	X	X	X	X	X	X	P	X	P
14. Chemical Treatment[4]	X	X	X	X	X	X	X	X	X	X
(a) Oil Stabilization	X	X	P	P	P	X	P	X	X	X
(b) Protection of Beaches	X	P	P	P	P	P	X	P	X	X
(c) Cleaning of Beaches	X	P	P	P	P	P	X	P	X	X
15. Burning[4]	A	A	A	A	A	P	X	X	X	P
16. Nutrient Enhancement	X	X	A	A	A	X	P	A	A	P
17. Microbial NRCon[4]	X	X	A	A	A	X	P	A	A	P
18. Sediment Reworking[4]	X	X	A	P	P	P	X	X	X	X
19. Shore Removal and Replacement[4]	X	X	P	P	P	X	X	X	X	X

[1] See Table I-2, for shoreline types.

[2] Key:

R Recommended. May be preferred alternative. Method that best achieves the goal of minimizing destruction or injury to the environment.

A Applicable. Variable and possibly useful but may result in limited adverse effects to the environment.

P Possible. Effectiveness and possible harm to the environment would have to be carefully evaluated.

X Do not use.

[3] Cutting will depend upon the time of year. Consider only if re-oiling of birds is possible.

[4] Requires State approval of all cases. RRT approval also required for federalized spills.

Reference: Based on OSPR Guidance Document.

A summary of the resources required to implement these cleanup techniques is provided in Table I-4.

Table I-4. Resource Requirements for Shoreline Cleanup Techniques.

Cleanup Technique	Resource Requirements
Manual Debris Removal	• Debris boxes, plastic bags, bins, hand tools (rakes, shovels, hand pumps • Light vehicle, shallow craft, helicopter • 10-to-100 people per mile • 1-to-3 supervisors per mile
Passive Collection (Sorbents)	• Snare boom • Fencing, pipe supports, cable, sorbent, hand tools, plastic bags • Small boat • 6 people
Sediment/Debris/Shore Removal with Heavy Equipment	• Dump trucks • Motor graders • Bulldozers • Front-end loaders • 1 equipment operator for each piece of equipment • 1 supervisor
Trenching	• Motor graders • Bulldozers • Dump trucks • 1 equipment operator for each piece of equipment • 1 supervisor
Shoreline Washing – Low Pressure (cold/warm water)	• Low pressure flushing unit • Seawater supply • Vacuum system • Sorbent pads • Storage for contained oil • Light vehicle • 2 boats • 3 operators per site
Shoreline Washing – High Pressure (cold water)	• High pressure flushing unit • Seawater supply • Vacuum system and 100 ft of boom • Sorbent pads • Storage for contained oil • Water heaters, power supply, header base, intake hoses • Vehicles • 2 small boats • 3 operators per site
Shoreline Washing – High Pressure (warm water)	• High pressure hot water pumps • 1,000-to-6,000 ft of boom • Light and heavy oil skimmers • 400-to-2,000 ft of hose of various diameters • 3 operators per site

Table I-4. Resource Requirements for Shoreline Cleanup Techniques.

Cleanup Technique	Resource Requirements
Slurry Sandblasting	• Sandblasting unit • Compressor • Sand supply truck • Front-end loader • Sand • Light vehicle, shallow craft, helicopter • 5-to-8 people
Vacuum Pumping	• Vacuum truck with suction hoses • Suction head, pump, storage tanks • Power source for portable units • 2-to-3 people per unit
Vegetative Cutting	• Cutting tools, collecting tools, plastic or burlap bags, rolls of ground cover • Light vehicle, shallow craft, helicopter • 5 crews of 10 workers each (4 workers with cutting tools and 6 with collecting tools) • 1 supervisor

Irrespective of the shoreline cleanup technique employed, the following general principles should be observed:

- Proper safety procedures should be followed. All workers must receive safety training, including appropriate HAZWOPER training in accordance with OSHA regulations.
- Oil trapped in booms should be picked up prior to the next tidal cycle.
- All food, trash, and waste should be removed from the shoreline daily, if possible, to minimize attracting scavengers into the contaminated area.
- All state and federal laws/policies, pertaining to wildlife protection and collection of live and dead animal parts from protected species, should be observed.
- Sensitive areas should be clearly delineated prior to deployment of equipment and personnel. Activity in a sensitive area should be restricted.
- All signs of human activity should be removed upon completion of treatment.
- Unaffected areas adjacent to shoreline treatment areas should be boomed off, where possible, to protect them from oiling during treatment operations.
- Impact to lower intertidal areas should be minimized. Sorbents should be employed below oiled upper beach faces to protect the lower intertidal zone from oiling.

I.4 ON-LAND RESPONSE AND CLEANUP STRATEGIES

I.4.1 Source Control

Containment and control of an oil spill are the first and primary activity of any response effort. The object of source control is to stop the discharge, which may involve a range of activities, including:

- Closing a valve.
- Plugging a hole.
- Facility shutdown.

This is done to meet the primary goal of protection of the public, personnel, the environment, and property.

Oil spill response and cleanup supplies are available at Ellwood Onshore Facility, Ellwood Pier and Platform Holly. Assistance is available from Clean Seas and NRC. Refer to Appendix F for equipment lists.

I.4.2 On-Land Containment and Recovery Strategies

General on-land response and recovery strategies are outlined below.

I.4.2.1 Earthen Berms or Dikes

Construct earthen berms, using whatever equipment is necessary to contain the oil in a readily accessible area. The collection point should allow vehicle access whenever possible.

I.4.2.2 Culverts

If an oil spill enters a small canal or dry waterway, a nearby downstream culvert can provide an efficient place to contain the spill. If the culvert has wing walls, it already restricts the channel and will provide good support for damming the flow. A solid covering can be used to block a pipe opening or box type opening. The contained oil can be removed using a vacuum truck and/or absorbent material.

I.4.2.2.1 Culverts: Upstream End

The following types of devices, materials, and installation strategies are suggested:

- For each culvert, a simple plywood panel of size sufficient to block the culvert and to fit flush with the culvert surface between the wing walls can be used.
- Stakes can be driven into the ground about three feet up-slope from the top of the culvert concrete. The panel can be lowered into place, with handling lines using the stakes as braces, and then fixed in position.

- A supply of about 20 sandbags would be needed. These sandbags can be placed upstream of the blocking panel to aid in holding it in place and sealing the edges.
- If water were flowing in the creek at the time of the oil spill, a space under the panel would be used to permit water to continue down the creek while the oil is blocked.

I.4.2.2.2 Culverts: Downstream End

Panels of the same size and structure as those prepared for culverts at the upstream end are suitable for the downstream end; however, supporting timbers may be needed to hold the panels over the ends of the culverts against the flowing oil.

I.4.3 On-Land Cleanup Techniques

Terrestrial (on-land) cleanup techniques are provided in Table I-5.

Table I-5. Terrestrial Cleanup Techniques.

Technique	Equipment	Personnel	Other Resources	Unit Area
Containment/ Diversion Berming	bulldozer or grader or front end loader, vacuum truck	supervisor equip. operators 4-5 laborers	hoses, plastic liner, soil, sandbags, sorbents, warning tape, protective clothing, fuel & maintenance for equipment	each containment location
Interception Trench	backhoe, vacuum pump	supervisor equip. operators 2-3 laborers	hoses, visqueen/plastic liner, sorbents, storage containers, plastic bags, barrier supports, protective clothing, fuel & maintenance for vehicle	each containment location
Blocking Dams	bulldozer or backhoe or front end loader, pickup truck with tools, possible vacuum truck or pump, skimmer, dump truck(s) for removal	supervisor equip. operators 2-3 laborers	plastic liner, geotextiles, soil, sandbags, 3-4” underflow pipe, barrier supports, sorbents, storage bags, protective clothing, fuel & maintenance for equipment	each dam location

Table I-5. Terrestrial Cleanup Techniques.

Technique	Equipment	Personnel	Other Resources	Unit Area
Culvert Blocking	backhoe or front end loader, pickup truck with tools	supervisor equip. operators 2-3 laborers	plywood, sheet metal, inflatable plugs (if available), soil, sandbags, lumber, hose and fittings, plastic bags, storage containers, protective clothing, fuel & maintenance for equipment	each culvert location
Manual Removal/ Vegetation Cutting	dump truck, debris box, possible pressure pump for washing vegetation	2 crews with 1 supervisor 5-10 laborers per crew	cutting tools, rakes, shovels, pitchforks, plastic bags, plastic sheeting, sorbent pads, protective clothing, fuel & maintenance for equipment	approx. 50 K sq. ft. (1+ acre) per 8-hr shift

I.4.4 Restoration

Once cleanup has been completed, it may be necessary to restore areas impacted by a spill. Severe impacts include significant soil contamination, site disturbance that significantly alters the contour of the location, cleaning of contaminated vegetation, or removal of vegetation killed or seriously damaged by oil.

Typical restoration involves one or more of the following:

- Remove contaminated soil and dispose of it in an approved disposal site.
- Re-contour a site that was disturbed in cleanup activities, which may involve the importation of soil if substantial amounts have had to be removed.
- Wash vegetation to remove light oil residues.
- Cut and trim vegetation to remove more heavily contaminated foliage.
- Remove vegetation that is dead or not expected to recover.
- Re-seed or place replacement vegetation if a significant amount of the existing ground cover was removed.
- Implement erosion control measures, such as applying jute mesh or hay bales, contour grading, seeding to stabilize slopes, applying rip-rap to erosion prone locations, etc.

Professional arborists, botanists, and/or landscape architects would be employed as appropriate to advise the Company in consultation with government agencies in the development and implementation of a Site Restoration Plan.

I.5 CREEK RESPONSE AND CLEANUP STRATEGIES

I.5.1 Blocking Creek Beds

An earthen dam or berm may be constructed downstream of the oil if the creek bed is dry. However, if the creek is flowing, then diversion booms, overflow booms, and/or water bypasses can be used.

With diversion booming, if water flow rate allows, intermittent berms can be placed in position with earthmoving equipment. The booms between the berms must permit water flowing in the creeks to escape under the oil and continue flowing. Allowing water to escape diminishes the extent that the collected oil spreads beyond the creek bed.

An overflow berm can be placed downstream if oil is contained upstream of another boom in a creek bed. If such a boom is placed in a creek bed, a water bypass must be made by which water can escape and flow in the creek.

I.5.2 Creek Cleanup Techniques

Steps required to cleanup a creek include:

- Remove contained oil using excelsior, absorbent pads, and vacuum truck as needed.
- Clean the banks and surrounding area in a manner acceptable to governmental authorities.
- Dispose of oil-soaked cleaning materials as required by law (see Appendix N, Waste Management and Disposal Plan).
- Implement government-approved restoration plan.

J.1 INTRODUCTION

Physical removal of oil is the preferred method of response. However, equipment capability, weather and sea conditions, and the size and location of the spill may limit conventional mechanical recovery and removal.

The use of alternative countermeasures may be considered when the preferred recovery, cleanup, or remediation techniques are inadequate and the environmental benefit of their use outweighs any adverse effects. Alternative countermeasures include:

- Dispersants.
- *In-Situ* Burning.
- Bioremediation.
- Shoreline Cleaning Agents.

The use of dispersants and *in-situ* burning are typically used for large offshore discharges. The National Contingency Plan, Section 300.910 authorizes the use of dispersants on all waters threatened by the release or discharge of oil. Section 300.910 also authorizes the use of *in-situ* burning on a case-by-case basis, with approvals from federal and state agencies.

Due to the environmental sensitivity of the local offshore environs, the use of these non-mechanical methods is extremely unlikely. Dispersant use and *in-situ* burning are fully described (including applicable permits, approvals, and authorizations) in the ACP.

Information contained in this section of the Oil Spill Plan should be referenced and used to complete the Pre-Approval Zone Dispersant Use Checklist and Dispersant Assessment Worksheet in accordance with the California Dispersant Plan (see Appendix U).

J.2 DISPERSANTS (ACP Sec 3270; California Dispersant Plan (2008))

J.2.1 Application Methods

Dispersants are typically applied to offshore slicks to promote dispersion of oil into the water column as very small droplets. The amount of spilled oil that might otherwise enter sensitive areas and/or reach shore is decreased. In this way, dispersants can often eliminate or reduce potential impacts to sensitive natural resources and economic resources.

Dispersants offer advantages over skimming technology when addressing dispersible oils. These advantages include:

- Dispersants can be applied to offshore or remote areas where the use of skimming vessels may be limited or response times protracted.

- Dispersants can be used more effectively in sea states where skimming vessels may not be able to operate.
- Aerial application of dispersants can more quickly address larger areas of spilled petroleum than skimming technology.
- Dispersants can be used in concert with mechanical skimming devises to increase the rate of surface oil removal.

Dispersant application equipment can be divided into three groups (according to the method of application) as follows:

1. Vessel Application Equipment.
2. Aerial Application Equipment.
3. Shoreline Application Equipment (rarely used).

Boat-mounted spray systems are very useful for small spills closer to land or in confined area. This is due to the relatively slow transit times, low coverage rate and limited swath width of vessel-based systems. These systems are normally the least costly and most easily procured application method.

Aerial application of dispersants is achieved through the use of rotary or fixed-wing aircraft. Fixed-winged applications incorporate the use of dedicated aircraft which have been specifically modified to apply dispersants or aircraft-of-opportunity equipped with the Aerial Dispersant Delivery System (ADDS)

For very small spills or in hard-to-reach areas, three-to-five gallon garden sprayers or portable pumps with hand-carried nozzle sprayers can be used to apply pre-mixed water-based dispersants.

Factors affecting dispersant and application method selection include:

- **Marine Conditions**. Sea conditions, temperature, water movement, depth, and salinity will determine which, if any dispersants can be used effectively. Marine conditions can also limit application methods. In Southern California, COREXIT 9500 (formerly COREXIT 9500) and COREXIT 9527 (formerly COREXIT 9527) are the dispersants stockpiled by MSRC and Clean Seas, respectively.
- **Biological Resources**. Dispersants should minimize ecological impacts. The effects of dispersing slicks into the water column must be evaluated against the impacts of allowing the oil to remain on the surface and recovered by mechanical means.

- **Type and Condition of Oil**. Oils that are relatively fresh and still able to spread or film out further are best suited for dispersion. As viscosity increases and other effects of weathering occur over time, the effectiveness of dispersants is reduced.
- **Size and Location of Spill**. The amount of dispersant required and the distance between the application site and the staging area will determine the feasibility of various methods of application.
- **Response Resources**. The availability of application equipment and qualified contractors, the proximity of the staging areas, and approximate cost need to be considered when evaluating the dispersant response option. Its effectiveness and manpower and equipment requirements should be evaluated in comparison with those of mechanical recovery and *in-situ* burning.

Monitoring techniques used for dispersant operations include:

1. **Direct and Indirect Observation**. Direct observation by monitoring personnel provides a more realistic approach in a real spill. This can be accomplished by a boat or aircraft. Aircraft provide adequate spatial coverage, can readily be dispatched to the spill site, and are therefore a preferred platform for monitoring. Video taping is a simple, inexpensive and available technique that can be used from aircraft or boats to observe indirectly, as well as document the extent and configuration of a spill, how oil responds to dispersants, the effects of wind, waves, and currents, etc. The primary drawback, as in visual or photographic observation, is the dependence on natural lighting. Sunlight reflecting off water can reveal the shape of very thin slicks, but lack of contrast between oil and water on overcast days greatly reduces effectiveness of visual observations.
2. **Scientific Monitoring Techniques**. These techniques include infrared sensing, microwave sensing and radar sensing, and water column monitoring.

A working group of federal scientist and oil spill responders has developed the Special Monitoring of Advanced Response Technologies (SMART) program to monitor the effectiveness of alternative response technologies including dispersants. The program provides a process to gather information rapidly on the effectiveness of dispersant application and provide information to the UC in a timely manner. The SMART program consists of both visual observations (Tier 1) and on-site water column monitoring (Tier 2). In addition, the program can be expanded to examine the fate and transport of the dispersed oil (Tier 3). Once finalized, the program will provide a practical and cost effective approach to effectiveness monitoring and should be incorporated into the QAP program.

J.2.2 Dispersant Toxicity

A recent review of dispersant toxicity studies suggests that the present generation of dispersants do not themselves present a significant threat to marine life. The primary threat to the environment comes from the dispersion of spilled oil constituents into the water column. However, studies show that the acute toxicity associated with dispersed oil is likely to be short term as the dispersed oil is typically diluted within hours to levels below those expected to produce impacts on the water column community. These findings, coupled with the potentially severe consequences to natural living resources when oil is on the water's surface or deposited within the productive intertidal regions, suggest that, when possible, the dispersion of oil may be the best choice after an oil spill has occurred.

J.2.3 COREXIT 9527 and COREXIT 9500

J.2.3.1 Physical and Chemical Properties

COREXIT 9527 is a blend of oxylate polymers, organic sulfonic acid salt, substituted fatty ester, and glycol ether. This product, developed in the 1980s, is a concentrated and highly effective oil dispersant for use on a wide range of oils. Its unique formulation provides a self-mixing dispersant that is biodegradable and of low toxicity.

COREXIT 9500 was developed in the 1990s and includes the same surfactants as COREXIT 9527 incorporated into a different solvent. A different solvent was used for the following reasons:

1. Prolonged exposure to COREXIT 9527 caused adverse health effects in some responders. These effects were attributed to its glycol ether solvent. Therefore, the solvent was replaced by a mixture of food-grade aliphatic hydrocarbons.
2. To extend the window of opportunity for dispersant use. The window of opportunity is limited by the effects of weathering on the chemical and physical properties of the spilled oil, especially the increase in oil viscosity.

COREXIT 9500 is a high-performance, biodegradable, low toxicity oil dispersant that is effective on a wide range of oils, including the heavier, more weathered oils, and emulsified oils.

A summary of the physical properties of COREXIT 9527 and COREXIT 9500 is provided below.

PHYSICAL PROPERTY	COREXIT 9527	COREXIT 9500
Specific Gravity at 60°F	0.98-1.02	0.949
pH	6.1	6.2
Flash Point	163°F	181.4°F
Pour Point	Less than -40°F	Less than -71°F
Viscosity at 100°F	162 cst at 32°F	22.5 cst at 104°F
Solubility	Complete	Miscible

Both COREXIT 9527 and COREXIT 9500 display a low toxicity as illustrated by the laboratory test results provided below.

MATERIAL TESTED	SPECIES	LC 50 (ppm)
COREXIT 9527	*Menidia beryllina* *Mysidopsis bahia*	14.57 96-hr 24.14 48-hr
COREXIT 9500	*Menidia beryllina* *Mysidopsis bahia*	25.20 96-hr 32.23 48-hr
No. 2 Fuel Oil	*Menidia beryllina* *Mysidopsis bahia*	10.72 96-hr 16.12 48-hr
COREXIT 9527 & No. 2 Fuel Oil (1:10)	*Menidia beryllina* *Mysidopsis bahia*	4.49 96-hr 6.60 48-hr
COREXIT 9500 & No. 2 Fuel Oil (1:10)	*Menidia beryllina* *Mysidopsis bahia*	2.61 96-hr 3.40 48-hr
Reference Toxicant (DSS)	*Menidia beryllina* *Mysidopsis bahia*	7.07 96-hr 9.82 48-hr

Both COREXIT 9527 and COREXIT 9500 are packaged usually in 55-gallon, non-returnable, high-density, polyethylene drums. Bulk shipments are also available from Nalco in Sugar Land, TX (Exxon Chemical Company) upon request. The shelf life of unopened drums of both products is unlimited. Containers should always be capped when not in use to prevent contamination and evaporation of solvents. No unusual storage precautions are necessary. Storage temperatures for either product are:

1. Maximum storage temperature: 170°F
2. Minimum storage temperature: -30°F
3. Optimum storage temperature range: 40°F to 100°F

J.2.3.2 Efficacy of COREXIT 9527 and COREXIT 9500 on Sockeye Crude

Both COREXIT 9527 and COREXIT 9500 are on the EPA National Contingency Plan Product Schedule and on the State of California list of licensed cleanup agents and therefore can be used in accordance with the California Dispersant Plan (Appendix U).

COREXIT 9527 and COREXIT 9500 are both effective on Sockeye crude oil (characteristics of Sockeye oil are found in Appendix E). In addition, the oil has relatively low wax and asphaltene content leading to favorable dispersant effectiveness. As mentioned previously, COREXIT 9500 is effective on a wide range of oils, including the heavier, more weathered oils and emulsified oils. 9500 has been shown to be slightly more effective than COREXIT 9527 with high viscosity oils..

J.2.3.3 Availability and Logistics of COREXIT 9527 and COREXIT 9500

Clean Seas has contracted with Aspen Helicopter of Oxnard, California for aerial application of dispersant from a helicopter. The helicopter can be called up, loaded at the Clean Seas Carpinteria Yard and onsite within approximately three hours. The application rate is approximately 5 gallons per acre and 110 gal per sortie. Twenty acres can be covered during each sortie. A sortie, which includes time to fuel and reload, takes approximately one hour. Clean Seas can run five-to-six sorties during daylight hours. Clean Seas maintains a volume of COREXIT at its yard in Carpinteria for use during a spill.

Sources for COREXIT EC9527 and COREXIT 9500 are listed below.

Source	Location	Amount Available (approx. gallons)	Likely Transport Mode to Carpinteria Yard /Santa Barbara Airport
Clean Seas	Carpinteria, CA	17,450	Truck
MSRC*	Everett, WA	14,190	Truck/Air
MSRC*	Long Beach, CA (various sites)	12,870	Truck/Air
MSRC*	Richmond, CA	9735	Truck/Air
Nalco (Exxon Chemical)	Sugar Land, TX	Continuous supply after 48 hours	Truck/Air

(*MSRC Dispersant Program, inventory as of 9/19/11)

Additional product can be obtained from Nalco in Sugar Land, TX. MSRC has contracts for a C-130 dispersant aircraft based in Phoenix, AZ, as well as a King Air dispersant/spotter airplane based in Stennis, MS.

J.2.4 Resource Protection

The primary objective of oil spill abatement and cleanup is to reduce the effect of spilled oil on the environment. However, equipment capability, weather, sea conditions, and spill magnitude may limit mechanical recovery. Use of chemical, oil spill cleanup agents may be considered when the preferred recovery techniques are inadequate and the environmental benefit of chemical use outweighs its adverse effects. The following guidelines will be observed in dispersant use:

1. Dispersants will be used only when authorized. The authorization process requires that information be provided on a FOSC Checklist and Support Information form (refer to ACP).
2. Only accepted, approved or licensed products will be used.
3. Dispersants will be used only at authorized concentrations.

4. Dispersant will be used only in calibrated delivery systems that will be operated by qualified individuals.
5. Dispersants will be used only in locations authorized by the FOSC.
6. Venoco will work closely with regulatory agencies in monitoring and documenting dispersant use operations.

J.2.5 Approval Processes for Dispersant Use in Waters off California (ACP Sec 3270, California Dispersant Plan (2008))

The California Dispersant Plan (CDP) provides an approval process which is a combination of the "pre-approved" Quick Approval Zone (QAZ) process for waters 15 nautical miles or more off the coast of California and the State's draft Dispersant Use Decision Process (DUDP) for use of dispersants in state waters. It provides a mechanism to the Unified Command (UC) to expedite the dispersant use decision. This is significant in that the window of opportunity for effective dispersant use can be very narrow. This accelerated review process, conducted by the Planning Section of the UC, is designed to provide the UC with sufficient information to determine if a dispersant use request should be made, and to provide members of the RRT with sufficient information to approve or disprove within two hours of its receipt. If the results support dispersant use, the FOSC will contact the RRT, provide information as required, and obtain a dispersant use decision.

Both the UC and RRT in taking such action must accept the following conditions:

1. The use of dispersants represents an acceptable risk to the environment.
2. The selected dispersant will have an acceptable level of effectiveness on the spilled oil.
3. Dispersant application will not disperse all the oil.
4. Mechanical or other methods will be required to address the remaining oil.

The geographical boundaries of the "pre-approved" QAZ are those marine waters off the coast of California, which occur between the lines drawn perpendicular to the Oregon/California border to a point 15 nautical miles from the California/Mexico border. Offshore, the QAZ extends seaward to the western most limits of the Exclusive Economic Zone. Inshore, the QAZ is limited to those waters beyond the depth of 60 feet, and a distance of 0.5 miles from the mainland and island shorelines or kelp beds. In addition, dispersant use is excluded from a one-mile radius around the mouths of rivers having significant salmon and steelhead trout runs during periods of adult and smolt migration. The use of dispersant in marine sanctuaries will require considerable coordination with the Sanctuary Managers and their staff who will be requested to participate in the planning process.

To ensure a streamlined operation, the UC and the Alternative Response Technology Unit of the UC Planning Section with assistance from OSPR will utilize the information-gathering and decision-making process using the checklists and procedures found in Section I and II of the California Dispersant Plan. Information on biological resources at risk and dispersant effectiveness will be obtained from the OSPR database. Results of the QAP review, supporting information, and dispersant use recommendation will be summarized on the FOSC Checklist. Copies of the Checklist and Support Information for the QAP are found in the ACP.

J.2.6 References

Chen, Andrie, C.T. 1998. Exxon Planning Guide for Oil Spill Response Equipment and Vessels.

National Research Council. 1989. Using Oil Dispersants on the Sea. Committee on the Effectiveness of Oil Spill Dispersants, Marine Board, Commission on Engineering and Technical Systems. National Academy Press, Washington, D.C. 335 pp.

Region IX Regional Contingency Plan. 2006. Appendix XII.

United States Coast Guard and Office of Oil Spill Prevention and Response. 2006. Area Contingency Plan Los Angeles/Long Beach (Northern/Southern Sector).

J.3 *IN-SITU* BURNING (ACP Sec 3280, Region IX Regional Contingency Plan, App. XIII)

J.3.1 Application Method

Burning has distinct advantages over other oil spill countermeasures. It offers the potential to rapidly convert large quantities of oil into its primary combustion products with a small percentage of other unburned and residue products. This technique could be most effective in dealing with a large spill at sea and in removing large quantities of oil from the marine environment before it comes ashore. Although limited by the ability to contain oil, *in-situ* burning might be the best option in areas where it is imperative to remove large quantities of oil quickly to protect on-water resources.

Typically, *in-situ* burning involves burning a certain thickness of oil (i.e., >2 mm but preferably several cm) within a fireproof boom. *In-situ* burning systems are typically composed of:

- Fire-resistant containment boom specifically designed to be heat-resistant and fire-resistant. This boom permits the collection of significant quantities of oil at thicknesses that allow self-sustained combustion.
- Conventional boom and towing cable used to aid in containment and collection of spilled oil, but kept away from burning oil. It may be about three times longer than the fire-resistant boom and attached to its ends.

- Oil ignition system used to ignite a pool of collected oil. Various alternatives include the Heli-torch (a helicopter-mounted gelled gasoline unit), burning rafts, and timed ignition devices.
- Support subsystems include boom tow vessels to collect and direct fragmented oil slicks into the mouth of the fire-resistant boom, monitoring vessels to ensure safety of operations, safety equipment, skimming vessels, and aircraft to monitor spill conditions.

Fire-resistant booms are available from a number of boom manufacturers and are sold in a range of sizes from 18 in (46 cm) for calm water use up to 43 in (109 cm) for open ocean use. Fire-resistant booms function generally like conventional booms, and therefore their selection criteria should include construction features, in addition to overall height, which allow optimum application in the sea conditions where their use is anticipated.

The oil-removal (or elimination) rates for *in-situ* burning can be quite high compared to mechanical removal (e.g., 80-to-90% for film 2-to-10 mm thick and 98-to-99% for film 10-to-100 mm thick); however, the success of burning depends on a number of factors. Factors that inhibit combustion include:

1. Insufficient film thickness (<1-to-2 mm).
2. Aged oil with low volatile content.
3. Emulsification. Ignition is difficult if water contents is >15-to-20 %. Wicking agents may be required if water content is >50 %.
4. Adverse weather conditions such as clouds, rain, poor visibility, and/or winds (in excess of 12 mph).
5. Adverse sea conditions such as waves exceeding 1 m and/or strong currents.
6. Oil submersion and or entrainment.
7. Vapor loss.

Factors that promote combustion include:

1. Oil layer thickness >2-to-3 mm.
2. Fresh oil with high volatile content.
3. High oil-to-water ratio (e.g., low emulsification with water, presence of wicking agent or combustion promoters).
4. Favorable weather conditions (i.e., sunny, warm, light winds, and good visibility).
5. Favorable sea conditions (i.e., calm to light seas, no current).

In-situ burning may be possible if personnel and equipment are available on short notice and can be dispatched to the spill within a relatively narrow “window of opportunity”. This “window” may consist of only of only a few hours to a day or two, depending on the nature of the spill, the characteristics of the oil, and the prevailing wind and sea conditions at the spill site. The proximity of the oil to be burned to shorelines, sensitive natural resources, population centers, etc., will also play an important role in determining the practicality and the time available for *in-situ* burning.

Currently, MSRC has 500 feet of fire-resistant boom with a 400-ft guide in El Segundo, CA and 500 feet of fire-resistant boom with a 400-ft guide in Port Angeles, WA.

J.3.2 Resource Protection

Use of *in-situ* burning may be considered when preferred techniques are inadequate and the environmental benefit of *in-situ* burning outweighs its adverse effects. A decision to conduct an *in-situ* burn should address the following:

- Burning operation must be timed and coordinated with other spill response operations and in conjunction with regulatory agencies.
- Health and safety of response personnel and the public.
- The threat posed to nearby facilities (e.g., terminals, marinas, and piers).
- Public concerns (e.g., air quality, disruption of normal activities).
- Environmental impacts to sensitive habitats and natural resources.
- Disposal of combustion products (e.g., soot, burn residue, and debris).
- Recovery or elimination of oil by other means (i.e., mechanical or non-mechanical).

If *in-situ* burning is used, the following guidelines will be adopted to protect area resources:

1. *In-situ* burning will not be used without authorization. The authorization process requires that information be provided on a checklist that recognizes resources at risk from mechanical and non-mechanical measures (for a copy of the checklist, refer to the ACP).
2. Only accepted, approved or licensed products and methods will be utilized.
3. *In-situ* burning will be carried out by qualified individuals and only in locations authorized by the FOSC.
4. Venoco will work closely with regulatory agencies in monitoring and documentation of the *in-situ* burning operations.

J.3.3 Permits, Approvals, Or Authorizations (ACP Sec 3280)

Use of *in-situ* burning may be considered by the FOSC when the preferred recovery techniques are inadequate and *in-situ* burning will lessen the environmental impacts of the spill. The National Contingency Plan (§300.910) authorizes the FOSC, with concurrence of the EPA representative to the RRT and as appropriate, with the concurrence of the Sate representative to the RRT (In the case of California, the Governor has delegated this role to the Administrator of OSPR.) with jurisdiction over navigable waters threatened by the release of discharge of oil and, in consultation with the DOC and DOI natural resource trustees, when practicable, to authorize the use of *in-situ* burning on a case-by-case basis.

A Preapproval Zone (35-to-200 miles off the California coast and the areas around special jurisdictions, such as marine sanctuaries, natural parks, national wildlife refuges), has been designated in a Letter of Agreement (LOA) among the USCG, EPA, DOC, and DOI. The FOSC must determine if conditions are met to authorize an *in-situ* burn as delineated by the LOA and notify the RRT and CDF&G representing the State of California.

J.3.4 References

Chen, Andrie, C.T. 1998. Exxon Planning Guide for Oil Spill Response Equipment and Vessels.

Region IX Regional Contingency Plan. 2008. Appendix XII.

United States Coast Guard and Office of Oil Spill Prevention and Response. 2008 Area Contingency Plan Los Angeles/Long Beach (Northern/Southern Sector).

J.4 BIOREMEDIATION (ACP Sec 3290, Region IX Regional Contingency Plan, Appendix XIV)

Bioremediation is a treatment technology that enhances existing biological processes to accelerate the decomposition of petroleum hydrocarbons and some hazardous wastes. Section 300.910 of the NCP authorizes the use of biological additives for the dispersion/abatement of oil spills.

Shoreline treatment by nutrient enhancement can significantly increase degradation rates of oil when compared to untreated shoreline areas. However, the technology is time-consuming and probably best suited to the treatment of specific types of shorelines and marsh habitats. Currently, bioremediation should be viewed as a polishing agent for the final stages of cleanup, rather than as a primary response tool, especially considering the slow degradation rates.

J.5 SHORELINE CLEANING AGENTS (ACP Sec 3240)

Shoreline cleaning agents applied to shorelines generally are designed either to prevent adherence (stranding) of oil or to release already stranded oil. Section 300.910 of the NCP authorizes the use of chemical agents to respond to discharges of oil. The efficiency of mechanical cleanup operations may be enhanced by the use of shoreline cleaning agents by assisting with the re-floating of oil or preventing its subsequent stranding. However, the potential for toxic responses in indigenous fauna or flora to the cleaning agent must be considered. Shoreline cleaning agents often remain undiluted for prolonged periods of time and consequently can have a greater impact upon the indigenous biological and geological resources.

K.1 SPILL RESPONSE TRAINING AND DRILLS OVERVIEW

Venoco's Training/Drill program has been developed to ensure facility personnel are prepared to perform their response duties and to be in compliance with State and Federal requirements. Training levels have been developed to provide a tailor curriculum for defined levels of response capabilities, which are designated for each individual depending on his or her specific job description and stated response role. This program is designed to train personnel so that they carry out their responsibilities and duties associated with immediate and sustained response to an incident.

The training of Venoco's response organization in the prompt and effective response to an oil spill/emergency incident is an integral part of the Company's environmental, health, and safety policies. The Company has developed a multi-faceted training program for the members of its response organization. The program consists of classroom instruction, field briefings, exercises, tabletop drills of the response team and equipment deployment drills involving Venoco personnel and Clean Seas' response equipment.

The program of spill response drills is designed to comply with the National Preparedness for Response Exercise Program (NPREP) and to test notification procedures, to exercise equipment, to practice response techniques, and to maintain a high level of readiness. These drills also serve to determine whether the response plan will function as intended and where modifications need to be made. The Venoco Safety Manager plans and carries out the drill programs as well as evaluates response exercises to ensure that the exercise met the required objectives, and that the exercise performance demonstrated the effectiveness of the plan.

Key components of the training and drill programs are addressed below.

- Members of the response organization are trained in their job positions.
- Safety training as required by federal and state health and safety laws is provided for all persons, including non-permanent responders, likely to be engaged in oil spill response.
- Drills are conducted to ensure that the plan functions in an oil spill/emergency.
- Drill frequencies are defined in accordance with NPREP guidelines and are designed to exercise either individual components of the plan or the entire response plan.
- Training and drill records (certificates, attendance records, and evaluations) are maintained for three years and all such documentation is made available to the regulatory agencies upon request.

K.2 TRAINING PROGRAM

K.2.1 Operational Risk Reduction

Training is an essential part of Venoco's operations. Venoco instructs its employees annually in the safe and efficient operation and maintenance of the crude oil pipelines and associated facilities, in emergency response, and in awareness of all applicable laws, rules, and regulations. All employees are provided with comprehensive on-the-job training covering all operating procedures (routine/abnormal) and the proper maintenance of equipment that will be associated with their job position. Each employee receives formal training in the properties and hazards of the chemical products associated with the pipeline system as part of the Hazard Communication and Right-To-Know Program. Training is also conducted at monthly safety meetings that may include but not be limited to discussions on pollution prevention regulations and procedures, internal Company policies, operations, maintenance and repair procedures, emergency response procedures, and accident/failure review and analyses.

Venoco's operations risk reduction training includes the following subjects:

Spill Prevention and Control (Frequency: Annually). In this program, the participant learns to identify potential spill sources, to properly use response equipment, to protect sensitive areas, and to determine the appropriate cleanup techniques for the various types of oil that may be spilled. Boat safety and handling are also covered. This training also satisfies the requirements of OPA 90 Awareness and Response.

Hazard Communication (Frequency: Annually). Right-To-Know training instructs personnel in the hazards of the products they handle, and how to obtain and read Material Safety Data Sheets (MSDS), Material Safety Data Bulletins (MSDB), and container labels. Employees are informed of the location of the MSDS library at the facility.

Incipient Fire Fighting (Frequency: Annually). Employees are given training on fixed fire extinguishing system(s) if installed at the facility and the operation of portable fire extinguishers. Personnel who may be required to activate a fixed system are instructed on when that might be required, the safe operation of the equipment, and a description of how the system works. Training also includes how to activate the system manually in the event automatic activation fails. Portable extinguisher training includes an explanation of the classes of fire, hydrocarbon chemistry, and how to activate and discharge a dry chemical extinguisher.

Personal Protective Equipment (Frequency: Annually). Employees required to use personal protective equipment are trained how to wear the equipment properly and how to inspect it to determine when it needs to be replaced.

Lockout/Tagout (Frequency: Annually). Describes the lockout and tagout process and reviews the procedures to assist facility personnel in preventing the unexpected energization, start-up or release of stored energy while performing maintenance, adjustments and installation work on equipment. Trains the employee to recognize situations in which the lockout/tagout requirement applies and to correctly follow the lockout/tagout policy.

Confined Spaces (Frequency: Annually). Explains the definition of a confined space, and describes the potential hazards which could be encountered. Describes how to use an atmospheric monitor. Identifies the safe conditions for work in the confined space, including atmospheric monitoring, ventilation, and wearing required PPE.

Hot Work (Frequency: Annually). Explains the definition of hot work. Provides guidance in performing hot work. Instructions for generating and utilizing hot work permits are also addressed.

Respiratory Protection (Frequency: Annually). Provides employees respiratory protection from airborne, workplace contaminants when such contaminants cannot be controlled by engineering measures.

Hydrogen Sulfide (Frequency: Annually). Employees are informed of the possible health effects associated with H_2S exposure, provided an understanding of safe operating procedures, and the use of PPE associated with H_2S.

First Aid/CPR (Frequency: Bi-Annually). Prepare employees to handle medical emergencies until professional medical care arrives.

K.2.2 Spill Response Safety Training

OPA 90 Awareness (Frequency: Semiannually). Response personnel are provided general information regarding the background and requirements of OPA 90 and the purpose of the oil spill contingency plan. A review covers how the plan is organized, what information it contains, and how it should be used. Personnel responsibilities under the plan emphasize notification and reporting procedures.

OPA 90 Response (Frequency: Annually). Response personnel are instructed in their duties regarding the response management system, discharge assessment, control and containment, the protection of sensitive areas, and material recovery and disposal. NPREP exercises are used to provide facility personnel with practical training experience, and evaluations of the exercises identify response actions that can be improved with further training.

Management of Major Spill Incidents (Frequency: Annually). This program is designed to teach participants emergency operations for managing major oil spill responses. It focuses on management aspects of spill response activities and includes training in locations, intended use, deployment strategies, and the operational and logistical requirements of response equipment, spill reporting procedures, oil spill trajectory analysis and predicting spill movement. Based upon actual spill experiences of the petroleum industry, this program helps participants anticipate the situations that may arise during large spills and the means to handle them.

Hazardous Waste Operations and Emergency Response (Frequency: Annually). Employees are trained to the level of HAZWOPER necessary to perform their emergency response duties.

First Responder/Awareness: Employees are trained to recognize an emergency situation, and to understand and implement emergency procedures.

First Responder/Operations: Employees are instructed to initiate spill containment from a safe distance. Training covers basic hazard and risk assessment techniques and hazmat terminology, how to select and use personal protective equipment, how to perform control, containment, and confinement operations, and how to implement basic decontamination measures.

HazMat Technician: Employees receive advanced, specialized training in order to aggressively respond to a hazardous material spill to contain and alleviate the condition. Training includes respirator training, decontamination procedures, hydrocarbon chemistry, personal protective equipment, and operation of air monitoring equipment.

HazMat Specialist: Employees receive advanced, specialized training in order to respond to a hazardous material spill. They respond with and provide support to HazMat Technicians. In addition to training equal to that of the HazMat Technician, they receive specific instruction concerning the substances they may be called upon to contain. Training also includes how to implement the local emergency response plan; awareness of the state emergency response plan; understanding the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment, chemical, radiological, and toxicological terminology, and in-depth hazard and risk techniques; and ability to select and use proper specialized chemical personal protective equipment, to perform specialized control, containment, and/or confinement operations, to determine and implement decontamination procedures, and to develop a site safety and control plan.

Incident Commander: Trained to assume control of an incident. Includes Venoco's incident command system, how to implement the facility's response plan, the associated risks of employees working in chemical protective clothing, decontamination procedures, how to implement the local emergency response plan, and knowledge of the state emergency response plan and of the Federal Regional Response Team.

First Aid and CPR Training (Frequency: Biennially). Courses in first aid or cardio-pulmonary resuscitation. Initial training course is followed up with an annual refresher for both first aid and CPR.

Hazardous Materials Transportation (Frequency: Annually). Training is provided to "HAZMAT Employees" who perform hazardous materials transportation activities. Training includes general awareness and familiarization of the DOT regulations, function-specific training applicable to the job duties the employee performs, and general safety training to address emergency response information, personal protection, and methods and procedures for avoiding accidents.

Specialized training, when applicable, is provided to employees on hearing conservation, forklifts, safety permitting, and other topics as new regulations develop. Any new employee who could engage in spill or leak response is given appropriate training and orientation, as well as on-the-job supervision until the new employee can demonstrate competency to the satisfaction of his/her supervisor.

Table K-1. Training Program Matrix.

Position	Training							
	Hazwoper	CPR/ First Aid	ICS	OPA 90 Awareness	OPA 90 Response	Oil Spill Prevention & Control	Manage-ment of a Spill	Hazard Communi-cations
Qualified Individual	•		•	•	•	•	•	•
Incident Commander	•		•	•	•	•	•	•
Safety Officer	•	•	•	•	•			•
Legal Advisor			•	•				
Planning Section Chief	•		•	•				
Operations Section Chief	•		•	•	•			•
Logistics Section Chief	•		•	•				
Finance Section Chief			•	•				

K.2.3 HAZWOPER Compliance

If a clean-up operation is required and third party personnel are needed, Venoco will use fully qualified response contractors/cooperatives to perform the work. If contractors/co-ops sub-contract to labor pools, documentation as to the training of casual laborers will be required. At the time clean-up operations are initiated, documentation from the contractor/co-op regarding the HAZWOPER qualification of their personnel will be obtained. Each contractor must provide a letter to the facility annually, which states that their personnel are properly trained. Prior to entry to the affected site, Venoco personnel review the following information with contractor management, casual laborers or volunteers:

Hazard Communication:

- Material adverse health characteristics.
- Material reactivity characteristics.
- Material flammability, explosivity characteristics.
- General site characteristics.
- Potential worksite personal safety hazards.
- Location of first aid assistance.
- Decontamination facility, if required.

Personal Protective Equipment:

- PPE requirements as identified by the material being handled and the activities being performed.
- Location where they will be working.
- Work they will perform.
- Lines of authority.

K.2.4 Response Team Training

Response personnel participate in the Facility Response Training Program discussed in Section K.2.2. The Immediate Response Team works with Clean Seas in semi-annual field exercises to develop and maintain a high level of response preparedness. A field briefing occurs prior to each exercise to review:

- Venoco's response teams.
- The roles and responsibilities of the members of the onsite response personnel.
- Immediate response procedures.
- Internal and external notification requirements and procedures.
- Clean Seas' response equipment and response strategies.
- Health and safety considerations.

The response training program ensures that:

- All Venoco response personnel know:
  - Their responsibilities under the plan;
  - The name and address of, and the procedures for contacting Venoco on a 24-hour basis; and
  - The name of and procedures for contacting the Qualified Individual on a 24-hour basis.
- Reporting personnel know:
  - The content of the Fact Sheet;
  - The toll-free telephone number of NRC and CA OES; and
  - The notification process.

- Persons engaged in response activities know:
  - The characteristics and hazards of the oil discharged;
  - The conditions that are likely to worsen in emergencies, including the consequences of facility malfunctions/failures, and the appropriate corrective actions;
  - The steps necessary to control any accidental discharge of oil and to minimize the potential for fire, explosion, toxicity, or environmental damage; and
  - The proper fire fighting procedures and the use of fire and safety equipment.

K.2.5 Use and Training of Volunteers and Temporary Help

All persons, including casual laborers and volunteers, who respond to oil spills in any capacity, as deemed appropriate by the FOSC, must receive training in compliance with 29 CFR 1910, Subpart L and 29 CFR 1910.12(q). Venoco will not use volunteers in a response but rather refer any volunteers to the State Agency Coordinator through the State Incident Commander (OSPR). Volunteers may be used as deemed appropriate by the State Agency Coordinator (Section 8574.3 of the Government Code). It should be noted that volunteer workers are recognized as employees of the State during oil spill cleanup operations and are covered by Worker's Compensation benefits under Section 3350 *et seq*. of the Labor Code.

K.3 DRILLS

K.3.1 NPREP

Venoco will conduct drills to further improve response personnel preparedness. The drill exercise program is developed in accordance with the comprehensive National Preparedness for Response Exercise Program (NPREP) document that represents a cooperative effort on the part of federal agencies, state, and industry to develop a consistent set of exercise guidelines which conform to OPA 90. The drills will be designed to test all components of the facilities. Table K-2 depicts the minimum triennial cycle of exercises at the facility, according to NPREP guidelines.

Table K-2. NPREP Response Exercise Program.

NPREP Exercises		
Total Number	**Frequency**	**Exercise Type/Description**
4	Quarterly	**QI Notification Exercise** **Scope:** Exercise communication between facility personnel and the QI(s) and/or the designated alternate(s). At least once a year, one of the notification exercises should be conducted during non-business hours. **Objective:** Contact must be made with a QI or designated alternate, as identified in the plan. **General:** All personnel receiving notification shall respond to the notification and verify the receipt of the notification. Personnel who do not respond should be contacted to determine whether or not they received the notification.
2	Semiannual	**Equipment Deployment Exercise (Clean Seas)** **Scope:** Deploy and operate facility equipment identified in the response plan. This equipment would be either (1) minimum amount for deployment or (2) the equipment necessary to respond to an average most probable spill, whichever is less. **Objective:** Demonstrate ability of CS to deploy and operate equipment. **General:** The facility may take credit for equipment deployed in an actual spill or training as long as activities are properly documented.
1	Annual	**Spill Management / Command Post Team Tabletop Exercise** **Scope:** Exercise the spill management team's organization, communication, and decision-making in managing a spill response. Each team identified in the plan (i.e., if different teams for different size spills) is required to conduct an annual tabletop exercise. **Objective:** Exercise the response team in a review of: knowledge of the plan, proper notifications, communication systems, ability to access an OSRO, coordination of internal spill response personnel, team transitions. **General:** A minimum of one tabletop exercise in a triennial cycle will involve simulation of the worst case discharge scenario.
1	Annual	**Unannounced Exercise:** this exercise may take the place of a required tabletop or an equipment deployment exercise.
1	Annual	**Equipment Deployment Exercise (with OSRO equipment)** **Scope:** Deploy and operate facility equipment identified in the response plan. This equipment would be minimum amount for deployment. **Objective:** Demonstrate ability of personnel to deploy and operate equipment. **General:** The facility may take credit for equipment deployed in an actual spill or training as long as activities are properly documented.
1 (max.)	Once every 3 years	**Government-Initiated Unannounced Exercise:** an unannounced drill may be called at any time. With satisfactory performance during the drill, another unannounced drill will not be called within 36 months. **Scope:** Exercise would involve response to average most probable discharge and equipment deployment. **Objective:** Conduct proper notifications and demonstrate that the response is: timely, conducted with adequate amount of equipment and properly conducted. **General:** The facility may take credit for an actual spill as long as activities are properly

Table K-2. NPREP Response Exercise Program.

NPREP Exercises		
Total Number	**Frequency**	**Exercise Type/Description**
		documented
Note:	*Venoco is a member of Clean Seas (CS). CS' drill and exercise program assures that shoreline protection strategies for all potentially impacted sensitive areas identified in the plan are exercised.* *Each component of the plan must be exercised at least once in the triennial cycle.*	

K.3.2 Evaluation And Credit

To receive appropriate evaluation and credit for drills and exercises, the criteria described in Section 820.01 of the California Oil Spill Contingency Plans Regulations must be followed. Section 820.01 is provided below in their entirety.

Note that the regulations also allow credit for actual spills, exercises conducted elsewhere by the management team, other exercises conducted by the Company's resources (e.g., OSROs), etc. provided that the necessary criteria are met.

820.01 Drills and Exercises - Evaluation and Credit

(a) Exercises shall be designed to exercise either individual components of the plan, as described in 820.01(c), or the entire response plan. Such exercises, individually or in combination, shall ensure that the entire plan is exercised at least once every three years. Any number of components may be tested during the exercises required by Sections 817.02(k)(1), 817.03(k)(1), 818.02(l)(1) and 818.03(l)(1).

(b) To receive credit from OSPR for an exercise, the following notification requirements must be met:

(1) The owner/operator shall invite the Administrator to participate in both the equipment deployment exercises and the management team tabletop exercises and shall submit written notification including, but not limited to, the following information: company name, address, marine facility/vessel name, OSPR contingency plan number, point of contact, phone/FAX number, type of exercise, date, time and location of exercise, sensitive sites being tested, exercise scenario description, objectives to be tested, and other participants in the drill. The owner/operator may use the OSPR Exercise Notification Form (FG OSPR 1964, 3/10/97) or a document that includes the same information as the Notification Form, for this purpose.

(2) The Administrator shall be given the following advance notice:

EXERCISE TYPE	MINIMUM NOTIFICATION REQUIRED
Tabletop Exercise, In-State	30 days
Tabletop Exercise, Out-of-State	90 days
Equipment Deployment Exercise	30 days
Full Scale Combination Exercise	60 days
Area Exercise	120 days
Internal Unannounced Exercise	30 days

(c) The Administrator shall determine if the elements of the plan were adequately tested by the exercise scenario and the response of the participants. The Administrator shall give credit for all exercise objectives successfully met during the exercise. Objectives not successfully met during the exercise will not receive credit and must be exercised again within the three year cycle. Exercise objectives shall include, but not be limited to, the following (as set forth in Appendix B of the PREP guidelines):

(1) Notifications: Test the notification procedures identified in the contingency plan;

(2) Staff mobilization: Demonstrate the ability to assemble the spill response organization identified in the contingency plan;

(3) Unified Command: Demonstrate the ability of the spill response organization to form or interface with a Unified Command;

(4) Discharge Control: Demonstrate the ability of the spill response organization to control and stop the discharge at the source;

(5) Assessment: Demonstrate the ability of the spill response organization to provide an initial assessment of the discharge and provide continuing assessments of the effectiveness of the tactical operations;

(6) Containment: Demonstrate the ability of the spill response organization to contain the discharge at the source or in various locations for recovery operations;

(7) Recovery: Demonstrate the ability of the spill response organization to recover the discharged product;

(8) Protection: Demonstrate the ability of the spill response organization to protect the environmentally and economically sensitive areas identified in the approved Area Contingency Plans;

(9) Waste Management: Demonstrate the ability of the spill response organization to properly manage the recovered product and to develop a waste management plan for approval by the Unified Command. The plan will include appropriate procedures for obtaining permits and/or waivers, waste characterization, waste minimization, volumetric determination, and overall waste management and final disposition, as appropriate;

(10) Communications: Demonstrate the ability to establish an effective communications system for the response organization;

(11) Transportation: Demonstrate the ability to provide effective multi-mode transportation both for execution of the discharge and support functions;

(12) Personnel Support: Demonstrate the ability to provide the necessary support of all personnel associated with the response;

(13) Equipment Maintenance and Support: Demonstrate the ability to maintain and support all equipment associated with the response;

(14) Procurement: Demonstrate the ability to establish an effective procurement system;

(15) Documentation: Demonstrate the ability of the spill response organization to document all operational and support aspects of the response and provide detailed records of decisions and actions taken. These documents shall be provided to the Administrator upon request.

(d) The owner/operator shall provide the following documentation in order to receive credit from OSPR for any exercise conducted:

(1) the contingency plan number;

(2) a list of all other participants and their roles, including contingency plan numbers if applicable;

(3) the objectives tested, as listed in (c) above;

(4) the ACP-listed environmentally sensitive site protection response strategies tested;

(5) copies of documents created for the drill or exercise (such as the site safety plan and the incident action plan, if written);

(6) a list of the other regulatory agencies attending the drill or exercise, if any; and,

(7) an exercise evaluation or post-spill critique.

(8) for all exercises:

(A) information to demonstrate whether the identified objectives as listed in subsection (c) above, have been met. The Evaluator Work Sheet (FG OSPR 1963, 2/9/98) or a form that includes the same information, may be used to gather this information;

(B) information of concern to the local Area Planning Committee including, but not limited to, the following: objectives tested, observations and description of successful positive action or statement of problem, and any recommendations for suggested action or improvement to Area Contingency Plans, marine facilities and vessel plans, response contractors, federal agencies, state agencies, local agencies, training or exercise programs. The USCG/OSPR Lessons Learned Reporting Form (ACP LL Rev. 2/98), or a form that includes the same information, may be used to gather this information.

(9) for all tabletop exercises:

(A) information including, but not limited to, the following: date of exercise, exercise or actual response; location; time started/time completed; the response plan scenario used; size of spill; evaluation of the spill management team's knowledge of the oil spill response plan; determination of proper notifications; evaluation of the communications system; ability to access contracted oil spill removal organizations; ability to coordinate spill response with On-

Scene Coordinator, state and applicable agencies; and ability to access sensitive site and resource information in the Area Contingency Plan if referenced. The Spill Management Team/Tabletop Exercise Report (FG OSPR 1966, 5/7/97) or a form that includes the same in formation, may be used to gather this information.

(10) For all equipment deployment exercises:

(A) information including, but not limited to, the following: date; identity of marine facility/vessel; locations); time started/completed; equipment ownership; a list of type and amount of all equipment deployed and number of support personnel employed; description of the exercise goals and a list of any Area Contingency Plan strategies tested, with a sketch of equipment deployments and booming strategies; if marine facility-owned equipment, was at least the amount of equipment deployed necessary to respond to the average most probable spill; was equipment deployed in its intended operating environment; was a representative sample of OSRO-owned equipment deployed; was the OSRO-owned equipment deployed in its intended operating environment; description of the marine facility's comprehensive training and equipment maintenance programs; did personnel responsible for equipment deployment actually deploy the equipment; and was deployed equipment operational. The Equipment Deployment Evaluation Form (FG OSPR 1965, 2/20/97), or a form that includes the same information, may be used to gather this information.

(e) The Administrator shall issue a report within 90 days to the owner/operator for any exercise attended by OSPR personnel, which evaluates the adequacy of the exercise scenario to test elements of the plan and its implementation, and the response of the participants. Any inadequacies noted in the Administrator's report must be addressed in writing by the owner/operator within 60 days of the receipt of the Administrator's report. The owner/operator's response shall outline remedies to the noted inadequacies including, but not limited to, any necessary changes to the plan, any changes in contracted or owned response resources, changes in or additions to training, and/or the need for additional drills or exercises. The owner/operator's response shall include a schedule for implementing the remedies.

(f) Protective Response Strategies for Environmentally Sensitive Sites

(1) Owner/operators are required to exercise protective response strategies for all ACP-listed environmentally sensitive sites within the area identified as impacted in their Off-site/Environmental Consequence Analysis for their reasonable worst case spill. Owner/operators are required to submit a schedule, with in 60 days of the effective date of this subchapter, for exercising the protective response strategies. Owner/operators are required to demonstrate to the Administrator that these areas have been tested, either with owner/operator owned equipment or through an OSRO under contract with the owner/operator.

(A) Each schedule shall be approved or denied within 180 days after receipt by the Administrator.

(B) The Administrator shall determine whether each schedule adequately assures that the shoreline protection strategies for all environmentally sensitive sites identified as potentially impacted will be exercise. If it is determined that a schedule is inadequate, it will be returned to the submitter with a written explanation of deficiencies and, if practicable, suggested modifications or alternatives.

(C) Upon notification of a schedule's deficiencies, the submitter will have 90 days to submit a new or modified schedule. Such a re-submittal shall be treated as a new submittal and processed according to the provisions of this section.

(2) The Administrator may approve an overall schedule to exercise the protection strategies for an entire ACP area. Such a schedule may be submitted by the owner/operator or by an OSRO, individually or in some combination thereof, which covers the sensitive sites of the entire ACP area, or the sensitive sites identified in the owner/operator's off-site/environmental consequence analysis. A schedule to exercise the shoreline protection strategies for an entire ACP area may be approved by the Administrator, even if the exercises are not able to be completed in the triennial cycle. If the deployment of the shoreline protection strategy is not possible at a site due to statutory, regulatory, or health and safety reasons, the owner/operator must identify these sites, describe the reasons the strategies are not deployable in an exercise situation and what measures will be taken to assure the shoreline protection strategy for the site will function in an emergency. The owner/operator may proposed representative sites, in lieu of the sensitive sites in a given area, as long as the Administrator is assured that all sensitive sites for that area are able to be protected.

(g) The Administrator may call a drill or exercise, or conduct an inspection, to validate all or part of a contingency plan. This drill, exercise, or inspection may be announced or unannounced.

(h) Substitution

(1) In-State Exercises

In substitution for the exercises required by Subsections 817.02(k)(1)(A) through (C), 817.02(k)(1)(B) and (C), 818.02(l)(1)(C) and (D), and 818.03(l)(1)(B), the Administrator may accept an exercise conducted by the marine facility or vessel, and called by an agency other than the OSPR, if all of the following conditions are met:

(A) The exercise tests one or more of the following: the marine facility or vessel's spill management team and spill response organization; deployment of the facility or vessel's response equipment; or deployment of other response resources identified in the contingency plan; and

(B) The exercise is conducted with the U.S. Coast Guard, or another local, state or federal agency and the OSPR has been invited with the minimum notification required in Section 820.01(b)(2); and,

(C) The owner/operator has received prior approval for the exercise substitution from the Administrator, and,

(D) The Administrator finds the exercise objectives and evaluation criteria equal to or exceeding those of the OSPR.

(2) Out-of-State Exercises

In substitution for the spill management team tabletop exercises, the Administrator may accept an exercise conducted by the vessel owner/operator outside of the State of California if the following conditions are met:

(A) The OSPR has been invited with the minimum notification required in Section 820.01(b)(2); and,

(B) The owner/operator has received prior approval for the exercise substitution from the Administrator; and,

(C) The Administrator finds the exercise objectives and evaluation criteria equal to or exceeding those of the OSPR.

(D) The only exercise that can be substituted under this provision is an exercise of the spill management team and a response management organization that is separate from the vessel operation itself.

(i) OSRO Exercises

An exercise of an OSRO's services may fulfill the equipment deployment exercise requirement of Section 817.02(k)(3) for any marine facility, or Section 818.02(l)(1)(D) for any vessel, that utilizes the OSRO's plan to fulfill the response requirements of the facility's or vessel's own plan. These exercises will not fulfill the semi-annual equipment deployment exercise requirement of marine facility-owned equipment pursuant to Section 817.02(k)(1)(B).

(j) Unannounced Exercises

An unannounced exercise may be used to satisfy the exercise requirements of this subsection under the following conditions:

(1) The owner/operator shall submit a written request to the administrator within 90 days after the unannounced exercise is conducted asking that the exercise be considered in substitution for one or more of the required exercises, and;

(2) The exercise tests one or more of the following: 1) the marine facility's or vessel's spill management team and spill response organization, 2) deployment of the facility's or vessel's response equipment, or 3) deployment of other response resources identified in the facility's or vessel's plan; and;

(3) For Internal Unannounced Exercises, the owner/operator shall comply with all requirements of Subsections 820.01(b) through (e); or

(4) For External Unannounced Exercises, the owner/operator shall comply with all the requirements of Subsections 820.01(c) through (e).

(k) Actual Spill

(1) Actions taken in response to an actual spill may be considered for exercise credit upon request of the owner/operator if all of the following conditions are met:

(A) The OSPR receives the documentation, as appropriate, outlined in Section 820.01(d); and,

(B) The OSPR receives documentation of State OES oil spill notification, and the owner/operator provides all the information required on the OSPR Notification Form (FG OSPR Form 1964); and,

(C) Activation of the spill management team is successfully accomplished; and,

(D) OSPR or another regulatory agency responds to the spill. A written response/evaluation by the owner/operator may be accepted by OSPR in lieu of an agency report if an agency report is not prepared; and,

(E) The response was carried out in accordance with an approved contingency plan, the appropriate Area Contingency Plan, and/or in accordance with the directions of the Administrator or Federal On-Scene Coordinator; and

(F) The OSPR receives a report from the Responsible Party as to cause of the spill, and procedures or other measures adopted to prevent a similar reoccurrence.

K.4 RECORDKEEPING

K.4.1 Training Records

Venoco will maintain records sufficient to document training of its spill response team members. Venoco will maintain records documenting training of the response personnel for as long as they have assigned duties in the response plan. These records will be available for inspection upon request by Venoco management personnel, its Qualified Individual, and government agencies.

K.4.2 Drill Records

Records to document drills of its oil spill response organization and response resources identified in this plan are maintained for five years. All records will be made available for inspection upon request by the government agencies.

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L.1 INTRODUCTION

This Communications Plan has been developed for spill/emergency response operation. The plan addresses communication procedures, function, range, and redundancy/backup systems.

L.2 COMMUNICATIONS REQUIREMENTS

Effective and efficient communications systems are a central requirement for emergency response at every level. The **Communications Unit Leader** develops and maintains the communications network throughout the response effort.

Communications requirements fall into two basic categories:

- Primary communications necessary to carry out response operations.
- Secondary communications necessary to support response operations.

A comprehensive, integrated communications network must be established linking the Command Post(s) to field operations. Redundancy must be built into the network. All equipment must be carefully tracked when distributed.

L.3 EXISTING COMMUNCATIONS NETWORK

The existing communications network will link Venoco with its OSRO, local, state, and federal emergency responders, as well as adjacent platform operators in the Santa Barbara Channel via:

- Telephone system (cellular/land line).
- 2-way hand-held radios
- Facsimile transmissions.
- Contractor/Cooperative UHF and/or VHF marine radios.
- Internet e-mail.
-

A summary of the communications network is provided in Table L-1 on the following page.

Table L-1. Venoco's Communications Network.

		RADIO SYSTEM[1]		
FACILITY/VESSEL	**TELEPHONE**	**TYPE/QUANTITY**	**CALL SIGN**	**FREQUENCY[2]**
Glenn C	805-212-6313	VHF Marine CH 16/1	WDB9635	
Jackie C	805-212-6314	VHF Marine CH 16/1	WCZ4564	
Carpinteria Facility	Table 2-11	Handhelds (5)		
Carpinteria Pier	Table 2-11	FM/3 Handhelds (1)		
Platform Gail/Grace	Table 2-11	Marine CH 16/1 Handhelds (20)	Gail: WHV916 Grace: KPZ717	
Venoco Corporate	805 745-2100			

NOTES:
1. Radio system has a range of approximately ten miles.
2. Radio system may be used to communicate for shoreline, marine, and/or air operations (i.e., ground-to ground, ground-to-air, ground-to-sea, sea-to-sea, and sea-to-air).

L.4 EMERGENCY RESPONSE COMMUNICATIONS NETWORK

L.4.1 Supplemental Communications

During response to a major incident, Venoco's existing network will be supplemented as necessary to provide an effective network linking the command posts, staging areas, vehicles, and/or offshore vessels. Supplemental communications may include:

- Telephones (fixed/cellular).
- Fax machines.
- Handheld radios.
- Personal computers and modems.
- Pagers.
- GTE / Nextel GOPAC system.
- Satellite phones may be required for remote SCAT or biology team communication, NRC Environmental maintains sat phones in their resource inventory.

For offshore response operations, additional frequencies (i.e., Channel 16 is monitored during routine operations) may also be used for communications with marine band radios. The FCC has assigned the following primary and secondary frequencies for oil spill response use:

- Primary Frequency 1 UHF 459.000/454.000 (T/R)
- Primary Frequency 2 UHF 454.000/454.000 (T/R)

- Secondary Frequency 1 VHF 159.480/158.445 (T/R)
- Secondary Frequency 2 VHF 158.445/158.445 (T/R)

Clean Seas' communications capabilities are included in their equipment list in Appendix F and the Directory of Contacts in Section 2.5. Venoco will be able to integrate its radio system with Clean Seas by placing a portable base station in the Clean Seas Mobile Communications Center and directing operations from there.

The primary communications system operates on UHF frequencies for command, coordination over distance, force development, and other supervisory functions during cleanup operations. Secondary communications operates on VHF frequencies and supports logistics (e.g., obtaining supplies, planning and staging equipment operations, interfacing with the land telephone system, receiving USCG information). A list of the standard VHF communication frequencies is provided in Table L-2.

Table L-2. Standard Marine VHF Voice Communication Frequencies.

Channel No.	Ship Frequencies (MHz)		Usage
	Transmit	Receive	
1	156.050	156.050	Port operations and commercial
3	156.150	156.150	Port operations and commercial
5	156.250	156.250	Port operations
6	156.300	156.300	Intership safety
7	156.350	156.350	Commercial
8	156.400	156.400	Commercial
9	156.450	156.450	Commercial and non-commercial
10	156.500	156.500	Commercial
11	156.550	156.550	Commercial
12	156.600	156.600	Port operations
13	156.650	156.650	Navigational (bridge to bridge)
14	156.700	156.700	Port operations
15	156.750	156.750	Environmental
16	156.800	156.800	Distress, safety, calling
17	156.850	156.850	State control
18	156.900	156.900	Commercial
19	156.950	156.950	Commercial
20	157.000	157.000	Port operations
21	157.050	157.050	U.S. Government only
22	157.100	157.100	Coast Guard liaison
23	157.150	157.150	U.S. Government only
24	157.200	161.800	Public correspondence
25	157.250	161.850	Public correspondence
26	157.300	161.900	Public correspondence

Table L-2. Standard Marine VHF Voice Communication Frequencies.

Channel No.	Ship Frequencies (MHz)		Usage
	Transmit	Receive	
27	157.350	161.950	Public correspondence
28	156.150	156.150	Public correspondence
65	156.300	156.300	Port operations
66	156.350	156.350	Port operations
67	156.375	156.375	Commercial
68	156.425	156.425	Non-commercial
69	156.475	156.475	Non-commercial
70	156.525	156.525	Only for distress or safety calling or general purpose calling using DSC
71	156.575	156.575	Non-commercial
72	156.625	156.625	Non-commercial
73	156.675	156.675	Port operations
74	156.725	156.725	Port operations
77	156.875	156.875	Port operations
78	156.925	156.925	Non-commercial
79	156.975	156.975	Commercial
80	157.025	157.025	Commercial
81	157.075	157.075	U.S. Government only
82	157.125	157.125	U.S. Government only
83	157.175	157.175	U.S. Government only
84	157.225	161.825	U.S. Government only
85	157.225	161.825	Public correspondence
86	157.325	161.925	Public correspondence
87	157.375	161.975	Public correspondence
88	157.425	157.425	Public correspondence
WX1	162.550	162.550	Weather (receive only)
WX2	162.400	162.400	Weather (receive only)
WX3	162.475	162.400	Weather (receive only)

L.4.2 Air Traffic

During the initial period of a large spill incident, air traffic will be limited to immediate response aircraft such as air logistics contractors and OSPR. Aircraft activity during this early stage will be coordinated by the Transportation Unit. The FAA will be notified by the Operations Section Chief or the **Transportation Unit Leade**r as soon as it is practical. Such a request can also be made through the Federal On-Scene-Coordinator. The FAA may be requested at that time to approve an Emergency Restricted Area. The FAA will specify direction of flight and altitudes and issue advisories as needed to control media and other air traffic. Aircraft involved in spill response operations will be assigned a unique frequency; aircraft operating in the restricted area will be controlled on this frequency.

Other designated frequencies for air traffic communications that can be accessed in an oil spill include the Department of Fish and Game's multicom frequency at 122.925 MHz. In addition, the Flight Phone 40 can be used during an incident for communications.

L.4.3 Marine Traffic Control

Vessels entering the cleanup area will be hailed on Channel 9, 10, or 16 and transferred to an operating marine channel (156-158 MHz) where they will be advised of the situation and informed of special conditions in the area. Vessels have VHF-FM radio telephones or hand-held radios that can be used for this purpose.

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M.1 INTRODUCTION

A number of sensitive and unique marine and coastal habitats occur along Southern California coastal area that could be affected by a spill event. These areas are recognized with respect to their economic and cultural importance and their environmental sensitivity by governmental agencies. An inventory of sensitive environmental areas in the Santa Barbara Channel is provided in Figure M-1. The Channel Islands are over 15 miles from the facilities but are included because of their significance environmentally, economically, and culturally.

