Proceedings of the Seventh Meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum

Santa Cruz, CA
November 13-14, 1997

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Ecosystem Management & Associates, Inc.
EM&A Report 97-02

REPORT AVAILABILITY

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CITATION

Suggested Citation:

Coelho, G.M. and D.V. Aurand (eds.). 1998. Proceedings of the Seventh Meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum. November 13-14, 1997. Ecosystem Management & Associates, Inc., Purcellville, VA. EM&A Report 97-02, 53 p.

TABLE OF CONTENTS

Page

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS, SYMBOLS, AND ACRONYMS

Term	Abbreviation, Symbol, or Acronym
Alaskan North Slope crude oil	ANS
American Petroleum Institute	API
American Society for Testing and Materials	ASTM
benzene, toluene, ethylbenzene and xylenes	BTEX
chemically enhanced water accommodated fraction (previously referred to as chemically dispersed oil or CDO)	CE-WAF
Chemical Response to Oil Spills: Ecological Effects Research Forum	CROSERF
Coastal Oilspill Simulation System	COSS
Alaska Department of Environmental Conservation	DEC
Ecosystem Management & Associates	EM&A
Environment Canada	EC
Environmental Protection Agency	EPA
Exxon Biomedical Sciences, Inc.	EBSI
gas chromatography - flame ionization detection	GC-FID
gas chromatography - mass spectrometry	GC-MS
infrared	IR
internal standard	IS
median lethal loading	LL50
laser particle counts	LPC
Louisiana State University	LSU
median lethal concentration	LC50
Minerals Management Service	MMS
National Oceanic and Atmospheric Administration	NOAA
Oil Spill Prevention and Response	OSPR
part per million (mg/L)	ppm
physically enhanced water accommodated fraction	PE-WAF
polycyclic aromatic hydrocarbon	PAH
Prudhoe Bay crude oil	PBCO
quality assurance/quality control	QA/QC
Regional Response Team	RRT
response factor	RF
Scientific Support Coordinator	SSC
Texas A&M University	TAMU
Texas General Lands Office	TGLO
total extractable organic content	TEOC
total hydrocarbon content	THC
total petroleum hydrocarbons	TPH

Term	Abbreviation, Symbol, or Acronym
ultraviolet-visible light	UV-VIS
United States Coast Guard	USCG
University of Alaska	UAK
University of California, Santa Cruz	UCSC
University of South Florida	USF
Venezuelan crude oil	VCO
volatile organic analyte	VOA
water accommodated fraction	WAF

ACKNOWLEDGMENTS

Financial support for this meeting was provided by the Alaska Department of Environmental Conservation, California Office of Oil Spill Prevention and Response, Florida Department of Environmental Protection, and the Minerals Mangement Service (Deparment of Interior). Their support is gratefully acknowledged.

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Abstract

This report summarizes the discussions held during the seventh meeting of CROSERF. Research progress reports were presented by the University of California, Santa Cruz, Exxon Biomedical Sciences, Inc., Texas A&M University, University of South Florida, and the University of Alaska, Fairbanks. All of the laboratories are now fully involved in the testing program. Considerable time was spent on the review and evaluation of a draft Long-Range Plan for the CROSERF researchers. The participants developed a revised toxicity testing matrix, which will be the basis for the plan, and which will be used by all of the laboratories to structure their research. The need for an expanded information dissemination effort was discussed, and will be included in the Long-Range Plan. The participants feel that, as results are now becoming available from the various testing programs, it is critical for the program to get this information to decision-makers. The participants agreed that the inland silverside minnow, *Menidia beryllina*, will serve as a standard test species for all laboratories.

A prototype CROSERF web page on the Internet has been developed by Texas A&M University, and was demonstrated at the meeting. Final protocols were reviewed and approved for round-robin toxicity testing of a dispersant-only solution and final guidelines for statistical analysis of toxicity data were approved. The development of a loose-leaf reference notebook which will contain all approved CROSERF protocols and appropriate reference material was approved.

1.0 Introduction

This volume documents the results of the seventh meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum (CROSERF). CROSERF is a working group composed of individuals from Federal and state government, academia, and industry dedicated to improving laboratory and mesocosm research on the ecological effects of chemical agents used in oil spill response. The emphasis of the group is on dispersants, however, other agents such as shoreline cleaners and emulsion breakers are also of interest.

1.1 The Purpose and Objectives of CROSERF

The purpose of CROSERF, as defined at the first meeting, is to provide state, Federal, and international agencies, industry, academic researchers and consultants engaged in research on the ecological effects of oil spill response chemicals, especially dispersants, with a forum for the exchange of ideas and coordination of research. Specific objectives of the Forum include:

- Discuss and resolve scientific issues related to ecological effects of chemicals used in oil spill response;
- Encourage the standardization of laboratory toxicity test procedures;
- Foster cooperative laboratory and mesocosm ecological research programs on oil spill response issues of mutual interest;
- Encourage the application of appropriate laboratory data collected under realistic exposure scenarios to the oil spill response decision process; and
- Contribute to the development of appropriate risk assessment protocols.

1.2 Previous Meetings of CROSERF

Since its inception in June, 1994, there have been six previous CROSERF meetings. The proceedings of those meetings are documented in the following reports:

- Meeting 1 - MSRC Technical Report 94-017 (Kucklick 1994);
- Meeting 2 - MSRC Technical Report 95-009 (Kucklick 1995);
- Meeting 3 - MSRC Technical Report 95-018 (Aurand and Kucklick 1995);
- Meeting 4 - Ecosystem Management & Associates Report 96-01 (Aurand and Coelho 1996);

- Meeting 5 - Ecosystem Management & Associates Report 96-03 (Coelho and Aurand 1996);

- Meeting 6 - Ecosystem Management & Associates Report 97-01 (Coelho and Aurand 1997).

1.3 Highlights of the Seventh Meeting of CROSERF

The seventh meeting of CROSERF was held at the West Coast Santa Cruz Hotel in Santa Cruz, CA on November 13-14, 1997. Twenty-four individuals, representing fourteen organizations, attended. Appendix A is a list of all invitees to the sixth meeting. Those who were at the meeting are indicated by an asterisk (*).

The meeting began with a review of research activities by the various participating laboratories since the last meeting. The University of Alaska, Fairbanks (UAF) is now fully operational and will begin testing shortly. This was the first meeting they attended as a full participant in the toxicity program. University of California, Santa Cruz (UCSC) has been concentrating on bringing their analytical chemistry capability into line with the other laboratories and with the approved CROSERF protocols. The University of South Florida (USF) group has just completed their year one testing program and has submitted a draft annual report to the American Petroleum Institute (API) and the Florida Department of Environmental Protection for review. The Texas A&M (TAMU) team has now begun year one testing on dispersant exposures. Exxon Biomedical Sciences, Inc. (EBSI) has not done any laboratory testing since the last meeting, but has been concentrating on preparing data reports and research articles.

