CALIFORNIA STATE FIRE MARSHAL (SFM)
PIPELINE SAFETY DIVISION
NOTIFICATION OF PROPOSED HYDROSTATIC TEST
CPSA

Date: 10/5/90

TEST ID: 90-241

1. Operator: Shell Oil Company
   Address: 2459 Redondo Avenue
   City: Long Beach, CA 90806
   Person calling: John McCain

2. Specific location of pipeline to be tested:
   Wilmington Refinery to Dominguez Refinery

3. Information on pipeline to be tested:
   Line Number: IR-21
   Pipe Diameter: 8.625 OD
   Length of line: 15211 feet
   Test pressure: 1080 lbs.

4. Location of test equipment: Wilmington Refinery

5. Date and time test is to conducted: 10/12/90 @ 0900 hrs.

6. Test Medium: Water   If other than water, has a waiver been granted?: ____________

7. Name and telephone number of independent testing firm or person responsible for certification of test results:
   Metco Equipment Inc. (213) 532-0210

****

8. Call received by: Chuck   Time: 1426 HRS

9. Assigned to: ____________ Date and time ____________

10. Date test results received: ____________

TEST ID: 90-241

This number should be given to person calling for use as a verification number.

SFM PIPELINE SAFETY DIVISION
HYDROSTATIC TEST RESULTS

PIPELINE DATA S.F.M. #90-241

Test Date 10-12-90

Pipeline Operator	Company conducting test if other than operator
SHELL PIPELINE CO.	

Kind of Test
[ ] New [ ] Replacement [ ] Annual [ ] 3 Year [X] 5 Year [ ] Other

Pipeline Identification (line number, name, etc)
LINE #21

Pipeline Location (mile post, street, station, etc)
From: WILMINGTON REFINERY
To: DOMINGUEZ REFINERY

Normal Product Transported	Normal Operating Pressure P.S.I. at (location)
D.E.A. LEAN	400

Maximum Operating pressure P.S.I. at (location)	
550	TEST PRESSURE 1080

PIPE DATA

Pipe O.D.	Wall Thickness	Specification & Grade (SMYS)	Length of Pipe Being Tested	Volume (Barrels)
8"	.312	"B"	14,567'	933

TEST DATA

Test Medium [X] Water [ ] Petroleum* — *Has Waiver been granted ?

Location of Pressure Recording Equipment — Elevation

Other Elevations	Pipeline--High Point -0-	Pipeline--Low Point -0-	
Test Equipment	Make & Model of Deadweight Tester CHANDLER	Serial # 22681	Date Last Calibrated
	Make & Model of Chart Recorder FOXBORO	Serial # 1175571	Date Last Calibrated 1-8-87
	Make & Model of Temperature Recorder REYNOLDS	Serial # 1249 JM	Date Last Calibrated 8-28-90

STATE LICENSE NO. 266416

METCO

METCO EQUIPMENT INC.

P. O. BOX 4700
18501 SOUTH MAIN STREET
CARSON, CALIFORNIA 90746

(213) 532-0210 321-0826

STATE FIRE MARSHAL
Pipeline Safety Division
7171 Bowling Dr., Suite 600
Sacramento, CA 95823

Gentlemen:

S.F.M. #90-241

Attached for your further handling is a copy of a pipeline hydrotest report, as per California State Fire Marshal's Office.

PIPELINE OWNER: SHELL OIL W.C.P.L.

PIPELINE TESTED: IR-21

DATE TESTED: 10-12-90

CONDUCTED BY: SHELL W.C.P.L.

WITNESSED BY: CLAUDE PARKER (METCO)

Should you need any further information, please contact the undersigned at (213) 532-0210.

Sincerely,

METCO EQUIPMENT INC.

DUSTY HILYAR,
Vice President

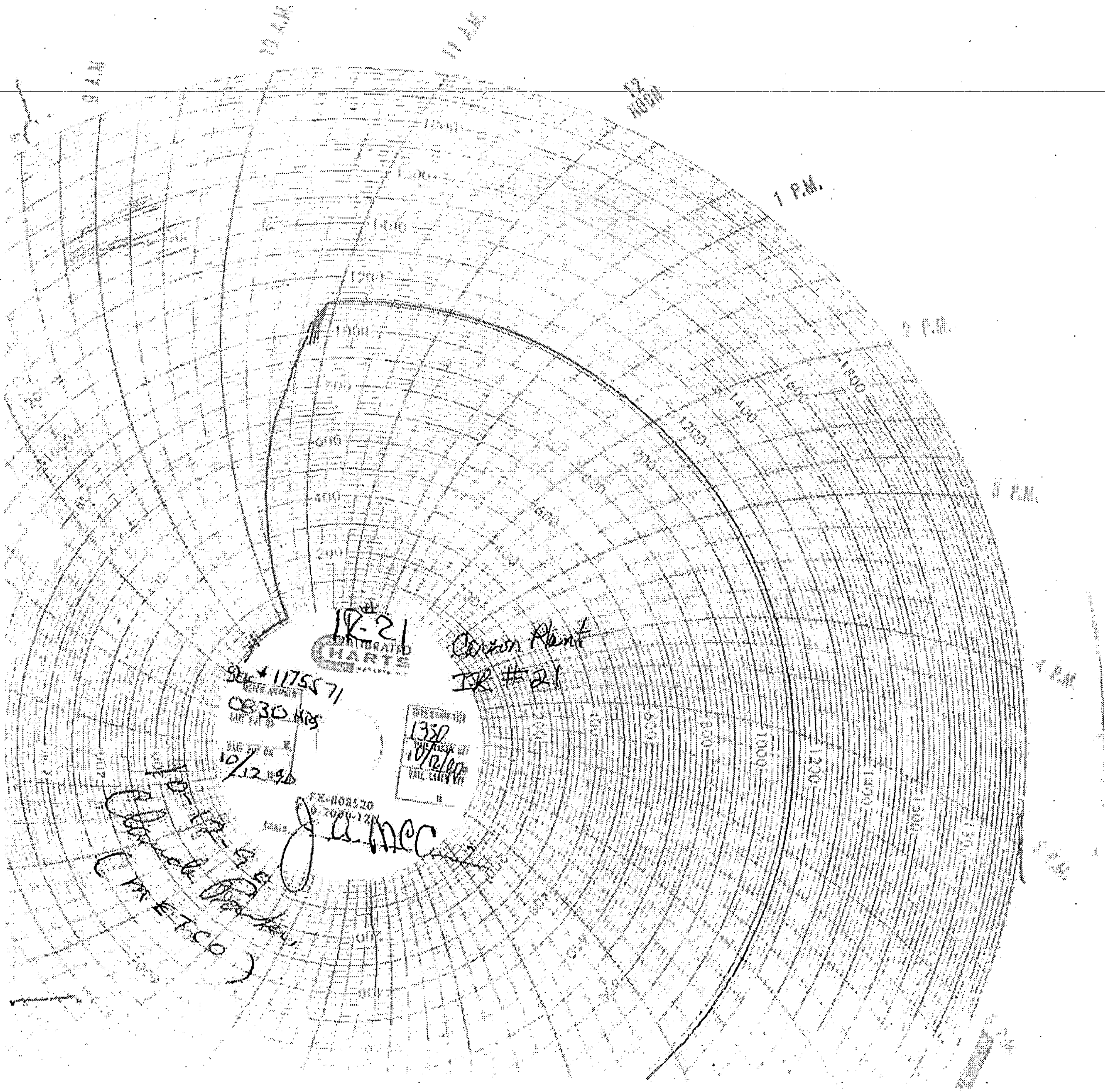
/slt
Attachments

HYDROSTATIC TEST RECORD

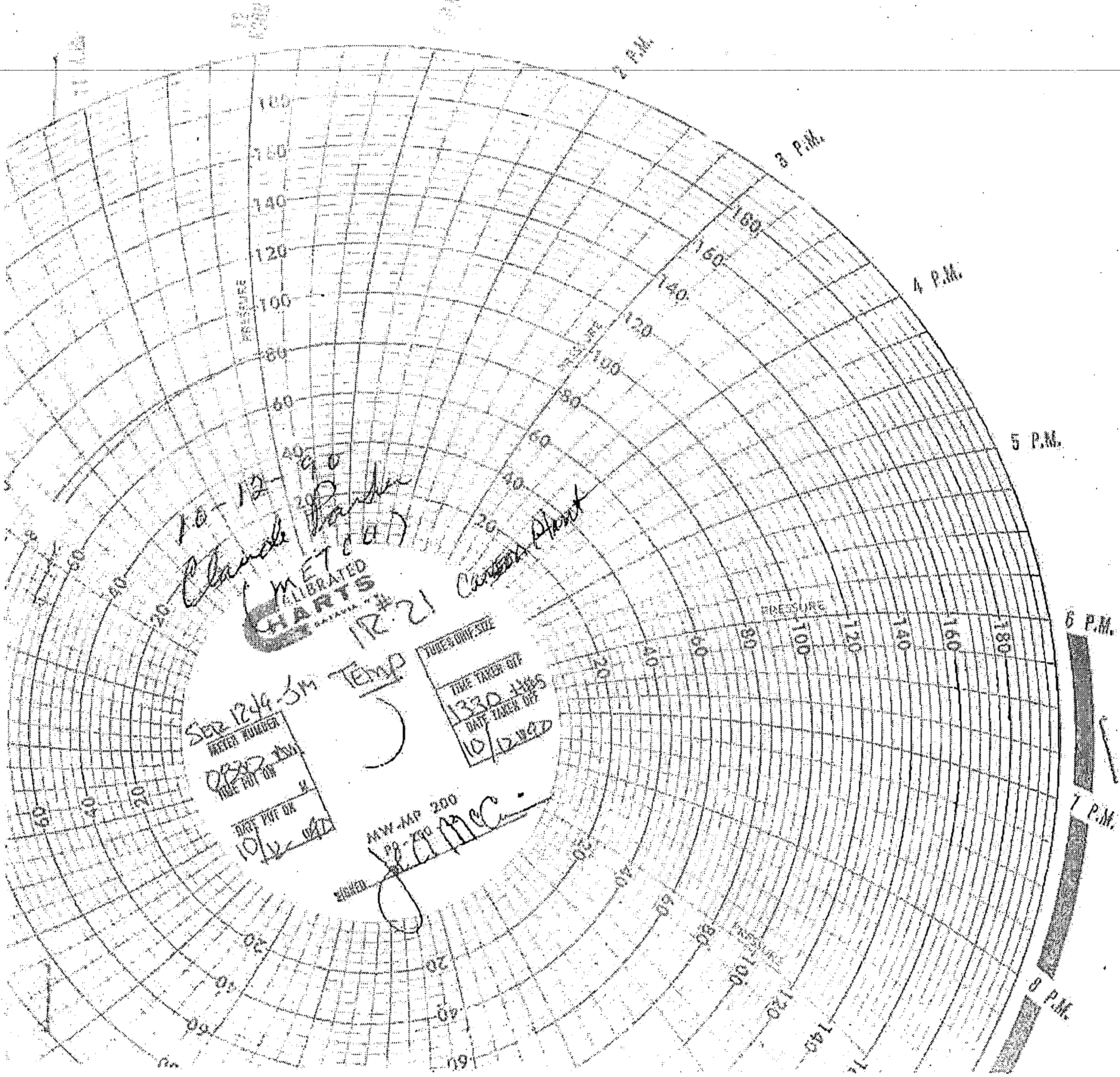
DATE: 10-12-90 LOCATION: Wilm. Ref.
TEST PRESSURE: 1080 LINE: I.R. 21

TIME	AMBIENT TEMPERATURE	LINE TEMPERATURE	RECORDER PRESSURE	GAUGE PRESSURE	DEAD WEIGHT TESTER	COMMENTS
9:20	68°	74°	1110	1100	1090	
9:35	69°	76°	1110	1100	1091	
9:50	69°	76°	1110	1100	1091	
10:05	69°	76°	1120	1100	1093	
10:20	72°	76°	1120	1100	1095	
10:35	73°	76°	1120	1100	1098	
10:50	74°	77°	1120	1100	1102	← Bled off 3 gallons
11:05	74°	78°	1115	1095	1090	
11:20	75°	79°	1115	1095	1094	
11:35	76°	79°	1115	1095	1097	
11:50	77°	80°	1120	1100	1103	← Bled off 3 gallons
12:05	77°	82°	1115	1095	1089	
12:20	78°	81°	1120	1095	1093	
12:35	78°	8[illegible]° (80°)	1120	1100	1098	
12:50	78°	80°	1120	1105	1102	← Bled off 2 gallons
1:05	79°	79°	1120	1100	1096	
1:20	79°	80°	1120	1105	1102	← END TEST

