Figure 188 Subsurface dispersed oil plume and almost complete absence of surface oil approximately 17 minutes into Test No. 17 (IFO 120 fuel oil, Corexit 9500 (DOR 1:50), and low energy (30 cpm) waves).

Figure 189 Subsurface dispersed oil plume along eastern containment boom 20 minutes into Test No. 17.

Figure 190 Residual non-dispersed surface oil that had collected in the northeast corner of the containment boom 22 minutes into Test No. 17.

Figure 191 Close up of residual non-dispersed oil in northeast corner of test area showing little or no splash over into the secondary containment boom 23 minutes into Test No. 17.

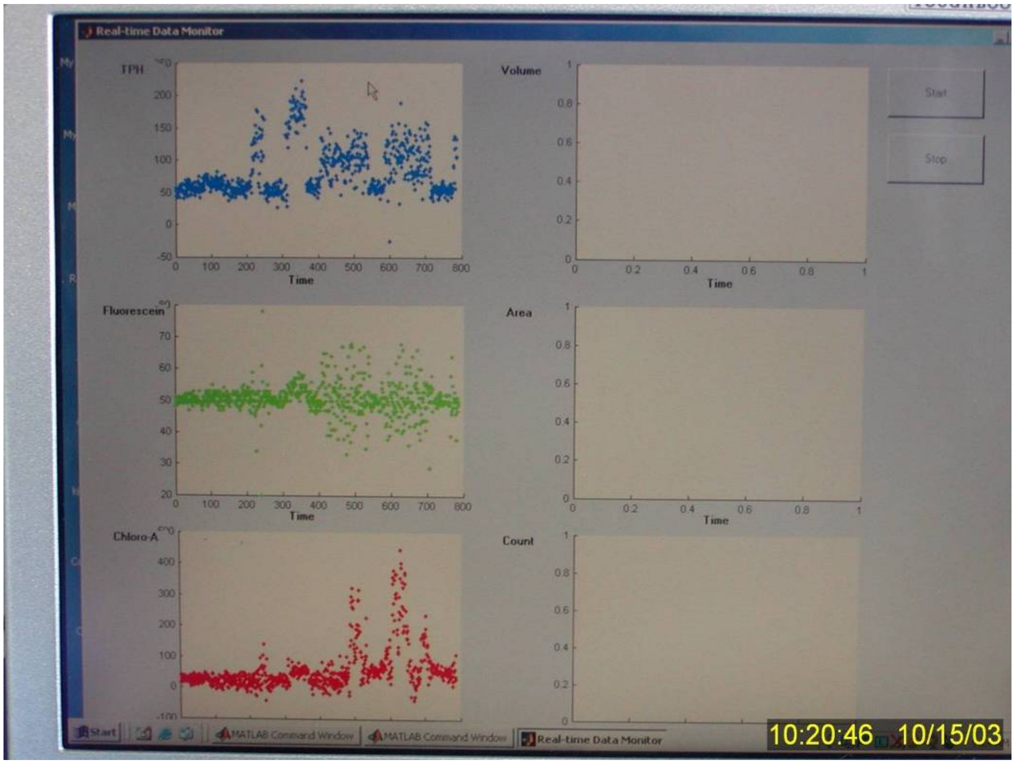

Figure 192 **Computer trace of dispersed oil measurement by the in situ fluorometer at 2-m depth during transect number 4 (from the north to the south along the eastern side of the tank) approximately 30-33 minutes into Test No. 17.**

Figure 193 **Tank surface photographed at the termination of Test No. 17 before using the fire monitors to sweep any remaining non-dispersed surface oil into the northeast corner (top of figure) for collection.**

Figure 194 **Remaining nondispersed surface oil that had naturally accumulated in the northeast corner of the test enclosure during Test No. 17. From the lack of any surface oil along the eastern containment boom at this time, it is believed that this oil was probably swept along the boom by the wave train during the test, and that it represented the non-dispersed oil photographed in Figures 185 and 186.**

Figure 195 **Additional oil collected after sweeping the test area with the fire monitors in preparation for quantitative recovery at the end of Test No. 17.**

Figure 196 Vacuum and squeegee recovery of residual non-dispersed surface oil at the end of Test No. 17.

Figure 197 Completing final preparations for Test No. 18: IFO 120 fuel oil, Corexit 9500 (nominal DOR 1:50), and intermediate wave energy (33.3 cpm).

Figure 198 Wave train established before Test No. 18 (IFO 120 fuel oil, Corexit 9500, and intermediate wave energy (33.3 cpm). Note the western edge of the containment boom has been blown almost to the center of the tank by the strong westerly winds (measured at 30-35 mph before the test).

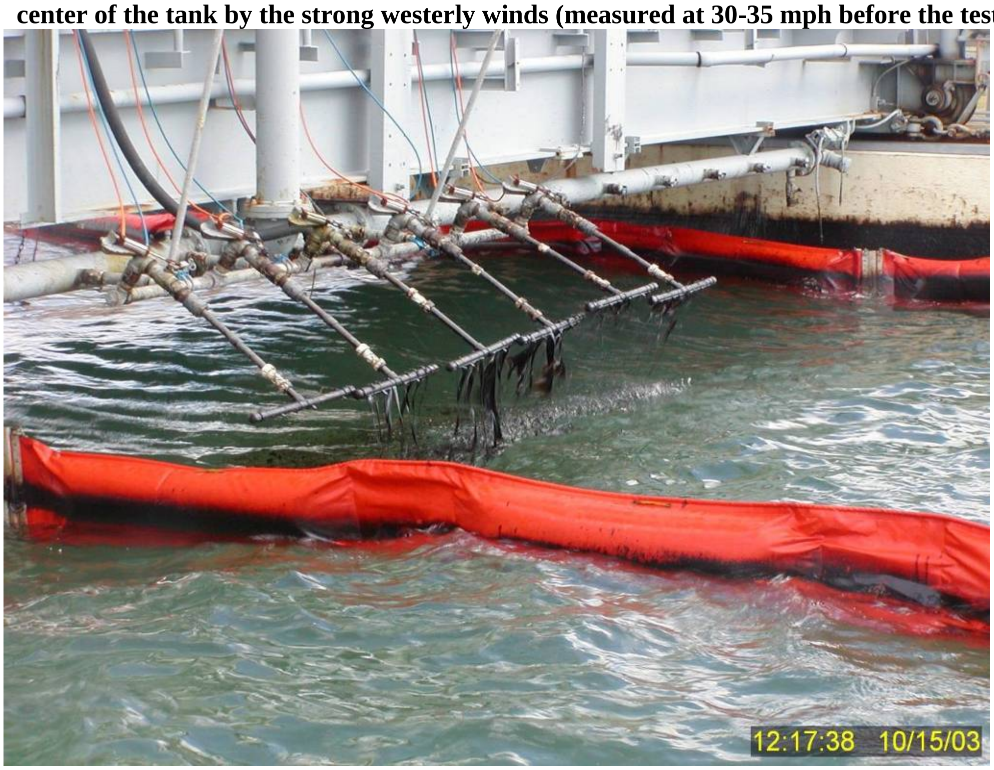

Figure 199 Application of IFO 120 fuel oil to water surface at the initiation of Test No. 18. Note how close the wind has pushed the western edge of the containment boom to the oil application manifold. As noted in the text, these wind conditions were clearly at the edge if not outside the normal operating range for the OHMSETT facility.

Figure 200 **Application of Corexit 9500 to the IFO 120 fuel oil at the initiation of Test No. 18. Note that this lighter, less viscous oil spreads out to make a more uniform target for the dispersant spray, but much of the dispersant was carried away by the wind.**

Figure 201 **Appearance of treated IFO 120 fuel oil as photographed from the side of the wave tank one minute after Test No. 18 dispersant application. Despite the lack of any white caps or cresting waves, much of the oil has already been dispersed into the water column.**

Figure 202 Appearance of the treated IFO 120 approximately two minutes after Test No. 18 dispersant application. Much of the oil has actually been dispersed into the water column where it is no longer subject to the strong cross wind pushing it towards the eastern containment boom along the top of the figure.

Figure 203 Overhead view of dispersed oil plume in the water column approximately two minutes after dispersant treatment in Test No. 18.

Figure 204 Dispersed oil plume in center of the wave tank approximately three minutes after dispersant treatment in Test No. 18. Note the use of a pole to fend the boom away from the tank wall under these windy conditions.

Figure 205 Overhead photograph of classic light-brown dispersed oil plume directly under the movable bridge in the center of the tank approximately 5 minutes after dispersant application in Test No. 18.

Figure 206 Minor amount of non-dispersed surface oil observed in the northeast corner of the primary containment boom approximately 5 minutes into Test No. 18.

