APPENDIX F.1

Summary of Workshop Test Infrastructure Supporting Equipment
(see APPENDIX F.2 for Data Acquisition Equipment details)

USCG Test Line

Tanks

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Tank</td>
<td>130 bbl custom built with two tapered sides</td>
</tr>
<tr>
<td></td>
<td>(All Fabrications Inc.)</td>
</tr>
<tr>
<td>Backup Tank</td>
<td>500 bbl Safety Vapor Type with special built</td>
</tr>
<tr>
<td></td>
<td>baffle section (Baker rental)</td>
</tr>
<tr>
<td>Buffer Tank</td>
<td>200 bbl open top type (Magnum Mud rental)</td>
</tr>
<tr>
<td>Water Receiving Tank</td>
<td>36 bbl open top type (Magnum Mud rental)</td>
</tr>
</tbody>
</table>

Work Platforms

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Tank</td>
<td>Wood platform w. hand rails, custom built by</td>
</tr>
<tr>
<td></td>
<td>CCG personnel</td>
</tr>
<tr>
<td>Buffer Tank</td>
<td>Wood platform w. hand rails, custom built by</td>
</tr>
<tr>
<td></td>
<td>CCG personnel</td>
</tr>
</tbody>
</table>

Containment Berms

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Tank</td>
<td>2 ply Plastic Tarp</td>
</tr>
<tr>
<td>Backup Tank</td>
<td>10 x 50 ft. Safeguard Berm (Baker Tank)</td>
</tr>
</tbody>
</table>

Hose Ramps

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Tank</td>
<td>4 ft. x 16 ft steel frame and plywood (USCG)</td>
</tr>
<tr>
<td>Buffer Tank</td>
<td>(2 pc) 8 ft. x 16 ft steel frame and plywood</td>
</tr>
<tr>
<td></td>
<td>(USCG)</td>
</tr>
</tbody>
</table>

Mix/Transfer Pumps

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup Tank</td>
<td>DOP-250 pump w. OMTS 315 motor</td>
</tr>
<tr>
<td>Buffer Tank</td>
<td>DOP-160 pump with standard motor</td>
</tr>
</tbody>
</table>
Oil/Water Separator

Loram Brush Chain Conveyor mounted above Backup Tank.

Hydraulic Power Units (HPUs)

Test Pumps and Mix/Transfer Pump: (2 pcs) USCG HVPU "Mod 8" or "HighStar"

Diesel Engine: Detroit Diesel Corp.
Type: Inline 6 Cylinder, 4-cycle
Model: Series 40-8.7 LT
HP: 225
Max RPM: 2200
Idle RPM: low 800 ±25 / high 2375 ±-50

Hydraulic Pump: Sunstrand
Type: Axial Piston
Model: Series 90, Open Loop
Max. Operating Press: 4000 PSI
Max Flow: 71 GPM / 290 LPM

Loram Skimmer: Hyde H11D-4 Power Unit with Yanmar

CCG Test Line

Tanks

Test Tank: 70 bbl custom built with tapered side and baffles, (All Fabrications Inc.)

Water Receiving Tank: 12 bbl open top type (Magnum Mud rental)

Work Platforms

Test Tank: Steel platform w. safety rails, provided by test tank manufacturer (All Fabrications Inc.)

Container Top: Wood platform w. hand rails, custom built by CCG personnel

Containment Berms

Test Tank: 12 x 12 ft. Safeguard Berm (Baker Tanks)

Hose Ramps

Test Tank: (2 pc) 8 x 20 ft steel frame and plywood (built by USCG)
Mix/Transfer Pump

Test tank: CCG GT-185 pump w. high pressure/high temperature plate wheel (CCG)

Hydraulic Power Units (HPUs)

Test Pump and Mix/Transfer Pump: CCG Universal Hydraulic Power Pack 100

Diesel Engine: Lister Petter
Type: 1.4.39T
Diesel Output: 100 HP @ 2300 RPM

Hydraulic Pump: Samhydraulik
Model: H1V/75 LS
Max. Hydraulic Flow: 40 USGPM
Max. Hydr. Pressure: 4500 psi