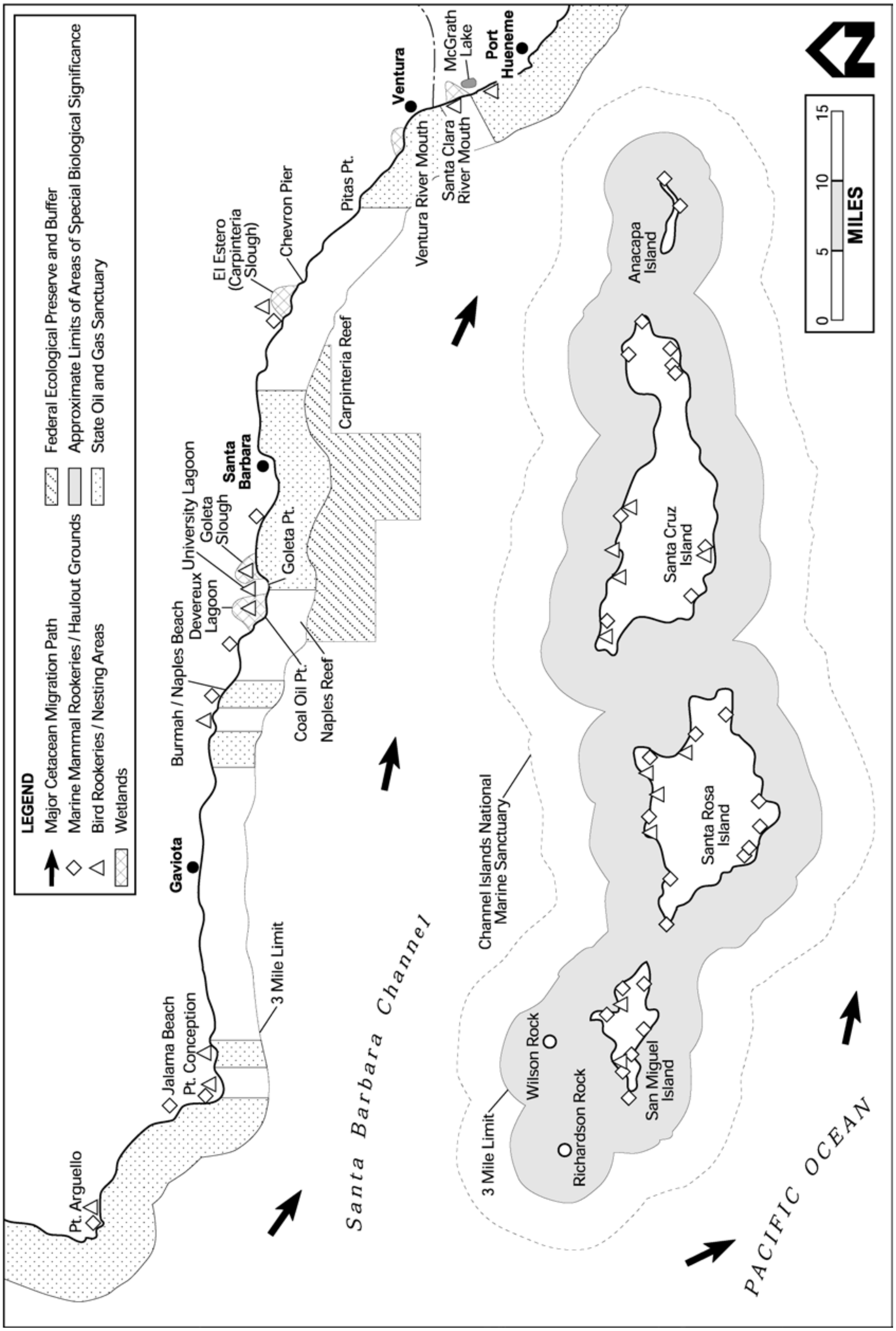
M.2 ENVIRONMENTALLY SENSITIVE RESOURCES (ACP Sec 9812)

Environmentally sensitive resources include:

- Shoreline types and associated marine resources.
- Presence of migratory and resident marine birds.
- Mammal migration routes and breeding, nursery, stopover, haul-out, and population concentration areas by season.
- Presence of aquatic resources.
- Presence of natural terrestrial animals, and plant resources in marine associated environments.
- Presence of state/federal-listed rare, threatened or endangered species.
- Commercial and recreational fisheries including aquaculture sites, kelp leases, and other harvest areas.

Sensitive resources are identified and mapped in the Area Contingency Plan (ACP) for Los Angeles/Long Beach (Northern/Southern Sector), 2008.

Figure M-1. Sensitive Resources in the Santa Barbara Channel.



Sensitive sites identified on ACP maps are provided below in Table M-1.

Table M-1. Environmentally Sensitive Areas

Site No.	Sensitive Site Name
4-567-A	Point Conception/Government Point
4-570-A	Damsite Canyon Creek
4-572-B	San Augustine Creek
4-575-A	Arroyo El Bolito
4-580-A	Canada De Santa Anita
4-585-A	Canada Del Alegria
4-590-A	Canada Del Agua Caliente
4-605-C	Canada Del Alcatraz and Cementario Creek
4-601-A	Gaviota Creek
4-610-A	Refugio Creek
4-615-A	El Capitan Creekp
4-620-A	Las Llagas, Dos Pueblos Creek
4-625-B	Naples
4-630-C	Eagle Canyon Creek
4-635-A	Tecolote Creek
4-640-A	Bell Canyon Creek
4-645-A	Devereux Slough
4-650-C	Goleta Point and Campus Lagoon
4-652-C	Goleta Beach
4-655-A	Goleta Slough
4-657-B	More Mesa/Goleta Rocks
4-660-A	Arroyo Burro Creek
4-662-C	Leadbetter Beach
4-665-A	Santa Barbara Harbor and Leadbetter Beach
4-670-A	Mission Creek; Laguna Channel
4-672-A	Sycamore Creek and Andree Clark Bird Refuge
4-674-A	Fernald Point Area
4-675-C	Summerland Beach
4-677-C	Loon Point and Elyse Creek
4-680-A	Arroyo Paredon Creek & Sandyland Area
4-685-A	Carpinteria Salt Marsh
4-690-A	Carpinteria Creek and State Beach
4-695-B	“Wave” Area, NW of Rincon Point
4-701-B	Rincon Point
4-705-C	Los Sauces Creek
4-711-C	Madranio Canyon
4-717-C	Javon Canyon
4-723-C	Padre Juan Canyon
4-729-C	A-Lease Canyon
4-735-C	Amphitheater Canyon
4-740-A	Ventura River
4-743-A	San Buenaventura State Beach
4-747-A	Ventura Harbor
4-750-A	Santa Clara River Estuary
4-761-A	McGrath State Beach, McGrath Lake
4-765-A	Mandalay State Beach
4-769-A	Oxnard State Beach
4-775-A	Channel Islands Harbor
4-780-A	Port of Hueneme

Table M-1. Environmentally Sensitive Areas

Site No.	Sensitive Site Name
4-783-A	Ormand Beach Wetlands and State Beach
4-787-A	Laguna Point
4-790-A	Mugu Lagoon
4-800-A	San Miguel Island, Pt. Bennett Area
4-803-A	San Miguel Island, Castle Rock Area
4-806-A	San Miguel Island, Easy Simonton Cove
4-809-A	San Miguel Island, Harris Pt. To Bat Rock
4-812-A	San Miguel Island, Cuyler Harbor, East Side
4-813-A	San Miguel Island, Prince Island
4-815-A	San Miguel Island, Bay Point Area
4-818-A	San Miguel Island, South Side
4-820-A	Santa Rosa Island, West End
4-824-A	Santa Rosa Island, North Central Area
4-829-A	Santa Rosa Island, NE End
4-834-A	Santa Rosa Island, Lagoon (east Side)
4-839-A	Santa Rosa Island, SE End
4-844-A	Santa Rosa Island, Ford Point Area
4-848-A	Santa Rosa Island, South Point Area
4-850-A	Santa Cruz Island, Posa Anchorage
4-852-A	Santa Cruz Island, Christi Ranch Area
4-855-A	Santa Cruz Island, NW Area
4-858-A	Santa Cruz Island, Prisoners Harbor
4-861-A	Santa Cruz Island, Water Harbor Area
4-864-A	Santa Cruz Island, NE End
4-867-A	Santa Cruz Island, Sandstone Pt. Area
4-870-A	Santa Cruz Island, Valley Anchorage Area
4-873-A	Santa Cruz Island, Bowen Pt. To Coches Prietos
4-876-A	Santa Cruz Island, Willows Anchorage
4-878-A	Santa Cruz Island, Punta Arena Area and Gull Island
4-880-A	Anacapa Island

Using OSPR maps, sensitive areas are mapped and prioritized (Codes A, B, and C) according to an environmental sensitivity ranking. A Site Summary Sheet is provided for each sensitive site and includes information on the site's:

- Location: U.S.G.S. quad, longitude and latitude, Thomas Guide.
- Site Description.
- Seasonal and special resource concerns.
- Resources of primary concern.
- Cultural, historical and archeological sensitivities
- Trustee Agency/Local Expert contacts.

A second sheet for each sensitive area, the Site Strategy Sheet, specifically addresses protection, containment, and cleanup strategies, including recommended techniques, equipment considerations, and access and logistics information.

Resources of concern in the area of Venoco's facilities and pipelines are summarized in Table M-2.

M.3 ECONOMIC AND CULTURAL RESOURCES (ACP Sec 9812, 9813, 9814)

Economic and cultural resources include:

- Public beaches, parks, marinas, boat ramps, and diving areas.
- Industrial and drinking water intakes, power plants, salt pond intakes.
- Offshore oil and gas leases and associated drilling platforms.
- Historical/archaeological sites.
- Areas of cultural or economic significance to Native Americans.
- Major waterways and vessel traffic patterns that are likely to be impacted.

The ACP contains a discussion of economically significant areas in a similar fashion as addressed for environmentally sensitive areas in Section M.2. Priority ranking codes D, E, and F are used to signify lower priorities for protection. The economic resources that may be affected, along with the appropriate priority ranking code for each resource, are summarized in Table M-3.

Table M-2. Inventory of Potentially Affected Natural Resources.

INVENTORY OF POTENTIALLY AFFECTED NATURAL RESOURCES	
Marine Mammals Harbor Seal (pupping off Carpinteria) California Sea Lion Northern Elephant Seal ***Seabirds*** Brown Pelican (SE, FE) California Least Tern (SE, FE) Light Footed Clapper Rail (SE, FE) Belding's Savannah Sparrow (SE) Coastal California Gnatcatcher (FT) Western Snowy Plover (FT) Brandt's Cormorant Pelagic Cormorant Western Gull Pigeon Guillemot Red-necked Grebe Surf Scooter Black Skimmer Pacific Loon Red-throated Loon Common Loon Sandpipers Herons ***Fin Fish*** Tidewater Goby (FE) Steelhead Trout (FE) California Grunion (during spawning) Surf Perch Halibut Northern Anchovy Corbina White Sea Bass Bonita Thresher Shark Yellowtail California Barracuda Jack Mackeral	***Shellfish*** Pismo Clam Abalone Spiny Lobster Crab Red Rock Shrimp ***Plants*** Salt Marsh Bird's Beak (FE, SE) Spartina Eelgrass Pickleweed ***Habitat/Reserves*** Point Conception to Ellwood Naples Reef Burmah Beach Tecolote Creek Coal Oil Point Devereux Slough and Lagoon University Lagoon Goleta Rocks/Slouch/Point Offshore City of Santa Barbara El Estero Lagoon Allesandro Lagoon – Ventura River Mouth Santa Clara River Estuary Natural Preserve Mugu Lagoon Lagoons Wetlands Creek mouths Dunes ***Channel Islands*** San Miguel Island Santa Rosa Island Santa Cruz Island Anacapa Island
Sources: *ACP, OSPR Guidance Documents, CDFG Natural Diversity Database* ***Key:*** *SE: State Endangered, FE: Federal Endangered; FT: Federal Threatened*	

Table M-3. Inventory of Potentially Affected Economic Resources.

INVENTORY OF POTENTIALLY AFFECTED ECONOMIC RESOURCES	
Mariculture Areas – D[1] Port Hueneme Area – Stellar Biotechnologies Ormond Beach Area – C.I. Marine Resources Institute SB Harbor, Stearns Wharf – Eaglenet Sea Farms Santa Barbara – Henry's Sea Ranch, AB Tec, Pacific Seafood, Sea Ventures Ent. Inc., South Coast Shellfish Ellwood – Goleta – Neushul Mariculture Inc. Goleta-Dos Pueblos Cultured Abalone Conception Bay-Abalone Co. ***Water Intakes*** Edison Mandalay Bay Edison Ormond Beach City of Santa Barbara Sea Water Intake Marine Science Institute (UCSB) Sea Water System ***Parks – E***[1] Gaviota State Park Refugio State Beach Park El Capitan State Beach Park Santa Barbara Shores Beach Access Isla Vista Beach Goleta Beach County Park Arroyo Burro Beach West Beach Santa Barbara Stearns Wharf Chase Palm Park East Beach / Butterfly Beach Hammonds Beach Eucalyptus Lane Miramar Beach Lookout County Park Loon Point Carpinteria City & State Beaches Rincon Beach County Park Hobson County Park Rincon Parkway North (camping/picnicking) Faria County Park Rincon Parkway South (camping/picnicking) Emma K. Wood State Beach Ventura River Bicycle Path San Buenaventura State Beach Channel Islands National Park Headquarters McGrath State Beach Oxnard State Beach	***Parks – E***[1] Port Hueneme State Park Point Mugu State Park ***Marine Services & Commercial Fishing – E***[1] Santa Barbara Harbor Carpinteria Pier Ventura Harbor & Village Ventura Yacht Club Ventura Isle and West Marinas Vintage Marina Channel Islands Harbor Anacapa Isle Marina Bahia Cabrillo Yacht Landing Channel Islands Commercial Fishing Marina Channel Islands Marina and Landing Channel Islands Small Boat Marina Cisco Sportfishing Pacific Corinthian Marina Peninsula Yacht Anchorage ***Tourist Areas – F***[1] City of Santa Barbara Carpinteria Rincon Point (surfing) La Conchita Beach Mussel Shoals Beach Oil Piers Beach Solimar Beach Ventura Pier Oxnard Shores Hollywood Beach Silver Strand Ormond Beach ***Cultural Resources*** None identified (a cultural resource specialist would advise the spill response team as necessary)
Sources: *ACP, OSPR Guidance Documents*	
[1] ***Priority Rankings:*** D = Economic activities and resources which require high water quality for their operation or existence. E = Facilities, businesses, or resources which directly use coastal or bay waters within their economic activity and which are at risk of oiling from a spill in marine waters. F = Marine-associated facilities, businesses, and resources.	

This Plan does not attempt to identify the location of sites or areas of importance to Native Americans. Many coastal areas of significance to Native Americans are known or have been identified in the public literature; however, some are often confidential. Many confidential locations are held at regional Information Centers throughout the state and by local Native American organizations. There are numerous public agencies and individuals that should be contacted during a significant oil spill incident. Refer to the ACP 2006, Sections 9812.2, 9813.2, and 9814.2 for the contact lists.

M.4 WILDLIFE CARE AND REHABILITATION (ACP Sec 3600-3640; Region IX Regional Contingency Plan – Sec XXII Wildlife Response Plan for California June 30, 2005)

M.4.1 Introduction

The protection, rescue, and rehabilitation of wildlife that are or may be endangered by a release of oil to the environment is a high-priority issue during the development and implementation of spill response procedures.

The activities involved in a wildlife response include:

- Protection.
- Rescue.
- Stabilization.
- Medical treatment.
- Transport.
- Cleaning.
- Rehabilitation and husbandry.
- Release.

Detail information on wildlife rescue and rehabilitation is included in the Federal Region IX Regional Contingency Plan, Sections XXII a and b (link to plan is provided above).

M.4.2 Contacts

Wildlife resources are considered public resources and can only be managed, manipulated, or treated under the authority of the following trustee agencies:

- California Department of Fish and Game.
- U.S. Fish and Wildlife Service.
- National Marine Fisheries.

The federal permits required for hazing, collecting, or holding live animals are presented in Table M-4. Each of the trustee agencies has jurisdiction over specific wildlife resources. Many of the activities related to the protection, recovery, and/or rehabilitation of wildlife require either permits or permission of the trustee agencies.

Table M-4. Federal Permits Required.

FEDERAL PERMITS REQUIRED				
Wildlife Resource	U.S. Fish and Wildlife Service		National Marine Fisheries Service	
	Collect and Hold	Haze	Collect and Hold	Haze
Migratory Birds	Yes	No*	No	No
Sea Otters	Yes	Yes	No	No
Whales, Porpoises, Seals, And Sea Lions	No	No	Yes	Yes
Terrestrial Mammals, Fishes, And Non-Threatened Reptiles	No	No	No	No
Threatened Or Endangered Sea Turtles	No	No	Yes	Yes
* A USFWS permit is needed to haze species managed by the USFWS under the Endangered Species Act.				

The establishment and execution of an effective wildlife response therefore requires early communications between Venoco and the trustees. These communications should include:

- Scope and nature of the wildlife response.
- Identification of the wildlife responder.
- Identification of wildlife resources.
- Prioritization of actions.

Venoco has designated the California Oiled Wildlife Care Network (OWCN) as its wildlife responder. In the event of an oil spill to water, Venoco will ask OSPR, representing the State in the Unified Command, to make the call to activate the OWCN. (All activities of the Network, including rescue, triage, treatment, cleaning, rehabilitation, and release are subject to approval of the trustee representatives.)

M.5 MAPS OF SENSITIVE RESOURCES

OSPR and NOAA have prepared an Environmental Sensitivity Maps Index (ESI) Atlas for California. These maps are made available to spill responses during an event and include information on:

- Shoreline Habitat Types.
- Human Use Features (e.g. access, boat camps, water intakes).
- Sensitive Biological Resources (including seasonal data).

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N.1 INTRODUCTION

Spilled oil and oil-contaminated materials recovered from water and/or land require proper handling. The management of oil and oil waste material, including recycling, treatment, storage, and disposal, must comply with the standards set forth in:

- 40 Code of Federal Regulations (CFR) Parts 261 and 265 as mandated by the Resource Conservation and Recovery Act (RCRA).
- California Code of Regulations Title 22, Division 4, Chapter 30.
- California Code of Regulations, Title 14, Division 1, Subdivision 4, Chapter 7, Subchapter 2, Determining Amount of Petroleum Hydrocarbons Recovered.

Spill response and cleanup procedures often produce contaminated materials that become wastes and need to be managed properly. These materials may be residue, contaminated soil or water, absorbent and other debris. The oily materials must be characterized for proper handling. Waste handling procedures should be preceded by several steps with an overall objective of waste minimization, cost effectiveness, minimization of impact on unaffected areas or already cleaned areas, regulatory compliance, worker safety, and proper disposal. The person in charge of meeting these objectives is the **Decontamination Unit Leader**.

N.2 WASTE MINIMIZATION

Venoco's objective is to minimize, to the extent technically and economically feasible, the generation and disposal of waste from oil spill response operations. Venoco requires that all appropriate technically and economically feasible methods be utilized in order to reduce the overall volumes of waste generated and disposed of. The following practices and procedures have been adopted:

- Wastes will be carefully characterized to ensure that the appropriate waste treatment or disposal practices are employed.
- Land disposal of wastes will be considered to be the last resort. All other legally appropriate and available methods of waste handling will be investigated prior to disposal of waste to land.
- Recycling of wastes, whether onsite or offsite, will be considered for each waste stream.
- Onsite or offsite treatment of hazardous waste will be carefully evaluated to determine whether such treatment could reduce the hazardous characteristics of the waste without threatening the safety of employees. Treatment of hazardous waste in the field may not be realistic under most circumstances.
- All employees are encouraged to provide suggestions on ways to minimize waste generation and disposal and report them to the **Decontamination Unit Leader**.

N.2.1 Debris Avoidance

It is generally not possible to avoid the generation of oily debris. **However, it is possible to minimize the generation of oily debris in the coastal zone if the anticipated area of oil impact is cleaned.**

Personnel can be deployed to remove debris from beach intertidal areas to above the high tide line in order to minimize oiling of stranded debris/trash. It is important to note that such crews are not likely to be certified as required under the Occupational Safety and Health Administration (OSHA) regulations in 29 CFR 1910.120 and can only perform this task prior to the stranding of spilled oil. A safety/industrial hygiene specialist should be consulted regarding the limitations of those crews and the effective establishment of exclusion zones in the area of beach impact.

N.2.2 Selection of Personal Protective Equipment

Depending upon climatic conditions and material compatibilities of personal protective equipment (PPE), waste can be minimized through the selection of reusable equipment, when possible. For instance, heavy gloves and boots can be decontaminated effectively and reuse can minimize the generation of oil-contaminated disposable gloves and boots, as long as the Safety Officer approves such equipment. Reusable rain gear may also be used instead of disposable suits, if approved. Such decisions should be made early in the response process in order to minimize generating containerized, contaminated PPE, which is generally disposed of at Class I (California hazardous waste) facilities.

N.2.3 Recovered Oil And Oily Waste

Both oil and oily water recovered from skimming operations should be offloaded to facilities where it can be recycled or managed within the established process and treatment streams. Such facilities may include warehouses, refineries, commercial reclaimers, and recyclers. These facilities can often provide temporary tank storage when necessary.

N.2.4 Sorbent Use/Reuse

Synthetic sorbents (i.e., pads, sweeps, booms) are standard response materials used to recover spilled oil. Their oleophilc, hydrophobic character makes them efficient at separating oil and water. They are also routinely used to recover oil from solid surfaces. Since oiled sorbent material often constitutes a substantial percentage of the oily solid waste generated during a response, opportunities for minimizing this waste volume should be considered.

Some sorbents are designed to be reusable or can be recycled onsite with inexpensive gear. Sorbent manufacturers' instructions should be followed regarding the limits of effective reuse for individual products. Sorbent sweeps and booms may be replaced with recyclable boom and other appropriate gear in circumstances where floating oil can be efficiently recovered without generating oiled sorbents. For example, in low energy shoreline areas with good access (e.g. harbors, bays, inlets), it may be possible to use containment booms and recover trapped oil with vacuum trucks instead of contaminating large volumes of sorbent.

N.2.5 Petroleum-Contaminated Soil Recycling And Reuse

Soils may be reused as daily landfill cover if after treatment they satisfy the waste profiling requirements of the State and commercial facilities. Oil/solid residuals may also be incorporated into construction materials. The costs and benefits of such recycling (less than $100 per ton and low future liability) versus disposal in a California Class I or II disposal facility (greater than $100 per ton and moderate-to-high liability) are substantial.

N.3 WASTE MANAGEMENT POLICIES

N.3.1 Disposal

Land disposal of waste, especially hazardous waste, is considered to be the least preferred method of waste disposition. Not only is land disposal of waste a costly option because of the many fees and taxes which must be paid, it is often the least environmentally sound method of dealing with waste.

N.3.2 Reuse and Recycling

Reuse and recycling of wastes are encouraged whenever appropriate and practicable. Many reuse and recycling activities of hazardous waste are strictly regulated. The **Decontamination Unit Leader** is responsible for the coordination of these activities.

N.3.3 Onsite Disposal

Onsite disposal of any waste is strictly prohibited unless specific approvals from the **Decontamination Unit Leader** and all appropriate agencies are obtained.

N.3.4 Storage

Storage of waste on designated sites is allowed while waste is being properly characterized, and pending proper treatment or disposal. Stockpiling of waste is an unacceptable waste management practice.

A temporary emergency permit for temporary storage facilities can also be issued by the California Department of Toxic Substances Control (DTSC) pursuant to 22 CCR §66263.18. The temporary facility/facilities should be available at an onshore location(s) nearest the recovery operation to temporarily store recovered petroleum products and contaminated materials and debris. Siting of the facility/facilities should be done with concurrence of DTSC and the Regional Water Quality Control Board.

N.3.5 Other Practices

Other waste management practices may be available and appropriate for wastes generated from spill response operations. These practices may include separation of petroleum and water, and extraction of oil from soil sorbents and booms using transportable treatment units, bioremediation of hydrocarbon contaminated soils, and other methods. The **Decontamination Unit Leader** is responsible for the coordination of these activities, including acquiring permits and/or agency approvals.

N.4 REGULATORY DEFINITION OF WASTES

N.4.1 Introduction

Hazardous waste in California is defined by both federal and state regulations. The basic definition of a hazardous waste is set by the federal regulations. The California definition parallels the federal but expands the hazardous waste definition to be even more stringent. The federal regulations also define restricted and acutely hazardous waste and California regulations define restricted, designated, and non-hazardous waste.

The Federal Resource Conservation and Recovery Act (RCRA) is the basic statutory framework for federal regulation of hazardous waste and covers the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was enacted in 1976 and it was most recently amended in 1984. RCRA is administered by the United States Environmental Protection Agency (EPA), Office of Solid Waste.

The California Hazardous Waste Control Law is the basic statutory framework for hazardous waste management in California. This program was originally enacted in 1972 and has been amended many times. This program is administered by the California Environmental Protection Agency (CalEPA), DTSC.

Proper classification and disposal of wastes are very important in order to avoid severe civil and criminal penalties, as well as to minimize future cleanup liabilities. Once petroleum products are spilled to navigable waters, they must be considered a hazardous waste until a waste classification is conducted. It is the generator's responsibility to properly classify the waste because handling, treatment, storage, transport, and disposal will depend on this classification.

N.4.2 Overview of Waste Categories

Wastes fall into one of the following general categories under federal and state regulatory schemes:

CATEGORY	STATE REGULATED	FEDERAL REGULATED
Hazardous Waste	X	X
California Hazardous Waste	X	
Extremely Hazardous Waste	X	
Restricted Hazardous Waste	X	X
Designated Waste	X	

Non-Hazardous Waste	X	X

The category of the waste will generally determine which disposal option may be legally available.

N.4.3 Federal Hazardous Waste

In order for a substance to be considered a hazardous waste under RCRA, it must meet the following qualifications:

- The substance must be a solid waste (by definition, a solid waste can be a liquid).
- The substance must be discarded.
- The substance must not be specifically exempted or excluded.
- The substance must exhibit certain specific characteristics of a hazardous waste or be specifically listed as a hazardous waste.

Several categories of substances related to oil production operations are excluded or exempt from RCRA regulations including waste residue, waste in process lines, waste samples and recyclable materials. However, it is important to note that even though a waste may be exempted under RCRA, the state regulations may still apply.

RCRA defines the characteristics of a hazardous waste as ignitability, corrosivity, reactivity, and toxicity. If a substance shows one or more of these characteristics, it is classified as hazardous even if the waste is not otherwise specifically listed as a hazardous waste. Substances derived from hazardous wastes and mixtures of solids or liquids and hazardous waste are hazardous wastes.

The 1984 Hazardous and Solid Waste Amendments to RCRA essentially banned all RCRA hazardous waste from land disposal as of May 8, 1990, unless the wastes have been treated to a specific standard to reduce their toxicity. Once treated, the waste may be disposed of in a hazardous waste disposal facility.

40 CFR Part 261.3 defines hazardous waste and provides guidelines for characterizing spilled materials. The following questions should be considered in evaluating mixtures:

1. *Is the spill residue a RCRA-listed hazardous waste?* [261.3(c)(2)(i)]

   There are two ways a spill residue could be a RCRA-listed hazardous waste:

   - First, if any material spilled was itself a RCRA-listed hazardous material. According to the mixture rule, the resulting spilled residue is automatically a RCRA-listed hazardous waste, regardless of the amount of listed hazardous material contained in the residue.
   - Second, if the material spilled was a commercial chemical product listed in 40 CFR 261.33(e) or (f), any resulting residue that needs to be discarded is a RCRA-listed hazardous waste.

As with any listed waste, or derivation from a listed waste, the spilled residue is a RCRA-listed hazardous waste unless de-listed by EPA and the California Department of Health Services.

2. *Is the spill a RCRA-characteristic waste?* [261.3(d)(1)]

   Does the spill residue exhibit any of the four defining characteristics? The spill residue is only hazardous if the residue exhibits a hazardous characteristic.

Decontamination Unit Leader should be consulted in the classification of RCRA waste streams and their ultimate disposal.

N.4.4 California Hazardous Waste

California regulations define hazardous waste as any waste which, due to its quantity, concentration, or physical, chemical or infectious characteristics, may either cause an increase in mortality or serious illness, or pose a substantial threat to health or the environment when improperly handled. All wastes defined as hazardous under RCRA are also defined by California as hazardous.

Additionally, a waste is hazardous if it meets any of the criteria for toxicity, ignitability, reactively, or corrosivity as defined by RCRA. California also adds criteria for persistence and bioaccumulation. A waste is hazardous if it contains a listed persistent and bioaccumulative substance in a concentration:

1. greater than the total threshold limit concentration (TTLC) or
2. greater than the soluble threshold limit concentration (STLC) as determined by the Wet Extraction Test.

Examples of California hazardous waste includes spent acids (corrosive), light oil tank bottoms (ignitable), contaminated soils (heavy metal concentration), and waste water (presence of a halogenated solvent such as carbon tetrachloride and TCE).

N.4.5 California Extremely Hazardous Waste

The category of extremely hazardous waste is defined as any hazardous waste or mixture of hazardous waste "which, if human exposure should occur, may likely result in death, disabling personal injury or serious illness." A list of chemicals that are considered to be extremely hazardous wastes is provided in 22 CCR Chapter 11, Appendix X. Additionally, a waste that meets the criteria in 22 CCR §§66261.110 and 66261.113 is an extremely hazardous waste. Examples of wastes potentially considered to be extremely hazardous wastes which may be found in oil production activities include, but are not limited to, chlorine, hydrogen sulfide, acrolein, mercury, polychlorinated biphenyl (PCBs), and hydrofluoric acid.

Additionally, requirements and restrictions apply to wastes defined as extremely hazardous waste. For example, a disposal permit is required for the disposal of extremely hazardous waste.

N.4.6 California Restricted Hazardous Waste

As of May 8, 1990, all hazardous wastes in California were to be prohibited from land disposal without prior treatment to reduce their toxicity. However, various extensions of this deadline have been provided by the State. Before preparing to dispose of a hazardous waste, the land disposal status should be reviewed by **Decontamination Unit Leader**.

N.4.7 Non-Hazardous Waste

The State of California categorizes non-hazardous wastes into two categories for purpose of identifying disposal options. These categories are:

- Designated wastes.
- Non-hazardous solid wastes.

These categories are prescribed under the California Water Code and the requirements are enforced by the Regional Water Quality Control Board.

Designated waste is a non-hazardous waste that contains pollutants that could cause degradation of water quality or is a hazardous waste, which has been granted a variance from hazardous waste management requirements. Examples of designated wastes include oil production wastes such as heavy oil tank bottoms, produced water, and soil contaminated with hydrocarbons. These and other wastes may be considered non-hazardous if they have been tested/reviewed to be non-hazardous. If the waste is determined to be a designated waste, certain disposal restrictions may apply. For example, designated wastes may only be taken to an approved land disposal facility. It should be noted that onsite treatment may be available for designated waste rather than disposal at a landfill. For example, soil contaminated with hydrocarbons could be treated onsite through methods such as bioremediation, vapor extraction, and chemical treatment to render the waste non-designated.

Non-hazardous solid waste generally includes rubbish, trash, and inert wastes, such as concrete, which do not meet the criteria of hazardous or designated wastes. Non hazardous solid wastes must be taken to an approved solid waste disposal facility.

N.5 WASTE CLASSIFICATION

Proper waste classification is one of the most important steps in waste management. The objective of characterizing the waste is to ensure proper handling in accordance with federal and state regulatory requirements. The **Decontamination Unit Leader** will characterize the waste. (An unknown waste is treated as hazardous.) To profile a waste, the waste will be sampled (with duplicates taken) according to a prescribed sampling procedure and sent to a laboratory or Treatment, Storage, and Disposal Facility (TSDF) for analysis. (It is preferable to have the analysis conducted at a laboratory.) The laboratory must be certified by the State to analyze hazardous wastes, approved by Venoco, and utilize EPA or California-approved tests. Both EPA and California list specific tests (e.g., TCLP and WET) that must be used to characterize a waste stream. The analytic tests recommended for oil-contaminated soil and debris are as follows:

- Ignitability.
- CCR Title 22 Metals.
- Total Petroleum Hydrocarbons (EPA Method 418.1, Crude Contamination).
- Fuel Hydrocarbons (Modified EPA Method 8015, Product Contamination).
- B/T/X/E EPA Method 8020.
- Acute Aquatic Assay.

Additional tests may be required depending on the specific circumstance. These tests may include reactivity, TCLP for benzene, volatile organics, and semi-volatile organics. After the waste is analyzed, Venoco will send the analysis to an appropriate Treatment, Storage, and Disposal Facility (TSDF) for profiling.

N.6 WASTE HANDLING

A primary concern in the handling of recovered oil and oily debris is the prevention of contamination of previously unaffected areas or recontamination of areas already cleaned. This can be accomplished by using correct handling techniques.

Collection method and activities will be under the control of the Incident Commander. The **Decontamination Unit Leader** is responsible for management of waste and should be in constant communications with the Incident Commander. He will accomplish this task in coordination with Venoco's Corporate Water and Waste Coordinator.

Recovered oil should be placed in sealable containers such as five-gallon cans with lids or caps, 55-gallon drums, portable pillow tanks, and tank trucks or other containers that can be sealed to prevent spillage. If the spill is from a tank, the recovered oil may be pumped back into sound tanks of compatible material or the recovered oil tanks. Oily wastes should be placed in leak-proof containers to prevent leakage during handling and transportation. Double-walled plastic bags are convenient for this purpose. For larger materials or those which could perforate the bags, debris boxes or similar containers could be used as long as they are lined with plastic or made leak proof by some other means. Hazardous waste bins and lined, dump truck beds may also be used for collection of oily wastes.

Oily debris, whether it is vegetation, sediments, or other materials, should be placed in leak-proof containers during handling and transport. Plastic bags are convenient for this purpose. Bags should be clearly marked or color-coded to indicate the type of waste. Debris boxes or similar containers may also be used provided they are lined with plastic or rendered leak-proof by some other means.

Proper handling of oil and oily wastes is imperative to ensure personnel health and safety. Care will be taken to avoid contact with oily wastes. All persons handling or coming into contact with oily wastes will wear protective clothing such as rain suits, rubber boots, and gloves. A barrier cream may be applied to response person's hands prior to putting on gloves to further reduce the possibility of oil waste absorption. Safety goggles will be worn by persons involved in waste handling activities where splashing might occur. Any portion of the skin exposed to oily waste will be washed with soap and water.

N.7 TEMPORARY ONSITE STORAGE

N.7.1 Regulatory Requirements

To expedite removal of spilled oil, refined products, and contaminated material from marine waters during an emergency response, temporary storage sites may be erected at appropriate shore locations (22 CCR 66270.1(c) 3).

The transportation of oil and contaminated material to temporary storage sites during a response is exempt from handling and permitting requirements (22 CCR 66263.30 and/or 22 CCR 66263.43). The onsite California Environmental Protection Agency, Department of Toxic Substance Control (DTSC) representative or duty officer should be contacted for approval. If a Unified Command is established, OSPR will facilitate the contact with the DTSC through their liaison function.

Venoco will maintain responsibility for recovered oil and oily wastes generated during recovery operations. A temporary storage site may require an emergency permit from the California Coastal Commission (CCC) Oil Spill Program to respond to oil-spill-related matters along the coast. The program acts as a single point of contact, and requests for emergency permits should be directed to the CCC Oil spill Program staff.

Siting of the temporary facility must be done with the concurrence of the FOSC and State OSC, DTSC, the local RWQCB, and the local health, fire and emergency services departments. If a Unified Command is established, OSPR will facilitate the contact of state and local government agencies' non-command through their liaison function.

N.7.2 Storage Methods (ACP Sec 3250)

Response operations will generate large quantities of waste materials. Recovered oil may contain substantial quantities of water and debris. To facilitate subsequent transportation and disposal efforts, the water and debris should be separated from the oil. Segregating wastes according to type facilitates and reduces the costs of disposal. Non-hazardous wastes must be segregated and stored away from designated or hazardous waste. If non-hazardous waste becomes mixed with designated or hazardous waste, the entire waste will become a designated or hazardous waste.

The following factors should be considered in selecting a storage method:

- The type and volume of material to be contained.
- The type of contaminants present, if any.
- The duration of storage.

- The environmental setting.
- Access.
- The time of year.
- The proximity to residential/recreational areas.

Non-hazardous waste should be stored in a manner that does not cause hygiene or safety problems, poor housekeeping, or nuisance conditions. The following considerations should be taken into account:

- Wastes that are subject to decay should be placed into appropriate roll-off bins or other trash receptacles covered to minimize odor.
- Solid non-hazardous wastes should be stored such that excessive dust will not create nuisances to the surrounding community.
- Solid non-hazardous or inert waste should be stockpiled so as not to create a safety problem.

The storage of designated and hazardous wastes should be given the same considerations in order to minimize the damage to health, safety, the environment, or property. All containers used to store these wastes should be suitable for storage of the specific wastes and be sound. The following practices should be observed:

- Oily debris should be stored in roll-off bins or dumpsters that are lined with plastic sheeting prior to use. To control free liquid accumulation in the containers, an inner lining of sorbent fabric should be used.
- Tanks should be sound and have sufficient shell strength. Closed tanks should have pressure controls such as vents to ensure that they do not collapse or rupture.
- Containers should be closed or fully covered during storage except when it is necessary to add or remove wastes.
- Any containers storing ignitable or reactive wastes should be stored at least 50 feet from the facility's property line.
- Incompatible wastes should not be stored in the same container or in an unwashed container that previously held an incompatible waste. Incompatible wastes stored in the same area should be separated by a wall or dike.
- There should be a containment system around the tanks to contain any leaks or spills and that will have the capacity to contain 100% of the contents of the single largest tank in the area.
- Containers should be stored in areas with sufficient containment capacity to handle precipitation from at least a 24-hour, 25-year storm plus 10% of the aggregate total volume being stored or the volume of the single largest container, whichever is greater.
- The base of a containment area should be of impervious materials and be free of cracks and gaps.

- Storage areas should be inspected regularly to ensure that tanks, containers, bags, etc. are not leaking and are in good condition.
- If any liquid is spilled within the containment curbs or dikes, the liquid should be removed immediately.
- Hazardous wastes should not be stored in tanks with a capacity of more than 5,000 gallons. Hazardous wastes should be stored in compliance with the time-period and labeling requirements prescribed by law.

The volume of oil that can be recovered and dealt with effectively depends upon the storage capacity available. Segregation of different waste streams is required to determine the amount of liquid petroleum hydrocarbons recovered in accordance with State regulations (see Appendix N.8). A summary of temporary storage methods is provided in Table N-1. The option(s) selected will be subject to regulatory requirements and approvals.

Table N-1. Temporary Storage Methods.

Container	Onshore	Offshore	Solids	Liquids	Notes
Drums/Roll-off Bins	✓	✓	✓	✓	May require handling devices. Must be covered and clearly marked or coded.
Plastic Bags	✓	✓	✓		Must be clearly marked or coded.
Dump/Flat Bed Trucks	✓		✓		Must be lined and covered. Consider flammability of vapors at mufflers.
Tank Trucks	✓	✓		✓	Consider road access. Can be barge-mounted.
Barges		✓	✓	✓	Liquids only in tanks. Consider venting of tanks.
Storage Tanks	✓	✓		✓	May require special hoses or pumps for transfer.
Storage Bags	✓	✓		✓	May require special hoses or pumps for transfer. Care not to subject to excessive motion on vessel.
Pits	✓		✓	✓	Liners and berms required. Locate above high water mark, on level terrain, and away from streams.
Note: All storage containers arriving at a temporary storage site/staging area should be inspected prior to use.					

N.7.3 Temporary Storage Sites/Staging Areas

Staging areas should be selected for use as a point of accumulation and temporary storage for oil spill-related wastes. These sites for wastes should be located with good access to the cleanup operations and to nearby streets and highways. Good storage sites are flat areas such as paved parking lots. Temporary storage sites should be selected and prepared to minimize contamination of surrounding areas from leaching oil. All area drains in the vicinity of a site should be identified and, in the event of a spill, all potentially affected drains should be diked.

Storage sites should not be located on or adjacent to ravines, gullies, streams, or the sides of hills, but will be located on areas with a minimum slope and above the high water mark. Access to the storage sites should be controlled and a five-mile-per-hour speed limit should be enforced within these sites. A spill control kit should be kept at each site. This kit includes a patch kit for potential leaking containers and a supply of sorbent and socks. Venoco has pre-identified the Ellwood Pier and Sandpiper Golf Course Parking lots and the northern end of the Ellwood Marine Terminal property as temporary waste storage sites/staging areas. Clean Seas maintains temporary storage capabilities in excess of 15,000 bbls. The selection of all site(s) are subject to regulatory requirements and approvals.

N.7.4 Container and Waste Tracking

The **Decontamination Unit Leader** will maintain a log tracking each container utilized (e.g. roll-off bin, fast tank, or other container) at the temporary storage sites/staging areas. The information entered into the log includes:

- Vendor name.
- Container type.
- Container's serial number.
- Internal tracking number.
- Delivery date.
- Pickup date.
- A brief description of the container's condition.

An internal tracking number is assigned sequentially according to container type (e.g., the first roll-off bin used will be assigned the number RB-001). This number indicates the destination on a Waste Tracking Form for each load of waste added to that container.

On a daily basis, the **Decontamination Unit Leader** will document the following daily and cumulative totals for each waste stream:

- Volume of waste received.

- Volume of waste stored onsite.
- Volume of waste disposed, by disposal facility.

N.8 QUANTIFYING THE AMOUNT OF LIQUID HYDROCARBONS RECOVERED

As required by CCR Title 14, Division 1, Subdivision 4, Office of Oil Spill Prevention and Response Chapter 7 (Enforcement), Subchapter 2, Section 877-880, Venoco must determine the number of gallons of discharged liquid petroleum hydrocarbons that are recovered and properly disposed of. The term “disposed of” includes liquid petroleum hydrocarbon that is reprocessed, recycled, or otherwise utilized as an ingredient in the manufacture of petroleum products or other products.

The regulations specify in detail required sampling analyses and calculations for the following waste streams (each considered separately):

- Contaminated sediment.
- Boom and sorbents.
- Debris.
- Liquid petroleum hydrocarbons.

The total recovered petroleum hydrocarbons are the sum of the volume of petroleum hydrocarbons from the four waste streams (in gallons).

N.9 INITIAL TREATMENT OF TEMPORARILY STORED MATERIALS

Petroleum and petroleum-contaminated cleanup materials can potentially be treated at a temporary storage site. Treatment processes include:

- Separation of water from collected petroleum with the aid of a transportable treatment unit (TTU).
- Decantation of water off petroleum materials stored temporarily in tanks.

Any water generated through the separation of petroleum and water may be discharged to a sanitary sewer system. Discharging to the sanitary sewer system will require a permit from the local sanitation district, which will establish effluent requirements for the discharged water. Should the sanitation district not allow the discharge of water to its system, the recovered water could either be discharged to marine waters or transported offsite for disposal. The discharge of recovered water to State waters will require an NPDES permit from the local RWQCB.

A portable incinerator is another type of TTU available during a spill response for use with contaminated material. The use of an incinerator will require a permit from the local air quality agency. The potential use of any TTU and applicable regulatory standards must be discussed with DTSC.

N.10 WASTE TRANSPORT

Recovered petroleum product that is not accepted at a refinery or recycling facility and contaminated material must be transported to an approved waste management facility. The type of waste management facility selected is based on the results of the waste characterization tests performed.

N.10.1 Hazardous Waste

Waste classified as hazardous under either federal or state regulations must be transported to a permitted or interim status hazardous waste facility. Hazardous waste must and will be transported by state-licensed hazardous waste transporters. The licensed hauler must have a U.S. EPA identification number and state transporter identification number. Prior to removal of the hazardous waste, a manifest (form DHS-8022A) must be prepared for recovered petroleum and other contaminated materials (22 CCR §§66263.20-66263.23). See also Section N.12, Waste Documentation.

N.10.2 Non-Hazardous Waste

Waste determined to be a non-hazardous but designated waste (23 CCR §2522) can be transported to a Class II waste management facility. Manifesting of the waste is not required but a Bill of Lading is required for transportation. The appropriate RWQCB and local health department should be contacted to identify the appropriate waste management facility and any additional waste testing requirements.

Non-hazardous wastes are transported by non-hazardous waste licensed transporters. A list of approved transporters is provided in Section 2 Table 2-16.

A hazardous waste manifest must accompany each load of hazardous waste and a Venoco non-hazardous shipping paper will accompany each load of designated waste or non-hazardous waste. (See also Section N.12, Waste Documentation). Proper transportation of recovered oil and oily waste in accordance with Federal, State, and local regulations is the responsibility of the **Decontamination Unit Leader**.

N.11 WASTE DISPOSAL

N.11.1 Waste Disposal Sites

The disposal, treatment, and recycling/reuse options legally available will depend on the classification of the waste. Inappropriate disposal, treatment, recycling/reuse is prohibited by law. Therefore, it is important to select the proper waste disposal options. Table N-2 summarizes the waste categories and the approved classes of facilities for each waste category.

Table N-2. Classification of Waste Facilities.

Waste Category	Approved Facilities
Hazardous Waste	Class I Hazardous Waste TSDF
Hazardous Waste Granted a Variance or Designated Waste	Class I Hazardous Waste TSDF or Class II Facility Permitted to Accept Designated Waste
Non-Hazardous Solid Waste	Class III – Landfill
Inert Waste	Landfills as approved by the Regional Quality Control Boards

Recycling, reuse, onsite or offsite treatment of wastes, which are classified as hazardous or designated, are reviewed on a case-by-case basis for approval. Recycling, reuse and onsite or offsite treatment of hazardous waste is encouraged where economically and technologically feasible. A list of disposal sites and recycling facilities for various categories of materials is provided in the Directory of Contacts (Section 2.5, Table 2-16).

N.11.2 Disposal Options

N.11.2.1 Crude Oil and Refined Petroleum Products

Under California law, material released or discharged to marine waters of the State is defined as waste. Once the final disposition of a specific waste is determined, the waste may be redefined as a product or material and may no longer be subject to waste management requirements.

Crude oil that is spilled into marine waters, recovered and transported to a refinery may be considered a product and may not be subject to hazardous waste management regulations [California Health and Safety Code (CHSC), 25943.2 (sic)]. The collected crude may be shipped to the refinery of the original destination or a refinery that can accept the spilled crude oil. Refined petroleum products that are recovered from marine waters may also be handled as product if they can be used for their regularly intended purpose (I.e., fuel, fuel oil, etc.) (CHSC 25250.3).

Recycling is another option by which recovered petroleum may be managed as a material (CHSC 25143.2). This option includes using petroleum in incineration as a fuel, as a substitute for raw materials feedstock, or as an ingredient used in the production of a product (e.g., asphalt).

Recovered petroleum that is not accepted by a refinery or that cannot be recycled must be managed as a waste. In order to determine the appropriate method of management, the waste must be characterized by a State-certified laboratory to determine if the waste is hazardous or non-hazardous. The responsible party must have the waste properly characterized for disposition [Title 22, Section 66260.200(c) of the California Code of Regulations].

N.11.2.2 Decanting Of Water Separated From Recovered Oil At Sea

Oil recovered at sea typically contains significant amounts of seawater. In order to maintain the efficiency of the skimming process for recovery, this water must be separated/decanted from the oil and discharged back into the ocean during recovery operations. Separated seawater typically contains elevated levels of hydrocarbons and thus, the discharge of this material may constitute a discharge of a pollutant. Blanket permission has been granted to decant water into a contained area in a response area. The DFG, OSPR, and RWQCB have mutually agreed on this issue. The FOSC has always had the authority to allow decanting of recovered water; that is, the FOSC or designated representative may authorize discharge of separated/decanted water back into the catenary area of a boom/skimming system outside State waters (three miles) with the exception of NOAA marine sanctuary waters.

N.11.2.3 Contaminated Debris

Contaminated debris, including organic material, contaminated cleanup equipment, and other contaminated materials that cannot be recycled must be managed as a waste. The materials must also be characterized as hazardous or non-hazardous before the appropriate waste management option is determined.

N.11.2.4 Oiled Animal Carcasses

DFG should be notified of any dead or oiled wildlife, prior to taking any action. DFG should provide instructions on how to handle these animals and whom to notify. If permission is granted to collect dead animals, with the concurrence of DFG, the following steps should be taken:

- Photograph the animal.
- Place the carcass in a sealable bag with an identification tag.
- Note the date, time, location, condition of the animal, and the distance from the spill.
- Store the carcass on ice for up to 24 hours. Freeze if held longer.

If significant numbers of animals are affected, Venoco may choose to bring in a Technical Specialist to establish a group for handling examination, dispensation, disposal, and agency interactions.

Oiled animals and carcasses collected by others should be turned over to the DFG/OSPR representatives who are responsible for wildlife rehabilitation and collection of carcasses for Natural Resource Damage Assessment (NRDA) investigations. The identification and location of OSPR representatives can be provided by the Unified Command. The DFG will be responsible for the disposal of oil-contaminated carcasses.

N.12 WASTE DOCUMENTATION

Records regarding waste are extremely important. Not only is recordkeeping required by law for all hazardous wastes, the records also provide documentation that Venoco complied with all relevant laws and regulations regarding waste management. Records will also provide the basis for hazardous waste fee computation. Table N-3 provides a summary of the records that are maintained for waste activity. Required records are maintained in easily retrievable files. If, due to space constraints, records are archived in a warehouse or other storage facility, a log to file is maintained to allow for easy retrieval.

Table N-3. Waste Documentation.

Record	Required By	Retention Period
Laboratory Test Results (including Chain of Custody, Sampling Map, and Methodology	22 CCR §66262.40(c) 40 CFR §262.40(c)	3 years from date waste treated or disposed
Venoco Non-Hazardous Shipping Paper	Company Procedure	Indefinite period
Uniform Hazardous Waste Manifest – Not yet signed by the disposal or treatment facility	22 CCR §66262.40(a) 40 CFR §262.40(a)	3 years or until signed manifest from the disposal or treatment facility is received
Hazardous Waste Manifest – Signed by the disposal or treatment facility	22 CCR §66262.40(a) 40 CFR §262.40(a)	3 years minimum by law
Exception Report	22 CCR §66262.40(b) 40 CFR §262.40(b)	3 years from the due date of this report
Biennial Report	22 CCR §66262.40(b) 40 CFR §262.40(b)	3 years from the due date of the report (March 1 of each even-numbered year)
Waste Profile	Company Procedure	Indefinite period
Hazardous Waste Generator Fee Return Hazardous Waste Generator Disposal Fee Return	Company Procedure	Indefinite period
Extremely Hazardous Waste Disposal Permit	Company Procedure	Indefinite period
Incineration/Waste Destruction Certificate	Company Procedure	Indefinite period
Employee Training Records	22 CCR §66265.16(e) 40 CFR §265.16	For all current employees Former employee – 3 years

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O.1 APPLICABLE REGULATIONS

The Occupation Safety and Health Administration (OSHA) has promulgated two sets of regulations that are applicable to oil spill response operations. They are:

- Hazard communications regulations (29 CFR §1910.1200).
- Hazardous waste operations and emergency response (HAZWOPER) regulations (29 CFR §1910.120).

The hazard communications regulations require that workers be informed of any hazards associated with the materials they may come into contact with during the conduct of response operations. Hazardous waste operations and emergency response regulations require the preparation of a Site-Specific Safety and Health Plan, and that workers be properly trained to carry out response operations in a safe and healthful manner.

O.2 EMPLOYEE RESPONSIBILITIES

Each employee must have a positive attitude toward injury prevention and safety. The employee should believe that all injuries can be prevented and act accordingly. The employee is responsible for the following actions:

- Perform the job safely, for personal safety, safety of fellow workers, and protection of facilities. This includes the proper use of safety equipment and devices, as well as safe work practices.
- Report every injury, as well as unsafe conditions or practices (including contractors), to his/her supervisor.
- Participate in all safety meetings.
- Assist in reporting and investigating incidents, injuries, and potentially serious incidents.
- Review and become familiar with the contents of safety manuals, handbooks, and publications.

O.3 CONTRACTOR RESPONSIBILITIES

Contractors will take all necessary precautions for the safety of all persons on the work site. Contractors must comply with Venoco safety rules and regulations, and applicable federal, state, and local safety laws, rules, and regulations necessary to prevent injury to persons or damage to property. In addition, contractors must:

- Ensure that their employees are trained in Venoco safety rules and practices, and in job-specific procedures.
- Perform all work in a safe, workmanlike manner.

- Provide required safety equipment for their employees.
- Report injuries, near misses and incidents, no matter how slight (including property damage) immediately (within 24 hours) to the Venoco supervisor or designated alternate.
- Operate valves or equipment without the Venoco supervisor's or designate alternate's approval, except in a life-threatening situation.
- Hold a pre-job safety meeting and other safety meetings as needed during the execution of the job.
- Communicate with the Venoco supervisor or designated alternate before beginning work.

O.4 CHAIN OF COMMAND

Overall responsibility for safety and health issues during response operations rests with the Incident Commander. The Safety Officer is responsible for safety and health matters. These safety-and-health-related activities are:

- Ensure that all response personnel receive the necessary level of training required under the HAZWOPER regulations.
- Ensure that all company safety policies, procedures, practices, and regulations are known and strictly adhered to during the conduct of response operations.
- Assist in personnel exposure monitoring.
- Prepare Site-Specific Safety and Health Plan.
- Ensure that there is an adequate supply of protective clothing and equipment for all personnel involved in response operations, and that personal protective equipment is properly utilized throughout operations.
- Ensure that all personnel are aware of, and take all appropriate actions to protect themselves from all situations that pose a threat to their safety and health.
- Suspend any activity that poses a threat to personal safety and health that cannot be avoided or mitigated through the use of protective clothing or the adoption of a safe operating procedure.
- Determine where first aid stations will be located, arrange for qualified staffing at these stations, see that adequate first aid supplies are available, and ensure that the locations of these stations are clearly posted.
- Maintain regular communications with emergency medical teams and first aid stations.
- Issue Safety and Health Bulletins, as appropriate.

- Maintain a record of all job-related injuries, including their cause, nature, and any corrective actions taken.
- Serve as the principal point of contact for OSHA representatives assigned to monitor response operations.
- Ensure that decontamination stations are established and that all personnel are decontaminated before leaving their work stations during breaks and at the end of each shift (see Appendix P, Decontamination Procedures).

O.5 COORDINATION WITH GOVERNMENT AGENCIES

During the conduct of response operations, the Incident Commander will meet, on a regular basis, with the FOSC and the State Incident Commander. Safety and health considerations will be among the issues addressed at these meetings, particularly with regard to matters relating to incident-specific application of relevant safety and health laws, rules and regulations, policies, practice, and procedures.

The Safety Officer will coordinate Venoco's activities with federal and state safety and health personnel. Additionally, the Safety Officer will prepare Site Specific Safety and Health Plan(s) that will be kept onsite and will address the safety and health hazards of each phase of site operations and include requirements and procedures for worker protection. All site personnel will be required to read the plan and acknowledge that they are aware of and fully understand its contents in accordance with 29 CFR §1910.120. These forms (Site Safety Plan, Site Characterization, Safety Tailgate Meeting) are found in Appendix C, Forms.

O.6 PERSONAL PROTECTION EQUIPMENT REQUIREMENTS

O.6.1 Introduction

Personal protection equipment (PPE) appropriate to the exposure hazards of the emergency response incident must be worn at all times while potential or actual exposure exists. Prior to exposure, positive identification of the contaminants must be made. Until a positive identification is made, no entry in less than "Level B" protective devices shall be allowed.

The Safety Officer will prepare a Site Safety Plan based upon site assessment, monitoring results, and know of job tasks and processes.

O.6.2 PPE Level Definitions

The federal OSHA has defined four levels of PPE from Level A, providing the highest level of protection, to Level D, which is the minimal protection used for nuisance contamination. Federal OSHA requirements (29 CFR 1910.120(q)(10)) should be reviewed during HAZWOPER training to ensure familiarity with the proper PPE for potential hazardous material releases. Table O-1 provides the protective clothing required for the four levels of PPE.

Table O-1. Personal Protection Equipment Requirements.

Clothing/Equipment	PPE Level[1]			
	A	B	C	D
Totally encapsulating chemical protective suit (TECPS)	•			
Chemical resistant clothing (i.e., overalls and long-sleeved jacket, hooded 1- or 2-piece chemical splash suit, or disposable chemical resistant clothing		•	•	
Coveralls				•
Pressure demand (positive pressure), full face SCBA or airline unit with escape SCBA	•	•		
Half face piece, air purifying respirator with appropriate canister or cartridges			•	
Inner chemical resistant gloves	•			
Inner and outer chemical resistant gloves		•	•	
Chemical resistant safety shoes/boots	•	•	•	
Safety shoes				•
Full-time two-way communications	•	•		
Safety glasses or chemical splash goggles				•
Hardhat		•	•	•

[1] Level A Use: When dealing with a release of highly concentrated H_2S material or extremely corrosive material.

Level B Use: When handling material requiring the greatest respiratory protection and skin protection, but not to TECPS standards.

Level C Use When handling material requiring chemical resistant clothing such as rubber boots, rain gear, safety glasses, and air purifying respirators.

Level D Use: Recommended for personnel responding to crude oil cleanup. Level D is appropriate only if there are no known or suspected air contaminants and no potential skin contact with hazardous materials.

When donning PPE, observe the following:

- No employee/contractor should conduct any operations in areas not directly visible to other personnel.
- Operations requiring entry to such areas will conducted using the “buddy system” and the Safety Officer should be notified.
- Establish and maintain communications with your supervisor for the duration of such activities.
- Continue to monitor conditions, anticipate changes in:
  - Weather that may affect safety.

  - Wind changes that could affect safe areas.
  - Temperature that may affect work conditions and worker safety. Be alert for signs of heat stress, heat rash, heat cramps, heat exhaustion, and heat stroke.
- During break or rest periods, remove PPE to facilitate cooling, as needed.
- All injuries, no matter how minor, must be reported to the Safety Officer as soon as possible, but no later than at the end of the shift.
- All requests for emergency or life-saving medical treatment are to be made through the 9-1-1 system.

PPE for Venoco employees is available at its facilities and aboard the various co-op vessels. For large-scale cleanup operations, PPE is available from various contractors. The Safety Officer will verify that contractors provide sufficient PPE for their workforce.

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P.1 INTRODUCTION (ACP Sec 3260)

During responses to spill incidents, decontamination of personnel, equipment, and the release site is essential for individual safety and to minimize movement of hazardous material into unaffected areas. To minimize the transfer of hazardous substances from the site as a result of response activities, contamination control and decontamination procedures are needed.

P.2 CONTAMINATION CONTROL

The Decontamination Unit will establish control at a contaminated response site to reduce the possibility of exposure to any contaminants including their transport by personnel and/or equipment from the site. Procedures include:

- Set up security and physical barriers (e.g., hazard tape, rope, road cones, or a combination of restraints) to exclude unnecessary personnel and visitors from the contaminated area.
- Minimize the number of personnel and equipment onsite consistent with effective operations.
- Establish work zones within the site to reduce the migration of hazardous substances.
- Establish control points to regulate access to work zones.

P.2.1 Work Zones and Access Control Points

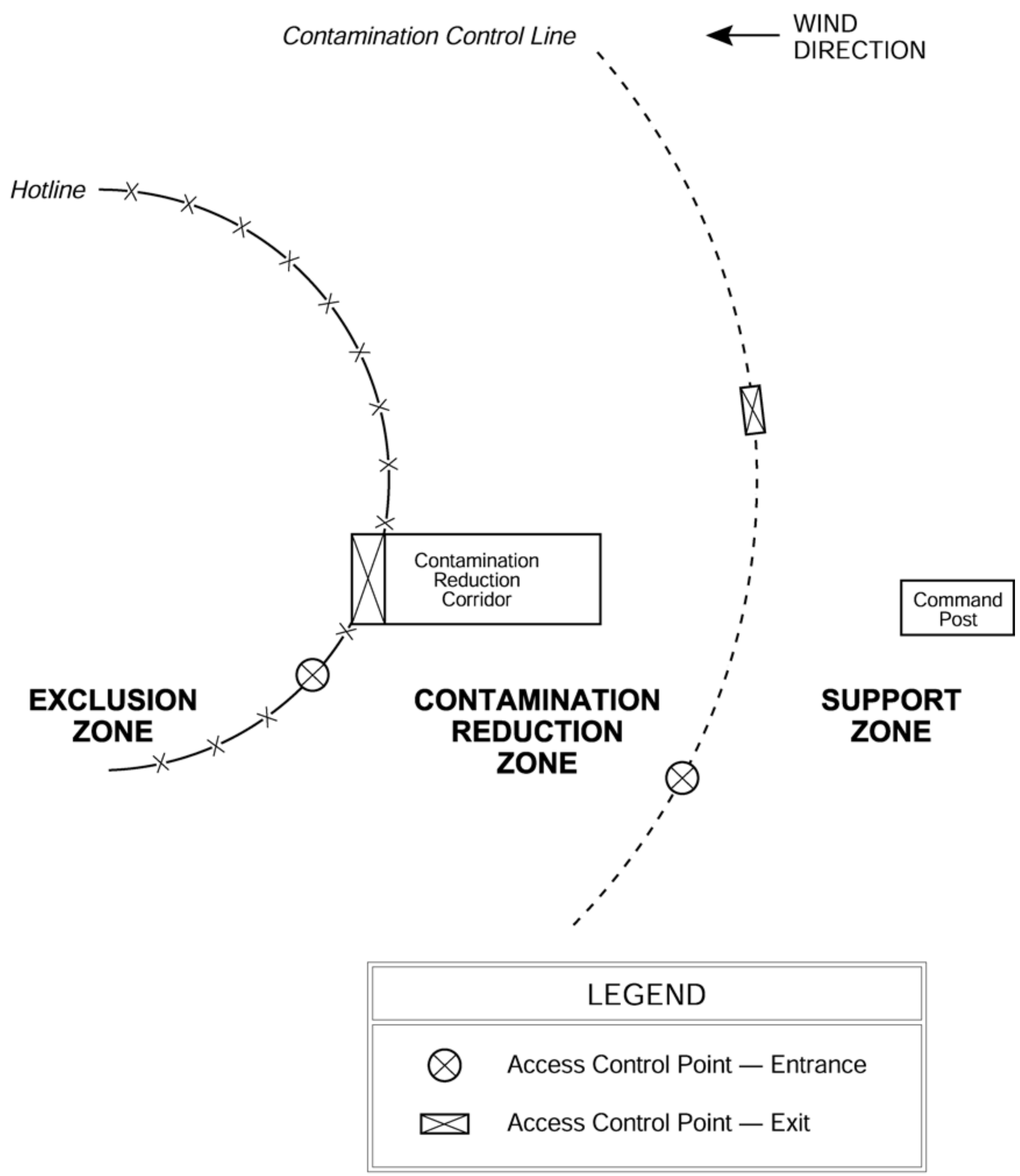
Work zones will be used to prevent or reduce the migration of contamination from a site where operations occur. Access control points will be used to limit the movement of personnel and equipment between work zones and onto the site itself.

The Decontamination Unit will establish three contiguous work zones surrounding each separate contaminated area on the site where response operations will occur. These zones are:

- Zone 1: Exclusion Zone.
- Zone 2: Contamination Reduction Zone.
- Zone 3: Support Zone.

An example of a work zone plan is shown in Figure P-1 on the following page.

Figure P-1. Site Work Zones Layout.



Movement of personnel and equipment into and out of the contaminated areas and between zones will be limited to access control points located upwind of the contaminated area. Refer to Table P-1 for work zone descriptions.

Table P-1. Work Zones and Access Control Points.

Zone	Type	Zone Location	Contamination Level	PPE	Access Control Point
1	Exclusion	Innermost or Hot Zone	Known or expected to occur	Specified level of protection	Must establish or located upwind of the contaminated area(s) along the outer boundary (i.e., the Hot Line)
2	Contamination Reduction or Warm Zone	Between the Exclusion and Support Zones	Clean Area: designed to provide a transition between Zones 1 and 3	Prescribed level of protection. Decontamination of PPE will occur at a series of stations	Entry and exit between Zones 2 and 3 will be restricted to access control points upwind of Zone 1 on the Contamination Control Line
3	Support or Cold Zone	Outermost: may include Field Command Post, transport vehicles, equipment, supplies, etc.	Clean Area	Normal work clothes, no contaminated clothing, equipment or supplies permitted	None: traffic will be restricted to authorized response personnel

The physical size of the zones will be determined by the:

- Nature of the released material.
- Climatic conditions of the area.
- Topography of the area.

The Hot Line (see Figure P-1) will be established initially:

- Visually surveying the immediate area of the release.
- Determining the location(s) of the involved hazardous substance(s).
- Studying monitoring data obtained during the initial site survey.

The boundary may be modified and adjusted over time, as more information becomes available.

P.3 DECONTAMINATION (ACP Sec 3260)

P.3.1 Overview

The Decontamination Unit is responsible for routine decontamination procedures and emergency contamination procedures. Routine decon is the primary focus of this section; however, emergency decon procedures should be established and carried out if it is safe to do so.

In an emergency, the primary concern is to prevent loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decon should be delayed until the victim is stabilized. Consider the following:

- If decon can be performed without interfering with essential lifesaving techniques or first aid, decon must be performed immediately.
- If an emergency due to a heat-related illness develops, protective clothing should be removed from the victim as soon as possible.
- During an emergency, provisions must also be made for protecting medical personnel and disposing of contaminated clothing and equipment.

P.3.2 Decontamination Area Site Setup

The Decontamination Unit will select a level site at the edge of the Exclusion/Hot Zone where an entrance to the Exclusion Zone and an exit through the Contamination Reduction Zone/Warm Zone and into the Support/Cold Zone may be located (see Figure P-1). The site selected should be away from the travel of equipment and supplies and not of value or needed for any future activities during the response. Steps for the design of the area include:

1. Construct a low berm around the decon site. Lay a sheet of visqueen over the entire surface area and over the berm. Weight sheet with soil around the outside edge of the berm. An example of a decontamination area is shown in Figure P-2 on page P-6.
2. Arrange all equipment in a fashion commensurate with the level of protection (e.g., Level D through A). Figure P-3 on page P-7 represents decontamination levels associated with Level A protection.
3. Lay down sorbent pads at decon entrance and near all tubs, buckets, and paths of travel where liquids may be tracked or deposited.

4. Set marker stakes and tape off decon area consistent with marking used for Exclusion/Hot Zone.
5. Post entrance and exit signs.
6. Label all waste containers appropriately. Have containers for contaminated debris and uncontaminated wrappings or trash (refer to Appendix N, Waste Management and Disposal Plan).
7. Set up boot washing tubs or pools, tub #1 containing Simple Green or other biodegradable soap and tub #2 containing clear water. An optional tub may also be used between tubs #1 and #2 with a milder soap concentration. Provide scrub brushes in each tub.
8. Set up a glove washing area on a table, bucket #1 containing soap and bucket #2 containing clear water. An optional bucket may also be used between, buckets #1 and #2 with a milder soap concentration. Provide rags or towels on the table.
9. If SCBAs are used in the Exclusion/Hot Zone, set up one bucket with mild bleach solution for mask washing, one with soap for mask washing, one for rinse, and have wipes or towel available.
10. Organize extra equipment and store neatly.
11. Take inventory of all PPE and decon equipment upon mobilization of decon. Log all PPE and equipment as it is resupplied or used on the response. Take inventory of PPE and decon equipment upon demobilization. Create a report of PPE used and status of equipment inventory at the end of the response.
12. **KEEP DECON AREA NEAT AND CLEAN AT ALL TIMES!**

The number of stations will depend on the amount and type of PPE. The maximum number of decontamination stations will be required for Level A protections. Decontamination procedures for lower levels of protection will consist of fewer decontamination stages for the amount of equipment worn or involve the elimination of wash and rinse stations when disposing of clothing.

Figure P-2. Decontamination Area Layout.