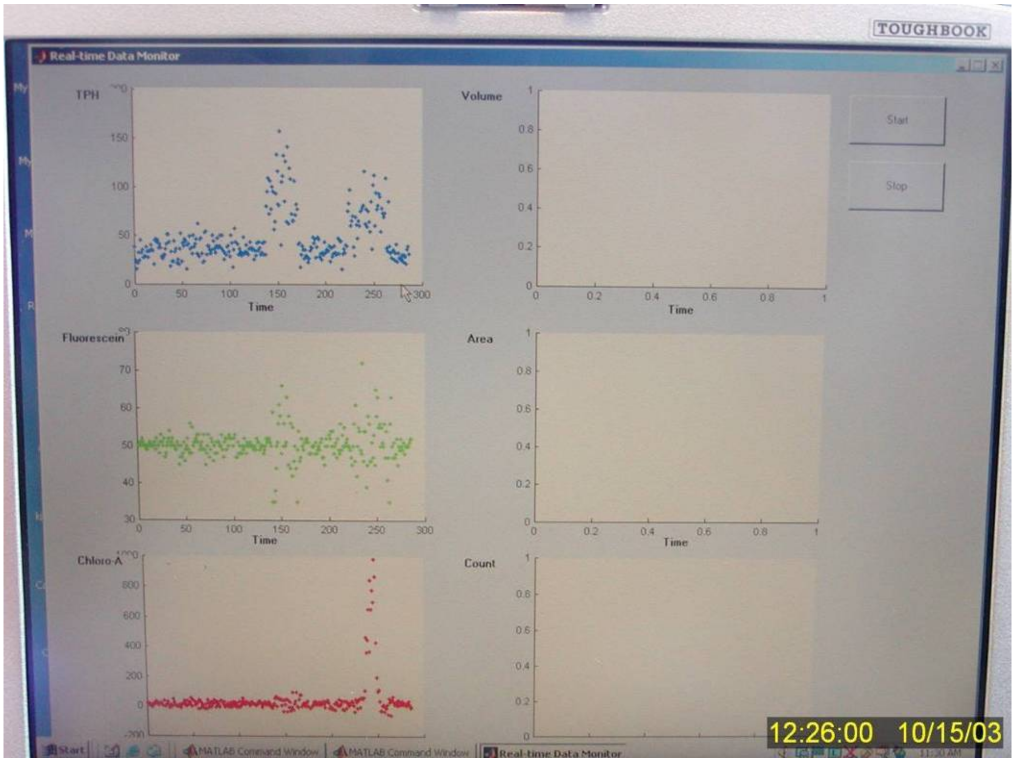

Figure 207 **Computer readout of the in situ fluorometer at 1 meter during the first north-to-south transect through the dispersed oil plume along the eastern edge of the containment zone.**

Figure 208 **Preparing to collect a discrete water sample from the 1-meter Turner AU-10 fluorometer effluent during a fluorescence peak.**

Figure 209 Collecting a discrete grab sample of water from the 1-meter fluorometer effluent during a fluorescence peak maxima.

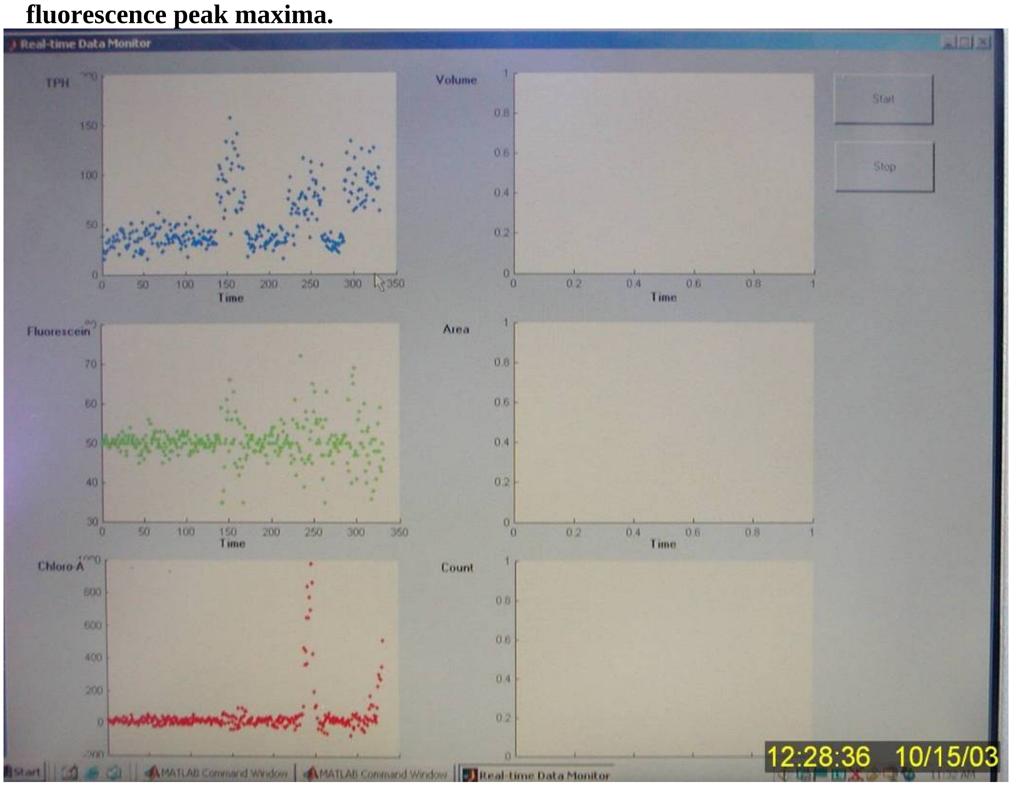

Figure 210 Computer readout of the signal from the 1-meter in situ fluorometer towards the end of the first north-to-south transect through the dispersed oil plume along the eastern side of the test enclosure.

Figure 211 Dispersed oil plume in the center of the tank and along the eastern containment boom 13 minutes into Test No. 18.

Figure 212 Dispersed oil plume in the center of the tank and along the eastern containment boom 15 minutes into Test No. 18. Note there is very little undispersed surface oil visible in this section of the test tank.

Figure 213 Light brown dispersed oil plume in water column near the eastern side of the test tank 20 minutes into Test No. 18. Photographed from the movable bridge directly above the plume about one-half way down the length of the tank.

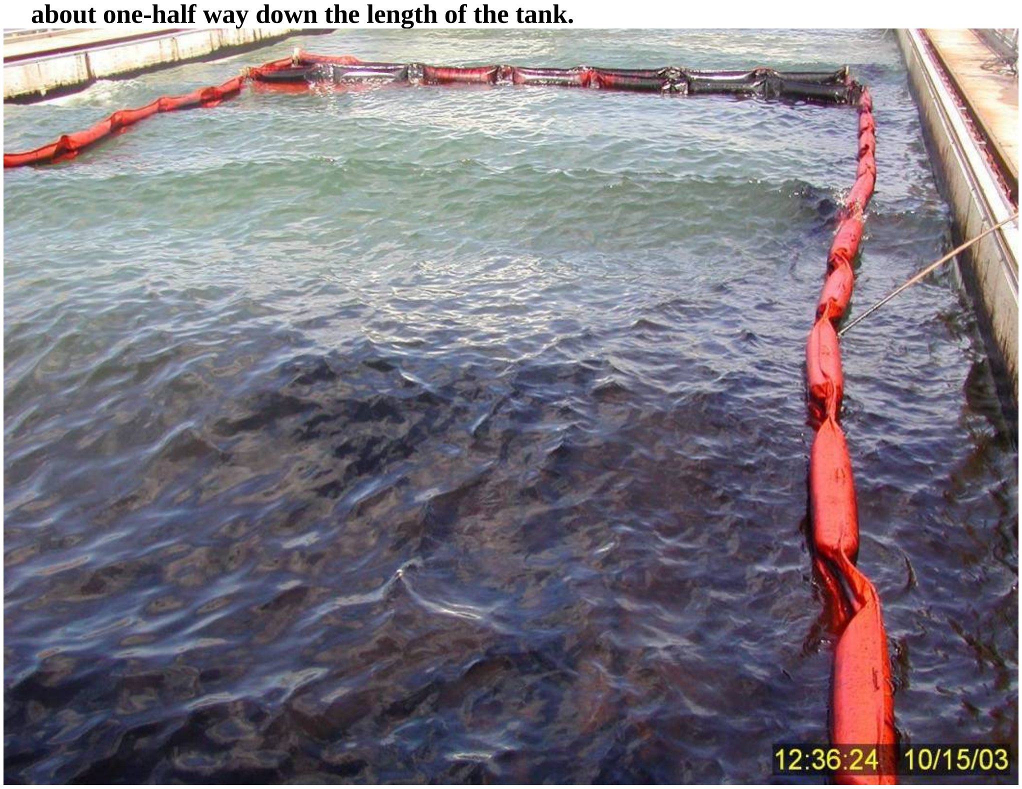

Figure 214 Dispersed oil plume in the center of the tank and along the eastern containment boom approximately 20 minutes after dispersant treatment in Test No. 18.

Figure 215 Residual undispersed surface oil accumulating along the north eastern edge of the primary containment boom approximately 21 minutes into Test No. 18.

Figure 216 Close up of undispersed surface oil in northeast corner of primary containment boom approximately 20-21 minutes into Test No. 18.

Figure 217 Undispersed surface oil in northeast corner of the primary containment boom photographed from directly overhead 23 minutes into Test No. 18.

Figure 218 Undispersed surface oil in northeast corner of primary containment boom and relatively oil-free water in secondary containment boom showing little or no splash-over (top of the photograph) 23 minutes into Test No. 18.

Figure 219 Containment boom after tearing away from the tether in the south west corner of the wave tank 24 minutes into Test No. 18. The boom had been anchored to the bridge shown at the top of the photograph, but the steady 30-35 knot winds from the west (right side of the figure) eventually caused the line to part. Note the dispersed oil plume remaining in the center of the tank.

Figure 220 Collapsing containment boom passing over dispersed oil plume and possibly sweeping some residual nondispersed surface oil before it ~ 25 minutes into Test No. 18.

Figure 221 Residual nondispersed surface oil adjacent to the containment boom against the eastern tank wall 25 minutes into Test No. 18.