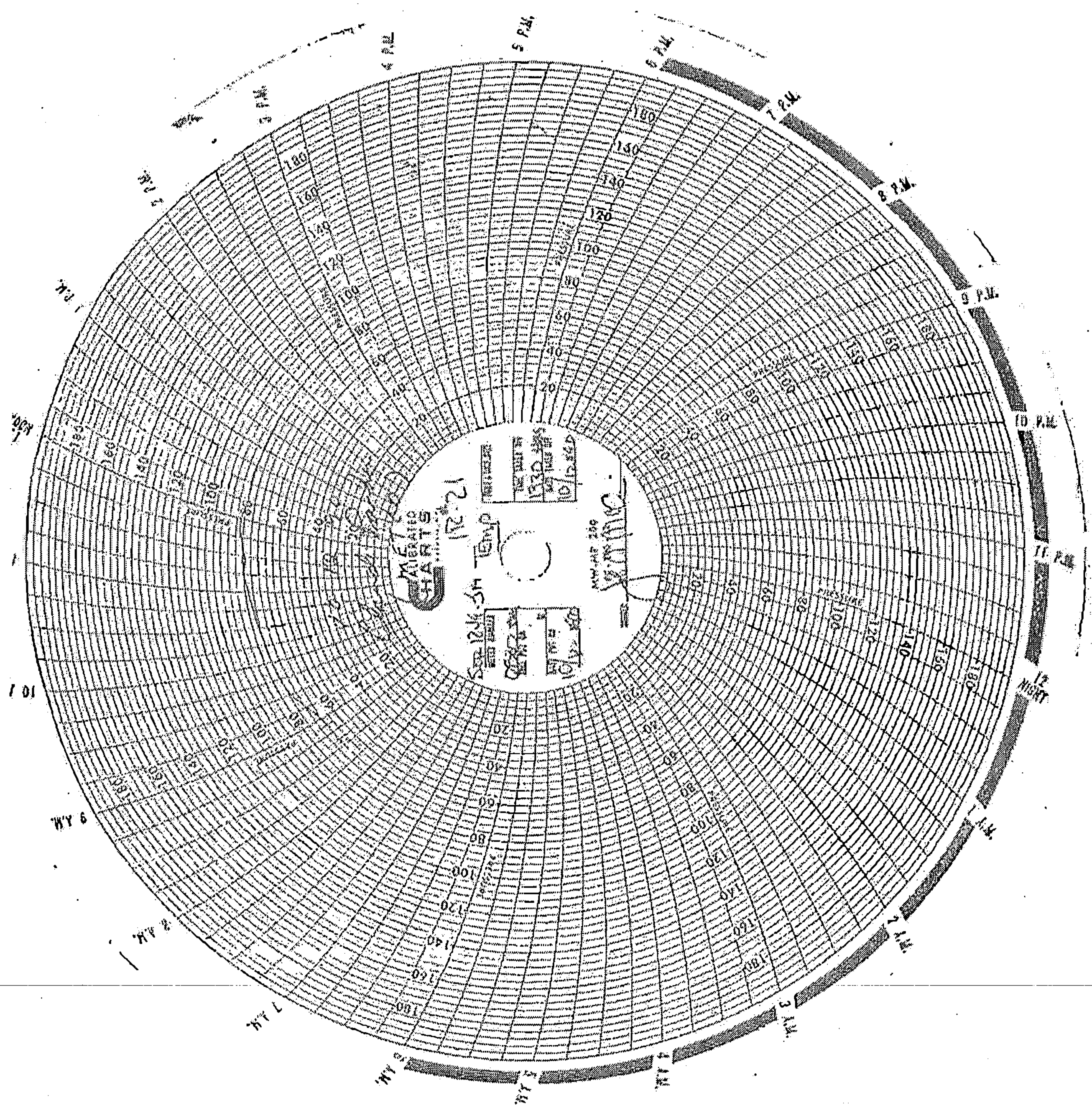
JRW/HD/9/19/85-MTCE



10 A.M.
11 A.M.
12 NOON
1 P.M.
IR-21
Carbon Plant
IR #21
0830 HRS
10/12/90
1330
PX-008520



2 P.M.
3 P.M.
4 P.M.
5 P.M.
6 P.M.
7 P.M.
8 P.M.
PRESSURE
20
40
60
80
100
120
140
160
180
CALIBRATED CHARTS
TUBE & ORIF. SIZE
TIME TAKEN OFF
1330 HRS
DATE TAKEN OFF
METER NUMBER
TIME PUT ON
DATE PUT ON
SIGNED
MW-MP 200
PO-200
SER 1249-3M
TEMP
10-12-90
IR #21


3 P.M.
4 P.M.
5 P.M.
6 P.M.
7 P.M.
8 P.M.
9 P.M.
10 P.M.
11 P.M.
12 NIGHT

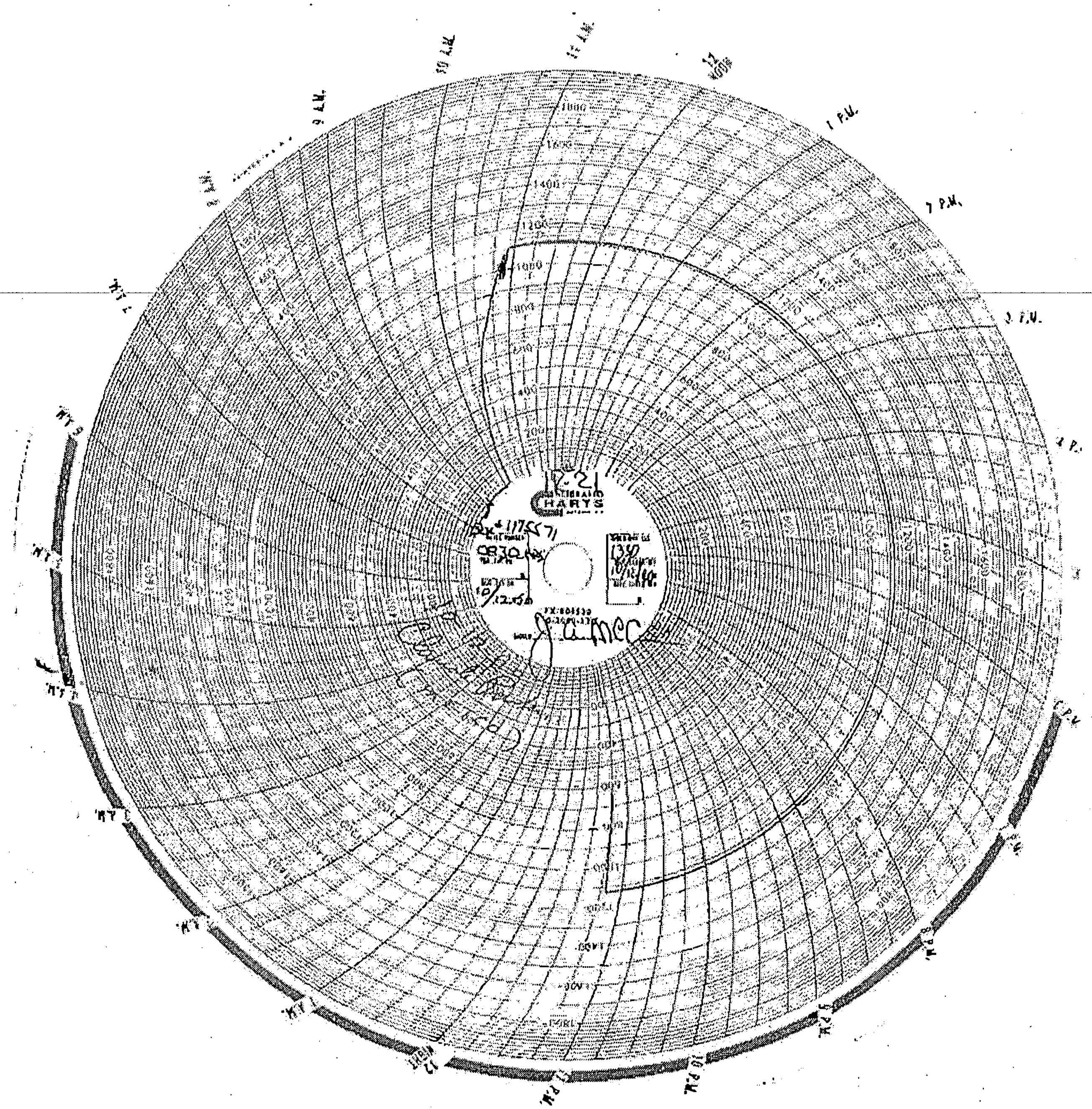


EXHIBIT F

TESORO

PIPE SEGMENT INFORMATION

State: California

Pipeline System Name: Southern California LAR TO Shell Carson Pipelines

Length Inspected:

Segment Name	Pipe Length (ft) per ILI Tool *	Pipe Length (mi) per ILI Tool *	HCA Length (ft) per ILI Tool *	HCA Length (mi) per ILI Tool *
Wilmington 21 Line	16,406	3.1	16,406	3.1
TOTAL	16,408	3.1	16,406	3.1

** This may be different from the BAP footage/mileage*

Date of successful ILI Run: July 7, 2010

SUMMARY

The Wilmington 8" 21 Line Jet pipeline from the Alameda Sepulvada Manifold to the Shell Carson Terminal was internally inspected by means of an NDT (Tuboscope) high resolution Geometry/IMU/MFL Combo ILI tool as part of Tesoro's Integrity Management Plan. The pipeline was evaluated to Tesoro Refining & Marketing Company's ILI specifications.

The results from the initial ILI report dated 8-18-2010 showed no Immediate, (1) - 60 day repair and no 180-day required repairs. Confirmation digs were completed to validate tool accuracy. All digs were completed by January 2011. The dig information is as follows.

ILI Results from Report

Categorization of Anomaly	# Anomalies excavated based on initial report	# Conditions identified after excavation and NDE	# Anomalies Repaired by steel or composite sleeve	# Anomalies Mitigated – re-taped	# Conditions for which No Repair Required
Immediate – (HCA, IMP-Required)	0	0	0	0	0
60 Day – (HCA, IMP-Required)	1	0	1	0	0
180 Day – (HCA, IMP-Required)	0	0	0	0	0
Misc-Not IMP Required	5	0	5	0	0

Dig #1 was a 45% corrosion anomaly with other multiple metal loss anomalies with an eight inch span. A Type B sleeve was installed. Digs #2, the only DOT required dig, was a dent over 3% found on the bottom of the pipe that was repaired with a Type B sleeve. A small scrap was found in the dent but was underneath good coating. This was probably done during the manufacturing/coating process. Dig #3 was a 42% metal loss with four other pits in close proximity that was repaired with a Type B sleeve. Dig #4 was a 49% metal loss with two other pits in close proximity that was repaired with a Type B sleeve. Dig #5 was only a 47% metal loss anomaly with three other pits in close proximity that was repaired with a Type B sleeve. Dig #6 was a 42% metal loss with six other pits in close proximity that was repaired with a Type B sleeve.

The results of the confirmation dig are follows:

ILI Dig Results from Final Report:

INITIAL ILI ITEM or LOCATION	DIG #	TYPE OF ANOMALY	ILI INITIAL REPORT - % DEPTH	FIELD NDE - % DEPTH	REPAIR	COMMENTS
3181.183	1	MLOS	45	35	Type B Sleeve	
4764.642	2	Dent	3.25	2.99	Type B Sleeve	
~~4773.975~~	~~3~~	~~MLOS~~	~~42~~	~~42~~	~~Type B Sleeve~~	
4773.975	3	MLOS	41	40	Type B Sleeve	
7377.992	4	MLOS	49	32	Type B Sleeve	
9160.392	5	MLOS	47	59	Type B Sleeve	
13845.508	6	MLOS	42	30	Type B Sleeve	

After reviewing the seven results from the six digs, four out of seven field-measured anomaly depths were within tool tolerance. Of the three that were over the tool tolerance, two anomalies were only two percent over and the third was seven percent. All the anomalies were overcalls with the exception of one. The results of the B31G Modified remaining burst pressure at all dig locations were well above the MOP of the pipeline.

Mistras performed a visual inspection and Ultrasonic Testing as well as all anomaly measurements at the anomaly locations. Mistras also performed Black on White Contrast Magnetic Particle Testing (external) at all locations. No indications of SCC were found at any of the anomaly locations.

Based on the results above from the 2010 ILI digs and with the tool tolerance overages minimal, the overall findings were satisfactory.

Titles and Signatures of Individuals involved in this Closure Report:

Pipeline Integrity Engineer: **Rick Parkinson**

Integrity Management Program Director: **Bernie Frieh, Manager of Environmental Compliance & Training**