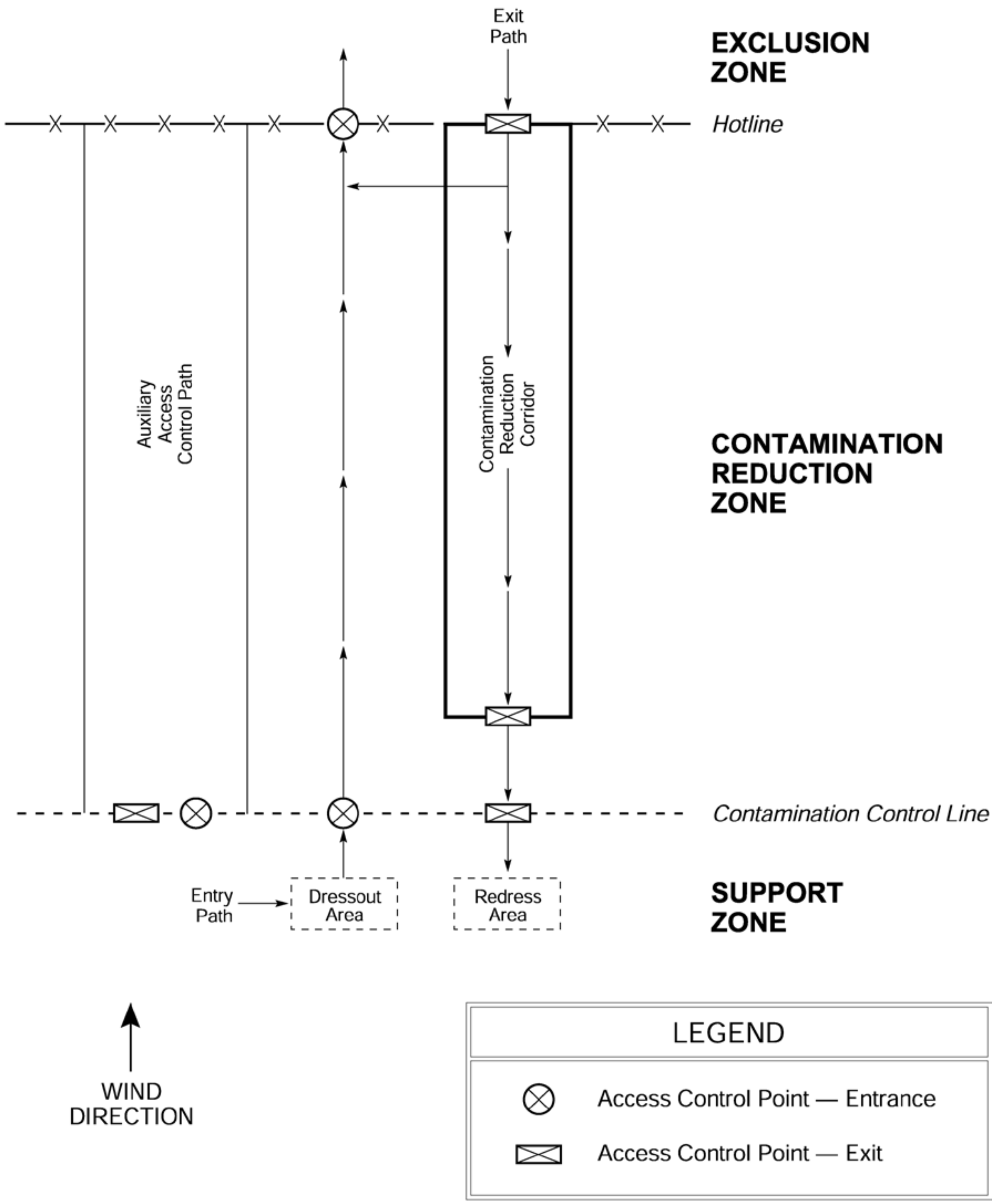
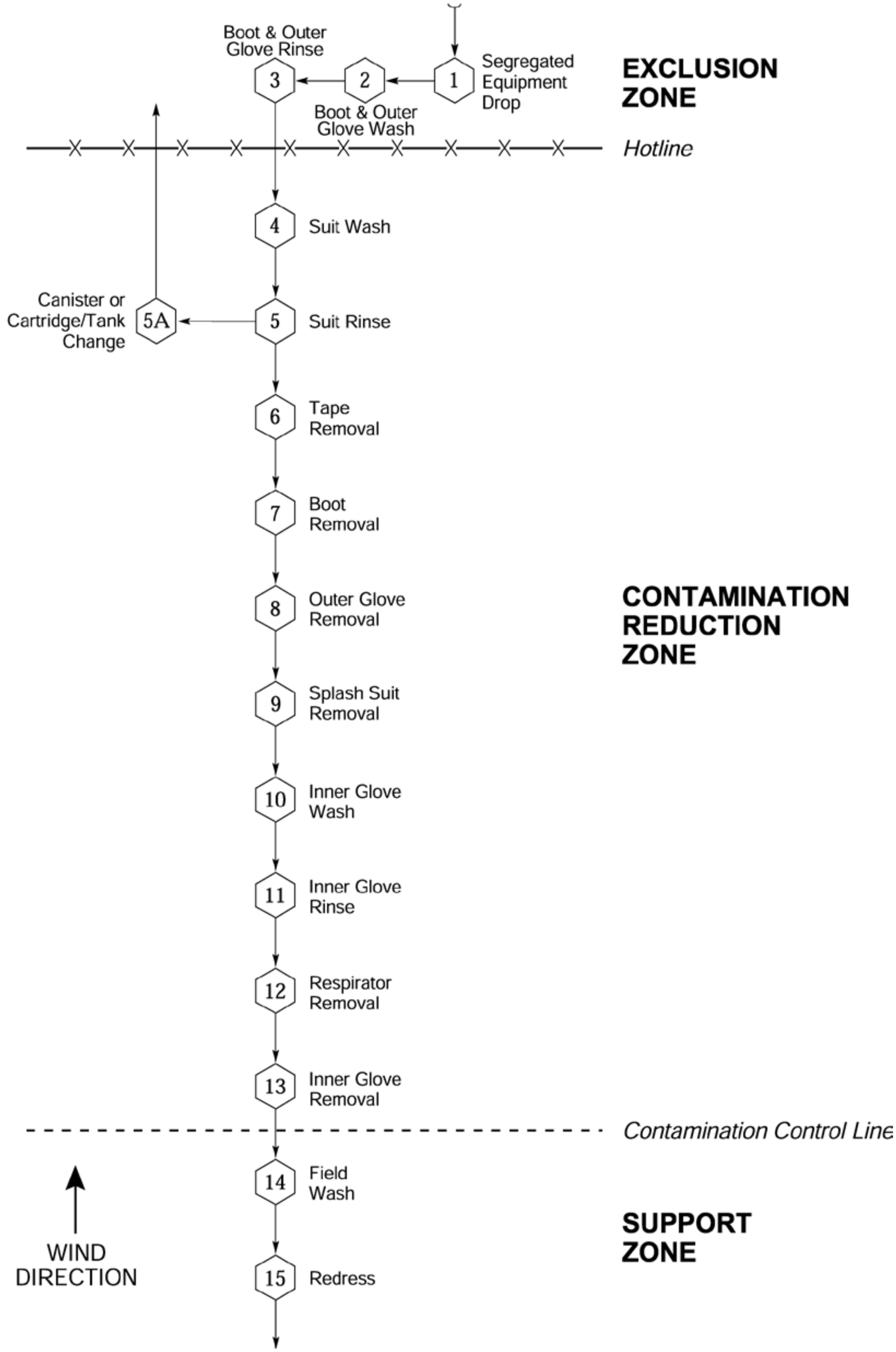


Figure P-3. Contamination Reduction Zone Layout.



P.3.3 Standard Decontamination Procedures for PPE Up To and Including Level B

Enter Decontamination Area from Exclusion/Hot Zone entrance and proceed through the following steps and stations:

1. Clean boots in Tub #1 using scrub brush.
2. Rinse boots in Tub #2 using scrub brush.
3. Clean gloves in Bucket #1.
4. Rinse gloves in Bucket #2.
5. Have Decon Technician (in PPE) remove tape from gloves, boots, and Tyvek suits.
6. Have Decon Technician remove outer gloves (leave inner gloves on).
7. Have Decon Technician remove SCBA (if worn and when decon area is verified to be below PEL exposure limits).
8. Have Decon Technician unzip Tyvek suit and assist removal of boots first, then Tyvek suit. Step into own shoes when clear of boots and suit.
9. If applicable, wash SCBA mask in Bucket #3 and rinse in Bucket #4. Dry mask.
10. Remove inner gloves, being careful not to touch outer surfaces.
11. Have Decon Technician deposit all throwaway PPE items in appropriate DOT drum.
12. Have Decon Technician stow all reusable PPE items neatly in temporary storage and made ready for reuse.
13. Depart through designated exit to Support/Cold Zone.

Q.1 INTRODUCTION

The following appendix includes information required by Title 14 CCR 817.02 that has not been addressed in Sections One and Two and Appendices A through P of this Plan. A cross-reference index (Table CR-2) is included at the front of the plan that identifies the location of information required by the above-mentioned regulations.

OSPR regulations apply to the offshore pipeline from Platform Grace that traverses State Waters, the Carpinteria and Ventura pipelines, and the Casitas Pier. The processing plant is subject to Chapter 6.67, commencing with Section 25270 and is therefore exempt from Title 14 CCR 817.02.

Q.2 CERTIFICATE OF FINANCIAL RESPONSIBILITY (COFR)

The certificate of financial responsibility are provided in the front of this plan.

Q.3 RISK AND HAZARD ANALYSIS

Q.3.1 Significant Spill History

Section 817.02(c)(1)(A) of the California Code of Regulations, Title 14, Division 1, Subdivision 4, Chapter 2 defines a significant spill as one that had a deleterious impact on the local environment, or caused the physical layout of the facility or the facility's operations procedures to be modified.

Chevron Pipe Line Company became the operator of the pipeline system in 1995 and Venoco subsequently became the operator in February 1999. Information on spills prior to 1995 is not available, however it is known that there have been no significant spills involving the facilities covered by this plan since 1995.

Q.3.2 Risk and Hazard Analysis Summary

The "What-If" methodology (in accordance with the American Institute of Chemical Engineers "Guidelines for Hazard Evaluation Procedures," Second Edition) was applied to the facilities covered in this Spill Contingency Plan. Two analyses were conducted, one addressing the Carpinteria Plant and one addressing all of Venoco's Ventura and Santa Barbara pipelines including the Platform Grace to Carpinteria pipeline and the Carpinteria pipeline system. The "What-if" methodology is appropriate to address all aspects of the facilities. A summary of the analyses and their findings is available at Venoco.

Control measures, in the form of systems, equipment, and procedures, are detailed in the analysis, and many are built into the design of facilities. All pressure vessels and some lines in the Carpinteria Plant are equipped with standard PSVs (Pressure Safety Valves). Pressure relief valves are selected, testing, sealed, and labeled for the protection of personnel, the environment, and equipment. The valves are calibrated to prevent exceedances of maximum allowable pressures. PSVs are, for example, fitted on the piping, which contains Therminol and other plant piping containing condensates. PSVs in the plant process area are connected to a large knockout drum. All oil storage tanks are located within secondary containment areas to prevent spills from reaching the environment.

Because of the control measures employed, no spills are expected within the Carpinteria Plant, Carpinteria Pipeline and Ventura Pipeline system.

Q.4 OFFSITE CONSEQUENCE ANALYSIS

Q.4.1 Trajectory Analysis

The largest reasonable worst case spill was estimated to be 61,207 bbl from Breakout Tank 887 at Rincon Station (see Section Q.6.1). This is considerably larger than the worst-case release from the Carpinteria pipeline (14,225 bbl, Appendix R) and the Platform Grace to Carpinteria pipeline (124 bbl, Appendix H). A 1,050-bbl spill trajectory analysis originally contemplated in the Clean Seas Regional Resource Manual for a Rincon facility is considered representative given that the tank is located 0.25 miles northeast of the ocean and 0.5 miles northwest of Sauces Creek. The following is a brief discussion of this trajectory analysis.

An envelope of possible spill trajectories was calculated for a shoreline facility located at the Rincon, which is located along the shore of the Santa Barbara Channel, approximately 15 nautical miles east of Point Conception. The trajectory analysis considered oil transport by the wind and tidal currents, and spreading of the oil by physical processes such as gravity, surface tension, and tidal dispersion. Immediately after release of the oil, spreading would occur primarily from physical spreading processes. Within the first 12 hours, the spill would be expected to occupy a patch one nautical mile in diameter. By three days, the spill patch would be three nautical miles in diameter.

Transport of the spill away from the source would be due primarily to longshore coastal currents and wind-induced surface drift. The direction and strength of this transport varies seasonally and with the direction, strength, and persistence of local winds. Westward transport, which would be expected when the westward flowing coastal current is strongest (spring and summer) and/or even when the winds are from the east and southeast, could move the spill to the Ellwood area after one day and within five nautical miles of Point Arguello after three days. During periods when the westward coastal current is weak (fall and winter) and when westerly winds are present, the spill would move eastward along the coast, reaching Ventura after one day and within seven nautical miles of Point Dume after three days. Santa Ana wind conditions combined with weak coastal currents would cause spill transport to the south, across the Santa Barbara Channel. Within three days, the spill would move across the channel to the islands of San Miguel, Santa Rosa, Santa Cruz, and Anacapa.

These spill trajectory envelopes represent the outer perimeter of shoreside areas that could receive oil in the event of a spill. The envelopes are based on regional extremes of climate, tide, current, and wind, and assume pessimistic dispersion a d other adverse weather conditions. These trajectory envelopes do not represent the trajectory of any spill.

Q.5 GENERAL TOXICITY, PERSISTENCE, AND SEASONAL EFFECTS OF CRUDE OIL

Q.5.1 Toxicity

In general, oil can be toxic to biological resources. Oil contamination of intertidal areas, waterfowl, and fur-bearing mammals can be severe. The following summarizes the potential toxicity from the oil to biological resources:

Wildlife

Wildlife is susceptible to significant injury and mortality from contact with oil spills. In general, the degree of sensitivity to oil spills is based on habitat location and behavioral characteristics. For example, most waterfowl and shorebirds, particularly diving birds are very sensitive to oil spills due to their extensive use of the water, whereas terrestrial birds may nest near the water but have a low sensitivity to oil spills if they do not frequent shoreline areas. Similarly, animals that frequent coastal areas may be impacted by oil spills if they feed on vegetation or dead animals along the shoreline that could become oiled.

Wildlife impacts may result from the physical effects of the oil on their fur or feathers or through ingestion during preening or scavenging. Selected marine mammals (e.g. sea otters and fur seals) and birds (primarily waterfowl) rely on their fur or feathers for insulation and buoyancy, which can be adversely affected if they become oiled. Significantly oiled sea otters, fur seals, or birds can perish from hypothermia and exhaustion, or may become sick from ingestion of the oil while preening. The effects of ingestion vary depending on the toxicity of the oil. In general, the lighter the crude oil or petroleum product, the more toxic it is to wildlife.

Finfish and Shellfish

The sensitivity of various fish species to oil spills typically depends on their growth stage (juveniles are generally much more sensitive than adults), their feeding or migration habits, and the type of oil. Species that frequent shallow or near-surface areas are often exposed to higher concentrations of dissolved hydrocarbons than those that reside primarily in deeper waters. Lighter crude oils and refined petroleum products have a greater impact on fish than heavier oils due to their generally greater solubility and higher concentrations of toxic compounds.

<u>Kelp and Eelgrass Beds</u>

Kelp and eelgrass beds are valuable habitats for numerous finfish and shellfish. Eelgrass is much less abundant than kelp but is used as spawning grounds for some fish and as an important sanctuary for a number of planktonic organisms. Eelgrass is very susceptible to the toxic and physical effects of oil spills. Kelp beds serve as habitats and sanctuaries for a number of finfish, shellfish, and other marine organisms but are less susceptible to the effects of oil spills. Kelp fronds and blades are covered with mucous that inhibits the oil from sticking; although a kelp forest canopy can trap substantial quantities of oil, resulting in the mortality of many its inhabitants. The effect of the oil is generally short-term due to kelp's rapid growth rate.

Q.5.2 Persistence

In general, the longer the oil is expected to persist on a shoreline, the higher the priority for protection. Long-term oil persistence can present chronic toxicity effects, as well as affecting the natural sediment erosional and depositional processes. The potential persistence or residence time of stranded oil on a shoreline is primarily dependent on the:

- Degree of impact.
- Type of shoreline sediments.
- Level of exposure to the elements.

In general, higher degrees of impact, coarser, well-sorted sediments, and lower levels of exposure to wind, waves, currents, and tidal flushing will increase the residence time of the oil on the shoreline. Coarser-grained sediments usually permit the oil to penetrate deeper into the shoreline but can also allow for greater tidal flushing and natural degradation. Finer-grained sediments typically inhibit penetration, but if oil does become incorporated into the sediments, residence time will increase.

Lower level of exposure, such as in protected inlets of bays, will increase the residence time due to the decreased natural abrasion caused by sediment movements and flushing action by wind, waves, and tides. Protected areas may also be shaded and calm, which could inhibit evaporation and photo-oxidation. A general guideline on the potential persistence of oil on various shoreline types is shown in Table I-2.

Q.5.3 Seasonal Effects

The primary seasonal effect on biological resources is whether the specific resource is present at the time of the spill. This is especially true of birds and mammals. Seasonal distribution of wildlife along the coast is provided for in the ESI maps. Plants may be affected differently depending on the timing of the spill relative to the plant's growing season. In general, oiling during the dormant winter season has the lowest impact; whereas oiling of vegetation during the summer growing season has longer effects.

Q.6 ON-WATER CONTAINMENT AND RECOVERY

Q.6.1 Reasonable Worst Case Discharge

Platform Grace to Carpinteria Pipeline

The worst-case discharge for the Platform Grace to Carpinteria offshore pipeline was calculated using the BOEMRE Pipeline Oil Spill Volume Estimator. (See Appendix H for details on the calculation.) The worst-case release was calculated to be 124 bbl.

Carpinteria and Ventura Pipeline Systems

Calculation of the worst case discharge for the Carpentaria and Ventura pipelines including breakout Tank 887 are provided below. The calculations considered:

- The volume discharged for each line section between two block valves, assuming maximum pumping rate and injection points and 2-hour time interval until the line is shut down.
- The maximum volume released from the breakout tank after reduction for allowable spill prevention measures.

POOI and Greka Rincon Island pump at a lower rate than Venoco and only inject when Venoco pumps (700 bph) are shut in. Dos Cuadras injects at 1200 bph, simultaneously with Venoco pumping at 700 bph. Crude oil flows by gravity from Rincon to Ventura (650 bph). Occidental Padre Canyon injects at 195 bph and Greka – Santa Fe lease injects 85-110 bph. Diameters of the line sections are: 10 inches (Line Sections 1 through 3), 22 inches (Line Sections 4 through 9), and 12 inches (Line Section 10).

Line Section/ Length (mi)		Volume (bbl)	Maximum Pump Rate (bph)	2-hr Pump Volume (bbl)	Total Volume Released (bbl)
1	3.54	1816	700	1,400	3,216
2	1.48	759	700	1,400	2,159
3	1.04	533	1,900	3,800	4,333
4	0.801	1,988	650	1,300	3,288
5	3.086	7,661	850	1,700	9,361
6	5.045	12,525	850	1,700	14,225
7	0.678	1,683	850	1,700	3,383
8	3.275	8,130	850	1,700	9,830
9	0.189	469	850	1,700	2,169
10	2.9	2,142	650	1,300	3,442
Worst Case Discharge From Line Section: Line Section 6: 14,225 bbl of Group 3 crude oil.					

Break Out Tank 887		
Storage Volume	204,024 bbl	
Spill Prevention Measures In Place	Secondary containment capacity greater than 100% capacity and designed according to NFPA 30	50% reduction
	Tank built, rebuilt and repaired according to API Std 620/650/653	10% reduction
	Automatic high-level alarms/shutdowns designed according to NFPA/API RP 2350	5% reduction
	Testing/cathodic protection designed according to API Std 650/651/653	5% reduction
Worst Case Discharge For Breakout Tank	0.3 x 204,024 = 61,207 bbl of Group 3 crude oil.	

Casitas Pier

The worst case discharge from Casitas Pier would be the entire volume of the fueling truck, which is 95 bbl (4,000 gallons) of diesel (Group 1, non-persistent).

Q.6.2 Persistence And Emulsification Factors

Group 3 Crude – Tank 887

Persistence Factor

= (Reasonable Worst Case Spill Volume) x (Persistence for Group 3 Crude)
= (61,207) x (0.5)
= 30,603.5 bbl

Emulsification Factor

= (Persistence Factor Volume) x (Emulsification Factor for Group 3 Crude)

= (30,603.5) x (2.0)

= 61,207 bbl

Group 1 Diesel – Casitas Pier

Persistence Factor

= (Reasonable Worst Case Spill Volume) x (Persistence for Group 1 Diesel)

= (95) x (0.2)

= 19.0 bbl

Emulsification Factor

= (Persistence Factor Volume) x (Emulsification Factor for Group 1 Diesel)

= (19.0) x (1.0)

= 19.0 bbl

Q.6.3 On-Water Response Planning Volume

The OSPR Response Planning Volume is 61,207 bbl, which is used to determine the amount of response equipment and services that must be under contract for the nearshore/inland environment.

Q.6.4 Response Capability Standard

According to the regulations, the total amount of on-water containment and recovery equipment and services required shall be the lesser amount necessary to address the response planning volume determined in Section 817(d)(2)(c) or the Daily Recovery Rate established in Section 817.02(d)(3)(B). With respect to the Santa Barbara Channel Area risk zone, the daily recovery rate is 3,125 bbl/day which is less than 10% of Venoco's worst case discharge. Therefore, Venoco must have 3,125 bbl/day of on-water containment capability mobilized and on-scene within two hours of notification.

Q.6.5 Non-Cascadable Equipment For On-Water Recovery

The amount of equipment that is non-cascadable outside of the Santa Barbara Channel for the Facilities and Pipelines is defined as: the total amount required will be the lesser of the amount necessary to address the Response Planning Volume or 10,000 bbl/ for the Santa Barbara Channel risk zone day (mobilized within 2 hours and on-scene within 12 hours). Clean Seas has nominated specific equipment to meet this requirement for its members and contract associates.

Q.7 SHORELINE PROTECTION AND CLEAN-UP

Q.7.1 Response Planning Volume

Persistence Factor
= (Reasonable Worst Case Spill Volume) x (Persistence for Group 3 Crude)
= (61,207) x (0.5)
= 30,603.5 bbl

Emulsification Factor
= (Persistence Factor Volume) x (Emulsification Factor for Group 3 Crude)
= (30,603.5) x (2.0)
= 61,207 bbl

The OSPR Shoreline Response Planning Volume is 61,207 bbl.

Q.8 RESPONSE RESOURCES

Table Q-1. Planning Volumes and Resources Required For OSPR Worst Case Discharge.

Factors	Values		
Worst Case Discharge Volume of Oil	61,207 bbl		
Type of Petroleum Handled	Group III		
Facility-Specific Operating Area	Nearshore		
Emulsification Factor (EF)	2.0		
Percent Recovered Floating Oil	50		
Percent Oil Onshore	50		
Percent Lost To Natural Dissipation	30		
Mobilization Factors (MFs)	.15 (Tier 1); .25 (Tier 2); .40 (Tier 3)		
Planning Volumes For On-Water Recovery (OWP)			
(Worst Case Discharge)(Percent Recovered Floating Oil)(Emulsification Factor)			
(61,207)(.50)(2.0) = 61,207 bbl			
Planning Volume For Onshore Recovery			
(Worst Case Discharge)(Percent Oil Onshore)(Emulsification Factor)			
61,207)(.50)(2.0) = 61,207 bbl			
Necessary Resources For On-Water Recovery			
(OWP)(MF) = 61,207)(MF)	Tier 1 (.15)	Tier 2 (.25)	Tier 3 (.40)
bbl/day	9,181	15,301	24,483
Conclusions: Venoco has contracted with response resources capable of handling a 61,207-bbl shoreline cleanup. Venoco has contracted and identified response resources for 9,181 bpd for Tier 1; 15,301 bpd for Tier 2; and 24,483 bpd for Tier 3. Venoco has contracted and identified temporary storage resources for 18,362 bpd for Tier 1; 30,602 bpd for Tier 2; and 48,966 bpd for Tier 3.			

Venoco will rely on Clean Seas for on-water containment and recovery of all spills. All of Clean Seas' response equipment, including the derated recovery capability, the amount of boom feet, and the temporary storage capability, is provided in Appendix F. Clean Seas has demonstrated in its ability to meet the OSPR daily recovery capability standards for the Santa Barbara Channel of 19,531 bbl/day within 12 hours, 35,156 bbl/day within 36 hours, and 66,406 bbl/day within 60 hours. Onshore cleanup will be provided by NRC Environmental Services (NRC). A copy of NRC's equipment list is provided in Appendix F.

R.1 RESPONSE ZONE APPENDIX

R.1.1 Introduction

This Response Zone Appendix has been prepared for Venoco's Department of Transportation (DOT)-regulated pipelines **(reference OPS Sequence Number 1514)**. A 15.4-mile long, 12.75/10.75-inch O.D, pipeline transports oil from Platform Grace to the onshore Carpinteria Oil and Gas Processing Plant. A 6-mile-long, 10-inch O.D., pipeline (known as the Carpinteria Pipeline) transports oil from the onshore Storage Tank 861 at the Carpinteria Plant to Rincon Station Breakout Tank 887. Oil flows by gravity through a 14-mile-long, 22-inch O.D. (known as the Ventura Pipeline) to the Crimson Marine Terminal in Ventura Harbor. A 2.9-mile section of a 12-inch line branches off the 22-inch line just east of the Ventura River and terminates at the Crimson facility in Ventura. The facilities are owned by Ellwood Pipeline Company and are operated by Venoco, Inc.

This appendix has been prepared to comply with the DOT Pipeline Hazardous Materials Safety Administration (PHMSA), 49 CFR Part 194, Response Plans for Onshore Pipelines. The core plan of the PHMSA appendix is found within the Oil Spill and Gas Contingency Plan.

R.1.2 Pipeline Design and Construction

The total length of the Ventura Pipeline System (Carpinteria Pipeline and Ventura Pipeline) that is active is approximately 23 miles.. All pipeline segments are equipped with an impressed current system and are monitored routinely. Pipe specifications are provided below.

Pipeline Segment	Specifications
Platform Grace Pipeline To Shore	
12/10-inch Platform Grace to Carpinteria Oil and Gas Processing Plant	0.375/0.365-inch wall thickness, API-5L X46/SA-106 GRB pipe 46,000 psig Specified Minimum Yield Strength
Carpinteria Pipeline	
10-inch Carpinteria to Tank 887 segment	0.250-inch wall thickness, API X-52 pipe 52,000 psig Specified Minimum Yield Strength
Ventura Pipeline	
22-inch Rincon to Ventura segment	0.312-inch wall thickness, API X-52 pipe 52,000 psig Specified Minimum Yield Strength
12-inch MP 9.610 to Crimson facility segment	0.250-inch wall thickness, API X-52 pipe 52,000 psig Specified Minimum Yield Strength

R.1.3 Pipeline Throughput

Oil is shipped continuously from Platform Grace to the Carpinteria Oil and Gas Processing Plant at an average throughput of 7,786 bbl/day. From the plant, oil is shipped via the Carpinteria Pipeline to Tank 887 during off-peak hours (0000-to-0600). Normal pumping rate is approximately 650-to-700 bph. Between Carpinteria to Rincon, there are three injection where crude is shipped from other facilities. Specifics are provided below.

Injection Points	Specifics
POOI La Conchita	500 bph, less than 4 hours per day. Scheduled to inject when Carpinteria pump is shut in.
Greka/ Rincon Island	85 bph, between 0600 and 1400. Scheduled to inject when Carpinteria pump is shut in.
DCOR	950-to-1200 bph, round the clock

From Tank 887, crude oil flows by gravity from the Rincon Station to Ventura. Two injection points, the Occidental Petroleum Padre Canyon (195 bph) and the Greka – Santa Fe lease (85-110 bph) are active along the Ventura Pipeline.

R.1.4 Information Summary

R.1.4.1 Operator Information

Name of Operator:	Venoco, Inc.
Name of Facility:	Santa Clara Unit: Platform Grace Pipeline to Shore Carpinteria & Ventura Pipeline System Rincon Station Breakout Tank 887
Address of Operator:	6267 Carpinteria Avenue, Suite 100 Carpinteria, CA 93013
Phone Numbers:	(805) 745-2100 (805) 745-1176 (fax)
Facility Street Address:	6267 Carpinteria Avenue Carpinteria, CA 93013 5775 West Pacific Coast Highway Ventura, CA 93001

R.1.4.2 Qualified Individual (Available on a 24-hr Basis)

The Qualified Individual (QI)/Designated Alternate is responsible for the implementation of the OSGCP. The QI "on duty" will immediately notify the State Incident Commander of this transfer of responsibilities and authorities. Names and telephone numbers of the Qualified Individual and Designated Alternate for the IIRT and SIRT are provided in Section 1.1 and Section 2.5.

The QI and Designated Alternate are English-speaking representatives, located in the United States, available on a 24-hour basis, and capable of arriving at the facility in a reasonable period of time, but not later than 12 hours. They have knowledge and training or experience to demonstrate competence in:

- Applicable Federal OSHA standards for emergency operations and California OSHA standards for emergency response operations.
- How to implement the Oil Spill and Gas Contingency Plan.
- Their responsibilities and authority.
- Requirement of the National Contingency Plan and the Area Contingency Plan, as required by OPA 90.
- Spill prevention and response provisions and procedures of this plan.
- Resources committed or that could potentially be committed during an incident.
- Procedures for obtaining and obligating funds for response activities and persons (external and internal) to contact who would expedite such actions.
- Ability to assess the need for additional resources and to make appropriate call-puts and contractual arrangements.
- Ability to act as a liaison between the facility and the State Incident Commander and the Federal On-Scene Coordinator.

Responsibilities and authority of the QI/Designated Alternate include:

- Implement the OSGCP for the Santa Clara Unit.
- Ensure internal and external notifications are made.
- Assume role of IC of the response team.
- Initiate communication with the FOSC and State IC. Continue to act as liaison with federal, state, and local officials.
- Obligate either directly or through prearranged contracts any funds/monies required to carry out all necessary or directed response activities.
- Develop strategic objectives and direct overall response operations.
- Approve all response plans for the company and the ordering/release of resources.
- Assess the possible hazards to human health and environment due to the release.
- Assess and implement prompt removal actions to contain and remove the substance released.
- Coordinate rescue and response actions.
- Review and approve of press releases.

R.1.4.3 Response Zone Description

There is a single response described as the following geographical area: offshore from Platform Grace to Carpinteria Plant and onshore from Carpinteria, westerly and north to Rincon Station (12 miles west of Ventura), and southwesterly to the City of Ventura.

R.1.4.4 Line Sections

Details on the line sections of the Santa Clara Unit Pipelines are provided below.

Line Section	Description	Starting Mile Post	Ending Mile Post
Platform Grace Pipeline To Shore			
1	12.75-inch O.D.pipeline segment from platform towards shore	0	11.77
2	From end of 12.75-inch O.D. segment Carpinteria Plant	11.77	15.39
Carpinteria Pipeline			
3	From Tank 861 at Carpinteria Plant to approximately 250 ft northwest of POOI entrance	0	3.540
4	From POOI entrance to La Conchita, intersection of Surfside St. and Ojai Ave.	3.540	5.021
5	From La Conchita to Rincon Facility	5.021	6.06
Ventura Pipeline			
6	From Tank 887 to front entrance of facility, Valve #8	0	.801
7	From front entrance to near 4351 Faria Rd, Valve #9	.801	3.887
8	From Faria Rd. to Emma Wood State Park, Valve #10	3.887	8.934
9	From Emma Wood State Park to east side of Ventura River, Valve #11	8.9340	9.610
10	From Ventura River to N.E. corner of Marina Park, Valve #12	9.610	12.885
11	From Marina Park to east side of Arundell Barranca, Valve #13	12.885	13.074
12	12-inch onshore lateral from the 22-inch pipeline at 301 W. Front St to the Crimson facility	9.602	Crimson

R.1.4.5 Basis for Determination of Significant and Substantial Harm

The Platform Grace Pipeline to Shore and the Carpinteria and Ventura Pipelines including Breakout Tank 887 are considered to be capable of causing significant and substantial harm to the environment because of their proximity to navigable waters and adjoining shorelines designated as environmentally sensitive habitat by the ACP. A statement of potential for significant and substantial harm should a worst case discharge occur is provided in Section 1.4.

R.1.4.6 Type of Oil and Worst Case Discharge Volume

Within the response zone, the worst case discharge is calculated to be 61,207 barrels of oil from Tank 887 (see R.2). The gravity of oil transported is 26.2º API, or Group 3 crude oil.

R.1.4.7 Material Safety Data Sheet (MSDS)

The MSDS for crude oil is provided in Appendix E of the Santa Clara Unit OSGCP.

R.1.4.8 Location of Sensitive Resources

Sensitive resources within an approximate 30-mile radius extend along the coast from Point Conception in the north to Mugu Lagoon in the south and to the Channel Islands offshore. Refer to Appendix M for a detailed discussion of sensitive resources.

R.1.4.9 Certification of Response Resources

Venoco has identified personnel and equipment within its own organization and is a member of a private oil spill removal organization, Clean Seas (see Appendix G), which will provide resources to respond to a worst case discharge or a substantial threat of such a discharge. Venoco has also contracted with Advanced Cleanup Technologies, Inc. (ACTI) for onshore cleanup resources. If necessary, Venoco intends to utilize the California Oiled Wildlife Care Network for wildlife rehabilitation.

R.1.5 Notification Procedures

Venoco has in place a set of well-defined internal and external notification procedures that address notification of the Company's response organization, including its response teams, qualified individual, and response contractors, regulatory agencies, and affected property owners (see Section 2.2 of the Santa Clara Unit OSGCP). The primary and secondary communication methods by which initial and follow-up notifications can be made are detailed in the Communications Plan (Appendix L of the Santa Clara Unit OSGCP).

R.1.6 Spill Detection and Spill Mitigation Procedures

The pipeline system does not transport crude that would corrode the pipeline. No corrosion inhibitors are used. The pipelines are continuously monitored by a SCADA (Supervisor Control and Data Acquisition) System (refer to Appendix B, Section B.2.3 of the Santa Clara Unit OSGCP). Pipeline markers are installed on the onshore portion of the line and Venoco has joined Underground Service Alert.

Information on initial spill detection and response procedures, response personnel and equipment are provided in the Santa Clara Unit OSGCP as follows:

- Section 2: Emergency Action Plan.
- Appendix D: Response Organization Duty Sheets.
- Appendix F: Equipment Lists.
- Appendix L: Communications Plan.
- Appendix N: Waste Management Plan.

R.1.7 Response Activities

The responsibilities and actions of operation personnel prior to arrival of the Qualified Individual will be under the direction of the Facility Supervisor or Operator-In-Charge. Priority will be directed initially towards ensuring the safety of personnel and the public and controlling the source.

As described in Section 2.2, the Facility Supervisor will initiate the notification process. The SIRT IC (Qualified Individual), with assistance from the Liaison Officer or designee, will conduct the notifications listed in Table 2-2SCU of this plan. Responsibilities and authorities of the Qualified Individual/Designated Alternate are provided in Section R.1.4.2.

Venoco has identified oil spill response resources (personnel and equipment) sufficient to respond to a worst case discharge. Tier 1 resources can be available within 12 hours and Tier 2 resources can be available within 36 hours. These resources are capable of sustaining a response for the first seven days of the response as required by 49 CFR Part 194, Appendix A, Section 4.0. These resources are described in R.3 and Appendices F and G of the Santa Clara Unit OSGCP.

R.1.8 List of Contacts

Persons and agencies to be notified, including the Qualified Individual and response contractors, are listed in Section 2.2 of the OSGCP. Additional contacts are provided in Section 2.5.

R.1.9 Training Procedures

Venoco has a training program to train and educate Company personnel who are assigned to immediate response and the Initial Incident Response Team. Training levels have been developed to provide a tailored curriculum for defined levels of response capabilities, which are designated for each individual depending on his/her specific job description. Training procedures and programs are described in detail in Appendix K of the Santa Clara Unit OSGCP.

Venoco’s response training program will ensure:

1. All Company personnel know:
   - Their responsibility under this plan.
   - The name and address of, and the procedures for contacting Company personnel on a 24-hour basis.
2. Reporting personnel know:
   - The content of the Information Summary (Appendix R.1.4).
   - The toll-free telephone number of the National Response Center (NRC).
   - The notification process.

3. Persons engaged in response activities know:
   - The characteristics and hazards of the discharge.
   - The conditions that are likely to worsen emergencies, including the consequences of facility malfunctions or failures, and the appropriate corrective actions.
   - The steps necessary to control any accidental discharge and to minimize the potential for fire, explosion, toxicity, or environmental damage.
   - The proper fire fighting procedures and use of equipment, fire suits, and breathing apparatus, as appropriate.

The accountability for training and exercising spill resources lies with the Safety Manager.

R.1.10 Drill Procedures

Drill procedures and programs are provided in Appendix K of the Santa Clara Unit OSGCP.

R.1.11 Plan Review and Update

The Plan will be reviewed every five years and be resubmitted to PHMSA for approval before five years from the last plan approval date. Modifications to the plan will be performed within 30 days of a change and will be submitted to PHMSA for approval. Changes addressed will include:

- An extension of an existing or construction of a new pipeline.
- Relocation or replacement of a pipeline that affects plan information (including worst case discharge volumes).
- The type of oil transported if its affects the required response resources.
- The name of the oil spill removal organization.
- Emergency response procedures.
- The Qualified Individual/Designated Alternate.
- A change in ownership.
- A change in the NCP or ACP that has significant impact on the equipment appropriate to response activities.
- Any other information relating to circumstances that may affect full implementation of the plan.

Venoco management will conduct a review of the plan after a spill to evaluate the effectiveness of the plan and need for revision. Following an incident, key members of the response organization will evaluate the effectiveness and efficiency of a response. The OSGCP will be revised as needed. Upon management approval, results of the review will be forwarded to PHMSA within 90 days following completion of response and cleanup activities.

R.2 WORST CASE DISCHARGE ANALYSIS

Platform Grace to Carpinteria Offshore Pipeline – The worst-case discharge for this pipeline was calculated using the MMS Pipeline Oil Spill Volume Estimator (See Appendix H for details on the calculation.) The worst-case release was calculated to be 124 bbl.

Carpinteria and Ventura Pipeline Systems - Calculations of the worst case discharge for the these pipelines considered:

- The volume discharged for each line section between two block valves, assuming maximum pumping rate and injection points and 2-hour time interval until the line is shut down.
- The maximum volume released from the breakout tank after reduction for allowable spill prevention measures.

POOI and Greka - Rincon Island pump at a lower rate than Venoco and only inject when Venoco pumps (700 bph) are shut in. DCOR (Rincon) injects at 1200 bph, simultaneously with Venoco pumping at 1,200 bph. Crude oil flows by gravity from Rincon to Ventura (650 bph). Occidental Padre Canyon injects at 195 bph and Greka – Santa Fe lease injects at 85-110 bph). Diameters of the line sections are: 10 inches (Line Sections 1 through 3), 22 inches (Line Sections 4 through 9), and 12 inches (Line Section 10).

Line Section/ Length (mi)		Volume (bbl)	Maximum Pump Rate (bph)	2-hr Pump Volume (bbl)	Total Volume Released (bbl)
1	3.54	1816	700	1,400	3,216
2	1.48	759	700	1,400	2,159
3	1.04	533	1,900	3,800	4,333
4	0.801	1,988	650	1,300	3,288
5	3.086	7,661	850	1,700	9,361
6	5.045	12,525	850	1,700	14,225
7	0.678	1,683	850	1,700	3,383
8	3.275	8,130	850	1,700	9,830
9	0.189	469	850	1,700	2,169
10	2.9	2,142	650	1,300	3,442
Worst Case Discharge From Line Section: Line Section 6: 14,225 bbl of Group 3 crude oil.					

Break Out Tank 887		
Storage Volume	204,024 bbl	
Spill Prevention Measures In Place	Secondary containment capacity greater than 100% capacity and designed according to NFPA 30	50% reduction
	Tank built, rebuilt and repaired according to API Std 620/650/653	10% reduction
	Automatic high-level alarms/shutdowns designed according to NFPA/API RP 2350	5% reduction
	Testing/cathodic protection designed according to API Std 650/651/653	5% reduction
Worst Case Discharge For Breakout Tank	0.3 x 204,024 = 61,207 bbl of Group 3 crude oil.	

R.3 PLANNING VOLUMES AND RESPONSE RESOURCES

Table R-1. Planning Volumes & Resources Required For DOT/PHMSA Worst Case Discharge.

<table>
<tr><th>Factors</th><th colspan="3">Values</th></tr>
<tr><td>Worst Case Discharge Volume of Oil</td><td colspan="3">61,207 bbl</td></tr>
<tr><td>Type of Petroleum Handled</td><td colspan="3">Group III</td></tr>
<tr><td>Facility-Specific Operating Area</td><td colspan="3">Nearshore</td></tr>
<tr><td>Emulsification Factor (EF)</td><td colspan="3">2.0</td></tr>
<tr><td>Percent Recovered Floating Oil</td><td colspan="3">50</td></tr>
<tr><td>Percent Oil Onshore</td><td colspan="3">50</td></tr>
<tr><td>Percent Lost To Natural Dissipation</td><td colspan="3">30</td></tr>
<tr><td>Mobilization Factors (MFs)</td><td colspan="3">.15 (Tier 1); .25 (Tier 2); .40 (Tier 3)</td></tr>
<tr><td colspan="4">Planning Volumes For On-Water Recovery (OWP)</td></tr>
<tr><td colspan="4">(Worst Case Discharge)(Percent Recovered Floating Oil)(Emulsification Factor)</td></tr>
<tr><td colspan="4">(61,207)(.50)(2.0) = 61,207 bbl</td></tr>
<tr><td colspan="4">Planning Volume For Onshore Recovery</td></tr>
<tr><td colspan="4">(Worst Case Discharge)(Percent Oil Onshore)(Emulsification Factor)</td></tr>
<tr><td colspan="4">61,207)(.50)(2.0) = 61,207 bbl</td></tr>
<tr><td colspan="4">Necessary Resources For On-Water Recovery</td></tr>
<tr><td>(OWP)(MF) = (61,207)(MF)</td><td>Tier 1 (.15)</td><td>Tier 2 (.25)</td><td>Tier 3 (.40)</td></tr>
<tr><td>bbl/day</td><td>9,181</td><td>15,302</td><td>24,483</td></tr>
<tr><td colspan="4">Conclusions:

Venoco has contracted with response resources capable of handling a 61,207-bbl shoreline cleanup.

Venoco has contracted response resources for 9,181 bpd for Tier 1; 15,302 bpd for Tier 2; and 24,483 bpd for Tier 3.

Venoco has contracted temporary storage resources for 18,362 bpd for Tier 1; 30,604 bpd for Tier 2; and 48,966 bpd for Tier 3.

The contracted resources will be located such that they can arrive on scene within 12, 36, and 60 hours of discovery of an oil discharge for Tier 1, Tier 2, and Tier 3, respectively.</td></tr>
</table>

Venoco will rely on Clean Seas for on-water containment and recovery of all spills. All of Clean Seas' response equipment, including the derated recovery capability, the amount of boom feet, and the temporary storage capability, is provided in Appendix F. Clean Seas has demonstrated in its ability to meet the Federal daily recovery capability standards for the Santa Barbara Channel of 12,500 bbl/day within 12 hours, 25,000 bbl/day within 36 hours, and 50,000 bbl/day within 60 hours. Onshore cleanup will be provided by NRC Environmental Services (NRC), equipment lists are provided in Appendix F.

S.1 HAZARD EVALUATION

This section addresses the requirements for a hazard evaluation at the Carpinteria Processing Plant as described in Section 1.4 of Appendix F to Part 112 of 40 CFR. A risk and hazard analysis of the facilities has been conducted and is summarized in Section Q.3. Several potential risk areas were uncovered and mitigation measures were recommended and implemented. Although the facility is equipped with controls and mitigation measures, releases are still possible.

S.1.1 Hazard Identification

Table S-1 presents the hazard identification for the tanks located at the Carpinteria Processing Plant. No loading of transportation vehicles is done at the facility. The LPG loading rack is out-of-service. There are no surface impoundments. There have been no significant spills since Venoco became operator in 1999. In 1992, there was a release of 30 gallons from the sump during a heavy rain storm. Corrective action was taken by placing a roof over the sump to prevent rainfall from entering. Seal drain boxes were also elevated.

Table S-1. Hazard Identification Tanks.

Tank No.	Substance Stored (Oil and Hazardous Substance)	Quantity Stored (gallons)	Tank Type/Year	Maximum Capacity (gallons)	Secondary Containment Volume (gallons)
861	Crude oil	7,001,400	Welded steel, floating roof/1960	9,114,000	8,232,000
T1	Water and oil (5%)	37,800	Welded steel, fixed roof/1960	42,000	6,846,000
T2	Water and oil (5%)	37,800	Welded steel, fixed roof/1960	42,000	6,846,000

S.1.2 Vulnerability Analysis

This section addresses the potential effects of an oil spill on human health, property, and the environment. Each of the areas listed in Section 1.4.2 of the regulations are addressed below.

Water Intakes. The Carpinteria Valley Water District via pipeline provides public drinking water for the nearby community. There are no drinking, cooling, or other water intakes near the facility that could be impacted by a release from the facility.

Schools. There are no known schools near the facility that could be impacted by a release from the facility. The closest school is Carpinteria Middle School, approximately 0.7 miles from the facility.

Residential areas. The City of Carpinteria is located north and west of the facility. Tar Pits City Park and Carpinteria State Beach are due west and Carpinteria Bluffs Public Open Space is due west. The parks and open space serve as a buffer between the facility and residential areas in the event of a spill.

Businesses. The only businesses in the immediate vicinity are Clean Seas and Joy Equipment Protection, which would not be impacted by a release.

Wetlands or Other Sensitive Environments. See Appendix M.

Fish and Wildlife. See Appendix M.

Lakes and Streams. There are no lakes and streams near the facility that could be impacted by a release from the facility. Carpinteria Creek is located more than 1,000 feet to the northwest.

Endangered Flora and Fauna. See Appendix M.

Recreational Areas. See Appendix M.

Transportation Routes. The facility is adjacent to a Union Pacific Rail Road mainline track to the south. U.S. Highway 101 is north of the facility. Tank and secondary containment failure would impact the railroad right-of-way.

Utilities. There are no utilities in the vicinity of the facility that would be impacted by a release from the facility.

Other Areas of Economic Importance. See Appendix M.

S.1.3 Analysis of the Potential for an Oil Spill

A risk and hazard analysis was conducted on the facility and is discussed in Section Q.3. It was determined that spills could range from a few drops up to 166,700 bbl., the worst case. Potential spill sources include tanks and vessels, pipelines and piping, and valves. All tanks and vessels are located within secondary containment systems.

S.1.4 Facility Reportable Oil Spill History

There have not been any reportable spills since Venoco took over the facility in 1999.

S.2 DISCHARGE DETECTION SYSTEMS

Appendix B, Inspection, Maintenance and Spill Prevention, describe the procedures and equipment used to detect discharges. This includes detection by personnel and by automated spill detection equipment.

S.3 DISCHARGE SCENARIOS

This section provides spill response scenarios from small, medium, and worst-case discharges at the Carpinteria Oil & Gas Processing Plant. The scenarios are based on the type of operations at the facility. The scenarios illustrate the Venoco's response is dependent on the size of the spill and particular circumstances of the incident. Emphasis is also placed on measures taken to mitigate the impact of the spill, including the protection of potentially affected areas.

The following scenarios are descriptive and are intended for planning purposes to provide a general overview of response activities that would occur, and the resources that would be mobilized. They are not intended to be used by response personnel during an actual incident.

S.3.1 Small Spill

Spills of 50 bbl or less are classified as small spills. Small spills can occur from operational activities such as tank or piping leaks/failures, sensing device failures, and operator errors. The following scenario is a line failure. This scenario demonstrates response actions by on-scene personnel, deployment of on-scene equipment, and post-incident actions taken.

Situation

The line breaks at a flanged connection. The Operator has just turned on the shipping pump when the pump surge causes the failure. The pump automatically shuts off due to the under-pressure switch activation. However, the U-shaped upstream line flow-back and the oil pumped until the pump stops rotating results in a 35 bbl spill onto the pump depression area. Part of the crude oil empties into a pipe drain that goes to the stormwater sump; the rest spreads out and covers an area of about 300 square feet.

Initial Response

The horn, which signaled the beginning of the shipping pump starting sounds again when the pump is stopped, and a warning light turns on in the control room.

The Facility Supervisor assesses the situation. Noting that the spill is contained and cannot enter marine waters, he calls the Operations Manager to advise him of the spill. He documents his actions.

The appropriate County, State, and federal agencies are then called and advised of the spill, the actions that are being taken, and that the spill will not affect marine waters or ground water supplies. He documents his actions.

Cleanup

The Facility Supervisor has one of the maintenance people start up the sump pump at the stormwater sump to send its contents to the slop tank. The other maintenance person is dispatched to bring in-plant sorbent pads to the scene. The oil on the ground is picked up by the sorbent pads, which are properly stored for future disposal. An outside contractor is brought in to remove the contaminated soil, dispose or treat the contaminated soil, dispose of the contaminated material (sorbent pads and soil) at an approved Class II disposal site, and rebuild the disturbed soil surface.

Post Spill

The Report of Oil and Hazardous Substances Release is filled out and submitted to the appropriate County, State, and federal agencies.

Repair of the ruptured line is started.

An order is placed is placed for the expended sorbent pads.

All documentation is collected and filed.

S.3.2 Medium Spill

The medium-sized spill involves a break in the oil line to Tank 861. The leak detection system fails to immediately detect the leak and shut in the line. This scenario highlights several key decisions, including whether Sustained Incident Response Team (SIRT) should be activated, which resources should be activated, which resources should be mobilized, and what actions need to be taken to protect vulnerable resources.

Situation

There is heavy rain.

An operator and two maintenance personnel are on duty.

A call is received from the Ranger of the State Beach stating that he sees oil floating on the water east of his establishment.

Initial Response

The Operator sends one of the maintenance people to the reported oil slick. The person is advised to also look at the pipeline landfall location and to report back as soon as possible. All actions are documented.

The Operator contacts the Facility Supervisor immediately and advises them of the reported spill. Notification is logged.

The Facility Supervisor calls Clean Seas and tells them of the spill. Notification is logged.

The maintenance person returns and reports he saw oil on the water and near the pipeline landfall location. There is still no instrumentation indication that the spill is coming from a Venoco pipeline or other source. The Incident Commander orders the pipeline shutdown. Pacific Operators Offshore Inc. crude oil pipeline also runs along the coast and is notified.

The Facility Supervisor assumes the position of Incident Commander. He activates Clean Seas and the SIRT, and calls 911. County, State, and Federal agencies are notified of the situation. The actions taken are logged.

Contain and Control

A Clean Seas OSRV arrives and booms off the affected waters and starts skimming operations.

The Incident Commander knows that additional outside contractors will be needed to assist in shoreline cleanup operations.

Cleanup

The Incident Commander advises the Safety Officer to ensure that the cleanup operations are being implanted to protect response personnel and comply with applicable provisions of 29 CFR Part 1920.120.

Shoreline cleanup work begins the next morning using approved contractors.

Personnel document all actions.

Post Spill

Plans are made to restore any areas required.

All other post spill actions are the same as for a small spill.

S.3.3 Worst Case Discharge

The worst case discharge is the failure of the 166,700-bbl storage tank with secondary containment failure (See Section S.4 for calculation).

Situation

Only the night operator is on duty.

The main storage tank is filled to capacity due to repairs ongoing on the shipping line. The tank has a catastrophic failure resulting in a sudden outpour of oil at high velocity that causes the southern berm to fail. The oil spills onto the Union Pacific right-of-way and into the ocean.

Initial Response

The night Operator hears the tank collapse and oil running outside the office. He immediately calls 911 and informs the dispatcher of the situation.

The Operator assumes the temporary role of Incident Commander and calls the Plant Supervisor, the California Emergency Management Agency (Cal-EMA) and the National Response Center. He also calls Clean Seas for activation to the site for containment and recovery purposes and start activation of the SIRT. Notifications are made per the Oil Spill Contingency Plan. The Union Pacific Rail Road, Amtrak, County, State, and Federal agencies are notified of the actions being taken, that marine waters have been affected, but that public water intakes have not been affected. All actions and notifications are documented.

Upon arriving at the plant, the Facility Supervisor takes over as the Incident Commander until relieved by the SIRT IC. He receives an update on the status of the spill. No estimates are available on the amount of oil that has reached marine waters and the amount that remains onshore. He also meets with fire and law enforcement units at the site.

All actions taken and notifications made are documented.

Sustained Response

The Incident Commander meets with the Section Chiefs to begin the sustained response action. He orders the Safety Officer to undertake measures to secure the site and to make sure that workers have the required training and necessary protective equipment. The Logistics Section Chief, after coordinating with the Operations Section Chief, begins to assemble outside contractors with the necessary equipment and manpower to cope with the full containment of the spill and the commencement of cleanup work.

USCG and DF&G personnel arrive at the Command Center and the Incident Commander briefs them on what happened, what response actions have been taken, and what response actions are planned.

A USCG vessel monitors the offshore response activities and provides advice on boom placement and skimming operations.

DF&G personnel monitor the shoreline for possible recovery of oiled wildlife.

A plan for beach cleanup activities by outside contractors at selected staging areas is developed and implemented.

The Public Relations Officer develops a press release to respond to public concerns and to advise the media of the progress being made in the cleanup operations.

Near the end of cleanup operations, plans are readied to revegetate and restore areas impacted by the spill.

Post Spill

The Incident Commander ensure all spill response and clean-up documents and plans are compiled and submitted to Corporate management for approval and submittal to the proper authorities.

The Documentation Unit Leader gathers all documentation including photographs, press releases, etc., and prepares a final spill report.

S.4 SMALL, MEDIUM AND WORST CASE DISCHARGE CALCULATIONS

Small Discharge

A small discharge is defined by EPA regulation 40 CFR 112 to be any spill up to 2,100 gallons (50 bbl).

Medium Discharge

A medium discharge is defined as a discharge greater than 2,100 gallons (50 bbl) and less than or equal to 36,000 gallons (857 bbl) or 10 percent of the capacity of the largest tank at the facility, whichever is less. The largest tank is 7,014,000 gallons (166,700 bbl). Therefore a medium discharge is greater than 2,100 gallons and less than or equal to 36,000 gallons.

Worst Case Discharge

The Carpinteria Oil & Gas Processing Plant is a multiple-tank facility with all storage tanks having adequate secondary containment. Tanks are not permanently manifolded together. Therefore the worst-case discharge is the capacity of the largest single aboveground storage tank within an adequate secondary containment area. The tank is the 166,700-bbl storage tank. **Final worst case discharge volume is 7,014,000 gallons**.

S.5 PLANNING VOLUMES AND RESPONSE RESOURCES

Small Discharge

The response resources required for handling a small spill are defined by 40 CFR 112 as including:

- 1,000 feet of containment boom and a means of deploying it within one hour of discovery of a spill.
- Oil recovery devices with sufficient daily recovery capacity to handle a small discharge and available within two hours of spill detection.
- Oil storage capacity equivalent to twice the daily recovery capacity required on-scene (i.e., 100 bpd or greater).

The resource requirements for this size spill would be satisfied through the use of Clean Seas and its equipment and personnel. A detailed inventory is provided in Appendix F and evidence of contractual agreement is provided in Appendix G.

Medium Discharge

The response resources for handling a medium spill must include:

- Oil recovery devices on-scene within 12 hours.

- Effective daily recovery capacity equal to 50 percent of the medium discharge (18,000 gallons/day or 492 bpd).
- Sufficient containment boom to arrive within the required response times.
- Temporary oil storage equal to twice the effective daily recovery capacity required on-scene (i.e., 36,000 gallons or 857 bbl).

The resource requirements for this size spill would be satisfied through the use of Clean Seas and NRC Environmental Services and their equipment and personnel. A detailed inventory is provided in Appendix F and evidence of contractual agreement with Clean Seas is provided in Appendix G. Venoco also holds a contract with NRC Environmental for onshore cleanup.

Worst Case Discharge

Table S-2. Planning Volumes and Resources Required For EPA Worst Case Discharge.

<table>
<tr><th>Factors</th><th colspan="3">Values</th></tr>
<tr><td>Worst Case Discharge Volume of Oil</td><td colspan="3">166,700 bbl</td></tr>
<tr><td>Type of Petroleum Handled</td><td colspan="3">Group III</td></tr>
<tr><td>Facility-Specific Operating Area</td><td colspan="3">Inland/Nearshore</td></tr>
<tr><td>Emulsification Factor (EF)</td><td colspan="3">2.0</td></tr>
<tr><td>Percent Recovered Floating Oil</td><td colspan="3">50</td></tr>
<tr><td>Percent Oil Onshore</td><td colspan="3">50</td></tr>
<tr><td>Percent Lost To Natural Dissipation</td><td colspan="3">30</td></tr>
<tr><td>Mobilization Factors (MFs)</td><td colspan="3">.15 (Tier 1); .25 (Tier 2); .40 (Tier 3)</td></tr>
<tr><td colspan="4">Planning Volumes For On-Water Recovery (OWP)</td></tr>
<tr><td colspan="4">(Worst Case Discharge)(Percent Recovered Floating Oil)(Emulsification Factor)</td></tr>
<tr><td colspan="4">(166,700)(.50)(2.0) = 166,700 bbl</td></tr>
<tr><td colspan="4">Planning Volume For Onshore Recovery</td></tr>
<tr><td colspan="4">(Worst Case Discharge)(Percent Oil Onshore)(Emulsification Factor)</td></tr>
<tr><td colspan="4">(166,700)(.50)(2.0) = 166,700 bbl</td></tr>
<tr><td colspan="4">Necessary Resources For On-Water Recovery</td></tr>
<tr><td>(OWP)(MF) = (166,700)(MF)</td><td>Tier 1 (.15)</td><td>Tier 2 (.25)</td><td>Tier 3 (.40)</td></tr>
<tr><td>bbl/day</td><td>25,005</td><td>41,675</td><td>66,680</td></tr>
<tr><td colspan="4">Conclusions:

Venoco has contracted with Clean Seas, and NRC Environmental Services (NRC) to respond to onshore, shoreline and offshore spill events, including temporary storage. Both contractors are certified and capable of meeting the federal tiers of 12.5K bpd (12 hr), 25K bpd (36 hr), and 50K bpd (60 hr). Equipment lists are provided in Appendix F.

Venoco has contracted response resources capable of handling a 166,700-bbl shoreline cleanup.

Venoco has contracted response resources for 12,500 bpd for Tier 1; 25,000 bpd for Tier 2; and 50,000 bpd for Tier 3. Venoco has identified additional resources for 12,505 bpd (Tier 1), 16,675 bpd (Tier 2) and 16,680 bpd (Tier 3)</td></tr>
</table>

ACRONYMS

ACP	Area Contingency Plan
ACTI	Advanced Cleanup Technologies, Inc.
APCD	Air Pollution Control District
BBL(S)	Barrel(s)
BPD	Barrel(s) Per Day
CALTRANS	California Department of Transportation
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CS	Clean Seas
CWA	Clean Water Act
DFG	California Department of Fish and Game
DOT	Department of Transportation (U.S.)
DTSC	Department of Toxic Substance Control
EMA	Emergency Management Agency
EPA	Environmental Protection Agency
ERAP	Emergency Response Action Plan
ESD	Emergency Shutdown Device
ESI	Environmental Sensitivity Maps Index (ESI) Atlas for California
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FOSC	Federal On-Scene Coordinator
GPM	Gallon(s) Per Minute
HAZWOPER	Hazardous Waste Operations and Emergency Response
H_2S	Hydrogen Sulfide
ICS	Incident Command System
IIRT	Initial Incident Response Team
JIC	Joint Information Center
LACT	Lease Automatic Custody Transfer
MAC	Multi-Agency Coordinator
MMS	Minerals Management Service
MSDS	Material Safety Data Sheets
MSO	Marine Safety Office
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System

NPREP	National Preparedness for Response Exercise Program
NRC	National Response Center
NRDA	Natural Resource Damage Assessment
NRT	National Response Team
NWS	National Weather Service
OCS	Outer Continental Shelf
OEM	Office of Emergency Management
OPA 90	Federal Oil Pollution Act of 1990
OSGCP	Oil Spill and Gas Contingency Plan
OSHA	Occupational Safety and Health Administration
OSPR	Office of Oil Spill Prevention and Response (Dept of Fish & Game)
OSRO	Oil Spill Response Organization
OSRV	Oil Spill Response Vessel
OWCN	Oiled Wildlife Care Network
PHMSA	Pipeline & Hazardous Materials Safety Administration (Dept of Transportation)
PIO	Public Information Officer
POOI	Pacific Operators Offshore, Inc.
PPE	Personal Protective Equipment
PREP	Preparedness for Response Exercise Program
PST	Pacific Strike Team
QI	Qualified Individual
RCRA	Resource Conservation and Recovery Act of 1976
RMA	Response Management Associates
RP	Responsible Party
RRT	Regional Response Team
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SIRT	Sustained Incident Response Team
SSC	Scientific Support Coordinator
TTU	Transportable Treatment Unit
UCS	Unified Command System
UHF	Ultra-High Frequency
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VHF	Variable High Frequency

WCD	Worst Case Discharge

DEFINITIONS

Abandoned Waste – Materials which are disposed of, burned or incinerated, or accumulated, stored, or treated.

Access/Staging Areas – Designated areas near the spill site accessible for gathering and deploying equipment and/or personnel.

Adverse Weather – The weather conditions considered when identifying response systems and equipment in a contingency plan for the applicable operating environment. Factors considered include wind, significant wave height, temperature, weather-related visibility, and the tides and currents.

Agency Representative – Individual assigned to an incident from an assisting or cooperating agency with full authority to make decisions on all matters affecting that agency's participation.

Barrel (bbl) – A barrel of oil equals 42 gallons (U.S.) at 60 degrees Fahrenheit.

Biological Additives – Microbiological cultures, enzymes, or nutrient additives that are deliberately introduced into an oil discharge for the specific purpose of encouraging biodegradation to mitigate the effects of a discharge.

Bioremediation – An oil spill cleanup technique using nutrients or a mixture of nutrients and bacteria to facilitate the degradation of the oil by microorganisms.

Burning Agents – Those additives that through physical or chemical means, improve the combustibility of the materials to which they are applied.

California Designated Waste – Any non-hazardous waste which contains pollutants which could cause degradation of water quality of a hazardous waste which has been granted a variance from hazardous waste management requirements. Examples of designated wastes include such oil production wastes as heavy oil tank bottoms, drilling muds, produced water, and soil contaminated with hydrocarbons.

California Extremely Hazardous Waste – Any hazardous waste or mixture of hazardous waste "which, if human exposure should occur, may likely result in death, disabling personal injury or serious illness."

California Hazardous Waste – Any hazardous waste which, due to its quantity, concentration, or physical, chemical or infectious characteristics, may either cause an increase in mortality or serious illness, or pose a substantial threat to health or environment when improperly handled.

California Hazardous Waste Control Law – State Law governing hazardous waste identification, handling, transportation, treatment, and disposal.

California Restricted Hazardous Waste – As of May 8, 1990, all hazardous wastes in California were to be prohibited from land disposal without prior treatment to reduce their toxicity. However, various extensions of the deadline have been provided by the State.

Captain of the Port Zone – A zone specified in 33 CFR Part 3 and the seaward extension of that zone to the outer boundary of the exclusive economic zone.

Cascadable – The movement of response equipment to the scene of a spill in multi-tiered stages.

Chemical Agents – Those elements, compounds, or mixtures that coagulate, disperse, dissolve, emulsify, foam, neutralize, precipitate, reduce, oxidize, concentrate, congeal, entrap, fix, make the pollutant mass more rigid or viscous, or other facilitate the mitigation of deleterious effects or the removal of the pollutant from the water.

Claim – A request, made in writing for a sum certain, for compensation for damages or removal costs resulting from an incident.

Clean Seas – An oil spill cooperative comprised of operating companies in the petroleum industry with interests in the Clean Seas' Area of Responsibility and who have joined in an effort to combat oil spill pollution. The Area of Responsibility is defined as the public and private properties, beaches, harbors, offshore islands, and waters along the coast of California between and including Point Dume to the south and Cape San Martin to the north.

Coastal Waters – This designation includes all U.S. waters subject to the tide, U.S. waters of the Great Lakes, specified ports and harbors on the inland rivers, waters of the contiguous zone (12 n.mi.) or other waters subject to discharges in connection with activities under the Outer Continental Shelf Lands Act or the Deepwater Port Act. These waters include those contained within the exclusive economic zone (200 n.mi.).

Coastal Zone – Means all United States waters subject to the tide, United States waters of the Great Lakes, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surface or land substrata, ground waters, and ambient air proximal to those waters. The term coastal zone delineates an area of federal responsibility for response action. Precise boundaries are determined by EPA/USCG agreements and identified in federal regional contingency plans.

Command Post/Center – A location in proximity to the spill scene, which serves as the central location for meetings and briefings and the base for all planning, logistics, and finance support activities.

Containment Boom – A vertical barrier which floats above water supporting a subsurface skirt and serves as one of the first lines of defense against the spreading of an oil spill. Due to the scope of utilization across land and sea environments, containment booms are designed for specific applications, such as long-term deployment and rapid deployment, as well as for operations in rough open water, moderate and calm seas, and in quiet, protected waters (e.g., harbors).

Cultural Resources – Current, historic, prehistoric, and archaeological resources which include deposits, structures, ruins, sites, buildings, graves, artifacts, fossils, or other objects of antiquity which provide information pertaining to the historical or prehistoric culture of people in the State as well as to the natural history of the State.

Damage Assessment – The process of determining and measuring damages and injury to the human environment and natural resources including cultural resources. Damages include differences between the conditions and use of natural resources and the human environment that would have occurred without the incident, and the conditions and use that ensued following the incident. Damage assessment includes planning for restoration and determining the costs of restoration.

Decontamination – The removal of hazardous substances from personnel and equipment necessary to prevent adverse health effects.

Demobilization – The deactivation of equipment, personnel, and other resources involved in response operations.

Derated Capacity – The manufacturer's rating for the recovery capacity of a piece of skimming equipment has been reduced to reflect the limitations of response equipment efficiency as a result of such variables as weather, sea state, current velocity, hours of operation per day, or visibility. The derated capacity shall be calculated as 20% of the manufacturer's rated skimming capacity (SC) for the equipment for a 24-hour period [(SC x 24 hours) x 20% = derated capacity].

Discarded – Any substance which is abandoned, recycled, or "inherently waste like."

Dispersants – Chemicals that can be applied to an oil spill to aid the natural process in breaking up the oil. There are three types of dispersants: water-based, solvent-based, and concentrates. Use of dispersants is subject to OSC approval, with approval of the EPA representative to the RRT and the concurrence of the State with jurisdiction over the navigable waters polluted by the spill.

Federal Hazardous Waste – As defined by RCRA, a solid discarded waste which is not specifically exempt or excluded, and which exhibits certain specific characteristics of a hazardous waste or is specifically listed as a hazardous waste.

Federal On-Scene Coordinator – USCG (coastal waters) or EPA (inland waters and land) representative who provides overall coordination of cleanup activities.

Federal Restricted Hazardous Waste – The 1984 Hazardous and Solid Waste Amendments to RCRA essentially banned all RCRA hazardous wastes from land disposal as of May 8, 1990, unless the wastes have been treated to a specified standard to reduce their toxicity. Once treatment has been completed, the waste can be disposed of in a hazardous waste disposal facility.

Hazardous Material – Any hazardous substance, pollutant, or contaminant including natural gas, natural gas liquids, liquefied natural gas, or synthetic natural gas usable for fuel (or mixtures of natural gas and such synthetic gas), and any substance designated under the authority of any of the following laws and regulations and the subsequent implementing regulations:

Section 311(b)(2) of the Clean Water Act: 40 CFR 116.4, Tables 116.4A and 116.4B, Lists of Hazardous Substances; and 40 CFR 117.3, Reportable Quantities of Hazardous Substances Designated Pursuant to Section 311 of the Clean Water Act.

Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): 40 CFR 302.4, Table 302.4, List of Hazardous Substances and Reportable Quantities.

Section 3001 of the Solid Waste Disposal Act: 40 CFR 261.3, Definition of Hazardous Waste; 40 CFR 261.32, Hazardous Wastes from Specific Sources; and 40 CFR 261.33, Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues Thereof.

Section 307(a) of the Clean Water Act: 40 CFR 129.4, Toxic Pollutants.

Section 112 of the Clean Water Act: 40 CFR 61.01, Lists of Pollutants and Applicability of Part 61.

Section 7 of the Toxic Substance Control Act: 40 CFR 716.120, Substances and Listed Mixtures to Which This Part Applies.

Section 302 of the Emergency Planning and Community Right-to-Know Act: 40 CFR 355, Appendices A and B, Extremely Hazardous Substances.

Transportation regulations in 49 CFR 171.8, Hazardous Materials Regulations: 49 CFR 172.101, Hazardous Materials Table; Appendix A, Table 1, Hazardous Substances Other Than Radionuclides; Appendix A, Table 2, Radionuclides; and Appendix B, List of Marine Pollutants.

Marine transportation regulations in 33 CFR 126 and 160: 126.07, Dangerous Cargo; 160.230, Certain Dangerous Cargo; 126.09, Designated Dangerous Cargo; and 126.10, Cargo of Particular Hazard.

Section 6.95 of the California Health and Safety Code, Hazardous Materials Release Response Plans and Inventory.