The Coastal Oilspill Simulation System (COSS) Mesocosm Dispersant Experiment is moving forward, with a target date of the end of January. In September a project review meeting was held in Corpus Christi, TX to review the proposed work plan. Based on the results of that meeting the project team is revising the research plan and conducting some recommended preliminary tests in the tanks before the full experiment will be attempted.

A preliminary version of a CROSERF web page has been developed by TAMU staff, and was presented to the participants for review.

A draft long-range plan for the CROSERF research effort was distributed and reviewed by the participants. The draft, as initially submitted, covered four topics: laboratory testing, mesocosm testing, field research and outreach. During the discussions, the group decided that this plan should include only the laboratory testing elements, and the report will be revised accordingly. The central element of the plan is a proposed testing regime which is to be used by all participating laboratories. A separate outreach plan will be developed. All of the participants supported an intensified effort to make sure that the results of the CROSERF testing and the results of these meetings are widely communicated to the response community.

It was suggested, and approved, that laboratory reference notebooks be developed for distribution to participating laboratories. They will contain all approved CROSERF protocols, contact lists, and selected reference materials of value to the researchers. The notebooks will be issued in a limited number, and periodically updated as the protocols develop by sending replacement sections to the document holders.

Finally, a new meeting format was initiated for the first time at this meeting. On the second day, technical participants and industry/government sponsors met in separate breakout sessions to discuss issues which were of concern only to that particular group. The technical breakout session concentrated on laboratory protocol and testing issues, while the information user breakout session focussed on outreach communication, data needs and planning for the future of the CROSERF program. At the conclusion of the breakout sessions the two groups recombined in plenary session to review their discussions. The participants recommended that this approach be continued in future meetings.

2.0 Progress Reports on Dispersant and Dispersed Oil Toxicity Research

2.1 University of California, Santa Cruz Progress Report

Michael Singer
University of California, Santa Cruz

In UCSC's initial round of testing using Prudhoe Bay crude oil (PBCO) and Corexit® 9527, hydrocarbon concentrations were quantitated using a single-shot GC-FID analysis of unconcentrated solvent extracts, as suggested by Dr. Jim Payne several years ago (Kucklick, 1994). This method produced a single concentration number that included all volatile and semi-volatile compounds that were chromatographable on the GC-FID. The results of this method were reliable and representative, but still did not allow for direct comparison with other studies that employed more complicated GC-MS chemistry. Therefore, during the latest round of tests using PBCO and Corexit® 9500, UCSC began using more detailed chemistry in order align their efforts with the other CROSERF labs.

So far they have completed two tests each using PBCO alone (WAF), and combined with 9500 (CEWAF), with topsmelt and mysids. Total Oil data (the sum of BTEX by GC-MS, and TPH (C_{10}-C_{32}) by GC-FID) showed that the CEWAF loading-concentration relationship of PBCO/9527 and PBCO/9500 were extremely similar, even though actual concentration numbers between the methods were not directly comparable. Also, the new concentrations were measured using full QA/QC protocols. As was seen in earlier work, PBCO WAF was generally about 80-90+% BTEX, whereas PBCO/9500 CEWAF consisted of ≥40% BTEX.

Dose-response relationships were fairly variable among species/toxicant combinations, but were consistent and repeatable within replicate test sets. As before, initial effects seen in mysid tests were truly narcosis, as evidenced by recovery of most or all animals effected, whereas no recovery was documented in topsmelt tests, suggesting different mechanisms at work in the two species. General trends seen in toxicity test results were:

WAF Effects:

- Significant, reversible narcosis in mysids initially at concentrations >4 ppm;
- Moderate mortality in mysids;
- Moderate initial effects in topsmelt;
- Significant 96-hr mortality in topsmelt (poor dose/response relationship);

CEWAF Effects:

- Significant mortality in juvenile mysids;
- Significant initial and 96-hr effects in topsmelt at concentrations >10 ppm;

Mysid Response:

- Significant initial narcosis in WAF at concentrations ~ 2-4x lower than in CEWAF;

- Significant 96-hr mortality in CEWAF at concentrations ~ 2-4x lower than in WAF;

Topsmelt Response:

- Moderate initial effects in both WAF and CEWAF;
- WAF and CEWAF roughly equitoxic at <20-30 ppm.

Future work will consist of finishing the triplicate toxicity tests for each species using PBCO and Corexit® 9500, then beginning the weathered oil testing.

2.2 University of Alaska, Fairbanks Progress Report

Christina Behr-Andres
University of Alaska, Fairbanks

The University of Alaska (UAK), Fairbanks, is the newest laboratory to join into the CROSERF research activities. This is the first CROSERF meeting that UAK research team members have attended, and a few minutes was taken to introduce the UAK members to the other CROSERF participants in attendance. This laboratory has just completed negotiations for the scope of research work with the Alaska Department of Environmental Conservation (DEC), and are heavily involved in planning the 1998 research activities. In addition to conducting the standard CROSERF tests using Corexit® 9500 and Alaska North Slope (ANS) crude oil, UAK's research will also involve dispersant effectiveness testing with an emphasis on cold temperatures (4 °C).

Initial shakedown testing with flow-through chambers will be conducted in Fairbanks. The chambers will then be shipped to a laboratory in Seward, AK for actual tests on species of concern. The Tanner crab and a cold water mysid are two species being considered for the toxicity testing work. A third species will also be used, but they have not made a decision as to what that will be. Initiation of actual toxicity testing is scheduled to begin in early Spring of 1998.

2.3 University of South Florida Progress Report

Ted Van Vleet
University of South Florida

The University of South Florida has just completed their first year of testing with *Mysidopsis bahia* and *Menidia beryllina* using Corexit® 9500 and fresh Venezuelan crude oil (VCO). These tests utilized the flowthrough chambers (identical to those used by the other CROSERF laboratories) and involved both spiked and continuous exposures. Table 2.1 summarizes all of the LC50 values discussed in this section. The USF data for dispersant only testing using Corexit® 9500 (continuous exposure) with *M. bahia* (6 day old) compares well

Table 2.1 Summary of the University of South Florida Toxicity Results for Year 1 Testing

with EBSI data, with a 96-hr LC50 value of 37.2 ppm (compare to EBSI values of ~30-35 ppm). Similar spiked exposure tests with the same species and dispersant indicated a 96-hr LC50 of 1038 ppm, which again compares with values previously reported by EBSI. Continuous and spiked exposure tests of Corexit® 9500 with *M. beryllina* (12 day old) were conducted and gave 96-hr LC50 values of 85.1 ppm and 21.6 ppm, respectively. A number of concerns were raised by members of the CROSERF group over the low value reported for this spiked exposure. To date, no other laboratory has ever reported a lower value for a spiked exposure compared to a continuous exposure, and there is concern by the other participating laboratories that there may have been a problem with the health of the organisms during this particular test.

