

		Data	Notes	Reference ID
Origin: Alberta, Canada				
This oil is the same as Federated (SOCSEX), except that the evaporated oils were produced by ESD using rotary evaporation.				
API Gravity		39.0		ESD 94
Equation(s) for Predicting Evaporation				
%Ev = (3.47 + 0.045T)ln(t) Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)				ESD 96
Sulphur (weight %)				
<u>Evaporation (weight %)</u>				
0		0.29		ESD 97
16		0.30		ESD 97
28		0.33		ESD 97
42		0.40		ESD 97
Flash Point (°C)				
<u>Evaporation (weight %)</u>				
0		< -30		ESD 95
16		35		ESD 95
28		78		ESD 95
42		> 95		ESD 95
Density (g/mL)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	0.8413		ESD 94
	15	0.8293		ESD 94
16	0	0.8708		ESD 95
	15	0.8589		ESD 95
28	0	0.8895		ESD 95
	15	0.8767		ESD 95
42	0	0.9063		ESD 95
	15	0.8924		ESD 95
Pour Point (°C)				
<u>Evaporation (weight %)</u>				
0		-15		ESD 95
16		-15		ESD 95
28		-1		ESD 95
42		9		ESD 95

Federated (1994)

		Data	Notes	Reference ID
Dynamic Viscosity (mPa·s or cP)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	10		ESD 94
	5	7		ESD 94
	10	4		ESD 94
	15	4		ESD 94
16	0	23		ESD 95
	15	10		ESD 95
28	0	208		ESD 95
	15	29		ESD 95
42	0	722		ESD 95
	15	101		ESD 95
Chemical Dispersibility (volume %)				
<u>Evaporation (weight %)</u>				
0	Corexit 9500	61		ESD 98
	Corexit 9527	20		ESD 95
	Dasic LTS	19		ESD 95
	Enersperse 700	15		ESD 95
16	Corexit 9500	38		ESD 95
	Corexit 9527	8		ESD 95
	Dasic LTS	16		ESD 95
	Enersperse 700	13		ESD 95
28	Corexit 9500	22		ESD 95
	Corexit 9527	4		ESD 95
	Dasic LTS	9		ESD 95
	Enersperse 700	3		ESD 95
42	Corexit 9500	18		ESD 95
	Corexit 9527	2		ESD 95
	Dasic LTS	1		ESD 95
	Enersperse 700	5		ESD 95

		Data	Notes	Reference ID
Hydrocarbon Groups (weight %)				
<u>Evaporation (weight %)</u>				
0	Saturates	74		ESD 95
	Aromatics	21		ESD 95
	Resins	3		ESD 95
	Asphaltenes	1		ESD 97
	Waxes	6		ESD 98
16	Saturates	69		ESD 96
	Aromatics	24		ESD 96
	Resins	5		ESD 96
	Asphaltenes	1		ESD 96
	Waxes	7		ESD 98
28	Saturates	64		ESD 96
	Aromatics	27		ESD 96
	Resins	7		ESD 96
	Asphaltenes	2		ESD 96
	Waxes	8		ESD 98
42	Saturates	62		ESD 96
	Aromatics	28		ESD 96
	Resins	7		ESD 96
	Asphaltenes	2		ESD 96
	Waxes	9		ESD 98
Adhesion (g/m²)				
<u>Evaporation (weight %)</u>				
0		2	<i>SD = 2</i>	ESD 94
16		17	<i>SD = 2</i>	ESD 95
28		26	<i>SD = 1</i>	ESD 95
42		25	<i>SD = 3</i>	ESD 95

Federated (1994)

		Data	Notes	Reference ID
Volatile Organic Compounds (ppm)				
<u>Evaporation (weight %)</u>				
0	Benzene	440		ESD 96
	Toluene	4,470		ESD 96
	Ethylbenzene	1,110		ESD 96
	Xylenes	7,120		ESD 96
	C3-benzenes	10,790		ESD 96
	Total BTEX	13,140		ESD 96
	Total VOCs	23,930		ESD 96
16	Benzene	50		ESD 96
	Toluene	2,620		ESD 96
	Ethylbenzene	900		ESD 96
	Xylenes	6,230		ESD 96
	C3-benzenes	11,400		ESD 96
	Total BTEX	9,810		ESD 96
	Total VOCs	21,200		ESD 96
28	Benzene	0		ESD 96
	Toluene	0		ESD 96
	Ethylbenzene	70		ESD 96
	Xylenes	850		ESD 96
	C3-benzenes	6,240		ESD 96
	Total BTEX	920		ESD 96
	Total VOCs	7,170		ESD 96
42	Benzene	0		ESD 96
	Toluene	0		ESD 96
	Ethylbenzene	0		ESD 96
	Xylenes	0		ESD 96
	C3-benzenes	0		ESD 96
	Total BTEX	0		ESD 96
	Total VOCs	0		ESD 96

Surface Tension (mN/m or dynes/cm)

<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>		
0	0	27.3	ESD 95
	15	25.8	ESD 95
16	0	29.0	ESD 95
	15	28.1	ESD 95
28	0	33.5	ESD 95
	15	29.4	ESD 95
42	0	DNF	ESD 95
	15	30.8	ESD 95

		Data	Notes	Reference ID
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	17.6		ESD 95
	15	16.2		ESD 95
16	0	18.4		ESD 95
	15	18.4		ESD 95
28	0	NM		ESD 95
	15	18.9		ESD 95
42	0	DNF		ESD 95
	15	16.9		ESD 95
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	18.7		ESD 95
	15	15.9		ESD 95
16	0	18.7		ESD 95
	15	18.3		ESD 95
28	0	NM		ESD 95
	15	18.2		ESD 95
42	0	DNF		ESD 95
	15	18.0		ESD 95

Federated (1994)

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (weight %)</u>	<u>Boiling Point (°C)</u>			
0	40	3		ESD 94
	60	4		ESD 94
	80	7		ESD 94
	100	12		ESD 94
	120	16		ESD 94
	140	21		ESD 94
	160	25		ESD 94
	180	30		ESD 94
	200	34		ESD 94
	250	44		ESD 94
	300	55		ESD 94
	350	65		ESD 94
	400	74		ESD 94
	450	82		ESD 94
	500	89		ESD 94
	550	93		ESD 94
	600	97		ESD 94
	650	99		ESD 94
16	100	2		ESD 95
	120	4		ESD 95
	140	8		ESD 95
	160	13		ESD 95
	180	18		ESD 95
	200	23		ESD 95
	250	35		ESD 95
	300	48		ESD 95
	350	60		ESD 95
	400	70		ESD 95
	450	80		ESD 95
	500	87		ESD 95
	550	93		ESD 95
	600	96		ESD 95
	650	99		ESD 95
28	160	2		ESD 95
	180	5		ESD 95
	200	10		ESD 95
	250	24		ESD 95
	300	38		ESD 95
	350	53		ESD 95
	400	65		ESD 95
	450	76		ESD 95

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (weight %)</u>	<u>Boiling Point (°C)</u>			
28	500	85		ESD 95
	550	91		ESD 95
	600	95		ESD 95
	650	98		ESD 95
42	200	1		ESD 95
	250	8		ESD 95
	300	24		ESD 95
	350	42		ESD 95
	400	56		ESD 95
	450	70		ESD 95
	500	81		ESD 95
	550	89		ESD 95
	600	94		ESD 95
	650	98		ESD 95

Federated (1998)