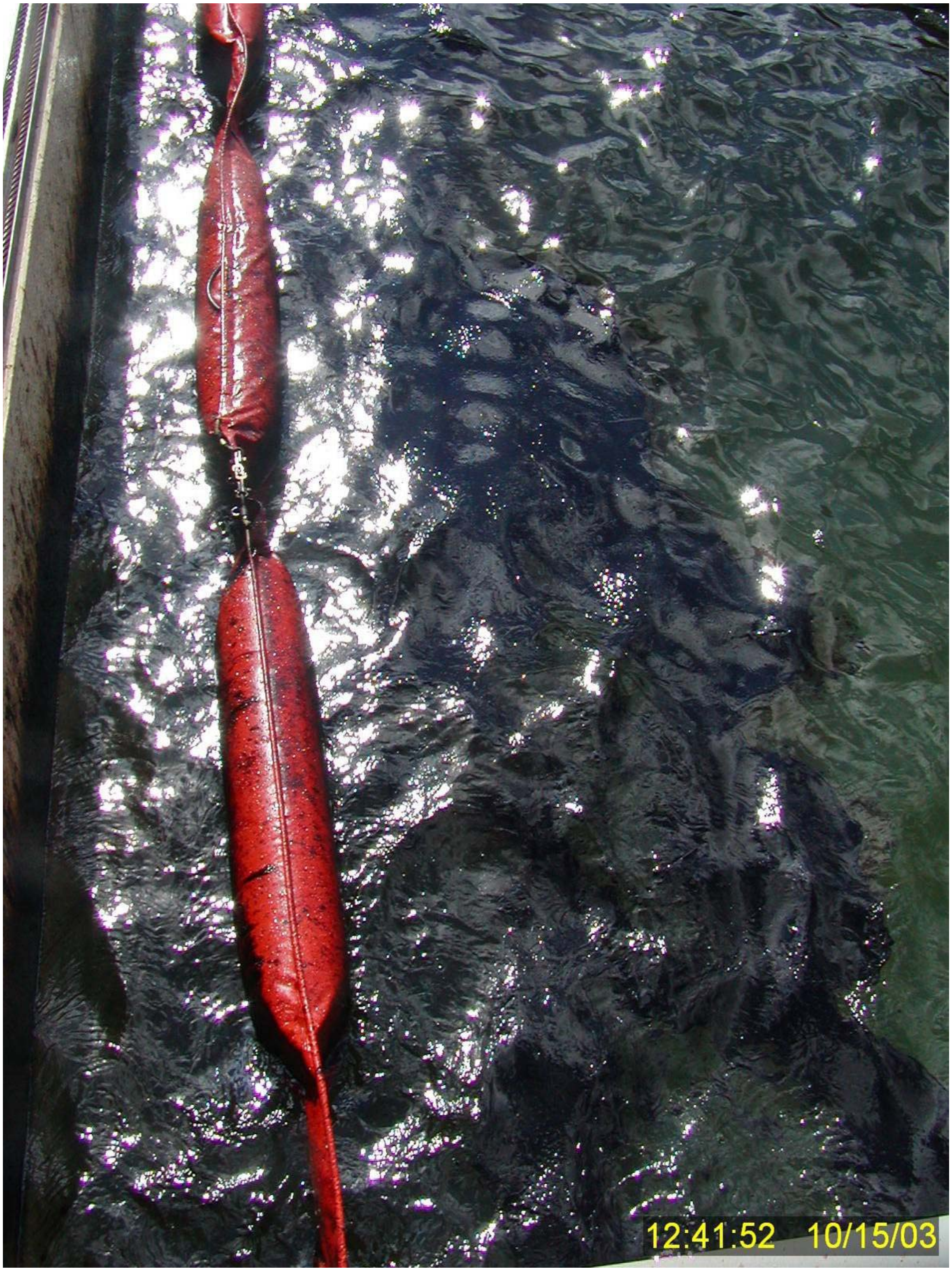

Figure 222 Residual nondispersed surface oil along eastern containment boom photographed before the western boom completely collapsed along the length of the tank wall 2 to 3 minutes later.

Figure 223 Western containment boom slowly drifting to the eastern tank wall (from right to left) approximately 25 minutes into Test No. 18 (about two minutes after the tether line separated). Note the two sides of the boom converging at the top of the figure (compare to Figure No. 219).

Figure 224 Primary and secondary containment boom collapsing near north end of wave tank two and one-half minutes after the tether line broke at approximately 12:40 hrs. By this time, the wave generator had been turned off, but it took several minutes for the waves to dampen within the tank.

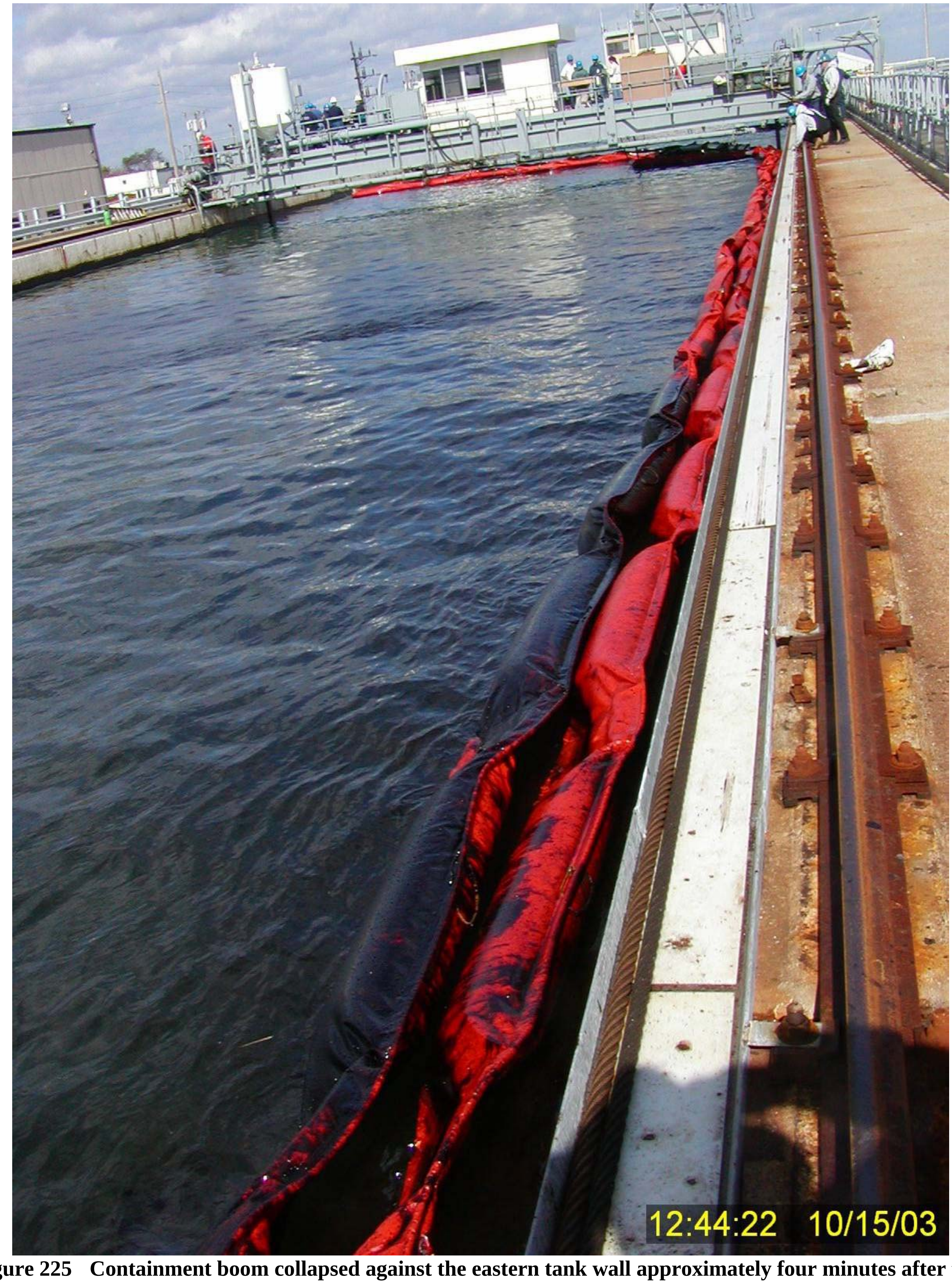

Figure 225 Containment boom collapsed against the eastern tank wall approximately four minutes after the tether line broke under the 30-35 mph wind stress 23 minutes into Test No. 18.

Figure 226 Initial efforts to reopen the containment boom to see if nondispersed surface oil could possibly be recovered. I have no doubt that some unknown amount of nondispersed surface oil was lost during these operations.

Figure 227 Reopening the containment boom for possible nondispersed surface oil recovery.

Figure 228 Nondispersed surface oil between reopened containment boom segments under the movable bridge eight minutes after the tether line had separated.

Figure 229 Partially reopened primary and secondary containment booms approximately 14 minutes after the tether line originally parted and efforts were undertaken to reconfigure the boom for an attempt at nondispersed surface oil recovery.

Figure 230 Nondispersed surface oil within newly reopened containment boom along eastern edge of wave tank 17 minutes after the tether line parted and the boom was stabilized for an attempt at oil recovery.

Figure 231 Use of fire monitor to herd residual surface oil to north end of tank for oil recovery. As in previous tests, the water spray was carefully directed to the water surface and not the oil to minimize additional artifactual dispersion.

Figure 232 Residual nondispersed surface oil being herded into the northern end of the primary and secondary containment zones 22 minutes after the test was aborted due to the boom failure towards the end of Test No. 18.