Section 6.6 of the California Health and Safety Code, Safe Drinking Water and Toxic Enforcement Act of 1986 (commonly referred to as Proposition 65).

HAZWOPER – Hazardous Waste Operations and Emergency Response (29 CFR ϶1910.120). Regulations developed by OSHA that cover the health and safety of workers at hazardous waste sites, including emergency response operations at oil spills.

Incident – An occurrence or event, either human-caused or natural phenomenon, that requires action by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Incident Commander – The individual responsible for the management of all incident operations.

Incident Command System – A combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, with responsibility for the management of assigned resources of an incident. This system was developed through a cooperative interagency effort and its organization structure is based upon a large fire organization that was developed over time by federal fire protection agencies.

Interim Storage Site – A site used to temporarily store recovered oil or oily wastes until the recovered oil or oily waste is disposed of at a permanent disposal site.

Marine Safety Detachment/Office – USCG Safety Office located in most U.S. ports. There is a MSO in Los Angeles-Long Beach. There is a MSD in Santa Barbara.

Maximum Extent Practicable – The planning values derived from the planning criteria used to evaluate the response resources described in the response plan to provide the on-water recovery capability and the shoreline protection and cleanup capability to conduct response activities for a worst-case discharge from a facility in adverse weather.

National Contingency Plan – The plan prepared under the Federal Water Pollution Control Act (33 United States Code ϶1321 *et seq.*) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 United States Code ϶9601 *et seq.*), including revisions.

Natural Resources – Includes land, fish, biota, wildlife, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the exclusive economic zone), any state or local government or Indian tribe, or any foreign government.

Nearshore Area – The area extending seaward 12 miles from the boundary lines defined in 46 CFR Part 7, except in the Gulf of Mexico. In the Gulf of Mexico, it means the area extending seaward 12 miles from the line of demarcation (COLREG lines) defined in 33 of the CFR §§ 80.740 – 80.850.

Non-Hazardous Waste – Any rubbish, trash, and inert wastes such as concrete which do not meet the criteria of hazardous or designated wastes.

Non Petroleum Oil – Oil of any kind that is not petroleum-based. It includes, but is not limited to, animal and vegetable oils.

Non-Routine Waste – Wastes that are not regularly generated, or have not been previously profiled. Examples of non-routine wastes include contaminated soil resulting from hydrocarbon or chemical spills, or the cleanup of previously contaminated soils, chemical or other containers which are no longer in use, demolition of structures containing asbestos, and from other non-routine operations.

Oil – Oil of any kind or in any form. Including but not limited to: petroleum, fuel oil, sludge, oil refuse, and mixed with wastes (other than dredged spoils).

Oil Spill Response Organization – An exclusive team referring to all internal and external manpower resources involved in response operations and response support activities.

Oily Debris – Includes sorbent pads/boom, protection clothing/gear, soil, sand, rocks, logs, kelp, plastics, mousse, oil/water mixture, and animal carcasses.

Persistent Oil – A petroleum-based oil that does not meet the distillation criteria for a non-persistent oil. Persistent oils are further classified based on specific gravity as follows:

Group II – specific gravity less than .85

Group III – specific gravity between .85 and less than .95

Group IV – specific gravity .95 to and including 1.0

Group V – specific gravity greater than 1.0

Qualified Individual(s) – An English-speaking representative(s) of the facility identified in the plan, located in the United States, available on a 24-hour basis, familiar with implementation of the facility response plan, and trained in his or her responsibilities under the plan. This person has full written authority to implement the facility's response plan. This includes: (1) activating and engaging in contracting with identified oil spill removal organization(s); (2) acting as a liaison with the pre-designated Federal On-Scene Coordinator; and (3) obligating, either directly or through prearranged contracts, funds required to carry out all necessary directed response activities.

Recyclable Materials – Oilfield waste such as spent lead-acid batteries being reclaimed, scrap metal, and oil reclaimed at a petroleum refinery from hazardous waste resulting from normal oilfield activities.

Regional Response Team – The federal response organization (consisting of representatives from selected federal and state agencies) which acts as a regional body responsible for planning and preparedness before an oil spill occurs and providing advice to the FOSC in the event of a major or substantial spill.

Resources – All personnel and major items of equipment available, or potentially available, for assignment to incident tasks on which status is maintained.

Response Contractors – An individual, organization, association, or cooperative that provides or intends to provide equipment and services for oil spill containment, cleanup, and/or removal activities.

Response Priorities – Mechanism used to maximize the effective use of manpower and equipment resources based upon their availability during an operational period.

Risk and Hazard Analysis – A study in which process hazards and potential operating problems that could lead to oil spills are identified using systematic method(s) as recommended by the American Institute of Chemical Engineers, or other means approved by the Administrator. This is the study referred to as the Hazard and Operability Study in Section 8670.28 of the Government Code.

Routine Waste – Wastes which are regularly generated on an annual basis. Routine wastes include drilling muds, tank bottoms and other similar wastes. These wastes have been, to a large extent, pre-classified through the waste profile program. Waste profiling is required prior to acceptance at a waste disposal facility. All wastes must be “profiled” or tested prior to disposal; however, certain routinely generated wastes that result from ongoing operations and processes will be tested or “profiled” once per year to maintain their classification.

Sheen – An iridescent appearance on the surface of the water.

Skimmer – An oil recovery device designed to “skim” floating oil from the oil/water surface. Skimmers employ a variety of mechanism methods to maximize the amount of oil extracted from the water’s surface while attempting to minimize the intake of water into recovery systems and hoses. Various types of skimmers are designed to perform under specific conditions, such as heavy, moderate, or light seas, and to recover certain grades of oil, such as high, medium, or low viscosity oils. Stationary and portable skimmers, usually deployed within an oil containment boom, are designed solely to recover oil; while advancing skimmers can perform the dual functions of oil containment and oil recovery in a single operation.

Solid Waste – Any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities. It is important to remember that, by definition, a solid waste does not have to be solid.

Sorbent – A sorbent is any material that absorbs oil or to which oil adheres. A sorbent should be oleophilic and hydrophobic (i.e., it should absorb petroleum products from 20-to-25 times its weight and repel water). Sorbents are available in many forms: sheets, booms, sweeps, blankets, and loose materials. Sorbents may be made of polymer beads, synthetic hydrocarbon polymers, cellulose, plastic fiber, and even straw.

Source Control – Any number of procedures that may be employed to stop, curtail, and/or inhibit the source of a spill.

Technical Specialists – Personnel with special skills who are activated only when needed.

Unified Command – A method for all agencies or individuals who have jurisdictional responsibility, and in some cases, those who have functional responsibility at the incident to contribute to determining overall objectives for the incident and selecting a strategy to achieve the objectives.

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FINAL

California Dispersant Plan and Federal On-Scene Coordinator (FOSC) Checklist

for

California Federal Offshore Waters

Fall 2008

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California Dispersant Plan Document Quick-Find

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The principal organizer and compiler of this report was Ellen Faurot-Daniels (CCC), with critical conceptual input and resource information support provided by Yvonne Addassi (OSPR). Creating this draft California Dispersant Plan would not have proceeded smoothly or successfully without the contributions of thought, effort and review provided by many others.

We relied extensively on work already completed by other authors and institutions. Leigh Stevens of Cawthron Institute, New Zealand, led the way by allowing us to use his "Oil Spill Dispersants: Guidelines for Use in New Zealand" as an extremely helpful model for our document. We also drew from various dispersant guidelines provided by Regional Response Teams throughout the U.S., dispersant guidelines published by ExxonMobil, the Cutter Information Corporation's "Oil Spill Dispersants: From Technology to Policy", the "Assessment of the Use of Dispersants on Oil Spills in California Marine Waters" by S.L. Ross, and various oil spill job aids available from the NOAA web site. Please see the References Cited section in this document for the full citations.

Beyond the use of these reports was the steadfast assistance of those we worked with in our own agencies and those on the Los Angeles Area Committee, dispersant subcommittee, dispersant workgroups, and various interested parties watching and assisting from outside the immediate working groups. Randy Imai of OSPR provided the charts in this report, Al Allen (Spilltec) provided the information, figures and formulas for dispersant dosage rates and relating those rates to dispersant application systems, and the oil spill clean-up cooperatives in California provided updated information on dispersant application resources. Members of the Los Angeles workgroups reviewed early drafts of this document, with John Day (Santa Barbara County) and Craig Ogawa (Minerals Management Service) providing especially helpful comments along the way. Ben Waltenberger (NOAA), Ken Wilson (OSPR), Melissa Boggs (OSPR) and Ellen Faurot-Daniels (CCC) pitched in to draft the Wildlife Aerial Observation Protocols, and Melissa Boggs led the workgroup addressing public outreach.

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SECTION I: Pre-Approval Zones

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OVERVIEW

PRE-APPROVAL ZONES

Purpose and authority

This document outlines the Dispersant Use Plan for state and federal marine waters within the Region IX Regional Response Team (RRT) area of operations.

This policy authorizes and provides guidelines to allow the federally pre-designated U. S. Coast Guard (USCG) Federal On-Scene Coordinator (FOSC) and/or the Unified Command to use dispersants in a timely manner to: 1) prevent or substantially reduce a hazard to human life; 2) minimize the adverse environmental impact of the spilled oil; and 3) reduce or eliminate the economic or aesthetic losses of recreational areas. This dispersant use plan will address the use of dispersants for each of two zones: Dispersant Pre-Approval Zones; and, RRT Approval Required Zones.

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The USCG Eleventh District Commander has pre-designated the three USCG Captains of The Port (COTP) as the FOSCs for oil discharges in their respective COTP zones (as defined in 33 CFR Part 3 and subject to joint response boundary agreements with EPA described in Section 1400 of the three California Area Contingency Plans), and has delegated to each COTP the authority and responsibility for compliance with the Federal Water Pollution Control Act (FWPCA).

The Governor of the State of California has designated the Administrator of the Department of Fish and Game Office of Oil Spill Prevention and Response (CDFG-OSPR) the authority and responsibility for providing approval for the use of dispersants for control of oil spills in or affecting California waters.

The USCG, EPA, DOI, DOC/NOAA, and CDFG-OSPR agree that one of the primary methods of controlling discharged oil shall be the physical removal of the oil by mechanical means. These agencies recognize that in certain instances timely, effective physical containment, collection and removal of the oil may not be possible, and the use of dispersants, alone or in conjunction with other removal methods, may be considered to minimize substantial threat to public health or welfare, or minimize serious environmental damage. This document establishes the policy under which dispersants listed on the NCP Product Schedule may be used in Federal waters off California by FOSCs.

The response planning process

The National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan –

NCP) directs the RRTs and Area Committees to address, as part of their planning activities, the desirability of using appropriate dispersants, surface washing agents, surface collecting agents, bioremediation agents, or miscellaneous oil spill control agents listed on the NCP Product Schedule, and the desirability of using appropriate burning agents. Regional Contingency Plans and Area Contingency Plans shall, as appropriate, include applicable authorization plans and address the specific contexts in which such products should and should not be used (40 CFR § 300.910). Additional information on how this plan was directed and developed is included in Appendix I.

What is in the California Dispersant Plan (CDP)

In its current form, the CDP includes an updated Federal On-Scene Coordinator (FOSC) checklist, and a series of discussion and decision boxes to facilitate the FOSC decision. To provide the greatest likelihood that this CDP will not only train but serve the Coast Guard regardless of which personnel are in the FOSC position in the future, it includes a number of appended materials that put oil, dispersant, natural resource and response resource information close at hand in one document. The CDP also includes a number of blank forms that can be removed, duplicated as needed, and used in the field during a spill response to provide orderly and timely information to the FOSC as the spill unfolds and a decision whether or not to use dispersants becomes imminent. Other report forms document bird and mammal presence, dispersant application methods, and dispersant effectiveness.

This document is not a lengthy discussion of the relative merits of any response tool, of dispersant or dispersed oil toxicity, or the details of Net Environmental Benefit Analyses (although key points on several of these topics is embedded in the Discussion Notes on the FOSC checklist, or in the appendices). It is not a primer on oil spill response in general, or the Incident Command System. All this information is available from other resources, much of which was considered in developing the zone recommendations and CDP. This CDP instead assumes that an oil spill has occurred and all agency notifications have been made, various response agencies are on scene and using the Incident Command System to structure the response, and that dispersant use is under active consideration by the FOSC. This CDP takes over from there, offering tools to the FOSC to guide that decision.

This CDP primarily focuses on the federal offshore waters that have been designated as "pre-approved" for dispersant use. To date, this includes the waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the California-Mexico border. This CDP also addresses waters closer than 3 miles from shore, within a National Marine Sanctuary, and within 3-miles of the California-Mexico borders, under the RRT Approval Process.

This CDP is a central, portable repository of all information that will guide the FOSC in a dispersant-use decision for pre-approval areas in federal offshore waters, regardless of which COTP pre-approval area the spill occurs and for which dispersants are being considered.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use decision at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the Unified Command in making a dispersant use decision, not hinder the process with unnecessary paperwork.

As a part of the dispersant pre-approval zone decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet — Not Required by RRT

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) Pre-Approval Zone Dispersant Use Checklist — Required by RRT

This checklist was designed to provide an overview of the pre-approval decision-making process and to provide a "dispersant decision summary" for the Incident, detailing the decisions made. Once this form is completed and the FOSC decides to use dispersants, the checklist should be faxed to the RRT as soon as feasible.

3) Dispersant Pre-approval Record of Decision — Required by RRT

This form was designed to provide a record of decision regarding the evaluation and authorization of dispersant use, consistent with the pre-approval criteria provided in the "pre-approval zone dispersant use checklist." The record of decision is to be signed by all members of the Joint Unified Command and should be faxed with the dispersant use checklist to the RRT as soon as feasible.

4) Checklist Documentation and Support Form Boxes #1 - #12 — Not Required by RRT

This form was designed as a support tool to evaluate the information required in the pre- approval zone dispersant use checklist. This form guides the user through each decision- making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the appendices, as needed, where additional information can be found.

DISPERSANT ASSESSMENT WORKSHEET

(Two pages)

Information gathered to complete this form will facilitate the dispersant pre-approval use determination; complete as much as possible without inadvisably delaying a dispersant use decision.

This report made by: ____________________ Organization: ____________________ Date: __________ Time: __________
Phone: ( )____________Fax: ( )______________ Mobile: ( )____________________ Pager: ( )____________________

On-Scene Commander: ____________________ Agency: ____
Phone: ( )____________ Fax: ( )______________ Mobile: ( )____________________ Pager: ( )____________________

Caller: ______________________________ Organization: ____________________ Date: __________ Time: __________
Phone: ( )____________ Fax: ( )______________ Mobile: ( )____________________ Pager: ( )____________________
Street: ______________________________ City ____________________ State _______ Zip Code __________

OES Control #________________________ **NRC #** ____________________

SPILL

Date of spill: ________________(month/day/year) Time of spill: ______________________________(PST, 24-hr clock)
Location: Latitude: ______________________N Longitude: ____W

Spill source and cause: ____
____

Amount spilled: ______________(gal or bbl) Type of release: ☐ Instantaneous ☐ Continuous
Flow rate if continuous flow (estimate): ___________
Oil name: ______________________________ API: ________ Pour point: __________ (ºF)

Information source: ____

ON-SCENE WEATHER, CURRENTS AND TIDES

(If not immediately available contact NOAA Scientific Support Coordinator (206-321-3320) or other resources noted in Appendix A).

Wind (from) direction: __________________ Next low tide: ______ (ft) at _______ (hrs)
Wind speed: __________________________ (knots) Next high tide: ______ (ft) at _______ (hrs)

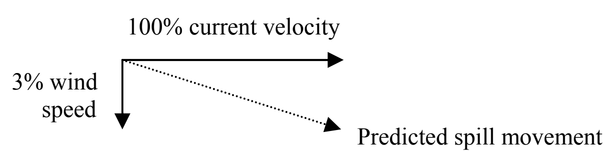
Current velocity: _________ (kts) Current (to) direction: _________ (ºtrue/magnetic)
Predicted slick speed: _________ (kts) Predicted slick direction: _________ (ºtrue magnetic)

Visibility: ______________ (nautical miles) Ceiling: ________ (feet) Sea state:________ (wave height in feet)

Information source:____

PREDICTING SPILL MOVEMENT

Plot spill movement on appropriate nautical chart. Using the information from the box above, predict slick direction and speed using 100% of current velocity and 3% of wind speed.



Estimated distance to shore/sensitive area: _________ (nm)
Estimated time to shore/sensitive area: _________ (hrs)

ESTIMATING OIL SPILL VOLUME

Extent of spill:

(a) Length of spill ______(nm) x Width of spill ______(nm) = Total spill area _________(nm^2)

(b) Estimate what proportion (%) of the total spill area is covered by oil: _______ (Express as decimal, % x 100)

(c) Estimate slick area: ________________ x ________________ = ___________________

Total slick area (a) | % oil cover (b) | Estimated slick area

Estimated spill volume:

You can make this estimate using any of the following approaches:

- Get a thickness estimate from the ADIOS oil weathering model (call the NOAA SSC (**206-321-3320**) for assistance);
- Generate your own volume estimate of spilled oil and the area it covers (convert both volume and area to metric units and then divide the volume by the area to estimate the thickness. Use the unit conversions found in Appendix K). Convert thickness to millimeters to use Appendix D.1).
- Use your knowledge of the approximate number of barrels of oil or emulsion per acre of slick.

POTENTIAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in **Appendix B**, briefly describe potential coastal areas and resources that could be impacted from this spill.

DISPERSANT SPRAY OPERATION

Information from **Appendices C.5 – C.8 and D.1** will be helpful.

Dispersant spray contractor name: ________________________________
Dispersant name: ________________________ Quantity available: __________

Street: ______________________________
City: ______________________________
State: ________ Zip Code: _____________
Phone: ( ) _________________________

Platform: Aircraft type: ☐ Multi-engine ☐ Single-engine
Boat type: ___________________________________
Other: ___________________________________
Dispersant load capability (gal): ______________________

Estimate:

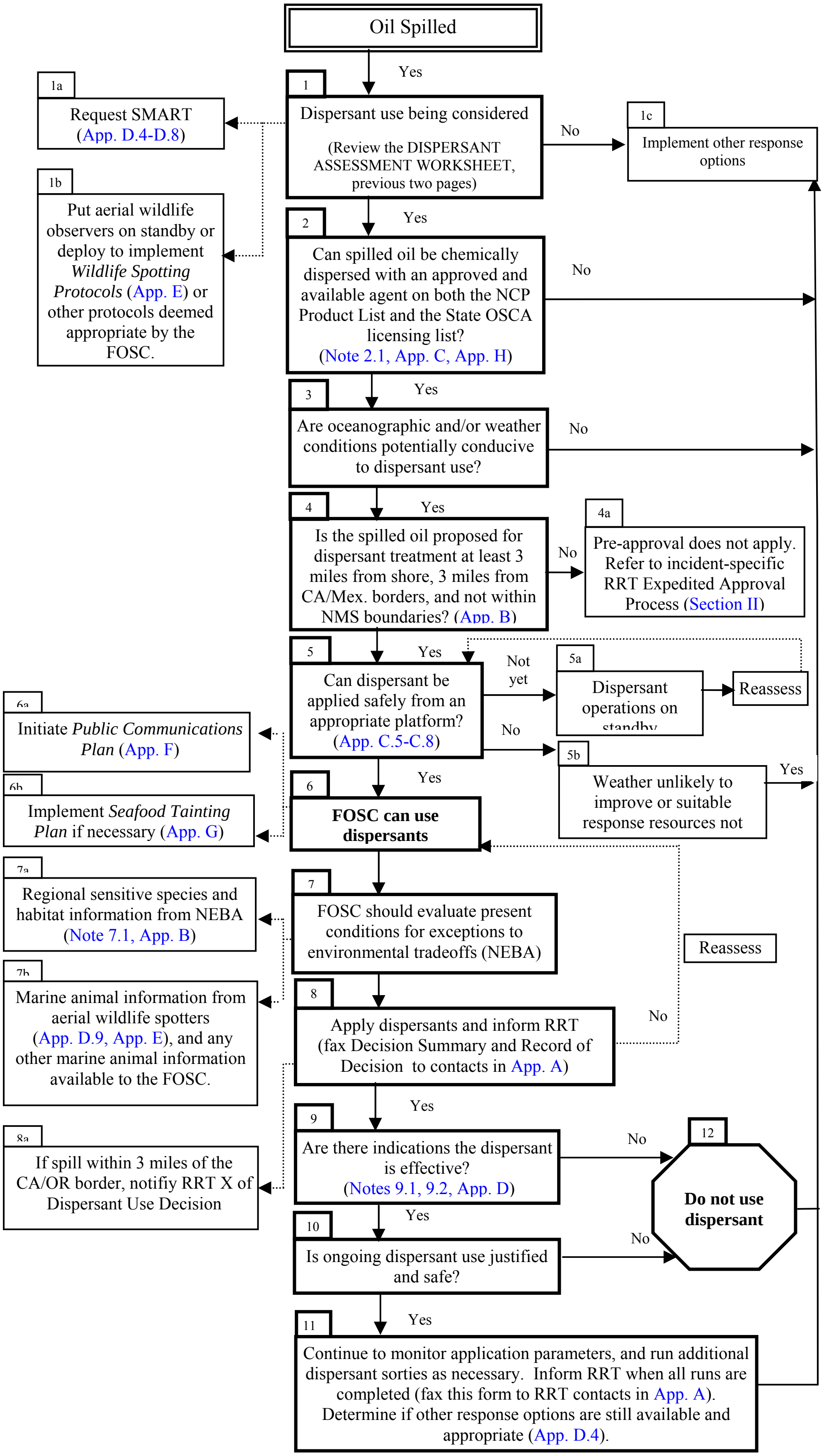
"Window of opportunity" for getting dispersant on the oil (App. C-10)__________________ (hrs from first report of spill)
Number of daylight hours available for first day of dispersant application:______________ (hrs from first report of spill)

Time to first drop on the oil: ____ (hrs from first report of spill)

Can dispersants to be effective after day one of the spill? YES / NO / Cannot determine at this time (circle one)

Note: It might be appropriate to conduct a small dispersant test before proceeding to a full application.

PRE-APPROVAL ZONE DISPERSANT USE CHECKLIST



Pre-Approval Zones

Dispersant Decision Summary

Spill location: ______________________

FOSC Name: ______________________

FOSC Signature: ______________________

Box	Decision	Time:	Date:	Initials:
1	Yes/No	____	________	________
2	Yes/No	____	________	________
3	Yes/No	____	________	________
4	Yes/No	____	________	________
5	Yes/No	____	________	________
6	Yes/No	____	________	________
7	Yes/No	____	________	________
8	Yes/No	____	________	________
9	Yes/No	____	________	________
10	Yes/No	____	________	________
11	Yes/No	____	________	________
	Run 2	____	________	________
	Run 3	____	________	________
	Run 4	____	________	________
	Run 5	____	________	________
	Run 6	____	________	________
	All done	____	________	________
12	Do not use	____	________	________

Supplemental Decisions:

1a	Yes/No	____	________	________
1b	Yes/No	____	________	________
5a	Yes/No	____	________	________
5b	Yes/No	____	________	________
6a	Yes/No	____	________	________
6b	Yes/No	____	________	________
7a	Yes/No	____	________	________
7b	Yes/No	____	________	________

Record of Decision:

If dispersant use is approved, sign and fax the Dispersant Pre-Approval Record of Decision with this Summary Sheet to the RRT.

Comments:

....

....

....

....

The following boxes and checklists are to support decision-making. Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay decision-making.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if one or more of the situations listed below exist:

- ❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
- ❒ Natural dispersion is limited
- ❒ Other response techniques are unlikely to be adequate, effective, or economical
- ❒ The oil could emulsify and form mousse or tar balls
- ❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g.*, marinas, wharves)
- ❒ Oil is likely to significantly impact economically important resources (*e.g.*, shellfish beds, tourist beaches)
- ❒ Other ……………………………………………………………………………………………………

Decision: Consider dispersant use?

❒ Yes Make notifications in **Box 1a**
Make notifications in **Box 1b**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

From Cawthron, 2000

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or sensitive areas (*e.g.*,wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART (Special Monitoring of Advance Response Technologies) monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of SMART monitoring equipment and personnel**. However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operation approved in accordance with this California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Appendices D.4 – D.8**.

Decision: Deploy SMART?

❒ Yes Use contact information in Appendix A. **Estimated arrival time**: …………………………..………..
Go to **Box 1b**.
❒ No Note reason why not deployed. ……………………………………………………………………….…….

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Go to **Box 1b** or **Box 1c** as appropriate.

BOX 1b **PUT AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Appendix D.9 and Appendix E**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❒ Yes Use wildlife spotter contact information in **Appendix E.2**. Go to **Box 2**.
❒ No Note reason why wildlife spotters not deployed ....
....

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Reconsider under **Box 7**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate. The following options are described in the Area Contingency Plan (Section 1640) and the Regional Contingency Plan (Section 1007.05).

❒ No action other than monitoring
❒ Mechanical containment and recovery of oil at sea
❒ Clean-up of oil from shorelines
❒ *In situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Appendix H**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Appendix A**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

The State OSCA licensed dispersants may also be found in **Appendix H,** calling the State OSPR representative on the RRT (**Appendix A**) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

Decision: Can this oil be dispersed with an approved and available agent?

❒ Yes Go to **Box 3.**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Taken in part from Cawthron, 2000

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see App. C.10 for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf (OCS) waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g.*, fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Appendices C.1 and C.2 show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker include two-three dozen different types of oil (only the most common are listed in **Appendix C.2**). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersibility is from specific oil weathering and dispersion data from field trials (see **Appendix C.3** for some tested and modeled oils).
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g.*, ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models.

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is < 2000 cSt, dispersion is probable.
- Viscosity is >2000 cSt, dispersion is possible.
- Viscosity is >5000 cSt, dispersion is possible with concentrated dispersant (*e.g.*, Corexit 9500).
- Sea temperature is <10º C or below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Appendix C.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g.*, ADIOS, **Appendices C.3 and C.4**) can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Table 2.1 **ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE**

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (**206-321-3320**) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website:
http://response.restoration.noaa.gov/software/adios/adios.html

Oil/product name:	____________		Wind speed:	____________	(knots)
Amount spilled:	____________	(gal or bbl)	Wave height:	____________	(m)
Type of release:		Circle one	Water temp.:	____________	(ºC)
❑ Instantaneous			Water salinity:	____________	(ppt)
❑ Continuous					

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

From Cawthron, 2000

BOX 3 **ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?**

Does the available technical information indicate that the existing oceanographic (*e.g*., surface current direction and speed, wave and chop height) and weather (*e.g*., wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

- ❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
- ❒ Consultation with the NOAA Scientific Support Coordinator (**206-321-3320**)
- ❒ Information resources and web sites noted in **Appendix A**
- ❒ Information from aerial overflights
- ❒ Information from ADIOS

Decision: Are ocean and weather conditions potentially suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 4 **IS THE SPILLED OIL PROPOSED FOR DISPERSANT TREATMENT AT LEAST 3 MILES FROM SHORE, NOT WITHIN NMS BOUNDARIES, AND NOT WITHIN 3 MILES OF THE CA/MEXICO BORDER?**

A full-page statewide chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with pre-approval dispersant zones noted, are in **Appendix B**.

Decision: Is the spilled oil within a Pre-Approval zone?

❒ Yes Go to **Box 5**.
❒ No Pre-Approval does not apply. Go to **Box 4a**.

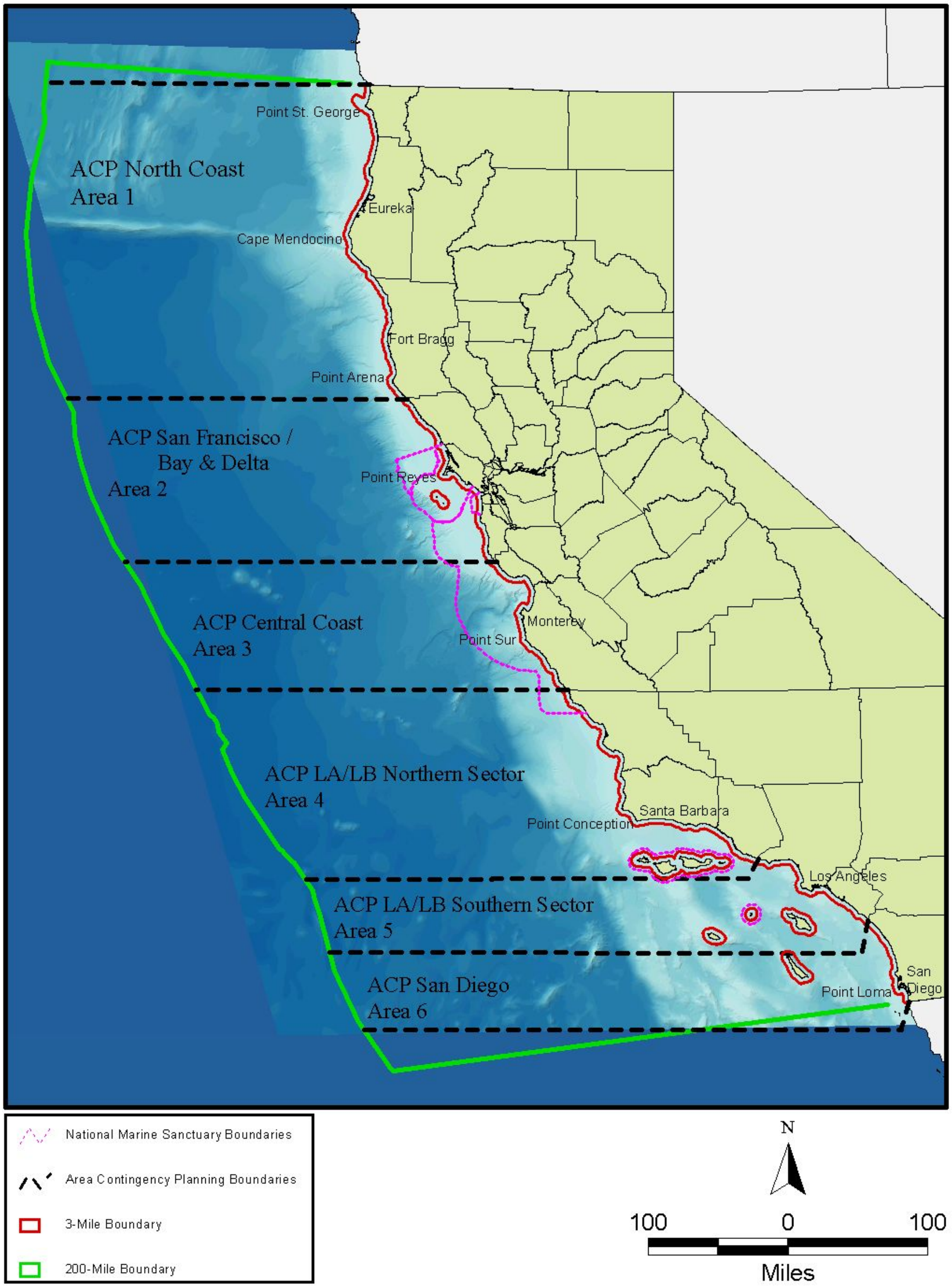
Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 4a **PRE-APPROVAL DOES NOT APPLY; REFER TO RRT APPROVAL PROCESS.**

The request for dispersant use does not qualify under the pre-approval guidelines for the use of dispersants in RRT Regional IX. Contact the NOAA SSC (**206-321-3320**) and begin the dispersant *RRT Approval Process*, **Section II**.

Chart 4.1

California Marine Waters Pre-Approval Dispersant Zone



BOX 5 CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (**206-321-3320**) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from resources noted in **Appendix A**. See **Appendices C.5 – C.8** for specific information on dispersant application platforms.

Decision: Is there a safe and appropriate application platform for a dispersant operation?
(See Discussion Note 5.2 below for important safety information)

	Yes	(Type)	No	(Why not appropriate?)
C-130/ADDS Pack	☐		☐	....
DC-4	☐		☐	....
Other large multi-engine airplane	☐	....	☐	....
Cessna AT-802	☐		☐	....
Other single-engine airplane	☐	....	☐	....
Helicopter	☐	....	☐	....
Work boat	☐	....	☐	....
	Go to **Box 6**		Go to **Box 5a and/or 5b**	

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Discussion Note 5.1 CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANT APPLICATION

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

- ☐ Is the selected dispersant available in the quantity needed?
- ☐ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
- ☐ Can the dispersant and application resources get to the spill scene on time?
- ☐ Will there be enough daylight hours for an effective dispersant application?

Refer to **Appendix C** for more specific regional dispersant resource information.

Discussion Note 5.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:
  - Physical hazards (*e.g.*, waves, tides, unstable or slippery surfaces)
  - Heavy machinery and equipment
  - Chemical hazards (*e.g.*, oil and dispersant exposure)
  - Atmospheric hazards (*e.g.*, fumes, ignition risks)
  - Confined spaces
  - PPE
  - Noise
  - Fatigue
  - Heat/cold stress
  - Wildlife (bites/stings)
  - Cleanup facilities
  - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 5a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Appendix A** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: Has the weather improved to the point where dispersants can be applied?

❒ Yes Go to **Box 6**
❒ No Continue to **reassess** (until/unless time window for successful application closed) or Go to **Box 5b**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

BOX 5b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

Go to **Box 1c**

BOX 6 **FOSC CAN USE DISPERSANTS**

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES:

- ❒ Pre-approval zones are only in waters no closer than 3 nautical miles from the nearest shoreline, not within 3 miles of the CA/Mexico borders, and not within the boundaries of a National Marine Sanctuary.
- ❑ Dispersants cannot be applied to any diesel spill.
- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist (see **Appendix E.2** for list) will accompany the SMART observer. However, the operation will not be delayed for either function.
- ❒ The marine wildlife observer, or the person functioning as that observer, is strongly encouraged to use the Wildlife Observation Report Form (**Appendix D.9**) and the Wildlife Spotting Protocols (**Appendix E**). However, the operation will not be delayed for this function
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS).
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see **Appendix A** for resource agency contact information).
- ❒ If the dispersant application platform is a boat, see Discussion Note 8.3.

BOX 6a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Appendix F**). The general public as well as stakeholders must be made aware of any decision to use dispersants and a mechanism created for reliable and continuous updates.

An initial press conference should be held which outlines the decision to use dispersants, provides background and scientific information, and addresses any other environmental and safety considerations expressed by the public. A sample press release is in **Appendix F.1**, with other public meeting and risk communication tips offered throughout **Appendix F**.

A public meeting should be scheduled as soon as possible to provide a mechanism for sharing information and addressing public concerns and fears**.** **Appendix F** provides guidelines for preparing and conducting a public meeting. Areas that must be adequately addressed during the meeting include:

- Seafood tainting concerns posed by dispersants (**Appendix G**).
- Risk communication (**Appendix F.2 and Appendix G**).
- Results of net environmental benefit analyses, and species of special concern (summarized in **Appendix B**).
- Monitoring policies established for the spill (tools used from **Appendix D**).

BOX 6b **IMPLEMENT *SEAFOOD TAINTING PLAN* IF NECESSARY**

Refer to **Appendix G** for key points to consider regarding seafood tainting, as well as information on accessing NOAA and state resources for assessing the tainting risk.

BOX 7 **FOSC SHOULD EVALUATE PRESENT CONDITIONS FOR EXCEPTIONS TO ENVIROMENTAL TRADEOFFS (NEBA)**

This FOSC Checklist applies only to those California offshore waters pre-approved for dispersant use (waters 3 – 200 nautical miles from shore, not within a National Marine Sanctuary, and not within 3 miles of the CA/OR or CA/Mexico borders); see **Box 4**. However, dispersant use even in the pre-approval areas must follow certain guidelines (**Box 6)** and may be further limited by federal agencies with responsibility for endangered marine animal management (**Appendix J**).

Pre-approval dispersant zone recommendations do not presume the absence of sensitive species, other marine species, or impacts to species on the water surface or in the upper water column. It does presume that there will be impacts from the spilled oil, and from dispersant use, to some of those species. However, based on the natural resource information used in the planning stage, it was determined that there could be a net environmental benefit to the use of dispersants.

However, at the time of an actual spill and a decision to use dispersants, real-time information on marine animal presence (**Box 1b** and **Box 7b**), the potential impacts from the spill (**DISPERSANT ASSESSMENT WORKSHEET**), and important supplemental information (**Appendix B** and **Boxes 7a-b**) should all be considered and weighed by the FOSC in making a final decision to use dispersants, probable impacts, and where the net environmental benefits will occur.

The FOSC may use the regional sensitive species and habitat information from **Appendix B** for each major coastal area in which dispersant use may have an impact in order to consider:

- ❒ The type and value of habitat potentially affected.
- ❒ The sensitivity of affected resources to oil, and to different oil response strategies.
- ❒ Natural recovery rates of affected species and habitats.
- ❒ Likely oil persistence and degradation rates with and without dispersant use.
- ❒ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

The central question to be answered in assessing <u>Net Environmental Benefit</u> is:

Will dispersant use significantly reduce the impact of the spilled oil?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into water depths greater than 10m will quickly dilute to levels where acute toxic effects are unlikely.
- Few acute toxic effects have been reported for crude oil dispersed into less than 10m of well-flushed water.
- Small spills of light fuels seldom require dispersant use.

BOX 7a **REGIONAL SENSITIVE SPECIES AND HABITAT INFORMATION FROM NEBA**

At the time of an actual oil spill or a decision to use chemical dispersants on the oil, marine species are expected to be on the water surface or in the upper water column. Before using chemical dispersants, the FOSC will have decided that there may be a net environmental benefit from dispersant use. Information on regional sensitive species and habitat information from the Net Environmental Benefit Analyses (NEBA), summarized for each region in **Appendix B**, can help the FOSC determine which species might actually be in the area and scouted for by the aerial observers (**Box 1b** and **Box 7c**). This additional information can provide further validation and justification to a FOSC that impacts of chemical dispersant application will be minimized wherever possible, and net environmental benefit maximized.

BOX 7b **MARINE ANIMALS INFORMATION FROM AERIAL WILDLIFE SPOTTERS**

The FOSC can take additional information and advantage from the Aerial Wildlife Observers if they have been deployed (**Box 1b**), or information from the Wildlife Aerial Survey Form (**Appendix D.9**) available from other aerial spotters, or information from wildlife spotters (**Appendix E.2**) available to the FOSC from other data collection forms or notes used by those spotters. Any of these resources will provide real-time or near real-time information on marine seabird and mammal presence, and can guide the FOSC on dispersant application parameters that may minimize impacts to those resources.

BOX 8 **APPLY DISPERSANTS AND INFORM RRT**

- ❑ Use the information on <u>estimated oil spill volume</u> from the DISPERSANT ASSESSMENT WORKSHEET and Discussion Note 8.1 below to:
  - Determine the dispersant application ratio (usually 1:20), and
  - Calculate the volume of dispersant required (**Appendices D.1 and D.2**).
- ❑ Record the details on the Dispersant Application Summary Form (**Appendix D.4**);
- ❑ Mobilize application team;
- ❑ If not already done, mobilize SMART. Some blank SMART forms are included in **Appendix D** for use by other trained professionals, if appropriate and when approved by the FOSC.
- ❑ Inform RRT (see **Appendix A** for contact information).

Decision: Dispersants applied?

❑ Yes Go to **Box 9**
❑ No Explain.

Make a note of the decision on Dispersant Use Checklist (Page I-9)

Reassess as necessary and appropriate.

Discussion Note 8.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators and in accordance with manufacturer instructions.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g*., fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are many factors that influence dispersibility (*e.g*., oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult to select an appropriate DOR for the conditions faced on the day of a specific spill
- The variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and underdosing as the system moves through light, heavy and sometimes “no” oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run.
- Area, volume and thickness can be related with the following expression:

$$\mathbf{10^4 \text{ x Area (hectare) x Thickness (mm) = Volume (liters)}}$$

or

$$\mathbf{\text{Volume (liters/Area (hectares) = }10^4\text{ x Thickness (mm)}}$$

►To convert liters/hectare to gallons/acre, multiply by 0.107. To convert liters/hectare to gallons/square kilometer, multiply by 26.42.
►These values (in any units) multiplied by the DOR (as a fraction, *e.g*., 1:5 = 1/5 or .2) will then yield the Desired Dosage (in those units) for that value of DOR.
►Refer to Appendix D.1 for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 8.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump-driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000-micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of 5.3 gallons per acre if using a 1:20 ratio.
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 8.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible to prevent oil being moved aside by the bow wave before being sprayed. This then uses the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical to effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater-supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:

- ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
- ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
- ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.

Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

In part from Cawthron, 2000

BOX 8a **NOTIFICATION OF RRT IX OF DISPERSANT USE WITHIN 3 MILES OF THE OR/CA BORDER**

The FOSC can approve the use of dispersants within the 3 miles zone of the California/Oregon border. Once a dispersant use decision is made, the FOSC should contact the RRT IX-X Liaison of the decision as soon a possible and should also endeavor to fax the Dispersant Record of Decision as well. Contact information can be found in **Appendix A.**

BOX 9 **ARE THERE INDICATIONS THE DISPERSANT IS EFFECTIVE?**

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Are there indications the dispersant is effective?

❑ Yes Go to **Box 10**
❑ No See Discussion Note 9.2 and return to **Box 8**, or Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page I-9) *From Cawthron, 2000*

Discussion Note 9.1 **ASSESSING DISPERANT EFFECTIVENESS**

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Appendix D**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Appendices D.1 and D.2** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Appendix D** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g.*, emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is "pushing" the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 9.2 **WHEN DISPERSANT IS NOT EFFECTIVE**

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application ratios (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 10 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Appendix H**); Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is at least 3 nautical miles from shore, not within the boundaries of a National Marine Sanctuary (see **Box 4**), and not within 3 miles of the CA/OR of CA/Mexico borders;
- ❑ The dispersant will have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant can be applied safely (see **Box 5**), with suitable weather (**Box 5a**) and available resources (**Box 5b**);
- ❑ There are indications the dispersant continues to be effective (see **Box 9**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 11**
- ❑ No Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page I-9)

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 11 **CONTINUE TO MONITOR APPLICATION PARAMETERS AND RUN ADDITIONAL DISPERSANT SORTIES AS NECESSARY**

More than one dispersant sortie (run) may be necessary to effectively treat the oil spill. Continue to monitor information on the spill extent, dispersant effectiveness, continued availability of suitable weather "windows" and dispersant application equipment and personnel, and perform addition applications as necessary.

- ❒ Record information from each sortie on the Dispersant Decision Summary.
- ❒ Inform RRT when all runs are completed (fax Dispersant Decision Summary form to RRT contacts in **Appendix A**).

THERE WILL BE A POINT WHEN DISPERSANTS ARE NO LONGER EFFECTIVE.

BOX 12 **DO NOT USE DISPERSANT**

Pre-approval to use dispersants does not apply if **any** of the following occur:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and); Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The spilled oil is closer than 3 nautical miles from shore, within the boundaries of a National Marine Sanctuary (see **Box 4**), or within 3 miles of the CA/OR or CA/Mexico borders. Approval to use dispersants within 3 miles of landfall or CA borders, or within a National Marine Sanctuary, does not fall within the Pre-Approval guidelines, and will instead need to be considered under the RRT Approval Process (see **Box 4a** and **Appendix I**);
- ❑ The dispersant will not have a net environmental benefit (see **Box 7a**);
- ❑ The dispersant cannot be applied safely (see **Box 5**), with suitable weather (**Box 5a**) or available resources (**Box 5b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 9**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

Go to **Box 1a**.

DISPERSANT PRE-APPROVAL
RECORD OF DECISION

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The Region IX, Regional Response Team has established dispersant pre-approval zones within waters 3 – 200 miles along the California coast, as designated and has provided policies and procedures for a FOSC to authorize the use dispersants consistent with these pre-approval zones. For purposes of this record of decision, the designated FOSC has completed the "Pre-Approval Zone Dispersant Use Checklist" and has determined that the oil spill, *Name of Oil Spill Incident*, meets the pre-approval criteria as outlined and that dispersant use is authorized.

________________ ________________

Federal On-Scene Coordinator — Date
United States Coast Guard

California statute requires that emergency response operations utilize the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Response Party and outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, the authorization of dispersant use as delegated by the Region IX RRT to the designated FOSC was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party. The Joint Unified Command has completed the "Pre-Approval Zone Dispersant Use Checklist" and has determined that the oil spill, *Name of Oil Spill Incident*, meets the pre-approval criteria as outlined and that dispersant use is authorized.

____________________________ ____________________________

State On-Scene Coordinator — Responsible Party Representative
Office of Spill Prevention and Response
State of California

________________ ________________

Date — Date

REFERENCES CITED

Etkin, Dagmar Schmidt. 1999. Oil Spill Dispersants: From Technology to Policy. Cutter Information Corp, Arlington, MA.

ExxonMobil Dispersant Guidelines. 2000. ExxonMobil Research and Engineering Company.

Mearns, A.J. & R.Yender, 1997. A summary of a NOAA workshop on management of seafood issues during an oil spill response. Proc. Arctic and Marine Oil Spill Program Technical Seminar. Environment Canada, Vancouver, pp. 203-214.

Reilly, T.I. and R.K York. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9.107pp.

Ross, S.L. 2002. Assessment of the Use of Dispersants on Oil Spills in California Marine Waters. S.L. Ross Environmental Research, Ltd. for Minerals Management Service, Herndon, VA.

State of California, Office of Emergency Services. 2001. Risk communication Guide for State and Local Agencies. 17pp.

Stevens, Leigh. 2000. Oil Spill Dispersants: Guidelines for use in New Zealand. Prepared for Maritime Safety Authority of New Zealand.

Wildlife Response Plan Appendices of the California Area Contingency Plan. Version 2, October 2003.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Resources from Internet World Wide Web sites:

NOAA Oil Spill Job Aids	http://response.restoration.noaa.gov/job_aid/glossary.html
(web links of 12/18/03)	http://resposne.restoration.noaa.gov/oilaids/spiltool
	http://response.restoration.noaa.gov/disp_aid/remember.html
	http://response.restoration.noaa.gov/disp_aid/checklist.html
	http://response.restoration.noaa.gov/oilaids/OilatSea.pdf
	http://response.restoration.noaa.gov//oilaids/SMART/SMART.html

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SECTION II: RRT Expedited Approval Zones

Table of Contents

OVERVIEW
RRT EXPEDITED APPROVAL ZONES

Protocols for dispersant use

The FOSC shall arrive at a decision to use dispersants using the information-gathering and decision-making process outlined below, and, using the checklists and procedures attached to this document, forward this information to the RRT for approval. These protocols presume that the FOSC has previously determined that a proposed dispersant use does not meet the criteria of pre-approval, but that dispersant use under a case-by-case RRT approval authority is being pursued.

RRT approval required for dispersant use

For those spill situations that are not addressed by the pre-approval process, FOSC authorization to use dispersants requires the concurrence of the RRT Co-Chairs (the U.S. Coast Guard and U.S. EPA) and State representatives to the RRT and in consultation with the DOI and DOC representatives. The RRT must approve the use of dispersants at the time of a spill for all scenarios within the designated marine waters:

- Marine waters within 3 nautical miles from the coastline, waters designated as a part of a National Marine Sanctuary, or waters that are within three miles of the borders of the Country of Mexico;

- Marine waters one mile from anadromous fish streams during times of emigration and immigration.

Once an FOSC determines to pursue the use of dispersants in a non-pre-approval zone, a formal evaluation of the trade-offs associated with this proposed dispersant use must be conducted. The forms and checklists found in the **DISPERSANT ASSESSMENT WORKSHEET** and **DISPERSANT USE CHECKLIST** below are designed to assist the FOSC or his/her designee in making this determination. The following is an overview of pertinent decision-making points:

- The spilled oil must be amenable to chemical dispersion. Diesel is strictly prohibited from dispersant-use;
- Oceanographic conditions allow for the effective and safe use of dispersants;
- The use of dispersants provides a net environmental benefit. Of special concern are kelp beds and marine waters less than 60 feet deep;
- Appropriate dispersants, dispersant application equipment and personnel are available.

Once the FOSC has filled out the checklists and forms and has determined dispersant use would be a viable and appropriate response option, the FOSC must put in a formal request for approval to the RRT. A spill-specific RRT conference call will be conducted in which all aspects of the dispersant-use request will be evaluated. The RRT will provide the FOSC with an answer regarding the dispersant approval request within 2 hrs of the formal request. The decision to use dispersants will be with approval of the RRT co-chairs and the representative of the State of California with consultation from the DOI and DOC. It is likely that the RRT will address similar stipulations as outlined in the pre-approval process, such as the following;

- Dispersants should not be applied directly to marine mammals within or outside of an oil slick;
- Dispersants will be applied in such a way as to avoid, to the maximum extent practicable, the spraying of seabirds outside the oil slick being treated;
- During the actual dispersant application operations, the sea surface area designated for dispersant application should be assessed by trained wildlife observers in the spotter aircraft for the presence of marine birds and mammals to avoid inadvertent spraying.
- The effectiveness of the dispersant application should be monitored at a minimum by observers trained is dispersant use and if possible with the Special Monitoring of Applied Response Technologies (SMART) monitoring program.

Quick Guide to Forms, Worksheets and Checklists

The CDP is designed primarily to assist the FOSC in making a dispersant use decision at the time of an incident. Many forms, worksheets, and checklists are included as a part of the CDP to facilitate information gathering, decision-making and providing supporting documentation, as necessary. These worksheets and forms should assist the Unified Command in making a dispersant use decision, not hinder the process with unnecessary paperwork.

As a part of the dispersant pre-approval zone decision-making process, please use the quick guide to forms, worksheets and checklists outlined below.

1) Dispersant Assessment Worksheet Not Required by RRT

This document was designed to assist in the gathering and organization of pertinent information necessary to make a dispersant use decision.

2) Pre-Approval Zone Dispersant Use Checklist Required by RRT

This checklist was designed to provide an overview of the pre-approval decision-making process and to provide a "dispersant decision summary" for the Incident, detailing the decisions made. Once this form is completed and the FOSC decides to use dispersants, the checklist should be faxed to the RRT as soon as feasible.

3) Dispersant Request Record of Decision Required by RRT

This form was designed to provide a record of decision regarding the evaluation and request for dispersant use, consistent with the criteria provided in the "expedited dispersant use zone checklist." The record of decision is to be signed by all members of the Joint Unified Command and should be faxed with the dispersant use checklist to the RRT.

3) Checklist Documentation and Support Form Not Required by RRT
Boxes #1 - #12

This form was designed as a support tool to evaluate the information required in the pre- approval zone dispersant use checklist. This form guides the user through each decision- making point, allowing evaluation of each question that is a part of the dispersant use decision-making process. This form also cross-references the appendices, as needed, where additional information can be found.

DISPERSANT ASSESSMENT WORKSHEET

Information gathered to complete this form will facilitate the RRT dispersant use determination; complete as much as possible without inadvisably delaying RRT decision-making.

This report made by: ____________________ Organization: ________________ Date: __________ Time: __________
Phone: (   )____________Fax: (   )____________ Mobile: (   )________________ Pager: (   )__________________

On-Scene Commander: ____________________ Agency: ____
Phone: (   )____________ Fax: (   )____________ Mobile: (   )________________ Pager: (   )__________________

Caller: ______________________________ Organization: ________________ Date: __________ Time: __________
Phone: (   )____________ Fax: (   )____________ Mobile: (   )________________ Pager: (   )__________________
Street: ______________________________ City ____________________ State ______ Zip Code __________

OES Control # ______________________ **NRC #** ____________________

SPILL

Date of spill: ______________(month/day/year) Time of spill: ________________________(PST, 24-hr clock)
Location: Latitude: ____________________N Longitude: ____________________________________W

Spill source and cause: ____
____

Amount spilled: ____________(gal or bbl) Type of release: ❑ Instantaneous ❑ Continuous
Flow rate if continuous flow (estimate): __________
Oil name: ______________________________ API: ________ Pour point: __________ (ºC)

Information source: ____

ON-SCENE WEATHER, CURRENTS AND TIDES

(If not immediately available contact NOAA Scientific Support Coordinator (206-321-3320) or other resources noted in Appendix A).

Wind (from) direction: ________________ Next low tide: ______ (ft) at ______ (hrs)
Wind speed: ______________________ (knots) Next high tide: ______ (ft) at ______ (hrs)

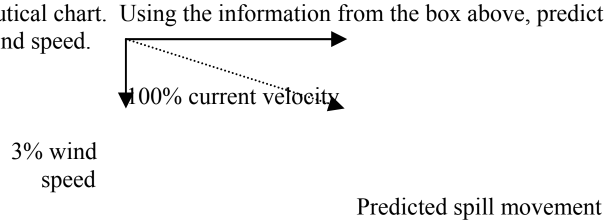
Current velocity: ________ (kts) Current (to) direction: ________ (°true/magnetic)
Predicted slick speed: ________ (kts) Predicted slick direction: ________(°true/magnetic)

Visibility: ____________ (nautical miles) Ceiling: ________ (feet) Sea state:________ (wave height in feet)

Information source:____

PREDICTING SPILL MOVEMENT

Plot spill movement on appropriate nautical chart. Using the information from the box above, predict slick direction and speed using 100% of current velocity and 3% of wind speed.



Estimated distance to shore/sensitive area: ________ (nm)
Estimated time to shore/sensitive area: ________ (hrs)

ESTIMATING OIL SPILL VOLUME

Extent of spill:

(a) Length of spill ______(nm) x Width of spill ______(nm) = Total spill area _________(nm^2)

(b) Estimate what proportion (%) of the total spill area is covered by oil: _______ (Express as decimal, % x 100)

(c) Estimate slick area: _______________ x _______________ = __________________
Total slick area (a) | % oil cover (b) | Estimated slick area

Estimated spill volume:

You can make this estimate using any of the following approaches:

- Get a thickness estimate from the ADIOS oil weathering model (call the NOAA SSC (**206-321-3320**) for assistance);
- Generate your own volume estimate of spilled oil and the area it covers (convert both volume and area to metric units and then divide the volume by the area to estimate the thickness. Use the unit conversions found in Appendix K). Convert thickness to millimeters to use Appendix D.1).
- Use your knowledge of the approximate number of barrels of oil or emulsion per acre of slick.

DISPERSANT SPRAY OPERATION

Dispersant spray contractor name: ________________________________
Dispersant name: ____________________ Quantity available: ________

Street: ________________________
City: ________________________
State: ________ Zip Code: ____________
Phone: ( ) ____________________

Platform: Aircraft type: ❑ Multi-engine ❑ Single-engine
Boat type: ____________________________
Other: ____________________________
Dispersant load capability (gal): ____________________

FOSC Complete:

"Window of opportunity" for getting dispersant on the oil (App. C 10): __________________ (hrs from first report of spill)

Number of daylight hours available for first day of dispersant application: ______________ (hrs from first report of spill)

Time to first drop on the oil: ____ (hrs from first report of spill)

Can dispersants to be effective after day one of the spill? YES / NO / Cannot determine at this time (circle one)

Note: It might be appropriate to conduct a small dispersant test before proceeding to a full application.

POTENTIAL BIOLOGICAL RESOURCE IMPACTS

Using the predictive spill and weather information from the boxes above, ADIOS, the NOAA SSC, other RRT trustee agencies, aerial wildlife observers and regional resource information noted in **Appendix B**, briefly describe potential coastal areas and resources that could be impacted form this spill.

When the spill is in a National Marine Sanctuary, Sanctuary representatives can assist with valuable resource information.

On-Water Resources:____
____
____
____
____
____

Shallow Subtidal Resources ____
____
____
____
____
____

Intertidal Resources:
____
____
____
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____
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____

Anadromous Resources:
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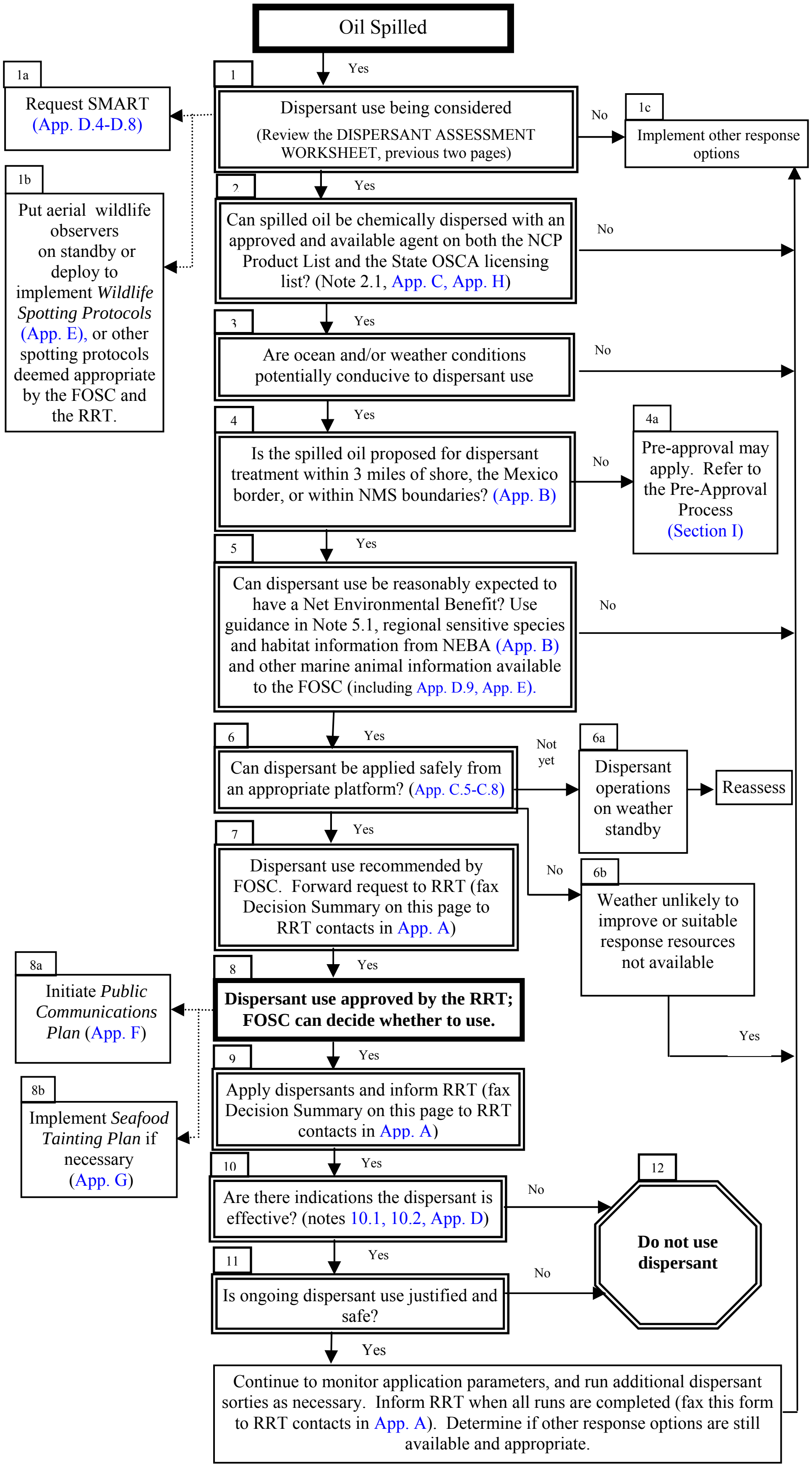
____
____

Significant Water Column Resources: ____
____
____
____
____

DISPERSANT USE CHECKLIST: RRT EXPEDITED APPROVAL REQUIRED ZONES



RRT Approval Zones

Dispersant Decision Summary

Spill location: ____________________

Decisions approved by: ________________

Box	Decision	Time:	Date:	Initials:
1	Yes/No	____	________	________
2	Yes/No	____	________	________
3	Yes/No	____	________	________
4	Yes/No	____	________	________
5	Yes/No	____	________	________
6	Yes/No	____	________	________
7	Yes/No	____	________	________
8	Yes/No	____	________	________
9	Yes/No	____	________	________
10	Yes/No	____	________	________
11	Yes/No	____	________	________
	Run 2	____	________	________
	Run 3	____	________	________
	Run 4	____	________	________
	Run 5	____	________	________
	Run 6	____	________	________
	All done	____	________	________
12	Do not use	____	________	________

Supplemental Decisions:

1a	Yes/No	____	________	________
1b	Yes/No	____	________	________
4a	Yes/No	____	________	________
6a	Yes/No	____	________	________
6b	Yes/No	____	________	________
8a	Yes/No	____	________	________
8b	Yes/No	____	________	________

Comments:

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....

The following boxes and checklists are to support decision-making. Complete as appropriate given time and information constraints. Do not allow completing each check-box to inadvisably delay an RRT decision.

BOX 1 **IS DISPERSANT USE BEING CONSIDERED?**

Dispersant use should be considered if:

- ❒ Oil is likely to significantly impact birds, marine mammals, or other flora and fauna at the water surface
- ❒ Natural dispersion is limited
- ❒ Other response techniques are unlikely to be adequate, effective, or economical
- ❒ The oil could emulsify and form mousse or tar balls
- ❒ Oil is likely to significantly impact shorelines, structures and facilities (*e.g*., marinas, wharves)
- ❒ Oil is likely to significantly impact economically important resources (*e.g*., shellfish beds, tourist beaches)
- ❒ Other ……………………………………………………………………………………………………

Decision: Consider dispersant use?

❒ Yes Make notifications in **Box 1a**
Make notifications in **Box 1b**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

From Cawthron, 2000.

Discussion Note 1.1 **KEY BENEFITS OF DISPERSANT USE**

- Dispersant use minimizes the effects of an oil spill principally by dispersing oil before it reaches shorelines or sensitive areas (*e.g*.,wetlands, estuaries).
- Removing oil from the surface of the water reduces the potential for impacts to birds and marine mammals, and limits the action of wind on spill movement.
- Dispersants can prevent oil from sticking to solid surfaces, and enhance natural degradation.
- Dispersants can effectively treat large spills more quickly and inexpensively than most other response methods.
- Dispersants can be effective in rough water and strong currents where mechanical responses are limited.
- Effective dispersant responses can greatly reduce the quantity of oil requiring recovery and disposal.
- Dispersant use is often the only feasible response to spills that exceed mechanical response capabilities.
- Dispersant use does not generally limit other options, except oleophilic mechanical responses.
- Dispersed oil that cannot be mechanically recovered generally poses few significant environmental problems.

From Cawthron, 2000

BOX 1a **REQUEST SMART**

Immediately deploy USCG Strike Team SMART to the spill site if dispersant use is likely. Every attempt should be made by the FOSC and the Strike Team to implement the on-water component of the SMART monitoring protocols in every dispersant application. **Dispersant application should <u>not</u> be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of monitoring equipment and personnel.** However, at a minimum, Tier 1 (visual) monitoring should occur by trained observers during any dispersant operations approved in accordance with the California Dispersant Plan. Tier 2 (on-site water column monitoring) and Tier 3 (fate and transport of the dispersed oil) SMART monitoring will be deployed as appropriate. Other information on monitoring dispersant effectiveness, including additional SMART background information, tools and report forms, is presented in **Appendices D-4 – D.8**.

Decision: Deploy SMART?

❒ Yes Use contact information in **Appendix A**. Go to **Box 1b**. **Estimated arrival time**: ____________
❒ No Note reason why not deployed. ……………………………………………………………...……………
Go to **Box 1b** or **Box 1c** as appropriate.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 1b **PLACE AERIAL WILDLIFE OBSERVERS ON STANDBY OR DEPLOY THEM TO IMPLEMENT THE *WILDLIFE SPOTTING PROTOCOLS***

Consider deploying trained wildlife spotters in initial spill overflight aircraft so that they can determine if the presence of marine animals in the spill or dispersant application zones could influence spray pattern decisions by the FOSC. The goal is to minimize over-spray onto unaffected animals. Wildlife spotters should use the forms and procedures given in the *Wildlife Spotting Protocols* (**Appendix E** and **Appendix D.9**). The FOSC will decide how subsequent and systematic wildlife spotting efforts can be safely conducted with the aerial resources available.

Decision: Notify/deploy aerial wildlife spotters?

❒ Yes Use wildlife spotter contact information in **Appendix E**. Go to **Box 2**.
❒ No Note reason why wildlife spotters not deployed ……………………………
…………………………………………………………………………………

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Reconsider under **Box 8**.

BOX 1c **IMPLEMENT OTHER RESPONSE OPTIONS**

Consider all response options to identify which option, or combination of options, is most appropriate. The following options are described in the Area Contingency Plan (Section 1640) and the Regional Contingency Plan (Section 1007.05).

❒ No action other than monitoring
❒ Containment and recovery of oil at sea
❒ Clean-up of oil from shorelines
❒ *In situ* burning

From Cawthron, 2000

BOX 2 **CAN SPILLED OIL BE CHEMICALLY DISPERSED WITH AN APPROVED AND AVAILABLE AGENT ON BOTH THE NCP PRODUCT LIST AND THE STATE OSCA LICENSING LIST?**

A NCP Product List may be found in **Appendix H**. Updated NCP Product Lists can be accessed via the EPA representative on the RRT (**Appendix A**), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) OR ACCESSING THE Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

The State OSCA licensed dispersants may also be found in **Appendix H** , by calling the State OSPR representative on the RRT (**Appendix A**) or) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

Decision: Can this oil be dispersed with an approved and available agent?

❒ Yes Go to **Box 3.**
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Taken in part from Cawthron,

Discussion Note 2.1 **OIL DISPERSIBILITY (Also see App. C.10 for Window of Opportunity)**

Three types of oils are typical of those produced or transported in California offshore waters: a) crude oils produced in California Outer Continental Shelf waters; b) oils imported from Alaska and foreign countries into California ports; and c) fuel oils that could be spilled from a variety of marine industrial activities (*e.g.*, fuel tanks from ships, cargoes of small tankers). Dispersants only work if the spilled oil has a relatively low viscosity at the time of treatment.

Appendices C.1 and C.2 show the California platform-produced oils and tankered oils, respectively.

Most oils produced from offshore platforms are heavy, and border on the range of oils that are considered to be difficult or impossible to disperse. The oils transported by tanker (1999-2001 data) include two-three dozen different types of oil (only the most common are listed in Appendix C.2). The most important is Alaska North Slope crude, which represents 50% of each annual total. Based on API gravity information, these oils appear to be dispersible when fresh.

- The most important criterion for dispersant use is whether the oil is dispersible.
- The best indication of oil dispersiblity is from specific oil weathering and dispersion data from field trials.
- Potential dispersibility can be *estimated* from physical properties of oils, under different oil weathering and spill scenarios (*e.g.*, ADIOS, Table 2.1 below). The ADIOS computer database predicts oil dispersion based on physical and chemical properties of spilled oil under specified spill conditions.
- Dispersant use should not be rejected exclusively on the basis of predictive models

Generally, if:

- Oil is able to spread on the water, it is likely to be dispersible.
- Viscosity is 2000 cSt, dispersion is probable.
- Viscosity is >2000 cSt, dispersion is possible.
- Viscosity is >5000 cSt, dispersion is possible with concentrated dispersant (*e.g.*, Corexit 9500).
- Sea temperature is >10º C below oil pour point, dispersion is unlikely.

Potential dispersion may also be assessed using tables in Appendix C.

Limitations of predicting dispersion:

- Using generic values of viscosity and/or pour point to predict dispersion (*e.g.*, ADIOS, Appendix tables C.3 and C.4) can underestimate the potential for oil to be dispersed.
- Most models are based on limited oil weathering, emulsification or dispersion data, therefore estimated windows of opportunity may be inaccurate.

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Table 2.1 **ADIOS (AUTOMATED DATA INQUIRY FOR OIL SPILLS) COMPUTER DATABASE**

Use the **DISPERSANT ASSESSMENT WORKSHEET** and the NOAA SSC (206-321-3320) for the information needed by ADIOS, or use the form below. The NOAA SSC should also be able to assist with ADIOS.

Copies of ADIOS are available from the NOAA website: http://response.restoration.noaa.gov/software/adios/adios.html

Oil/product name: ____________ Wind speed: ____________ (knots)
Amount spilled: ____________ (gal or bbl) Wave height: ____________ (m)
Type of release: Circle one Water temp.: ____________ (ºC)
❑ Instantaneous Water salinity: ____________ (ppt)
❑ Continuous

Important limitations on the use of ADIOS: ADIOS predicts dispersibility based on estimates of oil properties (including emulsification) under different conditions. As emulsification data are scarce, **predicted rates of dispersion may be different than actual rates of dispersion**. ADIOS is intended for use with floating oils only, and does not account for currents, beaching, or containment of oil. ADIOS is unreliable for very large or very small spills. It is also unreliable when using very high or very low wind speeds in modeling the spill.

BOX 3 **ARE OCEANOGRAPHIC AND/OR WEATHER CONDITIONS POTENTIALLY CONDUCIVE TO DISPERSANT USE?**

Does the available technical information indicate that the existing oceanographic (*e.g*., surface current direction and speed, wave and chop height) and weather (*e.g*., wind direction and speed, visibility, ceiling height) conditions are suitable for a successful dispersant application?