		Data	Notes	Reference ID
Origin: Alberta, Canada				
API Gravity		38.9		ESD 99
Equation(s) for Predicting Evaporation				
%Ev = (3.45 + 0.045T)ln(t)				ESD 99
Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)				
Sulphur (weight %)				
<u>Evaporation (weight %)</u>				
0		0.34		ESD 99
13		0.33		ESD 99
25		0.39		ESD 99
39		0.48		ESD 99
Flash Point (°C)				
<u>Evaporation (weight %)</u>				
0		-26		ESD 99
13		27		ESD 99
25		64		ESD 99
39		> 95		ESD 99
Density (g/mL)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	0.8419		ESD 99
	15	0.8298		ESD 99
	25	0.8225		ESD 99
13	0	0.8686		ESD 99
	15	0.8562		ESD 99
	25	0.8492		ESD 99
25	0	0.8866		ESD 99
	15	0.8735		ESD 99
	25	0.8665		ESD 99
39	0	0.9048		ESD 99
	15	0.8931		ESD 99
	25	0.8849		ESD 99
Pour Point (°C)				
<u>Evaporation (weight %)</u>				
0		-22		ESD 99
13		-2		ESD 99
25		7		ESD 99
39		15		ESD 99

		Data	Notes	Reference ID
Dynamic Viscosity (mPa s or cP)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	9		ESD 99
	15	5		ESD 99
	25	4		ESD 99
13	0	26		ESD 99
	15	9		ESD 99
	25	7		ESD 99
25	0	76	(a)	ESD 99
	15	23		ESD 99
	25	14		ESD 99
39	0	972	(a)	ESD 99
	15	88		ESD 99
	25	47		ESD 99
<i>(a) slightly non-newtonian</i>				
Hydrocarbon Groups (weight %)				
<u>Evaporation (weight %)</u>				
0	Saturates	72		ESD 99
	Aromatics	22		ESD 99
	Resins	4		ESD 99
	Asphaltenes	2		ESD 99
13	Saturates	70		ESD 99
	Aromatics	24		ESD 99
	Resins	4		ESD 99
	Asphaltenes	2		ESD 99
25	Saturates	65		ESD 99
	Aromatics	28		ESD 99
	Resins	5		ESD 99
	Asphaltenes	2		ESD 99
39	Saturates	64		ESD 99
	Aromatics	27		ESD 99
	Resins	6		ESD 99
	Asphaltenes	3		ESD 99
Adhesion (g/m²)				
<u>Evaporation (weight %)</u>				
0		5	SD = 1	ESD 99
13		8	SD = 2	ESD 99
25		14	SD = 1	ESD 99
39		42	SD = 5	ESD 99

Federated (1998)

		Data	Notes	Reference ID
Volatile Organic Compounds (ppm)				
<u>Evaporation (weight %)</u>				
0	Benzene	1,142		ESD 99
	Toluene	5,532		ESD 99
	Ethylbenzene	1,280		ESD 99
	Xylenes	8,048		ESD 99
	C3-benzenes	12,892		ESD 99
	Total BTEX	16,001		ESD 99
	Total VOCs	28,893		ESD 99
13	Benzene	387		ESD 99
	Toluene	3,098		ESD 99
	Ethylbenzene	1,232		ESD 99
	Xylenes	7,819		ESD 99
	C3-benzenes	13,971		ESD 99
	Total BTEX	12,535		ESD 99
	Total VOCs	26,506		ESD 99
25	Benzene	15		ESD 99
	Toluene	135		ESD 99
	Ethylbenzene	325		ESD 99
	Xylenes	2,905		ESD 99
	C3-benzenes	11,415		ESD 99
	Total BTEX	3,380		ESD 99
	Total VOCs	14,795		ESD 99
39	Benzene	28		ESD 99
	Toluene	4		ESD 99
	Ethylbenzene	0		ESD 99
	Xylenes	0		ESD 99
	C3-benzenes	25		ESD 99
	Total BTEX	33		ESD 99
	Total VOCs	58		ESD 99

		Data	Notes	Reference ID
Surface Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	26.1		ESD 00
	15	25.3		ESD 00
	25	24.7		ESD 00
13	0	27.9		ESD 00
	15	27.2		ESD 00
	25	26.8		ESD 00
25	0	54.6		ESD 00
	15	28.6		ESD 00
	25	28.1		ESD 00
39	0	DNF		ESD 00
	15	29.7		ESD 00
	25	29.3		ESD 00
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	16.4		ESD 00
	15	15.8		ESD 00
	25	12.3		ESD 00
13	0	10.3		ESD 00
	15	15.1		ESD 00
	25	12.0		ESD 00
25	0	NM		ESD 00
	15	14.2		ESD 00
	25	13.8		ESD 00
39	0	DNF		ESD 00
	15	NM		ESD 00
	25	8.4		ESD 00
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	17.4		ESD 00
	15	16.9		ESD 00
	25	15.2		ESD 00
13	0	NM		ESD 00
	15	17.4		ESD 00
	25	15.4		ESD 00
25	0	NM		ESD 00
	15	18.0		ESD 00
	25	17.2		ESD 00
39	15	DNF		ESD 00
		NM		ESD 00
		12.1		ESD 00

Federated (1998)

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (weight %)</u>	<u>Boiling Point (°C)</u>			
0	40	2		ESD 99
	60	3		ESD 99
	80	4		ESD 99
	100	9		ESD 99
	120	14		ESD 99
	140	18		ESD 99
	160	23		ESD 99
	180	28		ESD 99
	200	32		ESD 99
	250	43		ESD 99
	300	54		ESD 99
	350	65		ESD 99
	400	74		ESD 99
	450	82		ESD 99
	500	88		ESD 99
	550	93		ESD 99
	600	96		ESD 99
	650	98		ESD 99
	700	99		ESD 99
13	100	2		ESD 99
	120	6		ESD 99
	140	10		ESD 99
	160	15		ESD 99
	180	20		ESD 99
	200	24		ESD 99
	250	35		ESD 99
	300	47		ESD 99
	350	58		ESD 99
	400	68		ESD 99
	450	77		ESD 99
	500	84		ESD 99
	550	90		ESD 99
	600	93		ESD 99
	650	95		ESD 99
25	700	97		ESD 99
	140	1		ESD 99
	160	4		ESD 99
	180	8		ESD 99
	200	13		ESD 99
	250	26		ESD 99
	300	40		ESD 99

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (weight %)</u>	<u>Boiling Point (°C)</u>			
25	350	53		ESD 99
	400	65		ESD 99
	450	76		ESD 99
	500	84		ESD 99
	550	90		ESD 99
	600	95		ESD 99
	650	97		ESD 99
	700	99		ESD 99
39	200	1		ESD 99
	250	10		ESD 99
	300	25		ESD 99
	350	42		ESD 99
	400	56		ESD 99
	450	70		ESD 99
	500	80		ESD 99
	550	88		ESD 99
	600	93		ESD 99
	650	97		ESD 99
	700	99		ESD 99

Federated (SOCSEX)

	Data	Notes	Reference ID
Origin: Alberta, Canada			
This oil was used in the 1994/95 Subsurface Oil in Coarse Sediments Experiment (SOCSEX). The evaporated oils were produced by Coastal and Ocean Resources, using air stripping.			Harper 95

Density

<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>		
0	0	0.8413	ESD 94
	15	0.8293	ESD 94
18	0	0.8706	ESD 95
	15	0.8584	ESD 95
27	0	0.8776	ESD 95
	15	0.8654	ESD 95