Continuous exposure toxicity tests that were carried out on *M. bahia* (6 day old) with a WAF of VCO yielded a 96-hr LC50 value of 0.24 ppm TPH. These numbers are on the same order of magnitude with continuous exposure values that have been reported by EBSI for *M. bahia* and *H. costata* using Kuwait crude oil. The spiked exposure test performed on *M. bahia* using a WAF of the VCO indicated a 96-hr LC50 value of 0.65 ppm TPH. This value is lower than similar studies on *M. bahia* using Kuwait crude oil that were carried out at EBSI, in which a 96-hr LC50 of >2.93 ppm TPH was reported. This suggests that Venezuelan crude oil may be more toxic than Kuwait crude oil to *M. bahia*. Continuous and spiked exposure tests of the VCO WAF using *M. beryllina* indicated 96-hr LC50 values of <0.11 ppm TPH and 0.63 ppm TPH, respectively. Again, a comparison of these values to similiar tests conducted at EBSI with Kuwait crude oil suggest that the VCO is more toxic.

Finally, USF discussed the results of testing with CE-WAF of Venezuelan Crude oil and Corexit® 9500. Continuous and spiked exposure tests using *M. bahia* indicated 96-hr LC50 values of 0.53 ppm TPH and 12.6 ppm TPH, respectively. According to the data from both tests, it appears that the CE-WAF preparations of VCO are less toxic than the corresponding WAF preparations of the same oil. EBSI has reported a similar trend for Kuwait crude oil. When similar CE-WAF tests were performed on *M. beryllina*, 96-hr LC50 values of 0.68 ppm TPH and 2.84 ppm TPH were obtained for continuous and spiked exposures, respectively. These numbers indicate that CE-WAF is less toxic than the corresponding WAF for the continuous exposure, however, the CE-WAF may be slightly more toxic than the corresponding WAF for the spiked exposure tests.

2.4 Texas A&M University Progress Report

Bob Castro and Jim Bonner
Texas A&M University, College Station

Mr. Bob Castro provided a brief update on behalf of the TAMU research team. TAMU had unexpected delays in their toxicity testing due to prolonged contract negotiations between funding agencies. All of their toxicity testing equipment has been relocated from the COSS facility to the TAMU laboratory in Kingsville, TX. Currently their work has focussed on testing solutions of Arabian Light crude oil with the Microtox™ Test Analyzer. In addition, they have begun preliminary testing on *Mysidopsis bahia*, but have had problems with high mortality within the control population. They are currently reviewing their testing apparatus setup and

animal handling protocols to identify the cause for the high mortality. At this time, TAMU does not have data that are ready for presentation to the CROSERF group.

2.5 Exxon Biomedical Sciences, Inc. Progress Report

Gail Bragin
Exxon Biomedical Sciences, Inc.

A recent test objective for EBSI has been to compare measured test results (LC50s based on $TPH_{(resolved)}$) with lethal loading values (LL50s). As part of this effort they examined the test results for each of the major constituent classes and loading level by plotting volatiles, semi-volatiles (PAHs), $TPH_{(resolved)}$, and loading level against the percent mortality. Figure 2.1 contains data for both Kuwait and Forties crude oil tests with *Mysidopsis bahia* and *Menidia beryllina* - since these organisms responded similarly under equivalent test conditions. $TPH_{(resolved)}$ (green line) demonstrates the most significant dose-response relationship, with R^2 values of ~ 0.6 (spiked exposure tests) to 0.7 (constant exposure tests). None of the other constituents showed good correlation with toxicity, with R^2 values <0.2. In addition, at higher concentrations (used in the spiked exposure tests), percent mortality does not increase with increasing concentration for either the volatile fraction (blue line), or loading level (red line). In the EBSI experiments, $TPH_{(resolved)}$ LC50 values demonstrate that toxic effects occur at equivalent concentrations of oil in water for both oil and chemically dispersed oil.

EBSI also reviewed their reference toxicity data for some of the organisms used in their CROSERF tests. They wanted to see if some of the differences in toxicity observed in the tests with oil corresponded to differences in organism sensitivity. Figure 2.2 shows a plot of LC50 values from oil and dispersed oil tests (right Y axis in blue) and corresponding reference toxicant tests (left Y axis in red). In many instances, the differences in TPH LC50s corresponds with differences in reference toxicant LC50s (spiked exposure tests with *M. beryllina* and *C. gigas*; constant exposure tests with *C. gigas* and *S. maximus*). These differences could indicate the condition of the organisms over time, fluctuations in season, water quality, technician handling, etc. By performing reference toxicant tests concurrent with tests on oil, it becomes evident that the differences in organism sensitivity to oil, dispersed oil, and differing oils may be explained by external influences on organism sensitivity and not just the oil or dispersed oil.

EBSI conducted a laboratory test designed to relate their laboratory data more directly to conditions observed in the field (as described in CROSERF 5 proceedings). Although all of the data from this test has not yet been evaluated, it appears that it is important to measure $TPH_{(resolved)}$ as well as "TPH" (using common baseline integration). When working with low loading levels, they observed inconsistencies between the two measurements and had difficulty discerning concentrations above background (e.g.,-control) levels with the TPH measurement. Part of this test used laser particle counts (LPC) to evaluate possible differences in WAFs prepared using either no vortex or a 25% vortex. One of the reasons for doing this was that previous evaluations were based largely on measurements of volatile fractions in the water, which due to their solubility, etc. would not require as much energy or time to equilibrate in water. Early results indicate that additional energy (using the 25% vortex consistent with preparing CE-WAFs) yield a WAF with a broader range of particle sizes of equal quantity,

Figure 2.1 *Dose-response relationship of three components of oil (TPH, PAH and VOAs) and of loading levels versus mortality of test species*

Figure 2.2 *Comparison of LC50 values from oil and dispersed oil tests (right Y axis in blue) to corresponding reference toxicant tests (left Y axis in red)*

rather than a greater number of only smaller particles. Results from this testing need to be evaluated further, and will be discussed at future CROSERF meetings.

2.6 Progress report on COSS Mesocosm Dispersant Experiment

Don Aurand
Ecosystem Management & Associates, Inc.

Jim Bonner
Texas A&M University

Don Aurand opened this session with an overview of the current status of the project. On September 15 and 16, 1997, a meeting was held on the campus of TAMU-Corpus Christi to discuss the draft work plan for the project. Attendees were provided with a copy of the draft plan prior to the meeting as the basis for discussion. The fifteen persons were in attendance, including several subject-matter experts not directly associated with the design of the project. The two-day effort focused on two key issues: 1) exposure to oil and dispersed oil and how to convince the target audience that the experiment was properly designed, and 2) the ability of the facility (and the research team) to actually achieve the performance objectives in the tanks.