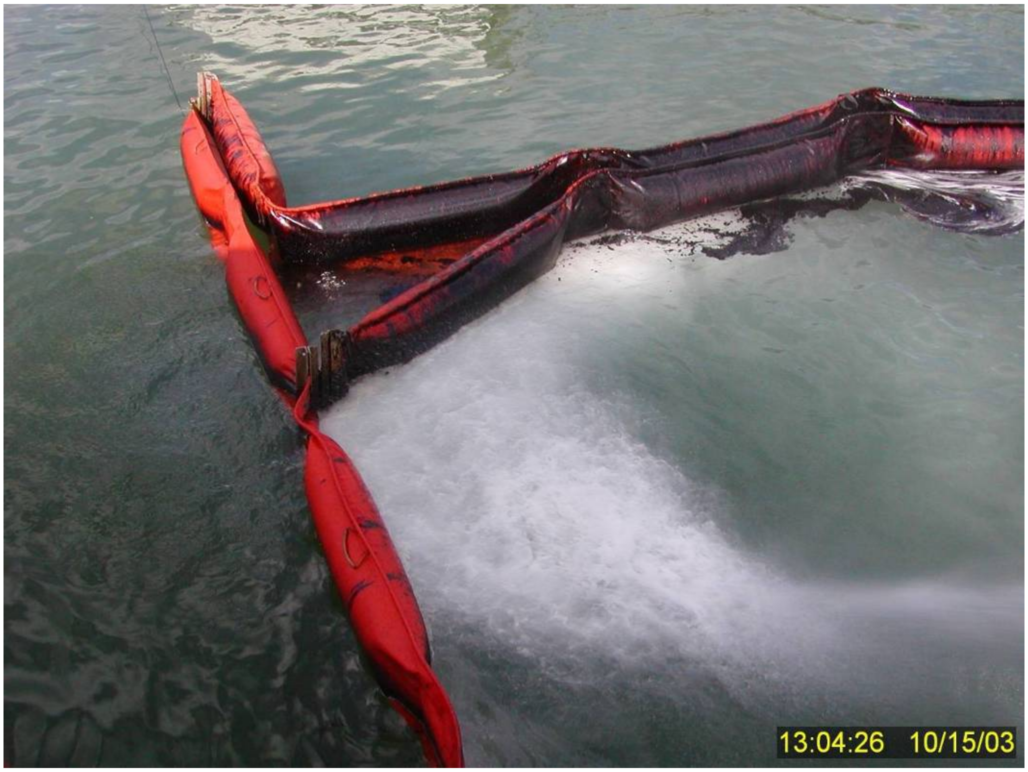

Figure 233 Example of fire monitor spray direction to herd residual surface oil with capillary waves and rising air bubbles in preparation for oil collection effort at the end of aborted Test No. 18.

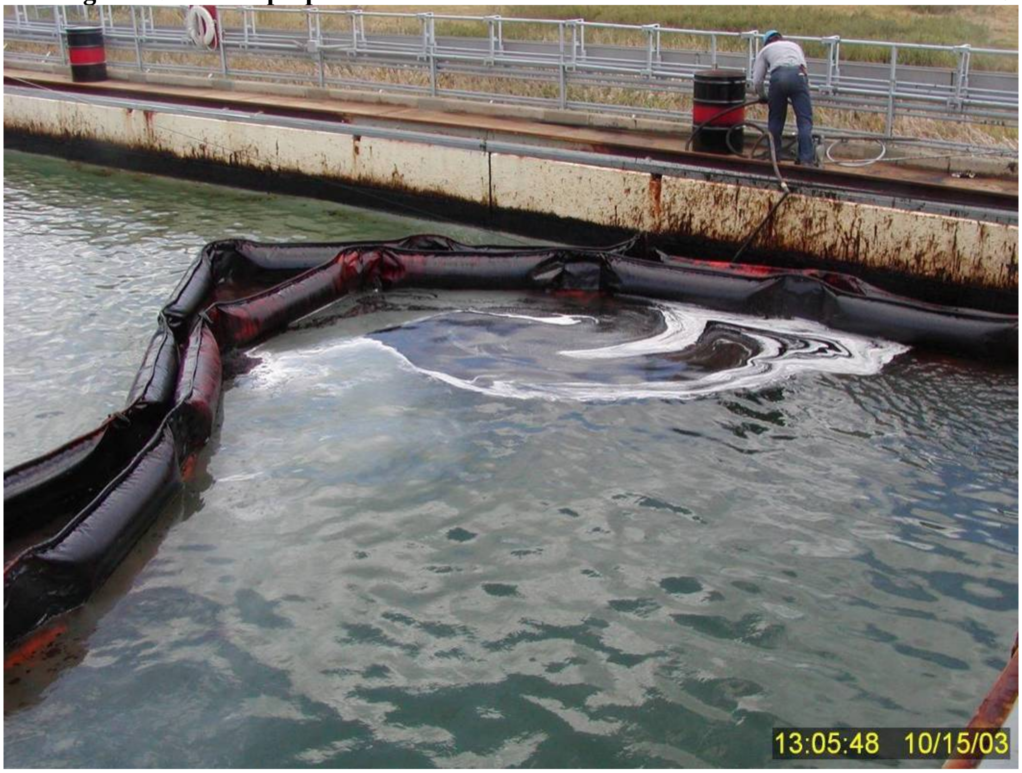

Figure 234 Nondispersed surface oil after being herded into the northeastern corner of the containment boom at the end of aborted Test No. 18.

Figure 235 Squeegee and vacuum recovery of residual nondispersed surface oil at the end of aborted Test No. 18.

Figure 236 Collapsed containment boom at the southern end of the test tank at the end of aborted Test No. 18. Note, I have no doubt that there was additional nondispersed surface oil trapped within the folds of the boom, so the recovered oil values are probably lower for this test than they otherwise would have been without the boom failure.

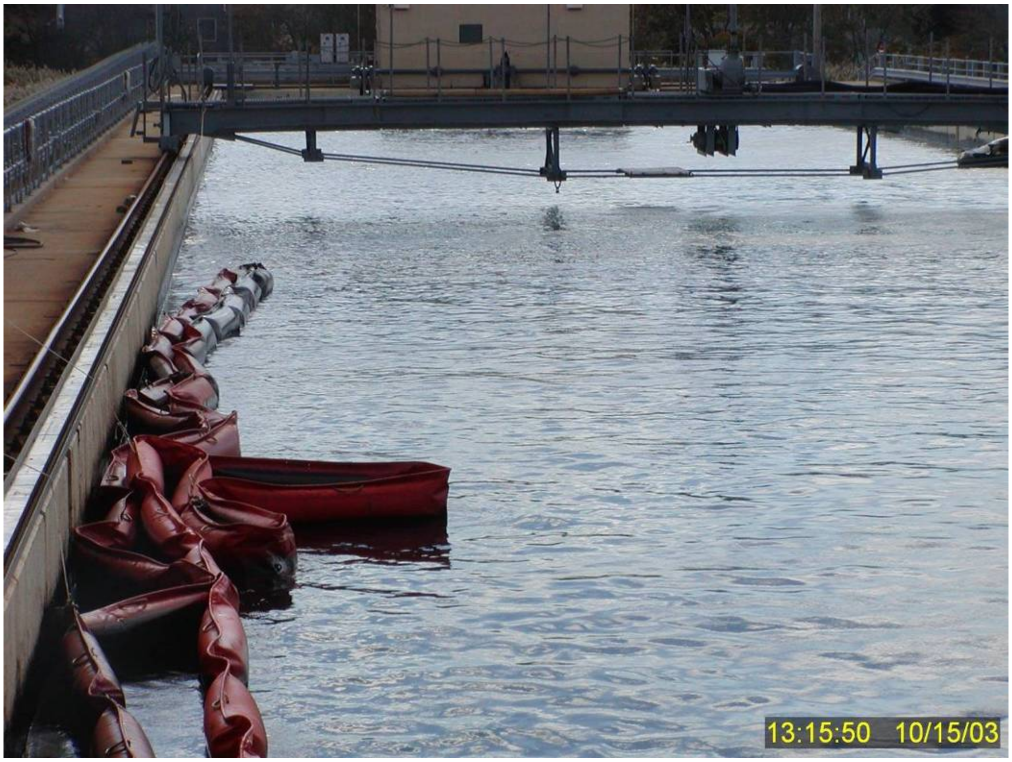

Figure 237 Close up of collapsed boom that no doubt trapped additional nondispersed surface oil that could not be collected and quantified at the end of Test No. 18.

Figure 238 Appearance of the test tank (looking south) after repairing the containment boom that had collapsed the previous afternoon during Test No. 18. Note the dark green color from residual dispersed oil still suspended in the water column 19 hours after the previous test was ended.

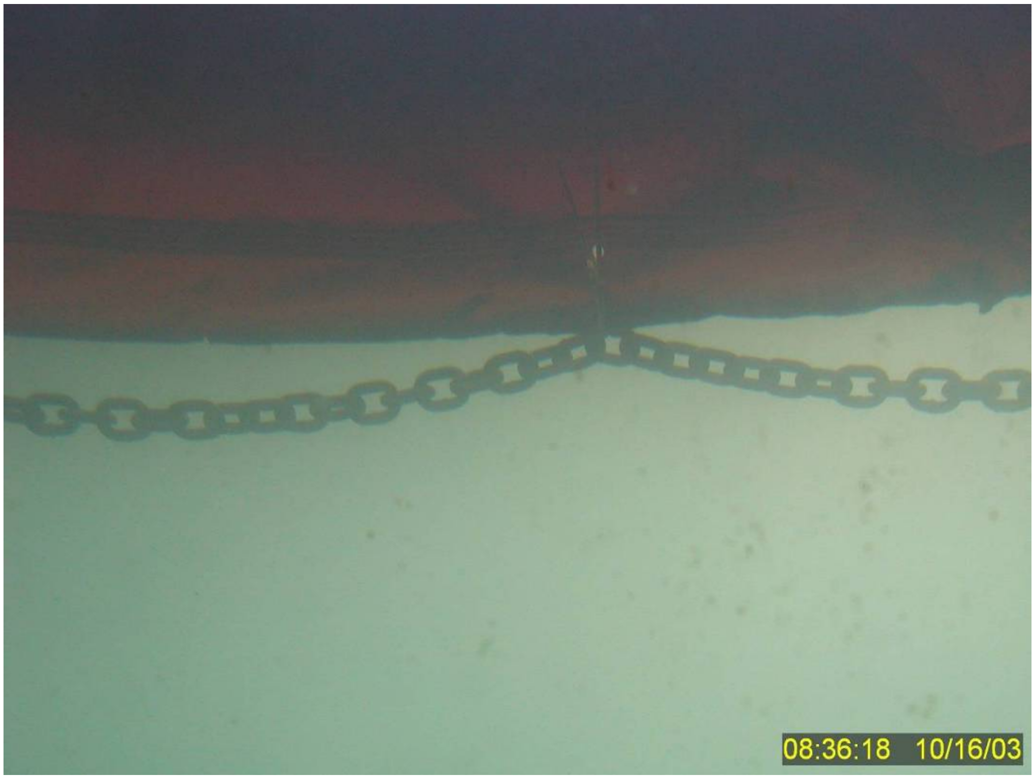

Figure 239 View of partially clouded water from central underwater window after 19 hours of calm following the termination of Test No. 18.

