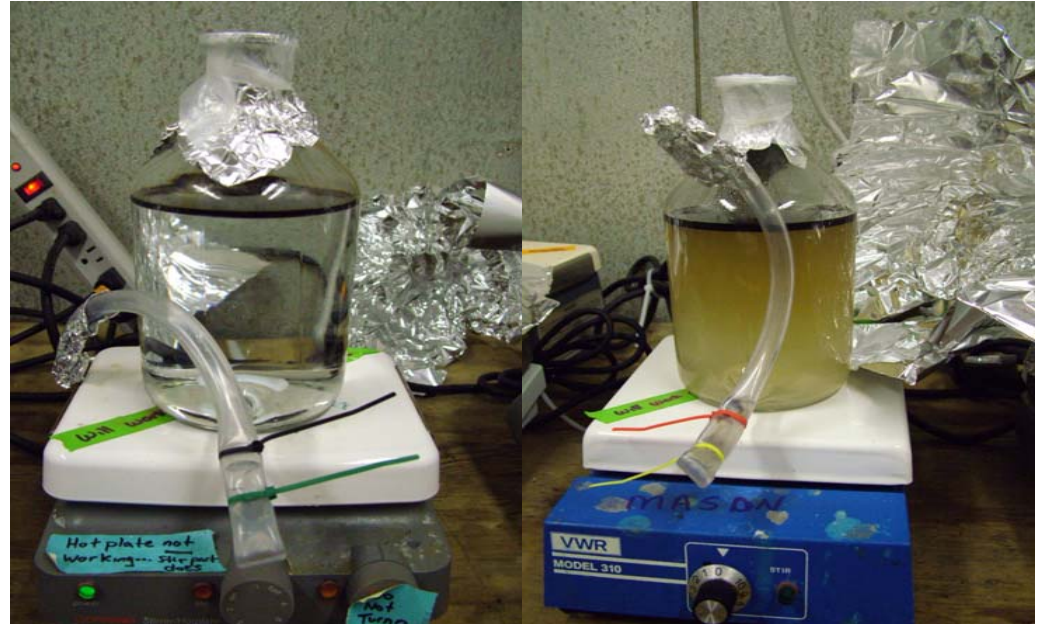


WAF and CEWAF Preparation



- Weathered Arabian light crude oil
- Corexit 9500
- Filtered / unfiltered preparations
- Static dosing, 8 hours
- Suite of chemical and biological metrics

Table 1: Summary of some of the sublethal effects reported in organisms exposed to dispersed oil 1. The studies detailed are only those reported since the 2005 NRC report as tables exist for sublethal effect studies from 1989-2005 within that report.

Species	Sublethal Effect Observed
<i>Mytilus edulis</i> (mussel)	Decreased feeding rate
<i>Zostera marina</i> (Seagrass)	Altered photosynthetic index
<i>Fundulus heteroclitus</i> (Mummichog larvae)	Increased enzyme activity (EROD)*; reduction in body size.
<i>Hyphessobrycon erythrostigma</i> (amazonian fish)	Altered sodium fluxes, CYP1A induction*
<i>Stylophora pistillata</i> / <i>Pocillopora damicornis</i> (corals)	Reduced growth
<i>Atherinops affinis</i> embryos (topsmelt)	Inhibition of hatching and development; cardiovascular effects
<i>Montastraea franksi</i> (coral)	Cellular stress response; Increases in protective enzymes; HSP70 and P-glycoprotein**
<i>Colossoma macropomum</i> (tambaqui fish)	Impaired gill ion regulation; altered blood parameters; membrane effects
Trout (fish)	CYP1A induction*
<i>Xenia elongata</i> (soft coral)	Cessation of pulsing; ulceration and dissolution of tissues; reduced growth

*; These are enzymes up-regulated (increased) in response to dispersed oil (PAH) exposure. They demonstrate that PAHs are bioaccumulated, the organism is trying to remove them from its body by these detoxification enzymes. **; These are protective enzymes up-regulated in response to stress (oil dispersant exposure and bioaccumulation). NOTE * and ** represent an energetic cost to the organism, which if continued, will divert energy away from normal growth and reproductive processes and ultimately can result in death.

Exhibit 1: Photo depicting corals held in clean seawater 32 days after an exposure to Corexit 9500 and dispersed oil (using Corexit 9500 and weathered Arabian light crude oil). Significant reductions in growth were observed compared with controls.



CONTROL SOFT CORALS



SOFT CORALS EXPOSED TO COREXIT 9500 (20ppm, 8 hours).



SOFT CORALS EXPOSED TO DISPERSED OIL (using 20ppm Corexit (1:25 ratio dispersant:oil) and 0.5g l⁻¹ weathered Arabian light crude oil with 8 hour exposure).

