



U.S. Department
of Transportation
**Federal Railroad
Administration**

Hazardous Material Releases due to Unsecured Openings and Lining Failures

Office of Research and
Development
Washington DC 20590

Volume II (Appendices)

Arthur D. Little, Inc.
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Appendix A

Cross Tabulation Matrices of FRA and AAR Release Incident Reports

1985-1989

Source: FRA Incident Reports and
AAR 1988 Annual Report

1985-1989		Source: FRA Incident Reports and AAR 1988 Annual Report																							
		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump		Wall		Liquid Line		Head		Eduction Pipe		Gauging Device		Other		Total	
Unsecured Openings	Bolts Loose	67 50.8	50.0 19.0	8 16.7	6.0 2.3	9 45.0	6.7 2.5	18 58.1	13.4 5.1			15 51.7	11.2 4.2							17 34.0	12.7 4.8			134 38.0	
	Bolt(s) Missing	1 0.8	25.0 0.3	2 4.2	50.0 0.6			1 3.2	25.0 0.3															4 1.1	
	Plug/Cap Off			1 2.1	20.0 0.3															4 8.0	80.0 1.1			5 1.4	53.3%
	Plug/Cap Loose			24 50.0	54.5 6.8			1 3.2	2.3 0.3			11 37.9	25.0 3.1							8 16.8	18.2 2.3			44 12.5	
	Item Warped					1 5.0	100 0.3																	1 0.3	
Gasket Failures	Deteriorated	56 42.4		3 6.3	4.3 0.8	8 40.0	11.4 2.3	1 3.2	1.4 0.3							2 67.7	2.9 0.6							70 19.8	
	Cut	2 1.5		1 2.1	33.3 0.3																			3 0.8	22.7%
	Dislodged	5 3.8				1 5.0	14.3 0.3									1 33.3	14.3 0.3							7 2.0	
Corrosion	Liner Failed			1 2.1	2.7 0.3	1 5.0	2.7 0.3			3 50.0	8.1 0.8	28 90.3	75.7 7.9					1 50.0	2.7 0.3	3 6.0	8.1 0.8			37 10.5	
	Liner Cut									3 50.0	100 0.8													3 0.8	12.5%
	Patch Failed									3 9.7	100 0.8													3 0.8	
	Bracket Broke							1 3.2	100 0.3															1 0.3	
Unknown		1 0.8	2.4 0.3	8 16.7	19.5 2.3			9 29.0	22.0 2.5			3 10.3	7.3 0.8	1 100	2.4 0.3			1 50.0	2.4 0.3	18 36.0	43.9 5.1			41 11.6	
Key	#	% Row	Total		132	48	20	31	6	31	29	1	3	2	50	353									
	% Col.	% Tot.			37.4	13.6	5.7	8.8	1.7	8.8	8.2	0.3	0.8	0.6	14.2										

Percentages may not sum to 100 due to rounding errors.

1985-1989

Source: FRA Incident Reports

1985-1989		Source: FRA Incident Reports																							
		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump		Wall		Liquid Line		Head		Eduction Pipe		Gauging Device		Other		Total	
Unsecured Openings	Bolts Loose	21 50.0	50.0 18.9	8 44.4	19.0 7.2	5 62.5	11.9 4.5	7 50.0	16.7 6.3			1 100	2.4 0.9									42 37.8	46.8%		
	Bolt(s) Missing	1 2.4	25.0 0.9	2 11.1	50.0 1.8			1 7.1	25.0 0.9													4 3.6			
	Plug/Cap Off																					0 0.0			
	Plug/Cap Loose			4 22.2	80.0 3.6			1 7.1	20.0 0.9													5 4.5			
	Item Warped					1 12.5	100 0.9															1 0.9			
Gasket Failures	Deteriorated	15 35.7	75.0 13.5	1 5.6	5.0 0.9	1 12.5	5.0 0.9	1 7.1	5.0 0.9					2 67.7	10.0 1.8							20 18.0	23.4%		
	Cut	2 4.8	67.7 1.8	1 5.6	33.3 0.9																	3 2.7			
	Dislodged	2 4.8	67.7 1.8											1 33.3	33.3 0.9							3 2.7			
Corrosion	Liner Failed			1 5.6	5.6 0.9	1 12.5	5.6 0.9			3 50.0	16.7 2.7	9 75.0	50.0 8.1					1 50.0	5.6 0.9	3 75.0	16.7 2.7	18 16.2	22.5%		
	Liner Cut									3 50.0	100 2.7											3 2.7			
	Patch Failed											3 25.0	100 2.7									3 2.7			
	Bracket Broke							1 7.1	100 0.9													1 0.9			
Unknown		1 2.4	12.5 0.9	1 5.6	12.5 0.9			3 21.4	37.5 2.7					1 100	12.5 0.9		1 50.0	12.5 0.9	1 25.0	12.5 0.9		8 7.2			
Key	#	% Row		% Col.		% Tot.																			
Total		42	18	8	14	6	12	1	1	3	2	4	111												
		37.8	16.2	7.2	12.6	5.4	10.8	0.9	0.9	2.7	1.8	3.6													

