

Dispersion of Viscous OCS Oils

- SL Ross Env Res Ltd.
- MAR Inc.

for

Minerals Management Service

Objective

- determine the effectiveness of chemical dispersants when applied to viscous OCS crude oils

Test Facilities

- SL Ross Wave Tank
 - Small-scale
- Ohmsett Wave Basin
 - Large-scale

SL Ross Wave Tank



Ohmsett Basin



Dispersants

- Corexit 9500

Oil Selection Criteria

- Viscosity > 2000 cP
- No production chemicals
- Quantities available for testing

Oil Source Support

Information Source	Contact Name
MMS California	Craig Ogawa
MMS New Orleans	Rusty Wright, Michael Keda
California Department of Fish and Game	Mike Sowbey
Aera Energy LLC	Dan Woo, Cindy Cagle, Steve Shehorn
Exxon Mobil	Donnie Ellis
Dos Cuadras Offshore Resources (DCOR)	Mike Finch
Marathon Oil Company	Terry Guillory, Jennifer Satterwhite
Venoco Incorporated	Keith Wenal
Plains Exploration and Production Company	Byron Everist
A Catalogue of Crude Oil and Oil Product Properties for the Pacific Region. Environment	Paula Smith

Final Oils Selected

1. Harmony,
2. Elly,
3. Gilda,
4. Gina,
5. Irene, and;
6. Heritage.... All California oils

Rejected Oils

- Ewing Bank - too light (100 cP)
- Hondo – similar to Harmony and high water content (90%)
- Gail – similar to Harmony

Small Scale Test Series

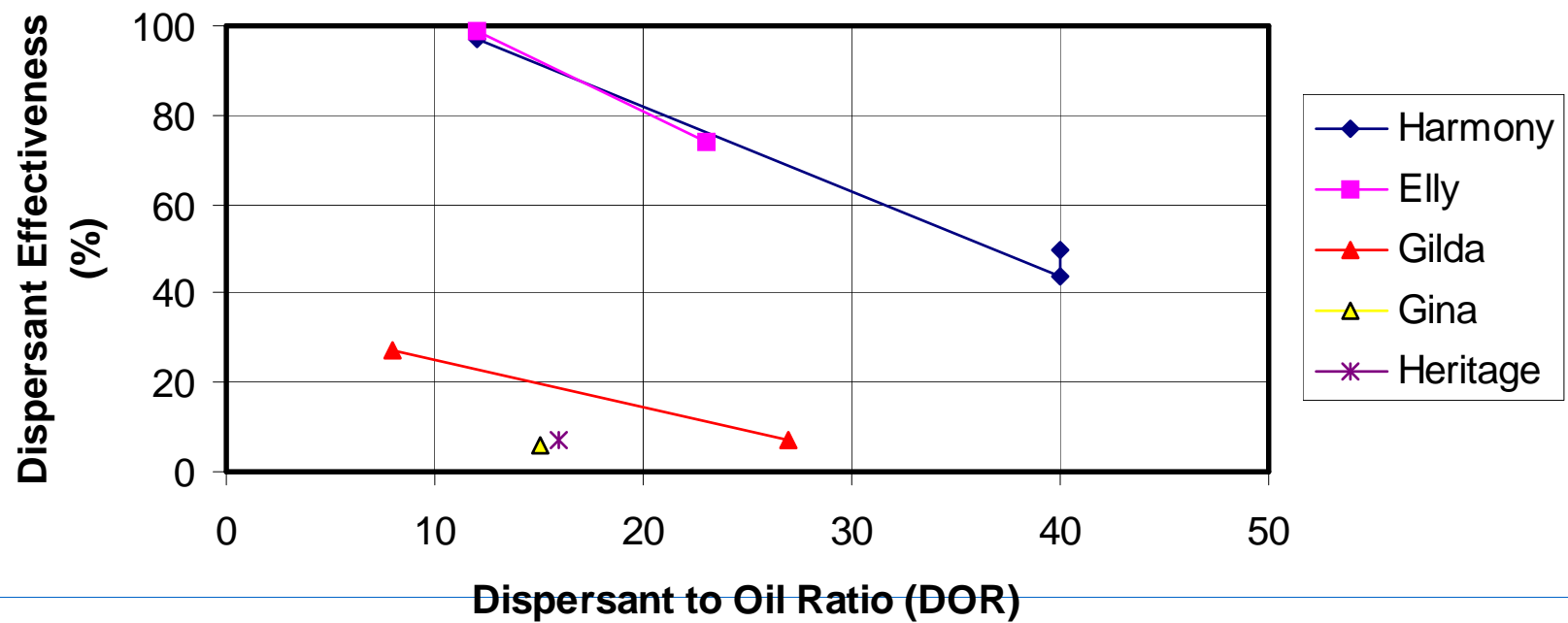
- On small samples of various oils
- Prelim Tests to evaluate oils for final selection