Dynamic Viscosity

<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>			
0	0	10		ESD 94
	5	7		ESD 94
	10	4		ESD 94
	15	4		ESD 94
18	0	55	(a)	ESD 95
		751	(b)	ESD 95
		8,624	(c)	ESD 95
	5	32	(a)	ESD 95
		269	(b)	ESD 95
		3,226	(c)	ESD 95
	10	19	(a)	ESD 95
		121	(b)	ESD 95
		1,058	(c)	ESD 95
	15	12		ESD 95
27	0	320	(d)	ESD 95
		2,952	(b)	ESD 95
		21,600	(c)	ESD 95
	5	146	(d)	ESD 95
		1,219	(b)	ESD 95
		10,180	(c)	ESD 95
	10	58	(d)	ESD 95
		196	(b)	ESD 95
		2,291	(c)	ESD 95
	15	16		ESD 95

Shear rate = (a) 500/s; (b) 10/s; (c) 1/s; (d) 100/s

		Data	Notes	Reference ID
Hydrocarbon Groups (weight %)				
<u>Evaporation (volume %)</u>				
0	Saturates	74		ESD 95
	Aromatics	21		ESD 95
	Resins	3		ESD 95
	Asphaltenes	1		ESD 95
18	Saturates	68		ESD 95
	Aromatics	26		ESD 95
	Resins	4		ESD 95
	Asphaltenes	3		ESD 95
27	Saturates	71		ESD 95
	Aromatics	25		ESD 95
	Resins	3		ESD 95
	Asphaltenes	1		ESD 95
Volatile Organic Compounds (ppm)				
<u>Evaporation (volume %)</u>				
0	Benzene	900		ESD 94
	Toluene	2,950		ESD 94
	Ethylbenzene	1,350		ESD 94
	Xylenes	8,700		ESD 94
	C3-benzenes	13,350		ESD 94
	Total BTEX	13,900		ESD 94
	Total VOCs	27,250		ESD 94
18	Benzene	90		ESD 95
	Toluene	1,600		ESD 95
	Ethylbenzene	1,200		ESD 95
	Xylenes	7,960		ESD 95
	C3-benzenes	13,960		ESD 95
	Total BTEX	10,840		ESD 95
	Total VOCs	24,800		ESD 95
27	Benzene	90		ESD 95
	Toluene	410		ESD 95
	Ethylbenzene	810		ESD 95
	Xylenes	6,150		ESD 95
	C3-benzenes	15,880		ESD 95
	Total BTEX	7,470		ESD 95
	Total VOCs	23,350		ESD 95

Federated (SOCSEX)

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (volume %)</u>	<u>Boiling Point (°C)</u>			
0	40	3		ESD 94
	60	4		ESD 94
	80	7		ESD 94
	100	12		ESD 94
	120	16		ESD 94
	140	21		ESD 94
	160	25		ESD 94
	180	30		ESD 94
	200	34		ESD 94
	250	44		ESD 94
	300	55		ESD 94
	350	65		ESD 94
	400	74		ESD 94
	450	82		ESD 94
	500	88		ESD 94
	550	93		ESD 94
	600	97		ESD 94
	650	99		ESD 94
18	100	1		ESD 95
	120	4		ESD 95
	140	8		ESD 95
	160	13		ESD 95
	180	18		ESD 95
	200	23		ESD 95
	250	35		ESD 95
	300	46		ESD 95
	350	59		ESD 95
	400	69		ESD 95
	450	78		ESD 95
	500	86		ESD 95
	550	91		ESD 95
	600	95		ESD 95
	650	98		ESD 95
27	700	99		ESD 95
	120	1		ESD 95
	140	4		ESD 95
	160	8		ESD 95
	180	13		ESD 95
	200	18		ESD 95
	250	31		ESD 95
	300	43		ESD 95

		Data	Notes	Reference ID
Boiling Point Distribution (weight %)				
<u>Evaporation (volume %)</u>	<u>Boiling Point (°C)</u>			
27	350	56		ESD 95
	400	67		ESD 95
	450	77		ESD 95
	500	85		ESD 95
	550	91		ESD 95
	600	95		ESD 95
	650	97		ESD 95
	700	99		ESD 95

Federated Light and Medium

	Data	Notes	Reference ID
Origin: Alberta, Canada			
Data from OGJ 99 were originally published in 1983 as part of a series entitled "Guide to Export Crudes for the '80s".			
API Gravity	39.7		OGJ 99
Sulphur (weight %)	0.20		OGJ 99
Reid Vapour Pressure (kPa)	31		OGJ 99
Pour Point (°C)	-10		OGJ 99
Kinematic Viscosity (mm²/s or cSt)			
	<u>Temperature (°C)</u>		
	40	4	OGJ 99
Hydrocarbon Groups (weight %)			
	Waxes	9	OGJ 99
Yield on Crude (volume %)			
	<u>Boiling Range (°C)</u>		
	<C5	3	OGJ 99
	Naphtha (C5-190)	31	OGJ 99
	Kerosene (190-277)	18	OGJ 99
	Distillate (277-343)	14	OGJ 99
	Gas oil (343-565)	28	OGJ 99
	Residue (>565)	9	OGJ 99
Metals (ppm)			
	Nickel	0.07	OGJ 99
	Vanadium	0	OGJ 99
Other Elements (weight %)			
	Nitrogen	0.11	OGJ 99

	Data	Notes	Reference ID
Origin: North Sea, UK			
API Gravity	34.7		OGJ 91b
Sulphur (weight %)	1.01		OGJ 91b
Reid Vapour Pressure (kPa)	58		OGJ 91b
Pour Point (°C)	-21		OGJ 91b
Kinematic Viscosity (mm²/s or cSt)			
Temperature (°C)			
20	12		OGJ 91b
38	7		OGJ 91b
Hydrocarbon Groups (weight %)			
Waxes	12		OGJ 91b
Yield on Crude (volume %)			
Boiling Range (°C)			
Light naphtha (IBP-85)	8		OGJ 91b
Naphtha (85-165)	16		OGJ 91b
Kerosene (165-235)	12		OGJ 91b
Light gas oil (235-300)	11		OGJ 91b
Heavy gas oil (300-350)	8		OGJ 91b
Residue (>350)	43		OGJ 91b
Metals (ppm)			
Nickel	3		OGJ 91b
Vanadium	10		OGJ 91b

Fluid Catalytic Cracker Feed

	Data	Notes	Reference ID
Synonyms: AGO+FGO Combined Gas Oil FCC Feed			
API Gravity	25.3		ESD 93
Equation(s) for Predicting Evaporation			
$\%Ev = (-0.08 + 0.013T)\sqrt{t}$ Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 98
Sulphur (weight %)	0.15		ESD 93
Flash Point (°C)	> 95		ESD 93
Density (g/mL)			
	<u>Temperature (°C)</u>		
	0	0.9167	ESD 93
	15	0.9018	ESD 93
Pour Point (°C)	29		ESD 93
Dynamic Viscosity (mPa·s or cP)			
	<u>Temperature (°C)</u>		
	0	50,730	(a) ESD 93
		266,900	(b) ESD 93
	15	9,351	(a) ESD 93
		40,160	(b) ESD 93
<i>Shear rate = (a) 10/s; (b) 1/s</i>			
Hydrocarbon Groups (weight %)			
	Saturates	59	ESD 96
	Aromatics	34	ESD 96
	Resins	6	ESD 96
	Asphaltenes	0	ESD 96
	Waxes	32	ESD 93
Adhesion (g/m²)	102	SD = 27	ESD 95
Volatile Organic Compounds (ppm)			
	Benzene	50	ESD 94
	Toluene	0	ESD 94
	Ethylbenzene	0	ESD 94
	Xylenes	0	ESD 94
	C3-benzenes	50	ESD 94
	Total BTEX	50	ESD 94
	Total VOCs	90	ESD 94