Percentages may not sum to 100 due to rounding errors.

1985

Source: FRA Incident Reports

1985		Source: FRA Incident Reports															
		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump	Wall	Liquid Line	Head	Eduction Pipe	Gauging Device	Other	Total
Unsecured Openings	Bolts Loose	6 33.3	40.0 14.6	5 55.6	33.3 12.2	1 100	6.7 2.4	3 75.0	20.0 7.3								15 36.6
	Bolt(s) Missing			2 22.2	67.7 4.9			1 25.0	33.3 2.4								3 7.3
	Plug/Cap Off																0 0.0
	Plug/Cap Loose																0 0.0
	Item Warped																0 0.0
Gasket Failures	Deteriorated	7 38.9	100 12.1														7 17.1
	Cut	2 11.1	67.7 4.9	1 11.1	33.3 2.4												3 7.3
	Dislodged	2 11.1	100 4.9														2 4.9
Corrosion	Liner Failed									6 85.7	100 14.6						6 14.6
	Liner Cut							1 100	100 2.4								1 2.4
	Patch Failed									1 14.3	100 2.4						1 2.4
	Bracket Broke																0 0.0
Unknown		1 5.6	33.3 2.4	1 11.1	33.3 2.4							1 100	33.3 2.4				3 7.3
Key	Total	18 43.9	9 22.0	1 2.4	4 9.8	1 2.4	7 17.1	0 0.0	1 2.4	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	41	
	#																
	% Row																
	% Col.																
	% Tot.																

#	% Row
% Col.	% Tot.

Percentages may not sum to 100 due to rounding errors.

1986

Source: FRA Incident Reports

1986		Source: FRA Incident Reports																							
		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump		Wall		Liquid Line		Head		Eduction Pipe		Gauging Device		Other		Total	
Unsecured Openings	Bolts Loose	5 55.6	38.5 12.2	1 33.3	7.7 2.4	3 75.0	23.1 7.3	3 33.3	23.1 7.3					1 100	7.7 2.4									13 31.7	36.6%
	Bolt(s) Missing	1 11.1	100 2.4																					1 2.4	
	Plug/Cap Off																							0 0.0	
	Plug/Cap Loose							1 11.1	100 2.4															1 2.4	
	Item Warped																							0 0.0	
Gasket Failures	Deteriorated	3 33.3	60.0 7.3	1 33.3	20.0 2.4			1 11.1	20.0 2.4															5 12.2	14.6%
	Cut																							0 0.0	
	Dislodged															1 100	100 2.4							1 2.4	
Corrosion	Liner Failed			1 33.3	10.0 2.4	1 25.0	10.0 2.4			2 50.0	20.0 4.9	3 60.0	30.0 7.3						1 50.0	10.0 2.4	2 67.7	20.0 4.9		10 24.4	36.6%
	Liner Cut									2 50.0	100 4.9													2 4.9	
	Patch Failed											2 40.0	100 4.9											2 4.9	
	Bracket Broke								1 11.1	100 2.4														1 2.4	
Unknown								3 33.3	60.0 7.3										1 50.0	20.0 2.4	1 33.3	20.0 2.4		5 12.2	
Key		# % Row		Total		9	3	4	9	4	5	1	0	1	2	3	41								
		% Col. % Tot.				22.0	7.3	9.8	22.0	9.8	12.2	2.4	0.0	2.4	4.9	7.3									

Percentages may not sum to 100 due to rounding errors.