Use the following resources:

- ❒ Information on the DISPERSANT ASSESSMENT WORKSHEET
- ❒ Consultation with the NOAA Scientific Support Coordinator (206-321-3320)
- ❒ Information resources and web sites noted in **Appendix A**
- ❒ Information from aerial overflights
- ❒ Information from ADIOS

Decision: Are ocean and weather conditions suitable for a dispersants application?

❒ Yes Go to **Box 4**.
❒ No Go to **Box 1c**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 4 **IS THE SPILLED OIL WITHIN 3 MILES FROM SHORE, A FEDERAL BOUNDARY OR WITHIN NMS BOUNDARIES?**

A full-page statewide nautical chart indicating the area three nautical miles from shore and the areas within National Marine Sanctuaries (Gulf of the Farallones, Cordell Banks, Monterey, Channel Islands) is in Chart 4.1 below. Regional charts, with dispersant approval zones noted, are in Appendix B.

Plot the position of the spill on the appropriate nautical chart, draw a circle around the spill source with a 10 nautical mile radius as a worst-case scenario for surface movement. Hash mark any area within the circle that is in waters 3 nautical miles from shore or within a National Marine Sanctuary. This is considered the dispersant operational area.

Decision: Is the spilled oil within an RRT Expedited Approval Required zone?

❒ Yes Go to **Box 5**.
❒ No Pre-Approval may apply. Go to **Box 4a**.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

BOX 4a **PRE-APPROVAL MAY APPLY; REFER TO THE PRE-APPROVAL PROCESS.**

The request for dispersant use may not require a case-by-case RRT approval and may fall within the parameters of the pre-approval guidelines for the use of dispersants in RRT Regional IX. Review the Pre-Approval Guidelines and begin the pre-approval process if appropriate (see Section I).

NEW CHART FOR RRT EXPEDITED APPROVAL ZONES IS BEING DEVELOPED

BOX 5 **CAN DISPERSANT BE REASONABLY EXPECTED TO HAVE A NET ENVIRONMENTAL BENEFIT?**

Use the regional sensitive species and habitat information from the Net Environmental Benefit Analyses for each major coastal area in which dispersant use may have an impact.

Consider:

❒ The type and value of habitat potentially affected.
❒ The sensitivity of affected resources to oil, and to different oil response strategies.
❒ Natural recovery rates of affected species and habitats.
❒ Likely oil persistence and degradation rates with and without dispersant use.
❒ Potential oil toxicity on surface water species compared to water column and/or seafloor species.

Dispersant use is generally not appropriate in areas with limited water circulation and flushing, near aquaculture facilities, shellfish beds and fish-spawning grounds, and around seawater intakes.

Decision: Will the dispersant use have a net environmental benefit?

❒ Yes Go to **Box 6**.
❒ No Go to **Box 1c**.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Discussion Note 5.1 **ASSESSING NET ENVIRONMENTAL BENEFIT**

The most important question to answer is: **Will dispersant use significantly reduce the impact of the spilled oil**?

- Rapid decisions on use are essential as dispersant must be applied quickly to be effective.
- Decision-makers must consider the various environmental, social, economic, political and cultural factors unique to each spill.
- Tradeoffs will be necessary, as no response is likely to satisfy all parties and protect all resources. The ecological impacts of oil are generally longer-lasting and more persistent than most other impacts.
- Ecological effects will be due primarily to the spilled oil. Dispersant applied at recommended rates is unlikely to cause significant adverse effects, even in multiple applications.
- Oil dispersed into greater than 10m or water will quickly dilute to levels where acute toxic effects are unlikely.
- Few acute toxic effects have been reported for crude oil dispersed into less than 10m of well-flushed water.
- Small spills of light fuels seldom require dispersant use.

BOX 6 **CAN DISPERSANT BE APPLIED SAFELY FROM AN APPROPRIATE PLATFORM?**

Use the information in the **DISPERSANT ASSESSMENT WORKSHEET** to evaluate which application platform(s) will be most effective, given the following particular considerations:

- The amount of oil spilled;
- The location of the operational area;
- The volume of available dispersants;
- The timeframe in which the required equipment can be on-scene.

Assume for planning purposes that the weather information on the **DISPERSANT ASSESSMENT WORKSHEET** will remain the same during the timeframe in which this decision is operating. At the earliest opportunity, contact the NOAA SSC (206-321-3320) for more detailed and updated weather information, but do not delay this decision process for the NOAA SSC weather input. Weather information may also be available from resources noted in **Appendix A.** See **Appendix C** for specific information on dispersant application platforms.

Decision: Is there an appropriate application platform for a dispersant operation?

	Yes	(Type)	No
C-130/ADDS Pack	☐		☐
DC-4	☐		☐
Other large multi-engine airplane	☐	……………………	☐
Cessna AT-802	☐		☐
Other single-engine airplane	☐	…………………	☐
Helicopter	☐	…………………	☐
Work boat	☐	…………………	☐
	Go to **Box 7**		Go to **Box 6a**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

Taken in part from Cawthron, 2000 and S.L. Ross, 2002

Discussion Note 6.1 **CURRENT LOGISTICS FOR A CALIFORNIA DISPERSANTS APPLICATION**

Use the information on the **DISPERSANT ASSESSMENT WORKSHEET** to consider the following:

- ☐ Is the selected dispersant available in the quantity needed?
- ☐ Can the estimated "window of opportunity" for getting the dispersant on the oil be met?
- ☐ Can the dispersant and application resources get to the spill scene on time?
- ☐ Will there be enough daylight hours for an effective dispersant application?

Refer to **Appendix C** for more specific regional dispersant resource information.

Discussion Note 6.2 **GENERAL SAFETY ISSUES**

- The FOSC is responsible for ensuring that health and safety requirements are adequately addressed during a response.
- Individuals should not engage in activities that they are not appropriately trained to perform.
- Individuals are expected to adhere to safety procedures appropriate to the conditions they are working under and/or are included in a dispersant-specific Site Safety Plan Annex.
- Vessel/aircraft operators are expected to define appropriate operational limits and safety and maintenance requirements for their craft.
- Vessels and response resources should be properly maintained and undergo proper decontamination procedures.
- Apply dispersants only if there is no significant risk to response personnel (*e.g.*, ignition risk, operational hazards).
- Ensure the appropriate personal protective equipment (PPE) is available.
- Ensure that application aircraft and vessels remain within standard operating limits.
- Each person involved in a response is required to take personal responsibility for his or her safety. The FOSC may appoint a Safety Officer and request development of a specific Site Safety Plan Annex. Key safety aspects to be considered in the plan may include:

  - Physical hazards (e.g., waves, tides, unstable or slippery surfaces)
  - Heavy machinery and equipment
  - Chemical hazards (e.*g*., oil and dispersant exposure)
  - Atmospheric hazards (*e.g*., fumes, ignition risks)
  - Confined spaces\PPE
  - Nose
  - Fatigue
  - Heat/cold stress
  - Wildlife (bites/stings)
  - Cleanup facilities
  - Medical treatment

HUMAN SAFETY OVERRIDES ALL OTHER CONSIDERATIONS DURING A RESPONSE

From Cawthron, 2000

BOX 6a **DISPERSANT OPERATIONS ON WEATHER STANDBY**

Consult with appropriate RRT IX members (USCG/District 11 Co-Chair, EPA, DOI, DOC and OSPR (See **Appendix A** for contact information) to notify them that dispersants are being considered, but delayed due to weather.

Decision: Has the weather improved to the point where dispersants can be applied?

		Date	Time
❒ Yes	Go to **Box 7**	……….	……….
❒ No	Continue to **reassess** (until/unless time window for successful application closed) <u>or</u> Go to **Box 6b**	……….	……….

BOX 6b **WEATHER UNLIKELY TO IMPROVE OR SUITABLE RESPONSE RESOURCES NOT AVAILABLE**

There will be spill situations where dispersant use may be appropriate but weather conditions and available resources will not allow dispersants to get on the oil within the appropriate weather window. In these cases, dispersant use will need to be abandoned and other response options considered instead.

	Date	Time
Go to **Box1c**	……….	……….

BOX 7 DISPERSANT USE RECOMMENDATION FORWARDED BY THE FOSC TO THE RRT FOR REVIEW AND APPROVAL

Once the FOSC has completed as much as possible of the DISPERSANT ASSESSMENT WORKSHEET and the DISPERSANT USE CHECKLIST and completed the dispersant decision summary, the FOSC will forward a request, along with any other requested data, to the RRT via a phone conference. Based on the information provided, the RRT will provide an approval/disapproval decision for dispersant use within 2 hours of the request.

A dispersant use approval will be made with the concurrence of the U.S. Environmental Protection Agency and the U.S. Coast Guard representatives to the RRT and the State of California, and in consultation with the U.S. Department of Commerce and U.S. Department of the Interior natural resource trustees.

BOX 8 DISPERSANT USE APPROVED BY THE RRT

DISPERSANTS APPROVED FOR USE BY THE FOSC NEED TO BE APPLIED USING THESE RRT IX GUIDELINES AS WELL AS ANY CASE-SPECIFIC GUIDELINES ISSUED BY THE RRT AS PART OF THE APPROVAL:

- ❒ The SMART controller/observer should be over the spray site before the start of the operation. If possible, a DOI/DOC-approved marine mammal/turtle and pelagic/migratory birds observation specialist will accompany the SMART observer, but in any event, operations will not be delayed for these individuals.
- ❑ Dispersants cannot be applied to any diesel spill in the San Diego Area Contingency Plan area.
- ❒ Personnel protective equipment for personnel on-site will conform to the appropriate dispersant's Material Safety Data Sheet (MSDS).
- ❒ Dispersant application aircraft will maintain a minimum 1000-foot horizontal separation from rafting flocks of birds. Caution will be taken to avoid spraying over marine mammals and marine turtles (see Appendix A for resource agency contact information).
- ❒ If the dispersant application platform is a boat:
  - The following ASTM standards apply to systems involving spray arms or booms that extend over the edge of the boat and have fan-type nozzles that spray dispersant in a fixed pattern:
    - ASTM F 1413-92: Standard Guide for Oil Spill Dispersant Application Equipment: Boom and Nozzle Systems
    - ASTM F-1460-93: Standard Practice for Calibrating Oil Spill Dispersant Application Equipment Boom and Nozzle Systems
    - ASTM F 1737-96: Standard Guide for use of Oil Spill Dispersant Application Equipment During Spill Response: Boom and Nozzle Systems.
  - Boat-based systems using a fire monitor and/or fire nozzle shall avoid a straight and narrow "firestream" flow of dispersant directly into the oil. There are no applicable ASTM standards for these systems at this time (December 2003).

BOX 8a **INITIATE *PUBLIC COMMUNICATIONS PLAN***

Once a decision to use dispersants is made, it is critical that a public communications plans be implemented (**Appendix F**). The general public as well as stakeholders must be made aware of the decisions to utilize dispersants and a mechanism must be put into to for reliable and continuous updates (**Appendix F.3**).

An initial press conference should be held which outlines the decision to utilize dispersants, provides background and scientific information as well as any environmental and safety considerations. Press packet information can be found in **Appendix F.1**.

A town hall meeting should be scheduled as soon as to provide a mechanism for sharing of information as well as addressing public concerns and fears. **Appendix F.2** provides guidelines for preparation of a town hall meeting. Areas that must be adequately addressed include the following;

- Seafood tainting concerns posed by the use is dispersants (**Appendix G**).
- Risk communication (**Appendix F.2**)
- Net environmental benefit analysis conducted and species of special concern.
- Monitoring policies established for the spill.

BOX 8b **CONSULT SEAFOOD TAINTING PLAN**

- Refer to **Appendix G** for key points to consider regarding Seafood tainting, as well as information on accessing NOAA and State of California resources for assessing the tainting risk

BOX 9 **APPLY DISPERSANTS AND INFORM RRT**

❒ Using the information on <u>estimated oil spill volume</u> from the **DISPERSANT ASSESSMENT WORKSHEET** and Discussion Note 9.1 below to:

- Determine the dispersant application ratio (usually 1:20), and
- Calculate the volume of dispersant required (**Appendix D.1**).

❒ Record the details on the Dispersant Application Summary Form (**Appendix D.2**);
❒ Mobilize application team;
❒ If not already done, mobilize SMART. Some blank SMART forms are included in **Appendix D** for use by other trained professionals, if appropriate and when approved by the FOSC.
❒ Inform RRT (see **Appendix A** for contact information).

Decision: Dispersants applied?

❒ Yes Go to **Box 10**.
❒ No Explain.

Make a note of the decision on Dispersant Use Checklist (Page II-10)

In part from Cawthron, 2000

Discussion Note 9.1 **GENERAL APPLICATION INFORMATION**

- The FOSC has final responsibility for operational aspects of dispersant applications.
- Dispersant must only be applied by experienced spray applicators.
- Dispersant must be applied in accordance with manufacturer instructions, unless approved otherwise by the FOSC.
- The persons applying dispersant are responsible for the calibration and operation of the spraying system, and the safety and maintenance of the application platform.
- Droplet size is the key variable influencing dispersant effectiveness. Undersized droplets (*e.g*., fog or mist) will be lost through drift and evaporation. Oversized droplets will punch through the oil and be lost in the water column.
- Dispersants pre-diluted in water are less effective than undiluted dispersant.
- Only undiluted concentrate dispersant is applied from aircraft. Dispersant should, where possible, be applied into the wind and parallel with the slick.
- Dispersant should be applied in a methodical and continuous manner to ensure the entire target area is treated.
- Spraying effort should concentrate on the thickest sections, and/or the leading edges, of oil that threaten sensitive areas.
- Thick portions of the slick may require several applications.
- Oil sheen (oil less than approximately .001 inch or .02 mm thick) should not be sprayed with dispersant.

Regarding the relationship between Dispersant-to-Oil Ratio (DOR) and the concentration of oil being treated:

- Regardless of DOR ratios suggested by dispersant manufacturers, there are may factors that influence dispersibility (*e.g*., oil characteristics, degree of weathering, water salinity, sea state) that may make it very difficult for any "user" to select an appropriate DOR for the conditions faced on the day of a specific spill
- he variability of slick thickness (or oil concentration) is such that one can never really characterize the actual oil concentration for more than a few seconds within the speed and swath constraints of a particular application system.
- With most application systems, one is usually overdosing and underdosing as the system moves through light, heavy and sometimes "no" oil on the water surface.
- The best estimate of the average oil thickness (or average volume of oil per unit are) must be used.
- Crude oil that is dark in color and thick enough to merit any response is generally between .001 inch (.017 mm) thick and .01 inch (0.25 mm). Crude oil emulsion begins to form at .01 inch (0.25 mm), and tar balls at .1 inch (2 mm). See Appendix D.1 for more information.
- Given that precise spray parameters are extremely difficult to achieve, dispersant applicators generally use about 5 gallons of dispersant per acre on their first run. This is a "middle-of-the-road" concentration in most situations of 2 to 3 barrels of oil per acre (or ~ 100 gallons per acre) following the initial rapid spreading phase. With a common accepted DOR of 1:20, the recommended dosage would be 1/20 x 100, or 5 gallons of dispersant per acre.
- Area, volume and thickness can be related with the following expression:

10^4 x Area (hectare) x Thickness (mm) = Volume (liters)

or

Volume (liters/Area (hectares) = 10^4 x Thickness (mm)

►To convert liters/hectare to gallons/acre, multiply by 0.107
►To convert liters/hectare to gallons/square kilometer, multiply by 26.42

►These values (in any units) multiplied by the DOR (as a fraction, e.g., 1:5 = 1/5 or .2) will then yield the Desired Dosage (in those units) for that value of DOR.

- Refer to **Appendix D.1** for some pre-calculated values.

From Cawthron, 2000 and Al Allen (Spilltec), 2003 personal communication

Discussion Note 9.2 **AERIAL APPLICATION**

This general aerial application guide is intended simply to highlight key issues. The FOSC will coordinate and oversee operational aspects of aerial dispersant applications.

- Aircraft applications should always include pump driven spray units.
- Dispersant droplet size should be between 400 and 1000 microns.
- Commercial aircraft spray nozzles generally range between 350 and 700 microns.
- 1000 micron spray nozzles may be needed for use on viscous oils.
- Nozzles should achieve an application rate of between 5.3 gallons per acre (1:20 ratio)
- Spray nozzles should be installed to discharge directly aft.
- Underslung buckets on helicopters should be mounted so the pilot can see the ends of the spray booms in flight.
- The altitude of the aircraft should be as low as possible.

From Cawthron, 2000

Discussion Note 9.3 **BOAT APPLICATION**

- Spray booms should be mounted as far forward as possible t prevent oil being moved aside by the bow wave before being sprayed. This then utilizes the mixing energy of the bow wave to break up the oil.
- Spraying systems should be set so that the spray pattern is flat, striking the water in a line perpendicular to the direction of the boat's travel.
- The fan-shaped sprays from adjacent nozzles should be set as low as possible, overlapping just above the oil/water surface, with the inboard spray striking the hull just above the waterline.

Undiluted dispersants

- Air blast sprayers and modified spray pumps can be used to apply undiluted concentrated dispersants and conventional dispersants.
- Treatment rate is usually constant and determined by nozzle size and spray pressure.
- Calibration and use of an appropriate droplet size is critical toe effective applications.

Pre-diluted dispersants

- Concentrated dispersants can be applied after pre-dilution in seawater, but will be less effective.
- The dispersant : water ratio should be equal to, or greater than, 10%
- Applications through ship's fire-fighting equipment are controlled by opening or closing the dispersant supply. Vessel speed is used to control the treatment rate.
- Dual pump systems for dispersant and seawater supplying spray booms allow the dilution rate to be adjusted.
- Boat speed is the main determinant of dispersant dose rate (reduce boat speed to increase the dose rate).
- Boat speed should be in the order of 5 knots for fresh spills of liquid crude or fuel oil, which assumes that the oil has spread to 0.1 mm thick.
- With reduced boat speeds, the required application rate per acre or km^2 can be maintained by reducing pump speed.

From Cawthron, 2000

BOX 10 ARE THERE INDICTIONS THE DISPERSANT IS EFFECTIVE?

- ❑ Acquire information from dispersant monitoring team (SMART team or other FOSC-designated monitors).
- ❑ Review dispersant monitoring results after each dispersant application.
- ❑ Determine if dispersant application is effective.
- ❑ Determine if chemical dispersion is significantly greater than natural dispersion.
- ❑ Assess whether changing application parameters could make the application more effective.

Decision: Is the dispersant effective?

- ❑ Yes Go to **Box 11**
- ❑ No See Discussion Note 10.2 and return to **Box 9**, or Go to **Box 12**

Make a note of the decision on Dispersant Use Checklist (Page II-10)

From Cawthron, 2000

Discussion Note 10.1 ASSESSING DISPERANT EFFECTIVENESS

- Dispersant applications must be monitored to confirm whether or not dispersant use is effective, and to determine the fate and transport of treated oil.
- Dispersant applications should not be delayed simply because monitoring is not in place.
- Visual observation is the minimum level of monitoring. Observations teams may use the forms in **Appendix D**.
- There will be very few instances where a dispersant application is possible but visual monitoring is not.
- Because dispersed oil plumes are often highly irregular in shape and thickness, it can be difficult to accurately estimate dispersant efficiency.
- The appropriate dispersant application dose depends on the oil thickness (see **Appendix D.1** for common dose rates based on oil thickness). Slicks are generally not of uniform thickness, and it is not always possible to distinguish among thicker and thinner portions of the same slick. It is therefore possible to apply too much or too little dispersant to some parts of a slick. Because over- and under-dosing can lead to variations in effectiveness, these variations should be noted.
- On-site monitoring of oil dispersed in the water column should support visual monitoring whenever possible. See **Appendix D** for additional information and forms.
- Decisions to terminate operations due to poor effectiveness should ideally be based on on-site monitoring results.
- A visible coffee-colored cloud in the water column indicates the dispersant is working.
- A milky-white plume in the water column can indicate excessive dispersant application.
- When dispersant is working, oil remaining on the water surface may also change color.
- A difference in the appearance of treated and untreated slicks indicates dispersion is likely.
- Absence of a visible cloud in the water column makes it difficult to determine whether the dispersant is working. When the water is turbid, you may not be able to see a plume. Oil remaining at the surface and sheens can also obscure an ability to see oil dispersing under the slick.
- Successful dispersion can occur with no visible indication of dispersion.
- A subsurface plume may not form instantly once dispersant has been applied. In some cases (*e.g.*, emulsified oil) it can take several hours for a plume to form. In other cases, a visible plume may not form, and you may wish to use sampling to learn whether dispersion has occurred.
- Boat wakes may physically part oil, falsely indicating successful dispersion. Mechanically dispersed oil will re-coalesce and float to the surface.
- Dispersants sometimes have a herding effect on oil after initial applications, making a slick appear to be shrinking when, in fact, the dispersant is “pushing” the oil together. The effect results from the surfactants in the dispersant, which causes a horizontal spreading of thin oil films. This can cause parts of a slick to seem to disappear from the sea surface for a short time.

From Cawthron 2000 and NOAA Oil Spill Job Aids

Discussion Note 10.2 **WHEN DISPERSANT IS NOT EFFECTIVE**

If monitoring shows dispersion does not appear effective, review all aspects of the application and monitoring for possible reasons why. Aspects to consider include:

- Dispersant formulation
- Application rations (increase or decrease oil: dispersant ratio)
- Application methods
- Monitoring methods
- Interpretation of monitoring results
- Oil weathering
- Weather conditions

From Cawthron, 2000

BOX 11 **IS ONGOING DISPERSANT USE JUSTIFIED AND SAFE?**

All of the following must apply to justify ongoing dispersant use:

- ❑ The spill can be chemically dispersed with an approved and available agent (see **Box 2** and **Appendix H**);
- ❑ Oceanographic and weather conditions are potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The dispersant will have a net environmental benefit (see **Box 5**);
- ❑ The dispersant can be applied safely (see **Box 6**), with suitable weather (**Box 6a**) and available resources (**Box 6b**);
- ❑ The dispersant is effective (see **Box 10**).

Decision: Continue with dispersant use?

- ❑ Yes Go to **Box 9**
- ❑ No Go to Box 12

There will be a point when dispersants are no longer effective.

BOX 12 **DO NOT USE DISPERSANT**

Dispersants should not be used if **any** of the following apply:

- ❑ The spill cannot be chemically dispersed with an approved and available agent (see **Box 2** and);
- ❑ Oceanographic and weather conditions are not potentially conducive to dispersant use (see **Box 3** and DISPERSANT ASSESSMENT WORKSHEET);
- ❑ The dispersant will not have a net environmental benefit (see **Box 5**);
- ❑ The dispersant cannot be applied safely (see **Box 6**), with suitable weather (**Box 6a**) or available resources (**Box 6b**);
- ❑ The dispersant is not significantly more effective than natural dispersion or other response options (see **Box 10**).

IF DISPERSANT USE IS CONSIDERED INAPPROPRATE, CONSIDER OTHER RESPONSE OPTIONS.

DISPERSANT EXPEDITED APPROVAL REQUEST
RECORD OF DECISION

Subpart J of the National Contingency Plan (NCP) provides that the FOSC, with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule. The EPA has been delegated authority to maintain a schedule of chemical countermeasures that may be authorized for oil discharges in accordance with procedures set forth in Section 300.900 of the NCP.

The Region IX, Regional Response Team has established dispersant expedited approval zones within waters of the State, any waters within a marine sanctuary waters and all waters within three miles of landfall. Any dispersant use within these zones requires that the designated Federal On-Scene Coordinator request approval by the RRT. For purposes of this record of decision, the designated FOSC has completed the “Expedited Dispersant Use Checklist” and has determined that the oil spill, *Name of Oil Spill Incident*, meets the criteria outlined within the checklist and formally requests a dispersant use decision from the RRT.

________________ ________________

Federal On-Scene Coordinator — Date
United States Coast Guard

California statute requires that emergency response operations utilize the Incident Command System. For marine oil spill response, a joint Unified Command Structure is implemented consisting of the Federal On-Scene Coordinator, the State On-Scene Coordinator and the Response Party and outlined in the Memorandum of Understanding between the United States Coast Guard and the California Department of Fish and Game, Office of Spill Prevention and Response. For purposes of this record of decision, request for the use of dispersants is formally requested by FOSC and the dispersant use checklist was completed within a Unified Command Structure and agreed upon by the State On-Scene Coordinator and the representative of the Responsible Party.

____________________________ ______________________________

State On-Scene Coordinator — Responsible Party Representative
Office of Spill Prevention and Response
State of California

________________ ________________

Date — Date

REFERENCES CITED

Etkin, Dagmar Schmidt. 1999. Oil Spill Dispersants: From Technology to Policy. Cutter Information Corp, Arlington, MA.

ExxonMobil Dispersant Guidelines. 2000. ExxonMobil Research and Engineering Company.

Mearns, A.J. & R.Yender, 1997. A summary of a NOAA workshop on management of seafood issues during an oil spill response. Proc. Arctic and Marine Oil Spill Program Technical Seminar. Environment Canada, Vancouver, pp. 203-214.

Reilly, T.I. and R.K York. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9.107pp.

Ross, S.L. 2002. Assessment of the Use of Dispersants on Oil Spills in California Marine Waters. S.L. Ross Environmental Research, Ltd. for Minerals Management Service, Herndon, VA.

State of California, Office of Emergency Services. 2001. Risk communication Guide for State and Local Agencies. 17pp.

Stevens, Leigh. 2000. Oil Spill Dispersants: Guidelines for use in New Zealand. Prepared for Maritime Safety Authority of New Zealand.

Wildlife Response Plan Appendices of the California Area Contingency Plan. Version 2, October 2003.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

Resources from Internet World Wide Web sites:

NOAA Oil Spill Job Aids (web links of 12/18/03)	http://response.restoration.noaa.gov/job_aid/glossary.html http://resposne.restoration.noaa.gov/oilaids/spiltool http://response.restoration.noaa.gov/disp_aid/remember.html http://response.restoration.noaa.gov/disp_aid/checklist.html http://response.restoration.noaa.gov/oilaids/OilatSea.pdf http://response.restoration.noaa.gov//oilaids/SMART/SMART.html

APPENDIX A

CONTACT NUMBERS AND RELEVANT WEB SITES

A.1 Agencies and Institutions

	Web Address	Phone
To Report Marine Pollution/Spills		800-424-8802
California Office of Emergency Services		800-852-7550
U.S. Coast Guard		
Marine Safety Offices		
San Francisco	http://homeport.uscg.mil/sanfrancisco	510-437-2956
Los Angeles-Long Beach	http://homeport.uscg.mil/lalb	310-732-2000
San Diego	http://homeport.uscg.mil/sandiego	619-683-6500
Weather and surf		619-289-1212
National Oceanic and Atmospheric Administration & NOAA National Weather Service		
Scientific Support Coordinator for California (Jordan Stout)		206-321-3320
Pager		800-759-8888 pin 5798818
Mobile		206-321-3320
Ocean Prediction Center	http://www.opc.ncep.noaa.gov or http://tidesandcurrents.noaa.gov/	
Tide Predictions and Coastal Water Temperature Guide	http://tidesandcurrents.noaa.gov/	
Nautical Charts	http://www.nauticalcharts.noaa.gov	
Physical, Chemical and Geological Ocean Data	http://www.ngdc.noaa.gov or http://www.ncddc.noaa.gov	
NOAA Trajectories, ESI maps, Job aids, etc.	http://response.restoration.noaa.gov	
National Weather Service – Local Offices and Forecasts		
Eureka	http://www.wrh.noaa.gov/eka/	707-443-6484
SF/Monterey	http://www.wrh.noaa.gov/mtr	831-656-1725
Oxnard/Los Angeles	http://www.nwsla.noaa.gov/buoy.html	805-988-6610
San Diego	http://www.wrh.noaa.gov/sgx	858-675-8700

APPENDIX A, continued

	Web Address	Phone
Other Measured Currents and Wind Data Sources		
UC San Diego	http://sdcoos.org/index.php	
Scripps	http://facs.scripps.edu/surf/weatherbody.html	
Regional Response Team (Region 9)	http://www.rrt9.nrt.org/ (tentatively will change in 2009)	
Coast Guard:	http://www.uscg.mil/D11/	
Command Center		510-437-3700
Captain Douglas Kaup: (RRT 9 Co-Chair)		510-437-5754
Susan Krala: Coast Guard RRT Coordinator		
Environmental Protection Agency:		
Daniel Meer (RRT 9 Co-Chair)		415-972-3132
Kay Lawrence (EPA alternate)		
Bill Robberson (EPA RRT Coordinator)		415-972-3072
Pager		800-759-8888 pin 2832870
Department of Interior:	http://www.doi.gov/	
Patricia Port (DOI representative)		510-817-1476
John Perez (alternate)		510-817-1477
Department of Commerce:	http://response.restoration.noaa.gov/	
Jordan Stout (primary representative)		206-321-3320
Doug Helton (alternate)		206-890-7760
State Office of Spill Prevention and Response	http://www.dfg.ca.gov/ospr/	
Yvonne Addassi (primary representative – Marine)		916-324-7626
Office		916-864-4906
Mobile		916-956-1162
National Marine Sanctuaries		
Channel Islands	http://channelislands.noaa.gov/	
24-hour pager		877-982-2617
Sanctuary Office		805- 966-7107
Ben Waltenberger		805-729-3082
Chris Mobley, Sanctuary Superintendent		805-259-6540
Andrea Hrusovsky		805-729-2388

APPENDIX A, continued

	Web Address	Phone
Monterey Bay	http://montereybay.noaa.gov/	
24-hr pager		888-902-2778
Main office phone		831-647-4201
Gulf of the Farallones & Cordell Bank	http://farallones.noaa.gov/	
Main office phone		415-561-6622
Superintendent: Maria Brown		415-561-6622 x 301
NMS Washington, D.C.		
Lisa Symons (pager)		800-218-1232

RRT10 – Contact through the Command Center 206-220-7001.

California Department of Health Services http://www.dhs.ca.gov/home/contactinfo/programcontacts.html

Division of Drinking Water and Environmental Management	916-449-5577
Environmental Health Investigations Branch	510-622-4500

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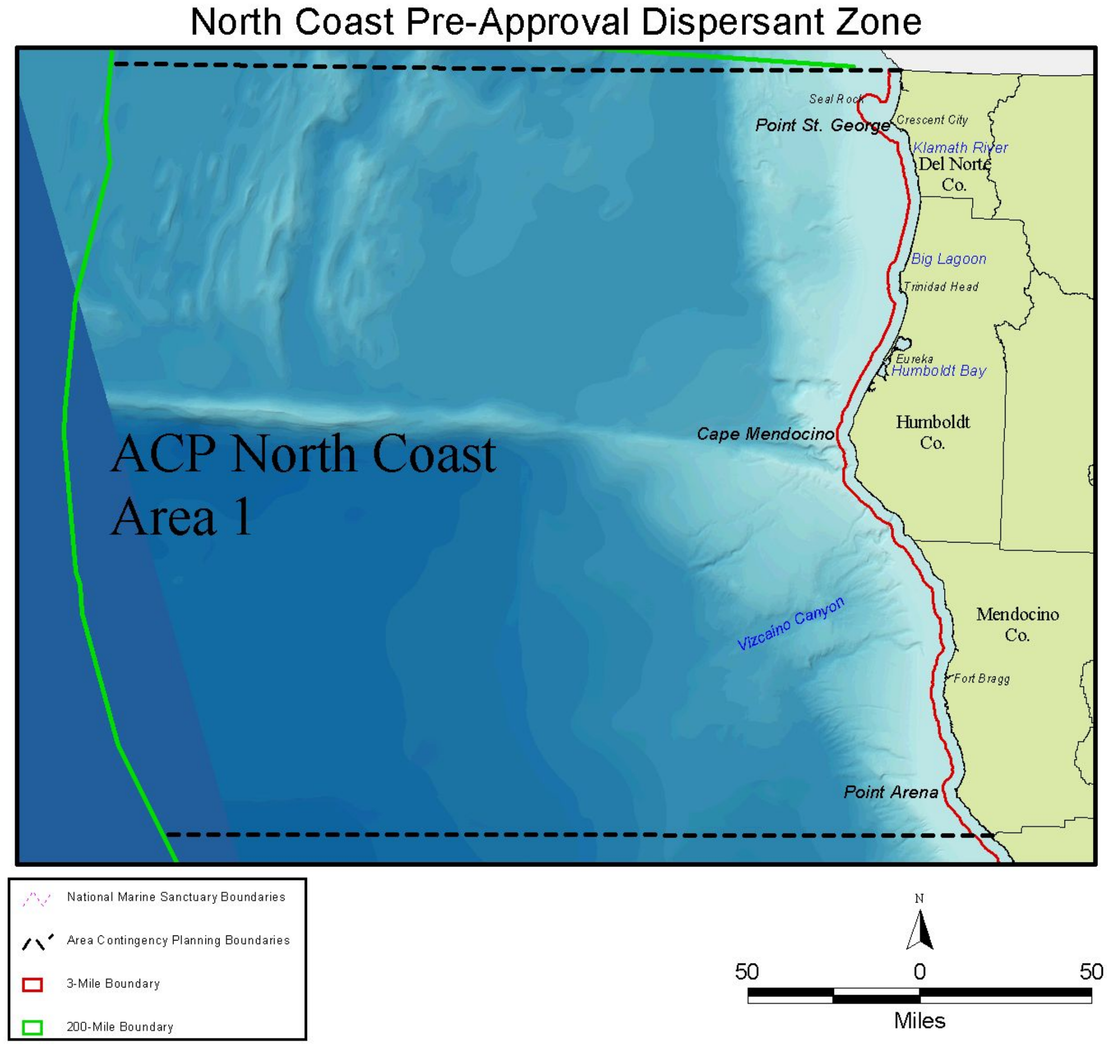
APPENDIX B

DISPERSANT ZONE CHARTS AND REGIONAL WILDLIFE RESOURCE SUMMARIES

B.1 North Coast



The North Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red) and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Oregon border are "RRT Approval Required"; RRT approval will be case-specific.

Offshore sea birds are seasonally concentrated in the areas off Point Arena, Cape Mendocino and Point St. George. These include phalaropes, auklets, petrels, shearwaters, fulmars, gulls and murres. Loons, grebes, endangered brown pelicans and marbled murrelets commonly occur inshore. Recent oil spills in the Humboldt Bay region have demonstrated that common murres and marbled murrelets are very susceptible to spilled oil. Shore birds, including the endangered western snowy plover, are also at risk should spilled oil reach the shore.

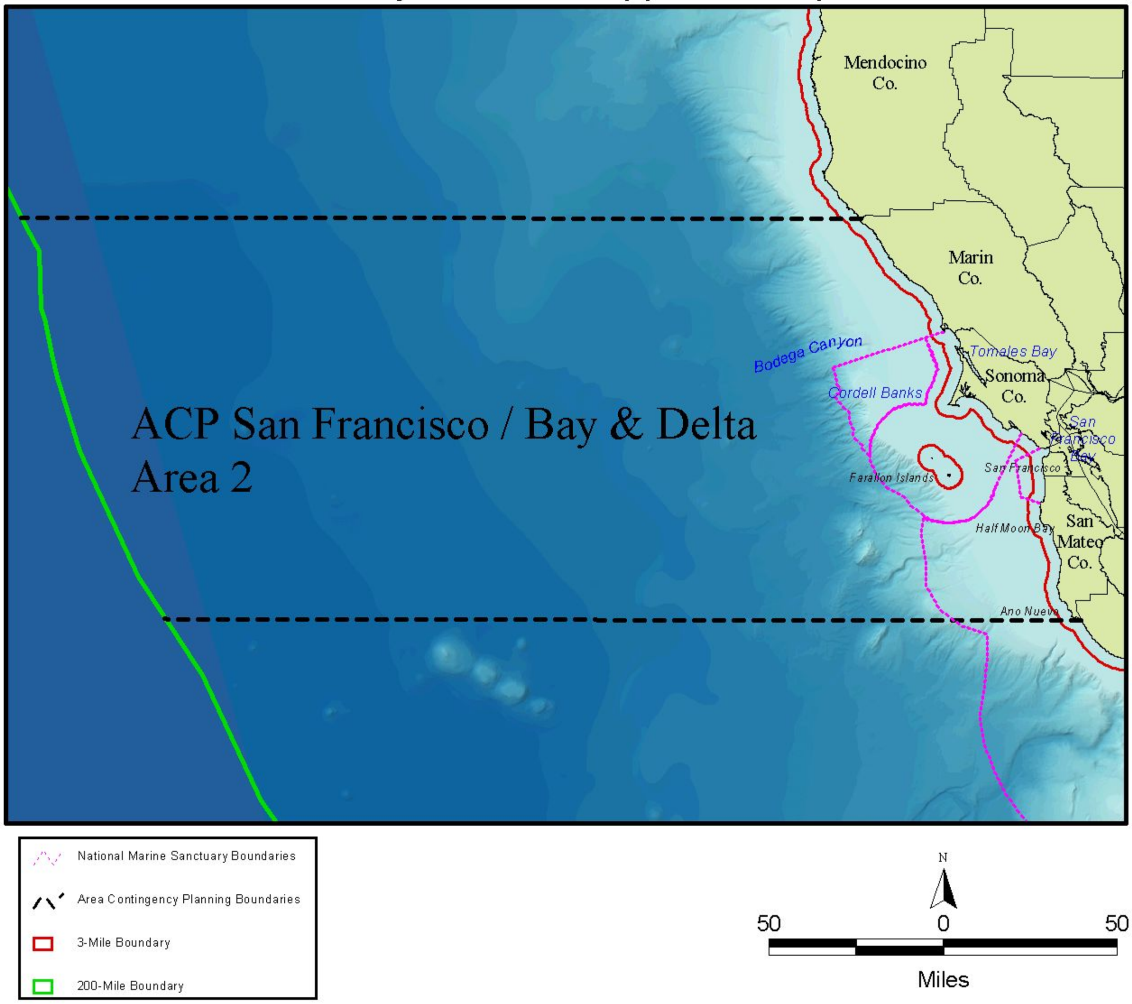
Many marine mammal species are potentially at risk, including several species of cetaceans (whales, dolphins, porpoises) and pinnipeds (seals and sea lions). Endangered cetaceans include blue, fin, humpback and sperm whales. Heavy oiling of the intertidal and upland areas of the coast can threaten harbor seal, Stellar sea lion and elephant seal pups.

Sensitive marine mammal areas include the slopes and offshore waters over Mendocino Ridge, the Vizcaino Canyon fan (used seasonally by northern fur seals), the Stellar sea lion rookeries at Cape Mendocino and Seal Rock, and the sea lion and harbor seal haul outs on St. George Reef and Trinidad Head. In addition, the waters near St. George Reef, the Klamath River mouth, and Big Lagoon near Trinidad Head support year-round populations of gray whales.

As oil comes ashore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland areas are the many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon and steelhead trout.

B.2 San Francisco-Bay Delta

San Francisco-bay Delta Pre-Approval Dispersant Zone



The San Francisco-Bay Delta dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Gulf of the Farallones, Cordell Banks, and Monterey Bay National Marine Sanctuaries (shown in magenta). Areas inside state waters or a National Marine Sanctuary are "RRT Approval Required"; RRT approval will be case-specific.

The offshore regions of the area are some of the most productive along the entire west coast. At least 11 species of sea birds are known to breed in the area including common murres, two species of auklets, storm petrels, tufted puffins, pigeon guillemots, and two species of cormorants. In addition, an additional 35 species of sea birds are seasonal visitors to the region (USGS, 2000). Several species of birds occur inshore, including the endangered marbled murrelet.

Recent oil spills in the San Francisco region have demonstrated that both common murres and marbled murrelets are very susceptible to spilled oil. Shore birds, including the endangered western snowy plover, are also at risk should spilled oil reach the shore.

The offshore area is also a haven for marine mammals. At least 33 species of marine mammals have been reported for the region, many of which are federally listed as endangered or threatened. Endangered species include the blue, humpback, fin, sei, right and sperm whales; threatened species include the Stellar sea lion, Guadalupe fur seal and the California sea otter.

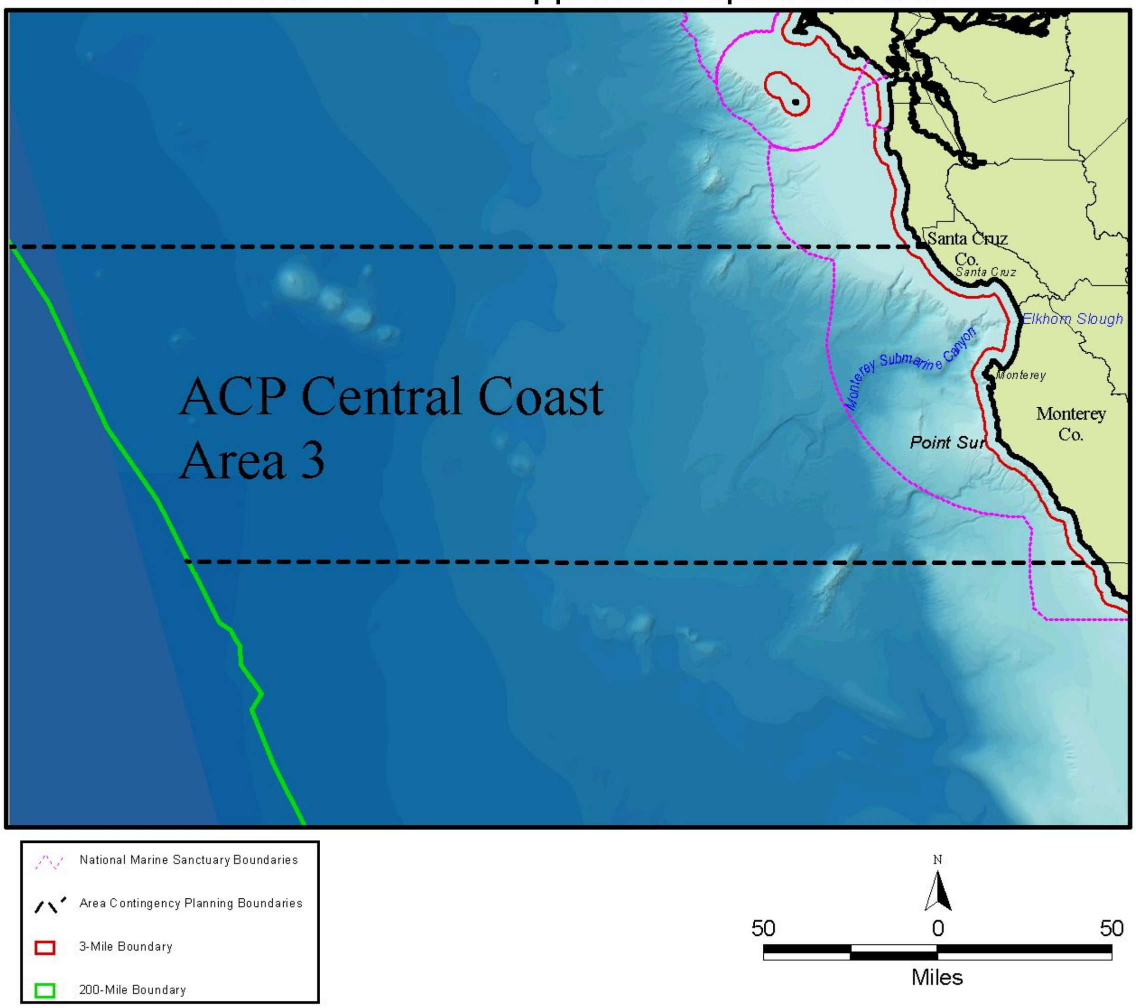
Most of the marine mammals are potentially at risk from spilled oil. In addition, heavy oiling of the intertidal and upland areas of the coast and Farallon Islands will threaten harbor seal, Stellar sea lion, northern elephant seal and northern fur seal pups.

The most sensitive regions of the waters off the San Francisco Area are the highly productive upwelling zones and shelf areas where both sea birds and marine mammals congregate in the spring and summer months to feed. These regions include Bodega Canyon, Cordell Banks, the region between Point Reyes and the Farallon Islands, and the shelf break off the most northern of the Farallon Islands.

As oil comes to shore, the rocky intertidal habitat, as well as wetlands and mud flats adjacent to river mouths, are at significant risk not only from the beached oil, but also from most of the cleanup procedures used to remove the oil. Of special concern in the marsh/wetland are many species of birds and mammals that inhabit these areas, as well as the potential for impacts to the young-of-the-year of the endangered Coho salmon and steelhead trout that may be residing in the area.

B.3 Central Coast

Central Coast Pre-Approval Dispersant Zone



The Central Coast dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Monterey Bay National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Approval Required"; RRT approval will be case-specific.

Oil spills within the offshore region of the Central Coast initially threaten all sea birds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shore birds, intertidal organisms, seal and sea lion pups) are at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters off Santa Cruz and Monterey counties, although seabird abundance drops south of Pt. Sur due to low water column productivity. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Sea bird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, sea bird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Over 100 species of sea birds have been reported from the region; about 70 of these species occur regularly. In the offshore (water depth > 200m) waters, common sea bird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmars, black-legged kittiwake, herring, Bonaparte's, western and California gulls, Cassin's and rhinoceros auklets, and common murres. In Monterey Bay proper, a significant segment of the world's ashy storm-petrel population is present during the autumn. Near shore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes, and western, California and Bonaparte's gulls. In addition, endangered species including brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Of all the sea birds occurring in the region, the common murre appears to be one of the species most frequently involved in oil spills. Data collected by the Office of Oil Spill Prevention and Response indicate that common murres are the most frequently oiled bird collected during recent central and northern California spill responses (Monterey Bay Mystery Oil Spill, 1997; Pt. Reyes tar ball incidents, 1997-98; T/V *Command* spill, 1999; San Mateo Mystery Spill (*Jacob Luckenbach*), 2001-03).

Shorebirds are another important component of the avifauna of the Central Coast area. More than 40 shorebird species have been recorded in central California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet, killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises and dolphins) and the sea otter. Cetaceans, including a number of endangered species (blue, humpback, fin, sei, right and sperm whales), use area waters as year-round habitat and calving grounds, important seasonal foraging grounds or annual migration pathways. Neither of the two threatened or endangered pinniped species occasionally seen in the area (Guadalupe fur seal, Stellar sea lion) breed here, but a large breeding population of northern elephant seals occurs at Año Nuevo, directly to the north and adjacent to the Central Coast planning area. California sea lions, harbor seals and sea otters also occur here. Harbor seals breed on offshore rocks and isolated beaches of the central coast. Aside from the breeding locations (Año Nuevo, the central coast) thousands of pinnipeds (elephant seals, California sea lions, harbor seals, Guadalupe fur seals, northern fur seals, Stellar sea lions) feed in and move through the area as either resident or migrating populations. The sea otter, a year-round resident of mainland central coast nearshore waters (generally within 6 miles of shore), is an endemic population of limited range and numbers currently experiencing population stress.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation against the cold are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

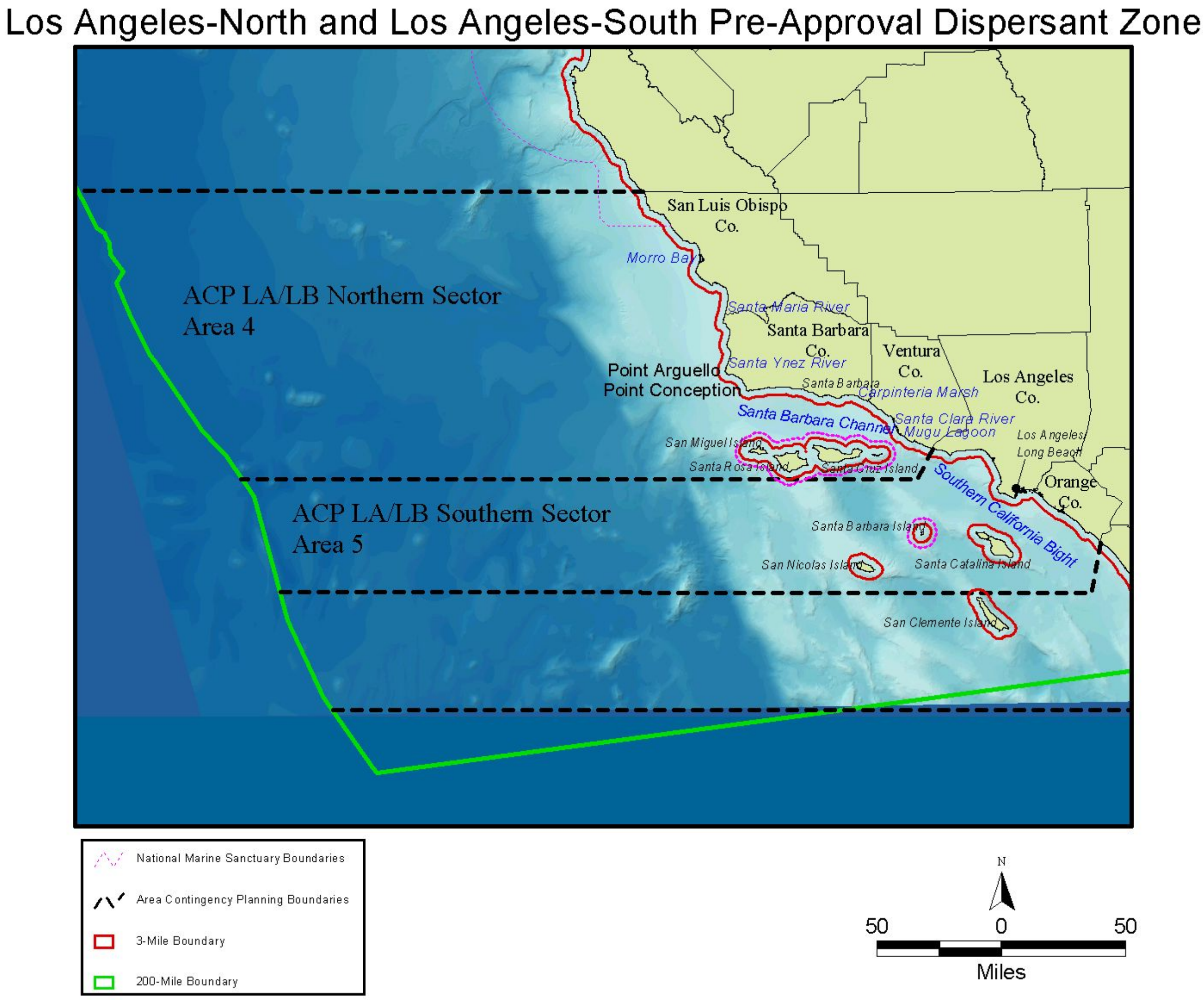
Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters of the region where most of the population is concentrated. Depending on the time of year, heavy oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses and changeable environmental conditions. The Monterey Submarine Canyon is an extremely important topographical feature in the central coast region, to which the area's large faunal species diversity and density is attributed. The fish represent a mix of permanent residents and periodic visitors. The important fish species of central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardine, Pacific whiting, Pacific herring, salmon, steelhead trout and sharks. Most of these species are widely distributed in the area, and it is unlikely that an oil spill will harm enough individuals, their prey or habitat to significantly decrease these populations. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and vulnerable to impacts is the market squid. Although squid are widely distributed offshore during most of their life cycle, they congregate inshore in very large numbers during spawning. Monterey Bay is one of the most important spawning areas in the state.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Various species of abalone are, where they occur, especially at-risk members of the shallow rocky habitat. Currently, all major species of abalone in the central California area are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

B.4 Los Angeles (north and south)



The Los Angeles (north and south) dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), shoreward of the 200-mile line (shown in green) and outside the Channel Islands National Marine Sanctuary (shown in magenta). Areas inside state waters or National Marine Sanctuaries are "RRT Approval Required"; RRT approval will be case-specific.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. High concentrations of seabirds occur in nearshore waters from Morro Bay to Point Arguello and the Santa Barbara Channel. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore waters (water depth > 200m), common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murres. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes and western, California and Bonaparte's gulls. In addition, endangered species including brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Breeding seabirds are especially vulnerable to oil spills. Seabird colonies occur on the Channel Islands and along the mainland from Pt. Conception north; few, if any, seabirds nest on the mainland south of Pt. Conception. The most common breeding species in this area include storm petrels (Leach's, ashy, and black), California brown pelican, cormorants (Brandt's, double-crested, and pelagic), western gulls and alcids (pigeon guillemot, Cassin's auklet, rhinoceros auklet). Although breeding seasons also vary from species to species, one or more species is generally conducting some aspect of reproduction (nest building, egg laying, chick rearing, etc.) from April through August. In 1989-1991, the total breeding seabird population of the project area was estimated at over 100,000 birds, representing about 16 percent of the total California seabird population.

Shorebirds are another important component of the avifauna of the Los Angeles-Long Beach area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the area include black-bellied plover, willet, whimbrel, marbled godwit, black turnstone, sanderling, western sandpiper, least sandpiper, dunlin, and dowitchers. Breeding shorebirds are limited to black oystercatcher, black-necked stilt, American avocet, killdeer, and the threatened western snowy plover, which nests and winters on sandy beaches.

Because of their migratory nature and the fact that few breed in the area, shorebirds are most abundant from fall through spring; comparatively few shorebirds remain during the summer months. Important shorebird use areas include Mugu Lagoon, Santa Clara River mouth, Carpinteria Marsh, Goleta Slough, the Santa Ynez River mouth, and the Santa Maria River mouth. Shorebird densities are not available for these areas, but they are generally considered to be lower than heavily used areas, such as the San Francisco Bay. Although densities are not available, shorebirds occupying sandy beaches in nearby Ventura County averaged about 44 birds per linear kilometer of beach.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions), 27 species of cetaceans (whales, porpoises, and dolphins), and the sea otter. Pinnipeds breed on the Channel Islands and on offshore rocks and isolated beaches along the mainland coast; thousands also move through the area during their annual migrations. Cetaceans, including a number of endangered species, use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways. The sea otter, a year-round resident of the mainland coast north of Point Conception, is appearing in increasing numbers in the western Santa Barbara Channel and around the northern Channel Islands.

The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales), two pinnipeds (Guadalupe fur seal and Steller sea lion), and the southern sea otter. The two threatened pinniped species do not breed in the area and presently are uncommon in southern California waters.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure. Sea otters, which rely almost entirely on maintaining a layer of warm, dry air in their dense underfur as insulation against the cold, are among the most sensitive marine mammals to the effects of oil contamination. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered less vulnerable to the effects of oiling than pinnipeds.

Sea otters would be at high risk from an oil spill if oil were to reach nearshore waters of the region. Depending on the time of year, heavy oiling of intertidal and upland areas of the mainland coast could also threaten harbor seal and northern elephant seal pups. Similar contact to the northern Channel Islands, particularly San Miguel Island, could have significant impacts on California sea lion, northern fur seal, northern elephant seal, and harbor seal pups, and possibly on adult fur seals as well.

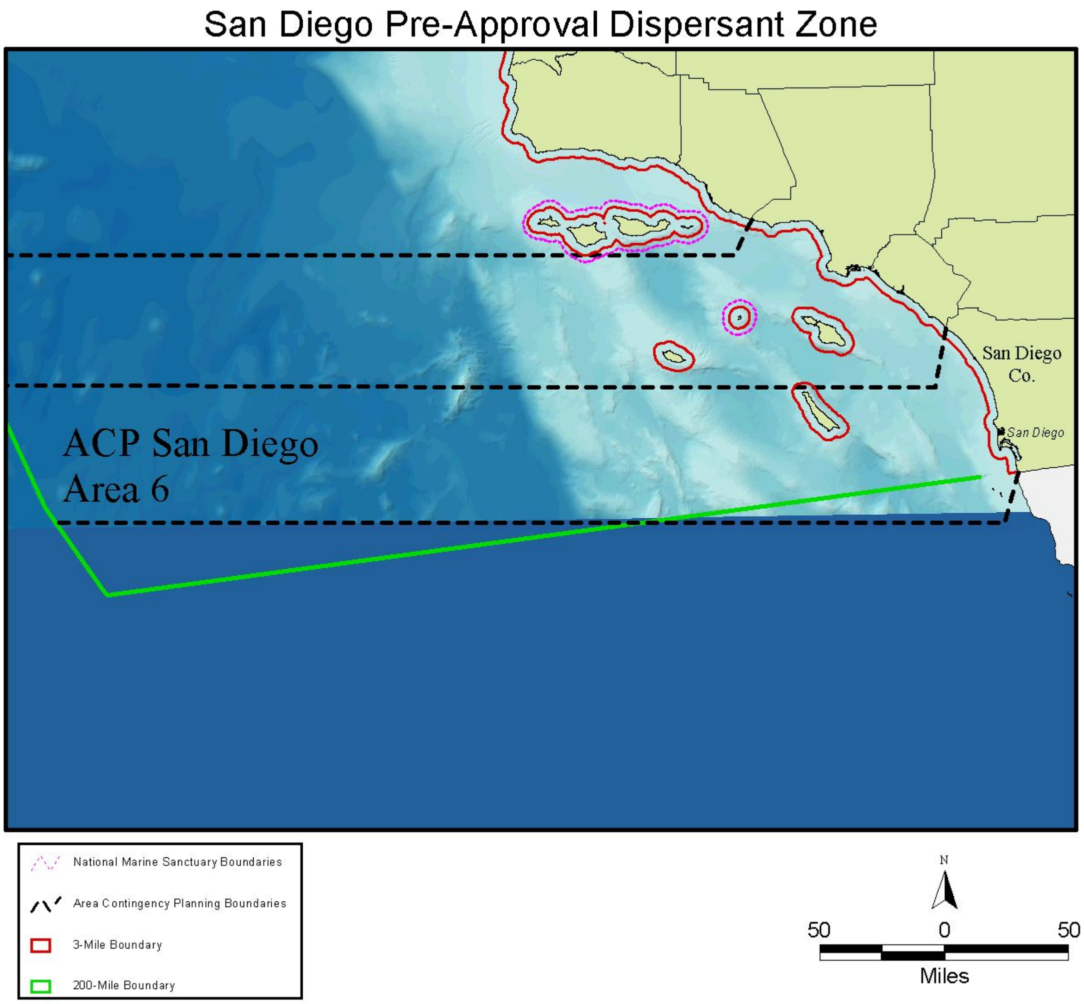
At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

The pelagic realm is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 150 to 200 m of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic species of southern and central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout, swordfish, and thresher shark. Most of these species are widely distributed in the SCB, and it is unlikely that an oil spill will harm enough individuals, their prey, or habitat to significantly decrease the population of a given species. However, northern anchovy are of concern since their restricted distribution during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and is vulnerable to impact is the market squid. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalone are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

B.5 San Diego



The San Diego dispersant use pre-approval area includes all waters seaward of the 3-mile state waters line (shown in red), and shoreward of the 200-mile line (shown in green). Areas inside state waters or within 3 miles of the California-Mexico border are "RRT Approval Required"; RRT approval will be case-specific.

Oil spills within the offshore region initially threaten all seabirds and marine mammals that frequent the area. If the spilled oil is driven on shore by the sea conditions and prevailing winds, additional resources (*e.g.*, shorebirds, intertidal organisms, seal and sea lion pups) and their shoreline haulout, roosting, and nesting habitats are also at risk for oiling.

Seabirds off California are generally most abundant in nearshore waters over the continental shelf; abundance drops off dramatically over the continental slope and deep offshore waters. Sea birds seasonally tend to concentrate near upwelling zones, in and "down stream" of offshore current jets associated with headlands, along temperature and salinity gradients, and along the shelf break. Both seabirds and marine mammals concentrate in these regions due to the high abundance of food.

Seabird densities are typically highest during the late summer through fall and winter periods (July through January) and lowest in April to June when birds are concentrated on their colonies. In general, seabird densities decrease when moving from the inshore to the offshore environment, dropping off considerably seaward of the continental shelf break.

Although over 100 species of seabirds have been reported from the region, the majority of individuals are composed of about 30 species. In the offshore (water depth > 200m) waters, common seabird species occurring seasonally include sooty shearwaters, phalaropes, Leach's storm petrel, northern fulmar, black-legged kittiwake, gulls (herring, Bonaparte's, western and California), auklets (Cassin's and rhinoceros) and common murres. Nearshore (water depth <200m), common species include sooty shearwaters, phalaropes, common murres, loons, western grebes and western, California and Bonaparte's gulls. In addition, endangered species including the brown pelicans, marbled murrelets (northern area of region), western snowy plovers, and least terns occur seasonally in the nearshore area and would be at risk from oil entering this area.

Shorebirds are another important component of the avifauna of the San Diego area. More than 40 shorebird species have been recorded in central and southern California; however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the project area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores.

A number of marine mammal species are potentially at risk from spilled oil in this region of the coast. At least 34 species of marine mammals inhabit or visit California waters. These include six species of pinnipeds (seals and sea lions) and 27 species of cetaceans (whales, porpoises, and dolphins). Cetaceans, including a number of endangered species, use area waters as year-round habitat and calving grounds, important seasonal foraging grounds, or annual migration pathways.

The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales) and two pinnipeds (Guadalupe fur seal and Steller sea lion). The two threatened pinniped species do not breed in the area and presently are uncommon in southern California waters.

Marine mammals vary in their susceptibility to the effects of oiling. Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure. Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat. Cetaceans, which rely on layers of body fat and vascular control rather than pelage to retain body heat, are considered to be less vulnerable to the effects of oiling than pinnipeds.

At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions. Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm- and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years. The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB.

The pelagic realm is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 150 to 200 m of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic fish species of southern and central California include northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout, swordfish, and thresher shark. Most of these species are widely distributed in the SCB, and it is unlikely that an oil spill will harm enough individuals, their prey, or habitat to significantly decrease the population size of any given species. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from spilled oil. Another species that is abundant in the epipelagic zone and is vulnerable to impacts is the market squid. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey.

Both rocky and sandy shallow habitats are at risk from spilled oil when it comes ashore. Abalone are an especially at-risk gastropod species of the shallow rocky habitat. Currently, all major species of abalone in central and southern California are severely depleted. Their depleted condition and life histories make abalone in shallow habitats especially vulnerable (at the population level) to impacts from spilled oil.

As oil comes on shore, the rocky intertidal habitat, as well as coastal wetlands and mud flats adjacent to river mouths are at significant risk both from the beached oil and from most of the cleanup procedures used to remove the oil. Of special concern in the coastal marsh/wetland areas is the potential for oiling many species of resident or visiting birds, mammals, young-of-the-year endangered Coho salmon, and steelhead trout.

APPENDIX C

DISPERSANT EFFICACY AND AVAILABLE RESOURCES

C.1 Oils produced from California offshore platforms

Oil Field Name	Platform Name	Pacific Outer Continental Shelf Study	Minerals Management Service/EC Catalog	
		API Gravity	Name	API Gravity
Beta	Ellen Elly Eureka Edith	17.3 – 18.3	Beta	13.7
Carpinteria	Hogan Houchin Henry	24.2	Carpinteria	22.9
Dos Cuadras	Hillhouse A B C	24.3	Dos Cuadras	25.6
Hondo	Hondo Harmony	21.5	Hondo	19.6
Hueneme	Gina	20.9	Port Hueneme	
Pescado	Heritage	21.5		
Pitas Point	Habitat		Pitas Point	38
Point Arguello	Hidalgo Harvest Hermosa	22.2	Point Arguello Commingled Point Arguello Heavy Point Arguello Light	21.4 18.2 30.3
Point Pedernales	Irene	21.1	Platform Irene	11.2
Sacate				
Santa Clara	Gilda Grace	20.9	Santa Clara	22.1
Sockeye	Gail	21.6	Sockeye Sockeye Commingled Sockeye Sour Sockeye Sweet	26.2 19.8 18.8 29.4
			Platform Holly	11

From S.L. Ross, 2002

C.2 Some fresh oil properties of top ten oils shipped to California by tank ship, 1999-2001

Oil Type	Identifying Properties			
	API gravity	Sulfur content (%)	Viscosity at 15º C, cP	Pour point, ºC
Alaska North Slope	26.8	1.15	17	-15
Arab Medium	30.8	2.4	29	-10
Maya	21.8	3.3	299	-20
Arabian Light	33.4	1.77	14	-53
Oriente	29.2	1.01	85	-4
Basrah Light	33.7	1.95	20	-15
Escalante/Canadon Seco	24.1	0.19	?	?
Arabian Extra Light	37.9	1.2	?	?
FAO Blend	31.0	3.0	?	?
Yemen	31.0	0.6	?	?

C.3 Pacific OCS and imported California oils that have undergone spill-related testing and modeling

Crude oil name	API gravity	Fresh oil pour point (ºC)	Oil viscosity @ 15 ºC at various weathered states			Emulsion formation tendency	Dispersant "Window of Opportunity"
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)							
Arab Medium	29.5	-10	29	91	275	Yes @ 0%	Very narrow
Arab Light	31.8	-53	14	33	94	Yes @ 0%	Narrow
Hondo	19.6	-15	735	9583	449700	Yes @ 0%	Very narrow
Hueneme	14.8	-9	4131	20990		Yes @ 0%	Very narrow
Maya	21.8	-20	299	99390		Yes @ 0%	Very narrow
Oriente	25.9	-4	85		6124	Yes @ 0%	Very narrow
Pt. Arguello Commingled	21.4	-12	533	41860	2266000	Yes @ 0%	Very narrow
Pt. Arguello Heavy	18.2	-4	3250		4953000	Yes @ 0%	Very narrow
Pt. Arguello Light	30.3	-22	22	183	671	Yes @ 0%	Very narrow
Santa Clara	22.1	-3	304	1859	22760	Yes @ 0%	Very narrow
Sockeye	26.2	-12	45	163	628	Yes @ 0%	Very narrow
Sockeye Sour	18.8	-22	821	8708	475200	Yes @ 0%	Very narrow
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)							
Alaska North slope	26.8	-15	17	110	650	Yes @ 26%	Narrow
Carpinteria	22.9	-21	164	3426		Yes @ 11%	Narrow
Dos Cuadras	25.6	-30	51	187	741	Yes @ 11%	Narrow
Sockeye Sweet	29.4	-20	20	39	321	Yes @ 17%	Narrow
OILS THAT DO NOT EMULSIFY							
Diesel	39.5	-30	8	25	100	No	Very wide
Pitas Point	38.0	<-60	2		2	No	Very wide

Crude oil name	Hours for oil to reach specified viscosity in 10 kt winds and 15ºC water temperature					
	(Modeled) 1000 barrel batch spill (*i.e.*, from tank ship)			(Modeled) 10,000 barrel batch spill (*i.e.*, from tank ship)		
	2000 cP	5000 cP	20,000 cP	2000 cP	5000 cP	20,000 cP
HIGHLY EMULSIFIABLE OILS (Emulsion forms at 0 to 10% oil evaporation)						
Arab Medium	4.2	6.4	22.0	4.9	7.7	39.0
Arab Light	10.0	36.0	Disp @ 41 hrs	13.3	68.8	Disp @ 68 hrs
Hondo	2.0	3.0	5.5	2.4	3.7	6.2
Hueneme	0.0	0.5	1.9	0.0	0.5	1.9
Maya	1.6	2.3	4.8	1.8	2.6	5.1
Oriente	2.2	3.2	5.2	2.8	3.8	6.4
Pt. Arguello Commingled	1.6	2.6	4.3	1.7	2.9	4.9
Pt. Arguello Heavy	0.0	0.5	1.7	0.0	0.5	1.9
Pt. Arguello Light	4.4	6.9	23.0	5.1	8.1	42.0
Santa Clara	2.6	3.8	6.6	2.9	4.4	7.9
Sockeye	3.9	5.6	13.2	4.3	6.4	20.4
Sockeye Sour	1.1	1.9	3.1	1.3	2.0	3.5
MEDIUM EMULSIFIABLE OILS (Emulsion forms at 11 to 29% oil evaporation)						
Alaska North slope	37.9	39.7	43.3	60.7	62.2	66.7
Carpinteria	5.6	6.6	8.9	8.3	9.5	12.0
Dos Cuadras	5.4	7.0	11.0	7.4	8.9	14.3
Sockeye Sweet	8.6	10.6	28.8	11.6	14.1	47.8
OILS THAT DO NOT EMULSIFY						
Diesel	60.0	Disp @ 69 hrs		101.0	Disp @ 111 hrs	
Pitas Point	Disp @ 2.3 hrs			Disp @ 3.5 hrs		

The opportunity for using dispersants effectively on most oils listed above is limited. Only a few of the produced oils appear amenable to dispersion. However, if spill circumstances are right and response is very rapid, some success might be possible. The situation is different for the imported oils. Alaska North Slope crude, which represents about 50% of the oil spill risk from tankers in California, appears to be quite amenable to dispersion. Diesel oil, which is ubiquitous and therefore tends to be spilled relatively frequently, is also a good candidate.