Contract Engineer: **Keith Edwards**

n	ID/OD	Odometer ft	Milepost	Distance to Next Feature ft	Wall Thickness (nominal) inches	Pipe Grade	MAOP psi	Long Seam Orientation o'clock Long Seam Type	Depth %	Depth inches	Length inches	Width inches	Orientation o'clock	Calculated Burst psi	CAOP 0.85dl psi	Rupture Pressure Ratio	Depth %	Depth inches	Length inches	Width inches	Calculated Burst psi	CAOP 0.85dl psi	Rupture Pressure Ratio	Depth %	Depth inches	Wall Thickness (nominal) inches	Length inches	Width inches	Orientation o'clock	Calculated Burst psi	CAOP 0.85dl psi	Ru Pre R
		EVENT DESCRIPTION							METAL LOSS - PREDICTED								METAL LOSS - WITH TOOL TOLERANCE							[illegible]								
		0.000	0.000	1.017	0.000	B	720	ERW																								
		3170.325	0.600	2.717	0.322	B	720	ERW																								
	E	3172.842	0.600	0.209	0.322	B	720	ERW	26	0.084	0.8	0.8	6:26	3133	720	1.37	36	0.115	1.4	1.5	3141	720	1.20									
	E	3173.150	0.600	0.025	0.322	B	720	ERW	17	0.055	1.2	1.7	3:45	3387	720	1.36	30	0.097	3.0	2.7	3113	720	1.19									
	E	3173.175	0.600	0.500	0.322	B	720	ERW	22	0.071	1.5	1.3	8:25	3289	720	1.38	32	0.103	1.8	2.3	3073	720	1.18									
	E	3174.073	0.600	0.667	0.322	B	720	ERW	20	0.054	0.7	1.4	8:20	3323	720	1.37	30	0.097	1.5	2.4	3104	720	1.21									
	E	3174.742	0.600	1.390	0.322	B	720	ERW	21	0.066	0.8	1.5	7:00	3337	720	1.38	31	0.100	1.4	2.5	3160	720	1.22									
	E	3176.009	0.600	1.270	0.322	B	720	ERW	23	0.074	0.8	1.0	4:20	3320	720	1.37	33	0.106	1.4	2.0	3165	720	1.21									
	E	3176.289	0.600	0.728	0.322	B	720	ERW	23	0.074	3.2	4.2	6:50	3120	720	1.30	33	0.106	3.0	5.2	2891	720	1.11									
	E	3177.009	0.600	3.479	0.322	B	720	ERW	21	0.066	0.4	1.7	5:10	3332	720	1.28	31	0.100	1.4	2.7	3180	720	1.22									
	E	3180.463	0.600	0.117	0.322	B	720	ERW	35	0.113	1.2	1.0	11:15	3183	720	1.22	45	0.145	2.0	2.0	2886	720	1.10									
	E	3180.580	0.600	0.563	0.322	B	720	ERW	25	0.081	2.3	1.9	1:40	3060	720	1.19	35	0.113	3.1	2.9	2863	720	1.00									
	E	3181.193	0.600	0.575	0.322	B	720	ERW	45	0.145	0.8	1.3	10:10	3229	720	1.34	55	0.177	1.6	2.3	2620	720	1.10	35.1	0.096	0.273	28.0	3.0	12:00-1:15			
	E	3181.808	0.600	0.334	0.322	B	720	ERW	27	0.087	1.4	1.0	1:40	3300	720	1.32	37	0.119	2.2	2.6	2864	720	1.19									
	E	3182.142	0.600	0.533	0.322	B	720	ERW	32	0.103	1.0	1.0	1:40	3242	720	1.24	42	0.135	1.8	2.0	2570	720	1.14									
	E	3182.675	0.600	0.500	0.322	B	720	ERW	33	0.106	1.1	0.9	1:35	3175	720	1.22	43	0.138	2.1	1.5	2860	720	1.11									
	E	3183.175	0.600	0.367	0.322	B	720	ERW	27	0.087	0.5	0.5	1:35	[illegible]	720	1.29	37	0.119	1.3	1.3	3157	720	1.21									
	E	3183.542	0.600	4.715	0.322	B	720	ERW	28	0.090	0.8	1.7	1:35	3282	720	1.25	38	0.122	1.8	3.7	3005	720	1.18									
		3188.258	0.600	1.525	0.322	B	720	ERW																								
		3189.783	0.600	2.025	0.322	B	720	ERW																								
		[illegible]	0.600	1.459	0.322	B	720	ERW																								
	E	4157.226	0.800	7.434	0.322	B	720	ERW	27	0.087	0.8	0.8	7:05	3281	720	1.20	37	0.119	1.3	1.8	3081	720	1.17									
		4164.642	0.800	3.400	0.322	B	720	ERW	[illegible]	[illegible]	8.8	0.0	3:30				[illegible]	[illegible]						2.99	[illegible]	0.282	8.0	3.8	[illegible]			
		4164.842	0.800	3.400	0.322	B	720	ERW																3.10	[illegible]	0.282						
	E	4170.043	0.800	[illegible]	0.322	B	720	ERW	22	0.071	0.8	0.7	3:25	3330	720	1.27	32	0.103	1.4	1.7	3172	720	1.21									
		4772.843	0.900	0.832	0.322	B	720	ERW																								
	E	4773.675	0.800	0.300	0.322	B	720	ERW	33	0.106	1.2	1.4	2:10	3195	720	1.22	43	0.138	2.0	2.4	2914	720	1.12									
	E	4773.975	0.800	0.767	0.322	B	720	ERW	42	0.135	1.3	1.8	2:00	3103	720	1.10	52	0.167	2.1	3.3	[illegible]	720	1.06	41.84	0.118	0.282	67.0	22.5	12:00-8:45			
	E	4774.742	0.800	1.003	0.322	B	720	ERW	41	0.132	13.5	3.0	3:00	2842	720	0.00	51	0.164	14.3	8.0	2391	720	[illegible]	40.4	0.114	0.282	67.0	22.5	12:00-3:05			
	E	4775.745	0.800	20.681	0.322	B	720	ERW	30	0.097	5.8	9.0	4:35	2745	720	1.05	40	0.129	6.6	10.9	2486	720	0.95									
		4796.425	0.910	24.242	0.322	B	720	ERW																								
		7359.550	1.390	16.975	0.322	B	720	ERW																								
	E	7377.525	1.400	0.401	0.322	B	720	ERW	26	0.084	0.8	0.8	7:00	3303	720	1.28	36	0.125	1.6	1.8	3024	720	1.17									
	E	7377.893	1.400	3.028	0.322	B	720	ERW	34	0.104	5.2	8.0	4:50	2208	720	0.88	38	0.122	6.1	9.0	2218	720	0.77	31.7	0.092	0.290	9.0	10.0	3:15-7:45			
		7381.017	1.400	23.224	0.322	B	720	ERW																								
		9158.408	1.730	5.034	0.277	B	720	SMLS																								
	E	9159.442	1.730	0.483	0.277	B	720	SMLS	32	0.089	0.9	1.8	7:30	2794	720	1.24	42	0.116	1.7	2.8	2556	720	1.14									
	E	9159.925	1.730	0.467	0.277	B	720	SMLS	40	0.111	2.8	4.1	8:10	2371	720	1.05	50	0.138	3.6	5.1	2095	720	0.93									
	E	9160.392	1.730	33.700	0.277	B	720	SMLS	47	0.120	3.2	6.8	8:35	2100	720	0.88	57	0.155	4.0	10.2	1924	720	0.85	38.4	0.107	0.281	33.0	7.6	6:00-9:15			
		9194.092	1.740	37.308	0.277	B	720	SMLS																								
		9231.600	1.750	41.617	0.277	B	720	SMLS																								
		[illegible]	2.670	2.109	0.277	B	720	SMLS					12:00																			
	E	[illegible]	2.600	2.550	0.277	B	720	SMLS	17	0.047	0.9	1.4	4:30	2846	720	1.27	27	0.075	1.7	2.4	2751	720	[illegible]									
	E	13841.026	2.600	1.187	0.277	B	720	SMLS	28	0.078	1.6	1.7	1:35	2689	720	1.10	38	0.105	2.4	2.7	2467	720	[illegible]									
	E	13842.075	2.600	1.467	0.277	B	720	SMLS	28	0.072	1.1	1.7	1:50	2788	720	1.24	36	0.103	1.8	2.7	2670	720	1.15									
	E	13843.542	2.600	0.416	0.277	B	720	SMLS	28	0.078	2.0	2.1	2:50	[illegible]	720	1.18	38	0.105	2.8	3.1	2409	720	1.07									
	E	13843.958	2.600	0.259	0.277	B	720	SMLS	25	0.069	1.0	0.9	3:10	2807	720	1.26	35	0.097	1.8	1.9	3000	720	1.18									
	E	13844.217	2.600	1.291	0.277	B	720	SMLS	30	0.081	1.8	2.6	2:10	2656	720	1.16	43	0.119	2.4	3.6	2395	720	1.07									
	E	13845.508	2.600	2.159	0.277	B	720	SMLS	42	0.116	1.0	1.8	10:50	2754	720	1.21	52	0.144	1.8	3.6	[illegible]	720	1.07	35	0.097	0.278	3.0	3.5	0.5			
		[illegible]	2.600	[illegible]	0.277	B	720	SMLS																								
		[illegible]	3.110		0.322	B	720	ERW																								

TREAM AGM			NEAREST DOWNSTREAM AGM				WELDS		JOINT LENGTHS			COORDINATES				
Station Number of Upstream AGM	Distance from AGM to Feature ft	Calculated Station Number of Feature	Description	Station Number of Downstream AGM	Distance from AGM to Feature ft	Calculated Station Number of Feature	Distance to Nearest Upstream Weld ft	Distance to Nearest Downstream Weld ft	Upstream Joint Length ft	Current Joint Length ft	Downstream Joint Length ft	Latitude	Longitude	Elevation ft	Comments	Rule
0	0.000	0.000	AGM MP 1.38	7275	4186.[illegible]	-11.[illegible]	0.000	1.017	0.000	1.000	0.000	33.8[illegible]	-118.23594361	31.529	Launch MP 0.00 Alameda Sepulveda	
2998	159.[illegible]	3157.[illegible]	AGM MP 1.38	7275	4116.707	3160.[illegible]	23.[illegible]	18.[illegible]	23.[illegible]	18.[illegible]	1.525	33.815[illegible]	-118.23345933	49.370		
2998	162.700	3160.700	AGM MP 1.38	7275	4114.050	3160.950	2.717	15.317	23.723	18.033	1.525	33.81535354	-118.2334[illegible]	49.[illegible]		
2998	162.[illegible]	3160.[illegible]	AGM MP 1.38	7275	4113.842	3161.158	2.[illegible]	15.108	23.723	18.033	1.525	33.81535370	-118.2334[illegible]	49.337		
2998	162.[illegible]	3160.[illegible]	AGM MP 1.38	7275	4113.017	3161.183	7.[illegible]	[illegible]	23.723	18.033	1.525	33.8153[illegible]	-118.2334[illegible]	49.337		
2998	163.633	3161.633	AGM MP 1.38	7275	4112.917	3162.083	3.[illegible]	14.183	23.723	18.033	1.525	33.81535435	-118.2334[illegible]	49.311		
2998	164.500	3162.500	AGM MP 1.38	7275	4112.550	3162.[illegible]	4.517	13.517	23.723	18.033	1.525	33.81535484	-118.2334[illegible]	49.295		
2998	165.766	3163.766	AGM MP 1.38	7275	4110.884	3164.016	5.733	12.300	23.723	18.033	1.525	33.81535577	-118.23347779	49.282		
2998	166.041	3164.041	AGM MP 1.38	7275	4110.708	3164.291	6.058	11.975	23.723	18.033	1.525	33.81535594	-118.23347878	49.255		
2998	166.766	3164.766	AGM MP 1.38	7275	4109.984	3165.016	6.783	11.250	23.723	18.033	1.525	33.8153[illegible]	-118.2334[illegible]	49.236		
2998	170.241	3168.241	AGM MP 1.38	7275	4106.509	3168.491	10.258	7.775	23.723	18.033	1.525	33.8153[illegible]	-118.23349[illegible]	49.147		
2998	170.358	3168.358	AGM MP 1.38	7275	4106.392	3168.608	10.375	7.658	23.723	18.033	1.525	33.8153[illegible]	-118.2334[illegible]	49.14[illegible]		
2998	170.841	3168.841	AGM MP 1.38	7275	4105.[illegible]	3169.191	10.[illegible]	7.[illegible]	23.723	18.033	1.525	33.8153[illegible]	-118.2334[illegible]	49.127	Type B Sleeve Repair	
2998	171.[illegible]	3169.[illegible]	AGM MP 1.38	7275	4105.184	3169.[illegible]	11.[illegible]	6.450	23.723	18.033	1.525	33.8153[illegible]	-118.2334[illegible]	49.114		
2998	171.[illegible]	3169.[illegible]	AGM MP 1.38	7275	4104.650	3170.150	11.917	6.117	23.723	18.033	1.525	33.815[illegible]	-118.23349754	49.104		
2998	172.433	3170.433	AGM MP 1.38	7275	4104.317	3170.683	12.450	5.583	23.723	18.033	1.525	33.8153[illegible]	-118.23349916	49.094		
2998	172.933	3170.933	AGM MP 1.38	7275	4103.8[illegible]	3171.1[illegible]	12.950	5.083	23.723	18.033	1.525	33.81536058	-118.23350070	49.085		
2998	173.300	3171.300	AGM MP 1.38	7276	4103.[illegible]	3171.5[illegible]	13.317	4.717	23.723	18.033	1.525	33.81536097	-118.23350204	49.075		
2998	178.016	3176.016	AGM MP 1.38	7275	4098.734	3176.2[illegible]	18.033	1.525	18.033	1.525	37.400	33.81536421	-118.23351707	48.[illegible]86		
2998	179.541	3177.541	AGM MP 1.38	7276	4097.209	3177.791	1.525	37.400	1.525	37.400	34.343	33.815[illegible]	-118.23352181	48.944		
2998	1738.516	4736.516	AGM MP 1.38	7275	2538.234	4736.7[illegible]	21.917	24.225	21.917	24.225	23.442	33.815[illegible]	-118.23[illegible]	31.555		
2998	1746.[illegible]	4744.[illegible]	AGM MP 1.38	7275	2528.784	4745.210	[illegible]	15.775	21.917	24.225	23.442	33.815[illegible]	-118.23[illegible]	31.542		
2998	1754.[illegible]	4752.[illegible]	AGM MP 1.38	7275	[illegible]	[illegible]	[illegible]	[illegible]	21.917	24.225	23.442	33.815[illegible]	-118.23[illegible]	31.5[illegible]	[illegible] Type B Sleeve Repair	[illegible]
2998	1754.[illegible]	4752.[illegible]	AGM MP 1.38	7275	[illegible]	[illegible]	[illegible]	[illegible]	21.917	24.225	23.442	33.815[illegible]	-118.23[illegible]	31.5[illegible]	Dent external [illegible]	[illegible]
2998	1759.[illegible]	4757.[illegible]	AGM MP 1.38	7275	2510.[illegible]	4758.[illegible]	21.[illegible]	2.342	21.917	24.225	23.442	33.815[illegible]	-118.2357[illegible]	31.[illegible]		
2998	1762.[illegible]	4760.[illegible]	AGM MP 1.38	7275	2514.[illegible]	4760.[illegible]	24.225	23.442	24.225	23.442	24.242	33.815[illegible]	-118.235[illegible]	31.[illegible]		
2998	1763.[illegible]	4761.[illegible]	AGM MP 1.38	7275	2513.317	4761.683	0.[illegible]	23.750	24.225	23.442	24.242	33.8150[illegible]	-118.23572385	31.381		
2998	1763.[illegible]	4761.[illegible]	AGM MP 1.38	7275	2513.017	4761.983	[illegible]	23.450	24.225	23.442	24.242	33.815[illegible]	-118.2357[illegible]	31.3[illegible]	Type B Sleeve Repair	
2998	1764.[illegible]	4762.[illegible]	AGM MP 1.38	7275	2512.[illegible]	4762.[illegible]	1.[illegible]	21.[illegible]	24.225	23.442	24.242	33.815[illegible]	-118.2357[illegible]	31.[illegible]		
2998	1765.[illegible]	4763.[illegible]	AGM MP 1.38	7275	2511.[illegible]	4763.750	2.758	[illegible]	24.225	23.442	24.242	33.815[illegible]	-118.23573000	31.3[illegible]		
2998	1786.183	4784.183	AGM MP 1.38	7275	2490.567	4784.433	23.442	24.242	23.442	24.242	23.[illegible]	33.8156[illegible]	-118.2357[illegible]	31.0[illegible]		
7275	71.[illegible]	7346.[illegible]	AGM MP 1.93 I-405	9912	2564.[illegible]	7347.258	22.725	22.4[illegible]	22.725	22.457	23.258	33.822[illegible]	-118.2416[illegible]	20.[illegible]		
7275	80.533	7355.533	AGM MP 1.93 I-405	9912	2545.[illegible]	7355.[illegible]	[illegible]	3.4[illegible]	22.725	22.457	23.258	33.822[illegible]	-118.2416[illegible]	20.[illegible]		
7275	81.[illegible]	7356.[illegible]	AGM MP 1.93 I-405	9912	2545.[illegible]	7356.[illegible]	[illegible]	3.[illegible]	22.725	22.457	23.258	33.822[illegible]	-118.2416[illegible]	20.[illegible]	Type B Sleeve Repair	
7275	84.0[illegible]	7359.0[illegible]	AGM MP 1.93 I-405	9912	2542.[illegible]	7359.7[illegible]	22.[illegible]	21.[illegible]	22.457	19.[illegible]	22.475	33.822[illegible]	-118.2416[illegible]	20.[illegible]		
7275	1867.[illegible]	9142.[illegible]	AGM MP 1.93 I-405	9912	[illegible]	9143.110	18.4[illegible]	[illegible]	18.4[illegible]	[illegible]	37.718	33.825[illegible]	-118.245[illegible]	17.303		
7275	1872.[illegible]	9147.[illegible]	AGM MP 1.93 I-405	9912	763.850	9148.150	6.033	[illegible]50	18.4[illegible]	[illegible]	37.7[illegible]	33.82544671	-118.245[illegible]	17.3[illegible]		
7275	[illegible]	9147.933	AGM MP 1.93 I-405	9912	[illegible]	9148.[illegible]	[illegible]	[illegible]	18.4[illegible]	[illegible]	37.7[illegible]	33.825[illegible]	-118.24562563	17.[illegible]		
7275	1873.400	9148.400	AGM MP 1.93 I-405	9912	[illegible]	9149.1[illegible]	[illegible]	[illegible]	18.4[illegible]	[illegible]	37.7[illegible]	33.825[illegible]	-118.245[illegible]	17.4[illegible]	Type B Sleeve Repair	
7275	1907.100	9182.100	AGM MP 1.93 I-405	9912	729.200	9182.600	[illegible]	37.7[illegible]	[illegible]	37.7[illegible]	41.817	33.82544680	-118.24573879	16.[illegible]		
7275	1944.808	9219.808	AGM MP 1.93 I-405	9912	691.492	9220.[illegible]	37.708	41.817	37.708	41.817	40.158	33.82544720	-118.24586353	16.975		
9912	3912.[illegible]	138[illegible]	AGM MP 2.79 213 St	14537	711.083	13825.917	7.350	9.300	1.[illegible]	16.[illegible]	43.675	33.8333[illegible]	-118.256[illegible]	10.7[illegible]	Tap	
9912	3916.1[illegible]	13827.1[illegible]	AGM MP 2.79 213 St	14537	708.975	13828.[illegible]	[illegible]	7.1[illegible]	1.[illegible]	16.[illegible]	43.675	33.83331[illegible]	-118.256[illegible]	10.213		
9912	3917.7[illegible]	13828.71[illegible]	AGM MP 2.79 213 St	14537	706.442	13830.[illegible]	11.[illegible]	4.[illegible]	1.[illegible]	16.650	43.675	33.8333[illegible]	-118.256[illegible]470	10.203		
9912	3918.7[illegible]	13829.7[illegible]	AGM MP 2.79 213 St	14537	705.375	13831.628	1[illegible]	[illegible]	1.[illegible]	16.650	43.675	33.8333[illegible]	-118.256[illegible]	10.200		
9912	3920.260	13832.250	AGM MP 2.79 213 St	14537	703.808	13833.092	14.[illegible]	2.125	1.[illegible]	16.650	43.675	33.83332204	-118.25639990	10.200		
9912	3920.[illegible]	13832.666	AGM MP 2.79 213 St	14537	70[illegible]	1383[illegible]	14.942	1.708	1.958	16.650	43.675	33.8333[illegible]	-118.256[illegible]	10.[illegible]		
9912	3920.925	13832.925	AGM MP 2.79 213 St	14537	703.233	13833.[illegible]	15.2[illegible]	1.4[illegible]	1.958	16.650	43.675	33.833323[illegible]	-118.25640[illegible]	10.[illegible]		
9912	3922.[illegible]	13834.[illegible]	AGM MP 2.79 213 St	14537	701.[illegible]	138[illegible]	[illegible]	0.1[illegible]	1.[illegible]	16.[illegible]	43.675	33.8333[illegible]	-118.256[illegible]	10.2[illegible]	Type B Sleeve Repair	
9912	3922.375	13834.375	AGM MP 2.79 213 St	14537	701.[illegible]	13835.217	16.650	43.675	16.650	43.675	42.192	33.8333[illegible]	-118.256[illegible]	10.2[illegible]		
16396	0.000	16896.000	Trap MP 3.10 Shell Carson	16396	0.000	16896.[illegible]	0.892		1.683			33.83[illegible]	-118.25236190	24.[illegible]	Trap MP 3.10 Shell Carson	