As a result of the discussions the main experiment is being delayed pending some preliminary performance trials. The new target date is mid-January, 1998. A series of assignments were given to various individuals for completion by January, and these are now underway. These relate primarily to demonstrating that the tanks will work, that the oil exposures can be effectively created, and that the biological, chemical and hydrographic data can be collected. TAMU staff have set up one tank exactly as anticipated in the work plan, and this tank is being used to confirm the items listed above. At present, TAMU has completed preliminary hydrographic work in the tanks, as discussed later in this section. Preliminary biological and chemical testing will occur in December.

Based on the results, a new work plan will be written and provided to the Workshop participants and to the various sponsors for review. This new work plan, as now envisioned, will provide for a series of two ecological experiments. The first experiment will involve low levels of exposure to oil and dispersed oil, and the second experiment will involve higher levels of exposure. If necessary, a third experiment, with a limited number of tanks, might be included to look at physical accumulation of oil in the intertidal zone with very high levels of oil or dispersed oil.

There is one potential addition to the experiment. The Coast Guard would like to verify in-situ fluorimetry readings against our chemistry samples for both oil and dispersed oil, as well as test a new infrared (IR) camera. Both of these activities seem feasible.

Dr. Bonner then discussed the current status of their preliminary hydrodynamic tests. They have confirmed that the wave and tidal regime as well as the beach profile specified in the work plan can be achieved. It has been possible to superimpose a “chop” on top of the

wave pattern so that oil will not resurface due to lack of energy. They have also confirmed that there is a turbulent mixing regime in the tanks and that there is minimal short circuiting in the flow pattern. This appears true even without waves (only tidal exchange). Oxygen levels in the tank are acceptable as long as waves are present and the tidal exchange is maintained.

Despite some regulatory issues, TAMU has developed a method to weather large volumes of the crude oil. They believe that they will be able to weather all of the oil needed, to the target of a 25% volume reduction (loss of C_{12} and below).

3.0 Reports on Assignments Made at the Last Meeting

Gina Coelho
Ecosystem Management & Associates

On the afternoon of the first day, the participants split into two breakout sessions. One group consisted of participants interested in technical research issues. This group was composed of the following participants: Christina Behr-Andres (UAK), Jim Bonner (TAMU), Gail Bragin (EBSI), Bob Castro (TAMU), Gina Coelho (EM&A), Charlie Henry (LSU, NOAA), Maureen Hodgins (UCSC), Susan Jacobson (UCSC), Susan McDonald (TAMU), Bob Perkins (UAK), Mickey Singer (UCSC), Ted VanVleet (USF), Dana Wetzel (USF), and Dan White (UAK).

Twelve topics were listed as items for discussion by this group (see Appendix B, Breakout Session 2). Summaries of discussions by this group on items 1 through 9 are provided in Section 3.0 of this report. Item 10 was also discussed by this group, and is reported in Section 5.0. Discussion of items 11 and 12 were deferred until all CROSERF members from both Breakout Sessions had regrouped, and are described later in these proceedings.

The first topic for discussion was selection of a subgroup coordinator. All members of the group agreed that Gina Coelho should serve as the coordinator, since she has regular contact with all of the research laboratories. In this capacity, she will serve as the point of contact to resolve inter-laboratory technical issues that arise during the CROSERF testing.

3.1 Results of Corexit® 9500 Absorption Curve Round-Robin Test

As a result of discussions at the sixth CROSERF meeting, a round-robin test was carried out to examine the absorption characteristics of Corexit® 9500. Each laboratory was to analyze two different Corexit® 9500 samples, one obtained from Mickey Singer at UCSC, the other from their own laboratory. Each dispersant was to be analyzed in filtered seawater prepared at two different salinities (20‰ and 33-35‰) over the dispersant concentration range of 1-1000 ppm. The round-robin test results were analyzed by USF and the following information was presented by Ted VanVleet. Combined data from the test are presented in Figure 3.1.

The data indicate that there were significant differences among laboratories for the absorbance versus concentration calibration curves (Figure 3.1A). Although significant variation was observed as a function of salinity, the inter-laboratory variation was greater than the salinity effect. The laboratory variability in absorbance verses dispersant concentration indicated not only an inter-laboratory variation based upon analyses of the same (i.e.,- UCSC reference) dispersant, but also a significant variation based upon the different dispersants that were being used. Previous work had indicated that differences in Corexit® 9500 dispersant could not be discerned using GC, combined GC-MS, IR-spectroscopy, or thin layer chromatography. Nonetheless, the round-robin exercise indicated that there were definite differences in the

Figure 3.1 *Results of the Corexit Ò 9500 inter-laboratory round-robin test*

various dispersants based upon their UV absorbance characteristics. If the difference in absorption curves was related to solubility differences among the dispersants, then this could affect the LC50 values being measured for toxicity tests carried out on the same species under otherwise identical conditions. Preliminary indications (after only a few tests) suggest that even though there may be a difference in the absorption spectra of different batches of Corexit® 9500, the results of biological toxicity tests using different batches of the dispersant may, in fact, be comparable.

Results of the round-robin test shown in Figure 3.1 indicate that most values fell within ±40% of the linear and polynomial best fit regression curves. Although the polynomial regression equation fits the data best, the difference between the polynomial fit and linear fin is small ($r^2_{polynomial} = 0.89$; $r^2_{linear} = 0.87$). It is recommended that in establishing a calibration plot for Corexit® 9500, each laboratory construct a calibration curve for the dispersant, and determine if it plots within ±40% of the average calibration curves that resulted from the round-robin experiment. If the data fall within this range, the dispersant can be used. Otherwise another series of dispersant standards should be prepared and the calibration plot should be re-run.

Finally, it was agreed upon by all members of the group that if a laboratory observed phase separation of the dispersant/water mixtures during dispersant WAF preparation, the solution should be analyzed. Any new laboratories joining CROSERF must compare their Corexit® 9500 results (using the calibration method described above) to this round-robin test prior to beginning toxicity testing with the dispersant. The Corexit® 9500 dispersant only round-robin test protocol will not be used in the future.

3.2 Results of Iatroscan Analysis of Oils

During the previous CROSERF meeting (April, 1997), Jim Bonner of TAMU offered to perform Iatroscan analysis on each of the oils being used for toxicity testing by the various CROSERF laboratories. As a result, each laboratory shipped a sample of fresh crude oil to TAMU. In addition, EM&A shipped samples of each of the three oils used in toxicity tests performed in the North Sea in 1994 through 1996. Sue McDonald gave a brief overview of their progress with these analyses. To date, they are still having difficulty with solvent interference in several of the oil samples, and do not have the final results to report for this meeting. These results will be discussed at the next CROSERF meeting and will be included in those proceedings.