Dispersants

Product (1:10 Product-to-No. 2 Fuel Oil ratio)	Toxicity (LC50 values in ppm)		Effectiveness (%)		
	Menidia (96-hr)	Mysidopsis (48-hr)	Prudhoe Bay Crude Oil	South Louisiana Crude Oil	Average of Crude Oils
BIODISPERS	5.95	2.66	51.00	63.00	57.00
COREXIT [®] EC9500A	2.61	3.40	45.30	54.70	50.00
COREXIT [®] EC9527A	4.49	6.60	37.40	63.40	50.40
DISPERSIT SPC 1000™	7.90	8.20	40.00	100.00	73.00
FINASOL OSR 52	5.40	2.37	32.50	71.60	52.10
JD-109	3.84	3.51	26.00	91.00	58.50
JD-2000™	3.59	2.19	60.40	77.80	69.10
MARE CLEAN 200	42.00	9.84	63.97	84.14	74.06
NEOS AB3000	57.00	25.00	19.70	89.80	54.80
NOKOMIS 3-AA	34.22	20.16	63.20	65.70	64.50
NOKOMIS 3-F4	100	58.40	62.20	64.90	63.55
SAF-RON GOLD	9.25	3.04	84.80	53.80	69.30
SEA BRAT #4	23.00	18.00	53.55	60.65	57.10
SEACARE ECOSPERSE 52 (see FINASOL [®] OSR 52)	5.40	2.37	32.50	71.60	52.10
SEACARE E.P.A. (see DISPERSIT SPC 1000™)	7.90	8.20	40.00	100.00	73.00
SF-GOLD DISPERSANT (see SAF-RON GOLD)	9.25	3.04	84.80	53.80	69.30
ZI-400	8.35	1.77	50.10	89.80	69.90
ZI-400 OIL SPILL DISPERSANT (see ZI-400)	8.35	1.77	50.10	89.80	69.90

Note: Toxicity data presented is the Dispersant PLUS No. 2 fuel oil (1:10 ratio)

Source: EPA National Contingency Plan Product Schedule Toxicity and Effectiveness Summaries

Dispersant	Toxicity to Fish (LC50 ppm, 96hr)
NOKOMIS 3-F4	100
NEOS AB3000	57.00
MARE CLEAN 200	42.00
NOKOMIS 3-AA	34.22
SEA BRAT #4	23.00
SAF-RON GOLD	9.25
Dispersit SPC 1000	7.90
Biodispers	5.95
Finasol OSR 52	5.40
Corexit EC9527A	4.49
JD-109	3.84
JD-2000	3.59
Corexit EC9500A	2.61



Based on EPA
Addendum of
May 10th 2010

Products deemed
Suitable alternatives
are listed in RED

Tests using 1:10
Mix with No. 2
Fuel Oil

Source: http://www.epa.gov/emergencies/content/ncp/tox_tables.htm

Directive at: <http://www.epa.gov/bpspill/dispersants.html>

Dispersant	Toxicity to shrimp (LC50 ppm, 48hr)
NOKOMIS 3-F4	58.40
NEOS AB3000	25.00
NOKOMIS 3-AA	20.16
SEA BRAT #4	18.00
MARE CLEAN 200	9.84
Dispersit SPC 1000	8.20
Corexit EC9527A	6.60
JD-109	3.51
Corexit EC9500A	3.40
SAF-RON GOLD	3.04
Biodispers	2.66
Finasol OSR 52	2.37
JD-2000	2.19

Based on EPA
Addendum of
May 10th 2010

Products deemed
Suitable alternatives
are listed in RED

Based on both
Criteria 4 are
suitable

Source: http://www.epa.gov/emergencies/content/ncp/tox_tables.htm

Directive at: <http://www.epa.gov/bpspill/dispersants.html>

Dispersant Only Toxicity Values

Dispersant Only	Toxicity to Fish (LC50 ppm, 96hr)
NEOS AB3000	91.1
NOKOMIS 3-AA	34.22
SEA BRAT #4	30.00
NOKOMIS 3-F4	29.80
Corexit 9500	25.20
Corexit 9527	14.57

Dispersant Only	Toxicity to shrimp (LC50 ppm, 48hr)
NEOS AB3000	33.0
Corexit 9500	32.23
NOKOMIS 3-F4	32.20
Corexit 9527	24.14
NOKOMIS 3-AA	20.16
SEA BRAT #4	14.00

Source: EPA National Contingency Plan Product Schedule Toxicity and Effectiveness Summaries