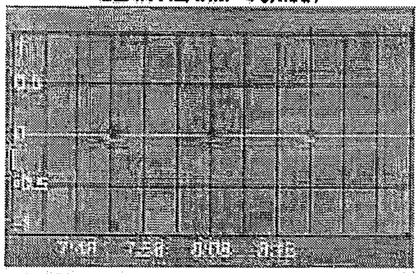
EXHIBIT G

ATMOS LEAK DETECTION - LINE 21/7 AVJET

5/23/2011 8:35:00 AM
353.71

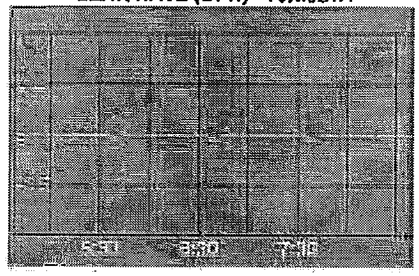
HOME

LEAK ALARM - 70XI321

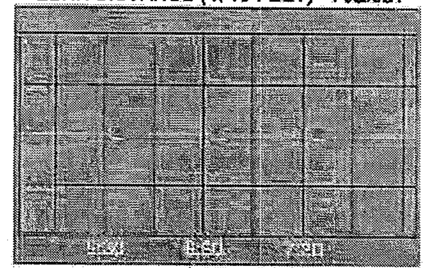


0 = No Leak 1 or 2 = Leak Alarm

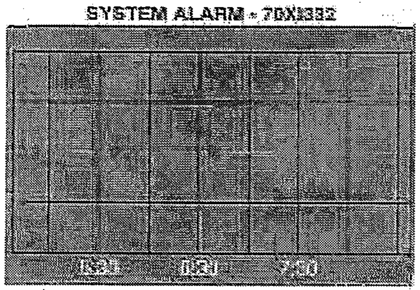
LEAK RATE (BPH) - 70XI321A



LEAK DISTANCE (x 10 FEET) - 70ZI321



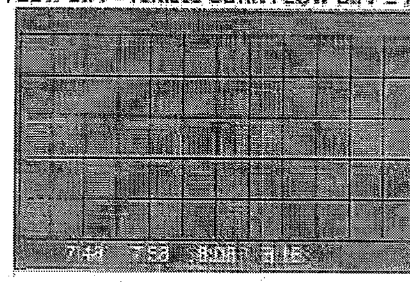
SYSTEM ALARM - 70XI332



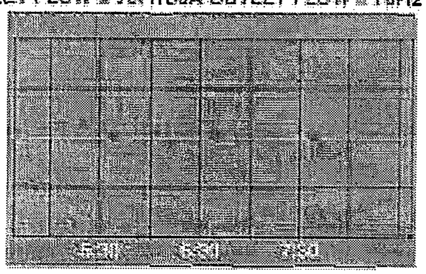
LEGEND FOR SYSTEM ALARM 70XI332

0 = No System Alarm
100 = Inlet Flow Stuck (70FI100A)
120 = Outlet Flow Stuck (70FI21A)
200 = Inlet Pressure Stuck (70PI101)
220 = Outlet Pressure Stuck (70PI5306)
300 = Inlet Flow Zero (70FI100A)
320 = Outlet Flow Zero (70FI21A)

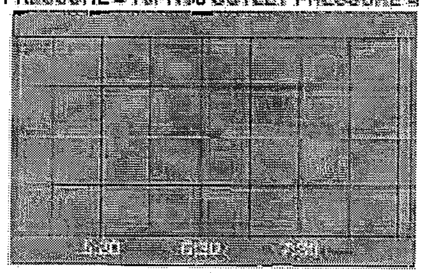
MEAN FLOW DIFF = 70XI305 CORR FLOW DIFF = 70XI305A



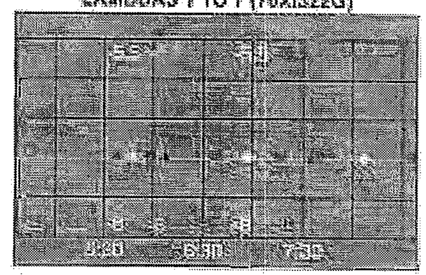
INLET FLOW = 70FI100A OUTLET FLOW = 70FI21A



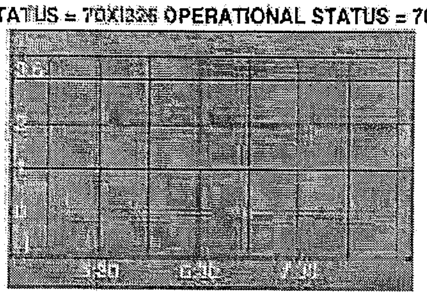
INLET PRESSURE = 70PI100 OUTLET PRESSURE = 70PI21



LAMBDAS 1 TO 7 (70XI322G)



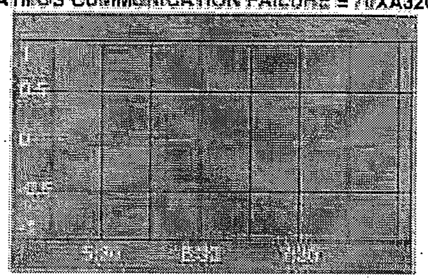
LINE STATUS = 70XI326 OPERATIONAL STATUS = 70XI328



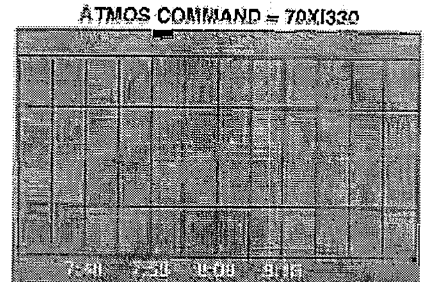
70XI326: 1 = RUNNING 2 = STOPPED 3 = SHUT IN
70XI328: 0 = NORMAL 1 = SMALL CHANGE 2 = LARGE CHANGE

ATMOS COMMUNICATION FAILURE = 70XA320

NORMAL



ATMOS COMMAND = 70XI330



0 = NO COMMAND 2 = RESTART 4 = SLEEP
1 = INITIALIZE 3 = RETURNE

PROJECT US-1436-TESORO

Tesoro LAR Line 7/21 and Line 28/32

SITE ACCEPTANCE TEST Document

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August 2008

Prepared For Tesoro Los Angeles Refinery

US-1436-TESORO-SAT-001 Rev. 1.1; Completed

Contents

1 INTRODUCTION

1.1 OVERVIEW

ATMOS International (ATMOSi) is to implement the statistical Leak Detection System (LDS) software on Tesoro's Los Angeles Refinery (LAR) AvJet and Gasoline/Diesel pipelines referred to as Line 7/21 and Line 28/32, respectively. They originate at the Tesoro RP&S; Line 28/32 has its initial metering at the Refinery while Line 7/21 has its initial metering at the Kinder Morgan manifold, with outlet metering at the Shell Carson Terminal. Neither pipeline has intermediate available instrumentation. Both pipelines are approximately 6 miles in length. Line 7/21 has an outside diameter (OD) of 8" and Line 28/32 has an OD of 12".

An overview of the pipelines is shown in Figures 1 & 2.

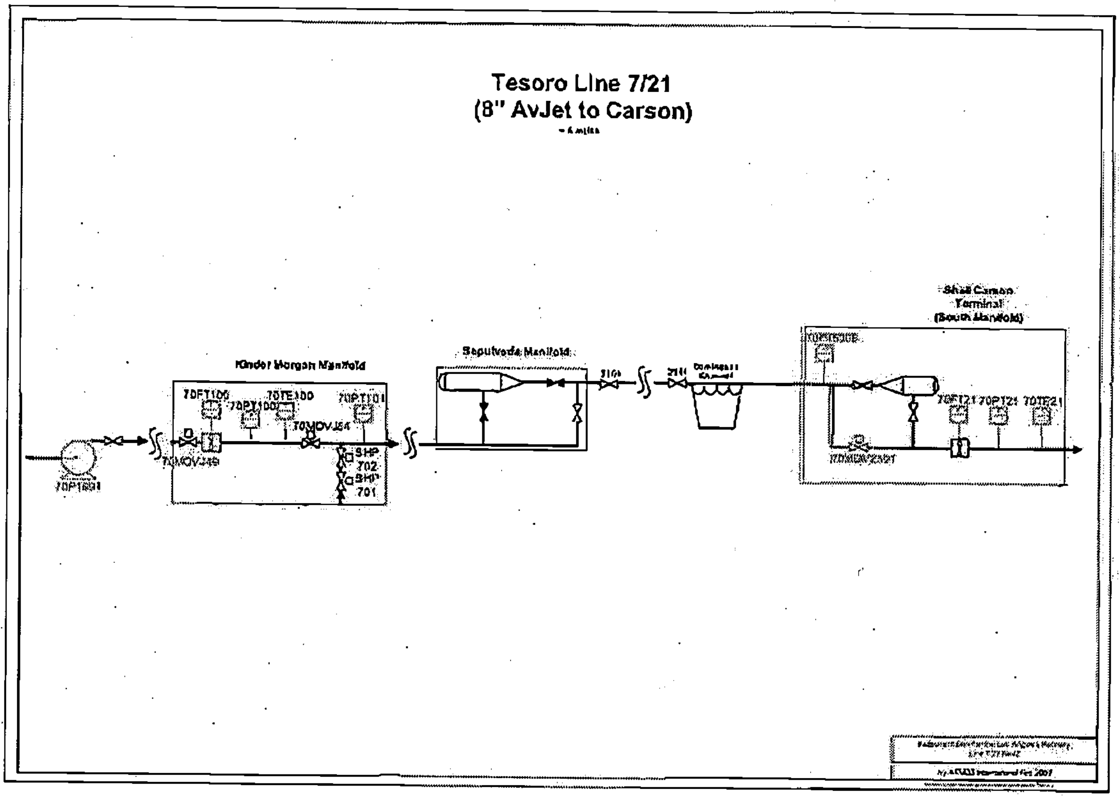

FIGURE 1: SCHEMATIC DIAGRAM OF LINE 7/21 (AVJET PIPELINE)