1987

Source: AAR Annual Statistics

1987		Source: AAR Annual Statistics		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump		Wall		Liquid Line		Head		Eduction Pipe		Gauging Device		Other		Total		
Unsecured Openings	Bolts Loose	46 51.1	50.0 19.0			4 33.3	4.3 1.7	11 64.7	12.0 4.5					14 50.0	15.2 5.8							17 37.0	18.5 7.0	92		38.0	56.2%	
	Bolt(s) Missing																							0		0.0		
	Plug/Cap Off			1 3.3	20.0 0.4																	4 8.7	80.0 1.7	5		2.1		
	Plug/Cap Loose			20 66.7	51.3 8.3									11 39.3	28.2 4.5							8 17.4	20.5 3.3	39		16.1		
	Item Warped																								0			0.0
Gasket Failures	Deteriorated	41 45.6	82.0 16.9	2 6.7	4.0 0.8	7 58.3	14.0 2.9																	50		20.7	22.3%	
	Cut																								0			0.0
	Dislodged	3 3.3	75.0 1.2			1 8.3	25.0 0.4																		4			1.7
Corrosion	Liner Failed											19 100	100 7.9												19		7.9	7.9%
	Liner Cut																								0		0.0	
	Patch Failed																								0		0.0	
	Bracket Broke																								0		0.0	
Unknown				7 23.3	21.2 2.9			6 35.3	18.2 2.5					3 10.7	9.1 1.2								17 37.0	51.5 7.0	33		13.6	
Key	#	% Row	Total	90	30	12	17	0	19	28	0	0	0	0	0	0	0	0	0	0	0	46		242				
	% Col.	% Tot.		37.2	12.4	5.0	7.0	0.0	7.9	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0						

Percentages may not sum to 100 due to rounding errors.

1988

Source: FRA Incident Reports

1988		Source: FRA Incident Reports																							
		Manway Cover		Btm Outlet		Fill Hole		Safety Vent/Valve		Sump		Wall		Liquid Line		Head		Eduction Pipe		Gauging Device		Other		Total	
Unsecured Openings	Bolts Loose	10	71.4	2	14.3	1	7.1	1	7.1														14	48.3	65.5%
	Bolt(s) Missing																						0	0.0	
	Plug/Cap Off																						0	0.0	
	Plug/Cap Loose			4	100																		4	13.8	
	Item Warped					1	100																1	3.4	
Gasket Failures	Deteriorated	5	62.5			1	12.5									2	25.0						8	27.6	27.6%
	Cut																						0	0.0	
	Dislodged																						0	0.0	
Corrosion	Liner Failed							1	50.0											1	50.0		2	6.9	6.9%
	Liner Cut																						0	0.0	
	Patch Failed																						0	0.0	
	Bracket Broke																						0	0.0	
Unknown																							0	0.0	
Key		Total		15	6	3	1	1	0	0	0	0	2	0	1	29									
				51.7	20.7	10.3	3.4	3.4	0.0	0.0	0.0	6.9	0.0	3.4											
				#	% Row			% Col.	% Tot.																

Percentages may not sum to 100 due to rounding errors.

Appendix B

Detailed Listing of Commodities Released, by Year, Totals
Source: HMIS (RSPA)

DOT Incident Report Form F5800.1

DEPARTMENT OF TRANSPORTATION

Form Approved OMB No. 04-5613

HAZARDOUS MATERIALS INCIDENT REPORT

INSTRUCTIONS: Submit this report in duplicate to the Director, Office of Program Support, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, (ATTN: DMT-412). If space provided for any item is inadequate, complete that item under Section H, "Remarks", keying to the entry number being completed. Copies of this form, in limited quantities, may be obtained from the Director, Office of Program Support. Additional copies in this prescribed format may be reproduced and used, if on the same size and kind of paper.