3.3 Comparison of Fluorometry and Gas Chromatography Data of WAF's and CE-WAF's

EBSI has been doing some preliminary testing in which they are comparing fluorometry analysis with gas chromatography analysis of WAFs and CE-WAFs. They are still working to calibrate the fluorometer, and do not have any results to discuss in this early stage of the study. Gail Bragin plans to give a presentation on their findings by the summer of 1998. Christina Behr-Andres of UAF mentioned that their laboratory also has an interest in such work, and that they plan to do some work with fluorometry analysis in 1998. Both studies will be revisited in a future meeting.

3.4 Discussion of Reference Oil WAF Round-Robin Test

The CROSERF group previously agreed that there was a need for each of the laboratories to periodically conduct a round-robin test to ensure inter-laboratory standardization of WAF preparation and chemical analysis. The protocol for performing this round-robin test was approved during the previous CROSERF meeting and is detailed in Appendix G of that proceedings (Coelho and Aurand, 1997; EM&A Report 97-01). Mickey Singer from UCSC shipped samples of the reference Prudhoe Bay crude oil to each laboratory in September of 1997. The laboratories have agreed to perform this test in 1998 and the results will be discussed at a future CROSERF meeting.

3.5 ASTM Standard Methods for Chemical Analyses of Oil

Charlie Henry (LSU, NOAA) looked into the ASTM methods for chemical analysis of crude oil. The CROSERF methods compare favorably with those established by ASTM. The primary difference is that the ASTM cut off for TPH analysis is at C_{28}, whereas the CROSERF group has opted to use a cutoff of C_{36}. He noted that this difference is likely due to the fact that the ASTM method specified C_{28} cutoff for diesel oil. The C_{36} is more appropriate for the crude oils being used in CROSERF testing. Although each laboratory can choose their own standards for recovery calculations, Charlie recommended 5α-androstane and hexamethylbenzene as two that general work well for crude oils.

3.6 Status of TPH Sub-Group

During the last CROSERF meeting, it was suggested that someone should look into the TPH Sub-Group and other organizations who may possibly be meeting to discuss issues related to hydrocarbon chemistry. Charlie Henry reported that the EPA and other organizations have numerous reports that discuss issues related to TPH analysis and reporting, but that they do not directly affect the activities of the CROSERF group. Many of these reports are on file at LSU, and he would be happy to send them out to any interested participants.

3.7 Discussion of *M. beryllina* as a Standard Test Species

At the last meeting, the CROSERF group agreed that there is a need to identify a standard test organism that they could all use. This organism will be used to do a laboratory intercalibration of the standard WAF, the standard dispersant solution, and the standard CE-WAF. In addition, this organism would be used in all on-going toxicity testing programs as a common reference point to compare data between the various test oils and dispersants. A decision between the two candidate species, the mysid, *Mysidopsis bahia* or the Inland silversides minnow, *Menidia beryllina*, was deferred until this meeting to allow the California participants to determine which species would be the easiest for them to use, since the state has strict rules against the use of non-indigenous species. Prior to this meeting, they determined that the use of *M. beryllina* is the better option within their program. This species is already in use in the TAMU and USF programs.

Based on these considerations, the participants were asked to approve *M. beryllina* as the standard test species, which was done. All participating laboratories will adjust their planned testing to reflect this decision.

3.8 Summary of Toxicity Results to Date

Several meetings ago, EBSI volunteered to summarize CROSERF-related toxicity numbers that had been generated by the participating laboratories. Figure 3.2 summarizes the information on dispersant-only toxicity data (for both Corexit® 9527 and Corexit® 9500) that exists to date. Note that this figure includes additional data from USF that were not yet available when the Sixth CROSERF Meeting Proceedings were published. The intent is to continue to update this information as new data become available. As the participating laboratories complete their work on WAF and CE-WAF using both fresh and weathered oil, they should report those values to Gail Bragin at EBSI so that similar comparisons can be made for oil and dispersed oil experiments.

Figure 3.2 *Dispersant-only toxicity data generated by CROSERF laboratories as of November, 1997 (with Corexit® 9527 and Corexit® 9500)*

4.0 New Discussion Topics

4.1 Concerns of Information Users and Regulatory Agencies

Don Aurand
Ecosystem Management & Associates

On the afternoon of the first day, the participants split into two groups. One group, consisting of industry and government representatives, met to discuss topics of concern to information users. Present in this session were Dave Panzer (MMS), Gary Moore (Scientex, representing EPA), Leslie Pearson (AK DEC), Robin Jamail (TGLO), Alexis Steen (API), Lyman Young (Chevron) and Don Aurand (EM&A).

The agenda suggested eight topics for discussion by this group (see Appendix B), which were used to focus the discussion. Most of the session was spent on only two topics, the future direction of CROSERF and the need for an outreach program, but all of the items were discussed. The comments of the group for each of the discussion topics are summarized below:

- Selection of Subgroup Coordinator - the participants felt that it was best if a government representative served in this capacity. Dave Panzer of MMS was selected by the participants and agreed to serve.

- Concerns other than toxicity for dispersants - prior to the meeting Mike Sowby (CA OSPR) had expressed a desire to discuss the possible role for CROSERF in dealing with other questions relating to dispersant use. Due to several on-going spill events in California, Mike was unable to attend the meeting. The participants agreed that it would be possible to use CROSERF for such issues, especially topics such as efficacy testing, but deferred further discussion until Mike could be present.

- The role of CROSERF for other chemical treating agents - there was a strong interest on the part of the participants in the possibility of expanding beyond dispersants. The topic of most interest appears to be shoreline cleaners.

- How can CROSERF results help the planning process? - the participants felt that this was a part of the outreach planning discussion.

- Emerging regional or national issues and activities relevant to CROSERF - the participants raised four issues for consideration. They are: 1) the nature of the pending USCG regulations concerning dispersant response capability, 2) inland dispersant use, 3) nearshore use of dispersants in marine or estuarine systems, and 4) what to do with all the information

(risk-benefit analysis). The participants felt all of these topics deserved future consideration.

- What should be in the CROSERF Web Page? - the participants felt the web page could be useful, but were concerned about its upkeep and ensuring appropriate content. They felt this topic needed attention.

- Review of Outreach section of Long Range Plan - the group spent most of their time discussing this topic. There was a strong consensus that outreach needs more attention. The highest priority is to develop basic, non-technical information (pre-written presentations that any of the members can use) that explains what CROSERF is and how agencies can interact with us. Several people strongly supported the idea of expanding our contacts with Regional Response Teams (RRTs), either through information packages or by holding joint meetings. It was also felt that we needed to encourage the US Coast Guard to get involved in CROSERF. There was no support for a newsletter, the participants felt that we could use existing publications, such as the Oil Pollution Intelligence Report or Golob's Oil Pollution Bulletin for this purpose. Several participants stressed the need for a broad, non-technical overview paper which would explain our purpose. The possibility of increased NOAA involvement in CROSERF was also raised, and it was suggested that CROSERF might contribute to NOAA Scientific Support Coordinator (SSC) training. The possibility of a training session at the Oil Spill Conference was also raised.