Fluid Catalytic Cracker Feed

	Data	Notes	Reference ID
Surface Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	DNF		ESD 94
15	DNF		ESD 93
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	DNF		ESD 94
15	DNF		ESD 93
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	DNF		ESD 94
15	DNF		ESD 93
Boiling Point Distribution (weight %)			
<u>Boiling Point (°C)</u>			
250	2		ESD 94
300	9		ESD 94
350	25		ESD 94
400	49		ESD 94
450	77		ESD 94
500	93		ESD 94
550	99		ESD 94

Fluid Catalytic Cracker Heavy Cycle Oil

	Data	Notes	Reference ID
Synonyms: FCC Heavy Cycle Oil			
API Gravity	24.3		ESD 92
Equation(s) for Predicting Evaporation			
$\%Ev = (0.17 + 0.013T)\sqrt{t}$ Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 96
Sulphur (weight %)			
<u>Evaporation (volume %)</u>			
0	0.14		ESD 93
4	0.16		ESD 93
9	0.14		ESD 93
Flash Point (°C)			
<u>Evaporation (volume %)</u>			
0	69		ESD 92
4	83		ESD 92
9	> 90		ESD 92
Density (g/mL)			
<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>		
0	0	0.9185	ESD 92
	15	0.9075	ESD 92
4	0	0.9213	ESD 92
	15	0.9102	ESD 92
9	0	0.9237	ESD 92
	15	0.9127	ESD 92
Pour Point (°C)			
<u>Evaporation (volume %)</u>			
0		-58	ESD 92
4		-58	ESD 92
9		-55	ESD 92
Dynamic Viscosity (mPa·s or cP)			
<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>		
0	0	4	ESD 92
	15	3	ESD 92
4	0	4	ESD 92
	15	3	ESD 92
9	0	5	ESD 92
	15	4	ESD 92

Fluid Catalytic Cracker Heavy Cycle Oil

		Data	Notes	Reference ID
Hydrocarbon Groups (weight %)				
<u>Evaporation (weight %)</u>				
0	Saturates	34		ESD 96
	Aromatics	64		ESD 96
	Resins	2		ESD 96
	Asphaltenes	0		ESD 96
	Waxes	0		ESD 92
9	Saturates	29		ESD 97
	Aromatics	69		ESD 97
	Resins	2		ESD 97
	Asphaltenes	0		ESD 97
	Waxes	1		ESD 98
Adhesion (g/m²)				
<u>Evaporation (volume %)</u>				
0		3	<i>SD = 1</i>	ESD 96
9		2	<i>SD = 1</i>	ESD 96
Volatile Organic Compounds (ppm)				
<u>Evaporation (volume %)</u>				
0	Benzene	80		ESD 94
	Toluene	790		ESD 94
	Ethylbenzene	400		ESD 94
	Xylenes	3,280		ESD 94
	C3-benzenes	10,160		ESD 94
	Total BTEX	4,550		ESD 94
	Total VOCs	14,700		ESD 94
4	Benzene	40		ESD 94
	Toluene	150		ESD 94
	Ethylbenzene	150		ESD 94
	Xylenes	1,320		ESD 94
	C3-benzenes	7,350		ESD 94
	Total BTEX	1,660		ESD 94
	Total VOCs	9,010		ESD 94
9	Benzene	0		ESD 94
	Toluene	90		ESD 94
	Ethylbenzene	50		ESD 94
	Xylenes	140		ESD 94
	C3-benzenes	2,860		ESD 94
	Total BTEX	280		ESD 94
	Total VOCs	3,140		ESD 94

Fluid Catalytic Cracker Heavy Cycle Oil

		Data	Notes	Reference ID
Surface Tension (mN/m or dynes/cm)				
<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>			
0	0	30.8		ESD 92
	15	31.0		ESD 92
4	0	31.2		ESD 92
	15	29.5		ESD 92
9	0	29.7		ESD 92
	15	30.4		ESD 92
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>			
0	0	26.1		ESD 92
	15	26.2		ESD 92
4	0	23.6		ESD 92
	15	23.6		ESD 92
9	0	22.8		ESD 92
	15	23.6		ESD 92
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (volume %)</u>	<u>Temperature (°C)</u>			
0	0	26.2		ESD 92
	15	27.1		ESD 92
4	0	25.4		ESD 92
	15	25.0		ESD 92
9	0	26.8		ESD 92
	15	24.2		ESD 92
Boiling Point Distribution (weight %)				
<u>Evaporation (volume %)</u>	<u>Boiling Point (°C)</u>			
0	40	1		ESD 94
	60	1		ESD 94
	80	1		ESD 94
	100	1		ESD 94
	120	2		ESD 94
	140	3		ESD 94
	160	3		ESD 94
	180	5		ESD 94
	200	11		ESD 94
	250	59		ESD 94
	300	95		ESD 94
9	180	1		ESD 96
	200	6		ESD 96
	250	56		ESD 96
	300	94		ESD 96

Fluid Catalytic Cracker Heavy Cycle Oil

		Data	Notes	Reference ID
Metals (ppm)				
<u>Evaporation (volume %)</u>				
0	Barium	< 0.3		Cao 92
	Chromium	< 2		Cao 92
	Copper	< 0.6		Cao 92
	Iron	< 4		Cao 92
	Lead	< 3		Cao 92
	Magnesium	4		Cao 92
	Molybdenum	< 0.6		Cao 92
	Nickel	< 1		Cao 92
	Titanium	< 0.6		Cao 92
	Vanadium	< 0.6		Cao 92
	Zinc	0.4		Cao 92
9	Barium	< 0.3		Cao 92
	Chromium	< 2		Cao 92
	Copper	< 0.6		Cao 92
	Iron	< 3		Cao 92
	Lead	< 3		Cao 92
	Magnesium	< 1		Cao 92
	Molybdenum	< 0.6		Cao 92
	Nickel	< 1		Cao 92
	Titanium	< 0.6		Cao 92
	Vanadium	< 0.6		Cao 92
<hr/>				
Aqueous Solubility (mg/L)				
Room temperature		17	(a)	ESD 92
(a) fresh water				

Fluid Catalytic Cracker Light Cycle Oil

	Data	Notes	Reference ID
Synonyms: FCC Light Cycle Oil			
API Gravity	1.6		ESD 93
Equation(s) for Predicting Evaporation			
$\%Ev = (-0.17 + 0.013T)\sqrt{t}$ Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 98
Sulphur (weight %)	0.36		ESD 93
Flash Point (°C)	> 95		ESD 93
Density (g/mL)			
	<u>Temperature (°C)</u>		
	0	1.0722	ESD 93
	15	1.0620	ESD 93
Pour Point (°C)	1		ESD 93
Dynamic Viscosity (mPa·s or cP)			
	<u>Temperature (°C)</u>		
	0	103,000	ESD 93
	15	7,418	ESD 93
Hydrocarbon Groups (weight %)			
	Saturates	17	ESD 95
	Aromatics	58	ESD 95
	Resins	4	ESD 95
	Asphaltenes	20	ESD 95
	Waxes	1	ESD 97
Adhesion (g/m²)	77	SD = 6	ESD 95
Volatile Organic Compounds (ppm)			
	Benzene	50	ESD 94
	Toluene	50	ESD 94
	Ethylbenzene	50	ESD 94
	Xylenes	150	ESD 94
	C3-benzenes	590	ESD 94
	Total BTEX	300	ESD 94
	Total VOCs	890	ESD 94
Surface Tension (mN/m or dynes/cm)			
	<u>Temperature (°C)</u>		
	0	DNF	ESD 94
	15	34.0	ESD 93