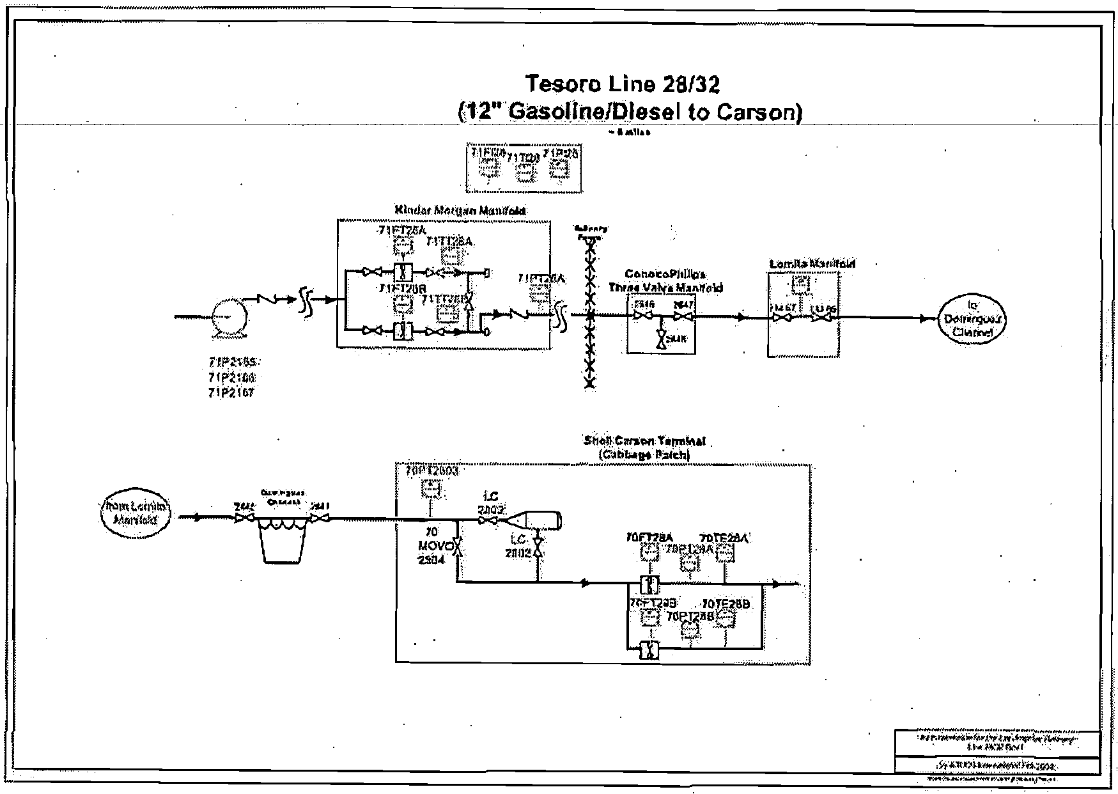

FIGURE 2: SCHEMATIC DIAGRAM OF LINE 28/32 (GASOLINE/DIESEL PIPELINE)

This document specifies the Site Acceptance Tests (SAT) to be carried out to prove the functionality of the leak detection software for Tesoro. It is not intended to test all possible situations that the leak detection system would be expected to perform, but aims to demonstrate how ATMOS™Pipe will operate under a leak test under running conditions from the Refinery to Sand Island. Two leak sizes of approximately 1% and 2% of the agreed nominal flow rate will be tested during the SAT while flowing from the Tesoro RP&S to Shell Carson for the both pipelines and a third test of 10% will be performed on the 7/21 line in order to test the leak location.

1.2 LEAK DETECTION SYSTEM DESCRIPTION

The ATMOS™Pipe leak detection software for the pipeline will be situated on the dedicated LDS Server within Tesoro's Central Control Room. The instrument measurements will come from the field PLCs to the ControlLogix (CLX) PLC. Measurements from the CLX PLC are visible on a KEPware OPC server which makes the PLC data available as OPC objects for ATMOS™Pipe to read. Output data from ATMOS™Pipe will be passed back through the OPC Server and back to the CLX PLC as displayed in Figure 3.

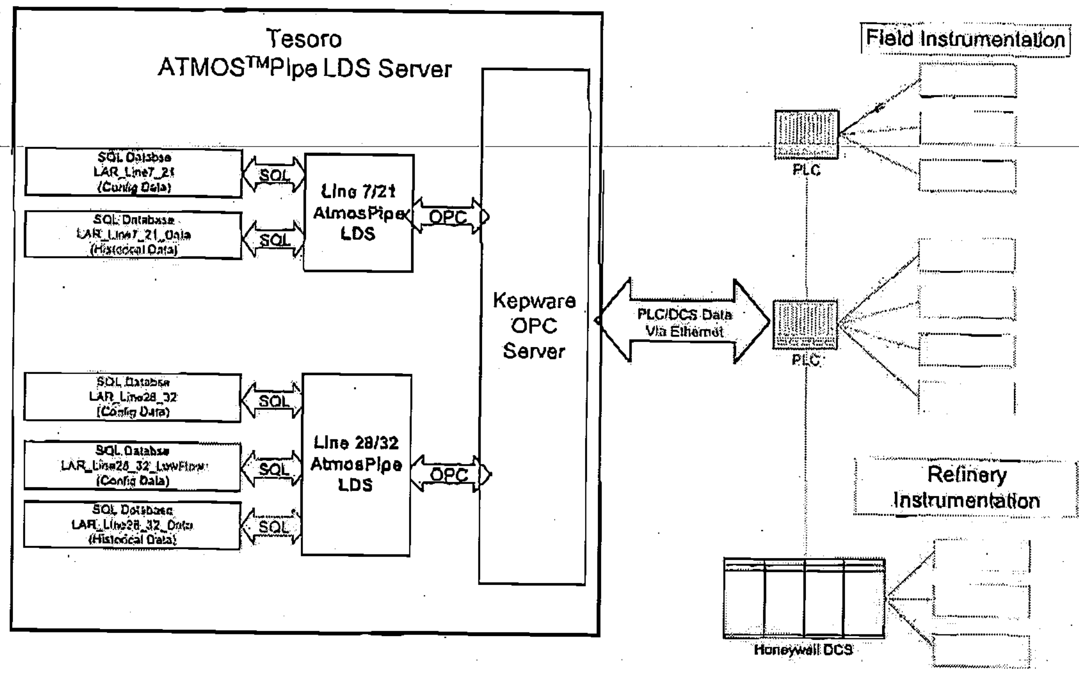

FIGURE 3: PROJECT OVERVIEW SCHEMATIC

The ATMOSTMPipe application will provide output data including pipeline status information and alarms which will be passed through the KEPWare OPC Server and back to the ControlLogix PLC to be read by the DCS.

1.3 SCOPE OF SITE ACCEPTANCE TESTS

The system SAT will be carried out at Tesoro's Refinery in Wilmington (Los Angeles), California.

The tests will cover the operator interface and the operation of the leak detection software.

Three dynamic leak tests will be performed at approximately 1%, 2% and 10% of the agreed nominal flow rate (1600bph) for the AvJet Line.

Two dynamic leak tests will be performed at approximately 1% and 2% of the agreed nominal flow rate (6000bph) for the Gasoline/Diesel Line. Please note the nominal flow rate is based upon the operating scenario solely dictated by the actual pipeline flow rate.

The ATMOS™Pipe Server has been installed on site since May 2008 and began data collection early-June 2008. This data was then transferred to ATMOSi offices in California via email. This site data was then passed through an offline ATMOS™Pipe system to allow the application to be configured and tuned.

During this data collection and tuning period, communications issues were identified. Therefore the leak test for the SAT cannot be performed until ATMOSi determines that all necessary data points show the correct state so that ATMOS™Pipe may determine that the line is running.

1.4 LEAK DETECTION SYSTEM PERFORMANCE CRITERIA

The following table shows target performance criteria for the Tesoro Los Angeles Refinery leak detection system based upon the data seen from site to date. The pass criteria for the leak test sections of the SAT are that system leak detection performance is demonstrated in accordance with these performance targets.

Leak size estimates are expected to have an accuracy of ±5% of real leak size or better.

Leak location accuracy: As a general rule, the location error decreases exponentially as the leak size increases.

Leak detection takes advantage of the ATMOS™Pipe system's ability to learn about the instrumentation system and compensate for errors and it is therefore the repeatability of the instrument measurements, which has the dominant effect rather than their absolute accuracy. However, leak location estimation depends on the accuracy of the measurements. For large leaks (greater than 10% of flow) an accuracy of ±5% of total pipeline length is achievable.

1.4.1 Leak Detection Performance Estimates for Line 7/21

The following tables show the desirable leak sizes and respective detection times based upon the data seen from site at this point.

Leak Rate	Leak Rate (barrels/hr)	Detection Time (min)
1%	16	60
2%	32	40
5%	80	30
10%	160	20
20%	320	12
30%	480	4
40%	640	2

Table 1.1: Line 7/21 (AvJet) Estimated Leak Detection Time and Sizes under Normal Running Conditions

The leak sizes above are based upon the originally agreed nominal flow rate of 1600 barrels/hr

1.4.2 Leak Detection Performance Estimates for Line 28/32

Leak Rate	Leak Rate (barrels/hr)	Detection Time (min)
1%	60	60
2%	120	40
5%	300	30
10%	600	20
20%	1200	12
30%	1800	4
40%	2400	2

Table 1.2: Line 28/32 (Gasoline/Diesel) Estimated Leak Detection Time and Sizes under Normal Running Conditions

The leak sizes above are based upon the originally agreed nominal flow rate of 6000 barrels/hr

2 SAT SCHEDULE

2.1 OVERVIEW

The dynamic leak test for Line 28/32 will be done by Tesoro during a transfer from the RP&S at the Los Angeles Refinery to the Shell Carson Terminal. Two leak tests will be performed, one of approximately 1% and one of approximately 2% of the agreed nominal flow rate. At these low flow rates the accuracy of the leak location algorithm cannot be verified.

The dynamic leak test for Line 28/32 will be done by Tesoro during a transfer from the RP&S at the Los Angeles Refinery to the Shell Carson Terminal. Two leak tests will be performed, one of approximately 1% and one of approximately 2% of the agreed nominal flow rate. At these low flow rates the accuracy of the leak location algorithm cannot be verified. A third test of approximately 10% will be performed on Line 7/21 in order to test the leak location algorithm.

As each test section is completed, results should be recorded in the Site Acceptance Test Form, which is attached as Appendix I to this specification.

Any software snags or non compliances should be noted in the appendix section for investigation and corrective action by ATMOSi, and both parties should sign accordingly.

2.2 PREPARATION ACTIONS FOR SAT

Prior to arriving on site for the SAT, Tesoro will have prepared the correct leak testing equipment and personnel.

ATMOSi should confirm that ATMOS™Pipe is running normally and ready for leak test. A leak shall be established at a nominal flow rate by the Tesoro team in the field. Results of the leak test shall be documented in the attached SAT results form.

2.3 METHODOLOGY FOR PERFORMING LEAK TESTS

2.3.1 Leak Test method Line 7/21 (AvJet)

The following procedure for simulating leaks on pipelines for ATMOSi leak detection testing is provided by Tesoro.

"Wet test" pipeline 7 (Avjet line)

- Product removed from the pipeline while the system is transferring product.
- P&T to be present at all times at leak test location while tests are being performed. Vacuum truck to have high pressure hose and carbon canister.
- RP&S control room: 310-522-6061 or 310-522-6017. Radio channel A-6.
- Four tests will be performed in the following manner.

When all parties have confirmed that they are aware that leak detection testing will be taking place:

1. Remove 2" drain valve cap at location designated by P&T representative.
2. Connect vacuum truck to 2" nozzle. Camlock is to be tied in proper manner to prevent it from disconnecting.
3. When all parties are ready, slowly open 2" drain valve, allowing product into the vacuum truck at a 1% leak rate. Note time below when valve is first opened.
4. Field personnel to contact RP&S control room and verify decrease in flow at Shell Houston.
5. When ATMOS leak detection alarms, close 2" drain valve.
6. Calculate approximate bbls discharged into the vacuum truck.
7. Record all required information below.

Test 7W-1.

At Kinder Morgan an amount of 19bbl/hr of product is transferred into the vacuum truck. The leak is 1% of the regular flow ~1900bbl/hr and should be detected and alarmed by the leak detection system (ATMOS) in less than 60 minutes.

Test 21W-1.

At Shell Carson South Products an amount of 19bbl/hr of product is transferred into the vacuum truck. The leak is 1% of the regular flow ~1900bbl/hr and should be detected and alarmed by the leak detection system (ATMOS) in less than 60 minutes.

2.3.2 Leak Test method Line 28/32 (Gasoline/Diesel)

The following procedure for simulating leaks on pipelines for ATMOSi leak detection testing is provided by Tesoro.

"Wet test" pipeline 32 (Diesel/Gasoline line)

- Product removed from the pipeline while the system is transferring product.
- P&T to be present at all times at leak test location while tests are being performed. Vacuum truck to have high pressure hose and carbon canister.
- RP&S control room: 310-522-6061 or 310-522-6017. Radio channel A-6.
- Four tests will be performed in the following manner.

When all parties have confirmed that they are aware that leak detection testing will be taking place:

8. Remove 2" drain valve cap at location designated by P&T representative.
9. Connect vacuum truck to 2" nozzle. Camlock is to be tied in proper manner to prevent it from disconnecting.
10. When all parties are ready, slowly open 2" drain valve, allowing product into the vacuum truck at a 1% leak rate. Note time below when valve is first opened.
11. Field personnel to contact RP&S control room and verify decrease in flow at Shell Houston.
12. When ATMOS leak detection alarms, close 2" drain valve.
13. Calculate approximate bbls discharged into the vacuum truck.
14. Record all required information below.

Test 32W-1.

At Twin meters LARC Tesoro LAR an amount of 50bbl/hr of product is transferred into the vacuum truck. The leak is 1% of the regular flow ~5000bbl/hr (for a gasoline shipment) and should be detected and alarmed by the leak detection system (ATMOS) in less than 60 minutes.

Test 28W-1.

At Shell Carson Cabbage Patch an amount of 50bbl/hr of product is transferred into the vacuum truck. The leak is 1% of the regular flow ~5000bbl/hr (for a gasoline shipment) and should be detected and alarmed by the leak detection system (ATMOS) in less than 60 minutes.