- Can we use the CROSERF meetings as an educational and outreach forum? - The group felt that this question was closely related to the previous discussion, but felt the key element was to have sessions in the future in conjunction with other meetings, so that we could schedule joint activities. RRT meetings were specifically identified, since we could then develop a meeting schedule which could allow an exchange with the members of the RRT.

Finally, the issue of future funding was briefly discussed. The participants felt that establishing a more formal "proposal" for consideration by potential sponsors was going to be a critical issue in the future. There was discussion about designating a "lead agency" to represent the group, but no consensus was reached as to how that would actually work.

4.2 CROSERF Reference Manual

Don Aurand
Ecosystem Management & Associates

Don Aurand recommended that the group approve the concept of developing a CROSERF notebook (a "laboratory users manual") which would contain information for the

researchers on topics such as oil characteristics, test species, definitions, protocols, and other appropriate reference material that the group may identify. This would accomplish several objectives, it would mean that we would not have to include approved protocols in the Proceedings once they were finalized, it would make it easier for the laboratories to find necessary information and ensure their compliance with the approved protocols, and it would allow information on inter-laboratory testing to be readily available. If a record is kept of where, and to whom, the looseleaf notebooks were sent, they can be periodically updated as new material becomes available. The participants were in favor of this concept, and EM&A agreed to develop the initial content for distribution. All members were asked to let EM&A staff know what they felt should be included.

5.0 Draft and Approved CROSERF Protocols

As was discussed in the previous section, EM&A will compile a CROSERF Laboratories User's Manual which will contain all approved protocols and guidelines from the CROSERF meetings. These protocols and guidelines had previously been printed in the appendices of every CROSERF Proceedings to date. This is the first proceedings in which this material has been omitted from the appendices. Newly approved protocols or guidelines will be printed in the Proceedings of the meeting at which they are given final approval, then incorporated into the User's Manual.

5.1 Discussion on the Draft CROSERF Protocol for Round-Robin Testing of a Dispersant-Only Solution

During the last CROSERF meeting, participants drafted the steps for a dispersant-only round robin test, and had planned to revise it for final approval at this meeting. However, as was discussed in Section 3.1 of this Proceedings, the participants of the technical breakout session agreed that it will not be necessary for each laboratory to conduct a round-robin test of a dispersant-only solution. Consequently, this protocol has been eliminated from the CROSERF requirements.

5.2 Final CROSERF Guidelines for Statistical Methods

Draft CROSERF guidelines for statistical methods used in analyzing toxicity data were presented at the last meeting. The group voted to finalized these guidelines, which are presented in Table 5.1. Note that one additional bullet was added to the bottom, which states that each laboratory must report the statistical method used when presenting toxicity results. Gail Bragin compiled decision trees (see Figure 5.1) that outline the logic for using various statistical methods to determine LC50 point estimations when: a) at least two concentrations result in partial mortalities; and b) one or less partial mortalities occur at the various concentrations tested.

Table 5.1 Finalized CROSERF Guidelines for Statistical Methods

1. Use Probit (probility unit) test if the data are normally distributed;
2. Use Spearman-Karber or Trimmed Spearman-Karber test for non-parametric distributions (if there is no control mortality);
3. Use the binomial method in situations where there are not partial kills (e.g.,- adjacent concentrations yield 0 and 100% mortalities), or re-run the test using a different range of concentrations;
4. Report statistical methods whenever presenting LC50 or other toxicity data.

Figure 5.1 *Decision trees describing use of various statistical methods for making point estimations of LC50 toxicity values*

6.0 Risk Assessment Models

At the first CROSERF meeting, the participants decided to try to develop conceptual models of marine systems which might be affected by oil spills, in order to provide a framework for interpreting the toxicity data they expected to develop. Since then, very little progress has been made towards achieving this goal, since it is in essence a 'peripheral' activity for the participants. At this meeting, the overall lack of progress was discussed, and the decision was made to drop the activity from the agenda.

7.0 CROSERF Web Page

Jim Bonner
Texas A&M University, College Station

At noon on the first day, Dr. Bonner, from Texas A&M University, gave a demonstration of the CROSERF Web Page currently being developed by his staff. The Web Page address is http://pipeline.tamuk.edu/CROSERF/. It is available through the web page that TAMU-Kingsville maintains for their research program on oil spill effects. At the present time, only the basic outline of the page has been completed, and all of the participants were given the opportunity to review the current page so that they could discuss the approach and content on the second day.

On the afternoon of the second day there was a general discussion of the value and content of the page, and what needs to be done in the future. Dr. Bonner briefly reviewed the presentation from yesterday, and summarized his expectations for the Web Page. The goal is to design the content so that the web page will appeal to both technical types and to the layperson who is looking for very basic information. He also indicated that he thought it could be a valuable way for the CROSERF participants to exchange data as it was developed, rather than to wait until the meetings or until an annual report can be completed. This led to a discussion of including preliminary data, since some of the participating laboratories have policies against releasing such data before it has been formally reviewed. Dr. Bonner indicated that he will ask if it is possible to design a "secure" location within the Web Page where only limited access is allowed. That way preliminary data could be available to CROSERF participants, but not to the general public.

Dr. Bonner indicated that TAMU was willing to host the Web Page and will provide a graphics expert and technical writing expert for staff support so that the design is appropriate. None of the other participants have, as yet, sent him any information to include, other than selected web site addresses to use for links in the page. He suggested that the best approach at this point would be for a small group of participants be selected to meet with the TAMU staff about the development of the web page. After some discussion, Don Aurand, Alexis Steen and Jim Clark were suggested.

Lyman Young mentioned that the American Chemical Society has published new guidelines which indicate that if you publish technical information on a web page, it is considered as a publication and therefore cannot be submitted to a journal. The group reviewing the content of the web page needs to seriously look into this to make sure that participants do not limit their ability to submit articles to peer-reviewed journals.

There was a general consensus that a web page would be a valuable tool if properly developed, but the participants felt there were a lot of remaining questions. No definitive plans concerning a meeting of the "design committee" were made.

8.0 Long-Range Plan for CROSERF

Don Aurand
Ecosystem Management & Associates, Inc.

At the last meeting, a draft outline was presented for a "Long-Range" Plan for CROSERF. The objective of this plan was to develop a multi-year strategy document for the CROSERF program which would incorporate all of the laboratory, mesocosm, and field studies anticipated by the participants. As agreed during CROSERF 6, Don Aurand, Gina Coelho, Jim Clark and Alexis Steen held a preliminary meeting to develop the basic elements of the plan. At that time, the basic outline of the report was developed and the general elements of the outreach program were defined. Table 8.1 presents the Table of Contents of the draft plan, based on these considerations.