Fluid Catalytic Cracker Light Cycle Oil

	Data	Notes	Reference ID
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	DNF		ESD 94
15	NM		ESD 93
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	DNF		ESD 94
15	NM		ESD 93
Boiling Point Distribution (weight %)			
<u>Boiling Point (°C)</u>			
200	1		ESD 94
250	4		ESD 94
300	10		ESD 94
350	20		ESD 94
400	37		ESD 94
450	65		ESD 94
500	87		ESD 94
550	95		ESD 94
600	97		ESD 94
650	99		ESD 94
Acute Toxicity of Water Soluble Fraction (mg/L)			
	<u>Test Organism</u>		
48h LC50	Daphnia magna	0.4	(a) Harris 94
<i>(a) results based on GC headspace analysis</i>			

Fluid Catalytic Cracker Medium Cycle Oil

	Data	Notes	Reference ID
Synonyms: FCC Medium Cycle Oil			
API Gravity	12.3		ESD 93
Equation(s) for Predicting Evaporation			
$\%Ev = (-0.16 + 0.013T)\sqrt{t}$ Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 96
Sulphur (weight %)	0.27		ESD 93
Flash Point (°C)	> 95		ESD 93
Density (g/mL)			
	<u>Temperature (°C)</u>		
	0	0.9961	ESD 93
	15	0.9835	ESD 93
Pour Point (°C)	-6		ESD 93
Dynamic Viscosity (mPa·s or cP)			
	<u>Temperature (°C)</u>		
	0	100	ESD 93
	15	31	ESD 93
Chemical Dispersibility (volume %)			
	Corexit 9527	60	ESD 91
	Dasic LTS	5	ESD 93
	Enersperse 700	15	ESD 93
Hydrocarbon Groups (weight %)			
	Saturates	30	ESD 94
	Aromatics	62	ESD 94
	Resins	7	ESD 94
	Asphaltenes	1	ESD 94
	Waxes	2	ESD 97
Adhesion (g/m²)	21	SD = 3	ESD 95
Volatile Organic Compounds (ppm)			
	Benzene	0	ESD 96
	Toluene	20	ESD 96
	Ethylbenzene	10	ESD 96
	Xylenes	130	ESD 96
	C3-benzenes	640	ESD 96
	Total BTEX	160	ESD 96
	Total VOCs	800	ESD 96

Fluid Catalytic Cracker Medium Cycle Oil

	Data	Notes	Reference ID
Surface Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	38.7		ESD 94
15	32.7		ESD 94
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	18.6		ESD 94
15	22.8		ESD 94
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	NM		ESD 94
15	27.3		ESD 94
Boiling Point Distribution (weight %)			
<u>Boiling Point (°C)</u>			
200	1		ESD 94
250	5		ESD 94
300	24		ESD 94
350	65		ESD 94
400	93		ESD 94
450	99		ESD 94

Fluid Catalytic Cracker Virgin Gas Oil

	Data	Notes	Reference ID
Synonyms: FCC VGO			
Evaporative loss of 84 wt% was produced by 6 hours of rotary evaporation, not the standard 48 hours.			ESD 94
API Gravity			
	31.8		ESD 93
Equation(s) for Predicting Evaporation			
%Ev = (2.5 + 0.013T)sqrt(t) Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 98
Sulphur (weight %)			
Evaporation (weight %)			
0	0.00		ESD 94
84	0.00		ESD 94
Flash Point (°C)			
Evaporation (weight %)			
0	21		ESD 93
84	51		ESD 94
Density (g/mL)			
Evaporation (weight %) Temperature (°C)			
0	0	0.8789	ESD 93
	15	0.8662	ESD 93
84	0	0.9076	ESD 94
	15	0.8957	ESD 94
Pour Point (°C)			
Evaporation (weight %)			
0	< -60		ESD 93
84	< -60		ESD 94
Dynamic Viscosity (mPa·s or cP)			
Evaporation (weight %) Temperature (°C)			
0	0	1	ESD 93
	15	1	ESD 93
84	0	1	ESD 94
	15	1	ESD 94

Fluid Catalytic Cracker Virgin Gas Oil

		Data	Notes	Reference ID
Hydrocarbon Groups (weight %)				
<u>Evaporation (weight %)</u>				
0	Saturates	3		ESD 96
	Aromatics	97		ESD 96
	Resins	0		ESD 96
	Asphaltenes	0		ESD 96
	Waxes	0		ESD 93
84	Saturates	19		ESD 96
	Aromatics	79		ESD 96
	Resins	2		ESD 96
	Asphaltenes	0		ESD 96
Adhesion (g/m²)				
<u>Evaporation (weight %)</u>				
0		1	<i>SD = 1</i>	ESD 95
84		3	<i>SD = 2</i>	ESD 95
Volatile Organic Compounds (ppm)				
<u>Evaporation (weight %)</u>				
0	Benzene	290		ESD 96
	Toluene	119,730		ESD 96
	Ethylbenzene	78,850		ESD 96
	Xylenes	225,030		ESD 96
	C3-benzenes	215,240		ESD 96
	Total BTEX	423,900		ESD 96
	Total VOCs	639,150		ESD 96
84	Benzene	140		ESD 95
	Toluene	840		ESD 95
	Ethylbenzene	5,490		ESD 95
	Xylenes	50,210		ESD 95
	C3-benzenes	430,990		ESD 95
	Total BTEX	56,680		ESD 95
	Total VOCs	487,670		ESD 95
Surface Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	29.2		ESD 94
	15	28.1		ESD 94
84	0	29.0		ESD 94
	15	28.6		ESD 94

Fluid Catalytic Cracker Virgin Gas Oil

		Data	Notes	Reference ID
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	28.7		ESD 94
	15	30.0		ESD 94
84	0	13.6		ESD 94
	15	16.7		ESD 94
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)				
<u>Evaporation (weight %)</u>	<u>Temperature (°C)</u>			
0	0	27.9		ESD 94
	15	30.6		ESD 94
84	0	13.7		ESD 94
	15	17.3		ESD 94
Boiling Point Distribution (weight %)				
<u>Evaporation (weight %)</u>	<u>Boiling Point (°C)</u>			
0	100	1		ESD 95
	120	23		ESD 95
	140	44		ESD 95
	160	70		ESD 95
	180	91		ESD 95
	200	96		ESD 95
	250	99		ESD 95
84	140	4		ESD 95
	160	15		ESD 95
	180	55		ESD 95
	200	78		ESD 95
	250	91		ESD 95
	300	97		ESD 95
	350	99		ESD 95
	400	99		ESD 95
Metals (ppm)				
	Barium	< 0.3		Cao 92
	Chromium	< 2		Cao 92
	Copper	< 0.6		Cao 92
	Iron	3		Cao 92
	Lead	< 3		Cao 92
	Magnesium	7		Cao 92
	Molybdenum	< 0.6		Cao 92
	Nickel	< 1		Cao 92
	Titanium	< 0.6		Cao 92
	Vanadium	< 0.6		Cao 92
	Zinc	0.6		Cao 92

Fluid Catalytic Cracker Virgin Gas Oil

		Data	Notes	Reference ID
Aqueous Solubility (mg/L)				
	Room temperature	286	(a)	ESD 93
<i>(a) fresh water</i>				
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
48h LC50	Daphnia magna	23	(a)	Harris 94
<i>(a) results based on GC headspace analysis</i>				

Forcados Blend

	Data	Notes	Reference ID
Origin: Nigeria			
Data from OGJ 99 were originally published in 1983 as part of a series entitled "Guide to Export Crudes for the '80s".			
API Gravity	29.7		OGJ 99
Sulphur (weight %)	0.29		OGJ 99
Pour Point (°C)	-20		OGJ 99
Kinematic Viscosity (mm²/s or cSt)			
<u>Temperature (°C)</u>			
10	11		OGJ 99
Yield on Crude (weight %)			
<u>Boiling Range (°C)</u>			
C1-C4	1		OGJ 99
Light naphtha (C5-65)	1		OGJ 99
Heavy naphtha (65-175)	12		OGJ 99
Kerosene (175-225)	9		OGJ 99
Gas oil (225-360)	38		OGJ 99
Heavy gas oil (360-525)	29		OGJ 99
Residue (>360)	39		OGJ 99