APPENDIX – SITE ACCEPTANCE TEST FORMS

PROJECT DETAILS

CLIENT:	Tesoro Pipelines, Terminals & Trucking Inc.
PROJECT No.:	U01-79/01
PROJECT TITLE:	Tesoro Los Angeles Refinery Line 7/21 and Line 28/32
SOFTWARE VERSION No.:	3.2.1
TEST PROCEDURE REF:	US-1436-TESORO-SAT-001 Rev 1.0
SCOPE OF TEST:	Site Acceptance
LOCATION:	Tesoro Los Angeles Refinery, Wilmington, CA, USA
DATE:	August 5 & 18, 2008

TEST RESULTS

Paragraph	Description	Result	Comments
2.3.1	Line 28/32 1% Leak (inlet)	(Pass) Fail	
2.3.1	Line 28/32 2% Leak (outlet) (AL) 1%	(Pass) Fail	
2.3.2	Line 7/21 1% Leak 1.5% (AL)	(Pass) Fail	
2.3.2	Line 7/21 2% Leak 0.6% (AL)	(Pass) Fail	
~~2.3.2~~	~~Line 7/21 10% Leak~~	~~Pass / Fail~~	did not test

PERFORMANCE RESULTS

Line 7/21

Test No	Pipeline Status	Leak Size bph -%	Leak Location (Actual)	Leak Started at (PC time)	Leak Detected at	Atmos Detection Time	Expected Detection Time	Atmos Leak Size Estimate	Expected Leak Size Estimate	Atmos Location Estimate (feet)
1	Running	~1.5	0	10:14:33	10:21:49	7 min 15 sec	50 min	27 bph	~25 bph	0
2	Running	~0.6	31680	13:29:02	13:49:33	17 min 15 sec	100 min	10.7 bph	~10 bph	26000
3	Running	10	Did not perform	Did not perform	Did not perform	Did not perform	20 min	Did not perform	~160 bph	Did not perform

Line 28/32

Test No	Pipeline Status	Leak Size bph -%	Leak Location (Actual)	Leak Started at (PC time)	Leak Detected at	Atmos Detection Time	Expected Detection Time	Atmos Leak Size Estimate	Expected Leak Size Estimate	Atmos Location Estimate (feet)
1	Running	1	0	10:40:43	11:23:05	42 min 20 sec	60 min	56.85 bph	~58 bph	11531
1*	Running	1	0	10:53:23*	11:23:05	29 min 40 sec*	60 min	56.85 bph	~58 bph	11531
2	Running	2	31680	13:53:47	14:06:19	12 min 25 sec	40 min	126.7 bph	~125 bph	12420

***Please note the additional asterisked test is the first test with a corrected start time. This time is taken by back extrapolating Lambda-1 to when it crosses the axis created by -7. This is done to give an accurate leak time since Tesoro opened and closed the test valve to varying degrees at the beginning of the test. Also, please be aware, even without the removal of the "extra" time it took to set-up for the leak test; ATMOS™Pipe detected the leak well under the leak performance estimate.**

TEST CONCLUSIONS

	Name in Print	Signature	Date
Test Accepted By Tesoro Refinery:	CRISTINA BORKOVICH	Cristina Borkovich	8/18/08
Test Rejected By:			
Test Witnessed By:	Andrew S.M. López	[signature]	8/18/08

FURTHER COMMENTS & ACTIONS

- LAR/Mangan will pursue whether better resolution can be obtained for line 21 line pressures. → per Tina this should read flows
- LAR still needs to decide whether line 28 ~~SAT needs to be~~ leak test (to verify leak location) needs to be performed again. Line pressure resolution was not resolved after until week after line 28 SAT was performed.

EXHIBIT H

NEWFIELDS

May 23, 2011

Mr. Marc Greenberg
Keesal, Young & Logan
400 Oceangate
Long Beach, CA 90801

Subject: Review of US Coast Guard Forensic Chemistry Analysis, Dominguez Channel Petroleum Samples

Dear Mr. Greenberg,

It is my understanding that several fugitive petroleum samples were collected in environs of the Dominguez Channel in Los Angeles, CA on February 10 and 14, 2011 by contractors for US Environmental Protection Agency (EPA) Region 9 Emergency Response Section. Those samples were submitted to the US Coast Guard Marine Safety Laboratory (MSL) for product identification. The results of those analyses were summarized in a US Coast Guard MSL Oil Sample Analysis Report.[1] Furthermore, it is my understanding that your client, Tesoro Corporation, operates one of several petroleum pipelines in the vicinity where the fugitive petroleum was discovered. Based on our conversations, it is my understanding that the only product shipped through Tesoro Corporation's pipeline has been commercial Jet Fuel (Jet A, or equivalent). You requested that I review the USCG February 23, 2011 MSL Oil Sample Analysis Report, and ascertain if the USCG data shows whether or not the samples collected from the Dominguez Channel contained Jet Fuel.

Samples Analyzed by US Coast Guard Marine Safety Laboratory

Three samples of fugitive petroleum were collected by US EPA, and submitted to the USCG MSL for forensic chemical analysis:

Sample ID	Collection Date
CS-02 (Spill)	2-10-11
CAH-MW-1 (Source)	2-10-11
CP-MW-2 (Source)	2-14-11

Findings

The USCG MSL is a laboratory that specializes in the forensic chemical analysis of petroleum. The types of analytical data generated by this laboratory go far beyond standard contract laboratory analyses, and utilize analytical methods specifically tailored for the detailed analysis of petroleum. The data produced by the USCG MSL can be used to ascertain, among other things, the type(s) of petroleum product(s) that compose fugitive petroleum. The cornerstone for forensic identification of petroleum is gas chromatography. A gas chromatogram is the graphical output from a gas chromatography analysis. The chromatogram, or "fingerprint", depicts the

[1] US Coast Guard, Marine Safety Laboratory. Oil Sample Analysis Report. (for) US EPA Region IX. Case No. 11-125. February 23, 2011.

presence and concentrations of hydrocarbons across a broad boiling hydrocarbon point range, progressing from more to less volatile compounds (left to right). Peaks in the "fingerprint" represent particular compounds, the height of which is proportional to the abundance of those compounds in the petroleum. Every petroleum product has its own unique distribution of peaks (individual hydrocarbons) and thus chromatographic signature. It is this fundamental gas chromatographic feature—the gas chromatographic "fingerprint"—that allows the forensic chemist to identify and distinguish one petroleum product from another. [2]

Gas Chromatograms of Reference Petroleum Products

Figure 1 presents gas chromatograms of reference petroleum products germane to this case. Specifically, gas chromatograms for an automotive gasoline, Jet A, kerosene, and lubricating oil are shown. These chromatograms were developed by NewFields, following forensic chemical methods of analysis very similar to those followed by the USCG MSL.[3] These chromatograms, like those presented by USCG MSL, span the C_9 to C_{35} carbon range, which brackets most petroleum products and crude oils.

Qualitatively, the chromatographic differences among the reference petroleum product are readily evident.

- The 'fingerprint' of *Gasoline* is composed principally of hydrocarbons of carbon number less than C_{12}; the preponderance of the peaks in this chromatogram are those of C_2-C_5 monoaromatics that compose automotive motor fuel.[4]
- The chromatogram for *Jet A* is distinguished by hydrocarbons in about the C_9-C_{17} range, characterized by a distinct unresolved complex mixture ("hump"), superimposed by a regular series of n-alkane hydrocarbon compounds.
- The chromatogram for *Diesel Fuel* is distinguished by hydrocarbons in about the C_{12}-C_{35} range, characterized by a distinct unresolved complex mixture ("hump"), superimposed by a regular series of n-alkane hydrocarbon compounds.
- The chromatogram for *Lubricating Oil* is distinguished by hydrocarbons in about the C_{20}-C_{35} range, characterized by a large, unresolved unresolved complex mixture ("hump") and few, if any, significant individual chromatographic peaks.

These qualitative chromatographic distinctions among different petroleum products form the basis for chemical fingerprinting, i.e., identification of petroleum in environmental samples.[5,6,7]

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[2] Morrison, R.D. 2000. Environmental Forensics. Principles and applications. CRC Press. New York, NY.
[3] Douglas, G.D., Emsbo-Mattingly, S.D., Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2007) Chemical fingerprinting methods. In: Introduction to Environmental Forensics, 2nd Ed., B. Murphy and R. Morrison, Eds., Academic Press, New York, pp. 312-454.
[4] Stout, S.A., Douglas, G.S., and Uhler, A.D. (2006) Automotive gasoline. In: B. Murphy and R. Morrison, Eds., Environmental Forensics: A Contaminant Specific Approach. Elsevier Publishing Co., San Francisco, CA. pp. 466-531.

[5] ASTM. 2000. Standard Test methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography. ASTM D-3328-00. American Society for Testing and Materials International, W. Conshohocken, PA. 7 p.
[6] Stout, S.A., Uhler, A.D., McCarthy, K.J. and Emsbo-Mattingly, S.D. 2002. Chemical Fingerprinting of Hydrocarbons. In: Introduction to Environmental Forensics. (B. Murphy and R. Morrison, Eds.), Academic Press, New York, P. 135-260.

Interpretation of USCG MSL Analytical Data

The USCG analysis of the three Dominguez Channel samples yielded three distinctive gas chromatograms (Figures 2-4). In the figures depicting the USCG MSL chromatograms, I have annotated the approximate carbon ranges for ease of interpretation by the reader. In my analysis of the USCG MSL chromatograms, I find:

- ***Sample CS-02 (Spill)*** is composed almost exclusively of automotive gasoline, with traces of higher boiling (~C_{12}-C_{20}) hydrocarbons (Figure 2). The presence of gasoline in this sample is readily identified by the predominance of <C_{12} hydrocarbons typical of motor fuel. The traces of higher boiling C_{12}-C_{20} hydrocarbons in the sample are too low in concentration to afford the opportunity to identify what, if any, particular petroleum product gives rise to these low level hydrocarbons. There is no evidence for Jet A product in this sample.

- **Sample CAH-MW-1 (Source)** is composed principally of a mixture of higher boiling, lubricating range petroleum and gasoline (Figure 3). The presence of lubricating range oils is evidenced by the large unresolved complex mixture appearing between about the C_{20}-C_{35} hydrocarbon range. The presence of gasoline in this sample is readily identified by the predominance of <C_{12} hydrocarbons typical of motor fuel. There is no evidence for Jet A product in this sample.

- **Sample CP-MW-2 (Source)** is composed almost exclusively of automotive gasoline, with traces of higher boiling (~C_{25}-C_{28}) hydrocarbons (Figure 4). The presence of gasoline in this sample is readily identified by the predominance of <C_{12} hydrocarbons typical of motor fuel. The low levels of higher boiling hydrocarbons in the ~C_{25}-C_{28} range are not readily recognized as a petroleum product; it is likely that these are hydrocarbons of some non-petroleum origin. There is no evidence for Jet A product in this sample.

My interpretation of the petroleum product composition of the three Dominguez Channel samples offered above is consistent with those given by USCG MSL scientists in their report of the analyses of these samples.[1]

Commentary on Supplemental Conventional Laboratory Analyses of Dominguez Channel Samples

In addition to the USCG MSL forensic chemistry analysis of the Dominguez Channel samples, there was a supplementary analysis of a fugitive petroleum product (presumably taken from the same location as the USCG MSL samples) carried out and reported by a routine contract laboratory, Sierra Analytical.[8] According to chain-of-custody records, a sample identified DC-1 was collected by the Los Angeles County Department of Public Works on February 11, 2011, and submitted to Sierra Analytical for routine chemical analysis. The data produced by this laboratory included measurements of individual volatile organic compounds (VOC), gasoline range hydrocarbons (GRO), diesel range hydrocarbons (GRO), a related set of carbon range compositional measurements, and semi-volatile organic compounds (SVOC). No gas

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[7] Daling, P.S., Faksness, L.G., Hansen, A.B., Stout, S.A. 2002. Improved and standardized methodology for oil spill fingerprinting. Environ. Forensics 3(3/4): 263-278.

[8] Sierra Analytical. February 11, 2011. Dominguez Channel. Work Order 1102183.

chromatograms or other meaningful forensic chemical measurements were provided in the Sierra Analytical laboratory report. No petroleum product identification for sample DC-1 was reported by Sierra Analytical.

In a May 13, 2011 PowerPoint briefing, the Los Angeles Region of the California Water Board highlighted results from the Sierra Analytical laboratory report, and suggested that the product found in the Dominguez Channel was composed "primarily [of] gasoline and jet fuel range hydrocarbons" (Figure 5). This conclusion appears to have been based solely upon interpretation of carbon fraction range compositional data without consideration of critical gas chromatographic data that is the cornerstone of petroleum product identification. The Board's conclusion that the Dominguez Channel sample contained Jet Fuel is flawed.

It has been long recognized that petroleum product identification cannot be deduced solely from carbon fraction range data, because almost all petroleum products naturally have overlapping carbon range composition.[9] Germane to this matter is the fact that the hydrocarbons found in the C_9-C_{12} compositional "trailing tail" of gasoline overlaps with the C_9-C_{12} "leading edge" of Jet A (or kerosene) (See Figure 1). Furthermore, the USCG MSL data reveals that there are low levels of C_{10}-C_{20} hydrocarbons present in the samples (albeit of unknown petroleum type). Thus, without supporting gas chromatogram data, there is no reliable way to deduce the nature of the petroleum product(s) (including Jet A) found in the C_9-C_{14} range of the fugitive sample DC-1 from carbon range data alone. In fact, the forensic quality analytical data for the same fugitive product that was produced by the USCG Marine Safety Laboratory clarifies the question of product composition in the Dominguez Channel samples: the USCG MSL data clearly demonstrates that the product source of these C_9-C_{14} low molecular weight hydrocarbons is, in fact, overwhelmingly of gasoline origin. There is no forensic evidence for the presence of Jet A in the Dominguez Channel samples.

Please do not hesitate to contact me if you have any questions concerning this correspondence.

Sincerely,

Allen D. Uhler, Ph.D.
Senior Consultant

[9] Total Petroleum Hydrocarbon Working Group Series. 1998. Volumes 1: Petroleum Hydrocarbon Analysis in Soil and Water, Wade Weisman, Association for Environmental Health and Sciences.