Dispersant	Effectiveness (%) (South Louisiana Crude oil)
Dispersit SPC 1000	100.00
JD-109	91.00
NEOS AB3000	89.80
MARE CLEAN 200	84.14
JD-2000	77.80
Finasol OSR 52	71.60
NOKOMIS 3-AA	65.70
NOKOMIS 3-F4	64.90
Corexit EC9527A	63.40
Biodispers	63.00
SEA BRAT #4	60.65
Corexit EC9500A	54.70
SAF-RON GOLD	53.80

Based on EPA
Addendum of
May 10th 2010

No set guidelines for
The definition of
'effectiveness'

Tests at 22° ± 3°C
1:10 dispersant:oil ratio

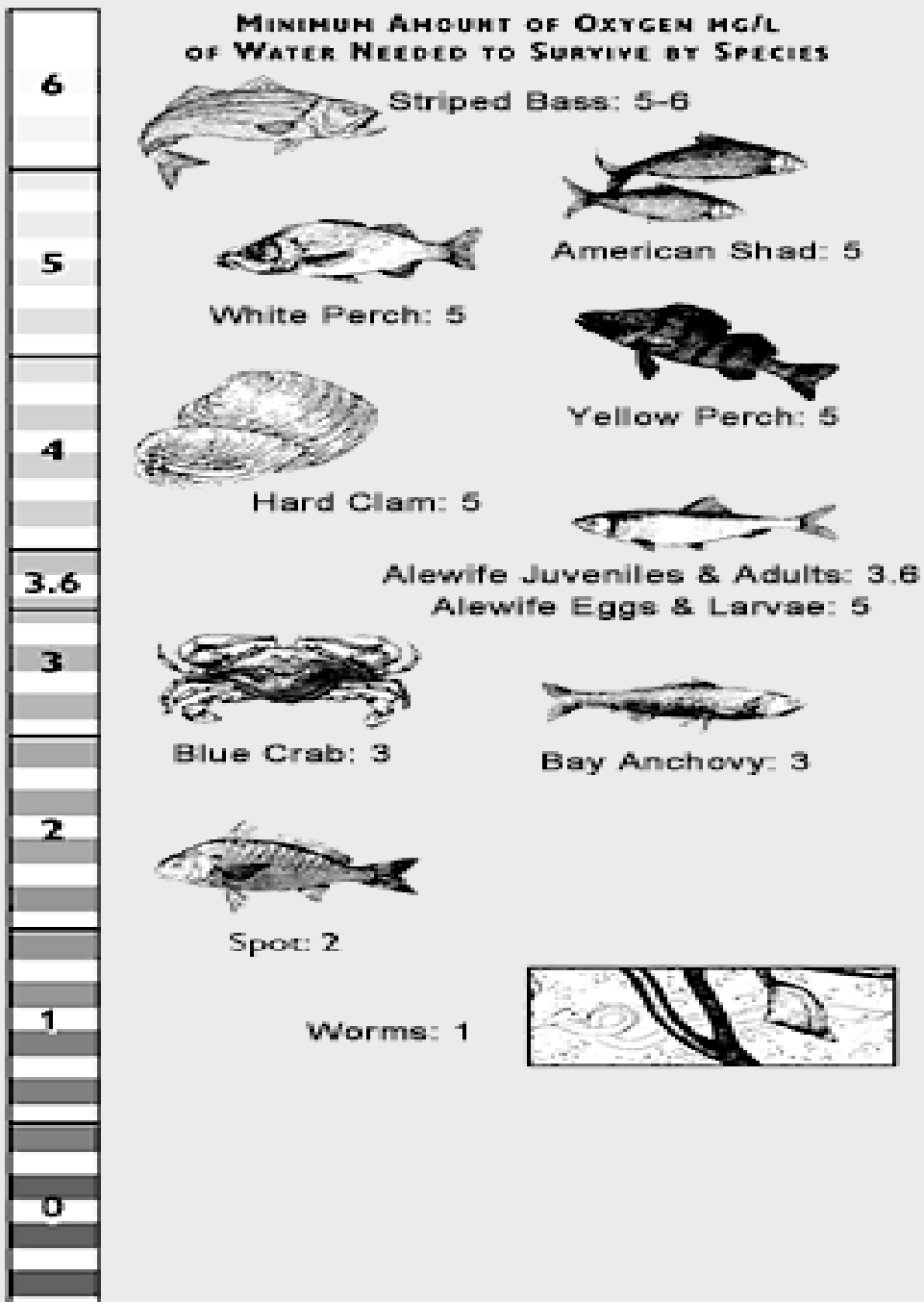
Source: http://www.epa.gov/emergencies/content/ncp/tox_tables.htm