Don Aurand proceeded to prepare a first draft of the Long Range Plan, which was distributed to the CROSERF participants on the first day of the meeting. On the second day, Don Aurand presented the highlights of the report, and the participants were asked to offer their suggestions. The main points presented in the overview are summarized as follows.

It was emphasized that this was a first draft, and since this was the first time that the members had seen the document, it was important that they take a careful look at the contents to determine if it was reflective of the way their laboratory or agency wanted to proceed. It is based on the accomplishments of the group to date, and represents an attempt to put all of the CROSERF work, including that already accomplished, into a coherent structure. The entire plan would take approximately three years to complete, if the participants were starting from scratch. However, since all of the projects are already underway, it is not clear how much effort remains. One of the major objectives for this meeting was to develop a time line for the activities.

The plan is divided into four major areas: laboratory testing, mesocosm (including the Coastal Oilspill Simulation System and the Texas A&M San Jacinto River controlled marsh field site), field testing, and outreach. Don Aurand summarized the content of each of these sections, and suggested that the participants initially focus on the laboratory testing section, since that was the portion of most interest to all participants. The participants first reviewed the list of proposed oils and test species and made minor changes. The next step was to review the proposed testing matrices, and determine what tests needed to be run. This was a lengthy discussion. The key issues were: the number of test species to be used by each laboratory, the need for replicate tests, the relative importance of spiked versus constant exposure tests, the need for sediment-based testing, the tests necessary to compare fresh versus weathered oil, the need for reference species testing, and the length of time it takes to complete the proposed suite of tests. Table 8.2 shows the proposed testing matrix presented in the draft plan, while Table 8.3 shows the modified testing matrix after discussion by the participants. The key changes are a reduction from four test species to two, a reduction in the number of replicates run, a reduction in the number of constant exposure tests, and the elimination of any sediment toxicity testing.

The participants all felt that obtaining data on spiked exposures with both fresh and weathered oil was the most important goal, and that continuous exposure data for weathered

Table 8.1 Table of Contents for the Draft Long-Range Plan

oil would add little information to the matrix. They preferred to limit those tests in an effort to have sufficient time to do replicate analyses. However, since the continuous exposure tests are similar to regulatory tests required by the EPA, everyone agreed that a limited number of this type of experiment should be included for fresh oil. Continuous exposure experiments for weathered oil were eliminated entirely. Two species were dropped from each laboratory for the same reason. In cases where only a single experiment is to be conducted (i.e.,- reference oil), each laboratory must check to see if their value is similar to values reported by other laboratories. If anamolous values are reported for the reference oil, the test should be repeated.

Table 8.2 Proposed Laboratory Toxicity Testing Matrix for Each of the Participating Laboratories (as presented in the draft long-range plan)

Species	Fresh Oil Spiked Exp. WAF	Fresh Oil Spiked Exp. CE-WAF	Fresh Oil Cont. Exp. WAF	Fresh Oil Cont. Exp. CE-WAF	Weath. Oil Spiked Exp. WAF	Weath. Oil Spiked Exp. CE-WAF	Weath. Oil Cont. Exp. WAF	Weath. Oil Cont. Exp. CE-WAF	Disp. Only
1	X R_o	X (2) R_o (2)	X	X	X	X	X	X	X
2	X R_o	X R_o	X	X	X	X	X	X	X
3	X	X			X	X			
4	X	X			X	X			
Menidia beryllina (ref. species)	X R_o	X	X	X	X	X	X	X	X R_d
Sediment Species	X R_o	X	X	X	X	X	X	X	X

X= Individual laboratory oil type;
R_o= ANS reference oil;
R_d= Corexit® 9500 reference dispersant

EBSI stressed their opinion that, although the group has agreed to reduce the testing efforts to two species (rather than the four species originally proposed for testing), there is an obvious trade-off by doing so. In most instances, only the most stringent LC50 result is used by regulators or the community. With three repetitive tests per species two-thirds of the data (and effort) is wasted. EBSI feels that if the group is trying to identify where there is a difference in sensitivity by an order of magnitude, it is more valuable to evaluate a broader range of organisms and life stages. It is unlikely that different results from repetitive tests on the same organism and oil would be of that magnitude. Reference toxicant tests are more likely to provide information on organism sensitivity over time than would be observed in three repititions of a test on oil performed in a relatively short amount of time with the same population of organisms. They posed two questions for the group to consider : 1) Is there more value in having repetitive LC50s for a fish (with a narrow range of 6 to 9 mg/L, for example) than showing that a different life stage may be orders of magnitude less sensitive? . . . or that a different taxonomic group may be an order of magnitude more sensitive? They propose that future CROSERF meetings continue discussion on the number of species and lifestages to be tested.

Table 8.3 Proposed Laboratory Toxicity Testing Matrix for Each of the Participating Laboratories (as modified during the CROSERF 7 discussions)

Species	Fresh Oil Spiked Exp. WAF	Fresh Oil Spiked Exp. CE-WAF	Fresh Oil Cont. Exp. WAF*	Fresh Oil Cont. Exp. CE-WAF*	Weath. Oil Spiked Exp. WAF	Weath. Oil Spiked Exp. CE-WAF	Disp. Only Spiked Exp.
A	3 X 1 R_o	3 X 1 R_o	3 X	3 X	3 X	3 X	Y
B	3 X 1 R_o	3 X 1 R_o	3 X	3 X	3 X	3 X	Y
Menidia beryllina (reference species)	1 R_o	1 R_o	-	-	3 X	3 X	Y 1 R_d

* These two types of experiments will serve as the bridge between CROSERF data and standard EPA regulatory data;

X= Individual laboratory oil type; Y= Individual laboratory dispersant batch

R_o= ANS reference oil; R_d= Corexit® 9500 reference dispersant

There was a strong consensus that trying to develop an appropriate spiked exposure sediment test was beyond the range of the current effort, even though the group felt it would be valuable. The participants were asked to return to their laboratories and consider the feasibility of completing the revised table, and to be prepared to discuss it again at the next meeting.

After completing the discussions of the laboratory section, the remaining sections were reviewed. The group agreed that the mesocosm and field study sections of the plan should be removed, since not all participants are engaged in those activities. They feel that CROSERF should remain aware of these activities, but not include them in any plan being used to develop funding. They did suggest, however, that when the plan is rewritten the laboratory testing be put in the context of its relationship to these other activities. The final section, outreach, was viewed as critical to the success of CROSERF. It was recommended that EM&A work with the sponsoring organizations to develop a revised outreach plan, based on the items identified during this meeting. EM&A will prepare a revised Long-Range Plan based on these considerations and submit it to the group for review.