From S.L. Ross, 2002

C.4 Description of general oil characteristics based on oil type

Type	Description	Characteristics	Crude oil examples	Refined product examples
I	**Light distillates** No need to disperse; oil will dissipate rapidly**.**	Specific gravity: <0.80 API gravity: >45 Viscosity: 0.5-2.0 cSt @ 15º C Non-persistent, very volatile, highly flammable, high evaporation rates, rapid spreading rates, highly toxic to biota, little if any emulsification, high penetration of substrate.	Algerian blend	Maui and Kapuni distillate, gasoline blendstocks, motor spirit (RMS/PMS), Avgas, Jet A1, kerosene
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).	Specific gravity: 0.80-0.85 API gravity: 35-45 Viscosity: 4 cSt to solid @ 15º C Non-persistent, moderate to high volatility, low to moderate viscosity, moderate to high toxicity, can form stable emulsions, moderate to high penetration of substrates.	<u>Pour point <41º F</u>: Brent, Ekofisk, Forties, Murban, Seria Light <u>Pour point >41º F</u>: Ardjuna, Beatrice, Camar, Lucina, Palanca, Angola, Pennington	Unfinished oils; automotive gas oil, marine gas oil, Navy gas oil
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.	Specific gravity: 0.80-0.95 API gravity: 17.5-35 Viscosity: 8 cSt to solid @ 15º C Persistent, moderate volatility, moderate viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.	<u>Pour point < 41º F</u>: Alaskan, Arabian light, Basrah, Dubai, Iranian heavy, Kuwaiti, Maya, Oriente <u>Pour point > 41º F</u>: Bonny light, Coban blend, Gamba, LSWR, Minas, Santa Cruz, Taching, Zaire	
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.	Specific gravity: 0.9501.00 API gravity: 10.0-17.5 Viscosity: 1500 cSt to solid @ 15º C Persistent, low to moderate volatility, moderate to high viscosity, variable acute toxicity, can form stable emulsions, low to moderate penetration of substrates.		Heavy fuel oil, residues, Fletcher blend, Maui F sands < pour point, lube oils, lube oil blendstocks
V	**Non-spreading oils** Persistent, generally not dispersible	Specific gravity: >1.00 API gravity: <10.0 Viscosity: Solid unless heated Persistent, very low volatility, little if any evaporation, very high viscosity, very low acute toxicity, can form stable emulsions, little if any penetration of substrate.		Heavy bunker fuel oil, bitumen, very heavy fuel oil, asphalt, paraffins, waxes, residual fuels

In part from Cawthron, 2000

C.5 General California dispersant application platform information (information in this section is being updated)

Application method	Weather limitations	Advantages	Disadvantages
C-130/ADDS Pack	Winds: 30 – 35 kts Waves: 17 – 23 ft	Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. Greatest delivery capacity; might be capable of fully treating all of the oil spilled in a blowout spill and all oil in a 10,000 bbl batch spill.	At present the nearest ADDS Pack units are outside the state; start-up times may be lengthy; spraying not likely to begin until the second day of the spill; very expensive; requires runway.
DC-4		Suitable for very large spills with longer (several day) time windows to accommodate the minimum 24-hour startup time. The platform modeled is owned by Airborne Support Incorporated of Houma, LA; delivery capacity is approximately one-half that of the C-130 ADDS Pack.	Earliest this aircraft can begin spraying dispersant in California is probably the morning of the second day.
Single-engine planes (*e.g.*, Cessna AT-802 "Agtruck")	Winds: 17 – 21 kts Waves: 6 – 9 ft Ceiling: ≥1000 ft Visibility: ≥ 3 nm	Suitable for small- to mid-sized spills that occur at considerable distance from the response centers provided the time window is long enough to accommodate their slower startup time. Purpose-built for aerial spraying; capable of fairly short start-up time; a number of Agtrucks available for use in a large spill; other small planes may be relatively inexpensive.	Smaller payload; more limited range; not yet available in California, although one AZ operator may be under contract to CA OSRO; platform may not be available until beginning of the second day; limited to smaller spills; uses neat dispersant only
Medium-size helicopter	Winds: 17 – 27 kts Waves: 6 – 17 feet	Available; highly maneuverable; capable of being re-supplied near spill site; good operational efficiency; lands almost anywhere. Above sea blowouts from oil platforms (of oils with a <u>medium</u> emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Limited by small payload and range; two are available in southern CA; use neat dispersant only. Blowouts of high emulsification rate oils will <u>not</u> be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.
Work boat	Winds: 7 – 21 kts Waves: 1 – 9 feet	Good control; mixes water. Above-sea blowouts from oil platforms (of oils with a <u>medium</u> emulsification rate) are good candidates for treatment by ship and helicopter platforms because they can remain on-scene and deliver dispersants constantly when needed. May be adequate to deal with small tanker spills close to their re-supply bases; could also respond to mid-sized spills provided the time window is long enough.	Moderate transit speed; only two ship-based systems (high-speed crew-cargo vessels) available in CA; limited to small spills; limited swath width. Blowouts of high emulsification rate oils will <u>not</u> be good candidates for dispersion from any platform type. Ship-based delivery may be limited by slow transit speed and small payload. These platforms are limited for spills at a distance from their base of operations, either because of slow transit speed or limited operating range. These limitations can be overcome in some circumstances by re-supplying them at or near the spill site.

From S.L. Ross, 2002

C.6 Characteristics of dispersant spraying platforms available to operators in California

Application system	Payload (gallons)	Pump rate (gpm)	Swath width (feet)	Average transit speed (knots)	Average Start-up time (hours)	Spray speed (knots)	Repositioning time (minutes)	Resupply time (hours)	Range
C-130/ADDS-pack	5500	600	100	214	24	140	2	1	7 hours
DC-4 [a]	2000-2500	500	100	214	1	157	2	1	
Agtruck AT-802	800	120	80	200	4	140	0.5	1	200 miles
Agtruck AT-502	500	120	80	200	4	140	0.5	1	200 miles
Helicopter	150	79	80	90	1	50	0.5	0.25	1.75 miles
Vessel A [b]	1000	10	120	7	1	7	2	1	
Vessel D [c]	20,000	60	175	25	1	25	2	1	

[a] Values reported in the literature for aircraft logistic characteristics such as payload are somewhat variable. For the DC-4 payload, values range from 2000 to 2500 gallons. The value used in calculations is at the upper end of this range, 2500 gallons. It must be recognized that the payload of the existing DC-4 platform in the Gulf of Mexico area is somewhat lower than this at 2000 gallons.

[b] Modeled after Clean Seas boom type vessel spray system.

[c] Modeled after new portable single-nozzle spray system developed by National Response Corporation (NRC) and mounted on one of NRC's crew-cargo vessels. System characteristics are as follows:

- Payload: capacity is up to 20,000 gallons in the form of up to 10 2000-gallon DOT marine-portable tanks
- Pump rates: variable at 12, 25, 40 and 60 gallons per minute
- Swath width: range of nozzle varies with pump rate up to 70 feet @ 60 gpm, with one system on each side. Allowing for the 35' beam of the vessel, swath width is 140'
- Vessel speed: maximum speed is 25 knots

From S.L. Ross, 2002

C.7 Dispersant spraying capacity of platforms as a function of distance [a]

Platform	Operating distance (miles)	Number of sorties per day	Payload (barrels)	Volume of dispersant sprayed per day (barrels)	Volume of oil dispersed per day (barrels) [b]
C-130/ADDS Pack [c]	10	4	130.8	523.2	10464
	30	4	130.8	523.2	10464
	100	3	130.8	39234	7848
	200	3	130.8	392.4	7848
DC-4 [d]	10	6	47.6	285.6	5712
	30	5	47.6	238.1	4761
	100	4	47.6	190.4	3808
	200	3	47.6	142.8	2856
AT-802	10	8	18.9	151.2	3024
	30	7	18.9	132.1	2642
	100	5	18.9	94.4	1887
	200	3	18.9	56.6	1132
Helicopter	1	30	5.7	169.8	3396
	10	21	5.7	119.7	2394
	30	11	5.7	62.3	1245
Vessel [e]	1	3	23.8	71.4	1428
	10	2	23.8	47.6	952
	30	1	23.8	23.8	476
	100	1	23.8	23.8	476

[a] Based on response to a batch spill of 3180 m^3 (20,000 barrels).
[b] Assuming 20 volumes of oil are dispersed per 1 volume of dispersant sprayed.
[c] ADDS Pack specifications as per Biegert Aviation: Maximum reservoir capacity = 5500 gallons (20.8 m^3 = 130.8), recommended capacity = 5500 gallons (18.9 m^3).
[d] Values reported in literature for payload of DC-4 range from 2000 to 2500 gallons (7.5 to 9.5 m^3); value used here is 2000 gallons (= 47.6 barrels) as per ASI, Houma, LA.
[e] Modeled after Clean Seas boom type vessel spray system.

From S.L. Ross, 2002

C.8 Stockpiles of dispersant application resources in California and North America (This section is currently being updated)

MSRC OWNED AND CONTROLLED DISPERSANT INVENTORY

March 2008*

Prepared by the Marine Spill Response Corporation

#	Dispersant Owner/Controller	Location of Dispersant	Method of Storage (# of Containers)	Amount (gallons) Corexit 9500	Corexit 9527	TOTAL AMOUNTS (Gallons)
1	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Slaughter Beach, DE	330 gallon Tote (1)		330	330
2	Marine Spill Response Corporation Edison, NJ John Sweeney - (732) 346-2450 Pager - (800) 218-6261	Edison, NJ Linden Warehouse	330 gallon Totes (16) 55 gallon Drums (91)		4,605 5,005	9,610
3	Marine Spill Response Corporation Edison, NJ John Sweeney - (732) 346-2450 Pager - (800) 218-6261	Portland, ME - OSRV Perth Amboy, NJ - OSRV Chesapeake City, MD - OSRV Virginia Beach, VA - OSRV	350 gallon Tote (1) 350 gallon Tote (1) 350 gallon Tote (1) 350 gallon Tote (1)		330 330 330 330	1,320
4	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	San Juan, Puerto Rico	330 gallon Totes (3)		900	900
5	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Stennis International Airport, MS	330 gallon Totes (58) ISO 5,000 gallons (1)		17,400 5,000	22,400
6	Marine Spill Response Corporation Mike Walker - (337) 475-6425 Pager - (888) 276-4246 Fax - (337) 475-6401	Miami, FL - OSRV Pascagoula, MS - OSRV Fort Jackson, LA - OSRV Lake Charles, LA - OSRV Galveston, TX - OSRV Corpus Christi, TX - OSRV	330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 330 & 550 g Tote (1 ea) 350 gallon Tote (1)		880 880 880 880 880 330	4,730
7	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Oil Mop Inc. Houston, TX	330 gallon Tote (74)	22,200		22,200
8	Marine Spill Response Corporation Rex Prosser (281) 776-4335 Office (832) 785-8169 Cell	Coolidge Airport Coolidge, AZ	5,000 gallon ISO (1)		3,300	3,300
9	Marine Spill Response Corporation Long Beach, CA Ray Nottingham - (562) 981-7610 Pager - (954) 462-6467	Tesoro Marine Terminal Long Beach, CA Terminal Island, CA - OSRV	330 gallon Totes (36) 330 gallon Totes (2)	10,800	605	11,405

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
		Within California [a]		
Clean Seas Cooperative [c] 1180 Eugenia Place, Suite 204 Carpinteria, CA 93013 24-hr phone: 805-684-3838 Contacts: Jim Caesar Phone: 805-684-4392	<u>Boats</u> Mr. Clean & Mr. Clean III: 1000 gallons Corexit 9527 on board each vessel. Swath width for Mr. Clean is 105 ft, for Mr. Clean III is 115 ft; vessel calibration and dosage rate vary from speeds of 3 to 10 knots and dosage rates from 2 – 10 gal/acre. <u>Aerial (helicopter)</u> Storage 150 gal max; pumping rate 50 – 100 gal per minute; boom length 32 ft, swath 50 – 60 ft depending on speed; speed 50 – 100 kts; dosage rate 2, 3 or 5 gal per acre. <u>Yard Inventory (Corexit 9527)</u> (2) 5000 gal tankers = 10,000 (13) 550 gal tanks = 7150 (20) 55 gal barrels = 1100 (1) 500 gal tank = 500 Clean Seas also has 880 gals of shoreline dispersant (Corexit 7664) stored at yard.	Corexit 9527	Carpinteria, CA	20,750

C.8, continued Stockpiles of dispersants application resources in California and North America

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
Other North American Dispersant Stockpiles [e]				
Alyeska Pipeline Service Company P.O. Box 196660 Anchorage, AK 99519-6660 Phone: 907-278-1611		Corexit 9527 Corexit 9527	Anchorage, AK Valdez, AK	56,000 4,000
Clean Islands Council/State of Hawaii 179 Sand Islands Access Road Honolulu, HI 96819 Phone: 808-845-8465		Corexit 9527 Corexit 9500	Honolulu, HI Honolulu, HI	3,080 34,180
Clean Caribbean Cooperative 2381 Stirling Road Fort Lauderdale, FL 33312 Phone: 954-983-9880		Corexit 9527 Corexit 9500	Pt. Everglades, FL Pt. Everglades, FL	4,070 25,300
LOOP, Inc. 1 Seine Court New Orleans, LA 70114 Phone: 504-368-5667		Corexit 9527	Houma, LA	33,600
Clean Gulf Associates 1450 Poydras Street, Suite 1625 New Orleans, LA 70112 Phone: 888-242-2007		Corexit 9527 Corexit 9500	Houma LA Sugarland, TX	5,665 28,985
CISPRI (CIRO) 1392 Ocean Drive Homer, AK 99603 Phone: 907-235-6785		Corexit 9527 Corexit 9527	Niski, AK Anchorage, AK	9,295 11,275

C.8, continued Stockpiles of dispersants application resources in California and North America

Organization	Equipment types	Type of dispersant	Dispersant storage location	Quantity of dispersant (gallons)
Marine Spill Response Corporation Clean Gulf Associates 396 Roland Road Houma, LA 70363 Phone: 985-580-0924		Corexit 9527	Houma, LA	16,000
Airborne Support, Inc. 3626 Thunderbird Road Houma, LA 70363 Phone: 985-851-6391		Corexit 9527 Corexit 9500	Houma, LA Houma, LA	2,000 4,470
National Response Corporation 11200 Westheimer Road Houston, TX 77042 Phone: 713-977-9951 Houston, TX		Corexit 9527 Corexit 9500	Cameron, LA Morgan City, LA	1,540 220
Clean Sound Cooperative 1105 13th Street Everett, WA 98201 Phone: 425-783-0908		Corexit 9527	Blaine, WA	6,270
Delaware Bay & River Cooperative 700 Pilottown Road Lewes, DE 19958 Phone: 302-645-7861		Corexit 9527	Slaughter Beach, DE	1,650
Clean Harbors Cooperative 4601 Tremley Point Road Linden, NJ 07036 Phone: 908-862-7500		Corexit 9527	Lyndon, NJ	1,375
Nalco Exxon Energy Chemicals Hwy 42 North Kilgore, TX 75662 Phone: 903-984-1695		Corexit 9527 Corexit 9500	Sugarland, TX Sugarland, TX	Producer

[a] The amount of dispersant currently (2003) available in California is 42,310 gallons (1007 barrels), sufficient to treat 20,140 barrels of oil, assuming a 1:20 (dispersant:water) dilution ratio.
[b] Email communication, Steve Ricks (Clean Bay) to Ellen Faurot-Daniels (California Coastal Commission), 12/12/03.
[c] Email communication, Jim Caesar (Clean Seas) to Ellen Faurot-Daniels (California Coastal Commission), 11/25/03.
[d] mail communication, Ray Nottingham (Clean Coastal Waters) to Ellen Faurot-Daniels (California Coastal Commission), 12/02/03.
[e] Substantively from S.L. Ross, 2002. North American stockpile values are approximate because quantities change constantly. A portion of the 273,615 gallons (6514 bbls) could be made available for use on spills in California. Assuming a 1:20 dilution ratio, this quantity is sufficient for a spill of approximately 150,000 barrels.

Updated from Cawthron, 2000

C.9 Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

Dispersant spray equipment for boats, helicopters and fixed-wing aircraft are available from various manufacturers throughout the world. Table C.9 is a partial representative listing. Publications such as the *International Oil Spill Control Directory* and the *World Catalog of Oil Spill Response Products* have more complete listings that are periodically updated.

Dispersant application systems differ in design, capability, versatility, size, weight, ease of handling and control of dosage. Their suitability depends in part on the type of dispersant used. Concentrated dispersants such as Corexit 9500 and Corexit 9527 are generally most appropriate for modern spray equipment. A detailed description of application equipment requirements is presented in the 1997/1998 *World Catalog of Oil Spill Response Products*.

	Boats	Helicopters	Fixed-wing aircraft
ABASCO 363 West Canino Houston, Texas 77037 Phone: 800-242-7745	X	X	X
Ayles Fernie International, Ltd. Unit D5 Chaucer Business Park Kemsing, Seven Oaks, Kent TN15 6YU England Phone: 44/1732762962	X		
Biegert Aviation, Inc. 22022 South Price Road Chandler, Arizona 85245 Phone: 602-796-2400			X
CECA S.A. (Subsidiary of Elf Aquitane Group) Avenue Alfred Nobel – 64000 PAU France Phone: 33/559 92 44 00	X		
Helitask Bourne Airfield Cambridge CB3 7TQ England Phone: 44/954-210-765		X	
KU-SINTEF Group S.P. Andersens vei 15b N-7034 Trondheim, Norway Phone: 47 73 59 11 00		X	
KOLDA Corporation 16770 Hedgecroft, Suite 708 Houston, Texas 77060 Phone: 281-448-8995	X		X

C.9, continued Manufacturers of dispersant spray systems for boats, helicopters and fixed-wing aircraft

	Boats	Helicopters	Fixed-wing aircraft
KAAF Agro Aviation Les Jasses D'Albaron 13123 Albaror Arles, France Phone: 33/9071188		X	
Kepner Plastic Fabricators, Inc. 3131 Lomita Blvd. Torrance, California 90505 Phone: 310-325-3162	X		
Ro-Clean Desmi 21B Hestehaven DK5260, Odense S. Denmark Phone 45-65-910-201	X		
Simplex Manufacturing Company 13340 NE Whitaker Way Portland, Oregon 97230 Phone: 503-257-3511		X	
Slickbar Products Corporation 18 Beach Street Seymour, Connecticut 06483 Phone: 203-888-7700	X		
Transland, Inc. 24511 Frampton Avenue Harbor City, California 90710 Phone: 310-534-2511	X		
Vikoma International Ltd. Prospect Road Cowes, Isle of Wight PO31 7AD, England		X	

From ExxonMobil, 2000

C.10 Dispersant "Window of Opportunity"

(this section is currently under revision)

The "window of opportunity" for dispersant use is general defined as the timeframe that is generally available for application of chemical dispersants in which that application can be expected to be reasonably effective. It is often difficult to accurately predict the "window of opportunity" for any given dispersant application. As a result, the use of "rules of thumb" combined with "best professional judgment" often provides for the best results.

A number of factors will affect the efficacy of dispersant use and these factors with either expand or narrow a given "window of opportunity." In general, most dispersant formulations are designed to work in ocean water with an average salinity around 35 ppt. The efficacy of most salt water dispersant formulations drop off significantly as the ocean salinity decreases, such as in bays and estuaries during times of fresh water incursion. In general, heavier crudes are more difficult to disperse than lighter crude oils. Additionally, dispersant efficacy will vary based on the weathering of oils, most significant are emulsion formation and evaporation. A number of studies have been funded by the United States Minerals Management Service, evaluating the perimeters that contribute to the "window of opportunity" for dispersant use and have found that in many cases the "window of opportunity" may be extended. The information found in this section will be revised to address the latest scientific information. Currently, the information below provides good, albeit perhaps conservative, parameters regarding the "window of opportunity" for dispersant use. Additionally, at the time of an oil spill incident, the NOAA Scientific Support Coordinator can run several models estimating the "window of opportunity" for dispersant use. The mathematics in these models, however, may not take into account the latest scientific data and as a result, something the best means of determining if dispersants will be effective during an oil spill incident is to conduct field tests and visually monitor dispersant efficacy.

Type	Description & General Dispersability
I	**Light distillates** No need to disperse; oil will dissipate rapidly.
II	**Light crudes** Relatively non-persistent. Easily dispersed if pour point under 41º F; probably difficult to disperse if water temperature is below pour point (behaves like a Group IV oil).
III	**Medium – heavy crudes, fuel oils** Fairly persistent, easily dispersed if treated promptly.
IV	**Heavy crudes and residues** Fairly persistent, probably difficult to disperse if water temperature is below pour point of material.
V	**Non-spreading oils (sinking oils)** Persistent, generally not dispersible

GENERAL DISPERSABILITY RELATIVE TO API GRAVITY AND POUR POINT

Probably difficult or impossible to disperse	Medium weight material. Fairly persistent. Probably difficult to disperse if water temperature is below pour point of material.	Lightweight material. Relatively non-persistent. Probably difficult to disperse if water temperature is below pour point of material.	No need to disperse. Very light weight material. Oil will dissipate rapidly
	Medium weight material. Fairly persistent. Easily dispersed if treated promptly.	Lightweight material. Relatively non-persistent. Easily dispersed.	

API	17	34.5	45
Gravity	.953	.852	.802

Derived from information published by the International Tanker Owners Pollution Federation, Ltd., London (API 1986)

This table provides general guidance only. Note that specific dispersant formulations are designed to treat heavier, more viscous oils. Consult manufacturer recommendations prior to application and recommendations from monitoring team for continued use.

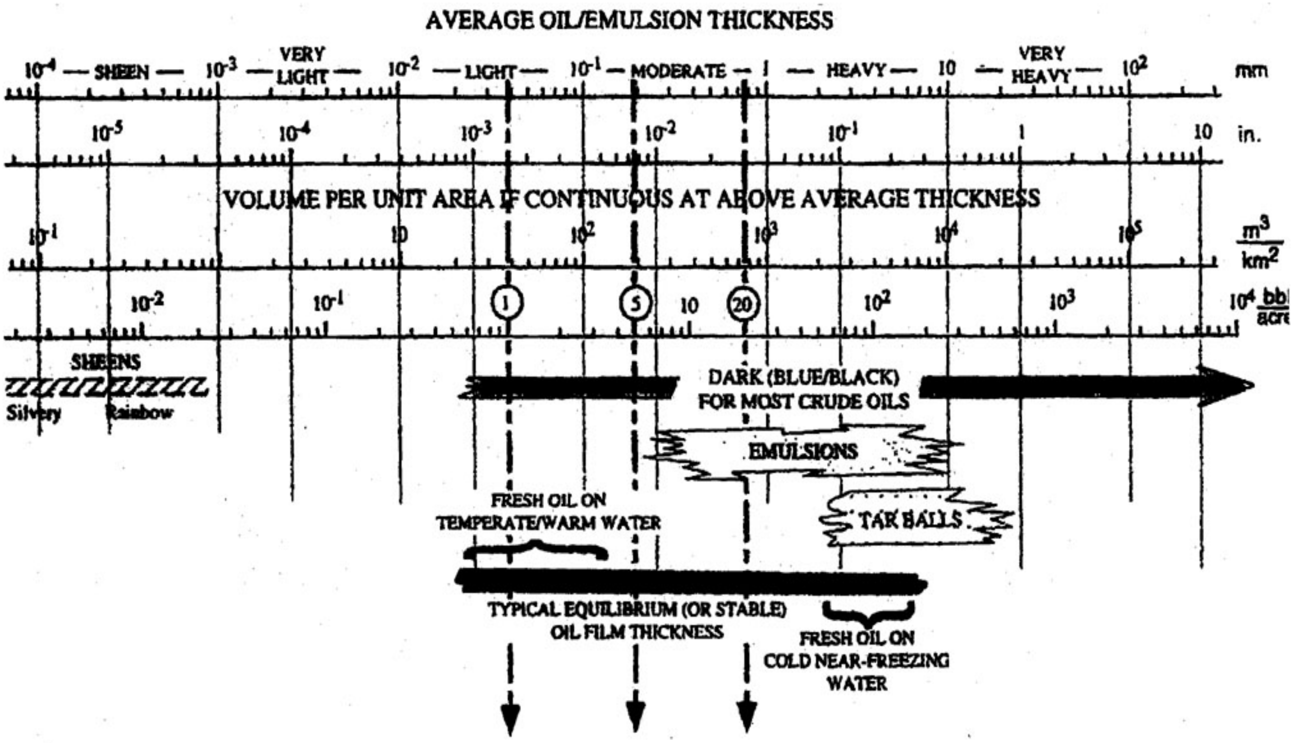
APPENDIX D

INSTRUCTIONS AND FORMS

D.1 Estimated dispersant dosages based on average oil thickness and dispersant-to-oil ratios

Average oil thickness **(inches)** (mm)	**Relative thickness**	**Dispersant-to-oil ratio (DOR)**						
		Oil concentration **(volume of oil/unit area)**	**1:1**	**1:5**	**1:10**	**1:20**	**1:50**	**1:100**
.0004 in (0.01 mm)	Very light to light	Gallons/acre	10.7	2.14	1.1	0.5	0.2	0.1
.001 in (0.02 mm)	Light	Gallons/acre	21.4	4.3	2.1	1.1	0.4	0.2
.002 in (0.05 mm)	Light	Gallons/acre	53.5	10.7	5.4	2.7	1.1	0.5
.004 in (0.1 mm)	Light to moderate	Gallons/acre	107	21.4	10.7	**5.4 ****	2.1	1.1
.019 in (0.5 mm)	Moderate	Gallons/acre	535	107	53.5	26.8	10.7	5.4
.04 in (1.0 mm)	Moderate to heavy	Gallons/acre	1070	214	107	53.5	21.4	10.7
.08 in (2.0 mm)	Heavy	Gallons/acre	2140	428	214	107	42.8	21.4
0.12 in (3.0 mm)	Heavy	Gallons/acre	3210	642	321	160.5	64.2	32.1

The 5 gallons/acre number was generated, assuming a light to moderate oil thickness and a DOR of 1:20. However, the table also makes it apparent that many other ratios may be appropriate depending on the volume or thickness of the spilled oil. How the oil behaves in the environment once it is spilled, and the dispersant application platform chosen, will also add a number of variables the FOSC will need to consider. Please see Discussion Note 9.1 for more information on slick thickness, oil volume, and dosage rate, as well as the figures in Appendices D.2 and D.3.



	DAY 3	DAY 2	DAY 1
Estimated Volume/Unit Area (bbl/acre)	1	5	20
Average Oil Thickness (inches)	0.0016	0.0077	0.031
Average Oil Thickness (millimeters)	0.039	0.197	0.79

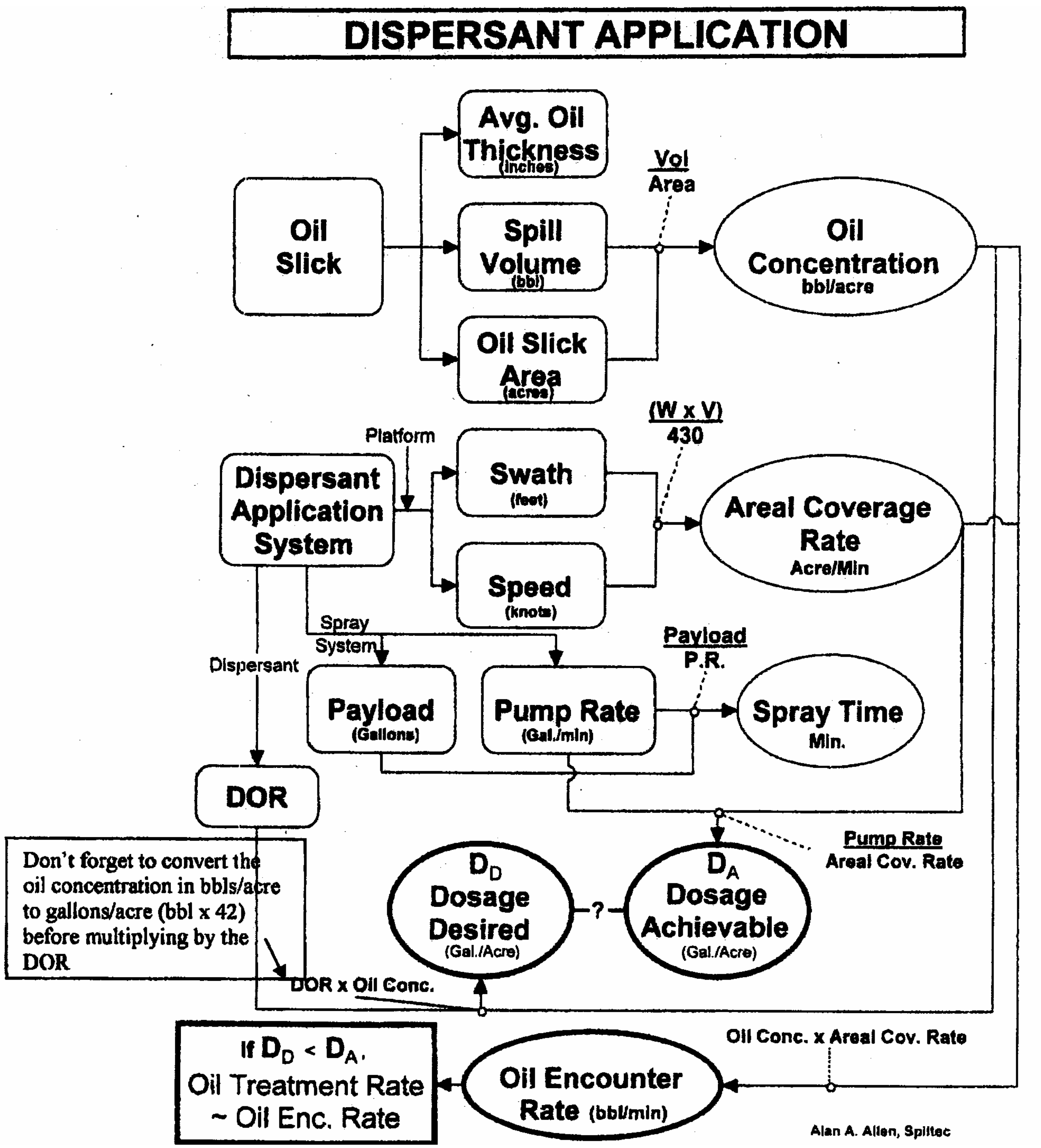
REPRESENTATIVE OIL CONCENTRATIONS & CORRESPONDING AVERAGE THICKNESS
(For Planning Purposes)

From Alan A. Allen (Spiltec), 2003 personal communication

D.2 Representative oil concentrations and corresponding average thicknesses

The circled numbers on the vertical lines in the figure above refer to 1, 5 and 20 barrels/acre as representative values for days 1, 2 and 3 following a significant crude oil spill.

D.3 **Oil slick characteristics and DOR as they apply to the dispersant application system**



D.4 Dispersant Application Summary Form

Incident name: ______________________________ Report number: __________

This report made by: ___________________________ Organization/agency: ____________________ Date: __________ Time: _______

Application parameters:

General location of application: __________________________________

Size of target area: __________________________________ (m^2/km^2/acres) Circle one

Volume of oil targeted: __________________________________ (gal/bbl) Circle one
(from Dispersant Pre-Approval Assessment Form)

Dispersant: oil ratio used: __________________________________

Volume of dispersant required: __________________________________ (gal/bbl) Circle one
(calculate or use Appendix D.1)

Diagram of application. Include scale, north arrow, location of oil, flight path and application location. Partition this box if multiple passes are expected so that each pass may be sketched.

Application platform:

Aircraft/Boat/Other: ___________________________

Type: ___________________________

Capacity: ___________________________

Pump rate: ___________________________

Swath width: ___________________________

Application speed: ___________________________

Application capacity:

Distance to slick: ___________________________

Base to spill return time: ________________________

Applications per hour: ________________________

Coverage per hour: ________________________

Application details:

Start time	Finish time	Total dispersant applied

In part from Cawthron, 2000

D.5 Monitoring dispersant effectiveness

Information in this section is based on the SMART (Special Monitoring of Advanced Response Technologies) Guidelines – a joint project of the U.S. Coast Guard, National Oceanic and Atmospheric Administration (NOAA), US Environmental Protection Agency (EPA), the Centers for Disease Control and Prevention and the Minerals Management Service. Additional information is from the NOAA HAZMAT Report 96-7.

- It is essential to monitor the effectiveness of dispersant applications on oil dispersion.
- It is desirable to monitor the fate of oil, and to assess the impact of dispersed oil on the environment.
- Monitoring intensity should reflect spill size and prevailing conditions, as well as the potential effects of the spill, and logistical and physical constraints. Monitoring intensity should increase with spill size as follows:

Spill size	Visual monitoring	Water column monitoring and sample collection	
		1 m depth	multiple depths
Small	✔		
Medium	✔	✔	
Large	✔	✔	✔

- Visual observation of dispersant effectiveness is the minimum acceptable level of monitoring.
- Termination of dispersant operations should, wherever possible, be based on real-time on-site water column monitoring results from at least one depth.
- Monitoring at multiple depths (either with real-time data or samples collected for later analysis) will provide the best information on dispersant effectiveness and the fate of dispersed oil.

Mobilizing monitoring resources

- It is imperative that monitoring teams and technical advisors are notified of possible dispersant use, and are mobilized as soon as possible (see **Box 1a).**
- Dedicated monitoring staff should be appointed and should not be expected to perform other operational functions.

Visual observation

- Visual observation from aircraft is the most reliable technique for detecting and mapping oil distribution.
- General aerial observation objectives include mapping the distribution and appearance of the oil, verifying the modeled forecast of oil movement, providing responders with an overview of the incident, and directing cleanup operations.
- Observations should be made using the General Observation Guidelines (Appendix D.4), Dispersant Observation Checklist (Appendix D.5) and Dispersant Observation Report Form (Appendix D.6).
- Observations should be photographed and/or videotaped for comparison and documentation.
- Oil close to the coastline is best viewed from a helicopter, ideally with a door or window removed allowing the observer to look straight down on the oil.
- For oil further offshore, multi-engine aircraft provide a longer range, higher speeds and wider margin of safety.
- As a minimum, the aircraft should have space for two observers (excluding the pilot), visibility from both sides, pilot-observer communications, and sufficient navigational aids to follow the proposed flight path.
- Prior to take-off, the observer should be aware of aircraft safety procedures, be familiar with the general spill area, have appropriate maps or nautical charts to record spill details, and know the environmental conditions likely to be encountered.
- Visibility, surface wind speed and direction, and sea state are all important for predicting oil movement and interpreting visual observations. Poor viewing conditions (*e.g.*, fog, rain, or overwashing in rough seas) can prevent observers from seeing the entire spill. Strong winds could indicate emulsification rates may be more rapid than anticipated.
- Advanced sensing instruments (*e.g.*, infrared thermal imaging, side-looking airborne radar, laser fluorescence, microwave radiometer, infrared-ultraviolet line scanner, LANDSAT satellite systems) can provide a high

Appendix D.5 continued

degree of sensitivity in determining dispersant effectiveness. Problems associated with each of these systems preclude their exclusive use during oil spills. Visual observations cannot always confirm that the oil is dispersed, and physical sampling of water beneath the slick may also be required.

Water column fluorometry and water samples

- Dispersant effectiveness can be confirmed in real-time by monitoring hydrocarbons in the water column using fluorometry.
- For medium and large spills, on-site monitoring is the preferred method for determining whether there is a significant difference between natural and chemical dispersion, and for deciding when dispersant operations should cease. It also provides the best means for determining the volume of chemically dispersed oil.
- Samples should ideally be collected at multiple depths from:
  - Water free of oil contamination (reference or control sites)
  - Water beneath the oil spill before dispersant application (pre-treatment)
  - Water beneath the oil spill after dispersant application (post-treatment)
- The time of sampling, instrument readings, relevant observations at selected time intervals and the exact position of each reading (preferably using Global Position System) must be recorded. Documentation of fluorometer calibration and verified instrument response should also be available.
- The sampling regime will depend on the availability of monitoring resources, the spill size and the logistical constraints of the response. At a minimum, sufficient samples are needed to characterize pre- and post-treatment differences relative to reference sites.
- As fluorometry measures natural fluorescence and not just oil, water samples should also be collected to allow fluorometry results to be related to measured oil concentrations. Fluorometry measures should be made using a continuous flow fluorometer. Water samples should be collected at the outlet port of the flow-trhough water duct, past the fluorometer cell. Water samples should be kept in a cool dark place prior to laboratory analysis.

Fate of dispersed oil

- Monitoring the track of the dispersed oil plume at several depths allows the dilution rate for the dispersed oil to be assessed, and the determination of the rate that hydrocarbon levels in the water column return to background levels.
- Trajectory models should be used where available to assist in tracking the plume. Dye markers can also be used.
- Oil fate monitoring requires:
  - Simultaneous monitoring from a single vessel using independent set-ups from at least two depths.
  - Collection of water samples to validate the fluorometer readings.
  - Wherever possible, measurement of water quality parameters (*e.g.*, temperature, conductivity, dissolved oxygen, pH, turbidity) to help explain the behavior of the dispersed oil.

Using and interpreting monitoring results

- Fluorometry readings will vary widely, reflecting the patchiness and inconsistency of the dispersed oil plume.
- Real-time data are essential if monitoring results are being used to guide dispersant operations and to determine when a response is no longer effective.
- An increase in the fluorometer signal trend beneath chemically dispersed oil of five times or greater than that of readings beneath untreated oil and reference sites is a good indication of dispersion occurring.
- It is important that actual oil concentrations are also measured so that the rate of natural dispersion can be compared to the rate of chemically enhanced dispersion, to determine the actual effect of dispersant use.

From Cawthron, 2000

D.6 General observation guidelines

- Wherever possible, use observers trained and experienced in identifying and quantifying oil floating on the sea;
- Use standard reporting terms (see below) and common guidelines to maintain consistency among observers.

STANDARD TERMS TO DESCRIBE OIL FLOATING ON THE WATER		
1	**Light sheen**	A light, almost transparent layer of oil. Sometimes confused with windrows and natural sheen resulting from biological processes.
2	**Silver sheen**	A slightly thicker layer of oil that appears gray, silvery or shimmers.
3	**Rainbow sheen**	Sheen that reflects colors
4	**Brown oil** (heavy or dull sheen)	Water-in-oil emulsion. Thickness typically 0.1 to 1.0 mm. Can vary depending on wind and current conditions.
5	**Mousse**	Water-in-oil emulsion. Colors can range from orange or tan to dark brown.
6	**Black oil**	Sometimes with a latex texture. Can look like kelp and other natural phenomena.
7	**Windrows** (fingers, stringers, streamers)	Oil or sheen oriented in lines or streaks. Brown oil and mousse can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.
8	**Tar balls**	Oil weathered into a pliable ball up to 30 cm. Sheen may or may not be present.
9	**Tar mats**	Non-floating mats of oily debris (usually sediment and/or plant matter) found on beaches or just offshore in shallow water.
10	**Pancakes**	Isolated patches of mostly circular oil (size range a few centimeters to 100s of meters in diameter). Sheen may or may not be present.

Oil on the water

- Oil is best viewed with the sun behind the observer, flying at a 30-degree angle to the slick.
- Mid-morning or mid-afternoon viewing is generally best, avoiding midday glare off the water and the limited contrast encountered in early morning or early evening.
- Overall spill dimensions are generally best viewed from an altitude of 1000-2000 feet.
- Estimating oil coverage and color are best from an altitude of 200-300 feet or less.
- Oil surface slicks and plumes can appear different for many reasons including oil or product characteristics, sun angles, viewing angles, type of observation platform, weather, light conditions, sea state, and dispersion rate.
- Waves, kelp beds, natural organics, pollen, plankton blooms, cloud shadows, jellyfish and algae can all look like oil under certain conditions.
- Low-contrast conditions (*e.g.*, overcast, twilight, haze) make observations difficult.

Dispersant applications

- May have variable effectiveness where different oil concentrations (spill thicknesses) result in variable oil/dispersant ratios being applied.
- May cause herding, temporarily “pushing” the oil together and making the slick appear to shrink, or to disappear from the sea surface for a short time.
- May change the color of an emulsified slick by reducing water content and viscosity.
- May change the shape of the slick, due to the de-emulsification action of the dispersant.
- May modify the spreading rates of oils (treated slicks can cover larger areas).

Dispersed oil plumes

- May not form immediately after dispersant application, especially if the oil is emulsified or there is low mixing energy.
- May not form or be visible at all.
- May be masked by surface oil and sheen or hidden by poor water clarity.
- May be mistaken for other things such as suspended solids.
- Are often highly irregular in shape and concentration.
- Can range in appearance from brown to white or cloudy.

Dispersant effectiveness

- A visible cloud in the water column indicates the dispersant is working
- Differences in the appearance of treated and untreated slicks indicate dispersion is likely.
- Boat wakes may physically part oil, falsely indicating successful dispersion.

D.7 **Dispersant Observation Checklist**

To be completed by dispersant observers on aircraft and vessels before departure

Incident name: ____ Report number:_____

This report by: ____________________ Organization: __________________ Date: ______ Time: ______

Observer name(s) and organizations: ____

____

Observation platform: Helicopter / aircraft / boat / other (specify): ____

Application platform: Helicopter / aircraft / boat / other (specify): ____

COMMUNICATIONS

	VHF	UHF	Other
Air to air:	____________________	____________________	____________________
Air to vessel:	____________________	____________________	____________________
Air to ground:	____________________	____________________	____________________
Ground to vessel:	____________________	____________________	____________________
Vessel to vessel:	____________________	____________________	____________________

	Aircraft/personnel names	Call sign	ETD to spill	ETA at spill
Sprayer 1:	____________________	____________________	__________	__________
Sprayer 2:	____________________	____________________	__________	__________
Spotter:	____________________	____________________	__________	__________
Observer:	____________________	____________________	__________	__________
Command Center:	____________________	____________________	__________	__________

DISPERSANT

Name: ____________________ Dispersant : oil ratio: ________________________________

Application altitude (ft): ____________________ Dilution prior to application (if any): ____________________

Observation altitude (ft): ____________________ Application rate: ________________________________

Circle one: gallons/acre, gallons/km^2, liters/hectare

WEATHER ❑ Sunny ❑ Overcast ❑ Cloudy ❑ Rain ❑ Fog

(Circle units used)

Sea state: __________	Wind speed: _________ knots	Air temp: ______ ºF
Wave height: __________ ft	Wind direction: _________ ºtrue/ºmagnetic	Sea temp: ______ ºF
Water depth: __________ft	Current speed: _________ knots	Salinity: ______ ppt
Visibility: __________nm	Current direction: _______ ºtrue/ºmagnetic	Tide: ______(flood/ebb/slack)

DISPERSANT OBSERVATION EQUIPMENT AND SAFETY CHECKLIST

Observation

- Basemaps, charts
- Clipboard, notebook, reporting forms, checklists
- Pens, pencils
- GPS, spare batteries
- Job aids for visual observation
- Camera, spare film
- Video camera, spare batteries
- Binoculars

Personal safety

- Lifejacket (and exposure suit if required)
- Survival equipments (*e.g.*, flares, locator beacon)

Safety brief

- Safety brief with pilot/skipper
- Purpose of mission
- Operational constraints
  - Area orientation, observation plan
- Trip duration
- Landing or mooring sites
- Radio frequencies and reporting schedule
- Safety features (*e.g.*, emergency locator beacon, fire extinguishers, first aid kit, radios)
- Emergency exit procedures
- Gear deployment (*e.g.*, current drogue, dye)

From Cawthron, 2000

D.8 Dispersant Observations Report Form

For recording dispersant observations from aircraft and vessels

Incident name: ____ Report number:_____

This report by: _______________________ Organization: ____________________ Date: ______ Time: ______

Application start time: _________________ (military time) Viewing difficulties (if any): _________________________
Application finish time: _________________ (military time) ____

VISUAL APPEARANCE OF SLICK (use standard definitions and visual guides of oil on water)

Before application	Immediately after application	20 minutes after application
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
______________________________	______________________________	______________________________
Film roll #: _____________________	Film roll #: _____________________	Film roll #: ___________________
Photo #: ________________________	Photo #: _________________________	Photo #: ______________________

Dispersion cloud observed? ❑ Yes ❑ No
Time taken for cloud to form: __________ minutes

Did oil re-appear (re-coalesce)? ❑ Yes ❑ No
Time taken to reappear: __________ minutes

% of slick treated: _________
% overspray: _________
Estimated % efficiency: _________

Describe any variation in effectiveness across slick:

Describe differences between treated and untreated areas:

Describe any biota present and any effects observed:

General comments/problems encountered:

Recommendations for future applications:

Start position
Latitude: ___________________________ north
Longitude: _________________________ west
Distance from shore: _________________ miles

Finish position
Latitude: ___________________________north
Longitude: _________________________ west
Distance from shore: _________________ miles

From Cawthron, 2000

D.9 **Wildlife Aerial Survey Form**

Incident name: ____ Survey #: ____ Flight # ____

Date: ___________ Survey page ____ of ____

Survey Crew: ____
____
____
____

Survey Equipment: _______________________________
____
____
____

Flight information:

Aircraft type: __________________________________

Start flight local time: ___________

End survey local time: ___________

End survey local time: ___________

End flight local time: ___________

Survey altitude range (ft): ___________

Physical conditions:

Wind (kts): _________ from direction: _____________

Cloud cover (%): _________ Seastate (wave height): ____ ft

Overall sighting conditions:

☐ Excellent ☐ Very good ☐ Good

☐ Fair ☐ Poor

Sighting #	Sighting specifics			General location
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
	Current altitude (ft):			
Comments:				

Wildlife Aerial Survey Form, continued

Incident name: ____ Survey #: ____ Flight # ____
Date: ___________ Survey page ____ of ____

Sighting #	Sighting specifics			General location
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Comments:				

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APPENDIX E

WILDLIFE SPOTTING AND MONITOR PROTOCOLS
TRUSTEE MONITORING DURING DISPERSANT OPERATIONS

The primary purpose of the trustee wildlife spotter (TWS) is to monitor dispersant operations and provide confirmation that dispersant application operations are being conducted in accordance with the policies and procedures for wildlife protection outlined in the dispersant use plan. Specifically, the trustee wildlife spotter is to ensure that:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Although it is the commitment of the RRT that wildlife trustee spotters be used when at all possible, dispersant operations will not be unduly delayed should a trained spotter not be available prior to dispersant application.

The trustee agencies with responsibility for oil spill prevention and response will select one trustee wildlife designee that will observe dispersant application operations and will be located in the dispersant spotter aircraft. It is the role of the trustee wildlife spotter to observe wildlife and assist the dispersant spotter and pilot avoid spraying of wildlife, making notes as necessary and appropriate to document the operation. If inadvertent spraying of wildlife occurs, the trustee wildlife spotter should make a note of this (including number of animals, species and location if possible) and include this information in his/her report to the Unified Command at the end of each dispersant operation. If at any time dispersant operations are not being conducted in accordance with the California Dispersant Plan, the trustee wildlife spotter should report back immediately to the Unified Command.

The trustee wildlife spotter should be properly trained to fulfill the functions required. Such training shall include:

1) Identification of marine birds and mammals from an aircraft, with special emphasis on species of concern during a dispersant operation;
2) General knowledge of dispersant application policies and procedures and annual training and coordination with operational personnel tasked with dispersant spotting in California;

3) General knowledge and understanding of the Incident Command System; and,

4) General aviation and safety knowledge.

E.1 Wildlife Aerial Survey Form

Incident name:___________________________________ Survey #: _____ Flight # _____
Date: ____________________ Survey page ____ of _____

Survey Crew: ___________________________ Survey Equipment: ___________________________
___________________________ ___________________________
___________________________ ___________________________
___________________________ ___________________________

Flight information:
Aircraft type: ________________________
Start flight local time:________________
End survey local time: ________________
End survey local time: ________________
End flight local time: ________________
Survey altitude range (ft): ________________

Physical conditions:
Wind (kts): _________ from direction___________
Cloud cover (%): _______ Seastate (wht): _____ ft

Overall sighting conditions:
☐ Excellent ☐ Very good ☐ Good
☐ Fair ☐ Poor

Dispersant Spraying Operations:

It is the policy of the RRT that the following stipulations apply for any dispersant use application:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Where dispersant use operations in accordance with these stipulations: ☐ yes ☐ no
If no, please elaborate ____
____
____
____
____
____

Wildlife Sighting:

Please note any observed wildlife in the grid below. Provide this information to the Resources at Risk Unit.

Sighting #	**Sighting specifics**			**General location**
	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			

Sighting	Number of animals:	Lat:	Taxa	
	Local time:	Long:	Species/ancillary ID info	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Comments:				

E.2 Sample Wildlife Aerial Survey Form

Incident name: *Santa Barbara Mystery Spill 34*
Date: *11Dec03*

Survey #: *1* Flight # *1*
Survey page *1* of *1*

Survey Crew: *Amelia Aviator -- pilot*
Joe Computer – data recorder
Bill Byrd – wildlife spotter
Olivia Oyle – dispersant spotter

Survey Equipment: *7 x 50 binoculars*
Garmin GPS
Digital camera
Tape recorder

Flight information:
Aircraft type: *Partenavia fixed-wing*
Start flight local time: *1400 PST*
End survey local time: *1415 PST*
End survey local time: *1510 PST*
End flight local time: *1530 PST*
Survey altitude range (ft): *400-1000 ft*

Physical conditions:
Wind (kts): *10-15* from direction: *NW*
Cloud cover (%): *ave. 60%* Seastate (wave height): *1-2* ft

Overall sighting conditions:
☐ Excellent ☐ Very good ☐ Good
☐ Fair ☐ Poor

Dispersant Spraying Operations:

It is the policy of the RRT that the following stipulations apply for any dispersant use application:

1) dispersants will not be applied directly to marine mammals within or outside of an oil slick:

2) dispersants will be applied in such as way as to avoid, to the maximum extent practicable, the spray of seabirds outside of the oil slick are being treated

3) if sea birds and/or marine mammals are present in the dispersant application area, the application of dispersants will be dictated by the first two stipulations.

Where dispersant use operations in accordance with these stipulations: ☐ yes ☐ no
If no, please elaborate:____

Wildlife Sighting:

Please not any observed wildlife in the grid below. Provide this information to the Resources at Risk Unit.

Sighting #	Sighting specifics			General location
1	Number of animals:*12*	Lat: *34 23.22 N*	Taxa: *Avian*	*NE corner of spill, 100m from leading edge*
	Local time: *1430*	Long: *119 43.23 W*	Species/ancillary ID info: *Brown pelicans*	
	Current altitude (ft): *450*			
Sighting *2*	Number of animals: *300*	Lat: *34 24.11 N*	Taxa: *Unknown*	Center of spill, in oil
	Local time: *1000*	Long: *119 33.87 W*	Species/ancillary ID info: *UNID small cetaceans*	
	Current altitude (ft): *1000*			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	
	Local time:	Long:	Species/ancillary ID info:	
	Current altitude (ft):			
Sighting	Number of animals:	Lat:	Taxa:	

E.3 List of experienced aerial wildlife observers

This list is drawn in part from the List of Wildlife Experts and Contractors from Appendix 1b of the Wildlife Response Plan, a stand-alone response resource to use with each of California's Area Contingency Plans. Individuals excerpted from that list are those with aerial wildlife observation experience. Others listed are known to the response community as also having the requisite aerial observation skills and potentially available to help implement the Wildlife Observation Protocols during a dispersant response.

We offer here some of the same insights and caveats found in the Wildlife Response Plan:

> *"In general, the listing is divided into marine birds and marine mammals [experts}, with a few having expertise in near shore terrestrial animals. The list includes individuals who have a history of cooperation with [the California Department of Fish and Game] CDFG (other than individuals already known ... through the Oiled Wildlife Care Network – OWCN). It includes both agency personnel and private consultants statewide. This list is not comprehensive; some qualified individuals or companies may not be included. This list is not an endorsement of the ability of the personnel shown.*
>
> *This list was generated as a resource to [the Office of Spill Prevention and Response] OSPR field responders to aid in addressing wildlife issues and environmental sensitivities during spill response. Individuals on this list may be valuable to a spill response in many ways. For example, 1) local experts will often have site-specific knowledge (e.g., status of local populations, breeding status, abundance, seasonal occurrence) which will be necessary for effective spill response planning, 2) agency personnel shown can assist by recommending individuals from this list or others that may not be listed who may also be willing to participate in the response, 3) staffing Wildlife Reconnaissance functions, and 4) endangered species consultation and monitoring.*
>
> *Generally, all personnel listed, other than agency personnel, have indicated an ability to travel and work statewide. Spills involving endangered species and/or marine mammals will require special expertise. Non-agency affiliated personnel who are shown having expertise with listed species and marine mammals generally have permits and/or MOUs with CDFG, USFWS and/or NMFS."*

While these observers have the training and approvals necessary to assist in wildlife surveys during an oil spill response, they have not yet been separately briefed, pre-trained or vetted relative to the more particular needs of implementing the Wildlife Aerial Observation Protocols during a dispersant application.

This is a preliminary list that will be updated once experienced observers have been identified, trained in the specific dispersant-related Wildlife Observation Protocols, and vetted by the responsible federal and state trustee agencies. This list below is offered for the interim.

E.3 List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS (THIS DOCUMENT IS CURRENTLY BEING UPDATED)

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Adams, Josh	Seabird capture, handling, ID, at-sea survey, radio telemetry, Monterey Bay to San Mateo county coast.	USGS	Work: 831-771-4422 Cell: Home: 831-684-9317 Emergency: home Email: Josh_Adams@usgs.gov
Ainley, David*	Seabirds, boat surveys	Harvey and Associates	Work: 408-263-1814 or 415-332-5718 Cell: Home: Emergency: Email:
Ames, Jack	Sea otters, oil spills, boat/shore/aerial sea otter surveys	CDFG-OSPR	Work: 831-469-1740 Cell: 831-212-7010 Pager: 408-939-5489 Home: 831-633-5294 Emergency: pager or cell Email: james@ospr.dfg.ca.gov
Anderson, Dan*	California brown pelican, waterbirds, pollution ecology	University of California	Work: 530-752-2108 Dept. office: 530-752-6586 Email:
Applegete, Tom	Shorebirds, California least tern, western snowy plover, waterfowl, SLO and Santa Barbara counties	Wildwing	Work: 805-764-2780 Cell: 805-235-1728 Home: Emergency: work or cell Email: wildwing@onemain.com
Boyce, Jennifer*	Seabirds, oil spills	NOAA, Restoration Center	Work: 562-980-4086 Cell: Home: Emergency: Email: Jennifer.boyce@noaa.gov
Burkett, Esther*	Marbled murrelet	CDFG-HCPB	Work: 916-654-4273 Cell: Home: Emergency: Email: eburkett@dfg.ca.gov
Colwell, Mark	Shorebirds, waterbirds	Humboldt State University	Work: 707-826-3723 Cell: Home: 707-822-7309 Emergency: home Email:
Copper, Elizabeth	California least tern	Avian Research Associates	Work: 619-435-1340 Cell: Home: Emergency: Email: ecopper@san.rr.com
Ford, Glenn	Seabirds	R.G. Ford Consulting	Work: 503-287-5173 Cell: 503-282-0799 Home: Emergency: Email: eci@teleport.com

E.2, continued **List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS**

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Garrett, Kimball	Birds	Los Angeles County Museum of Natural History	Work: 213-763-3368 Cell: Home: Emergency: Email: kgarrett@nhm.org
Golightly, Rick	Seabirds, seabird colonies, oil spills	USGS-BRD	Work: 707-826-3952 Cell:530-304-4118 Home: Email: rtg1@humboldt.edu
Gorbics, Carol	Seabirds and sea otters. Alternate to Katy Zeeman.	USFWS	Work: 760-431-9940 x 214 Cell: 760-271-6934 Home: 760-804-3984 Emergency: Email:
Gress, Frank*	Seabirds, California brown pelican	CA Institute of Environmental study	Work: 530-756-6944 or 530-756-1175 Cell: Home: Emergency: Email; fgress@pacbell.net
Harvey, Jim*	Seabird and shorebird surveys, seabird and pinniped handling, marine mammals, Santa Cruz and Monterey counties	Moss Landing Marine Labs	Work: 831-632-4400 Cell: Home: Emergency: Email: harvey@mlml.calstate.edu
Haulena, Martin	Marine mammals and sea turtles, Mendocino to SLO counties	The marine Mammal Center	Work: 415-289-7370 Cell: 415-819-2254 Home: Email: haulenam@tmmc.org
Henkel, Laird	Aerial wildlife observation Seabird and shorebird surveys	CDFG-OSPR	Work: 831- 649-2880. Cell: 831-212-7665 Home: Emergency: home or cell Email: lhenkel@ospr.dfg.ca.gov
Hewitt, Ro	Western snowy plover, bird ID, local avifauna, California and southern Oregon	LBJ Enterprises	Work: 707-442-0339 Cell: phone 707 496 0854 Home: 707-269-0271 Emergency: home or cell Email: lbjent@humboldt1.com
Imai, Randy	Aerial wildlife observations, oil spill mapping and technology	CDFG-OSPR	Work: 916-324-0000 Cell: 916-826-5271 Pager: 916-360-2232 Home: Emergency: pager or cell Email: rimai@ospr.dfg.ca.gov
Jurek, Ron*	Snowy plover, least tern, shorebirds, birds, raptors	CDFG-HCPB	Work: 916-654-4267 Cell: Home: Emergency: Email: rjurek@dfg.ca.gov
Keane, Kathy	California least tern	Keane Biological Consultants	Work: 562-708-7657 Cell: 562-708-7657 Home: Emergency: Email: keanebio@yahoo.com

E.2, continued **List of wildlife experts potentially able to assist in dispersant-related implementation of the WILDLIFE OBSERVATION PROTOCOLS**

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Kovacs, Karen*	Wildlife, waterbirds	CDFG-Eureka	Work: 707-445-6493 Cell: Home: Emergency: Email: kkovacs@dfg.ca.gov
LeValley, Ron	Waterbirds, marbled murrelet, snowy plover	Mad River Biologists	Work: 707-839-0900 Cell: 707-496-3326 Home: Emergency: Email:
Karl Mayer	Specialty/ Geographic Area: Sea Otters, marine mammals, land/ boat basedsea otter surveys, sea otter capture/ handling; Santa Cruz, Monterey, SLO counties	Monterey Bay Aquarium	Work phone: (831)644-7595 Cell phone: (831)915-2635 Email: kmayer@mbayaq.org
McAllister, Sean	Waterbirds, marbled murrelet, snowy plover, oil spills	Mad River Biologists	Work: (707) 442-4302 Cell: (707) 496-8790 Home: Emergency: Email: sean@madriverbio.com
McChesney, Gerry	Seabirds, seabird colonies, oil spills	USFWS, San Francisco Bay NWR	Work: 510-792-0717 Cell: Home: Emergency: Email:
Nevins, Hannah	Seabird and shorebird surveys, seabird and pinniped handling	Moss Landing Marine Labs	Work: 831-771-4422 Cell: Home: Emergency: home Email: hrnevins@hotmail.com
Ralph, C.J.	Marbled murrelet, seabirds, oil spills	US Forest Service	Work: 707-825-2992 Cell: Home: 707-822-2015 Emergency: Email: jcr2@homboldt.edu or cjralph@humboldt1.com
Roletto, Jan	Wildlife, marine mammals, oil spills	Gulf of the Farallones NMS	Work: 415-561-6622 Cell: home: Emergency: Email: j.roletto@noaa.gov

E.2, continued List of wildlife experts potentially able to assist in dispersant-related implementation of WILDLIFE OBSERVATION PROTOCOLS

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Sharp, Brian	Waterbirds, oil spills	Sharp	Work: 541-763-2050 Cell: Home: Emergency: Email: ecoperspectives@yahoo.com
Singer, Steve	Marbled murrelet, birds	Singer	Work: 831-427-3297 Cell: Home: Emergency: Email:
Strong, Craig	Seabirds, shorebirds, special expertise with brown pelicans, waterfowl, marine mammals and marbled murrelet; west coast, San Diego-WA, Del Norte and Humboldt counties	Crescent Coastal Research	Work: 503-338-6023 Cell: 503-791-0509 Home: 503-338-5510 Emergency: home Email cstrong@pacifier.com
Swanson, Jim	Region 3 biologist	CDFG	Work: 707-944-5528 Cell: Home: Emergency: Email: jswanson@dfg.ca.gov
Sydeman, Bill*	Birds, oil spills	Point Reyes Bird Observatory	Work: 415-868-1221 Cell: Home: Emergency: Email: waterislife@hotmail.com
Tershey, Bernie	Seabirds	Island Conservation, Center for Ocean Health	Work: 831-459-1461 Cell: Home: Emergency: Email: tershey@islandconservation.org
Zeeman, Katy	Endangered species, wildlife, sea otters; Ventura through San Diego counties	USFWS	Work: 760-431-9440 x 291 Cell: Home: Emergency: Email: Katie_zeeman@fws.gov
Other Experienced Observers			
Boggs-Blalack, Melissa	Regional marine biologist, oil spills	CDFG-OSPR	Work: 805-772-1756 Cell: 805-558-1005 Pager: 805-614-2106 Home: Emergency: cell or pater Email: mboggs@ospr.dfg.ca.gov
Croll, Don	Seabird identification, surveys	University of California Santa Cruz, Center for Ocean Health	Work: 831-459-3610 Cell: Home: Emergency: Email: croll@biology.ucsc.edu
DeVogeleare, Andrew	MBNMS marine research director	Monterey Bay National Marine Sanctuary	Work: 831-647-4213 Cell: Home: Emergency: Email: andrew.p.devoglaere@noaa.gov

E.2, continued List of wildlife experts potentially able to assist in dispersant-related implementation of WILDLIFE OBSERVATION PROTOCOLS

Name (* Info not verified)	**Specialty/Geographic Area Covered**	**Agency/Company/ Organization**	**Contact Numbers**
Faurot-Daniels, Ellen	Land/boat/aerial sea otter surveys, oil spills, marine biologist, supervisor	California Coastal Commission	Work: 415-904-5285 or 831-427-4852 Cell: 831-334-2134 Pager: 415-201-5792 Home: 831-726-1750 Emergency: pager Email: efaurotdaniels@coastal.ca.gov
Harris, Mike	Land/boat/aerial sea otter surveys	CDFG-OSPR	Work: 805-772-135 Cell: 831-212-7090 Pager: 805-348-9316 Home: Emergency: cell or pager Email: mikeharris@ospr.dfg.ca.gov
Hatfield, Brian	Land/boat/aerial sea otter surveys	USGS-BRD	Work: 805-927-3893 Cell: 805-305-2121 Home: Emergency: Email: brian_hatfield@usgs.gov
Kenner, Mike	Land/boat/aerial sea otter surveys	USGS-BRD	Work: 831-459-3244 Cell: Home: Emergency: Email:
Kieckhefer, Tom	Cetaceans and sea otters	Pacific Cetacean Group and Friends of the Sea Otter	Work: 831-582-1030 or 831-373-2747 Cell: Home: Emergency: Email: kieckhefer@aol.com or education@seaotters.org
Kong, Corey	Los Angeles/Long Beach Area Environmental Scientist – Oil Spills	Dept. Fish and Game, Office of Spill Prevention and Response	Work: 562-598-6203 Cell: 562-477-7081 Pager: 562-400-4181 Home: Emergency: Email: ckong@ospr.dfg.ca.gov
Lewis, Robin	Regional marine biologist and supervisor, oil spills	CDFG-OSPR	Work: 858-467-4215 Cell: 619-972-0507 Pager: 619-893-2969 Home: Emergency: cell or pager Email: rlewis@ospr.dfg.ca.gov
Staedler, Michelle	Land/boat/aerial sea otter surveys	Monterey Bay Aquarium	Work: 831-648-4976 Cell: 831-594-7Pager: Home: Emergency: Email: mstaedler@mbayaq.org
Stewart, Julie	Land/boat/aerial sea otter surveys	Monterey Bay Aquarium	Work: Cell: 831-254-0949 Pager: Home: Emergency: Email: jstewart@mbayaq.org
Tinker, Tim	Land/boat/aerial sea otter surveys	UC Santa Cruz	Work: 831-459-2357 Cell: 831-254-9748 Pager: Home: Emergency: Email: tinker@biology.ucsc.edu

APPENDIX F

PUBLIC COMMUNICATIONS PLAN

F.1 Sample Press Release for use in the California Pre-Approval Zone

Attention: Proposed Use of Chemical Dispersants

In response to oil spill cleanup issues associated with the ________________________ oil spill incident, the Unified Command has given approval for the use of the chemical dispersant ________________ to promote rapid oil dispersion into the surrounding water column during this incident and under the following conditions:

The dispersant use meets the "pre-approval zone" criteria as set forth in the California Dispersant Use Plan – Pre-approval zone checklist and as approved by the Region IX Regional Response Team, ensuring;

- the application of dispersants will be in the off-shore waters off the state 3 – 200 miles and not within a National Marine Sanctuary;
- the application of dispersants provides a net environmental benefit for species at risk from this oil spill and/or of species of special concern; and,
- the application of dispersants can be done safely and in accordance with standard marine and aviation practices.

As a part of the Unified Command's decision for dispersant use, federal and State Trustee Agencies **(list agencies, as necessary)** identified the (**list species of special concern in which dispersant use will potentially benefit**) as species of special concern and of significant risk of injury from this oil spill, especially if the spill were allowed to spread and hit sensitive habitats and shorelines. Wildlife and resource agencies believe that these species will be benefited by the use of dispersants and will monitoring the operations as appropriate for these species. (**provide any information, as necessary on fisheries and plans for any seafood tainting panels)**

In addition, dispersant use operations will be monitored by **(list the agencies; contacts of necessary**) using the methodology developed by the US Coast Guard (1999) Special Monitoring of Applied Response Technologies (SMART) protocols and as specified in the California Dispersant Use Plan. These protocols are designed to determine the effectiveness of dispersant use, thus providing a feed-back loop to the Unified Command for when operations should be terminated.

Close the press release with information on any press conferences or public meetings that will be held, where to get additional information, etc. . . and/or any telephone numbers of contact information that people can use.

FI.b. Oil Spill Dispersants: Frequently Asked Questions (FAQs)

1. Why are chemical dispersants used on an oil spill ?

Dispersants are used to minimize the environmental impact of an oil spill.

Dispersants *do not eliminate the problem of an oil spill* but are intended as a means of reducing the overall environmental impact of an oil slick at sea. Oil Spill Dispersant use accelerates the weathering and biological breakdown of oil at sea and *reduces the impact of oil on sensitive nearshore environments*.

Oil Spill Dispersants are also highly effective in *reducing exposure of sea birds and marine mammals to oil* as most sea birds are oiled by slicks on the surface of the sea or in near shore coastal habitats.

Undispersed slicks and residual oils are a persistent threat to nearshore, birds, mammals and intertidal communities due to the toxicity of, and contact with oil. Dispersed oil is less "sticky" than undispersed oil, therefore the adhesion and absorption onto surfaces and sediments of dispersed oil is greatly reduced compared with the original oil slick.

In a spill incident environmental trade-offs of protection and sacrifice will occur. These decisions are not taken lightly by response authorities and will be based on the best available advice and scientific data to achieve a net environmental benefit.

2. What are oil spill dispersants ?

Dispersants are chemical formulations with an active ingredient called surfactants. Surfactants are specifically designed chemicals that have both hydrophilic (water liking) and oleophilic (oil liking) groups in the chemical compound. These chemicals reduce the interfacial tension between the oil and water and helps the creation of small oil droplets, which move into the water column facilitating quicker natural biological breakdown (biodegradation) and dispersion. By decreasing the size of the oil droplets, and dispersing the droplets in the water column, the oil surface area exposed to the water increases and natural breakdown of the oil is enhanced. Thus removing the threat of the oil from the water surface to within the water column.

Dispersion is a natural process that occurs in surface slicks as wind and wave action break up the surface slick. However, naturally dispersed oil droplets tend to recoalesce and return to the water surface and reform as surface slicks. The additional of chemical disprsants allows the wind and wave action to then carry the small oil drolets away and dilut the concentration of the droplets in the water colum; these dispersed oil droplets are then targeted by indigenous oil-consuming microbes wehre they are broken down into the ultimate components, carbon dioxide and water.

3. On what basis is the decision made to use dispersants in a spill incident?

The main basis for decision making in determining whether oil spill dispersant will be used is:

" Will the application of the chemical dispersant to the spilled oil minimize the overall environmental impact of the oil spill?"

Except for the impact on marine birds and mammals, the most damaging effect of oil spills is when the oil strands on shorelines or enters restricted shallow waters like estuaries. Oil Spill Dispersants are a prime and vital response tool to stop oil coming ashore or from entering sensitive nearshore environments especially when weather and sea conditions do not allow the use of oil containment and recovery equipment.

Oil Spill Dispersants are usually not applied to oil spills in "near shore areas" for example: where sea grass beds, oyster beds, mariculture or coral reefs are present. However, dispersant use may be authorized by the Region IX Regional Response Team in these circumstances when there is a possibility of an impact of oil on a more sensitive nearhore habitat, or wildlife impacts are possible. For example, when an approaching oil slick may impact sensitive mammal breeding areas, or endangered species such as migratory birds.