	Data	Notes	Reference ID
Origin: Iran			
Synonyms: Fereidoon			
Data from OGJ 99 were originally published in 1983 as part of a series entitled "Guide to Export Crudes for the '80s".			
API Gravity	31.3		OGJ 99
Sulphur (weight %)	2.50		OGJ 99
Reid Vapour Pressure (kPa)	39		OGJ 99
Hydrogen Sulphide (weight %)	0		OGJ 99
Pour Point (°C)	-37		OGJ 99
Kinematic Viscosity (mm²/s or cSt)			
<u>Temperature (°C)</u>			
20	15		OGJ 99
Yield on Crude (volume %)			
<u>Boiling Range (°C)</u>			
C1-C5	6		OGJ 99
Naphtha (C5-93)	10		OGJ 99
Naphtha (93-160)	11		OGJ 99
Kerosene (160-271)	18		OGJ 99
Gas oil (271-343)	11		OGJ 99
Residue (>343)	49		OGJ 99
Metals (ppm)			
Nickel	11		OGJ 99
Vanadium	36		OGJ 99

Forties Blend

	Data	Notes	Reference ID
Origin: North Sea, UK			
Data from OGJ 99 were originally published in 1995.			
API Gravity	40.5		OGJ 99
Sulphur (weight %)	0.35		OGJ 99
Water Content (weight %)	0.0		OGJ 99
Hydrogen Sulphide (weight %)	< 1		OGJ 99
Density (g/mL)			
	<u>Temperature (°C)</u>		
	15	0.8227	OGJ 99
Pour Point (°C)	-12		OGJ 99
Kinematic Viscosity (mm²/s or cSt)			
	<u>Temperature (°C)</u>		
	20	4	OGJ 99
	30	3	OGJ 99
Chemical Dispersibility (volume %)			
	Corexit 9500	58	ESD 95
	Corexit 9527	59	ESD 95
Hydrocarbon Groups (weight %)			
	Asphaltenes	0	OGJ 99
Yield on Crude (volume %)			
	<u>Boiling Range (°C)</u>		
	Light ends (C1-C5)	10	OGJ 99
	IBP-150	31	OGJ 99
	150-230	15	OGJ 99
	230-350	23	OGJ 99
	350-375	4	OGJ 99
	375-550	18	OGJ 99
	>550	10	OGJ 99
Metals (ppm)			
	Nickel	1	OGJ 99
	Vanadium	2	OGJ 99

Fuel Oil No. 1 (JP-1)

		Data	Notes	Reference ID
Synonyms:	Kerosene Kerosine Range Oil			
Colour		Colourless to light brown		CHRIS 91
Flash Point (°C)		38		CHRIS 91
Flammability Limits in Air (volume %)		0.7 to 5		CHRIS 91
Ignition Temperature (°C)		229		CHRIS 91
Odour Threshold (ppm)		1.00		CHRIS 91
Density (g/mL)	<u>Temperature (°C)</u>			
	0	0.8038		CHRIS 91
	15	0.7994		CHRIS 91
	25	0.7895		CHRIS 91
Pour Point (°C)		-49 to -43		CHRIS 91
Dynamic Viscosity (mPa·s or cP)	<u>Temperature (°C)</u>			
	0	2		CHRIS 91
	15	1		CHRIS 91
	25	1		CHRIS 91
Surface Tension (mN/m or dynes/cm)	<u>Temperature (°C)</u>			
	20	23 to 32		CHRIS 91
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)	<u>Temperature (°C)</u>			
	20	47 to 49		CHRIS 91
Toxicity (mg/L)	<u>Test Organism</u>			
24h TLm (a) fresh water	Bluegill	2,990	(a)	CHRIS 91
Biological Oxygen Demand (%)	<u>Time (days)</u>			
	5	53		CHRIS 91

Fuel Oil No. 1 (JP-3)

		Data	Notes	Reference ID
Colour		Colourless		CHRIS 91
Flash Point (°C)		52 to 66		CHRIS 91
Odour Threshold (ppm)		1.00		CHRIS 91
Density (g/mL)	<u>Temperature (°C)</u>			
	20	0.8000		CHRIS 91
Dynamic Viscosity (mPa·s or cP)	<u>Temperature (°C)</u>			
	15	1		CHRIS 91
Toxicity (mg/L)	<u>Test Organism</u>			
24h TLm (a) fresh water	Bluegill	2,990	(a)	CHRIS 91
Biological Oxygen Demand (%)	<u>Time (days)</u>			
	5	53		CHRIS 91

	Data	Notes	Reference ID
Equation(s) for Predicting Evaporation			
$\%Ev = (8.96 + 0.045T)\ln(t)$ Where %Ev = weight percent evaporated; T = surface temperature (°C); t = time (minutes)			ESD 96
Sulphur (weight %)			
	0.04		EETD 89
Density (g/mL)			
	<u>Temperature (°C)</u>		
	0	0.7669	EETD 89
	15	0.7549	EETD 89
Dynamic Viscosity (mPa·s or cP)			
	<u>Temperature (°C)</u>		
	0	1	EETD 89
	15	1	EETD 89
Surface Tension (mN/m or dynes/cm)			
	<u>Temperature (°C)</u>		
	0	22.7	EETD 89
	15	22.8	EETD 89
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
	<u>Temperature (°C)</u>		
	0	9.3	EETD 89
	15	17.0	EETD 89
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)			
	<u>Temperature (°C)</u>		
	0	32.8	EETD 89
	15	36.0	EETD 89

Fuel Oil No. 1 (JP-4)

		Data	Notes	Reference ID
Distillation (°C)				
	<u>Total Distillate (volume %)</u>			
	IBP	23		EETD 89
	5	84		EETD 89
	10	92		EETD 89
	15	99		EETD 89
	20	102		EETD 89
	25	108		EETD 89
	30	112		EETD 89
	35	117		EETD 89
	40	122		EETD 89
	45	128		EETD 89
	50	133		EETD 89
	55	139		EETD 89
	60	146		EETD 89
	65	153		EETD 89
	70	159		EETD 89
	75	166		EETD 89
	80	174		EETD 89
Metals (ppm)				
	Barium	< 0.3		Cao 92
	Chromium	< 2		Cao 92
	Copper	< 0.6		Cao 92
	Iron	< 3		Cao 92
	Lead	< 3		Cao 92
	Magnesium	4		Cao 92
	Molybdenum	< 0.6		Cao 92
	Nickel	< 1		Cao 92
	Titanium	< 0.6		Cao 92
	Vanadium	< 0.6		Cao 92
	Zinc	< 0.6		Cao 92
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
48h LC50	Daphnia magna	48	(a)	Harris 94
<i>(a) results based on GC purge-and-trap analysis</i>				

Fuel Oil No. 1 (JP-5)

	Data	Notes	Reference ID
Synonyms: Heavy Kerosene			
A high flash point kerosene.			CHRIS 91
Colour	Colourless		CHRIS 91
Flash Point (°C)	min 72		CHRIS 91
Flammability Limits in Air (volume %)	0.6 to 4.6		CHRIS 91
Ignition Temperature (°C)	246		CHRIS 91
Odour Threshold (ppm)	1.00		CHRIS 91
Density (g/mL)			
	<u>Temperature (°C)</u>		
	0	0.8390	CHRIS 91
	15	0.8244	CHRIS 91
	20	0.8201	CHRIS 91
Pour Point (°C)	< -48		CHRIS 91
Dynamic Viscosity (mPa·s or cP)			
	<u>Temperature (°C)</u>		
	0	3	CHRIS 91
	15	2	CHRIS 91
Biological Oxygen Demand (%)			
	<u>Time (days)</u>		
	5	53	CHRIS 91