9.0 Action Items

The following list was generated as a result of discussions during the November 1997 CROSERF meeting. The list consists of both newly identified action items, as well as continued effort items.

New Items:

1. Look into location of next RRT meeting as possible location for concurrent CROSERF meeting in Spring, 1998.
   C. Henry (LSU, NOAA)

2. Provide summary information on standard chemical methods (ASTM, NOAA, etc.) and how they compare to CROSERF standard methods.
   C. Henry (LSU, NOAA)

3. Compare fluorimetry and GC data of WAFs and CE-WAFs.
   Christina Behr-Andres

4. Send information on Lumatox test system to Gina Coelho.
   Alexis Steen (API)

5. Send reference PBCO oil to all labs for conducting round-robin WAF characterization.
   M. Singer (UCSC)

6. Conduct the WAF round-robin characterization test using the PBCO reference oil.
   All labs

Continued Items:

7. Perform round-robin test of chemical characterization of a standard Water Accommodated Fraction (WAF) using the EPA reference oil (see above) and the test procedure agreed upon during CROSERF 6 meeting. Report the test results to Charlie Henry.
   All Labs

8. Send information about your institution, research work, etc. to Sue McDonald at TAMU for update of the CROSERF Webpage.
   All Labs, A. Steen (API), D. Panzer (MMS), L. Young (Chevron), C. Henry (LSU, NOAA)

9. Coordinate CROSERF webpage development.
   J. Bonner (TAMU), D. Aurand (EMA), A. Steen (API)

10. Complete Iatroscan analysis of the various CROSERF test oils and present at CROSERF 8
    S. McDonald (TAMU)

11. Report any toxicity results obtained by using CROSERF protocols to Gail Bragin so that she can update the summary tables of CROSERF data.
    All Labs

12. Prepare a second draft of the long-range plan and outreach for CROSERF.
    D. Aurand, G. Coelho

13. Update summary table of all toxicity results to date.
    G. Bragin

10.0 References

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Aurand, D. and G. Coelho (eds.). 1996. Proceedings of the Fourth Meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum. Ecosystem Management & Associates, Purcellville, VA. EM&A Report 96-01, 50 p.

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Kucklick, J.H. (ed.). 1994. Proceedings of the First Meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum. Marine Spill Response Corporation, Washington, D.C. MSRC Technical Report Series 94-017, 83 p.

Kucklick, J.H. (ed.). 1995. Proceedings of the Second Meeting of the Chemical Response to Oil Spills: Ecological Effects Research Forum. Marine Spill Response Corporation, Washington, D.C. MSRC Technical Report Series 95-009, 30 p.

Appendix A

List of Invitees

CHEMICAL RESPONSE TO OIL SPILLS ECOLOGICAL EFFECTS RESEARCH FORUM (CROSERF)

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Appendix B

Meeting Agenda

Meeting Agenda
California Office of Oil Spill Prevention & Response
University of California, Santa Cruz
West Coast Santa Cruz Hotel
Santa Cruz, California
Thursday and Friday, November 13 and 14, 1997

(Names below each agenda item indicate presenter or session moderator)

Day 1 - November 13 (Thursday)

0900 Welcome
Mike Sowby, California Office of Oil Spill Prevention and Response

0905 Introduction of participants and overview of meeting: adoption of agenda
Don Aurand, Ecosystem Mgt. & Assoc.

0915 Introduction of University of Alaska, Fairbanks Research Team and Program Overview
Bob Perkins, UAF
Tina Behr-Andres, UAF

0930 Review of CROSERF Program to date
Don Aurand, Ecosystem Mgt. & Assoc.

0940 Progress report on State of California's research activities
Mickey Singer, UCSC

1000 Progress report on State of Florida's research activities
Ted Van Vleet, University of South Florida

1020 Progress report on Environment Canada's research activities
Sandra Blenkinsopp, Environment Canada

1030 Break

1100 Progress report on State of Texas' research activities
Jim Bonner and Sue McDonald, Texas A&M

1120 Progress report on Exxon Biomedical Science's research activities
Jim Clark and Gail Bragin, EBSI

1140 Progress report on COSS Mesocosm Dispersant Experiment
Don Aurand, EM&A; Jim Bonner, TAMU; Jim Clark EBSI

1200 Demonstration of CROSERF Web Page
Jim Bonner, TAMU

1220 Lunch

1330 Technical and Regulatory Breakout Sessions

Breakout Session 1
Information Users and Regulatory Agencies

1. Selection of Subgroup Coordinator

2. Concerns other than toxicity for dispersants (Sowby).

3. The role of CROSERF for other chemical treating agents.

4. How can CROSERF results help the planning process?

5. Emerging regional or national issues and activities relevant to CROSERF

6. What should be in the CROSERF Web Page?

7. Review of Outreach section of Long Range Plan (Aurand).

8. Can we use the CROSERF meetings as an educational and outreach forum?

Breakout Session 2
Research Issues for Participating Laboratories

1. Selection of Subgroup Coordinator

2. Results of Corexit 9500 Absorption Curve Round-Robin Test (Van Vleet)

3. Results of Iatroscan Analysis of Oils (Stephens/Bonner)

4. Comparison of fluorimetry and GC data of WAFs and CE-WAFs (Bragin/Clark)

5. Discussion of reference oil WAF round-robin test (Coelho/Moore)

6. ASTM standard methods for calculating recovery during chemical analyses (Henry)

7. Status of TPH subgroup (Henry)

8. Discussion of *M. beryllina* as standard test species (Coelho)

9. Summary of Toxicity Results to date (Clark)

10. Discussion of draft protocols, standard definitions, etc. (Coelho)

11. What should be in the CROSERF Web Page?

12. Review of Research Objectives section of Long Range Plan (Clark/Coelho)

1515 Break

1530 Technical and Regulatory Breakout Sessions Continued

1630 Return to Single Session - Highlights from Breakout Sessions

1700 Adjourn

Day 2 - November 14 (Friday)

0900 Meeting convenes - review of yesterday's activities
Don Aurand, Ecosystem Mgt. & Assoc.

0915 Discussion of Breakout Sessions, Conclusion.
Don Aurand, Ecosystem Mgt. & Assoc.

0930 CROSERF Web Site - Discussion of Recommendations
Jim Bonner, TAMU

1000 Estuarine Exposure Scenarios
Don Aurand, Ecosystem Mgt. & Assoc.

1030 Break

1045 Depart for Optional Tour of Wildlife Care Facility
Mike Sowby, OSPR

1130 Lunch

1230 Long-range plan for CROSERF - Goals, Objectives and Timelines
Don Aurand, Ecosystem Mgt. & Assoc.

1430 Discussion of Next Meeting and Work Assignments

1500 Adjourn