SL Ross Wave Tank

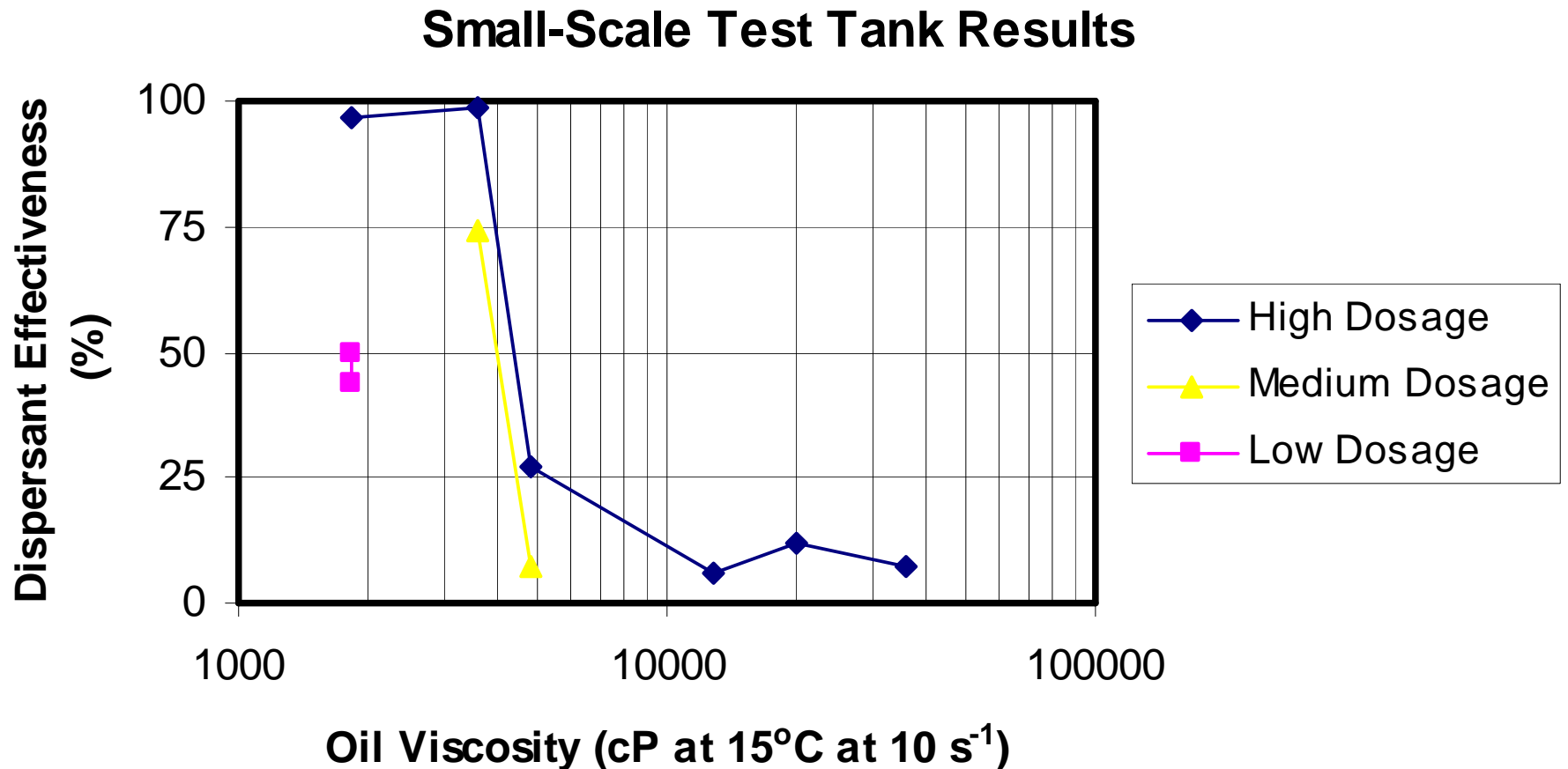


DOR Effect

Small-Tank Dispersant Effectiveness versus DOR for Viscous Oils



Results Summary



Small Scale Summary

- Confirmed suitable oils with a range of “Dispersibilities”
- Ordered large volumes of test oils for Ohmsett testing