A INCIDENT			
1. TYPE OF OPERATION 1 ☐ AIR 2 ☐ HIGHWAY 3 ☐ RAIL 4 ☐ WATER 5 ☐ FREIGHT FORWARDER 6 ☐ OTHER (Identify) _____			
2. DATE AND TIME OF INCIDENT (Month - Day - Year) _____. _____. _____. _____ a.m. _____ p.m.		3. LOCATION OF INCIDENT	
B REPORTING CARRIER, COMPANY OR INDIVIDUAL			
4. FULL NAME		5. ADDRESS (Number, Street, City, State and Zip Code)	
6. TYPE OF VEHICLE OR FACILITY			
C SHIPMENT INFORMATION			
7. NAME AND ADDRESS OF SHIPPER (Origin address)		8. NAME AND ADDRESS OF CONSIGNEE (Destination address)	
9. SHIPPING PAPER IDENTIFICATION NO.		10. SHIPPING PAPERS ISSUED BY ☐ CARRIER ☐ SHIPPER ☐ OTHER (Identify) _____	
D DEATHS, INJURIES, LOSS AND DAMAGE			
11. NUMBER PERSONS INJURED			12. ESTIMATED AMOUNT OF LOSS AND/OR PROPERTY DAMAGE INCLUDING COST OF DECONTAMINATION (Round off in dollars) \$
12. NUMBER PERSONS KILLED			
14. ESTIMATED TOTAL QUANTITY OF HAZARDOUS MATERIALS RELEASED			
E HAZARDOUS MATERIALS INVOLVED			
15. HAZARD CLASS (*Sec. 172.101, Col. 3)	16. SHIPPING NAME (*Sec. 172.101, Col. 2)	17. TRADE NAME	
F NATURE OF PACKAGING FAILURE			
18. (Check all applicable boxes):			
(1) DROPPED IN HANDLING	(2) EXTERNAL PUNCTURE	(3) DAMAGE BY OTHER FREIGHT	
(4) WATER DAMAGE	(5) DAMAGE FROM OTHER LIQUID	(6) FREEZING	
(7) EXTERNAL HEAT	(8) INTERNAL PRESSURE	(9) CORROSION OR RUST	
(10) DEFECTIVE FITTINGS, VALVES, OR CLOSURES	(11) LOOSE FITTINGS, VALVES OR CLOSURES	(12) FAILURE OF INNER RECEPTACLES	
(13) BOTTOM FAILURE	(14) BODY OR SIDE FAILURE	(15) WELD FAILURE	
(16) CHIME FAILURE	(17) OTHER CONDITIONS (Identify)	19. SPACE FOR DOT USE ONLY	

Form DOT F 5800.1 (10-70) (9/1/76)

*Editorial change to incorporate redesignation per HM-112.

DOT Incident Report Form F5800.1—Continued

G PACKAGING INFORMATION - If more than one size or type packaging is involved in loss of material show packaging information separately for each. If more space is needed, use Section H "Remarks" below keying to the item number.				
ITEM		#1	#2	#3
20	TYPE OF PACKAGING INCLUDING INNER RECEPTACLES (Steel drums, wooden box, cylinder, etc.)			
21	CAPACITY OR WEIGHT PER UNIT (55 gallons, 65 lbs., etc.)			
22	NUMBER OF PACKAGES FROM WHICH MATERIAL ESCAPED			
23	NUMBER OF PACKAGES OF SAME TYPE IN SHIPMENT			
24	DOT SPECIFICATION NUMBER(S) ON PACKAGES (21P, 17E, JAA, etc., or none)			
25	SHOW ALL OTHER DOT PACKAGING MARKINGS (Part 175)			
26	NAME, SYMBOL, OR REGISTRATION NUMBER OF PACKAGING MANUFACTURER			
27	SHOW SERIAL NUMBER OF CYLINDERS, CARGO TANKS, TANK CARS, PORTABLE TANKS			
28	TYPE DOT LABEL(S) APPLIED			
29	IF RECONDITIONED	A REGISTRATION NO. OR SYMBOL		
	OR	B DATE OF LAST TEST OF INSPECTION		
30	IF SHIPMENT IS UNDER DOT OR USCG SPECIAL PERMIT, ENTER PERMIT NO.			
H REMARKS - Describe essential facts of incident including but not limited to defects, damage, probable cause, stowage, action taken at the time discovered, and action taken to prevent future incidents. Include any recommendations to improve packaging, handling, or transportation of hazardous materials. Photographs and diagrams should be submitted when necessary for clarification.				
31. NAME OF PERSON PREPARING REPORT (Type or print)		32. SIGNATURE		
33. TELEPHONE NO. (Include Area Code)		34. DATE REPORT PREPARED		