Figure 240 Residual surface oil inside the northeast corner of the primary containment boom after reestablishing the boom configuration on 16 October 2003.

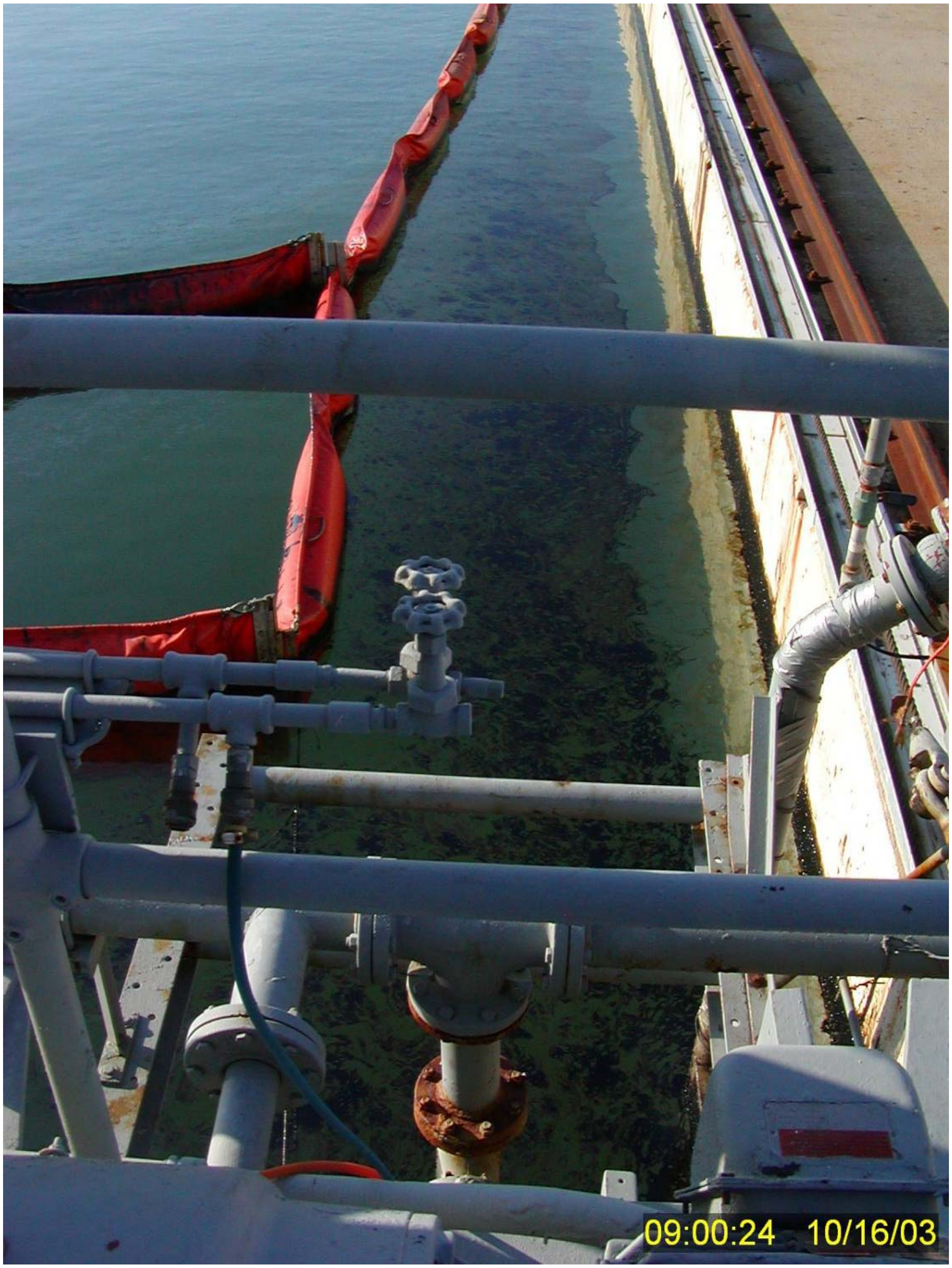

Figure 241 Residual surface oil between the western side of the containment boom and the tank wall observed after the boom configuration was reset earlier in the morning (photographed looking south). Presumably this was dispersed oil that had resurfaced throughout the tank overnight (during 19 hours of relative calm) while the boom remained collapsed against the eastern tank wall (see Figures 236 and 237). Upon pulling the boom open again, only a minor amount of the resurfaced oil was still inside the containment zone (see Figure 240), and evidently most of it was deflected by the boom to ultimately become trapped between the boom and the tank walls. Unfortunately, this oil was not collected for quantification of resurfacing behavior.

Figure 242 Permanent boom curtain beneath the northern-most bridge in raised position to facilitate tank cleaning (fire monitor herding of surface oil) outside of the test area in preparation for Test No. 19.

Figure 243 Dispersant control/pumping apparatus. The white Nalgene reservoir holds the dispersant, which is pumped under a specified pressure to the dispersant spray bar mounted beneath the bridge.

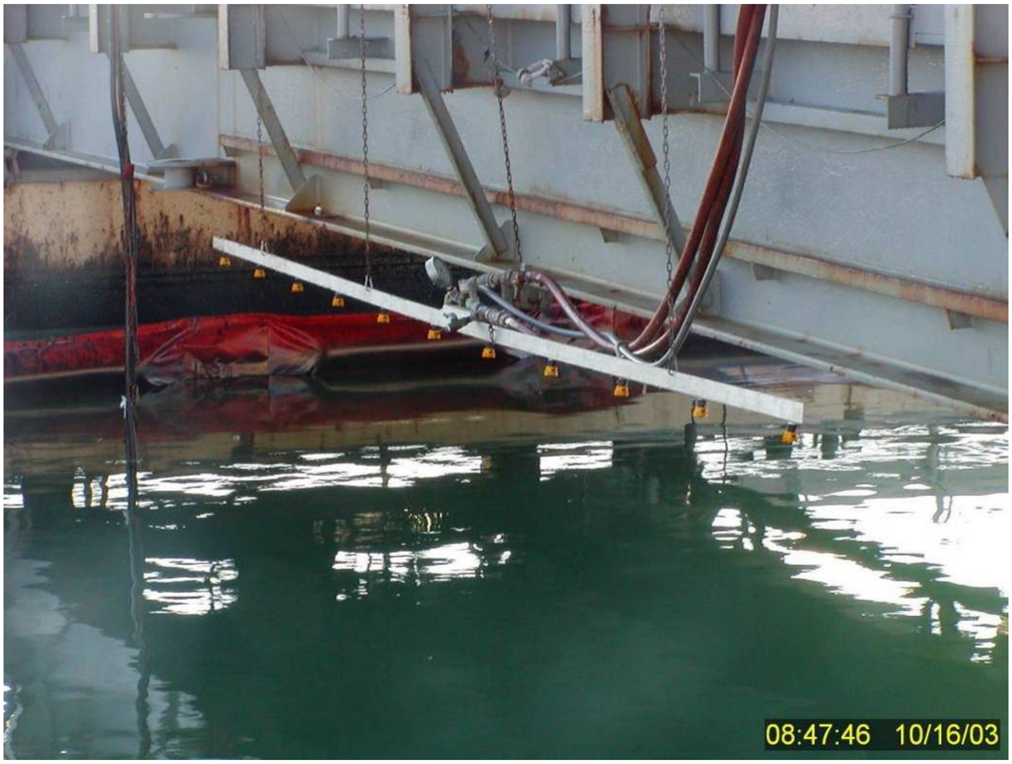

Figure 244 Dispersant spray bar with eleven UniJet Model No. 80015 flat spray nozzles suspended 1.5 m above the water beneath the north side of the movable bridge. These were the nozzles used for Test No. 19 when a nominal DOR of 1:25 was desired.