Ohmsett Basin



Large Scale Tests

- Ohmsett Basin
- Oils selected based on Small-scale Test results
 - Large samples acquired(different properties)

Test Oil Viscosity Comparison

Oil	Viscosity (cP)	
	SL Ross	Ohmsett
Gina	12,780	5,500
Irene	19,920	33,400
Harmony	1,825	1,530
Heritage	36,000	40,100
Elly	3,600	4,980
Gilda	4,800	6,530

Test Sequence

- Oil and Dispersant on Bridge
- Start Waves
- Lay Down Oil & Spray Dispersant
- Waves for 30 minutes
- Collect Oil Remaining
- Determine Quantity of Oil Collected
- Calculate Dispersant Effectiveness

Oil Discharge Hopper and Pump



Oil Discharge Header



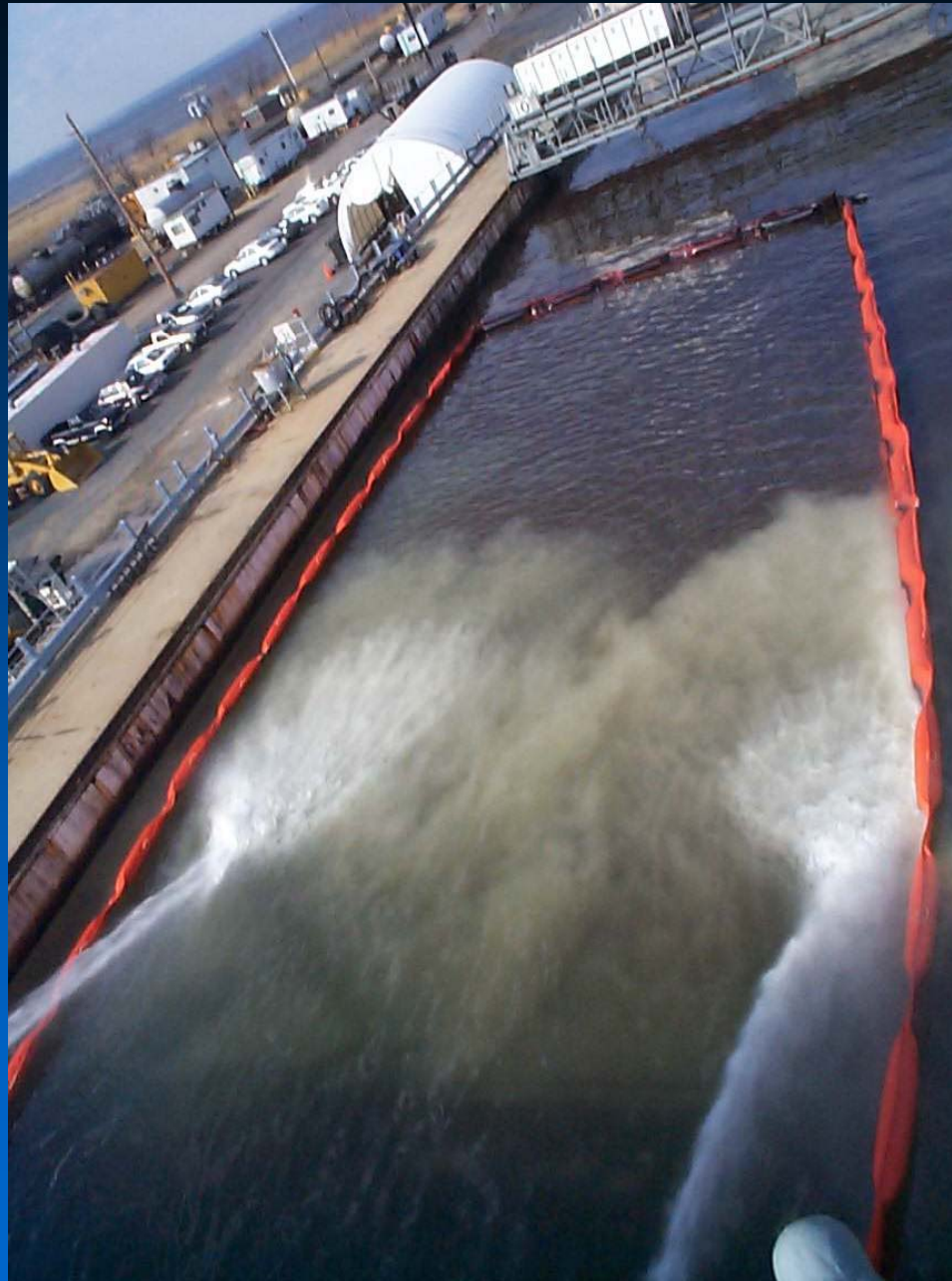
Dispersant Spray Bar



Video of test



Oil Herding & Collection



Test Emulsion Viscosities

- Oil Viscosities ranged from 1500 to 33,000 cP
- Viscosity 'gap' between 7000 and 30,000