Overall Dims: 76” x 48” x 58” (L x W x H)
Weight: 3100 lbs

ERE Skimmer: ERE Diesel Hydraulic Power Pack

Common Functions

Water Lubrication System

Water Lubrication Control Stand

Water Lubrication Control Stand (WLCS), custom built by Hyde Marine after a flemingCo concept:

(4 pcs) Gate Valve for inlet side and discharge side injection flow control and flow on/off

Lube water temperature gauge f. data logger (discharge side)

Lube water temperature gauge f. data logger (inlet side)

Lube water flow gauge f. data logger (discharge side)

Lube water flow gauge f. data logger (inlet side)

Water Lubrication Pumps

Hot Water

High Pressure: Grundfos CR5-20 with 7.5 HP motor
Low Pressure: Scot Ardox Pump 50 with 5 Hp motor

Cold Water

High and Low Pressure: (2 pcs) Comet BP105 3-stage diaphragm pump with hydraulic motor (CCG)

Lube Water Supply/Return Hoses

Hot Water
(4 pcs) 1.5 x 25 ft.
(2 pcs) 1.5 x 50 ft.
(4 pcs) 1.25 x 75 ft.

Cold Water Used existing 2” hoses from USCG VOPS

Lube Water Tanks

Tempered water tank, 24 bbl open top type (Magnum Mud rental)
Hot water tank, 24 bbl open top type (Magnum Mud rental)
Cold water tank, 12 bbl open top type (Magnum Mud rental)

Swift Hose Add-on System (SHAS)

SHAS, custom built by Hyde Marine after a JVOPS Workgroup concept: Four parallel 6 inch “through” and “by-pass” valve systems, each with 6 inch Hydrasearch female on inlet and 6 inch Hydrasearch male on outlet.

Boiler System

US Navy Steam Generator type Clayton E-60 Van (US Navy ESSM)

Manufacturer: Clayton Industries
Heat Output: 2,008,500 Btu/h (588 kW)
Operating Pressure: 200 psi

400 ft. Steam Hose (US Navy ESSM)

(2 pcs) Large Steam heating coils (US Navy ESSM)
(3 pcs) tube type heat exchangers (Titan Maritime LLC)
Chiller System

Chiller System (Universal Industrial Refrigeration rental), consisting of:

- Air cooled chiller, 180,000 Btu/h (53 kW) chilling effect
- 400 gal buffer tank with circulation pump
- Heat exchanger

480V Generator Set Magnum Products, Inc. (rental from Grand Rental Station) Model: MM6566E, 3 PH 56KW, 480V, 84A
1 PH 50KW, 208V, 194A

Test Hoses

- 2000 ft 6 inch Titan layflat rubber hose with Hydrasearch Couplers (US Navy)
- 1300 ft 6 inch Titan layflat rubber hose with Hydrasearch Couplers (USCG Gulf Coast Strike Team)

Additional 200 ft 6 inch Titan layflat rubber hose and a number of Hydrasearch Couplers (CCG and Hyde Marine) were used to make drop hoses for test pumps and other uses. Hoses were cut to length, fitted with couplers, and hydrostatic tested on site.

Portable Hydrostatic tester and Hydrasearch adapter (Hyde Marine)

Hydraulic Power Units

Cold Water Pumps: LAMOR LPP 30D (Clean Caribbean & Americas)

Electrical Power Units

25kW Generator power supply to Steam Generator and Data Acquisition Container (US Navy ESSM)

Ancillary Water Pump Systems for circulating chilled water

- (2 pcs.) 158 USgpm Honda Water Pumps (Grand Rental)

Light Masts

- (2 pcs.) 1000W Portable Light Stands (Grand Rental)
Cranes

Heavy Lift Mobile Crane and Operators (Cenac Towing)

Cherry Picker and Operators (Cenac Towing)

Fork Lift

Cenac Towing Fork Lift and Operators (Cenac Towing)

Decontamination Area

Hose Cleaning System

US Navy Hose Pigging System, including Pig Launcher, Pig Catcher, various hose scraping and cleaning pigs, ACO330 Air Compressor, Mod 9 HPU, Pressure Washer, various Pumps, hoses, fittings, and machinery containment berms. (US Navy ESSM)

Fine Cleaning was done with hot water pressure sprayer and manually, with brushes and rages (ASC)

Tanks

200 bbl open top for hose and pump cleaning (Magnum Mud)