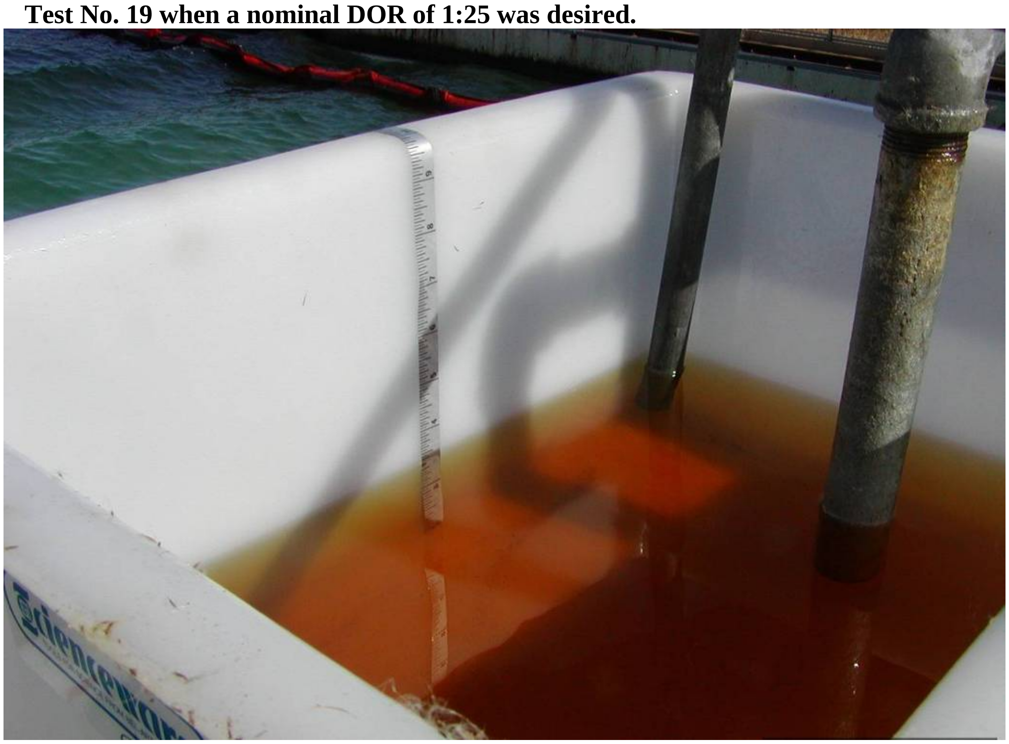

Figure 245 Tape measure permanently mounted inside the dispersant reservoir for measuring dispersant height before and after each test application.

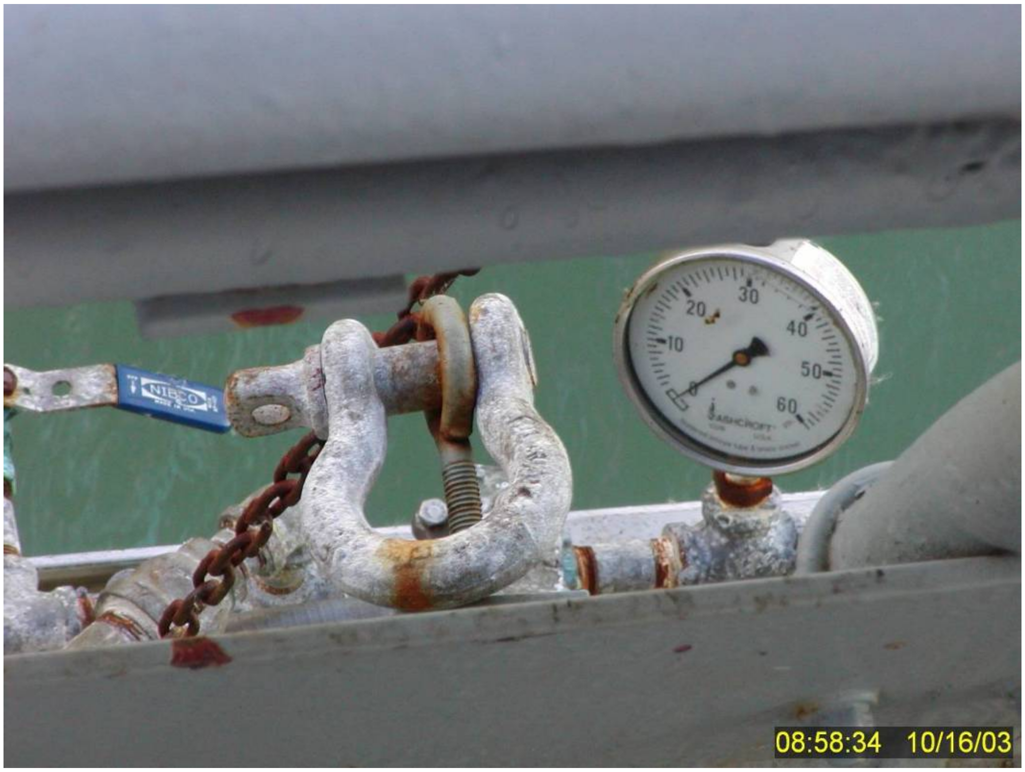

Figure 246 Pressure gauge mounted on the dispersant spray bar to measure dispersant pressure immediately before application.

UniJet SPRAY NOZZLE TIP

FLAT SPRAY

DOR 1/50 1/25

B 17

UNIJET SYSTEM

FLAT SPRAY

T FEMALE BODY OR

TT MALE BODY

SCREEN STRAINER

SPRAY TIP (See Chart)

TIP RETAINER

MESH SELECTION GUIDE	
Equivalent Orifice Diameter	Recommended Screen Mesh
UP THROUGH .018" (.46 mm)	200
.019" (.47 mm) THROUGH .031" (.79 mm)	100
.032" (.80 mm) AND LARGER	50