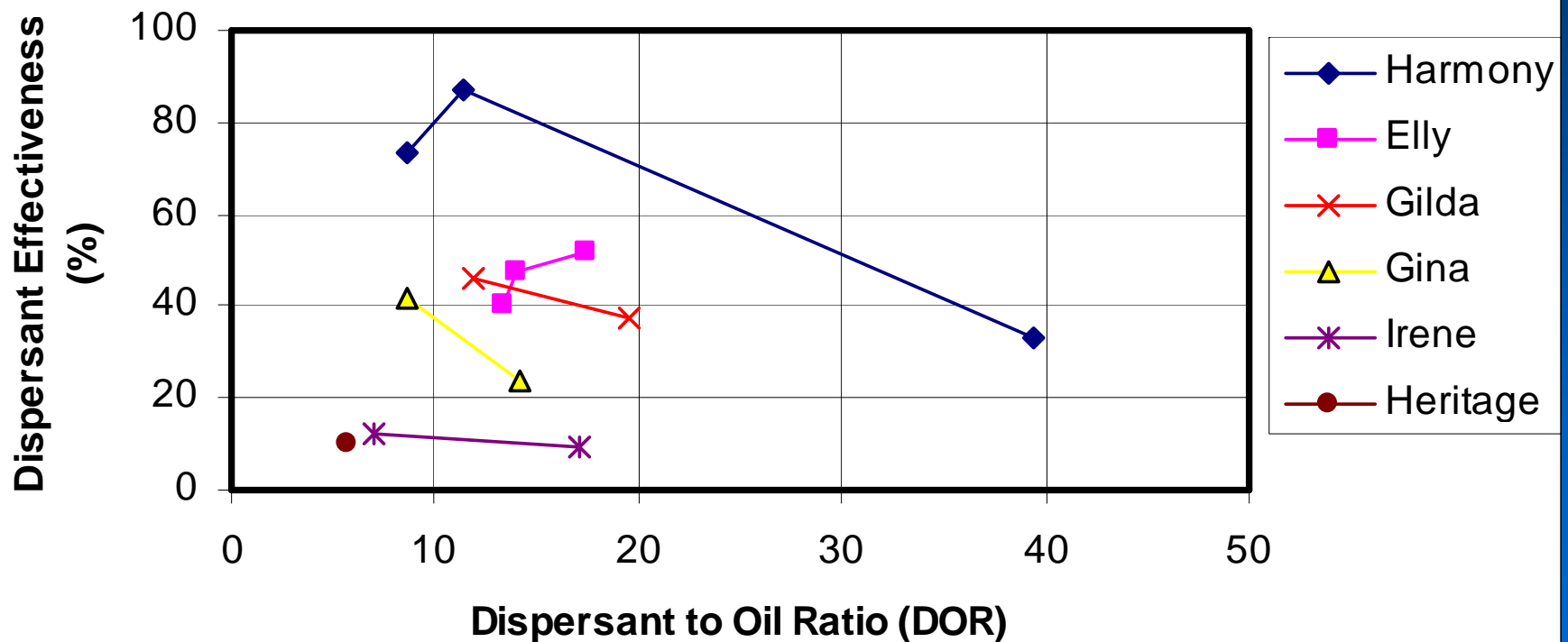
Ohmsett Results Summary

Oil	Water Temp °C	DOR	DE (%)	DE (%)
Harmony	9	Control	12.8	
Harmony	14	9	86.3	73.6
Harmony	14	11	100	87.2
Harmony	13	39	46	33.3
Elly	14	Control	29.9	
Elly	13	13	58.1	28.2
Elly	15	14	65.2	35.3
Elly	14	17	69.8	39.9
Gina	14	Control	12.5	
Gina	13	9	54.4	41.9
Gina	13	12	30.9	18.4
Gilda	14	Control	11.2	
Gilda	13	12	57.5	46.3
Gilda	12	20	48.5	37.4
Irene	11	Control	17.1	
Irene	10	7	29.5	12.4
Irene	11	17	26.4	9.3
Heritage	18	Control	26.2	
Heritage	14	Control	17	
Heritage	16	6	31.7	10.1