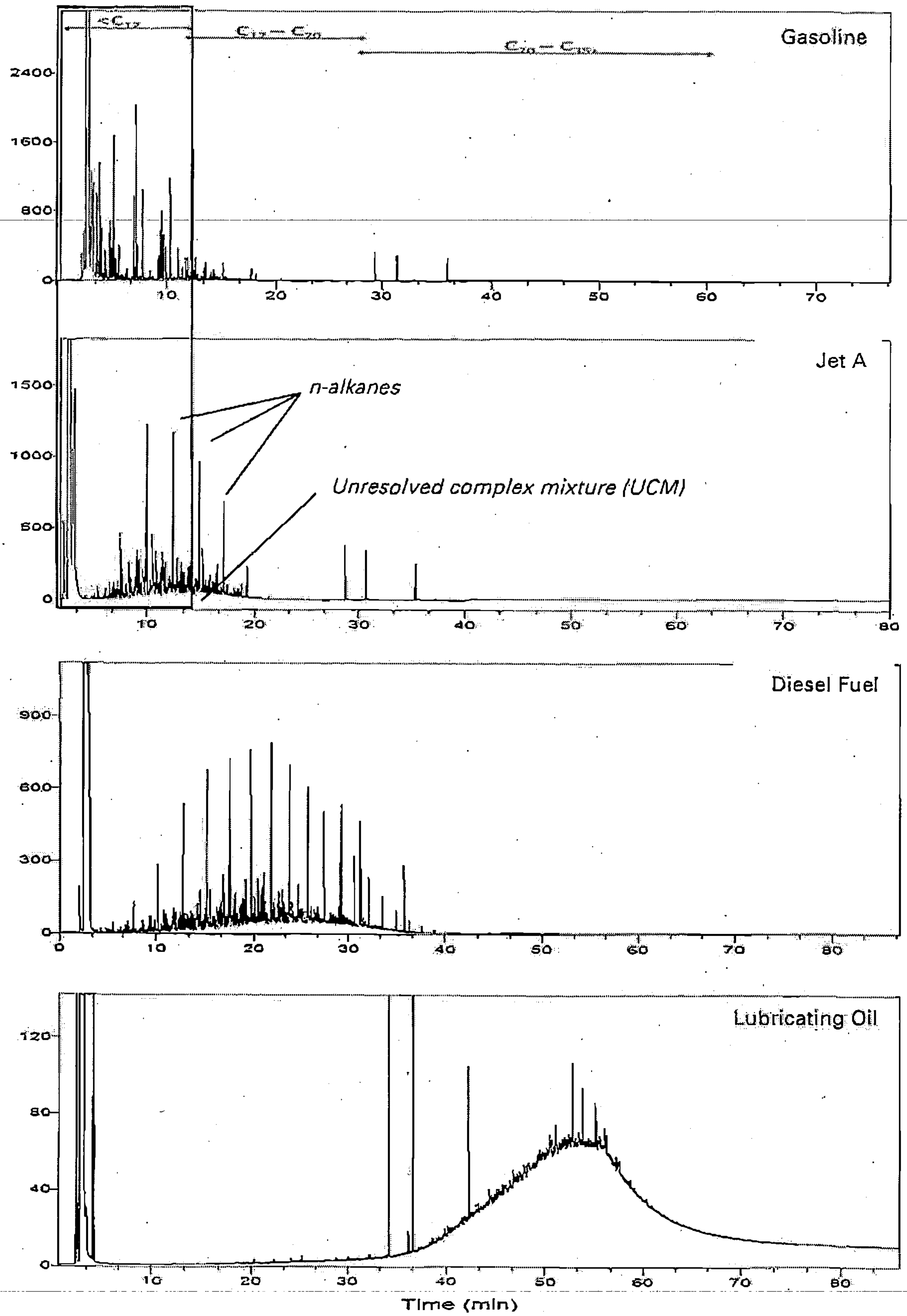

Figure 1. Comparative gas chromatograms and compositional carbon ranges for petroleum reference products. Note: shaded box shows C_9-C_{12} carbon range compositional "overlap" between gasoline and Jet A. Carbon ranges depicted.

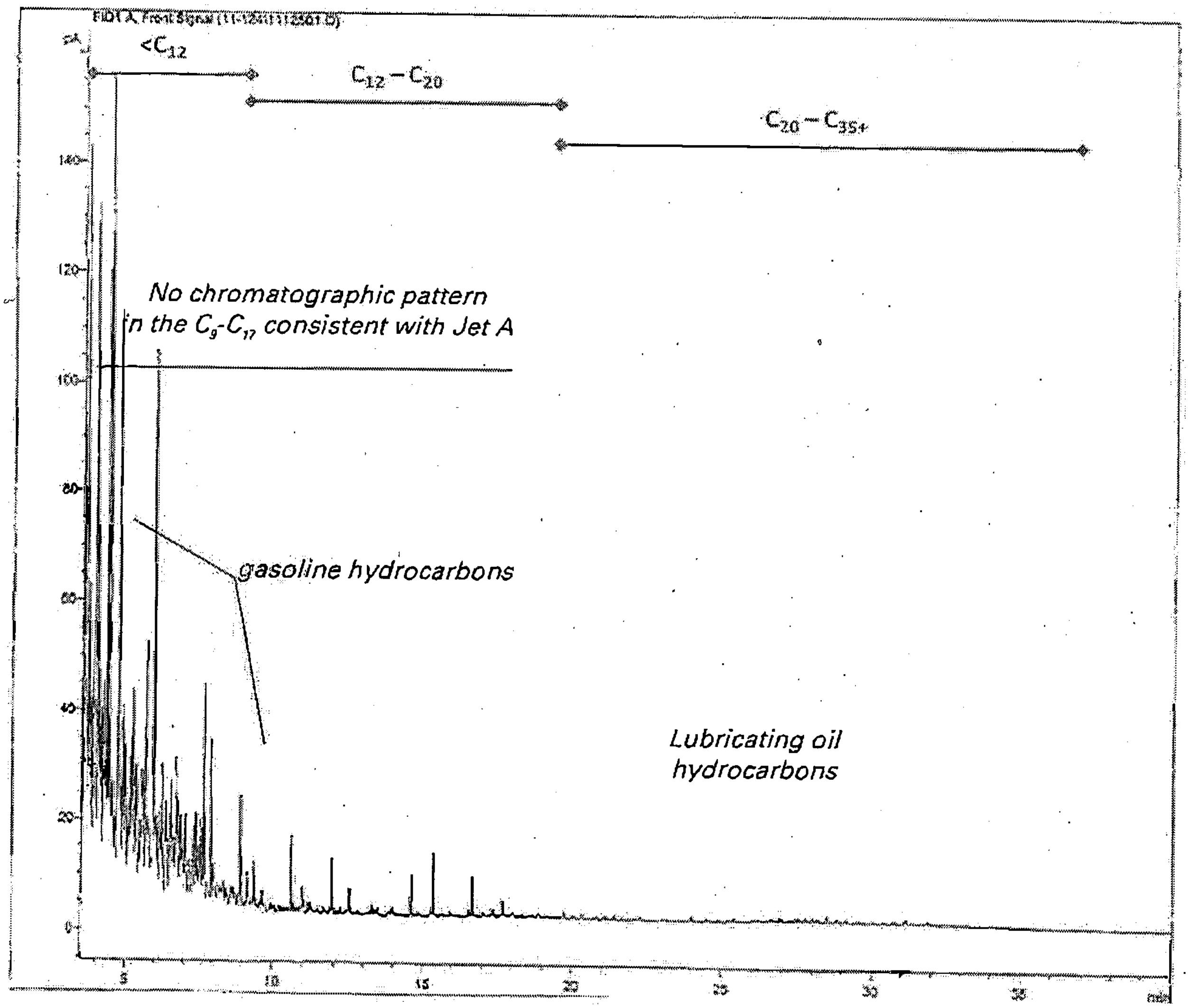

Figure 3. USCG Marine Safety Laboratory gas chromatogram of sample "CAH-MW-1 (Source)". Preponderance of chromatographic signal is in the C_{20}-C_{35+} range (consistent in character with complex mixture of lubricating oil), and C_9-C_{12} hydrocarbons consistent with automotive gasoline. There is no chromatographic evidence for the presence of Jet A.

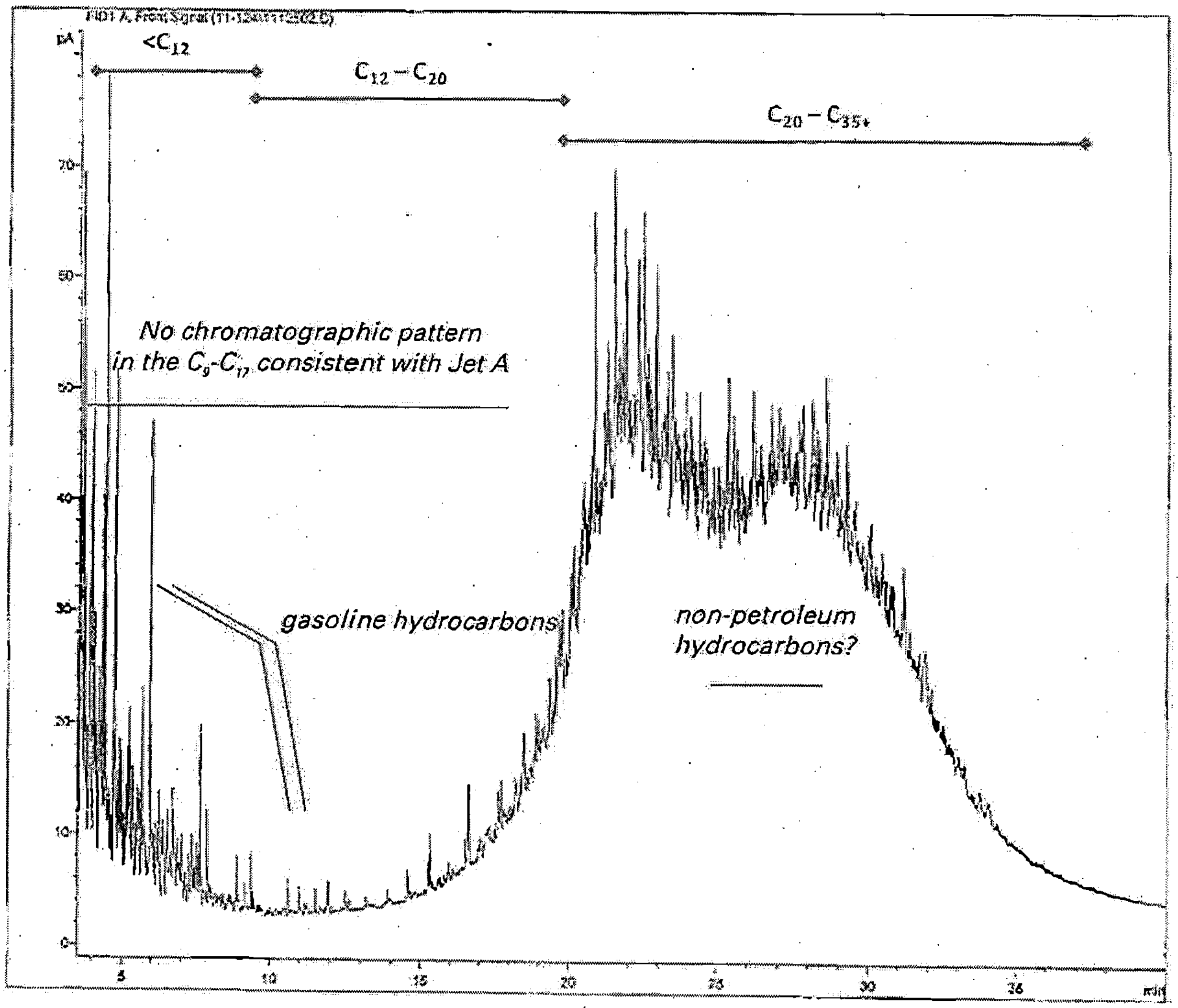

Figure 4. USCG Marine Safety Laboratory gas chromatogram of sample "CP-MW-2 (Source)". Preponderance of chromatographic signal is in the C_9-C_{12} range, and consistent in character with automotive gasoline. Small cluster of chromatographic peaks in the ~C_{25}-C_{28} range are not readily recognized as a petroleum product; it is likely that these are hydrocarbons of some non-petroleum origin. There is no chromatographic evidence for the

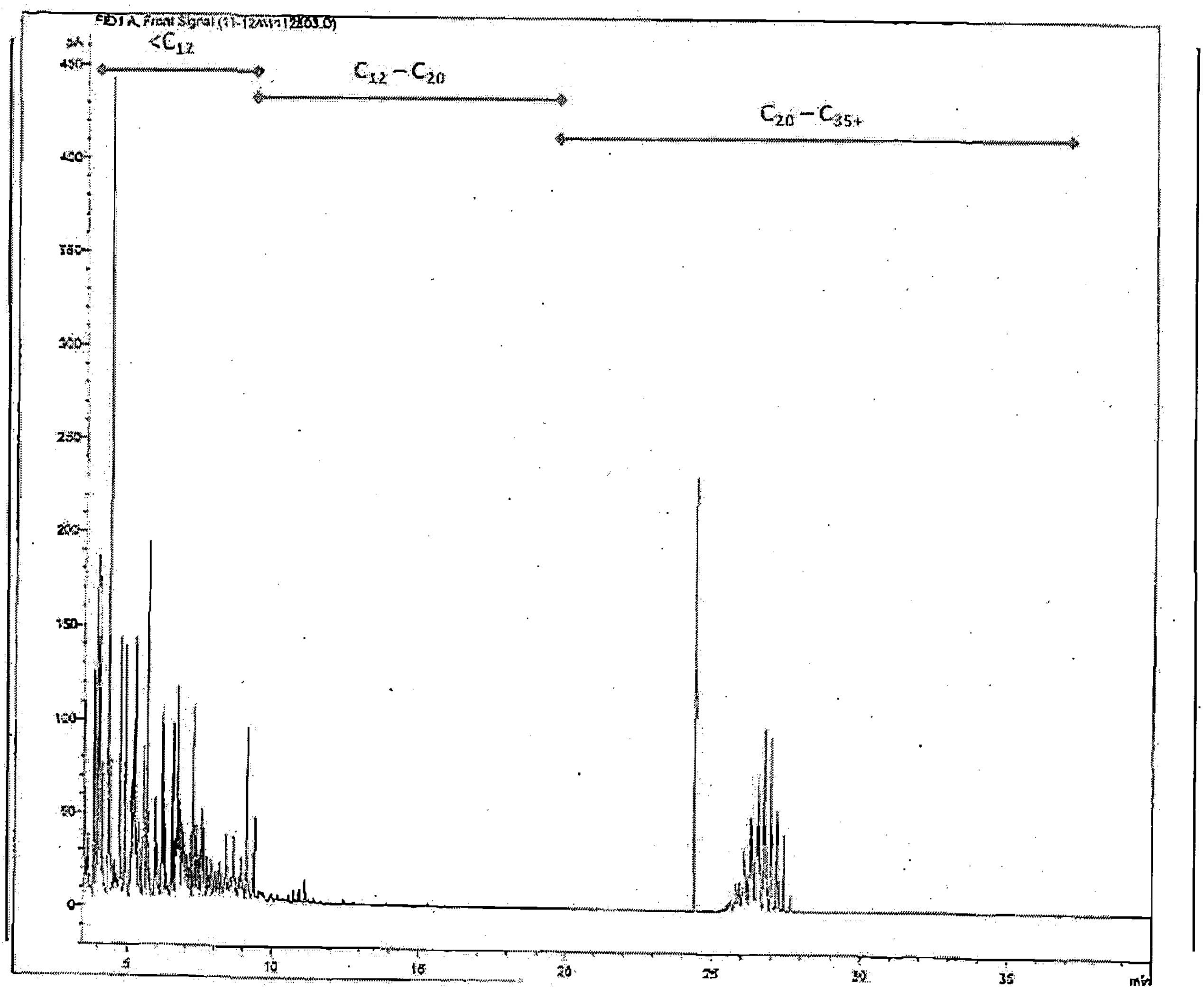

Figure 5. Slide from May 13, 2011 PowerPoint briefing by the Los Angeles Region of the California Water Board which highlighted results from the Sierra Analytical laboratory report. Based on hydrocarbon range data alone (and no further forensic chemistry evidence), the Board concluded that the product found in the Dominguez Channel was composed "primarily [of] gasoline and jet fuel range hydrocarbons".