Directive at: <http://www.epa.gov/bpspill/dispersants.html>

DISSOLVED OXYGEN CRITERIA

MINIMUM AMOUNT OF OXYGEN MG/L
OF WATER NEEDED TO SURVIVE BY SPECIES

Milligrams of Oxygen per Liter of Water



BP Dissolved Oxygen Data:
(released May 20th 2010)

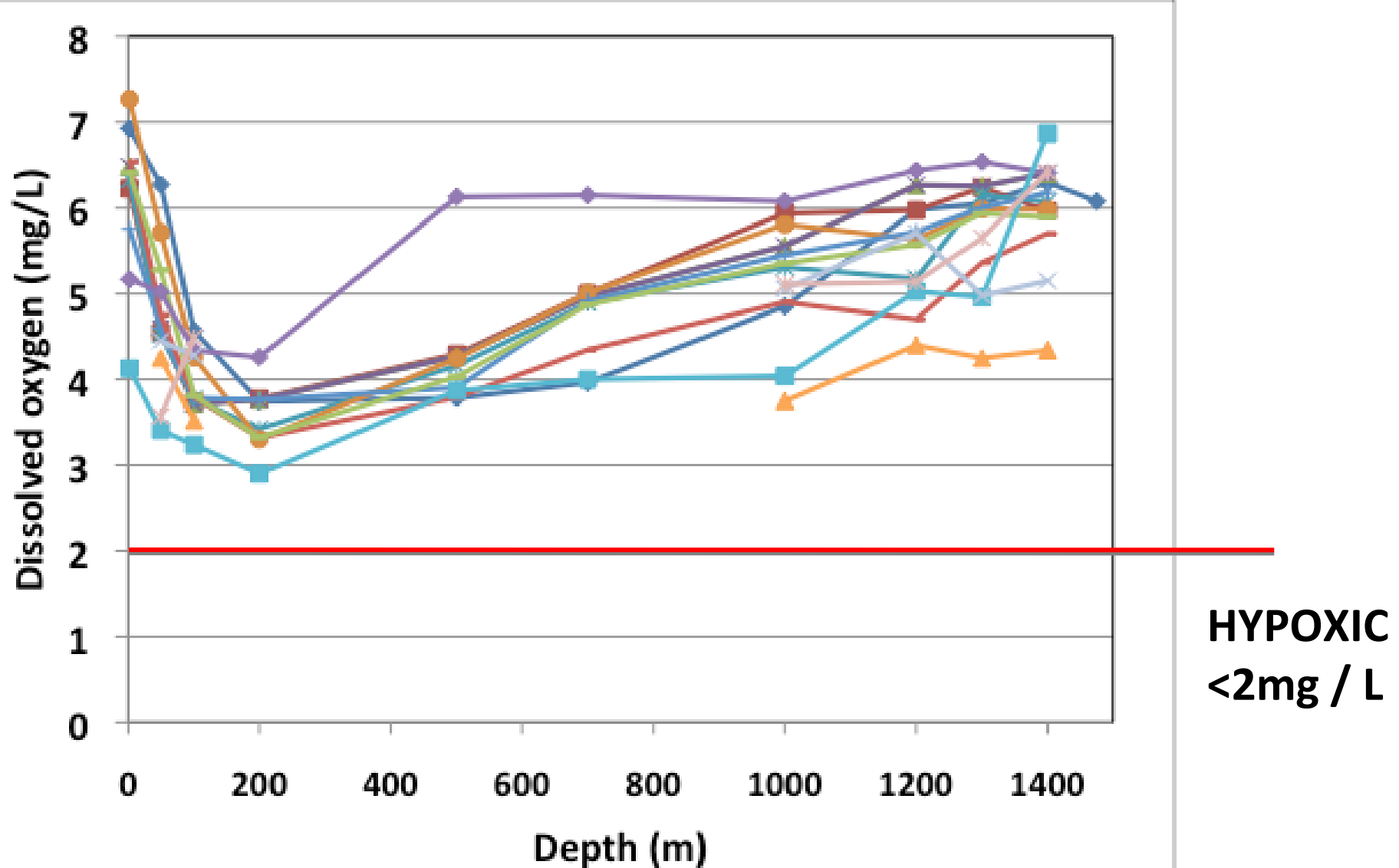
HIGH : 6.93 mg /L

LOW : 3.30 mg /L

(**Source:** RV Brooks McCall
Data Summary Cruise
5/15-5/19/2010)

Graph summarizing the BP Dissolved Oxygen Data

(From all sites listed B20-B33; May 15th to May 19th)



HYPOXIC
<2mg / L

(Source: From EPA website: RV Brooks McCall Data Summary Cruise 5/15-5/19/2010)