PERFORMANCE DATA

Spray Angle at 40 psi	Capacity Size	Equiv. Orifice Diam. Inches	CAPACITY (gallons per minute)											SPRAY ANGLE			
			5 psi	10 psi	20 psi	30 psi	40 psi	60 psi	80 psi	100 psi	200 psi	300 psi	500 psi	20 psi	40 psi	80 psi	200 psi
110°	11001	.026	.03	.05	.07	.09	.10	.12	.14	.16	.22	.27	.35	94°	110°	121°	124°
	110015	.031	.05	.07	.11	.13	.15	.18	.21	.24	.34	.41	.53	97°	110°	121°	124°
	11002	.036	.07	.10	.14	.17	.20	.25	.28	.32	.45	.55	.71	98°	110°	120°	123°
	11003	.043	.11	.15	.21	.26	.30	.37	.42	.47	.67	.82	1.1	99°	110°	120°	123°
	11004	.052	.14	.20	.28	.35	.40	.49	.57	.63	.89	1.1	1.4	100°	110°	119°	122°
	11005	.057	.18	.25	.35	.43	.50	.61	.71	.79	1.1	1.4	1.8	100°	110°	118°	122°
	11006	.062	.21	.30	.42	.52	.60	.73	.85	.95	1.3	1.6	2.1	101°	110°	117°	122°
	11008	.072	.28	.40	.56	.69	.80	.98	1.1	1.3	1.8	2.2	2.8	102°	110°	117°	121°
	11010	5/64	.35	.50	.71	.86	1.0	1.2	1.4	1.6	2.2	2.7	3.5	103°	110°	117°	119°
	11015	3/32	.53	.75	1.1	1.3	1.5	1.8	2.1	2.4	3.4	4.1	5.3	104°	110°	117°	118°
	11020	7/64	.71	1.0	1.4	1.7	2.0	2.5	2.8	3.2	4.5	5.5	7.1	105°	110°	117°	118°
	11030	9/64	1.1	1.5	2.1	2.6	3.0	3.7	4.2	4.7	6.7	8.2	10.6	105°	110°	117°	118°
95°	9501	.026	.03	.05	.07	.09	.10	.12	.14	.16	.22	.27	.35	81°	95°	105°	113°
	95015	.031	.05	.07	.11	.13	.15	.18	.21	.24	.34	.41	.53	82°	95°	105°	113°
	9502	.036	.07	.10	.14	.17	.20	.25	.28	.32	.45	.55	.71	82°	95°	105°	113°
	9503	.043	.11	.15	.21	.26	.30	.37	.42	.47	.67	.82	1.1	83°	95°	104°	111°
	9504	.052	.14	.20	.28	.35	.40	.49	.57	.63	.89	1.1	1.4	84°	95°	103°	108°
	9505	.057	.18	.25	.35	.43	.50	.61	.71	.79	1.1	1.4	1.8	84°	95°	102°	107°
	9506	.062	.21	.30	.42	.52	.60	.73	.85	.95	1.3	1.6	2.1	86°	95°	101°	106°
	9508	.072	.28	.40	.56	.69	.80	.98	1.1	1.3	1.8	2.2	2.8	87°	95°	100°	105°
	9510	5/64	.35	.50	.71	.86	1.0	1.2	1.4	1.6	2.2	2.7	3.5	89°	95°	100°	105°
	9515	3/32	.53	.75	1.1	1.3	1.5	1.8	2.1	2.4	3.4	4.1	5.3	90°	95°	100°	105°
	9520	7/64	.71	1.0	1.4	1.7	2.0	2.5	2.8	3.2	4.5	5.5	7.1	90°	95°	100°	105°
	9530	9/64	1.1	1.5	2.1	2.6	3.0	3.7	4.2	4.7	6.7	8.2	10.6	91°	95°	101°	105°
	9540	5/32	1.4	2.0	2.8	3.5	4.0	4.9	5.7	6.3	8.9	11.0	14.2	92°	95°	100°	105°
	9550	11/64	1.8	2.5	3.5	4.3	5.0	6.1	7.1	7.9	11.2	13.7	17.7	93°	95°	99°	103°
	9560	3/16	2.1	3.0	4.2	5.2	6.0	7.3	8.5	9.5	13.4	16.4	21	93°	95°	99°	103°
	9570	13/64	2.5	3.5	4.9	6.1	7.0	8.6	9.9	11.1	15.7	19.2	25	93°	95°	99°	103°
80°	800050	.018			.035	.043	.050	.06	.07	.08	.11	.14	.18	61°	80°	95°	101°
	800067	.021		.03	.05	.06	.067	.08	.09	.11	.15	.18	.24	67°	80°	94°	99°
	8001	.026		.05	.07	.09	.10	.12	.14	.16	.22	.27	.35	68°	80°	89°	92°
	80015	.031		.07	.11	.13	.15	.18	.21	.24	.34	.41	.53	68°	80°	89°	92°
	8002	.036	.07	.10	.14	.17	.20	.25	.28	.32	.45	.55	.71	69°	80°	88°	91°
	8003	.043	.11	.15	.21	.26	.30	.37	.42	.47	.67	.82	1.1	70°	80°	87°	90°
	8004	.052	.14	.20	.28	.35	.40	.49	.57	.63	.89	1.1	1.4	71°	80°	86°	89°
	8005	.057	.18	.25	.35	.43	.50	.61	.71	.79	1.1	1.4	1.8	71°	80°	86°	[illegible]
	8006	.062	.21	.30	.42	.52	.60	.73	.85	.95	1.3	1.6	2.1	72°	80°	85°	
	8008	.072	.28	.40	.56	.69	.80	.98	1.1	1.3	1.8	2.2	2.8	72°	80°	84°	
	8010	5/64	.35	.50	.71	.86	1.0	1.2	1.4	1.6	2.2	2.7	3.5	73°	80°	84°	
	8015	3/32	.53	.75	1.1	1.3	1.5	1.8	2.1	2.4	3.4	4.1	5.3	74°	80°	83°	
	8020	7/64	.71	1.0	1.4	1.7	2.0	2.5	2.8	3.2	4.5	5.5	7.1	74°	80°	83°	
	8030	9/64	1.1	1.5	2.1	2.6	3.0	3.7	4.2	4.7	6.7	8.2	10.6	74°	80°	83°	
	8040	5/32	1.4	2.0	2.8	3.5	4.0	4.9	5.7	6.3	8.9	11.0	14.2	74°	80°	83°	
	8050	11/64	1.8	2.5	3.5	4.3	5.0	6.1	7.1	7.9	11.2	13.7	17.7	74°	80°	83°	
	8060	3/16	2.1	3.0	4.2	5.2	6.0	7.3	8.5	9.5	13.4	16.4	21	75°	80°	83°	
	8070	13/64	2.5	3.5	4.9	6.1	7.0	8.6	9.9	11.1	15.7	19.2	25	75°	80°	83°	
73°	730023	.012			.016	.020	.023	.028	.032	.036	.051	.063	.081	50°	73°	89°	
	730039	.016		.020	.028	.034	.039	.048	.055	.062	.087	.11	.14	53°	73°	87°	
	730077	.022		.039	.055	.067	.077	.09	.11	.12	.17	.21	.27	53°	73°	86°	
	730116	.028	.04	.06	.08	.10	.116	.14	.16	.18	.26	.32	.41	54°	73°	85°	
	730154	.032	.05	.08	.11	.13	.154	.19	.22	.24	.34	.42	.54	55°	73°	84°	
	730231	.040	.08	.12	.16	.20	.231	.28	.33	.37	.52	.63	.82	56°	73°	83°	
	730308	.045	.11	.15	.22	.27	.308	.38	.44	.49	.69	.84	1.1	58°	73°	82°	
	730385	.051	.14	.19	.27	.33	.385	.47	.54	.61	.86	1.1	1.4	59°	73°	81°	[illegible]
	730462	.056	.16	.23	.33	.40	.462	.57	.65	.73	1.0	1.3	1.6	60°	73°	80°	84°
	730616	.065	.22	.31	.44	.53	.616	.75	.87	.98	1.4	1.7	2.2	63°	73°	79°	83°
	730770	.072	.27	.38	.54	.67	.770	.94	1.1	1.2	1.7	2.1	2.7	64°	73°	77°	82°
	730924	.078	.33	.46	.65	.80	.924	1.1	1.3	1.5	2.1	2.5	3.3	65°	73°	77°	80°
65°	650017	.011			.012	.015	.017	.021	.024	.027	.038	.047	.06	44°	65°	77°	86°
	650025	.013			.018	.022	.025	.031	.035	.040	.06	.07	.09	45°	65°	77°	84°
	650033	.015			.023	.029	.033	.040	.047	.052	.07	.09	.12	47°	65°	76°	83°
	650050	.018			.035	.043	.050	.060	.07	.08	.11	.14	.18	48°	65°	75°	82°
	650067	.021		.03	.05	.06	.067	.08	.09	.11	.15	.18	.24	50°	65°	75°	81°
	6501	.026		.05	.07	.09	.10	.12	.14	.16	.22	.27	.35	51°	65°	74°	80°
	65015	.031		.07	.11	.13	.15	.18	.21	.24	.34	.41	.53	51°	65°	74°	80°
	6502	.036	.07	.10	.14	.17	.20	.25	.28	.32	.45	.55	.71	52°	65°	73°	79°
	6503	.043	.11	.15	.21	.26	.30	.37	.42	.47	.67	.82	1.1	53°	65°	72°	78°
	6504	.052	.14	.20	.28	.35	.40	.49	.57	.63	.89	1.1	1.4	53°	65°	72°	76°
	6505	.057	.18	.25	.35	.43	.50	.61	.71	.79	1.1	1.4	1.8	53°	65°	72°	76°
	6506	.062	.21	.30	.42	.52	.60	.73	.85	.95	1.3	1.6	2.1	54°	65°	72°	75°
	6508	.072	.28	.40	.56	.69	.80	.98	1.1	1.3	1.8	2.2	2.8	55°	65°	71°	74°

Figure 247 UniJet Spray Nozzle Tip Performance Data Specification Sheet for spray nozzles 8001 and 80015 used in the OHMSETT heavy fuel oil dispersant tests.

Figure 248 Close up of UniJet Model No. 8001 flat spray nozzle used for the dispersant tests when a nominal DOR of 1:50 was desired.

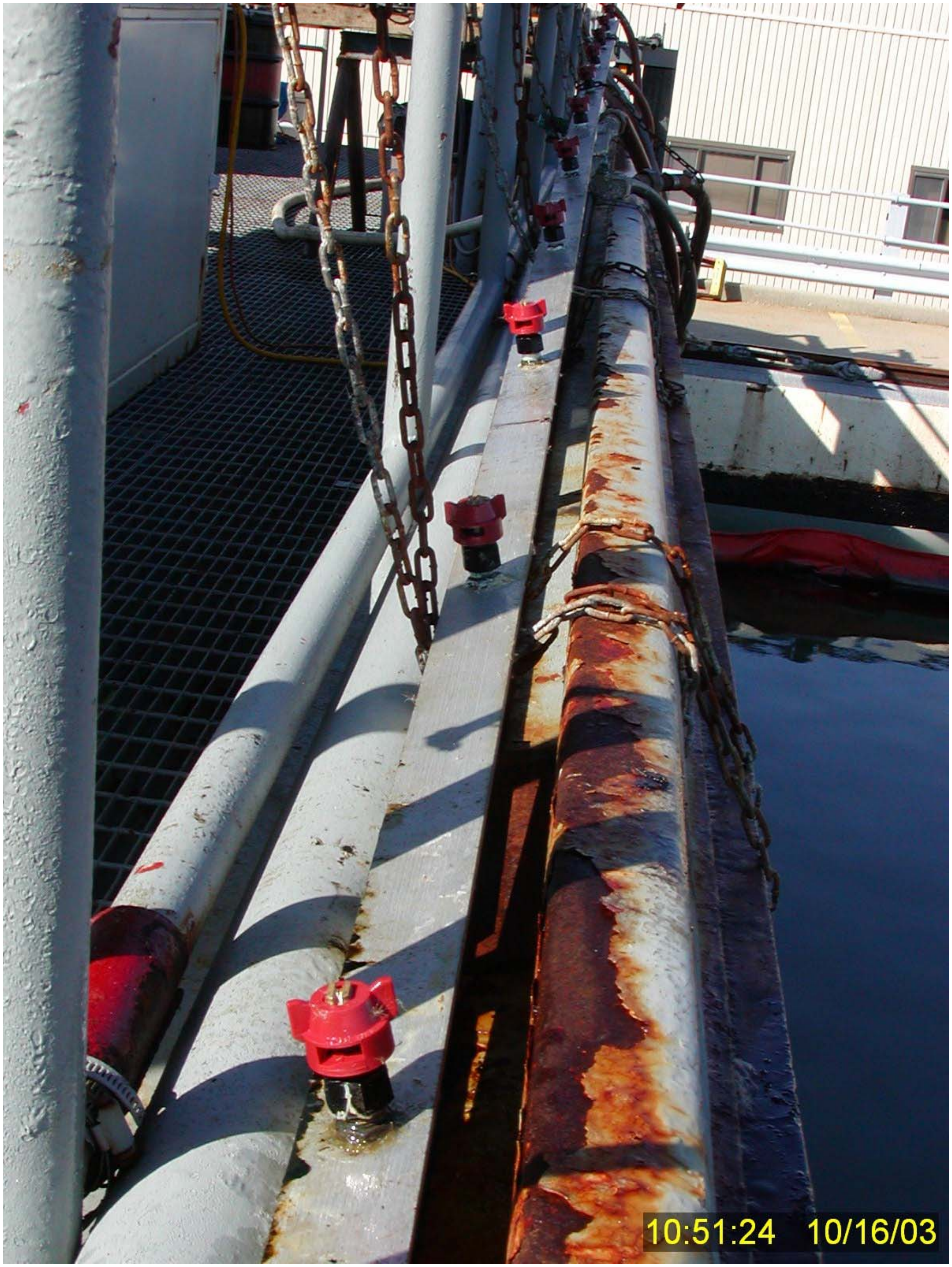

Figure 249 UniJet Model No. 8001 flat spray nozzles mounted on the dispersant spray bar while it was pulled up to the movable bridge rail for adjustment in preparation for Test No. 20.