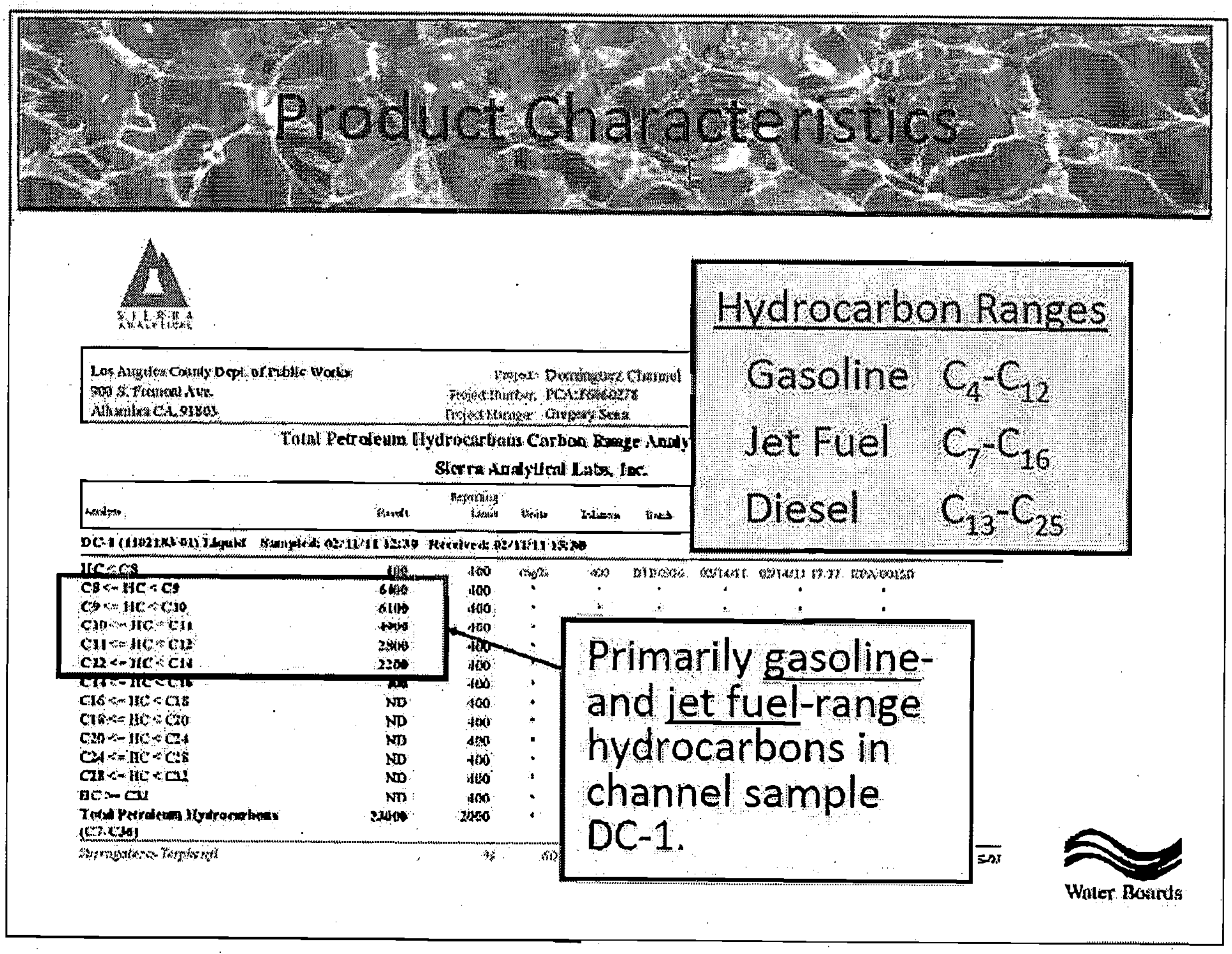

Figure 5. Slide from May 13, 2011 PowerPoint briefing by the Los Angeles Region of the California Water Board which highlighted results from the Sierra Analytical laboratory report. Based on hydrocarbon range data alone (and no further forensic chemistry evidence), the Board concluded that the product found in the Dominguez Channel was composed "primarily [of] gasoline and jet fuel range hydrocarbons".

EXHIBIT I

ALLEN D. UHLER, Ph.D.

Senior Consultant

Environmental Forensics Practice

EXPERIENCE

Dr. Uhler has over 25 years experience in the field of environmental chemistry, with a specialization in environmental forensics—the integration of advanced chemical analyses, chemical fate and behavior, source identification techniques, and operational practices—to determine the nature, sources, and fate of industrial chemicals in the environment.

Dr. Uhler has developed and applied advanced analytical methods for the study of the environmental chemistry of petroleum-, coal-derived and anthropogenic hydrocarbons, PCBs, persistent pesticides, dioxins and furans, metals and organometallic compounds in waters, soils, sediments, and soil- and air-borne vapors. He has used numerical and geospatial data analysis techniques to reveal chemical relationships among samples and suspected sources, to differentiate chemical signatures in complex source settings, to evaluate weathering characteristics of organic chemicals, and to track the fate of these chemicals in complex, contaminated environments. He has conducted numerous assessments of the occurrence, sources, and fate of fugitive petroleum at refineries, offshore oil and gas production platforms, bulk petroleum storage facilities, along petroleum pipelines, at retail gasoline stations, at varied industrial facilities, and in sedimentary environments. He has studied the occurrence, behavior, and fate of coal-derived wastes at former manufactured gas plants, wood-treating facilities, and in sedimentary environments. His has studied the behavior and environmental chemistry of man-made industrial chemicals in industrial, residential, and sedimentary settings.

Prior to joining NewFields Dr. Uhler was a senior consulting chemist at Battelle Memorial Institute for over 17 years.

APPOINTMENTS AND PROFESSIONAL AFFILIATIONS

- Invited Chairperson, Environmental Forensics, *Sixth International Conference on Remediation of Contaminated Sediments.* New Orleans, LA. February, 2011.
- Member ASTM Committee E50.06, Forensic Environmental Investigations.
- Invited speaker, EPA *17th Annual UST/LUST National Conference.* Seattle WA. March, 2005.
- Editorial Board, *Journal of Environmental Forensics.* Amherst Press. 1999 – Present.
- Invited Speaker, International Society of Environmental Forensics. Santa Fe, NM. September, 2002.
- Invited Chairperson, *International Business Communication's 3rd Executive Forum on Environmental Forensics.* Washington, D.C. June, 2000

- Invited Chairperson, *International Business Communication's 2nd Executive Forum on Environmental Forensics*. Washington, D.C. June, 1999.
- Founding Co- Editor-in-Chief, *International Journal of Environmental Forensics*. Amherst Press. 1998-1999.
- Feature Editor, "Environmental Forensics", in *Soil, Sediment, Groundwater*. 1998-2003.
- Invited Speaker, *National Environmental Forensics Conference: Chlorinated Solvents and Petroleum Hydrocarbons*. August 27-28, 1998, Tucson, AZ.
- Editorial Advisory Board, *Soil, Sediment, Groundwater*. 1997-present.
- Technical Advisory Committee, *Association for Environmental Health and Sciences*, 1996-2005.
- Moderator, *Chemical Analysis,* 12th Annual Conference on Contaminated Soils, Amherst, MA.
- Staff Fellow, US Food and Drug Administration, Division of Environmental and Elemental Contaminants Branch, Methods Development Group, Washington, DC. 1985-1987.
- Associate Referee, Association of Official Analytical Chemists, (AOAC) 1985-1995.
- Faculty Research Associate, University of Maryland, 1983-1985.

EDUCATION AND TRAINING

Ph.D. Chemistry, University of Maryland – 1983
M.S. Chemistry, University of Maryland – 1981
B.A. Chemistry, SUNY, Plattsburgh – 1978

PUBLICATIONS

[1] Uhler, A.D., McCarthy, K.J., Emsbo-Mattingly, S.D., Stout, S.A. and Douglas, G.S. (2010). Predicting chemical 'fingerprints' of vadose zone soil gas and indoor air from non-aqueous phase liquid composition. Environ. Forensics 11: 342-354.

[2] Stout, S.A., Douglas, G.S. and Uhler, A.D. (2010). Assessing temporal and spatial variations of gasoline-impacted groundwater using relative mole fractions and PIANO fingerprinting. Environ. Forensics 11:328-341.

[3] Uhler, A.D., Stout, S.A., Emsbo-Mattingly, S.D., and Rouhani, S. (2010). Chemical fingerprinting: streamlining site assessment during the sustainable redevelopment process. In: Sustainable land development and restoration. Decision consequence analysis. Brown, K., Hall, W.L., Snook, M. and Garvin, K. (eds). Butterworth-Heinemann, Burlington MA, pp. 325-344.

[4] Plantz, G. McCarthy, K.J., Emsbo-Mattingly, S.D., Uhler, A.D., and Stout, S.A. (2008) Evaluating The Vapor Intrusion Pathway - Challenges and Source Identification. Environ. Claims J., 20(1): 71-86.

[5] Douglas, G.D., Emsbo-Mattingly, S.D., Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2007) Chemical fingerprinting methods. In: Introduction to Environmental Forensics, 2nd Ed., B. Murphy and R. Morrison, Eds., Academic Press, New York, pp. 312-454.

[6] Uhler, A.D., Stout, S.A., and Douglas, G.S.. (2006) Chemical heterogeneity in modern marine residual fuel oils In: Oil Spill Environmental Forensics: Fingerprinting and Source Identification, Z. Wang and S.A. Stout, Eds., Elsevier Publishing Co., Boston, MA, pp. 327-348.

[7] Douglas, G.S., Stout, S.A., Uhler, A.D., McCarthy, K.J., and Emsbo-Mattingly, S.D. (2006) Advantages of quantitative chemical fingerprinting in oil spill source identification. In: Oil Spill Environmental Forensics: Fingerprinting and Source Identification, Z. Wang and S.A. Stout, Eds., Elsevier Publishing Co., Boston, MA, pp. 257-292.

[8] Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2006) Chemical characterization and sources of distillate fuels in the subsurface, Mandan, North Dakota. Environ. Forensics, 7(3): 267-282.

[9] Stout, S.A. and Uhler, A.D. (2006) Causation for variable n-alkylcyclohexane distributions in distillate NAPLs from Mandan, North Dakota. Environ. Forensics, 7(3): 283-287.

[10] Uhler, A.D. and Emsbo-Mattingly, S.D. (2006). Environmental Stability of PAH source indices in Pyrogenic Tars. *Bull. Env. Cont. Tox.* 76: 689 – 696.

[11] Emsbo-Mattingly, S.D., Uhler, A.D., Stout, S.A., Douglas, G.S., McCarthy, K.J., and Coleman, A. (2006) Determining the source of PAHs in sediment. *Land Contamination & Reclamation* 14 (2): 403-411.

[12] Stout, S.A., Douglas, G.S., and Uhler, A.D. (2006) Automotive gasoline. In: B. Murphy and R. Morrison, Eds., *Environmental Forensics: A Contaminant Specific Approach.* Elsevier Publishing Co., San Francisco, CA. pp. 466-531.

[13] Stout, S.A., Douglas, G.S. Uhler, A.D. (2005) Monitoring the natural recovery of hydrocarbon-contaminated sediments with chemical fingerprinting. *Env. Claims J.* **7(3-4)**: 287-314.

[14] Uhler, A.D., Emsbo-Mattingly, S.J., Liu , B., Hall, L.W., and Burton, D.T. 2005. An Integrated Case Study for Evaluating the Impacts of an Oil Refinery Effluent on Aquatic Biota in the Delaware River: Advanced Chemical Fingerprinting of PAHs. *Human Eco. Risk Ass.* 11: 771 – 836.

[15] Hall, L. W., Dauer, D.M., Alden, R.W., Uhler, A.D., DiLorenzo, J., Burton, D.T., and Anderson, R.D. 2005. An Integrated Case Study for Evaluating the Impacts of an Oil Refinery Effluent on Aquatic Biota in the Delaware River: Sediment Quality Triad Studies. *Human Eco. Risk Ass.* 11: 657 – 770.

[16] Stout, S.A., Douglas, G.S. Uhler, A.D., McCarthy, K.J. and Emsbo-Mattingly, S.D. (2005) Identifying the Source of Mystery Waterborne Oil Spills – A Case for Quantitative Chemical Fingerprinting. *Env. Claims J.* **17(2):** 71-88.

[17] Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2005) Middle distillate fuel fingerprinting using drimane-based bicyclic sesquiterpanes. *Environ. Forensics* **6(3):** 241-252.

[18] Stout, S.A., Uhler, A.D., and Douglas, G.S. (2005) Chemical fingerprinting of gasoline and diesel fuel at LUST sites. U.S. EPA L.U.S.T. Line, Bulletin 49, p. 1-5.

[19] Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2004) Characterizing the source of fugitive middle distillate fuels – A case study involving railroad diesel fuel, Mandan, North Dakota. *Environ. Claims J.,* **16(2)**: 157-172.

[20] Stout, S.A., Uhler, A.D., and Emsbo-Mattingly, S.D. (2004) Comparative evaluation of background anthropogenic hydrocarbons in surficial sediments from nine urban waterways. *Environ. Sci. Technol.*, **38(11)**: 2987-2994.

[21] Emsbo-Mattingly, S.D., Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2003) Identifying manufactured gas plant tar in the environment using chemical fingerprinting. *Environ. Claims J.*, **15(4)**: 477-490.

[22] Stout, S.A., Uhler, A.D., Emsbo-Mattingly, S.D. (2003) Urban background – Characterization of ambient anthropogenic PAH in urban sediments. V. Magar and M. Kelley, Eds., *Proceed. 7th Int'l. Symp. on In Situ and On-Site Bioremediation*, Orlando, FL, ISBN 1-57477-139-6, Battelle Press, Columbus, OH, Paper No. I-06, 8 pp.

[23] Stout, S.A., Uhler, A.D., Emsbo-Mattingly, S.J. (2003) Characterization of "urban background" PAH in sediments. *Contaminated Soil, Sediment & Water*, Sept. Issue, pp. 16-18.

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[25] Uhler, R.M., Healey, E.M., McCarthy, K.J., Uhler, A.D., and Stout, S.A. (2003) Detailed chemical fingerprinting of gasoline for environmental forensic investigations. Part 2: Analytical method performance. *Contaminated Soil, Sediment & Water*, Jan/Feb Issue. 12-17.

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