Ohmsett Test Results

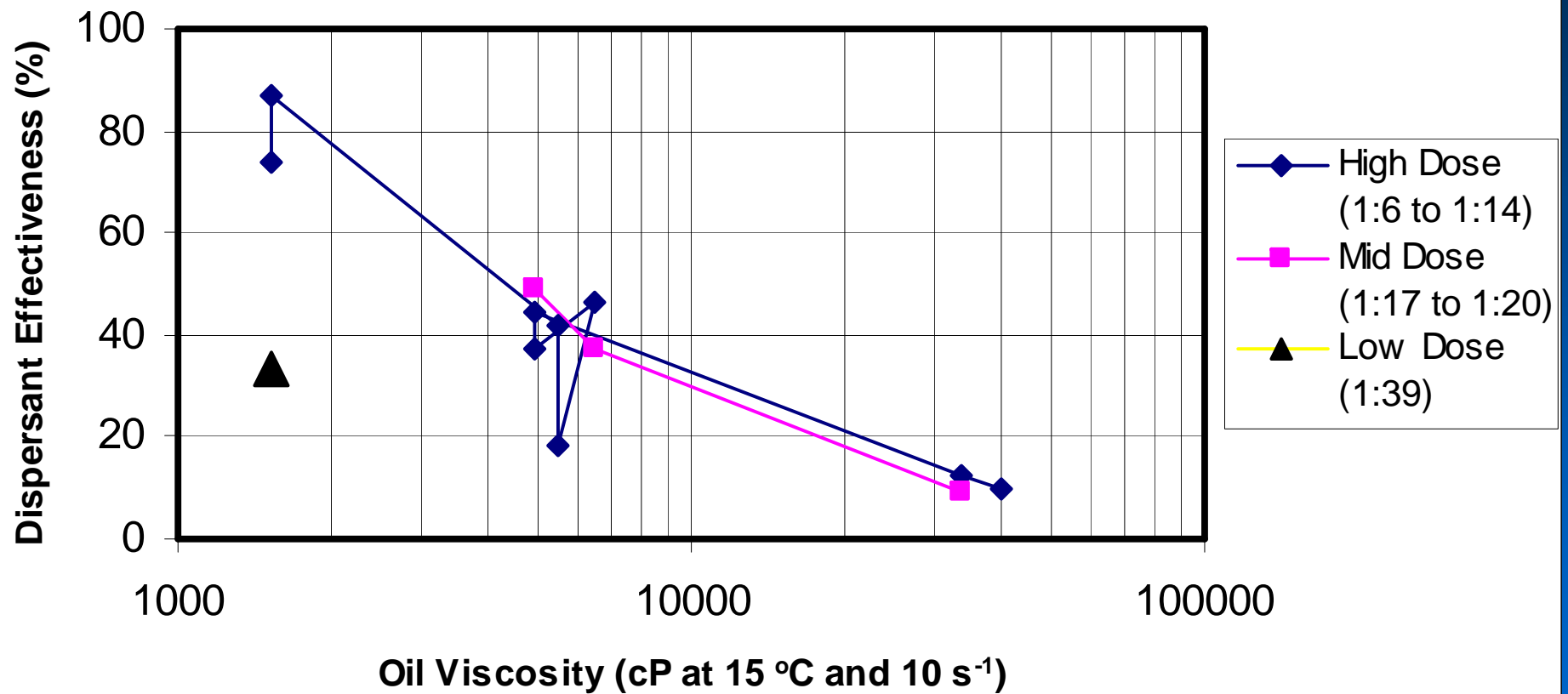
DE vs DOR

Ohmsett Tank Dispersant Effectiveness vs DOR for Viscous Oils



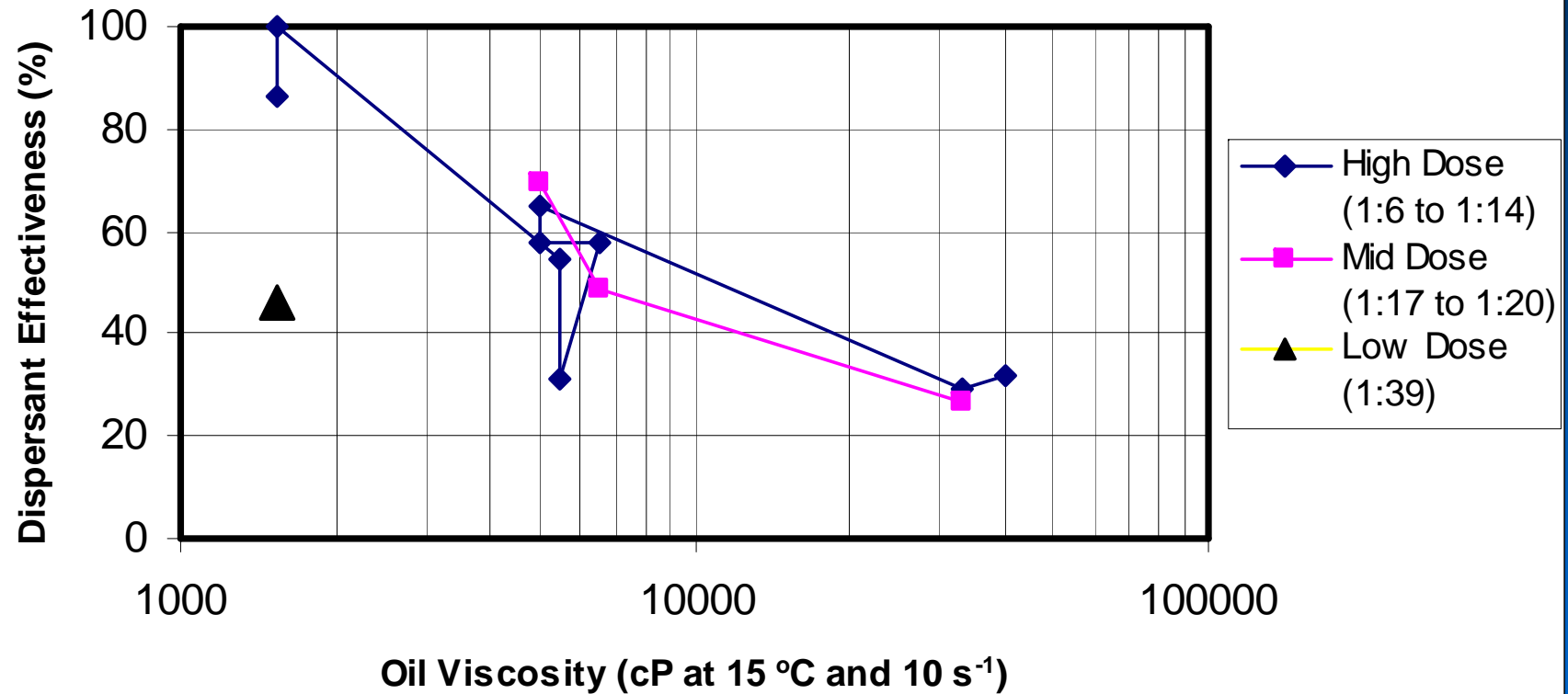
DE vs Viscosity

Ohmsett Tank Results: DE versus Oil Viscosity



Raw DE vs Viscosity

Ohmsett Tank Results: RAW DE versus Oil Viscosity



Result Highlights

- Successful dispersion on Oils with viscosities < 6000 cp
- Insignificant Dispersion on oils with viscosities $> 30,000$ cP
- Viscosity a good indicator of oil dispersibility for these oils
 - Oils of similar viscosity had similar dispersibility

Recommendations

- Test Dispersibility of oils with viscosities $> 6000 \text{ cP}$ $< 30,000 \text{ cP}$

Poor dispersion (Irene 33,000 cP)



Moderate dispersion (Elly 5000 cP)



Good dispersion (Harmony 1500 cP)



Good dispersion (cont)