Fuel Oil No. 1 (JP-6)

		Data	Notes	Reference ID
A high flash point special kerosene used in advanced supersonic aircraft.				Dukek 78
Sulphur (weight %)		max 0.10		Dukek 78
Flash Point (°C)		min 60		Dukek 78
Density (g/mL)				
	<u>Temperature (°C)</u>			
	15	0.779 to 0.806		Dukek 78
Pour Point (°C)		max -43		Dukek 78
Kinematic Viscosity (mm²/s or cSt)				
	<u>Temperature (°C)</u>			
	-20	max 8		Dukek 78
Hydrocarbon Groups (volume %)				
	Aromatics	max 5		Dukek 78
Distillation (°C)				
	<u>Total Distillate (volume %)</u>			
	10	max 196		Dukek 78
	FBP	max 288		Dukek 78

Fuel Oil No. 1 (JP-8)

		Data	Notes	Reference ID
A kerosene, modelled on Jet A-1, which is used in new military aircraft.				Dukek 78
Sulphur (weight %)		max 0.40		Dukek 78
Flash Point (°C)		min 38		Dukek 78
Density (g/mL)				
	<u>Temperature (°C)</u>			
	15	0.775 to 0.840		Dukek 78
Pour Point (°C)		max -50		Dukek 78
Kinematic Viscosity (mm²/s or cSt)				
	<u>Temperature (°C)</u>			
	-20	max 8		Dukek 78
Hydrocarbon Groups (volume %)				
	Aromatics	max 25		Dukek 78
Distillation (°C)				
	<u>Total Distillate (volume %)</u>			
	10	max 205		Dukek 78
	FBP	max 300		Dukek 78

Fuel Oil No. 1 (Kerosene)

		Data	Notes	Reference ID
Synonyms: Kerosene Kerosine				
For additional fuel specifications refer to ASTM D396.				
Colour		Colourless		CHRIS 91
Flash Point (°C)		min 38		CHRIS 91
Flammability Limits in Air (volume %)		0.7 to 5		CHRIS 91
Density (g/mL)				
	<u>Temperature (°C)</u>			
	0	0.8390		CHRIS 91
	15	0.8095		CHRIS 91
	20	0.8050		CHRIS 91
Dynamic Viscosity (mPa·s or cP)				
	<u>Temperature (°C)</u>			
	0	2		CHRIS 91
	15	1		CHRIS 91
Surface Tension (mN/m or dynes/cm)				
	<u>Temperature (°C)</u>			
	20	23 to 32		CHRIS 91
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)				
	<u>Temperature (°C)</u>			
	20	47 to 49		CHRIS 91
Toxicity (mg/L)				
	<u>Test Organism</u>			
24h TLm	Bluegill	2,990	(a)	CHRIS 91
(a) fresh water				
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
48h LC50	Rainbow trout larvae	2	(a)	Lockhart 87
		2	(b)	Lockhart 87
(a) closed container; (b) open container				
Acute Toxicity, Oil in Water Emulsion (µL/L)				
	<u>Test Organism</u>			
96h LC50	Fathead minnow	57	(a)	Hedtke 82
	Frog larvae	46	(a)	Hedtke 82
(a) flow-through apparatus				
Biological Oxygen Demand (%)				
	<u>Time (days)</u>			
	5	53		CHRIS 91

Fuel Oil No. 2

	Data	Notes	Reference ID
Synonyms: Diesel Fuel Oil Furnace Oil Home Heating Oil			
For additional fuel specifications refer to ASTM D396.			
Sulphur (weight %)			
	0.36		EETD 86
	0.16	(a)	EETD 86
(a) winter diesel			
Flash Point (°C)			
	104		Mackay 82b
	91		EETD 84
Density (g/mL)			
<u>Temperature (°C)</u>			
0	0.8740		EETD 84
	0.8490		Mackay 82b
15	0.8660		EETD 84
20	0.8400		Mackay 82b
Pour Point (°C)			
	-27		Mackay 82b
Dynamic Viscosity (mPa·s or cP)			
<u>Temperature (°C)</u>			
0	8		Mackay 82b
20	4		Mackay 82b
Hydrocarbon Groups (weight %)			
Asphaltenes	0		Mackay 82b
Waxes	0		Mackay 82b
Surface Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	29.0		EETD 84
15	27.4		EETD 84
20	26.2		Mackay 82b
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	16.2		EETD 84
15	13.6		EETD 84
20	25.6		Mackay 82b
Oil/Fresh Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
0	15.1		EETD 85
15	14.7		EETD 85

Fuel Oil No. 2

		Data	Notes	Reference ID
Aqueous Solubility (mg/L)				
	<u>Temperature (°C)</u>			
	5	3	(a)	Maijanen 84
		2	(c)	Maijanen 84
	20	3	(a)	Maijanen 84
		3	(b)	Mackay 82b
		3	(c)	Maijanen 84
	22	3	(b) (d)	Suntio 86
		0.3	(b) (e)	Suntio 86

(a) distilled water; (b) fresh water; (c) salt water
(d) diesel fuel; (e) heating oil

		Data	Notes	Reference ID
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
24h LC50	Neanthes arenaceodentata	> 9		Rossi 76
	Capitella capitata	> 9		Rossi 76
	Mysidopsis almyra	3		Anderson 74
	Palaemonetes pugio	4		Anderson 74
	Penaeus aztecus	5		Anderson 74
	Menidia beryllina	6		Anderson 74
	Fundulus similis	6		Anderson 74
	Cyprinodon variegatus	> 7		Anderson 74
48h LC50	Neanthes arenaceodentata	3		Rossi 76
	Capitella capitata	4		Rossi 76
	Mysidopsis almyra	0.9		Anderson 74
	Palaemonetes pugio	4		Anderson 74
	Penaeus aztecus	5		Anderson 74
	Menidia beryllina	5		Anderson 74
	Fundulus similis	5		Anderson 74
	Cyprinodon variegatus	> 7		Anderson 74
96h LC50	Neanthes arenaceodentata	3		Rossi 76
	Capitella capitata	2		Rossi 76
	Nereis vexillosa	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Palaemonetes pugio	4		Anderson 74
	Penaeus aztecus	5		Anderson 74
	Orchomene pinguis	> 2	(a)	Rice 79
		> 0.5	(b)	Rice 79
	Acanthomysis pseudomacropsis	> 0.5	(b)	Rice 79
		2	(a)	Rice 79
	Eualus suckleyi	1	(a)	Rice 79
		0.6	(b)	Rice 79
	Crangon alaskensis	0.4	(a)	Rice 79
		0.4	(b)	Rice 79
	Pargurus hirsuticulus	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Paralithodes camtschayica	1	(a)	Rice 79
		0.8	(b)	Rice 79
	Menidia beryllina	4		Anderson 74
	Fundulus similis	4		Anderson 74
	Cyprinodon variegatus	6		Anderson 74
	Oncorhynchus gorbuscha	1.0	(a)	Rice 79
		0.5	(b)	Rice 79
	Salvelinus malma	0.2	(a)	Rice 79
		0.7	(b)	Rice 79