4. What are the negative effects of dispersants on the environment ?

The acute toxicity of dispersed oil generally *does not reside in the dispersant* but in the more *toxic fractions of the oil*. Dispersing oil into the water in situations where there is little water movement or exchange, such as shallow embayments, increases exposure of subsurface, benthic organisms and fish to the toxic components of the oil.

Fish and other marine life in the larvae stage or juvenile stages are more prone to the toxicity effects of oil and dispersants. Therefore it is unlikely dispersants will be used near commercial fisheries, important breeding grounds, fish nurseries, shellfish aquaculture etc. unless it is to protect a more important environmental resource.

Seagrasses and coral reef communities are particularly sensitive to dispersed oil because instead of the oil "floating over" the reefs and submerged seagrass beds the oil/dispersant mixture in the water colour will *come into direct contact with these sensitive ecosystems.*

Generally there is a reluctance by spill responders to use dispersants in shallow waters less than 30 feet deep, although there may be situations where using dispersants could save nearshore impacts or wildlife.

5. Who authorizes the use of dispersants during an oil spill response?

Under the Oil Pollution Act of 1990, the Region IX Regional Response Team is vested with the authority over dispersant use for marine oil spills. Subpart J of the National Contingency Plan (NCP) provides that the Federal On-Scene Coordinator (FOSC), with the concurrence of the EPA representative to the Regional Response Team and the State with jurisdiction over the navigable waters threatened by the oil discharge, and in consultation with the U.S. Department of Commerce (DOC) and U.S. Department of the Interior (DOI) natural resource trustees, when practicable, may authorize the use of dispersants on oil discharges; provided, however, that such dispersants are listed on the NCP Product Schedule and licensed for use by the State of California.

The California Dispersant Use Plan outlines the process by which the Federal On-Scene Coordinator can undertake a dispersant use decision and provides the criteria to determine if a spill meets the requirements outlined by the RRT for pre-approval of dispersant use. If all the pre-approval criteria is met, the FOSC can authorize the use of dispersants. If it is determined that a spill does not meet the pre-approval, then the final decision for a dispersant-use determination rests with the RRT

6. How effective are oil spill dispersants ?

Chemical dispersants aid the natural dispersion of oil by reducing the oil/water interfacial tension and, along with the natural motion of the sea, allow the break up of oil on the water into very fine droplets.

Effectiveness of oil dispersion by chemical dispersants at sea is governed by a range of conditions and include the:

- type and chemistry of the oil,
- degree of weathering of the oil,
- the thickness of the oil slick,
- type of dispersant,
- droplet size and application ratio,
- prevailing sea conditions (wave mixing energy), and
- sea temperature and salinity.

7. Will dispersants work on all types of oils ?

No, dispersants will not work on all oil spills.

The first rule in combating oil spills with dispersants is that the oil must be amenable to dispersant use. It is also well understood by oil spill response agencies that *dispersants are only effective on certain types of oils* and the first priority is always to determine the spilled oil's physical and chemical properties in order to assess combat options.

It has been generally accepted that non-dispersable oils are;

non-spreading oils (pour point is higher than sea temperature), highly viscous oils (> 2000 Centistokes (cSt) - a measurement of the mobility of oil), a water-in-oil emulsion has formed (mousse).

A "rule of thumb" amongst spill responders as to whether or not a dispersant will work has historically been - "a dispersant may have a reasonable success rate if the oil is continuing to "flow" or spread as a fluid (not just sheening)".

Unfortunately this "rule of thumb" is only partly correct. The properties of these oils are determined by their chemical composition which vary widely. For the purposes of determining the use of dispersants at various sea temperatures the important properties are:

- the specific gravity (or API gravity),

- pour point, and
- viscosity.

Pour point and viscosity of a spilt oil are the dominant factors for the determination dispersant use. The California Dispersant Use Plan provides an outline of this information that can assist responders at the time of an oil spill incident

8. How quickly do we need to apply dispersants to an oil spill ?

As quickly as possible!

There is only a limited "window of opportunity" to use chemical dispersant in an oil spill incident. This is primarily due to the changing properties of the spilt oil due to weathering of the oil, but is also governed by the location and speed of movement of the slick onto the foreshores or into estuarine environments.

This window of opportunity may be as little as only a few hours. Sometimes if the conditions are favourable, a day or two.

Therefore it is essential that the capability exists to quickly activate and deploy resources anywhere across California to deliver and apply oil spill dispersants at sea.

9. What are the Health and Safety Issues Associated with the Use of Chemical Dispersants During An Incident?

Response workers must be careful to ensure that personnel do not get sprayed by the dispersants, or come in contract with any of the overspray. Vessels must only be deployed under safe sea conditions.

10. Are There any Waster Generation of Disposal Issues Associated with the Use of Chemical Dispersants?

Effective use of dispersant agents should signficatly reduce the amount of oil wastes generated.

F.2 General risk communication guidelines

- **Know the stakeholders**

  Identifying both external and internal stakeholders and finding out their diverse and sometimes competing interests and concerns is the first step to any successful risk communication effort. The best way to determine stakeholder interests and concerns is to ask them! Conduct interviews with key leaders both outside and inside your organization. Use the information gathered in this step to develop your risk communication program for establishing collaborative problem-solving and communication efforts.

- **Simplify language and presentation, not content**

  When trying to communicate the complex issues behind a health risk, it is easy to leave out information that seems to be overly technical. Risk communication research and studies have proven that all audience members can understand any technical subject if it is presented properly. This can be done, for example, through the use of visuals and diagrams and by defining all technical, medical and scientific jargon and acronyms.

- **Be objective, not subjective**

  It is often very easy to differentiate between opinions and facts. It can be difficult, however, to respond credibly to opinions without substantiating them or offending the individual asking the question. In order to maintain credibility, respond to both opinions and facts in the same manner.

- **Communicate clearly and honestly**

  To communicate clearly, present information at the audience's level of understanding. People can reject information that is too difficult for them or they can reject a communicator who is perceived to be dishonest or untrustworthy. As a result, they may refuse to acknowledge the information or become hostile. On the other hand, they may become hostile if they feel patronized. The bottom line is – know the audience! In addition, whenever possible, provide familiar examples and concrete information that can help put the risk in perspective.

- **Deal with uncertainty**

  When communicating health risks, results are not definitive. Discuss sources of uncertainty, such as how the data were gathered, how they were analyzed, and how the results were interpreted. This demonstrates that the uncertainties are recognized, which can lead to an increase in trust and credibility. However, when discussing uncertainty, the communicator should stress his or her expertise and knowledge of the subject. This will reinforce the leadership's ability to handle the situation and could allay concerns and fears regarding the risk and the risk-management decision.

- **Be cautious when using risk comparisons**

  In order to put risks in perspective, comparing an unfamiliar risk to a familiar one can be helpful. However, some types of comparisons can alienate audience members. Avoid comparing unrelated risks, such as the risks associated with smoking versus those associated with air contamination. People rarely accept the comparison of unrelated risk.

- **Develop key messages**

  Key messages are those items of importance, the health risk information that needs to be communicated. They must be clear, concise, and to-the-point. No more than three messages should be communicated at one time. Repeat key messages as often as possible to ensure they are not misunderstood or misinterpreted.

- **Be prepared**

  Most questions and concerns can be anticipated if the audience is known. In fact, the communicator should know 70 percent of the possible questions that could be asked. Consider how to answer general questions and how to respond to specific inquiries.

F.3 Risk communication guide for state or local agencies

Much of the following is excerpted from "Risk Communication Guide for State and Local Agencies", produced be the California state Office of Emergency Services (October 2001). The full copy of the report can be requested from Yvonne Addassi (OSPR; see Appendix A) or by accessing the following internet web site:

http://www.oes.ca.gov/oeshomep.nsf/all/RiskGuide/$file/RiskGuide.pdf

Key risk issues often of interest to the community

- Consequences of worst-case and alternative scenarios and the likelihood of disaster.
- Local government and community emergency response actions, and how those have been factored into state and federal response actions.
- Community notification systems.
- Perceived risks as reported by the media.
- Use of standards and accepted practices.
- Safety thresholds and limits.
- Acceptance of the decision process and decisions by the technical, scientific and environmental communities
- Other potential considerations (*e.g*., business (including commercial fishing and tourism) and recreation (including fishing and beach access) impacts.

- Pay as much attention to community outrage factors, and to the community's concerns, as you do to scientific data. At the same time, do not underestimate the public's ability to understand technical information.

General risk perception and communication issues

- Risks under individual control are accepted more readily than those subject to industry or government control.

At the time of an actual spill response and/or a decision to use dispersants, response actions will be directed by the Unified Command. It is important that during an oil spill emergency response, actions taken are quick, well-considered, yet nevertheless directive. To offset public unease at how heavy-handed this may seem, it will be helpful to briefly review how various stakeholder groups and the public were included in preceding dispersant response planning process, and how the current dispersant decision is being guided by real-time data gathering. Also include information on other agency consultations, and how particular concerns about living resources, fishery impacts, and socioeconomic impacts will be addressed.

- Risks that seem fair are more acceptable than those that seem unfair.

It may be helpful to explain the Net Environmental Benefit Analysis process that was used in the response planning phase. At that time, it was determined that 1) harm would occur as a result of a spill, and 2) the goal is to minimize the overall harm and spare the most sensitive resources, and provide a net environmental benefit. However, the communicator will also need to address questions of impacts to business and coastal and ocean access, as these were not considered at the time that net environmental benefits were being weighed during the planning process.

- Risk information that comes from trustworthy sources is more readily believed than information from untrustworthy sources.

Use the guidance offered above in Appendix F.2.

- Exotic risks seem more dangerous than familiar risks.

Use of dispersants in California is not yet a common oil spill response practice. The public will expect to see that all other means to recover oil using the more traditional mechanical means have been considered. They also need to understand the circumstances under which dispersants may cause less harm to the environment than would those more traditional mechanical recovery tools, and how all means to recover and/or re-locate the oil to less sensitive environmental "compartments" will be used.

- Risks that are "undetectable" are perceived as more dangerous.

It is extremely likely that the public will interpret a decision to use dispersants as a decision to "hide" the oil. These concerns need to be addressed openly and honestly, drawing on the communication tools in Appendix F.2 as well as the resource impact information generated during the dispersant Net Environmental Benefit Analysis response planning process.

F.3, continued

Possible objectives of a risk communication program

- Research the issues with stakeholders to gather sufficient information to identify the most important risk communication objectives to address.
- Identifying the stakeholders to anticipate or assess their varying interests, in order to design an effective risk communication program is a critical initial task.
- Stakeholders can include the residential, business, commercial or industrial communities, your agency and other agencies (local and state governments, special districts), environmental groups, and general interested members of the public. Media members may also be present.
- The level of stakeholder interest is a driving force in the assignment of risk communication priorities -- properly identifying and understanding all stakeholder objectives will enhance risk communication effectiveness.
- Communication objectives may include:
  - informing the community, seeking input or feedback, clarifying the probability and consequences of potential risks, addressing existing controversies or concerns, providing a forum for discussion, improving stakeholder understanding and support of government decisions, clarifying agency roles in controlling risk, coordinating federal and state emergency response plans with local government and business emergency response plans, and satisfying regulatory requirements to communicate risk.
- Potentially important objectives during and after the incident include:
  - retaining credibility and trust, clarifying how the current incident compares to the previously assessed risk, identifying how lessons-learned will be used to decrease risks and consequences in the future, and providing enhancements to future community emergency response.

Defining effective risk communication activities during and after incidents

- If an incident was noticed by or impacted the public, time is of the essence in providing information to the community.
- Several communication media (*e.g*., newspapers, television, radio, technical journals) will be readily available, but not necessarily controllable.
- The community will gauge the success of the incident investigation efforts and control of causal factors by how much information is communicated to the community.
- If there is a high degree of uncertainty, focus the risk communication effort on what is being done to control the emergency. Keep the communication channels open.
- Contact news media to provide information. See "**Guidelines for meeting with the media**" below. If there is uncertainty with respect to event chronology or causes, release the information prudently and properly identify that the information is preliminary, but additional information will be provided as it becomes available.
- After an incident:
  - Ensure that any preliminary information has been verified, clarified or modified so that future references to the incident will be factual.
  - Follow-up with local and regional media to verify key information and provide a close-out mechanism for the spill response.
  - Be honest and candid with the public and media, using the guidelines in Appendix F.2.a

Choosing the right representatives

- Use field/community relations staff to relay community concerns within the agency.
- Choose carefully those who represent the agency, and provide appropriate support (e.g.
- Technically-qualified people should have a major role in risk communication.
- For effective communication, representatives need to address technical, communication and authority issues.
- If possible, use the same agency representative throughout the life of the event.
- In some situations, a non-agency representative may be more useful than someone from inside an agency.

Responding personally

- When you speak at a public meeting, tell people who you are, what your background is, and why you are there.
- When speaking personally, put your views into the context of your own values, and urge your audience to do the same.
- If your personal position does not agree with agency policy, do not misrepresent yourself or mislead the community.
- Prepare responses to potential questions before the meeting.

F.3, continued

Creating and maintaining trust and credibility during and after an incident

- Maintain open channels of communication.
- Provide critical information promptly.
- Ensure that the public receives a clear message that the emergency responders are taking appropriate actions to mitigate the event.
- Provide a resource for the public to call to secure additional information.
- Take appropriate steps to promptly investigate the cause of the event.
- Ensure that the public receives a clear message that an investigation of the incident was performed and appropriate actions to prevent a future incident were identified for implementation.
- Provide appropriate follow-up information and follow through with any commitments to the community.
- Recognize that people's values and feelings are a legitimate aspect of public health and safety issues and that such concerns may convey valuable information.
- When people are speaking emotionally, respond to their emotions. Do not merely respond with data.
- Be aware of your own values and feelings about an issue and the effect they have on you.
- Empathetic words will be effective only if your tone of voice, body language and demeanor reinforce what you are saying.

Guidelines for meeting with the media

- Be prepared. Plan what you want to say and anticipate reporter's questions.
- Take and keep control. You decide where to be interviewed. Bridge to your points or to turn negative questions into positive responses. Don't repeat negatives. Know when to exit the interview.
- Make your point. Bring your own agenda to the interview. Stress positive aspects of your operation.
- Keep your composure and watch your body language. Look and sound like you want to be there. Be cooperative, not combative. Avoid a defensive appearance.
- Don't speculate. If you do not have an answer, say so. Do not answer hypothetical questions. Do not feel all questions must be answered immediately.
- Never say "No Comment". Give sound reasons why you cannot answer a question (proprietary information, lack of authority, etc.).
- Never go "Off the Record". Anything you say may be reported. Do not be tricked into answering a question when a reporter says he has turned off a microphone or camera.

F.4 Planning a public meeting: Checklist

As discussed in Appendix F.3, public meetings are one way to involve the community stakeholders in your agency's spill response communications plan. They can be organized in many different ways, depending on the goal, topic, audience and other factors. This checklist will help with general elements that would apply to most public meetings.

PUBLIC MEETING CHECKLIST

MEETING PURPOSE

Organizations and individuals identified?	❑Yes	❑ No
Interests identified and categorized?	❑Yes	❑ No
Meeting time:	____________	
Date:	____________	
Hours:	____________	
Meeting place(s):	____________	
Address:	____________	
	____________	
Central location?	❑Yes	❑ No
Public transportation access?	❑Yes	❑ No
Suitable parking?	❑Yes	❑ No
Safe area?	❑Yes	❑ No
Adequate space?	❑ Yes	❑ No
Adequate facilities?	❑Yes	❑ No
Total expected:		
General session planned?	❑Yes	❑No
Number of small groups/number in each:		
Agenda questions developed?	❑Yes	❑No
Schedule developed?	❑Yes	❑No
Stakeholder interest topics included?	❑ Yes	❑ No
Speakers and speaker order identified?	❑Yes	❑ No

PUBLICITY

Methods selected:	____________	
____________		
____________		
Material prepared?	❑Yes	❑ No
Number of copies:	____________	
Material distributed?	❑Yes	❑ No
Personal follow-up?	❑Yes	❑ No
PIO/JIC contacted?	❑Yes	❑ No
Message developed?	❑Yes	❑ No
Message approved?	❑Yes	❑ No
Answers prepared?	❑Yes	❑ No
Press release issued?	❑Yes	❑ No

MEETING ARRANGEMENTS

Tables, chairs, lecterns obtained?	❑Yes	❑No
Audio/visual equipment obtained?	❑ Yes	❑No
Registration table?	❑Yes	❑ No
Name tags?	❑Yes	❑No
Refreshments?	❑Yes	❑ No
Heating & cooling OK?	❑Yes	❑ No
Sound & lights OK?	❑Yes	❑ No
Pens, pencils, flipcharts?	❑Yes	❑ No

INFORMATION DEVELOPMENT AND PRESENTATION

Information to be provided:

Written information completed?	❑Yes	❑ No
Role for moderator identified?	❑Yes	❑No
Moderator rehearsed?	❑ Yes	❑ No

RECORDING THE PROCEEDINGS

Methods:
Moderators:
Meeting evaluation tools:

Recommendations made?	❑Yes	❑No
Recommendations taken?	❑ Yes	❑No
Post-meeting report to public made?	❑Yes	❑ No

F.5 Dispersant fact sheet

Include in press packet, distribute at public meetings, or use for other general background briefing and information purposes.

Oil Spill Dispersants

One tool used occasionally in oil spill response is chemical dispersants. Under strict approvals and a narrow set of conditions, dispersants can be sprayed from planes, helicopters or boats onto oil spills in California marine waters. Chemical dispersants break a slick into smaller droplets, promoting mixture of oil into the water column, and accelerating dilution and biological degradation.

Conditions of use

- Federal and state approval for dispersant applications in California is considered when an effective conventional response is not feasible or not totally adequate in containing or controlling the spill.

- Before dispersants are used the response agencies will use all real-time information at their disposal to determine the resources at probable risk from both the oil and the dispersants used against it. Any dispersant application must follow strict guidelines laid down by several agencies and the groups, biologists and community members that assist with advice to those agencies. The federal and state response agencies will make every effort to communicate their oil spill response decisions to the public, through the media and/or in public meetings.

- The primary oil spill response method used in California is mechanical containment and recovery, which involves the use of containment booms, skimmers and other related equipment. The many hindrances to spill recovery, however, place a real advantage to having many “tools in the toolbox”, as historically, no more than 10 percent of the oil has been recovered from large marine spills. Current mechanical technology is not effective in waves greater than about 6 feet, winds greater than 20 knows, or currents greater than 1 knot.

- Dispersants are best used to protect shorelines, when the damage to the shore and nearby marine life would be worse than dispersing the oil into deeper offshore water.

- Dispersants are best used on the leading edge of oil slicks, which might otherwise get out of control and head toward shore.

- Dispersants must be applied soon after the oil is spilled and before the oil weathers or the slick is broken up. This usually means dispersant application with a matter of several hours to a few days, depending on spilled oil circumstances.

- The best conditions are whet the water is deep and when there is sufficient mixing action from waves, wind or current.

How dispersants work

- Dispersants help prevent formation of water-oil emulsions, or mousse, and they speed up biological breakdown of oil by natural marine organisms. They also ability of oil to stick to sediments and other organisms in the water.

Limitations on dispersant application

- Only dispersants approved by federal and California state governments can be used, and only on oils that have a fairly high likelihood of being “dispersible”.
- Ocean and weather conditions must be conducive to dispersant use.
- The spilled oil must be at least 3 miles from shore and not within a National Marine Sanctuary, or other agency approvals will be required before they can be used.
- Dispersant use must be considered to provide a “net environmental benefit” – in other words, once the oil is spilled, resources somewhere are going to be negatively impacted, so the goal is to minimize impacts to the most sensitive resources in the area at the time of the spill.
- Dispersants have to be applied safely, and dispersants cannot continue to be used if they are not effective.

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APPENDIX G

SEAFOOD TAINTING PLAN

G.1 Overview for Managing Seafood Concerns During an Oil Spill

The following material is drawn largely from three documents:

Mearns, A.J. & R.Yender, 1997. A summary of a NOAA workshop on management of seafood issues during an oil spill response. Proc. Arctic and Marine Oil Spill Program Technical Seminar. Environment Canada, Vancouver, pp. 203-214.

Reilly, T.I. and R.K York. 2001. Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill. NOAA Technical Memorandum NOS OR&R 9.107pp.

Yender,R., J. Michel, and C. Lord. 2002. Managing Seafood Safety After an Oil Spill Seattle: Hazardous Materials Response Division., Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

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Seafood safety is a concern raised at nearly every oil spill incident of any significance. Both actual and potential contamination of seafood can substantially affect commercial and recreational fishing, subsistence seafood use and generate public health concerns. Loss of confidence in seafood safety and quality can impact seafood markets long after any actual risk to seafood from a spill has subsided, resulting in serious economic consequences. Protecting consumers from unpalatable and unsafe seafood is a primary objective of federal and state public health agencies after a spill occurs.

The purpose of this guidance is to identify the various problems that can arise and to describe the remedies available. The information is aimed primarily at those in the fisheries sector suffering economic loss as well as spill responders and managers with responsibilities for protecting public health, and consumers concerned about the safety and quality of seafood. Interested parties are encouraged to share experience gained in managing fishery resources during oil spills. Guidance will be changing as a result of recent California legislation (2008 AB 2935 Huffman) mandating fishing closure in response to il spills, but implementing procedures are under development. Seafood managers may be faced with making many urgent decisions after an oil spill, often based on limited data:

Should seafood harvest in the spill area be closed or restricted?

If closed, what criteria should be applied to re-open a fishery?

How should seafood safety and palatability be evaluated?

How can health risks best be communicated to the public?

Public health officials and other seafood managers do not routinely deal with oil spills as part of their day-to-day responsibilities. Consequently, they typically have little experience with risks to seafood from oil spills when they suddenly are faced with determining appropriate seafood management actions in response to a spill.

Subsequent to an oil spill, there are three separate areas of concern that are often grouped together under the broad definition of "seafood tainting." The Unified Command will need to adequately address each issue in turn as well as the pertinent stakeholders. These three areas can be loosely outlined as follows:

- **Seafood Tainting Concerns**: Contamination of seafood can usually be detected as a petroleum taste, or taint. Public confidence in seafood products can quickly erode as a result of suspect, or actually contaminated products reach the market. The presence of taint simply indicates that flavor or odor is altered; it does not characterize the nature of the off-flavor or off-odor, quantify the degree of taint, or imply any human health hazard. Although health concerns are usually generated from seafood taint, "tainting" is primarily a marketing concern regarding the salability of seafood. It is reasonable to conclude, with respect to oil spill contamination, that if seafood is not "tainted," it is acceptable for consumption.

  Seafood tainting panels can be established on a spill-specific basis by contacting the U.S. Food and Drug Administration. Additionally, the U.S. Coast Guard can close a particular "area of operation" to fishing and/or seafood harvest as a part of the emergency powers of an oil spill.

- **Public Health Concerns:** The occurrence of contamination in seafood organisms or products following an oil spill can lead to public health directives being involved because of the presence of known carcinogenic compounds in petroleum products. The aromatic fractions of oil contain the most toxic compounds, with polycyclic aromatic hydrocarbons (PAH) being of greatest concern. The California Department of Public Health (CDPH; see **Appendix A**) should be contacted to determine chemicals of concern as well as testing levels. Additionally, the CDPH can coordinate the closure and reopening of areas and fisheries for public health reasons.

- **Trustee Agency Concerns:** Many finfish, shellfish, mollusks, and crustaceans can become contaminated during an oil spill. Petroleum contamination of finfish and shellfish depends upon a variety of biological and ecological factors, including feeding strategies, habitat utilization, and physiology. The ecological and population impacts of a spill will be species and habitat specific. The California Department of Fish and Game (CDFG) has the primary state trustee authority for these resources and can be contacted to determine if biological and ecological factors are a concern for a given resource. Additionally, the CDFG can close any fisheries under its jurisdiction for population health concerns.

Fishing is important in all maritime nations and many oil spills cause damage to subsistence, recreational and commercial fishing activity. Aquaculture enterprises have become widely established, thereby increasing the sensitivity of many coastal areas to oil pollution impact. Increased public awareness and heightened food quality and safety standards have meant that even small oil spills can cause a large impact and generate strong political interest.

Oil pollution effects take a variety of forms. Animals and plants may be killed as a result of oil smothering and toxicity. Catches and cultivated stock may become physically contaminated or acquire a taint. Fishing and cultivation gear may be oiled, leading to the risk of catches or stock becoming contaminated or fishing being halted until gear is cleaned or replaced. The handling of seafood products in bulk means that it is seldom practical to locate and remove the oiled specimens.

Fishermen and aquaculture operators are often on the front line of oil spill impact, but equipment suppliers, transporters, wholesalers and others are also involved in the process of bringing seafood produce to the market. Government authorities have a duty to protect public health and ensure that seafood products reaching the consumer are safe and palatable. A number of management strategies are available to prevent or minimize oil pollution impact on fishing and aquaculture activity. Fishing and harvesting restrictions can be imposed to prevent contamination of fishing gear and to protect consumers and markets. Such measures also provide time for evaluating risks and for organisms and their habitat to recover from oil contamination.

Oil spill impact on seafood resources

The impact of an oil spill on marine life depends largely on the physical and chemical characteristics of the oil and the way these change with time, a process known collectively as “weathering”. The main physical processes which act on the oil during the course of a spill are evaporation, natural dispersion and, to a lesser extent, sedimentation. Specific gravity, viscosity, chemical composition and toxicity of the pollutant and the way they change with time tend to determine the degree of oil exposure for seafood organisms. The prevailing weather and sea conditions will determine the movement of spilled oil. Clean-up activities such as the use of chemicals or aggressive washing techniques can also affect the fate of oil. Thus, a variety of factors combine to define the character of a particular oil spill and the fate of sensitive resources in its path.

Adult free-swimming fish, squid, shrimp and wild stocks of other commercially important marine animals and plants seldom suffer direct harm from oil spill exposure. This is because only rarely will oil concentrations in the water reach sufficient levels to cause tainting or mortality. The greatest impact is found on shorelines and shallow waters where animals and plants may be physically coated and smothered by oil or exposed directly to toxic components in the oil. Edible seaweeds and sea urchins are examples of shoreline species that are especially sensitive to smothering and oil toxicity, respectively. Apart from direct effects, oil may cause more subtle long-term damage to behavior, feeding growth, or reproductive functions. It is a complex task to isolate these sublethal pollution effects from the influence of numerous other factors.

As a general guide, dispersants should not be used close to aquaculture facilities or spawning grounds and nursery areas. Stripping oiled seaweed from rocks and indiscriminate hot water washing are examples of aggressive response techniques that can affect commercially exploited species and delay natural recovery.

Fishing and aquaculture activities

Oil can foul the boats and gear used for catching and cultivating commercial species. Flotation equipment, lift nets, cast nets, and fixed traps extending above the sea surface are more likely to become contaminated by floating oil, whereas lines, dredges, bottom trawls and the submerged parts of cultivation facilities are usually well protected, provided they are not lifted through an oily sea surface or affected by sunken oil.

Seaweeds, shellfish and cultivated animals kept in cages or tanks are usually unable to avoid contact with oil contaminants in the water and the presence of oil pollutants may significantly add to the stresses already imposed by keeping animals in artificial conditions. Floating oil may physically coat fish-farming facilities, and unless they are rapidly cleaned they may act as a longer-term source of stock re-contamination.

There are many complex influences on the health of cultivated organisms and observed effects may be the result of a combination of factors. If, for example, the stocking density or the water temperature in a fish farm is unusually high, there is a greater risk of mortality, disease or growth retardation occurring as a result of oil contamination.

The cultivation of seaweed, fish, crustaceans, mollusks, echinoderms and sea squirts frequently involves the use of onshore tanks to rear the young to marketable size, or to a size and age suitable for transfer to the sea. Such facilities are usually supplied with clean seawater drawn through intakes located below the low water mark. The intakes may occasionally be under threat from sunken oil or dispersed oil droplets, which may lead to contamination of pipework and tanks and the loss of cultivated stock.

Fishing and seafood cultivation are not always pursued throughout the year and seasonal differences in sensitivity to oil spills can therefore occur. The collection of wild seed, or the rearing of larvae in onshore tanks supplied with water piped from the sea is one example of seasonal activity.

Tainting

The contamination of seafood can usually be detected as a petroleum taste, or taint. Public confidence in seafood products can quickly erode as a result of suspect, or actually contaminated, products reaching the market. Filter-feeding animals such as bivalve mollusks are particularly vulnerable to tainting since they may easily ingest dispersed oil droplets and oiled particles suspended in the water column. Animals with a high fat content have a greater tendency to accumulate and retain petroleum hydrocarbons in their tissues.

A taint is commonly defined as an odor or flavor that is foreign to a food product. Background concentrations of oil in water, sediment and tissues are highly variable and both the degree of taint that may result and consumer tolerance levels for taint are different for different seafood products, communities and markets. The presence and persistence of taint will depend mainly on the type and fate of oil, the species affected, the extent of exposure, hydrographic conditions and temperature. Tainting of living tissue is reversible but, whereas the uptake of oil taint is frequently rapid, the depuration process whereby contaminants are metabolized and eliminated from the organism is slower.

The concentrations of hydrocarbons at which tainting occurs are very low. Some of the chemical components in crude oils and oil derivatives with the potential to cause tainting have been identified but many are unknown and no reliable threshold concentrations for petroleum-derived tainting agents have been established. Hence it is not possible to determine by chemical analysis alone whether a product is tainted or not. However, the presence or absence of taint can be determined quickly and reliably by sensory testing, when a trained panel and sound testing protocols are employed. Sensory testing is further described below.

Public health concerns

The occurrence of contamination in seafood organisms or products following a major spill has potentially damaging implications for marketing and can lead to public health directives being invoked because of the presence of known carcinogenic compounds in petroleum products. The aromatic fractions of oil contain the most toxic compounds, and among these it is the 3- to 7-ring polycyclic aromatic hydrocarbons (PAH) that command greatest attention.

The input of potentially carcinogenic PAH stems largely from combustion sources and petroleum and, for the human population, exposure to PAH is primarily from food. However, in common with other potentially carcinogenic pollutants, it is not possible to define a concentration threshold of potential carcinogens in seafood products that represents a risk-free intake for humans. Furthermore, a wide variety of smoked food, leafy vegetables and other dietary components also contain the same PAH compounds. The detailed composition of the diet determines which food items are major contributors for individual consumers. It is important to recognize that different regions and ethnic groups have varying levels of seafood in their diets.

Generally, PAH levels in foods are not subject to legislative limits, although limits exist for some compounds in drinking water. The risk to an individual or community from oil spill-derived carcinogens should be assessed in the context of the overall exposure from all potential sources, which is subject to many variables. From a general risk evaluation of the amount, frequency and duration of PAH exposure following oil spills, most studies have led to the conclusion that oil spill-derived PAH contamination of seafood is not a significant threat to public health. However, it is important to note that while toxicologists have assessed the threat to public health as negligible, it may be difficult to convince local users, fish buyers and consumers in general, especially when there is an option of buying seafood from other locations.

A further complication for food safety and quality controllers is that a seafood diet is inherently nutritious and rich in protein and vitamins. Restrictions on seafood intake can cause consumption patterns to shift toward less healthy diets. Other forms of contamination, such as heavy metals, algal toxins, pathogenic bacteria and viruses, also affect seafood safety and quality. The potential impact of an oil spill on public health must be viewed in a wider context in order to identify and implement appropriate strategies.

Oil spill protection and clean-up response options

Booms and other physical barriers can sometimes be used to protect fixed fishing gear and aquaculture facilities, although in most cases it is impossible to prevent damage altogether. Fishing and cultivating equipment is often purposely sited to benefit from migration routes or efficient water exchange. Such locations are characterized by fast water flow, which is where booms will not perform well.

Sorbent materials are often useful for removing oil sheens from water and tank surfaces. Sorbent booms are easy to deploy and move, and serve to control sheens in floating cultivation pens. However, oil-saturated sorbents should be replaced regularly to avoid them becoming a source of secondary pollution. Another potential concern when dealing with aquaculture facilities is the risk of spreading disease with booms and other equipment moved from one location to another.

Dispersant should be used with care so as not to cause tainting of shellfish and captured or cultivated stock. As a general guide, it is not prudent to use dispersant in shallow waters where fishing or aquaculture is important. However, if used at a safe distance, dispersants can reduce or prevent contamination of equipment by floating oil. It is difficult to define in general terms what represents a safe distance since this will depend on dilution rates and the strength and direction of prevailing currents.

The remedial methods employed should be chosen with care, so as not to make matters worse. Almost all clean-up techniques cause damage, which should be taken into account when considering the merits of removing oil pollution from an affected area. For example, attempts at cleaning intertidal mudflats can cause long-term disruption and damage to the habitat of cockles and clams. There are occasions when it is better to rely on natural recovery processes for oiled habitats than to inflict more damage from clean-up measures known to be futile.

Sensory testing

Oil-tainted food is unpalatable even at very low levels of contamination, which provides a safety margin in terms of public health. As a generalization, if seafood is taint-free, it is safe to eat. Properly conducted sensory testing is the most efficient and appropriate method for establishing the presence and disappearance of tainting, and for indicating whether seafood is fit for human consumption. The International Standards Organization (ISO) provides information on the training of sensory evaluation panels. A trained sensory panel using properly prepared samples and a written testing protocols are essential elements in sensory testing in order to obtain reproducible results. In some cases of potentially unsafe seafood it may be appropriate to avoid taste tests and instead focus on olfactory testing.

A sampling program with defined objectives will often be necessary to determine the degree, spatial extent and duration of the oil contamination problem. The aim is to take and analyze the number of samples necessary to obtain statistically reliable results. Target species are those of commercial, recreational or subsistence fishing value and which are commonly consumed. Samples of animal and plant tissue are perishable and must be secured and stored so as to preserve their integrity. Control samples from a nearby area unaffected by oil pollution are important for reference purposes and to eliminate the interference of background contamination, but are difficult to find in practice. In the case of commercial species it is sometimes possible to obtain reference samples from the marketplace. If appropriate reference samples cannot be obtained, a trained panel of expert testers should nevertheless be able to determine when seafood is taint-free.

In principle, a relatively small number of samples are sufficient to confirm the initial presence of taint and define the affected area in order to introduce a restriction. Monitoring the progressive loss of taint, by sampling at appropriate intervals thereafter, allows the point at which taint disappears to be determined with some confidence. The oil type would determine the frequency of sampling, the habitat and organisms affected, and the rate at which depuration was observed to occur. A time series of samples gives clues to depuration rates and allows future trends to be predicted. While it is not an absolute requirement to have reference samples in order to conduct a sensory evaluation, the taint-free threshold can best be defined as the point where a representative number of samples from the polluted area are no more tainted than an equal number of samples from a nearby area or commercial outlet outside the spill zone. Account should also be taken of levels considered acceptable in comparable seafood species being harvested in other areas of the country.

This approach is inherently fair and recognizes that tainted samples, not necessarily due to oil spills, can occur in any population. Once two successive sample sets over a short period of time remain clear, restrictions can be removed or the scope of the ban adjusted as a distinct area or species is shown to be free of taint. The confidence in accepting that the fish or shellfish are clean and safe following a particular spill comes from an adequate time-series of monitoring data showing the progressive reduction in taint.

Chemical analysis

In some cases, the chemical composition and the fate of the spilled oil, widespread subsistence fishing and aquaculture, or the presence of commercial shellfish resources in the path of the oil may argue for chemical analysis to be undertaken. Chemical screening for exposure can complement sensory evaluations and help validate sensory testing. Sensory evaluation does not preclude the need for chemical analysis and may serve as a screening tool for selecting samples for further chemical analysis.

It is widely recognized that to impose a single fixed standard for PAH levels in seafood by reference to baseline data is unworkable for several reasons. Baseline data are rarely available and unlikely ever to be applicable to the conditions prevailing during a particular oil spill. Background levels of hydrocarbons, where they are known, vary greatly and are subject to both pyrogenic and chronic anthropogenic input. PAH intakes in seafood meals also vary greatly between different communities, as do the perceived sensitivities of individual consumers. One viable approach is to ensure that samples should be taint-free. PAH levels in the samples may also be compared to reference samples collected just outside the affected zone or which are freely marketed elsewhere in the country. However, this may be difficult to implement in areas that are known for their "pristine" seafood.

Analysis of water and sediment is usually not necessary since the condition of seafood organisms inhabiting water and sediment environments is of primary interest. In any case, the organisms effectively “monitor” the condition of their surrounding environment by the process of accumulating and depurating contaminants, and if they remain viable then there is little need to monitor other components. In cases where animals or plants are continuously re-contaminated from an invisible or unknown source it may be appropriate to attempt to monitor the pathway of oil contamination. However, reliable interpretation of analytical data from sediment samples can be difficult if there is a wide range of other contaminants present.

Costs and compensation

When it proves impossible to protect fishing gear and cultivation facilities from oil contamination, the choice becomes one of cleaning, repairing, restoring or replacing the affected item, facility or habitat.
In some situations compensation arrangements may exist, allowing fishermen and aquaculture operators to be reimbursed for costs incurred and losses suffered. Claimants will be expected to provide evidence of the losses, such as receipts of payments made and records of income in previous years.

The complexities of biological systems and business interactions often make it difficult to separate the actual impact of an oil spill from other influences. Reliable catch statistics are rarely available in sufficient detail to enable oil spill effects to be isolated from other influences such as variable fishing effort and natural fluctuations in the stock. Only with expert knowledge of local circumstances, careful investigation and comparisons with nearby unpolluted areas can the true causes of observed damage be determined. In the case of subsistence fishing no financial transactions may be involved, so catch records are unlikely to be available. However, it should be possible to quantify subsistence loss in bartering terms or with other market-based substitutes.

Economic loss resulting from mortality of cultivated organisms may need to be quantified at several levels. The first level is the immediate mortality and loss suffered by the grower. This may simply be a question of counting and weighing the casualties, documenting any reduction in growth rate, and calculating any financial losses from projected harvests and from closed or under-utilized aquaculture facilities. Depending on the magnitude of the event and the availability of suitable substitutes, losses may also be suffered by processors, transporters, wholesalers and retailers. In a large or notorious incident actual or perceived tainting may result in short and long-term loss of markets and reduced prices across broad geographic regions. Quantification of these impacts can be complicated and may involve not only the direct losses, but also the advertising costs incurred to limit the harm to a region's reputation.

Management strategies for protecting seafood resources

The simplest management strategies involve no intervention beyond monitoring the evolution of an oil spill and any threat to seafood safety. Low-key intervention can take the form of advisory information or the issuing of guidelines to the seafood industry. Stricter measures include retail controls, impoundment of catches and seafood products, activity bans and fishery closures.

All management options have drawbacks or indirect effects and a careful review of the various facets of an oil spill is to be recommended before any actions are taken. Commercial fishing creates complex changes in the abundance and distribution of the exploited species. Any sudden change in the fishing effort is therefore likely to affect population densities. Thus, while most oil spill management strategies undoubtedly cause business interruption and financial loss, some fishery closures have also resulted in beneficial stock conservation, particularly where the exploited species have been non-migratory.

Preferred management strategies reflect cultural and administrative traits in different countries. In Asia there are few reported instances of tainting or seafood contamination following oil spills. Formal closures or activity bans are seldom, if ever, introduced. Instead voluntary suspension of fishing in oil-polluted areas is the norm. The voluntary suspension typically lasts a few weeks until the gross oil contamination of shorelines has disappeared or has been removed. In most cases, fishing and harvesting are resumed without any ill effects in terms of tainting, public health or market confidence.

During an oil spill it is vital to communicate information to the media and the public in an effective manner on the likelihood of adverse consequences for fishery resources. Inaccurate public information about tainting and contamination may limit the range of management strategies available, causing unnecessary fishing and harvesting restrictions and/or loss of consumer confidence in the market. Risk communication is an ongoing process that must be addressed in both spill response planning as well as during the spill event. Information about risk can be communicated through a variety of channels, from media reports to public meetings. Several resources provided in Appendix F can provide further information on successfully communicating risk to the media and public.

The media can play a valuable role in promoting a rational reaction to temporary disruptions. For example, where a properly conducted sampling and testing regime provides clear evidence that seafood is safe, the media provides the vehicle for getting this message to the consumer. The needs of the media are best served by providing factual information and by clearly justified decisions. Contingency planning provides the best opportunity for managers to select an appropriate strategy and implement the most effective response for dealing with a threat to seafood safety and quality.

Fishing and aquaculture procedures

In addition to standard spill response measures, there are management options that may help minimize contamination and financial losses. Options include moving floating facilities out of the path of slicks, sinking of specially designed cages to allow oil to pass, and transfer of stock to areas unlikely to be affected. The opportunities to use these approaches are likely to be rare for a range of technical, logistical and cost considerations, but in the right circumstances and with planning they may be practicable.

Temporarily suspending the replenishment of seawater drawn in from the sea and re-circulating water already within the system may be an effective method of isolating stock cultivated in shore tanks or ponds from the threat of oil contamination. Closing sluice gates to prawn ponds, for example, can also afford short-term protection, but care must be taken to ensure that the build-up of noxious waste products in stagnant or re-circulating water over time does not cause mortalities. Suspension of feeding is another way of reducing the risk to farmed fish and other cultivated stock from coming into contact with floating oil or contaminated feed. In land-based facilities the reduction or suspension of feeding has the advantage that the loading of waste products in the re-circulated water is reduced.

For such measures to be effective it is vital that sensitive fishing and aquaculture facilities are identified in local area contingency plans and that key personnel are notified in the event of an oil spill in their area. The plans can also identify optimal response options and the sources of necessary materials and equipment. The preparation and maintenance of such plans are normally the responsibility of local government authorities or operators of local oil-handling facilities.

In some cases aquaculture operators may face the risk of ultimately losing all the stock due to oil spill damage. Harvesting before the stock becomes oiled might be possible, albeit selling the products at a lower price, and thereby salvaging some of its value. Conversely, normal harvesting could be delayed to allow contaminated stock to depurate and become taint-free.

Where fish are caught by anglers for sport, sufficient protection can sometimes be provided simply by issuing advice against consuming the catch and for recreational fishermen to adopt a catch-and-release policy.

Fishing and harvesting restrictions

Government restrictions on fishing activity are often unrelated to oil spills and are imposed as a means of stock conservation or to ensure fair competition among fishermen. Fishing may be restricted to certain periods and locations, with closures often coinciding with breeding seasons and sites to encourage natural stock replenishment. Catches may be restricted to certain quantities or quotas in a given period. Temporary closures of fisheries are imposed to protect consumers from health hazards when water and sediment quality or a seafood resource has become degraded by pollutants, natural toxicants or microorganisms.

Fishery closures can be imposed after an oil spill in order to prevent or minimize fishing gear contamination and to protect or reassure seafood consumers. Fishermen can agree to a voluntary suspension of fishing activity as a precautionary measure during a period when oil is drifting in their normal fishing area, and thereby avoid repeatedly contaminating fishing gear. Alternatively, a fishery may be protected by extending existing closures or imposing additional bans, but there are likely to be secondary consequences from all these measures.

Fishery closures imposed to protect equipment and catches can generally be lifted once the sea surface is visually free of oil and sheen, and there is no problem with sunken oil. Aerial surveillance is the most reliable way of checking sea surface conditions. Restrictions imposed on the basis of proven tainting are likely to be more prolonged and require careful monitoring. In most oil spill scenarios a fisheries and aquaculture management protocol consisting of a visible-sheen test and sensory tests will satisfy the demand for scientific credibility and provide adequate safeguards against unpalatable and unsafe seafood reaching consumers.

Credible decision-making with respect to fishing and harvesting restrictions should be based on sound scientific principles and common sense. Knowledge of fishery resource management is essential, as is an understanding of oil pollutants, their physical and chemical characteristics, likely biological impact, and background levels of contamination, both locally and nationally. Seafood consumption patterns and seasonal variations in trading and marketing will further help define a public health risk profile and allow regulators to form a considered opinion on risk management. It is vital to determine the criteria that will be applied for reopening a fishery before a ban is put in place. These criteria form an important part of contingency plans. It is also critical to assess the benefits accruing as a result of a closure against the losses that will ensue from closing or restricting normal fishing and cultivation activity.

Conclusions and recommendations

Oil spills can pose a significant threat to fishing and aquaculture resources. The main oil pollution effects are physical contamination of equipment, tainting and contamination of seafood, and economic loss from business interruption, including loss of consumer confidence. With effective contingency plans and spill response procedures, much can be done to prevent or reduce the impact of oil spills on fishing and aquaculture.

The repercussions of contaminated seafood on public perception can be serious unless the issues of market confidence and public health are properly managed. In most cases a management protocol consisting of a visible-sheen test coupled with sensory testing will provide adequate safeguards against unpalatable and unsafe seafood reaching consumers.

To maintain confidence in the fisheries sector there should be a sound strategy for implementing a fishery closure, based on scientific data, and a consistent application of management restrictions. An important component of oil spill contingency considerations is the need to determine re-opening criteria before deciding on whether to impose fishing and harvesting bans. Part of the rationale for introducing fishery closures is to minimize or prevent economic damage that might otherwise occur, as well as protecting the consumer. In such cases some form of economic appraisal is necessary in order to monitor the effectiveness of control measures from a cost-benefit viewpoint.

G.2 Decision Process for Managing Seafood Safety

The default position regarding management of seafood safety during an oil spill is to have no closure or other restrictions on seafood harvest. In some cases there may be an initial, temporary *de facto* closure if the U.S. Coast Guard establishes a safety zone restricting access in areas of active oil recovery. Fishermen also may voluntarily avoid working in oiled areas to prevent oiling their gear and catch. This initial period after a spill can provide an opportunity to evaluate spill conditions and conduct limited testing to determine whether a precautionary closure or other immediate restrictions on seafood harvest are warranted.

The first step for seafood managers after an oil spill has occurred is to collect and evaluate information on the nature of the spill. The spill response organization should be able to provide the following information almost immediately after the spill occurs:

- Overflight maps and trajectory analyses showing the present and predicted spread of surface slicks;
- Forecasts of weather and sea conditions that may affect the potential for oil to mix into the water column;
- Results of oil weathering models;
- Details about the oil type and expected behavior;
- Predictions of oil fate and persistence; and, some cases,
- Chemical results for water and sediment samples collected in the spill area.

Fishery management agencies and associations should be able to provide information on:

- Species being harvested now or in the near future;
- Geographical extent of the harvest areas;
- Harvest gear types in use; and,
- Data on background levels of PAH contamination in the spill area (from NOAA, California State Mussel Watch, and other monitoring programs).

Based on this information, seafood managers can assess whether the oil spill is likely to expose and contaminate seafood. If seafood is not at significant risk, then no harvest closures or other seafood restrictions are needed, and this determination is communicated to the public. Because spills are dynamic, conditions are monitored and risks to seafood reevaluated until the threat abates.

If managers determine that seafood may be affected, the next step is to assess whether seafood is tainted or contaminated to levels that pose a consumption risk to human health. Information that can help determine the impacts includes:

- Overflights and ground surveys identifying visible oil in seafood harvesting areas;
- Chemical analysis of water and/or sediment samples from the harvest area;
- Sensory testing of seafood samples from representative species and areas (both spill and reference areas);
- Chemical analysis of tissue samples from representative species and areas (both spill and reference areas); and,
- Data on background levels of oil-related contaminants.

Determining whether seafood has been contaminated can take time. Developing and implementing sampling plans, conducting sensory and/or chemical testing, and evaluating results may require weeks or longer. Monitoring continues and the risk assessment process is repeated as necessary.

If seafood is tainted or is contaminated to a level posing a potential health risk, the next step is to select the most appropriate seafood management action(s). Examples of management actions include seafood advisories, increased inspections of harvested seafood or fishing gear, harvest closures, and fishing gear restrictions. If a fishery is closed or otherwise restricted, seafood managers must establish criteria for determining when the seafood is palatable and safe for human consumption and that restrictions can, therefore, be lifted. No accepted international or federal criteria have been established for oil-related contaminants in seafood. State seafood managers generally have developed their own criteria for each spill, resulting in some inconsistencies among spills. Varying levels of background contamination also have contributed to inconsistencies in criteria applied.

Seafood Safety Management Authority

Typically, authority to manage seafood to protect human health resides with state health agencies. Many states routinely chemically analyze finfish and shellfish tissues for contamination as part of their water-quality monitoring programs. If a state concludes that eating contaminated finfish or shellfish collected from state waters poses an unacceptable human health risk, it may issue local fish consumption advisories or harvest closures for specific water bodies or parts of water bodies and specific species.

The Food, Drug, and Cosmetic Act authorizes the U.S. Food and Drug Administration (USFDA) to protect and promote public health. The USFDA's responsibilities include keeping "adulterated" food off the market. The USFDA has jurisdiction over seafood that crosses state lines in interstate commerce.

The Magnuson Act, 16 U.S.C. 1801 *et seq.*, authorizes NOAA's National Marine Fisheries Service (NMFS) to regulate fishing in federal waters (generally from 3-200 miles from shore). The act is targeted toward fishery conservation rather than protection of public health or economic concerns. Fishery management plans, developed under the authority of the Magnuson Act, specify any limitations imposed on fishing for federally regulated species. Limits on fishing are enforced by means of regulations published in the Federal Register, in compliance with the Administrative Procedures Act. In the event of an oil or chemical spill, publication of an emergency rule in the Federal Register is required to put an enforceable, official fishery closure in place and to make any modifications to the closure once it is put into effect. The Magnuson Act was recently amended to allow emergency action fisheries closures to remain in effect indefinitely. Previously, such closures were limited to two 90-day periods.

Specific Seafood Contamination Terminology

Adulteration

According to the U.S. Food and Drug Administration (FDA), a food is considered adulterated if it bears or contains any poisonous or deleterious substance that may render it injurious to health, if it contains any filthy, putrid, or decomposed substances, or if it is otherwise unfit for food (Federal Food, Drug, and Cosmetic Act, Section 402).

Taint

Taint is commonly defined as an odor or flavor that is foreign to a food product, including seafood (ISO 1992). According to this definition, the presence of a taint simply indicates that flavor or odor is altered; it does not characterize the nature of the off-flavor or off-odor, quantify the degree of taint, or imply health hazard.

Body Burden

The concentration of a contaminant in an organism, reported for the whole animal, or for individual tissues such as gonads, muscle, and liver, is referred to as the body burden. It can be reported on the basis of either wet or dry weight of the organism or tissue.

Uptake

Uptake is the process of contaminant accumulation in an organism. Uptake of oil can occur via the following mechanisms:

- Adsorption (adhesion) of oil on the skin.
- Absorption of dissolved components from the water through the skin (including interstitial water exposures for infauna).
- Absorption of dissolved components through the gills.
- Adsorption of dispersed oil droplets to the lipid surfaces in the gills.
- Ingestion of whole oil droplets directly or of food contaminated with oil, followed by sorption in the gut.

Many factors influence uptake, including the exposure concentration and duration, pathway of exposure, lipid content, and feeding and metabolic rates. Uptake from water generally occurs more quickly than dietary uptake or uptake from sediments.

Bioaccumulation

The net accumulation of a substance by an organism as a result of uptake from all environmental sources and possible routes of exposure (contact, respiration, ingestion, etc.) is termed bioaccumulation.

Bioconcentration

The net accumulation of a substance as a result of uptake directly from aqueous solution.

Biomagnification

The increase in body burden of a contaminant with trophic level is called biomagnification. PAHs generally do not biomagnify in finfish and shellfish because of their low dietary uptake efficiencies, on the order of 1 to 30%, reflecting slow kinetics and short residence time in the gut.

Elimination

All of the processes that can decrease tissue concentrations of a contaminant, including metabolism, excretion, and diffusive loss are collectively termed elimination. *Metabolism* is an active physiological process whereby a contaminant is biotransformed into metabolites. For PAHs, the metabolites are more water-soluble, which facilitates *excretion*, another active physiological process that eliminates contaminants (both parent compounds and metabolites) through bile, urine, or feces. *Diffusive loss* refers to a decrease in tissue burden caused by simple diffusion out of the organism, which is controlled by partitioning between tissue and water. The term *depuration* may be used for the mechanism of diffusive loss, and *elimination* may be used for the combined process of metabolism, excretion, and diffusive loss. These definitions are slightly different than those used by ASTM (1994), which defines depuration as “the loss of a substance from an organism as a result of any active or passive process” and provides no definition for elimination. However, the definitions given are more precise and will be followed in this document. Elimination can also include release of PAHs in lipid-rich eggs or gametes during spawning.

Elimination processes begin as soon as uptake occurs. In constant exposure experiments, body burdens tend to reach a “steady state” in which fluxes of the contaminant moving bi-directionally across a membrane or boundary between compartments or phases have reached a balance, not necessarily equilibrium. When the exposure decreases, elimination rates depend, in part, on the hydrophobic properties of the compound. The half-lives of individual compounds vary (see discussion below).

Growth Dilution

Growth dilution occurs when the rate of tissue growth exceeds the rate of accumulation, such that it appears as though elimination is occurring because the tissue concentration is decreasing. This process may be important when monitoring bivalves during the growing season.

Oils have been grouped into types with similar properties to help predict their behavior at spills. This same approach can be used to characterize the relative risk of contamination of seafood by oil type. Table II-2 summarizes the properties and risk of seafood contamination for the five oil groups commonly encountered by spill responders. These generalizations can be used when initially screening an incident to evaluate the potential for seafood contamination.

ASSESSING THE LIKELIHOOD OF SEAFOOD EXPOSURE AND CONTAMINATION

Each oil spill is a unique combination of conditions and events. Seafood is only at risk of contamination from a spill if it is exposed to the oil. Once exposed to oil, an organism becomes contaminated only to the extent it takes up and retains petroleum compounds. Factors that influence the potential for spilled oil to expose and contaminate seafood are discussed in this section.

Oil Types and Properties

Oil type and properties strongly influence whether seafood is exposed and contaminated. Crude oils and the refined products derived from them are complex and variable mixtures of hydrocarbons of different molecular weights and structures. They can contain hundreds of different compounds. All crude oils contain lighter fractions similar to gasoline, as well as heavier tar or wax fractions. Because of these differences in composition, different oils vary considerably in their physical and chemical properties. For example, consistencies of different crude oils vary, ranging from a light volatile fluid to a viscous semi-solid. Such differences in properties influence behavior of spilled oil and subsequent cleanup operations.

The petroleum hydrocarbons that comprise oil are composed primarily of hydrogen and carbon, but also can contain varying amounts of sulfur, nitrogen, oxygen, and trace metals. The three main fractions of hydrocarbon compounds in oils are saturates, aromatics, and polar compounds. The table below shows the properties and relative abundance of each fraction in different types of oil products.

Seafood contamination can result from exposure to the dissolved fraction of oil, dispersed oil droplets, or an oil coating. With regard to the dissolved fraction, the aromatic fraction of the oil poses the greatest exposure risk because aromatics are relatively more soluble than the other components in oil. Saturates are a major component of oil, but they have lower solubility and higher volatility compared to aromatics of the same molecular weight. Furthermore, saturates are virtually odorless and tasteless, and do not contribute to tainting.

Table G.2-1 Characteristics of oil types affecting the potential for seafood contamination

Gasoline products	Diesel-like products and light crude oils	Medium-grade crude oils and intermediate products	Heavy crude oils and residual products	Non-floating oils
Examples – Gasoline	Examples – No. 2 fuel oil, jet fuels, kerosene, West Texas crude, Alberta crude	Examples – North Slope crude, South Louisiana crude, IFO 180, lube oils	Examples – San Joaquin Valley crude, Venezuelan crude, No. 6 fuel oil	Examples – Very heavy No. 6 fuel oil, residual oils, vacuum bottoms, heavy slurry oils
Specific gravity of < 0.80 Floats on surface	Specific gravity of < 0.85; API gravity of 35-45* Usually floats on surfaces, although can contaminate suspended sediments that are then deposited on the bottom.	Specific gravity of 0.85-0.95; API gravity of 17.5 – 35 * Usually floats on surface, although can mix with sand by stranding on beaches or in the surf zone, and be deposited in the nearshore area.	Specific gravity of 0.95 – 1.00; API gravity of 10-17.5 * Usually floats on surface but can sink in fresh water or in seawater if they emulsify or mix with sand (in the surf zone or after stranding on beaches) and deposit in the nearshore.	Specific gravity greater than 1.00; API gravity < 10 * Will sink in fresh water; may sink in seawater if they emulsify or mix with sand (in the surf zone or after standing on beaches) and deposit in the nearshore.
High evaporation rates; narrow cut fraction with no residues.	Refined products can evaporate to no residue; crude oils do leave residues.	Up to one-third will evaporate in the first 24 hours; will form persistent residues.	Very little product loss by evaporation; will form persistent residues.	Very little evaporation when submerged; also very slow weathering overall when submerged.
Low viscosity; spreads rapidly to a thin sheen; readi8ly dispersed; will not emulsify.	Low to moderate viscosity; spread rapidly into thin slicks; readily dispersed by natural processes; may form unstable emulsions.	Moderate to high viscosity; dispersed by natural processes only very early in the spill; readily emulsifies.	Very viscous to semisolid; will not readily disperse or mix into the water column; can form stable emulsions.	Very viscous to semi-solid; will not readily disperse or mix into the water column; can form stable emulsions.
Low risk of seafood contamination because of rapid and complete loss via evaporation; potential contamination for spills in confined areas with high mixing, such as small rivers; no reported cases of tainting for marine spills.	Moderate to high risk of seafood contamination because relatively high content of low molecular weight, water-soluble aromatic hydrocarbons, which are semi-volatile and so evaporate slowly; dispersed droplets are also bio-available.	Moderate to high risk of seafood contamination because of high percentage of low-molecular weight aromatic hydrocarbons; coating of gear and intertidal species can be significant.	Low risk of finfish contamination because of low water-soluble fraction and little natural mixing in the water; moderate to high risk of shellfish contamination where shoreline oiling is heavy; can coat gear and intertidal species.	Low risk of finfish contamination because of high viscosity; where thick oil accumulates on the bottom, could become a chronic source; moderate to high risk of contamination of benthic species because of coating and persistence of submerged oil.

* API gravity is used by the petroleum industry rather than density. It is determined by the following equation: API at 60º F = 141.5/oil density – 131.5

Of the aromatic hydrocarbons, the mono-aromatic hydrocarbons, such as benzene, toluene, ethyl benzene, xylene (known collectively as BTEX), other substituted benzenes, and the 2- to 3-ringed PAHs (naphthalene, fluorene, dibenzothiophene, anthracene and their substituted homologues, referred to as low-molecular weight

PAHs) comprise over 99 percent of the water-soluble fraction. The distribution of these compounds in the spilled oil is one measure of the potential for contamination of seafood from water exposure.

Compounds in petroleum-derived oils have a general pattern of increasing abundance with higher level of substitution of a benzene ring (*e.g*., unsubstituted parent naphthalene is less abundant than C1-naphthalene, which is less abundant than C2-naphthalene). This pattern indicates that the PAHs are "petrogenic," that is, they are from petroleum oils. The PAH pattern is very different for hydrocarbons produced from the combustion of fossil fuels ("pyrogenic" hydrocarbons), in that the parent PAHs are by far the dominant compounds in hydrocarbons of pyrogenic origin. Also, it is important to note that crude oils contain very low concentrations of the high-molecular weight PAHs (*e.g*., 4- and 5-ringed compounds such as pyrene, chrysene, and benzo[a]pyrene) that are associated with combustion by-products. These differences in relative PAH abundance are key components of fingerprinting analysis.

Refined products have characteristic ranges of PAHs representative of the distillation fraction in the product. PAHs in No. 2 fuel oil are dominated by the 2- and 3-ringed compounds. Heavy fuel oils are sometimes cut or blended with lighter fractions to meet customer specifications, as is the case with the intermediate fuel oil (IFO-180), and so can contain some low-molecular weight PAHs.

For exposure via ingestion of whole oil droplets or contaminated sediments, the high-molecular weight PAHs pose greater risk of contamination. These compounds have low water solubility and are more lipophilic. In organisms with relatively limited capability to metabolize PAHs, such as bivalve mollusks, the high-molecular weight compounds are more likely to accumulate in tissues and persist for longer periods, compared to the low-molecular weight PAHs, which are more rapidly eliminated. Finfish and some crustaceans, however, readily metabolize and eliminate all of these compounds rapidly.

Biological and Ecological Factors Affecting PAH Contamination of Seafood

Petroleum contamination of finfish and shellfish depends upon a variety of biological and ecological factors. Understanding how different feeding strategies, habitat utilization, and physiology influence the likelihood of petroleum contamination of particular species is critical when managing seafood after spills. G.2-2 summarizes several of these factors for different types of seafood organisms.

Metabolic Capacity

Both vertebrates and invertebrates have mixed-function oxygenase (MFO) enzyme systems that enable them to metabolize petroleum substances. Enzymatic activity is low in invertebrates compared to vertebrates, and therefore induction of metabolism occurs at a higher contamination level in invertebrates. Finfish are able to rapidly and efficiently biotransform or metabolize PAHs and excrete the resulting metabolites into bile. These metabolites do not pose a health risk to human consumers of the finfish. Marine invertebrates, including most shellfish, metabolize petroleum compounds slowly and inefficiently; consequently, they tend to accumulate high concentrations and wide ranges of PAHs.

Metabolic capacity of organisms is important from a seafood safety standpoint because some PAHs have carcinogenic potential for human consumers, due to the highly chemically reactive oxidation products that form during the first stage of metabolism in vertebrates. Human consumers often eat invertebrates in their entirety, and, therefore, may ingest all of the hydrocarbons that have accumulated in the organism and may be present in the organism's gut. Because finfish, like other vertebrates, rapidly and efficiently metabolize petroleum hydrocarbons, they generally pose little or no health risk to human consumers. Exceptions to this may occur for consumers for whom the edible portion of finfish includes tissues such as liver and gall bladder, which tend to accumulate higher levels of PAHs than muscle tissue.

Temperature

It is generally accepted that uptake and elimination rates both tend to increase with increasing temperature, though there is some contradiction among reported study results for PAHs.

The rate of reaction in chemical and biological processes generally increases 2- to 4-fold for a 10°C increase in temperature. Uptake, metabolic, and elimination rates typically increase with temperature, but at different rates, making it difficult to predict body burdens under the constantly changing oil concentrations that occur at spills. However, at high temperatures and increased respiration and filtration rates, it is expected that uptake will occur quickly, to relatively high concentration, followed by rapid declines. At low temperatures, body burdens are likely to be lower, but elimination rates will also be slower. At very low temperatures, some species stop feeding and thus are at lower risk of exposure.

Table G.2-2 Habitat utilization, feeding strategies, and risk of exposure to oil of different seafood groups.

Seafood groups	Examples	Metabolic capacity	Habitat utilization	Feeding strategies	Risk of exposure
Finfish					
Anadromous fish	Sturgeon, herring, salmon	High capacity	Nearshore and shallow water during spawning	Predatory	Moderate to high in nearshore and shallow water during spawning
Marine pelagic and bottom fish	Mackerel, jacks, cod, flounder	High capacity	Highly mobile, most species prefer depths of > 10m	Predatory	Low
Reef fish	Sea basses, snappers, porgies	High capacity	Relatively deep waters (10 – 200 m)	Predatory	Low to moderate; higher risk in shallow water
Estuarine fish	Bluefish, mullet, anchovies	High capacity	Spawning in intertidal or subtidal habitats; offshore winter migrations	Predatory	Moderate to high in nearshore and shallow water during spawning
Crustaceans					
Lobster, crabs, shrimp	American lobster, pink shrimp, blue crab	Reduced capacity	May migrate seasonally; range of depths between estuarine and deep waters.	Predatory; omnivorous, scavengers	Benthic burrowing, estuarine and shallow water species at higher risk than deep water species
Mollusks					
Oysters, mussels	American oyster, Pacific oyster, blue mussel	Very limited capacity	Shallow subtidal and intertidal regions, estuaries; attached to substrates	Filter-feeders	High
Clams, scallops	Hard clam, soft-shell clam, bay scallop, sea scallop	Very limited capacity	Intertidal and shallow subtidal areas; benthic or buried in the sediment; some mobility	Filter/deposit feeders	High
Gastropods	Abalone, conch, snails, whelk, limpet, top shell	Very limited capacity	Intertidal and shallow to deep subtidal areas; epibenthic; some mobility	Grazers and predatory	Moderate to high

Physiology

Lipid, carbohydrate, and protein levels are known to vary seasonally in certain aquatic invertebrate species, often associated with reproductive changes. Some of these changes in biochemical composition may affect uptake and elimination rates seasonally. Seasonal variation may also result from differences in feeding rates, microbial activity, and various environmental factors.

Organisms with higher overall lipid content generally exhibit higher levels of uptake or retention of petroleum compounds. For example, salmon (muscle lipid content of 4.0% wet weight) accumulated higher hydrocarbon concentrations than cod (muscle lipid content of 0.75% wet weight). Uptake rates of PAHs in clams peaked when gametogenesis was near completion and decreased during spawning, while elimination rates peaked during spawning. Oysters and clams sampled at the high point of lipid and glycogen reserves during their spawning cycles (the fall) had PAH tissue levels that were 2 to 3 times higher than they were when sampled during the spring. High elimination rates during the loss of lipid-rich eggs are consistent with findings that finfish and shellfish tend to accumulate PAHs in tissues with high lipid content because PAHs are strongly hydrophobic.

Potential variations in PAH uptake and elimination rates in seafood species due to seasonal and physiological variation should be taken into account during spill response. These differences should be considered when designing seafood sampling plans and when comparing analytical results from samples from different species, collected at different times of year, or collected during different stages in the life cycle of the organisms.

Chronic Exposure Stress

Bioaccumulation levels and elimination rates of hydrocarbons for finfish and shellfish may depend on the type and duration of exposure to petroleum products, and the extent to which the organisms have been chronically exposed to other contaminants. Chronic exposure appears to reduce elimination capacity. In fact, there may be two phases of elimination: an initial rapid phase followed by a second slower phase for PAHs that are sequestered in stable compartments of the organism, such as storage lipids. Some chronic hydrocarbon pollution studies have indicated no significant reductions in PAH levels in tissues over 2-4 months for clams and mussels, even when the animals were moved to cleaner habitats. The ratio of liver/muscle concentrations in finfish sometimes can be used as an indicator of the level of chronic PAH contamination at a site. Liver levels represent shorter-term exposure to oil, while muscle levels represent longer-term bioaccumulation. Therefore, lower liver/muscle ratios may indicate decreased efficiency in an organism’s ability to biotransform absorbed or ingested oil into compounds that are easily excreted.

Other subsistence and recreational seafood organisms

Some organisms that are collected and consumed for subsistence and recreation were not discussed in this section. Examples are octopus, squid, seals, whales, seaweed, and algae. There isn’t enough information on these organisms to thoroughly discuss the level of risk they may pose to consumers following an oil spill. It should be noted, however, that if these organisms occur in a spill area and are exposed, restrictions on harvest or consumption advisories might be warranted, depending on contamination and consumption levels.

Summary

- Wild finfish are unlikely to become contaminated or tainted because they typically are either not exposed or are exposed only briefly to the spilled oil and because they rapidly eliminate petroleum compounds taken up. Exceptions may occur if a large amount of fresh, light oil is mixed into the water column or if bottom sediments become contaminated. If nearshore sediments are contaminated, species that spawn in nearshore and shallow waters are more likely to be exposed to spilled oil than pelagic and benthic species.
- Penned finfish are more susceptible to tainting and contamination because they are not able to escape exposure.
- Shellfish are more likely than finfish to become contaminated from spilled oil because they are more vulnerable to exposure and less efficient at metabolizing petroleum compounds once exposed.

- Among crustaceans, species that burrow are at the highest risk of exposure at spills where bottom sediments are contaminated, followed by species that utilize nearshore and estuarine benthic habitats.
- Bivalves are at high risk of contamination because they are sessile, filter- and deposit- feed, and occur in substrates in shallow subtidal and intertidal areas that are more likely to become contaminated.
- It is generally accepted that uptake and elimination rates both increase with temperature, though study results are somewhat contradictory.
- PAHs tend to accumulate to higher concentrations in lipid-rich tissues and organisms. Sea-sonal differences in tissue lipid content associated with spawning may influence uptake and elimination rates of PAHs in some marine species.
- Chronic exposure to hydrocarbons in water and sediments may reduce elimination capacity.

MONITORING SEAFOOD FOR CONTAMINATION

The preceding section described information that can help determine the likelihood that spilled oil will expose and contaminate seafood. If it is decided that seafood is at significant risk, the next step is monitoring to determine whether seafood actually is contaminated, and to characterize the extent and degree of contamination. This section provides general guidelines for developing seafood sampling plans and conducting sensory and chemical testing of seafood samples for petroleum contamination.