Roll-off for Solid Waste Material

Containment Berms

Hose Cleaning: 100 ft x 20 ft (ASCO)

Hose Pigging: 75 ft x 30 ft (US Navy ESSM)

Personnel: 20 ft x 20 ft (ASCO)

Data Acquisition Container

14 Container with light strips and ventilation. Tables and chairs were set up inside for data acquisition team office, data logger, laptop computers, etc. (Hyde)

Shop Van with Electric Generator

20 ft. Container with workbenches, tools, miscellaneous parts proved to be extremely helpful in the relatively remote location of the test site. (US Navy ESSM)
Storage and Shipping Containers

(2 pcs) US Navy Containers were placed beside the CCG Test tank and Backup tank to extend the safe working area around these tanks. Wooden platforms with hand rails were erected on top of these containers. (US Navy ESSM)

Office Trailers with Electric Generator

(2 pcs) Office Trailers were used by Test Engineers for planning and meetings and by the Logistics team. (O'Brien's)

List of Test Infrastructure Equipment Suppliers

U.S. Coast Guard Gulf Strike Team  
U.S. Coast Guard Aviation Training Center  
Mobile, AL 36608  
(251) 441 6623

Canadian Coast Guard  
Rescue, Safety and Environmental Response  
1 Queen Street, P.O. box 1236  
Charlottetown, PE C1A 7M8  
(902)368-0204

U.S. Navy Supervisor of Salvage  
GPC-ESSM Operations  
P.O. Box JK  
Williamsburg, VA 23187  
(757) 887-7402

Hyde Marine, Inc.  
28045 Ranney Parkway  
Cleveland, OH 44145  
(440) 871-8000

Cenac Towing Co.  
141 Bayou Dularge Rd.  
Houma, LA 70363  
(985)872-2413

All Fabrications Inc.  
4472 Shrimpers Row  
Houma, LA 70363  
(985) 851-3527
Magnum Mud Equipment Co., Inc.
PO box 4258
Houma, LA 70361
(985) 872 1755

Baker Tanks, Inc.
Baton Rouge Branch-39
35173 hwy. 30
Geismar, LA 70734
(225) 673 4955

ASCO Environmental
1801 Peters Rd.
Harvey, LA 70058
(504) 366 6557

Grand Rental Station
605 Barataria Ave.
Houma, LA 70360
(985) 876 3107

Universal Industrial Refrigeration Inc.
39222 Hwy. 621
Gonzales, LA 70737
(504) 647 8125

Bluewater Rubber & Gasket Co.
1131 Barrow Street
Houma, LA 70360
(985) 851-2400

Shannon Hardware Houma
1386 Grand Caillou Rd
Houma, LA 70363

Clean Caribbean & Americas
2381 Stirling Rd.
Ft. Lauderdale, FL 33312
(954) 983-9880

O'Briens Oil Pollution Service, Inc.
645 Codifer St
Slidell, LA 70458-4023
(504) 781-0804
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Sensor Type</th>
<th>Manufacturer</th>
<th>Range</th>
<th>Accuracy (+/-)</th>
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<tbody>
<tr>
<td>Data Logger</td>
<td>Electronically Recorded Key Data</td>
<td>Q(hydr)</td>
<td>Omega</td>
<td>5-50 gpm</td>
<td>1.5 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P(pump)</td>
<td>Omega</td>
<td>0-300 psi</td>
<td>1 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T(WL in)</td>
<td>Omega</td>
<td>0-300 psi</td>
<td>1 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q(WL in)</td>
<td>Omega</td>
<td>0-50 USgpm</td>
<td>0.5 psi</td>
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<tr>
<td></td>
<td></td>
<td>T(oil/inlet) A</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q(WL out)</td>
<td>Omega</td>
<td>0-50 USgpm</td>
<td>0.5 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T(oil/bulk) A</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P(pump BU)</td>
<td>Omega</td>
<td>0-300 psi</td>
<td>1 psi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q(hydr BU)</td>
<td>Omega</td>
<td>5-50 gpm</td>
<td>1.5 gpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P(WL in)</td>
<td>Omega</td>
<td>0-300 psi</td>
<td>1 psi</td>
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<tr>
<td></td>
<td></td>
<td>Q(WL out)</td>
<td>Omega</td>
<td>0-50 USgpm</td>
<td>0.5 psi</td>
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<tr>
<td></td>
<td></td>
<td>T(oil/bulk) CC</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T(oil/bulk) C</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg F</td>
</tr>
</tbody>
</table>