Fuel Oil No. 2

		Data	Notes	Reference ID
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
96h LC50	Myoxocephalus polyacanthocephalus	1	(a)	Rice 79
		2	(b)	Rice 79
	Platicthys steelatus	> 1.0	(a)	Rice 79
		> 2	(b)	Rice 79
	Pholis laeta	> 0.9	(a)	Rice 79
		> 2	(b)	Rice 79
	Chlamys hericus	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Katharina tunicata	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Mytilus edulis	> 1	(a)	Rice 79
		> 4	(b)	Rice 79
	Thais lima	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Collisella scutum	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Paranemertes peregrina	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
	Leptasterias hexactis	> 3	(a)	Rice 79
		> 8	(b)	Rice 79
<i>(a) total aromatics; (b) total hydrocarbons measured by IR spectrophotometry</i>				

Acute Toxicity, Oil in Water Emulsion (mg/L)

	<u>Test Organism</u>		
24h LC50	Mysidopsis almyra	2	Anderson 74
	Palaemonetes pugio	4	Anderson 74
	Penaeus aztecus	9	Anderson 74
	Menidia beryllina	260	Anderson 74
	Fundulus sumilis	48	Anderson 74
	Cyprinodon variegatus	250	Anderson 74
48h LC50	Mysidopsis almyra	1	Anderson 74
	Palaemonetes pugio	3	Anderson 74
	Penaeus aztecus	9	Anderson 74
	Menidia beryllina	125	Anderson 74
	Fundulus sumilis	36	Anderson 74
	Cyprinodon variegatus	200	Anderson 74
96h LC50	Palaemonetes pugio	3	Anderson 74
	Penaeus aztecus	9	Anderson 74
	Fundulus sumilis	33	Anderson 74
	Cyprinodon variegatus	93	Anderson 74

Fuel Oil No. 2 (High Aromatic Content Heating Oil)

	Data	Notes	Reference ID
Synonyms: Furnace Oil Home Heating Oil			
API Gravity	33.7		API 81
Sulphur (weight %)	0.12		API 81
Density (g/mL)			
Temperature (°C)			
16	0.8558		API 81
Pour Point (°C)	-29		API 81
Kinematic Viscosity (mm²/s or cSt)			
Temperature (°C)			
40	2		API 81
100	1		API 81
Hydrocarbon Groups (weight %)			
Saturates	57		API 81
Aromatics	42		API 81
Distillation (°C)			
Total Distillate (volume %)			
IBP	138		API 81
5	181		API 81
10	199		API 81
15	210		API 81
20	219		API 81
25	227		API 81
30	235		API 81
35	245		API 81
40	253		API 81
45	261		API 81
50	269		API 81
55	275		API 81
60	282		API 81
65	288		API 81
70	297		API 81
75	305		API 81
80	316		API 81
85	325		API 81
90	336		API 81
95	352		API 81
FBP	387		API 81

Fuel Oil No. 2 (High Aromatic Content Heating Oil)

		Data	Notes	Reference ID
Other Elements (weight %)				
	Nitrogen	0.01		API 81

Fuel Oil No. 2 (Typical Heating Fuel Oil)

		Data	Notes	Reference ID
Synonyms: Furnace Oil Home Heating Oil				
API Gravity		32.1		API 81
Sulphur (weight %)		0.19		API 81
Reid Vapour Pressure (kPa)		2		ESD 91
Density (g/mL)				
	<u>Temperature (°C)</u>			
	15	0.8641		API 81
Metals (ppm)				
	Barium	< 0.3		Cao 92
	Chromium	< 2		Cao 92
	Copper	< 0.6		Cao 92
	Iron	< 3		Cao 92
	Lead	< 3		Cao 92
	Magnesium	0.5		Cao 92
	Molybdenum	< 0.6		Cao 92
	Nickel	< 1		Cao 92
	Titanium	< 0.6		Cao 92
	Vanadium	< 0.6		Cao 92
	Zinc	< 0.6		Cao 92
Other Elements (weight %)				
	Nitrogen	0.01		API 81
Aqueous Solubility (mg/L)				
	<u>Temperature (°C)</u>			
	20 (approx.)	56	(a)	MacLean 89
	22	0.3	(a)	Suntio 86
	20 (approx.)	51	(b)	MacLean 89
<i>(a) fresh water; (b) salt water</i>				
Acute Toxicity of Water Soluble Fraction (mg/L)				
	<u>Test Organism</u>			
48h EC50	Daphnia magna	2	(a)	MacLean 89
		0.01	(b)	EETD 89
	Artemia spp.	8	(a)	MacLean 89
		0.04	(b)	EETD 89
48h LC50	Daphnia magna	2	(a)	MacLean 89
		0.01	(b)	EETD 89
	Artemia spp.	11	(a)	MacLean 89
		0.05	(b)	EETD 89

(a) results based on fluorescence spectroscopy; (b) results based on GC purge-and-trap analysis

Fuel Oil No. 4

	Data	Notes	Reference ID
Synonyms: Residual Fuel Oil			
For additional fuel specifications refer to ASTM D396.			
Flash Point (°C)			
	78		Mackay 82b
Density (g/mL)			
<u>Temperature (°C)</u>			
0	0.9380		Mackay 82b
20	0.9250		Mackay 82b
Pour Point (°C)			
	-3		Mackay 82b
Dynamic Viscosity (mPa·s or cP)			
<u>Temperature (°C)</u>			
10	47		Mackay 82b
20	23		Mackay 82b
Hydrocarbon Groups (weight %)			
Asphaltenes	3		Mackay 82b
Waxes	6		Mackay 82b
Surface Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
20	32.1		Mackay 82b
Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)			
<u>Temperature (°C)</u>			
20	30.2		Mackay 82b
Aqueous Solubility (mg/L)			
<u>Temperature (°C)</u>			
20	6		Mackay 82b

Fuel Oil No. 5

	Data	Notes	Reference ID
Synonyms: Bunker B Fuel Oil Heavy Fuel Oil No. 5 Light Fuel Oil No. 5 Navy Special Residual Fuel Oil			
For additional fuel specifications refer to ASTM D396.			
Colour	Dark		CHRIS 91
Flash Point (°C)	> 54		CHRIS 91
Flammability Limits in Air (volume %)	1 to 5		CHRIS 91
Density (g/mL)			
<div>Temperature (°C)</div> 16	0.9349		CHRIS 91
Pour Point (°C)	-18		CHRIS 91
Dynamic Viscosity (mPa·s or cP)			
<div>Temperature (°C)</div> 38	44		CHRIS 91

Fuel Oil No. 6

	Data	Notes	Reference ID
Synonyms: Marine Boiler Fuel Marine Fuel Oil 320 Residual/Heavy Fuel Oil			
Data from Shell 1999 were taken from MSDS Number 361-330.			
Flash Point (°C)	> 62		Shell 99a
Flammability Limits in Air (volume %)	0.5 to 5		Shell 99a
Ignition Temperature (°C)	220		Shell 99a
Density (g/mL)			
Temperature (°C)			
15	< 0.9910		Shell 99a
Kinematic Viscosity (mm²/s or cSt)			
Temperature (°C)			
50	230 to 320		Shell 99a

	Data	Notes	Reference ID
Origin: North Sea, UK			
Data from OGJ 99 were originally published in 1983 as part of a series entitled "Guide to Export Crudes for the '80s".			
API Gravity	39.3		OGJ 99
Sulphur (weight %)	0.26		OGJ 99
Pour Point (°C)	-12		OGJ 99
Kinematic Viscosity (mm²/s or cSt)			
Temperature (°C)			
40	3		OGJ 99
Yield on Crude (volume %)			
Boiling Range (°C)			
C1-C4	3		OGJ 99
Gasoline (C5-85)	20		OGJ 99
Naphtha (85-165)	20		OGJ 99
Kerosene (165-235)	16		OGJ 99
Gas oil (235-300)	12		OGJ 99
Gas oil (300-350)	10		OGJ 99
Residue (>350)	33		OGJ 99