Figure 250 Close up of one of eleven UniJet Model 80015 flat spray nozzles used to deliver a nominal DOR of 1:25 at 60 psi (see Figure 247).

Figure 251 Dispersant spray control unit with Superdispersant SD 25 in the Nalgene reservoir.

Figure 252 Tape measure used for dispersant volume measurements before and after each test.

Figure 253 Completion of tank preparations just before Test No. 19: IFO 180 fuel oil plus Corexit 9500 at a nominal DOR of 1:25 and low (30 cpm) energy waves.

Figure 254 Initiation of wave train just before Test No. 19. These are the first waves coming down the tank at a 30 cpm wave paddle frequency before the desired sea-state was obtained approximately 6-7 minutes later.

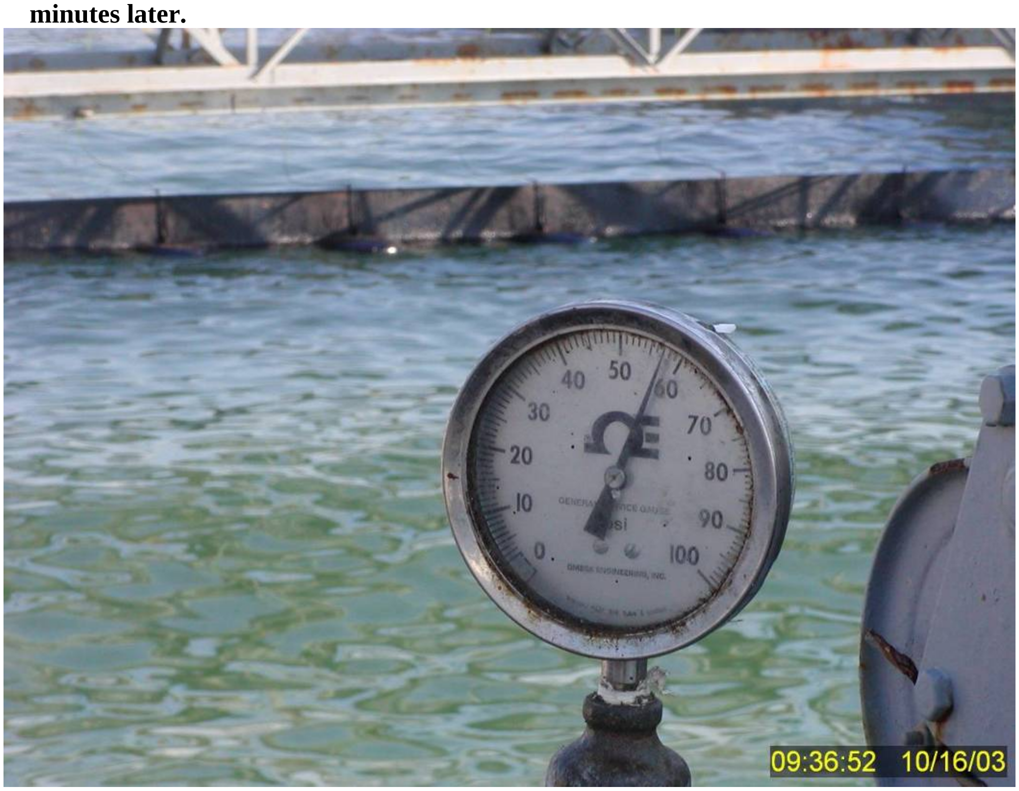

Figure 255 Dispersant control unit pressure guage (reading 57-58 psi on the recirculating plumbing shown in Figure 251) just before initiation of Test No. 19 where a nominal DOR of 1:25 was desired.

Figure 256 Dispersant pressure measured on the spray bar (57-58 psi) during dispersant application at the initiation of Test No. 19. Note the uneven distribution of oil on the water surface passing beneath the spray resulting in significant under dosing of the slick.

Figure 257 Appearance of the treated IFO 180 fuel oil approximately one minute after dispersant application in Test No. 19.

Figure 258 Appearance of the surface IFO 180 fuel oil four minutes after dispersant application in Test No. 19. Note the complete lack of any dispersion under these low-energy conditions despite the higher nominal DOR of 1:25.

Figure 259 Undispersed surface oil accumulating near the eastern containment boom approximately five minutes after dispersant application in Test No. 19 (photographed from the south looking north). Note the complete lack of any chemically enhanced dispersion or entrainment into the water column.

Figure 260 Undispersed surface oil accumulating along the eastern containment boom approximately 6 minutes after dispersant application in Test No. 19 (photographed from the north looking south). Note the complete lack of any dispersed oil plume under these conditions.

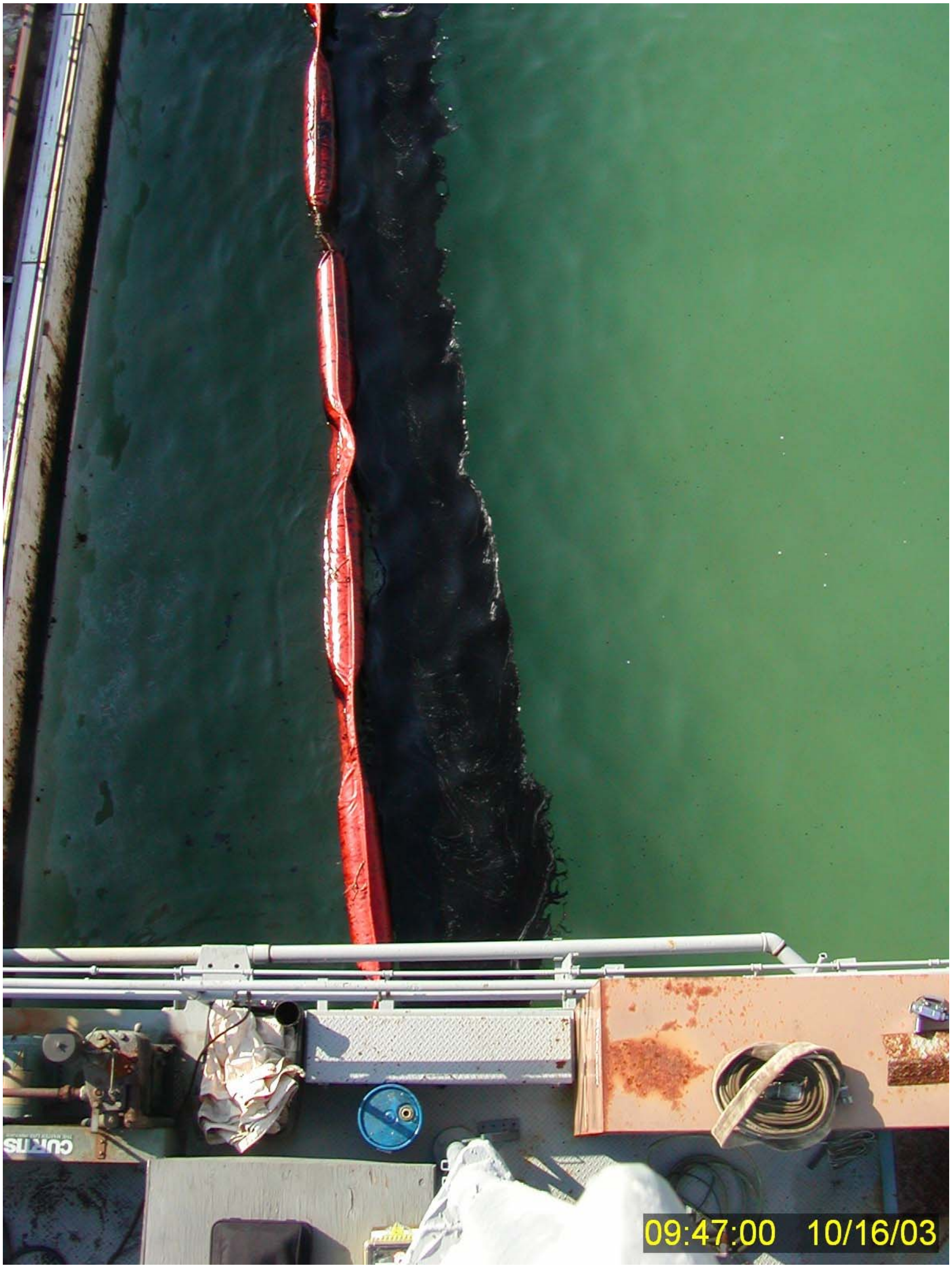

Figure 261 Nondispersed surface oil accumulating along the eastern containment boom ~9 minutes after dispersant application in Test No. 19. Photographed from the observation platform 15 feet above the movable bridge looking from the north to the south (toward the wave generator).

Figure 262 Nondispersed surface oil accumulating along the eastern containment boom ~12 minutes after dispersant application in Test No. 19. Photographed from the observation platform 15 feet above the movable bridge looking from the south to the north (toward the secondary containment boom). Note there is still little or no evidence of any significant chemically-enhanced dispersion.

Figure 263 Accumulation of nondispersed surface oil in the northeast corner of the primary containment boom approximately 13 minutes after dispersant application in Test No. 19. At this time, there is just the slightest indication of minor (and anomalous) dispersion due to enhanced turbulence caused by the waves interacting with the containment boom. This is more fully developed after another 10 minutes (as shown in Figures 264 and 265).

Figure 264 Slightly enhanced dispersion of IFO 180 fuel oil caused by localized turbulence adjacent to the primary and secondary containment booms ~22 minutes into Test No. 19.

Figure 265 Slightly enhanced dispersion of IFO 180 fuel oil caused by localized turbulence adjacent to the primary and secondary containment booms ~23 minutes into Test No. 19.