Notes:
- Temperature signal accuracy for Data Logger is +/- 1%
- Backup P(Pump) PX543-150GI 0-150 psi accuracy=1.5 psi (Canadian Coast Guard Test Tank Tests)
### Instrumentation and Sensors

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<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P(hydr supply)</td>
<td>HPU supply pressure</td>
<td>psi</td>
<td>Bourdon Tube Gauge</td>
<td>Ashcroft</td>
<td>0-6000 psi</td>
<td>120 psi</td>
<td>1</td>
</tr>
<tr>
<td>P(hydr return)</td>
<td>HPU return pressure</td>
<td>psi</td>
<td>Bourdon Tube Gauge</td>
<td>Ashcroft</td>
<td>0-160 psi</td>
<td>3 psi</td>
<td>1</td>
</tr>
<tr>
<td>Q(hydr HPU)</td>
<td>Hydraulic flow gauged at USCG HPU</td>
<td>USgpm</td>
<td>In-Line FM magnetic pick up visual display</td>
<td>Hedland</td>
<td>10-100 gpm</td>
<td>3 gpm</td>
<td>1</td>
</tr>
<tr>
<td>T(disch oil)</td>
<td>Temperature of discharged oil at end of test hose</td>
<td>Degr. F</td>
<td>Bi-metal Thermometer</td>
<td>Wika</td>
<td>0-250</td>
<td>2.5 deg</td>
<td>1</td>
</tr>
<tr>
<td>T(hot WL tank)</td>
<td>Temperature of hot lubrication water tank</td>
<td>Degr. F</td>
<td>T-Type thermocouple using hand held multimeter as reader</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg. F</td>
<td>1</td>
</tr>
<tr>
<td>T(temp WL tank)</td>
<td>Temperature of tempered lubrication water tank</td>
<td>Degr. F</td>
<td>Bi-metal Thermometer</td>
<td>Wika</td>
<td>0-250</td>
<td>2.5 deg</td>
<td>1</td>
</tr>
<tr>
<td>T(ambient)</td>
<td>Ambient temperature</td>
<td>Degr. F</td>
<td>Digital Temp Log</td>
<td>Oaklon</td>
<td>(-58 to 212) deg F</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>T(oil/bulk 1-9)</td>
<td>USCG backup tank bulk oil temperatures, sensors 1 to 9</td>
<td>Degr. F</td>
<td>T-Type thermocouple using hand held multimeter as reader</td>
<td>Omega</td>
<td>0-300 deg F</td>
<td>3 deg. F</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Calculated Data Description

- \( Q(oil) \) USgpm, calculated from \( Q(hydr) \) with \( Q(WL \text{ in}) \) deducted
- \( Q(drumfill) \) USgpm, calculated from weight of oil filled into drum/time

#### Excel Graph Descriptions

<table>
<thead>
<tr>
<th>Function</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Q(oil) )</td>
<td>USgpm, calculated from ( Q(hydr) ) with ( Q(WL \text{ in}) ) deducted</td>
</tr>
<tr>
<td>( Q(hydr \text{ flow}) )</td>
<td>USgpm</td>
</tr>
<tr>
<td>( P(pump \text{ press}) )</td>
<td>psi</td>
</tr>
<tr>
<td>( T(WL \text{ in}) )</td>
<td>Degr. F</td>
</tr>
<tr>
<td>( T(WL \text{ out}) )</td>
<td>Degr. F</td>
</tr>
<tr>
<td>( Q(WL \text{ in}) )</td>
<td>USgpm</td>
</tr>
<tr>
<td>( Q(WL \text{ out}) )</td>
<td>USgpm</td>
</tr>
<tr>
<td>( T(oil/\text{inlet}) A )</td>
<td>Degr. F</td>
</tr>
<tr>
<td>( T(oil/\text{inlet}) B )</td>
<td>Degr. F</td>
</tr>
<tr>
<td>( T(oil/\text{bulk}) A )</td>
<td>Degr. F</td>
</tr>
<tr>
<td>( T(oil/\text{bulk}) B )</td>
<td>Degr. F</td>
</tr>
</tbody>
</table>