Developing Seafood Sampling Plans

The first step in developing a sampling plan is defining the questions to be answered. Sampling should not begin before study objectives have been clearly established. Because every oil spill is a unique combination of conditions and the objectives of seafood sampling may vary from spill to spill, there is no standard sampling plan that can be applied to all seafood contamination monitoring studies. Generally, though, any sampling plan to monitor for potential seafood contamination from an oil spill should specify the study area, sampling locations, target species, number of samples to be collected, timing of initial and repeat sampling, sample collection methods and handling procedures, and analyses to be conducted. The statistical design must ensure sufficient statistical power to provide the information needed at the desired level of confidence to support seafood management decisions.

Some general guidelines for designing a seafood-sampling plan are presented below. For more detailed guidelines, see *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories Volume 1: Fish Sampling and Analysis* by the U.S. Environmental Protection Agency (2000). For more detailed sampling guidelines for sensory testing, see *Guidance on Sensory Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill* (Reilly and York 2001).

Selecting sampling locations

In selecting sampling locations, all likely pathways of oil exposure should be identified (*e.g.*, surface slicks, dispersed or dissolved oil in the water column, submerged oil associated with bottom sediments), so that risks to specific fisheries can be evaluated. Inclusion of commercial, recreational, and subsistence harvest areas should be considered.

Collection of pre-exposure samples from the spill area or samples from appropriate unexposed reference areas is extremely important because they can provide information on background levels of contamination in the spill area. Petroleum hydrocarbons are ubiquitous in environmental samples, so we cannot assume that all petroleum hydrocarbons measured in a sample or all increases over time are a result of an oil spill. Furthermore, monitoring often continues until the level of contamination returns to “background.” Reference samples are key to determining the range of background concentrations and the baseline against which changes over time will be evaluated.

The best reference samples are pre-spill samples taken in areas not yet oiled but in the potential path of the oil ("before" can be compared with "after" exposure). If pre-spill sampling is not possible, unexposed reference sites comparable to exposed sites can be selected for sampling. However, site histories and differences in the characteristics of the sites should be carefully evaluated to determine whether there are significant differences between the exposed and reference areas. Often, areas that escape oiling do so because they differ fundamentally from exposed areas (for example, bays that face different directions), and so would not be expected to exhibit the same "background" conditions. Any differences between reference and exposed sites must be considered when analyzing and interpreting results.

National monitoring programs such as NOAA's National Mussel Watch Program can provide valuable pre-spill data for determining historical ranges of background concentrations of PAHs in shellfish at several locations around the country. When available for an area, PAH data from the NOAA Status and Trends Program (including the National Mussel Watch Program) or other monitoring programs may help determine normal background levels and seasonal patterns in contaminant levels.

Selecting target species to be sampled

Evaluating risk to human health from seafood consumption usually is a primary purpose of seafood sampling, so including species harvested commercially, recreationally, and for subsistence use may be important. Species that are present throughout the area of concern may be most appropriate for sampling if results are to be compared spatially or if the results are to be used to make statistical inferences to the entire area.

Hydrocarbon uptake and elimination rates vary widely. Finfish, for example, quickly metabolize and eliminate PAHs. Bivalves generally tend to bioaccumulate most contaminants and often serve as good indicators of the potential extent, degree, and persistence of contamination. On the other hand, some shellfish species stop feeding or passing water over their gills at extreme temperatures and, consequently, may exhibit low uptake rates under certain conditions. Consider such differences when selecting species for monitoring and comparing results among species.

Sampling frequency and duration

Monitoring generally should continue until contaminant levels reach background levels or predetermined acceptable levels. Periodic sampling before those levels are reached can reveal trends in contaminant levels. Appropriate monitoring frequency and duration will depend on spill conditions, such as oil type and volume spilled, flushing rates of affected water bodies, and the degree of exposure to wave action of contaminated shorelines. Appropriate monitoring frequency and duration will also depend on the species exposed and exposure duration. Finfish generally eliminate hydrocarbons within days or weeks, whereas bivalves may require several weeks or months. Elevated levels of petroleum compounds in bivalves have been detected for years at some sites where high levels of oil persist in adjacent sediments. Time of year should also be considered in some climates because elimination rates may be slower in cold temperatures. Other factors to consider with regard to monitoring frequency are the turnaround time for sample analysis and time required for the evaluation team to meet, interpret the results, and decide on the need for further sampling. Sampling plans may need to be adjusted over time as conditions change and as monitoring results provide new information on the fate of the oil and on which pathways of exposure are significant.

Sample collection and handling

The seafood-sampling plan should specify all details about sample collection. This includes the areas to be sampled, number of samples to be collected from an area (to meet statistical objectives), number of organisms or quantity of tissue to be composited (to meet analytical requirements), size of organisms to be collected, tidal elevations for collection (in the case of intertidal invertebrates), method of marking or recording exact sampling locations, and field notes to be recorded.

The sampling plan should also specify how seafood samples should be handled. This includes any field preparation, packaging and temperature requirements (for example, wrapping in foil, keeping in a cooler at 4°C or below, and freezing within a specified period of time), labeling, and any chain-of-custody requirements during transport to the analytical laboratory. The edible portion, which may vary culturally, is usually the portion of interest. Seafood samples collected for sensory testing generally should be handled as they would be during commercial, recreational, or subsistence harvest and transport.

Procedures should be followed to prevent cross-contamination in the field (such as preventing exposure of samples or sampling equipment to exhaust fumes and engine cooling systems on vessels) and to maintain the integrity of the samples. Likewise, good laboratory practices should be employed to prevent contamination of samples during preparation and analysis.

Testing Seafood for Contamination and Tainting

Generally, two different types of evaluations can be conducted after oil spills to determine whether seafood is contaminated. Sensory testing determines whether seafood is tainted, *i.e.*, if it has an off-odor or off-flavor. Chemical analysis determines whether tissues are contaminated with targeted compounds. Detailed methods of chemical analysis can indicate the presence as well as the quantity of specific contaminants in tissues. These results can be used to evaluate risk to human health through consumption of contaminated seafood. Summaries of these types of seafood testing are described below.

Sensory evaluation of seafood for presence of petroleum taint

When an oil spill occurs, local seafood resources may be exposed to petroleum compounds that affect their sensory qualities; that is, smell, taste, and appearance. Even when seafood from a spill area is considered acceptable with regard to food safety, flavor and odor may still be affected, negatively impacting the seafood's palatability, marketability, and economic value. Furthermore, tainted seafood is considered by the U.S. Food and Drug Administration to be adulterated and, therefore, is restricted from trade in interstate commerce.

Tainted seafood is defined as containing abnormal odor or flavor not typical of the seafood itself (ISO 1992). Under this definition, the odor or flavor is introduced into the seafood from external sources and excludes any natural by-products from deterioration due to aging during storage, decomposition of fats, proteins, or other components, or due to microbial contamination normally found in seafood. Taint is detected through sensory evaluation, which has been defined as "the scientific discipline used to evoke, measure, analyze and interpret those reactions to characteristics of foods and materials as perceived through the senses of sight, smell, taste, touch and hearing" (Food Technology Sensory Evaluation Division 1981). Humans have relied for centuries on the complex sensations that result from the interaction of our senses to evaluate quality of food, water, and other materials. In more recent times, sensory testing has developed into a formalized, structured, and codified methodology for characterizing and evaluating food, beverages, cosmetics, perfumes, and other commercial products. Sensory evaluation techniques are routinely used commercially in quality control, product development, and research. Sensory testing can be either subjective or objective. Subjective testing measures feelings and biases toward a product rather than the product's attributes. For objective testing, highly trained assessors use the senses to measure product attributes. Testing of seafood for petroleum taint should be completely objective and should be conducted by highly trained analysts.

Objective sensory testing serves as a practical, reliable, and sensitive method for assessing seafood quality. Only human testers can measure most sensory characteristics of food practically, completely, and meaningfully. Though advances continue to be made in developing instrument-based analysis, human senses remain unmatched in their sensitivity for detecting and evaluating organoleptic characteristics of food. The U.S. Food and Drug Administration and NOAA's National Marine Fisheries Service routinely employ sensory evaluation in inspecting seafood quality. Seafood inspectors are essentially sensory analysts, or assessors, who work as expert evaluators in the application of product standards. A major objective of seafood sensory inspection is to evaluate quality with regard to decomposition of fisheries products. Sensory analysis can also provide information on presence of taint from external sources, such as spilled oil and chemicals.

Sensory panels

Objective sensory evaluation of seafood is usually conducted using a panel of trained and experienced analysts. Sensory analysts must be screened for sensitivity and then trained in applying established sensory science methodology. Participation in calibration or "harmonization" workshops ensures uniform application of sensory evaluation criteria for particular types of contaminants, including standard terminology and consensus on levels of intensity of sensory characteristics. Descriptive analyses and references are used to yield results that are consistently accurate and precise.

There are different types of sensory analysts, which function differently and have specific selection, training, and validation requirements. *Trained assessors* are sensory analysts selected and trained to perform a specific task. *Expert assessors* are the most highly trained and experienced category of sensory analyst. Expert assessors generally evaluate product full-time, function independently, and often are used in quality control and product development. Examples of products evaluated by expert sensory assessors include wine, tea, coffee, and seafood. Through extensive standardized training and experience with sensory methodology, these expert assessors have become extremely objective and evaluate quality with a high degree of accuracy and precision. Seafood inspectors fall into the category of expert assessors, and can make consistent and repeatable sensory assessments of quality characteristics of seafood as they relate to grade level or decisions to accept or reject product.

The number of panelists needed depends on the level of expertise and experience of the analysts used. For panels of expert assessors, such as NMFS and FDA seafood inspectors, usually only three to five analysts are needed. If less experienced analysts are used, a larger number of panelists is recommended. Whenever possible, use of expert seafood assessors, such as seafood inspectors, is recommended for evaluation of seafood for presence of petroleum taint. Extensive product knowledge and experience enable seafood inspectors to very accurately distinguish variations related to product processing, storage, deterioration, etc. from taint due to external sources. Some seafood inspectors for NMFS and FDA have had specialized training for detecting petroleum taint in seafood and experience evaluating seafood samples at oil spills. If called upon, these specialized inspectors are available to conduct sensory evaluation of seafood during spill events.

Sensory evaluation procedures

Applied as a science, sensory evaluation should be conducted under specific, highly controlled conditions in order to prevent extraneous influences in the testing environment from affecting panelists' sensory responses. Accordingly, sensory testing is best conducted in facilities specifically designed for sensory testing. The NMFS Seafood Inspection Branch maintains several such laboratories around the country. Seafood samples collected during a spill event can be shipped to these laboratories for sensory evaluation. In most cases, NMFS and FDA recommend that samples be shipped and evaluated in the same manner as they normally are shipped and sold (*i.e.*, fresh, live, frozen). When this is not possible, as may be the case for oil spills in very remote areas, sensory analysts can conduct evaluations at the scene of an incident.

All sensory testing should be conducted under the supervision of a sensory professional, who designs and implements the sensory testing procedure. A trained "facilitator" should coordinate sensory analysis. The facilitator conducts the testing, including receiving, preparing, and presenting samples to the expert sensory panel, and collecting the resulting data in a scientific and unbiased manner. All of these steps should be conducted according to standardized procedures under highly controlled conditions. Suspect samples are presented to assessors in blind tests, along with control or reference samples. Samples are first smelled raw, then smelled cooked, and finally tasted by each panelist independently to determine whether petroleum taint is present. A sensory professional statistically analyzes panelist's responses to determine whether samples pass or fail with regard to presence of petroleum taint. These results, in turn, help seafood managers determine whether restrictions are needed on seafood harvest or marketing from the spill area due to tainting.

We are not certain which compounds in petroleum are responsible for taint perceived by humans, so chemical analysis cannot yet substitute for sensory testing in determining whether a taint is present. It has been suggested that the principal components of crude and refined oils responsible for tainting include the phenols, dibenzothiophenes, naphthenic acids, mercaptans, tetradecanes, and methylated naphthalenes. The human olfactory system generally is very sensitive to phenolic and sulfur compounds, even though they are minor components of oil.

In 2001, NOAA published a technical guidance document on appropriate sensory methodology to objectively assess seafood for the presence of petroleum taint. Written by sensory scientists with NOAA's National Marine Fisheries Service Seafood Inspection Program and Canada's Food Inspection Agency, in cooperation with the U.S. Food and Drug Administration, *Guidance on Testing and Monitoring of Seafood for Presence of Petroleum Taint Following an Oil Spill* comprehensively describes recommended standard procedures, including collection, preservation, and transport of seafood samples, for sensory evaluation. The guidance is intended to assist in conducting scientifically sound and legally defensible sensory tests on seafood during oil spill response, with adequate and appropriate quality control.

Chemical testing techniques for petroleum contaminants in seafood

Chemical testing of seafood often is conducted after an oil spill to determine whether seafood tissues are contaminated with petroleum compounds. Both detailed and screening methods of analysis can be employed. Below, we summarize methods typically used after past oil spills, including some of their advantages and disadvantages.

DETAILED METHODS OF CHEMICAL ANALYSIS: GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Detailed chemical analysis of seafood after oil spills typically is conducted using gas chromatography and mass spectrometry (GC/MS), which measures individual PAHs at very low detection levels and provides a PAH pattern (or fingerprint) to compare to that of the source oil. Prior to analysis, hydrocarbons are extracted from seafood tissue samples and the extract is split into three fractions: 1) the saturated hydrocarbons fraction (containing the n-alkanes, isoprenoids, steranes and triterpanes; 2) the aromatic hydrocarbon fraction (containing the PAHs and sulfur heterocyclics; and 3) the polar hydrocarbon fraction (containing the nitrogen heterocyclic compounds. Recovery standards appropriate to each fraction are added.

The PAHs in the fraction generally are of greatest concern with regard to risk to human health. The gas chromatograph separates targeted PAH compounds yielding a retention time that, in combination with the mass spectra from the mass spectrometer, enable detailed identification of individual compounds by their ion masses. The method often used is usually referred to as "Modified" EPA Method 8270, which is EPA Method 8270 for semi-volatile compounds modified to include quantification of the alkyl-substituted PAH homologues, in addition to the standard PAH "priority pollutants." In oil, alkylated homologues of PAHs are more predominant than parent PAH compounds, often by an order of magnitude. This is in contrast to pyrogenic (combustion) and other potential PAH sources. The detailed chemical fingerprint provided by GC/MS analysis enables differentiation among sources of PAHs found in the sample. Contamination from a specific spill can be distinguished from background sources of contamination, such as PAHs derived from combustion sources. GC/MS can also measure analytes other than PAHs to help with fingerprint analysis of oil or to track oil weathering. The GC/MS can be run in the selected ion monitoring (SIM) mode, rather than the full-scan mode, to increase the minimum detection levels (MDL) of the individual parent and selected homologue PAHs by a factor of 10 to 40. Minimum detection levels for individual PAHs are very low, in the range of parts per billion (ng/g) in tissue. The quantitative results for specific, targeted PAHs can be used to assess whether levels detected pose a risk to human health through seafood consumption.

Normal turnaround time for analysis of tissue samples for PAHs is approximately two weeks. Fast turnaround time is approximately three days for a batch of samples. Costs for GC/MS-SIM analysis of tissues are relatively high, starting from about $750 per sample, plus premiums of 50-100% for fast turnaround. The sample-processing rate depends on the throughput capabilities of the laboratory and the degree of quality control (QC) of the data before the results are released, ranging from approximately 20 to a maximum of 100 samples per week.

Data Reporting and Interpretation

The importance of data reporting and interpretation should not be underestimated in plan-ning seafood safety monitoring programs after oil spills. Some simple steps can be taken to help avoid confusion and prevent incorrect conclusions. For example, the analytical laboratory should include at least the following information for all analytical data reported:

Header Information

- *Sample Name or Field ID: the sample name or number assigned by the sampler*
- *Sample Type: e.g., sample, field blank, trip blank, procedural blank, QC*
- *Batch No.: analytical batch number (so samples run as a batch can be identified, particularly if problems are found with a batch run)*
- *Matrix: e.g., water, sediment, tissue, oil*
- *Percent Moisture: for tissue and sediment samples*
- *Sample Size: weight or volume of sample used for analysis*
- *Collection Date: date the sample was collected*
- *Extraction Date: date the sample was extracted*
- *Analysis Date: date the sample was analyzed*
- *Analysis Method: EPA Method or other description*
- *Surrogate Corrected?: Are the reported concentrations corrected for surrogate recovery?*
- *Method Detection Limit: the minimum detection level*
- *Units: units in which the concentration is reported, including whether concentrations are wet weight or dry weight (for tissue)*

Analyte Data

- *Individual and Total PAH concentrations*
- *Surrogate Recovery (%): for every sample*
- *Key to Data Qualifiers: The lab should include a key to any qualifiers used to flag reported values that have some kind of data accuracy issue. For example, two standard qualifiers used under the USEPA Contract Laboratory Program guidelines (USEPA 1994) are:*
- *U = the analyte was analyzed for, but was not detected above the reported sample quantification limit*
- *J = the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample*

Analysis of the source oil, if available, is needed to enable fingerprint comparisons. Only expert petroleum hydrocarbon chemists should interpret fingerprints because the complex processes of oil weathering and uptake result in variable PAH patterns in organisms. Also, patterns can be difficult to interpret in samples collected from areas with high background levels of contamination.

Caution is advised when comparing analytical results for samples of different types, or samples collected from different areas or at different times. Before drawing conclusions, consider any differences in the analyses conducted or the way the data are reported. Examples of differences to watch for include:

- The units in which results are reported, and whether reported concentrations are dry or wet weight;
- Whether the lists of analytes and minimum detection limits for individual PAHs are the same;
- Whether reported concentrations have been corrected for surrogate recovery; and

- Whether reported concentrations have been lipid-normalized. PAH uptake and retention tend to increase with the increasing lipid content of tissues. Consequently, differences in lipid content may need to be considered when comparing and interpreting analytical results over time or among different organisms.

Rapid screening methods of analysis

Rapid, low-cost analytical methods, generally known as screening methods, can be employed to identify contaminated samples and prioritize them for detailed analysis. Detailed methods of analysis for PAHs in tissue are time-consuming and expensive. The large number of samples often collected after an oil spill can quickly overwhelm laboratory capacity and strain resources. Screening methods of analysis can rapidly process large numbers of samples to yield semi-quantitative estimates of contaminant concentrations and allow ranking of samples by degree of contamination. Used in a tiered approach, screening methods can identify the most contaminated samples, prioritizing or reducing the number of samples that need to be processed by detailed analytical techniques, such as GC/MS.

For example, in response to the need to analyze large numbers of subsistence seafood samples collected after the *Exxon Valdez* oil spill in Prince William Sound, Alaska, NOAA's Northwest Fisheries Science Center used reverse-phase, high performance liquid chromatography (HPLC) with fluorescence detection to screen for metabolites of aromatic compounds in finfish bile. Finfish rapidly metabolize aromatic compounds and concentrate the resulting metabolites in bile for excretion, often at concentrations that are orders of magnitude greater than those in edible tissue. Using this rapid, low-cost method, hundreds of finfish tissue samples were screened for indication of exposure to petroleum contaminants, enabling GC/MS analyses to be focused on selected samples to confirm presence and quantities of individual contaminants. HPLC/UV fluorescence screening methods have also been used for rapidly measuring aromatic compounds in invertebrate tissues. This screening method was used successfully on lobster samples collected after the *North Cape* oil spill off the coast of Rhode Island in 1996.

Screening analyses, such as the HPLC/fluorescence method described above, generally can be completed in rapid turnaround time (within 24 hours) and can be conducted on a research vessel or onshore lab. Rapid availability of results enables sampling modifications based on indications of exposure. This can be very helpful during the critical early phases of an oil spill response, when decisions regarding closing or otherwise restricting seafood harvest may be made.

The utility of HPLC/fluorescence and other screening methods, however, is more limited than detailed methods of analysis. For example, though it may be possible to recognize chromatographic patterns associated with characteristic classes of petroleum products, HPLC/fluorescence screening does not produce a detailed "fingerprint" similar to the results acquired from GC/MS. Consequently, HPLC/fluorescence usually will not enable differentiation between background contamination sources and the spilled oil, especially in very polluted areas. Since HPLC/fluorescence screening does not quantify individual aromatic compounds, the results cannot be used to assess risk to human health from consumption of contaminated seafood. Furthermore, measurement of fluorescent aromatic compounds in bile is not a standard analysis, limiting temporal and spatial comparisons using historical data sets. Lastly, HPLC/fluorescence screening for fluorescent aromatic compounds in bile is a specialized technique, and laboratory availability and expertise needed to conduct the analyses reliably may be limited.

Water Monitoring

Water samples often are collected and analyzed as part of the initial spill response and assessment. Seafood safety managers can use these results to help estimate the extent and duration of seafood exposure to oil in the water column. Monitoring water concentrations may also be important if water-quality criteria are applied as a condition for reopening a closed fishery or removing other harvest restrictions.

Oil concentrations in the water column generally peak early after an oil spill and, in most cases, rapidly decline to background levels within days to a week, as was the case for example at the *New Carissa* oil spill. Accordingly, if water sampling is to be conducted, initial sampling should commence very soon after a spill occurs. Oil may persist longer than usual in the water column if there are multiple or ongoing oil releases, if the released volume is extraordinarily large, or if large volumes of oil are physically dispersed. After the *Braer* oil spill, for example, elevated oil concentrations were detected in the water column as long as 50 days after release. Dissolved and dispersed oil plumes in the water column are driven by currents and so may have a very different spatial distribution than surface slicks, which are driven primarily by wind.

Under the authority of the Clean Water Act (63 FR 68354-68364), EPA has issued national recommended water-quality criteria for priority toxic pollutants to be used by states and tribes in adopting water quality standards. EPA has issued water-quality criteria for protection against human health effects for three mono-aromatic hydrocarbons and eight PAHs (listed in Table G.2-3). These particular compounds, however, are present in crude oils and refined products at very low levels and constitute a tiny percentage of the PAHs normally detected in water samples after an oil spill. None of the water quality criteria to protect aquatic communities (both freshwater and saltwater) issued by EPA are for PAHs. EPA has issued recommended water quality criteria for organoleptic effects for 23 chemicals, though not for any of the compounds present in petroleum products. Some states have established state water quality standards for PAHs in their coastal waters.

Sediment Monitoring

Sediment monitoring can be included as part of a post-spill monitoring program to determine whether sediments may be a potential chronic source of oil exposure to adjacent seafood collection sites, particularly at intertidal sites where bivalves are harvested. Sediment sampling also may facilitate fingerprint analysis of PAHs in tissues by providing the PAH pattern in contaminated sediments, which may be different than the PAH pattern in the fresh source oil. It is important to recognize, however, that sediments often contain high levels of background PAH contamination, particularly in urban areas and harbors. PAHs and other contaminants detected may not be related to a particular oil spill. Also, characterization of sediment contamination can be difficult because of the inherent heterogeneity of intertidal sediments over space, depth, and time.

There are no national sediment quality criteria for PAHs in marine or freshwater sediments. Some states have established sediment quality standards and cleanup screening levels to prevent adverse biological effects. How these standards would relate to seafood adulteration or safety issues is unclear.

Table G.2-3 National recommended water quality criteria for priority toxic pollutants for protection agains human health effects.

PAH priority pollutant	Human health criteria for consumption of water + organism (μg/L)	Human health criteria for consumption of organism only (μg/L)
Benzo[a]anthracene	0.0044	0.049
Benzo[a]pyrene	0.0044	0.049
Benzo[a]fluoranthene	0.0044	0.049
Benzo[k]fluoranthene	0.0044	0.049
Dibenzo[a]anthracene	0.0044	0.049
Fluoranthene	300	370
Fluorene	1300	14000

SEAFOOD RISK ASSESSMENT

(Risk assessment and determination of caner risk should be conducted by the California Department of Public Health).

Several different endpoints can be considered when assessing risks posed to human health from consuming contaminated seafood. These include both carcinogenic and non-carcinogenic effects to the general population, as well as to particularly susceptible segments of the population such as children, pregnant women, and subsistence seafood consumers. Human epidemiological studies, when available, and laboratory studies involving animals are used to assess the likely effects of contaminants at various exposure levels.

Evidence from occupational studies of workers exposed to mixtures of PAHs indicates that many of these compounds may be carcinogenic to humans. Individual PAHs that are considered to be probable human carcinogens include benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene (IRIS 1994). Most of the data gathered from laboratory studies provides information on carcinogenic effects of lifetime exposure to PAHs. Information on non-carcinogenic effects is limited. Consequently, cancer generally is the primary endpoint considered when assessing potential risks to human health from consumption of seafood from an oil spill area.

Seafood Advisory and Action Levels from Previous U.S. Oil Spills

The action or advisory levels resulting from cancer risk calculations differ among spills, depending on the assumptions made and input values selected. At the *New Carissa* oil spill, the Oregon Health Division calculated action levels for average and upper end shellfish consumers of 45 ppb BaP equivalents (BaPE) and 10 ppb BaPE, respectively. Action levels derived by the California Department of Health Services for average and upper-end shellfish consumers following the *Kure* spill were 34 ppb BaPE and 5 ppb BaPE, respectively. At the *North Cape* oil spill, the Rhode Island Department of Health essentially applied a BaPE criterion of 20 ppb for the maximally exposed lobster consumer over the five-year exposure duration. Action levels calculated by the Maine Bureau of Health for lobster consumption after the *Julie N* oil spill for ten and 30- year exposure durations were 50 ppb and 16 ppb BaPE, respectively. Advisory levels for subsistence consumers after the *Exxon Valdez* oil spill, assuming a ten-year exposure period, were three ppb BaPE for salmon, five ppb BaPE for finfish, 11 ppb BaPE for crustaceans, and 120 ppb BaPE for bivalve mollusks. Advisory levels based on a lifetime exposure assumption were approximately an order of magnitude lower. None of the finfish or shellfish samples collected from harvesting areas near Prince William Sound exceeded these advisory levels. Interestingly, the upper-bound lifetime cancer risk for Alaskan subsistence seafood consumers eating the most contaminated bivalve mollusks from the spill area was calculated to be two orders of magnitude lower than the lifetime risk calculated for consumers of locally smoked salmon

.

At several of these spills, the calculated action levels were used as recommended levels for reopening harvest of closed seafood fisheries. For example, at the *New Carissa* oil spill, shellfish were considered safe if all samples contained less than 10 ppb BaP equivalents. If any shellfish tissue levels were above 45 ppb BaP equivalents, shellfish in those areas would be considered unsafe, and further monitoring considered necessary. If samples contained more than 10 ppb but less than 45 ppb BaP equivalents, the need for further monitoring would be assessed on a case-by-case basis. A similar tiered approach was used at the *Kure* oil spill. If all samples contained less than 5 ppb BaP equivalents, shellfish beds could be reopened. If any samples contained between 5 and 34 ppb BaP equivalents, the need for further action before reopening would be assessed. If any samples contained more than 34 ppb BaP equivalents, additional sampling and environmental monitoring prior to reopening would be considered.

The Equivalency Approach for Risk Assessment

The equivalency approach used in relative cancer risk assessment is a method used for assessing the risk of exposure to a mixture of several different compounds that are related in terms of chemical and biological activity. Rather than calculating individual risks for each compound, one component of known potency is used as a standard. Concentrations of each of the other compounds are adjusted based on their estimated potency relative to the standard, to calculate an equivalent concentration for the standard. Summing the equivalent concentrations yields a single number from which the cancer risk can be estimated.

This toxicity equivalency approach has been widely used for mixtures of dioxins and furans, for example. The relative potencies of individual dioxin and furan compounds are expressed in terms of 2,3,7,8-tetra-chlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) equivalents. 2,3,7,8-TCDD was chosen as the standard by which the potency of individual dioxin and furan compounds are estimated because most laboratory studies on the effects of dioxins have been conducted using 2,3,7,8-TCDD. Data are more limited on the effects of other congeners. The same approach can be used with petroleum compounds, which also occur in complex mixtures.

SEAFOOD TAINT RISK COMMUNICATION

Both technical and social factors should be considered when communicating information on the health and safety of seafood following an oil spill, particularly when dealing with different groups. The risks and consequences have different meanings for the subsistence user, sport fisher, average consumer, commercial fisher, elected official, regulator, and responsible party representative. Regulators and scientists measure risk quantitatively and accept the uncertainty inherent in the risk-assessment process. The public perceives risk more qualitatively and subjectively, and is influenced by prior experience with similar risks and information made available to them. The public wants to know whether the seafood is safe to eat; yet the answers given are typically posed in terms of “acceptable risk” or “not a significant risk.” Risk communicators should be aware of and try to overcome: 1) gaps in knowledge, 2) obstacles inherent in the uncertainties of scientific risk assessment, and 3) barriers to effective risk communication.

Please see Appendix F for further general information on risk communication approaches and techniques. In addition:

- Meet directly with groups such as commercial fishing associations, recreational users, subsistence users, seafood vendors, etc. Meetings can fail if the risk communicators are not prepared or knowledgeable, or appear to be withholding information. Specialized bulletins or communication methods may be necessary for special groups, such as Native American subsistence users and non-English-speaking users.
- Use unambiguous terms whenever possible. Health risks are commonly described in terms of probabilities of cancer based on assumed consumption rates and periods. It is assumed that carcinogens do not have safe thresholds for exposures; that is, any exposure to a carcinogen may pose some cancer risk (USEPA 2000b). However, it is both useful and appropriate to define “safe” and “unsafe” levels of PAHs in seafood based on risk rates that are commonly considered to be acceptable. For example, water-quality criteria for carcinogenic contaminants in water usually use risk rates in the range of 10^{-5} to 10^{-6}. The general public understands the concepts of acceptable risks, although there may be components of society where these risks conflict with local cultures, such as the Alaska Native subsistence users during the *Exxon Valdez* oil spill. As long as the risk communicators clearly define what is meant by “safe” and “unsafe,” these terms are appropriate.

Communicating Relative Risks

Risk communicators commonly compare the relative risk of a specific activity to known risks of other activities. For example, the public is accustomed to hearing the risks of death by automobile accident or airplane crash. These are considered voluntary risks taken by people who decide to drive or fly after considering the risks and benefits associated with these activities, whether or not their perceptions are realistic. The public generally will accept risks from voluntary activities that are roughly 1,000 times greater than involuntary risks that provide the same level of benefits.

Because the potential human-health risks from eating seafood contaminated by an oil spill are associated with PAHs, it is tempting to compare the PAH levels in seafood samples with those found in other food sources. PAHs are ubiquitous contaminants, measurable in many foods. Based on information from previous spills, PAH levels in seafood from oil-spill-contaminated waters generally are considerably lower than PAH levels found in smoked foods. During the *Exxon Valdez* oil spill, however, village community residents became upset when it was pointed out that samples of smoked fish from the villages contained carcinogenic hydrocarbon levels hundreds of times higher than any shellfish samples collected from oiled beaches, and nearly 10,000 times higher than wild salmon. The residents considered eating smoked salmon to be an acceptable, voluntary risk, and eating oil-contaminated seafood to be an involuntary, unacceptable risk. Guidelines for risk communication include being sensitive to the distinction between voluntary and involuntary risk, and avoiding risk comparisons that equate the two. Risk comparisons should be made carefully.

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APPENDIX H

NATIONAL CONTINGENCY PLAN (NCP) PRODUCT LIST

and

STATE LICENSED OIL SPILL CLEANUP AGENTS (OSCA)

Within the U.S. only dispersants that have met the approval criteria set by the U.S. Environmental Protection Agency (EPA) and that are listed on the EPA National Contingency Plan (NCP) Product Schedule can be legally sprayed. The NCP Product Schedule includes the products shown in the table below.

In addition to meeting the approval criteria set by the EPA, dispersants used in California must be a California state-licensed Oil Spill Cleanup Agent (OSCA). The two dispersants currently meeting the state-licensing requirements are also shown below.

Dispersants with federal approval	**Dispersants licensed in California**
BIODDISPERS	
DISPERSIT SPC 1000	
FINASOL OSR 52	
JD-109	
JD-2000	
NEOS AB 3000	
MARE CLEAN 200	
SAF-RON GOLD	
SEA BRAT #4	
ZI-400	
COREXIT 9527A	**COREXIT 9527A**
COREXIT 9500A	**COREXIT 9500A**
NOKOMIS 3-AA	**NOKOMIS 3-AA**
NOKOMIS 3-F4	**NOKOMIS 3-F4**

Updated NCP Product Lists can be accessed via the EPA representative on the RRT (Appendix A), by calling the Emergency Response Division of the U.S. EPA (202-260-2342) or accessing the Internet at http://www.epa.gov/oilspill/ncp/dsprsnts.htm

Additional information on California state-licensed dispersants may be obtained by contacting the OSPR representative on the RRT (Appendix A) or accessing the Internet at http://www.dfg.ca.gov/ospr/reg_com/osca.html

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APPENDIX I

DETERMINATION PROCESS FOR CALIFORNIA OFFSHORE DISPERSANT ZONES

The use of dispersants in marine waters off California requires detailed foresight and planning. In an effort to expedite a decision to use dispersants and reduce first strike response time, the Regional Response Team Region IX in August of 2000 adopted formal changes to the planning and operations sections of the Regional Contingency Plan (RCP). These sections detail a dispersant use planning process to be undertaken by each of the six California marine Area Committees (AC). Specifically, each AC was tasked with designation of approval zones for dispersant use within its area of operation and the development of a dispersant use plan to include at least the following: 1) Incident Command System (ICS) protocols and forms, 2) Federal On-Scene Coordinator Checklist, 3) dispersant monitoring plan, and 4) wildlife spotting protocols. Finally, each committee was asked to review training and drill requirements for plan implementation as well as dispersant response equipment assuming a 4-hour response time.

Beginning in February 2001, each Area Committee (North Coast, San Francisco-Bay Delta, Central Coast, Los Angeles-North, Los Angeles-South, San Diego) designated a dispersant subcommittee to develop their regional dispersant use zone recommendations. Los Angeles subsequently combined LA-north and LA-south efforts under one subcommittee. San Diego developed an additional Sea Bird Task Force that compiled sea bird information primarily for the Southern California Bight area, and reported their results to the San Diego dispersant subcommittee for their particular consideration in developing recommended zones. All subcommittees initiated the planning process by gathering the pertinent resource data for the region and becoming familiar with the effects of dispersants and dispersed oil in the marine environment. Based on the information reviewed, each subcommittee developed a Net Environmental Benefit Analysis (NEBA) to aid them in constructing the area’s dispersant use zone recommendations. Based on the results of the NEBA, each subcommittee ultimately concluded that in the case of dispersible crude and fuel oils, dispersing the spilled oil into the water column may, on balance, be less harmful to the environment than letting the oil remain on the ocean’s surface for extended periods of time.

Each subcommittee and Area Committee drafted their dispersant zone recommendations, along with some general dispersant application guidelines, and forwarded those through the U.S. Coast Guard to the RRT. All zone recommendations were approved by the RRT between February 2002 and July 2003. Parallel to the RRT dispersant zone review and approval process, the Los Angeles subcommittee was continuing to meet in workgroups to develop drafts of the other elements (updated FOSC checklist, Wildlife Observation Protocols, Public Outreach Plan, dispersant shortfall analysis, and incorporation of dispersant effectiveness monitoring) necessary to make a complete Area Dispersant Plan (ADP). In doing so, there was a recognition that much of the Los Angeles effort would not only be useful as a starting point for similar efforts by other Area Committees in developing their individual ADPs, but would in fact mature into an overarching California Dispersant Plan that would serve all six marine Area Committee regions in the state and save them the need to develop five other, largely redundant, dispersant plans. This California Dispersant Plan (CDP) includes the zones for each area, as well as an updated Federal On-Scene Coordinator (FOSC) checklist and all appendices needed to implement the CDP.

The Net Environmental Benefit Analysis (NEBA) Process

Once oil is spilled to the ocean there will be inevitable impacts to the environment within the geographical area of the spill no matter how much effort is put into spill response. The primary goal of any oil spill response is to minimize the area of impact and remove the spilled oil from the water's surface as fast as possible, thus minimizing the impact to the organisms inhabiting the terrestrial, estuarine, intertidal, shallow subtidal and ocean surface environments. This response goal is not meant to overlook the potential for impacts to the organisms found immediately below the ocean surface, but instead provides a mechanism for discussion of the environmental trade-offs associated with any response option.

Each regional dispersant subcommittee assessed and compared the impacts of an oil spill and associated cleanup activities on the biological resources of their area. This examination was conducted using a Net Environmental Benefit Analysis (NEBA), modeled on an Ecological Risk Assessment previously conducted for the San Francisco Bay. In each case, the NEBA examined and compared the risk to the environment associated with available oil spill response options. Spill response options evaluated were 1) no on-water response, 2) mechanical cleanup, 3) *in situ* burning, and 4) dispersant use. The risks of these cleanup options were examined using a NEBA risk matrix, which qualitatively combined the risk to the biological resource resulting from both the magnitude (percentage) of the population impacted with the expected time for the population to recover from the impact.

The NEBA in each area was conducted using an assumed spill of Alaska North Slope crude oil, a dispersible crude oil commonly transported along the coast of California. The approach was a "what-if" analysis in that all sensitive species that could be found in a region, regardless of time of year, were incorporated. This approach was undertaken to eliminate the need to conduct the multiple NEBAs necessary to address spatial and temporal differences found each region. By using this approach, each dispersant subcommittee had all the pertinent resource information at their disposal at one time and could examine and incorporate temporal and spatial differences in their single analysis.

Each regional NEBA had the same general findings:

1) In average or worse-than-average offshore response settings, and/or where spill distance from shore significantly increases the response time, mechanical cleanup techniques and *in situ* burning may, by themselves, provide very little improvement over the no response option. When this is the case, these response techniques will not significantly reduce the risk of spilled oil contacting biological resources at the sea surface or in more inshore (*e.g.*, intertidal) regions.

2) When used in an appropriate and timely manner, dispersants can remove a significant amount of oil from the surface water. Appropriate and timely application includes a number of decision factors, included in this CDP.

3) While dispersants may measurably reduce the risk of oil to surface and coastal biological resources, there may be a temporally limited increase in risk to the plankton community in the upper several meters of the water column.

4) Shoreline cleanup methods may not be available or appropriate for use in some sensitive coastal habitats (*e.g.*, rocky intertidal, marshes, wetlands); their inappropriate use may pose a greater risk to these sensitive habitats and dependent species than the oil itself. The goal in this case shifts to keeping the oil from ever reaching sensitive coastal and inland areas.

In the NEBA process, the benefits and risks of each cleanup option were evaluated separately. However, an effective spill response may use a combination of several available response options. Oceanographic conditions permitting, it is expected that dispersants would be used in combination with mechanical cleanup equipment and response strategies.

NEBA results suggested that the appropriate and timely use of dispersants (on oil spills characterized as "dispersible") could greatly enhance the ability to remove significant quantities of oil from the offshore water surface. This may greatly reduce the risk of spilled oil reaching the more abundant and sensitive habitats and species found in the more inshore, coastal areas. While dispersing oil into the water column can pose a short-term risk to the plankton community inhabiting the upper few meters of the water column, the impacts will be to a much more geographically limited area, and the temporal duration will be relatively very short. The environmental "trade-off" decision-making at the time of a response – weighing the impacts associated with oil on the surface for weeks to months versus the short term toxicity (minutes to hours) resulting from dispersed oil in the water column – can and will be made by the response agencies on a case-by-case spill response basis.

The detailed NEBA matrices developed by each regional dispersant subcommittee are not part of this report, although information about particular resources of concern is summarized in Appendix B.

Environmental "Trade-off" Decisions

The proposed area dispersant zone recommendations acknowledge that weighing of environmental "trade-offs" is not as easy as it may seem, even when information on sensitive resources has been gathered ahead of time. Information on species occurrences and distributions is still very incomplete, as is our knowledge of how they may be affected by prevailing oceanographic conditions.

No resource can be categorized as always being of greater or lesser value than another. For instance, while spill impacts on seabirds, mammals and sensitive communities are more "apparent" to scientists, responders and the general public, other more "hidden" resources (such as the seasonal plankton community in the upper water column) are at potentially greater risk from oil dispersed into the water. This community may contain the larvae of important sport, commercial, and/or ecologically significant (*i.e*., primary or important animal prey) species.

The following were understandings regarding the plankton communities at risk from a dispersed oil plume:

- In most imaginable response settings, it may be better to disperse the oil into the water column (where there may be short-term toxicity to larvae in the upper few meters of the water column) than to leave the undispersed and unrecoverable oil on the water surface (where it could reside long-term, spread, and potentially impact a wider range of sensitive coastal species and habitats).

- Due to the spatial and temporal distribution of larval species, the dispersed oil from any one oil spill response was expected to impact a very limited portion of the overall community. Many constituent plankton species would quickly replenish their numbers through reproduction or immigration from surrounding waters. It was therefore considered unlikely that there would be population-level affects to the plankton community.
- The concentration of dispersed oil in the open ocean can decrease rapidly through natural dispersion and biodegradation processes. The dispersed oil plume can spread and thin quickly in the three-dimensional space of the water column, and natural biodegradation processes work quickly to break the small droplets of oil in the plume into carbon dioxide and water. In areas where the dilution potential is the greatest (*i.e*., open ocean), concentrations of dispersed oil high enough to cause adverse effects are unlikely to persist for more than several hours. Oil concentrations are typically less than 50 part per million (ppm) below dispersed slicks, although different authors report slightly

different upper levels. Field data indicate that concentrations of dispersed oil are usually less than 1 ppm at depths below 10 meters. Within a matter of weeks to months, dispersion and biodegradation processes can remove much of the plume of oil droplets from the upper water column, and/or reduce concentrations of oil in the water column and at depth to scientifically non-detectable levels.

- In contrast, undispersed and unrecovered oil left on the water's surface in the open ocean can drift for weeks to months, where it can continue to impact pelagic birds, mammals and perhaps sea turtles. If the oil moves toward shore, it can strand in sensitive coastal habitats (especially intertidal areas) and pose a persistent threat, on a time scale of months to years, to those sensitive coastal habitats and their dependent species and communities.

- Emulsification of the oil remaining at the water surface increases the oil-in-water volume, and hence the contamination risk to marine and coastal plant and animal communities.

Oil spill impacts to marine birds and mammals can threaten the existence and persistence of whole colonies and perhaps the entire population of some species. This is especially true for colonies and populations of common murres, the endangered marbled murrelet, shorebirds (including the endangered western snowy plover) and the southern sea otter.

Stakeholder involvement and outreach efforts

The regional Area Committees, which developed the pre-approval dispersant zone recommendations, and from those this document, are mandated by the Oil Pollution Act of 1990 to include any interested member of the public. Given the sensitivity that dispersant use issues can raise, each regional Area Committee made special and repeated efforts to bring interested stakeholders onto the dispersant subcommittees even if they had not shown previous or consistent interest in other Area Committee response planning work. Generally, in spite of these efforts, most dispersant subcommittees came to include those who were already the most active in their respective Area Committees. Statewide information-sharing and continuity was provided by the Office of Spill Prevention and Response (OSPR), California Coastal Commission (CCC) and the National Oceanic and Atmospheric Administration (NOAA).

In early 2001, a team of RRT representatives made a presentation at a public meeting of the California Coastal Commission; another presentation of the same material was later made at the Gulf of the Farallons Research Symposium. Throughout 2001 and 2002, there were several "Stakeholder Meetings" to distribute the dispersant response planning information to other agencies and interested members of the public. The OSPR and NOAA staff also provided the materials for the U.S. Fish and Wildlife Service and National Marine Fisheries Service reviews, and regularly briefed the RRT on progress of each dispersant subcommittee. OSPR and CCC staff regularly briefed the state Oil Spill Technical Advisory Committee.

Further public outreach was offered in public information sessions at several coastal locations in California and at a public meeting of the California Coastal Commission. The U.S. Coast Guard will also publish a Federal Register Notice of this plan once it is finalized, on which the public may comment.

APPENDIX J

RESULTS OF REVIEWS WITH OTHER AGENCIES

J.1 U.S. Fish and Wildlife Service (Endangered Species Act)

Underway. Insert when **completed**

J.2 National Marine Fisheries Service (Endangered Species Act, Marine Mammal Protection Act, Essential Fish Habitat)

- Regional Response Team Request
- Department of Commerce Review

J.3 California Coastal Commission (Coastal Zone Management Act)

Occurs at end of process. Insert when completed.

J.2 National Marine Fisheries Service (Endangered Species Act, Marine Mammal Protection Act, Essential Fish Habitat

Regional Response Team IX

National Oil and Hazardous Substances Contingency Plan

Environmental Protection Agency
United States Coast Guard
Agency for Toxic Substances and Disease Registry
Department of Agriculture
Department of Commerce
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Interior
Department of Justice
Department of Labor
Department of State
Department of Transportation
Federal Emergency Management Agency
General Services Administration
Region 9 Tribes
State of Arizona
State of California
State of Nevada

November 17, 2005

Mr. Ray Bosch
U.S. Fish and Wildlife Service
Endangered Species Act Section 7
1655 Heindon Rd.
Arcata, CA 95521

Dear Mr. Bosch:

Subject: Request for Formal Consultation under ESA Section 7

In accordance with the requirements of Section 7 of the Endangered Species Act, we are requesting the initiation of Formal Consultation on the effects of the Regional Response Team IX implementation of the Pre-Approval Process of its Dispersant Use Plan. Through informal consultation with you, we have determined that proposed application of chemical dispersants under the Dispersant Use Pre-Approval Process may affect, and is likely to adversely affect, some listed species (see enclosed Biological Assessment). The Regional Response Team has also determined that the proposed use of chemical dispersants under the Pre-Approval Process may affect, but is not likely to adversely affect, several other listed species.

Please note that the Dispersant Use Plan, and the Dispersant Pre-Approval Process, has been developed with the assistance of representatives of the U.S. Fish and Wildlife Service as members of one or more of the six Coastal Zone Area Committees, and in accordance with the procedures identified at 40 CFR Part 300, the National Contingency Plan. While these actions may result in short-term adverse effects, it is our belief that the listed species will ultimately benefit from them.

To assist in completing Formal Consultation, please find attached the Biological Assessment that has been produced through the planning process described in the Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act using the Planning Template contained in Appendix C of that Agreement.

Report Oil Spills and Chemical Releases Toll Free
1-800 424-8802

Thank you for your efforts in this matter. If you require additional information, please contact CDR Bill Robberson, US EPA Regional Response Team IX Coordinator, at (415) 972-3072.

Sincerely,

Mr. Dan Meer,
EPA RRT-IX Co-Chair

Captain Gerald Swanson,
USCG RRT-IX Co-Chair

Attached: Biological Assessment – Impacts to Species listed or Proposed for listing under the Federal Endangered Species Act

Cc: Mr. Michael Sowby, California DFG, OSPR
Ms. Patricia S. Port, REO, Department of the Interior

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administratic
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

In Reply Refer To:
F/SWR3:JJD

AUG 18

Captain Steve Thompson
DOC/NOAA Representative
Regional Response Team IX
Ft. Mason, Bldg 201
San Francisco, California 94123

Dear Captain Thompson,

Thank you for contacting the Southwest Region (SWR) oil spill response representative, Mr. Joe Dillon in our Santa Rosa Area Office, and asking for written clarification regarding the Southwest Region's position on the use of oil dispersants in the event of a spill in federal waters off the California coast. As you are aware through your coordination activities with Joe the last few years, we support the use of the latest formulations of oil spill dispersants, Corexit 9527 and Corexit 9500, to prevent the migration of spilled oil to sensitive habitats such as estuaries, rookeries and the intertidal region. In areas such as these, oil may permeate the substrate resulting in long term exposure of NOAA trust resources to the oil and its degradation products.

The Northwest Region (NWR) of NOAA's National Marine Fisheries Service concluded an Endangered Species Act (ESA) section 7 consultation for oil spill response activities in November 2003. This consultation considered the potential effects of dispersant use on large whales, Steller sea lions and salmonids. These ESA listed species also occur in the Southwest Region as well as several species of sea turtles and the white abalone. Section 7 consultation for the various oil spill response options has not been conducted in the SWR.

The use of the two dispersants mentioned above was analyzed as part of the NWR's biological opinion. The biological opinion reviewed numerous studies related to the toxicity and fate of oil and oil treated with dispersants. It concluded that the Corexit dispersants are much less toxic than most oils such that the primary factor leading to any toxic response in a spill situation is the oil itself. Field trials conducted by the National Ocean Service (NOS) have shown that dispersed oil does not penetrate below approximately 10 meters in depth in measurable concentrations. These same field trails found that the mean peak concentration of dispersed oil (10.8 parts per million (ppm) with a range of 2.2 ppm to 53.8 ppm) was reached about one hour from the application of dispersants. The concentrations rapidly declined past this point in time. Dispersed oil concentrations were not likely to exceed one ppm at depths of 10 meters or greater.

The use of the Corexit dispersants does not measurably add to the risk of effects to listed species exposed during an oil spill event. In many cases the use of dispersants helps mitigate the potential effects by reducing the time the oil spends on the surface of the water where the most vulnerable marine animals (i.e. fur seals and birds) may be exposed. The biological opinion concluded with the determination that the likelihood that response options will exacerbate the effects of oil spills is minimal. Rather, they collectively benefit listed species and habitat through minimizing the greater environmental risk from spills. The SWR has shared this opinion of oil spill response, including the use of the latest formulations of dispersants, for many years. We plan to stay up to date with developments in the field by continuing to work with the NOS and the Regional Response Team.

We would also like to take this opportunity to thank you for your efforts over the last three years to coordinate with Joe as he was assigned this duty. We hope this coordination will continue with your expected replacement as well as the new NOS Scientific Support Coordinator when that vacant position is eventually filled. We feel there is still work to be done in oil spill planning in the SWR to maximize protection to all NOAA resources and look forward to continuing the process.

Sincerely,

Anthony G Morton

for Rodney McInnis
Regional Administrator

Cc: Bill Robberson, USEPA Region IX, San Francisco, California
Mike Sowby, CDFG OSPR, Sacramento, California
Val Chambers, NMFS, Long Beach, California
Scott Hill, NMFS, Long Beach, California
Steve Edmondson, NMFS, Santa Rosa, California
Michael Aceituno, NMFS, Sacramento, California
Dick Butler, NMFS, Santa Rosa, California
Irma Lagomarsino, NMFS, Arcata, California
Craig Wingert, NMFS, Long Beach, California
Joe Dillon, NMFS, Santa Rosa, California

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APPENDIX K

UNIT CONVERSIONS

Volume

1 U.S. Gallon (gal) = 231 in^3 = 0.1337 ft^3
1 barrel(s) (bbl) = 42 U.S. gal = 5.615 ft^3
1 bbl = 158.97 liter (L) = 0.159 m^3
1 U.S. gal = 3.785 L
1 L = 0.26 gal
1 tonne of oil = 1000 L = 1m^3 = ~ 264 gal
1 m^3 = 6.29 bbl = 264.2 gal
1 ft^3 = 0.0283 m^3 = 7.48 gal
1 m^3 = 10^6 cm^3 = 10^3 L
1 Imperial gal = 1.2 U.S. gal
1 U.S. gal = 0.83 Imperial gal

Length

1 inch = 2.54 cm
1 ft = 30.38 cm
1 ft = 0.3048 m
1 m = 3.2808 feet
1 statute mile = 0.87 nautical mile (nm)
1 mile = 1610 m = 5280 ft
1 nm = 6076 feet
1 km = 0.54 nm
1 nm = 1.852 km = 1852 m
1 nm = 1.15 statute miles
1 micron = m x 10^{-6} = mm x 10^{-3}
1 fathom (6 ft) = 1.829 m
1 m = 0.547 fathoms

Volume Rate

L/hr x 0.0063 = bbl/hr
L/hr x 0.0044 = gpm
tonnes/hr (or m^3/hr) x 4.4 = gpm
tonnes/hr x 6.3 = bbl/hr
bbl/hr x 0.7 = gpm

L/sec x 15.9 = gpm

gpm x 34.29 = bbl/day
m^3/hr x 16.7 = L/min
L/min x 0.06 = m^3/hr
gpm x 3.78 = L/min
bbl/day x 0.11 = L/min
bbl/day x 0.0292 = gpm

Distance Rate

1 knot = 1.69 ft/sec
1 knot = 1.94 m/sec = 1.13 miles/hr
ft/sec x 0.593 = knots
m/sec x 1.94 = knots
miles per hour (mph) x 1.5 = ft/sec

knots (kts) x 51.4 = cm/sec

Area

1 hectare = 10000 m^2 = 100m^2
1 acre = 43560 ft^2 = 0.4047 hectares = 247 km^2
1 acre = 4047 m^2
1 hectare = 2.471 acres
1 ft^2 = 0.0929 m^2
1 mile^2 = 2.59 km^2
1 nm^2 = 847 acres

Weight

1 pound (lb) = 0.45 kilograms (kg)
1 kg = 2.2 lb
lb/ft x 1.48 = kg/m
kg/m x 0.672 = lb/ft
1 metric ton = 1000 kg (~ 1 long ton)

From ExxonMobil , 2000

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APPENDIX L

ABBREVIATIONS AND ACRONYMS

AC	Area Committee
ACP	Area Contingency Plan
ADP	Area Dispersant Plan
ADIOS	Automated Data Inquiry for Oil Spills
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
AZ	Arizona
CA	California
CDNMS	Cordell Bank National Marine Sanctuary
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CDP	California Dispersant Plan
CINMS	Channel Islands National Marine Sanctuary
COTP	Captain of the Port
CZMA	Coastal Zone Management Act
DOC	Department of Commerce
DOI	Department of Interior
DUP	Dispersant Use Policy
EADC	Emergency Aerial Dispersant Consortium
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FOSC	Federal On –Scene Coordinator
GFNMS	Gulf of the Farallons National Marine Sanctuary
GIS	Geographic Information System
GPS	Global Positioning System
HCPB	Habitat Conservation Planning Branch
LA	Los Angeles
MBNSM	Monterey Bay National Marine Sanctuary
MMPA	Marine Mammal Protection Act
MSDS	Material Safety Data Sheet
NCP	National Contingency Plan
NEBA	Net Environmental Benefit Analysis
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center <u>or</u> National Response Corporation
OCS	Outer Continental Shelf
OWCN	Oiled Wildlife Care Network
OSCA	Oil Spill Cleanup Agent
OSPR	Office of Spill Prevention and Response
OSRO	Oil Spill Response (or Removal) Organization
PPE	Personal Protective Equipment
PST	Pacific Standard Time
RCP	Regional Contingency Plan
RRT	Regional Response Team
SCB	Southern California Bight
SMART	Special Monitoring of Advanced Response Technologies
SSC	Scientific Support Coordinator

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APPENDIX M

GLOSSARY

ADIOS

Automated Data Inquiry for Oil Spills. A NOAA computer database listing the characteristics of crude oils and refined products, and predicting expected characteristics and behavior of oil spilled into the marine environment.

API gravity

A scale for measuring fluid specific gravities based on an inverse relationship with specific gravity.

Black oil

A black or very dark brown layer of oil, sometimes with a latex texture. Depending on the quantity spilled, oil tends to quickly spread out over the water surface to a thickness of about 1 millimeter (0.04 inches). Can look like kelp and other natural phenomena. From the air, it is impossible to tell how thick a black oil layer is.

Brown oil

Water-in-oil emulsion. Thickness typically is 0.1 to 1.0 millimeters, but will vary depending on wind and current conditions. Usually has a heavy or dull sheen. Brown oil can be easily confused with algal scum collecting in convergence lines, algae patches, or kelp.

Centistoke (cSt)

A unit of measurement used in defining the kinematic viscosity of a fluid.

Chemical dispersant

A chemical formulation containing surface active agents (surfactants) that lower the surface tension between oil and water, promoting the formation of oil droplets and reducing the tendency of oil to stick to other droplets or surfaces, thereby enhancing dispersion into the water column.

Clean up

Actions taken to prevent further oil releases, protect areas from oil damage, mitigate oil effects (*e.g.*, through deflection, containment, collection, chemical dispersion, or bioremediation), and clean up of oil-contaminated areas and wildlife where monitoring shows a net environmental benefit in doing so.

Coastal waters

The territorial sea from the shoreline high water mark and then offshore to 12 nautical miles.

Continental waters

The coastal waters (high water mark to 12 nautical miles offshore) and the Exclusive Economic Zone (12 to 200 nautical miles offshore), and all water over the continental shelf.

Contingency plan

An action plan prepared in anticipation of an oil spill for a site or region, containing guidelines and operating instructions to facilitate efficient and effective clean up operations, and to protect areas of biological, social and economic importance. Contingency plans affecting response planning and response in California include Area Contingency Plans (federally directed by the Oil Pollution Act of 1990, covering marine response in federal waters (3 – 200 nautical miles from shore) throughout California, and with the greatest regional detail), the State Contingency Plan (California state directed by the Lempert-Keene-Seastrand Act, covering California response in state waters (0-3 nautical miles from shore), the Regional Contingency Plan (federally directed and managed by the Region IX Regional

Response Team, covering marine and inland response in several western states), and the National Contingency Plan (federal directed and covering national response in marine and inland waters).

Convergence line
A line on the water surface where floating objects and oil collect. A convergence can be the interface between two different types or bodies of water, or it can be caused by a significant depth change, tidal changes, or other common phenomena. Convergences are common in the marine environment.

Dispersion
The breaking up of an oil slick into small droplets that are mixed into the water column by breaking waves and other sea surface turbulence.

Emulsification
The formation of a water-in-oil mixture. Different oils exhibit different tendencies to emulsify, and emulsification is more likely to occur under high energy conditions (strong winds and waves). An emulsified mixture of water in oil is commonly called "mousse"; its presence indicates a spill that has been on the water for some time.

Entrainment
The loss of oil from containment when it is pulled under a boom by a strong current. Entrainment typically occurs from booms deployed perpendicular to currents greater than 1 knot (0.5 meters per second).

Flash point
(see volatility)

Mousse
An emulsified mixture of water in oil. Mousse can range in color from dark brown to nearly red or tan, and typically has a thickened or pudding-like consistency compared to fresh oil. Incorporation of up to 75 percent water into the oil will cause the apparent volume of a given quantity of oil to increase by up to four times.

Pancakes
Isolated, roughly circular patches of oil ranging in size from a few feet across to hundreds of yards (or meters) in diameter. Sheen may or may not also be present.

Persistent oil
Oils and petroleum products such as crude oils, fuel oils and lubrication oils that, when spilled, remain in a residual form in the environment for an appreciable period.

Plume
Oil that is dispersing into the water column as a cloud of small droplets.

Pour point
The temperature below which oil will not flow.

Recoverable oil
Oil in a thick enough layer on the water to be recovered by conventional techniques and mechanical equipment. Only black or dark brown oil, mousse, and heavy sheens (which are dull brown in color) are generally considered to be thick enough to be effectively recovered by skimmers.

Sheen

A very thin layer of oil floating on the water surface. Sheen is the most commonly-observed form of oil during the later stages of a spill. Depending on thickness, sheens range in color from dull brown for the thickest sheens to rainbow, gray, silver and near-transparent in the case of the thinnest sheens.

- A <u>light sheen</u> is almost transparent, and is sometimes confused with windrows and natural sheen resulting from biological processes.
- A <u>silver sheen</u> is a slightly thicker layer of oil that appears silvery or shimmers; occasionally called gray sheen.
- A <u>rainbow sheen</u> reflects colors.

Slick

Oil spilled on the water, which absorbs energy and dampens out surface waves, making the oil appear smoother – or slicker – than the surrounding water.

SMART

Special Monitoring of Applied Response Technologies. A cooperatively designed monitoring program for *in situ* burning and dispersants. SMART relies on small, highly mobile teams to collect real-time data, which are subsequently channeled to the Unified Command to address critical questions, such as whether dispersants are effective in dispersing the oil.

Specific gravity

The ratio of the mass of oil to the mass of freshwater, when both are of the same volume and temperature.

Streamers

A narrow line of oil, mousse, or sheen on the water surface, surrounded on both sides by clean water. Streamers result from the combined effects of wind, currents, and/or natural convergence zones. Often, heavier concentrations of mousse or sheen will be present in the center of a streamer, with progressively lighter sheen along the edges. Streamers are also often called “fingers” or “ribbons”.

Tarballs

Weathered oil that has formed pliable balls or patches that float on the water. Tarballs can range in diameter from a few millimeters (much less than an inch) to a foot (0.3 meters). Sheen may or may not be present, depending on how weathered or hardened the outer layer of the tarball is.

Tarmats

Non-floating mats of oily debris (usually sediment and/or plant matter) that are found on beaches or in shallow water just offshore.

Unified Command

Representatives of the spiller, the federal government, and state government, who are collectively in charge of the spill response. For California marine spills, the federal representative is the U.S. Coast Guard and the state representative is the California Department of Fish and Game Office of Spill Prevention and Response.

Viscosity

An oil’s internal resistance to flow. Highly viscous oil will not flow easily.

Volatility

A property of a liquid that has a low boiling point and a high vapor pressure at ordinary pressures and temperatures.

Water-in-oil emulsion

(see mousse)

Weathering

A combination of physical and environmental processes, such as evaporation, dissolution, dispersion, and emulsification, which act on spilled oil to change its physical properties and composition.

Window of opportunity

The period of time available for undertaking a particular response. For example, the application of dispersant before the oil emulsifies to a stage where dispersant becomes ineffective.

Windrows

Streaks of oil that line up in the direction of the wind. Windrows typically form early during a spill when the wind speed is at least 10 knots (5.1 meters per second). Sheen is the form of spilled oil that most frequently forms windrows.

California Dispersant Plan
Appendix N

MSDS
(Material Safety Data Sheets)
for Dispersants

Dispersants:

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SAFETY DATA SHEET

PRODUCT

COREXIT (R) EC9500A

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **COREXIT (R) EC9500A**

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 1 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Distillates, petroleum, hydrotreated light	64742-47-8	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Keep away from heat. Keep away from sources of ignition - No smoking. Keep container tightly closed. Do not get in eyes, on skin, on clothing. Do not take internally. Avoid breathing vapor. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap and water.
Wear suitable protective clothing.
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. May cause nausea and vomiting. Can cause chemical pneumonia if aspirated into lungs following ingestion.

INHALATION :
Repeated or prolonged exposure may irritate the respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Frequent or prolonged contact with product may defat and dry the skin, leading to discomfort and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS :
Skin contact may aggravate an existing dermatitis condition.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. Get medical attention.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting: contains petroleum distillates and/or aromatic solvents. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 181.4 °F / 83 °C (PMCC)

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

LOWER EXPLOSION LIMIT : Not flammable

UPPER EXPLOSION LIMIT : Not flammable

EXTINGUISHING MEDIA :
Alcohol foam, Carbon dioxide, Foam, Dry powder, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Water mist may be used to cool closed containers.

UNSUITABLE EXTINGUISHING MEDIA :
Do not use water unless flooding amounts are available.

FIRE AND EXPLOSION HAZARD :
Low Fire Hazard; liquids may burn upon heating to temperatures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Do not touch spilled material. Remove sources of ignition. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Use with adequate ventilation. Keep the containers closed when not in use. Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store away from heat and sources of ignition. Store separately from oxidizers. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., Stainless Steel 304, Stainless Steel 316L, Aluminum, Hastelloy C-276, MDPE (medium density polyethylene), HDPE (high density polyethylene), PVC, Plexiglass, Teflon, Kalrez, Perfluoroelastomer, PTFE, TFE, FEP (encapsulated)

UNSUITABLE CONSTRUCTION MATERIAL :
Mild steel, Carbon steel, Buna-N, Brass, Copper, Natural rubber, Polyethylene, Polypropylene, Ethylene propylene, EPDM, Neoprene, Nitrile, Polyurethane, Viton, Alfax, Hypalon

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

Substance(s)	
Oil Mist (Mineral)	TWA: 5 mg/m3 STEL: 10 mg/m3

OSHA/PEL :

Substance(s)	
Oil Mist (Mineral)	TWA: 5 mg/m3

AIHA/WEEL :

Substance(s)	
Propylene Glycol	TWA: 10 mg/m3

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Nitrile gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Hazy Amber
ODOR	Hydrocarbon
SPECIFIC GRAVITY	0.95 @ 60 °F / 15.6 °C
DENSITY	7.91 lb/gal
SOLUBILITY IN WATER	Miscible
pH (100 %)	6.2
VISCOSITY	177 cst @ 32 °F / 0 °C 70 cst @ 60 °F / 15.6 °C
POUR POINT	< -71 °F / < -57 °C
BOILING POINT	296 °F / 147 °C
VAPOR PRESSURE	15.5 mm Hg @ 100 °F / 37.8 °C

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Acartia tonsa	48 hrs	34 mg/l		Product
Artemia	48 hrs	20.7 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	50 - 70%

The portion in water is expected to float on the surface.

BIOACCUMULATION POTENTIAL
Component substances have a potential to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D018

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Distillates, petroleum, hydrotreated light : Irritant
Propylene Glycol : Exposure Limit
Organic sulfonic acid salt : Irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Propylene Glycol	57-55-6

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

A claim has been submitted to the Hazardous Materials Information Review Commission (HMIRC) for exemption from disclosure of a substance.

HMIRC Registry Number : 6639
Filed : 06/01/2006

WHMIS CLASSIFICATION :
B3 - Combustible Liquids

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 10/22/2008
Version Number : 1.13

SAFETY DATA SHEET

PRODUCT

COREXIT(R) EC9527A

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **COREXIT(R) EC9527A**

APPLICATION : OIL SPILL DISPERSANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
2-Butoxyethanol	111-76-2	30.0 - 60.0
Organic sulfonic acid salt	Proprietary	10.0 - 30.0
Propylene Glycol	57-55-6	1.0 - 5.0

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING
Eye and skin irritant. Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver. Harmful by inhalation, in contact with skin and if swallowed.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Wear suitable protective clothing. Keep container tightly closed. Flush affected area with water. Keep away from heat. Keep away from sources of ignition - No smoking.
May evolve oxides of carbon (COx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause moderate irritation.

SKIN CONTACT :
Can cause moderate irritation. Harmful if absorbed through skin.

INGESTION :
May be harmful if swallowed. May cause liver and kidney effects and/or damage. There may be irritation to the gastro-intestinal tract.

INHALATION :
Harmful by inhalation. Repeated or prolonged exposure may irritate the respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
Excessive exposure may cause central nervous system effects, nausea, vomiting, anesthetic or narcotic effects.
Chronic :
Repeated or excessive exposure to butoxyethanol may cause injury to red blood cells (hemolysis), kidney or the liver.

AGGRAVATION OF EXISTING CONDITIONS :
Skin contact may aggravate an existing dermatitis condition.

HUMAN HEALTH HAZARDS - CHRONIC :
Contains ethylene glycol monobutyl ether (butoxyethanol). Prolonged and/or repeated exposure through inhalation or extensive skin contact with EGBE may result in damage to the blood and kidneys.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. Get medical attention.

SKIN CONTACT :
Flush affected area with water. Get medical attention.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 163 °F / 72.7 °C (TCC)

This product does not sustain combustion per the method outlined in 49 CFR Appendix H.

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Ensure all containers are labeled. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 316L, Hastelloy C-276, MDPE (medium density polyethylene), Nitrile, Plexiglass, Kalrez, TFE, Alfax, Teflon, HDPE (high density polyethylene), Neoprene, Aluminum, Polypropylene, Polyethylene, Carbon Steel C1018, Stainless Steel 304, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use., FEP (encapsulated), Perfluoroelastomer, PVC

UNSUITABLE CONSTRUCTION MATERIAL :
Copper, Mild steel, Brass, Nylon, Buna-N, Natural rubber, Polyurethane, Hypalon, Viton, Ethylene propylene, EPDM

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :
Substance(s)

2-Butoxyethanol	TWA: 20 ppm , 97 mg/m3
Propylene Glycol	

OSHA/PEL :
Substance(s)

2-Butoxyethanol	TWA: 50 ppm , 240 mg/m3 (Skin)
Propylene Glycol	

AIHA/WEEL :
Substance(s)
For propylene glycol, an 8 hour TWA of 10 mg/m3 (aerosol) and 50 ppm (total).

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Amber
ODOR	Mild
SPECIFIC GRAVITY	0.98 - 1.02
DENSITY	8.2 - 8.5 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	6.1
VISCOSITY	160 cst @ 32 °F / 0 °C
POUR POINT	ASTM D-97 -66.9 °F / -55 °C
POUR POINT	< -40 °F / < -40 °C
BOILING POINT	340 °F / 171 °C
VAPOR PRESSURE	< 5 mm Hg @ 100 °F / 38 °C Same as water
EVAPORATION RATE	0.1

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

No toxicity studies have been conducted on this product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Turbot	96 hrs	50 mg/l	

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
Component substances have a low potential to bioconcentrate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
X	Delayed (Chronic) Health Hazard
X	Fire Hazard
	Sudden Release of Pressure Hazard
	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

Hazardous Substance(s)	CAS NO	% (w/w)
Glycol Ethers		30 - 60

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

2-Butoxyethanol	111-76-2
Propylene Glycol	57-55-6

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
D2B - Materials Causing Other Toxic Effects - Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

PRODUCT

COREXIT(R) EC9527A

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
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