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	9930	SULFURIC ACID	497	11.75	11.75
2	5700	HYDROCHLORIC ACID	377	8.91	20.67
3	6300	LP GAS	277	6.55	27.22
4	9575	SODIUM HYDROXIDE LQ	265	6.27	33.48
5	1620	AMMONIA ANHYDROUS	253	5.98	39.47
6	8365	PHOSPHORIC ACID	226	5.34	44.81
7	5130	FLAM LIQUIDS N.O.S.	169	4.00	48.81
8	10820	METHYL ALCOHOL	113	2.67	51.48
9	3730	CORR LIQ N.O.S.	87	2.06	53.54
10	9874	STYRENE MONOMER INH	86	2.03	55.57
11	4005	DENATURED ALCOHOL	84	1.99	57.56
12	8319	PETROLEUM NAPHTHA CL	79	1.87	59.42
13	3475	COMBUSTIBLE LIQ NOS	74	1.75	61.17
14	2711	CARBON DIOXIDE	65	1.54	62.71
15	2710	CO2 LIQUIFIED	53	1.25	63.96
16	5853	HYDROGEN PEROX >52	51	1.21	65.17
17	8320	PETROLEUM NAPHTHA	48	1.14	66.30
18	9760	SULFURIC ACID SPENT	47	1.11	67.42
19	1270	ALKA COR LIQ N.O.S.	37	0.87	68.29
20	10650	VINYL ACETATE	37	0.87	69.17
21	4668	ETHYL ALCOHOL	35	0.83	69.99
22	7950	OLEUM	34	0.80	70.80
23	5203	FUEL OIL 1,2,4,5,6	33	0.78	71.58
24	4661	ETHYL ACRYLATE INHB	29	0.69	72.26
25	5852	HYDROGEN PEROX40-52	29	0.69	72.95
26	8628	POTASS HYDROXIDE LQ	29	0.69	73.63
27	10890	XYLENE (XYLOL)	29	0.69	74.32
28	10340	TOLUENE	28	0.66	74.98
29	6100	ISOPROPANOL	26	0.61	75.60
30	5457	HAZARD SUBST L/S	24	0.57	76.16
31	5800	HYDROFLUOSILIC ACID	24	0.57	76.73
32	3140	CHLORINE	23	0.54	77.28
33	1010	ACETONE	22	0.52	77.80
34	2460	BUTADIENE INHIBITED	20	0.47	78.27
35	5459	HAZARD WASTE L/S	18	0.43	78.69
36	2463	BUTYL ALCOHOL	17	0.40	79.10
37	4714	ETHYLENEDIAMINE	17	0.40	79.50
38	7100	METHYL METHACRYLATE	17	0.40	79.90
39	1182	ALCOHOLIC BEVERAGE	16	0.38	80.28
40	1008	ACETIC ANHYDRIDE	15	0.35	80.63

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
41	1730	ARGON PRESS LIQUID	15	0.35	80.99
42	5360	GASOLINE including	15	0.35	81.34
43	7040	METHYL ETHYL KETONE	15	0.35	81.70
44	8440	PHOSPHORUS TRICL2	15	0.35	82.05
45	1000	ACETALDEHYDE(ET AL)	14	0.33	82.38
46	1720	ARGON	14	0.33	82.71
47	3351	COAL TAR DISTILL CL	14	0.33	83.05
48	5201	FUEL AVIATION TURBN	14	0.33	83.38
49	5202	FUEL OIL	14	0.33	83.71
50	5580	HEXANE	13	0.31	84.02
51	7931	OIL NOS PETROL CL	13	0.31	84.32
52	9900	SULFUR DIOXIDE	13	0.31	84.63
53	1004	ACETIC ACID AQU SLN	12	0.28	84.91
54	1006	ACETIC ACID GLACIAL	12	0.28	85.20
55	7702	NITRIC ACID FUMING	12	0.28	85.48
56	8495	PINE OIL	12	0.28	85.77
57	2500	BUTRALDEHYDE	11	0.26	86.03
58	3770	CRUDE OIL PETROLEUM	11	0.26	86.29
59	4660	ETHYL ACETATE	11	0.26	86.55
60	5570	HEXAMETHYLENE DIA S	11	0.26	86.81
61	1190	ALCOHOL N.O.S.	10	0.24	87.04
62	1426	AMMONIUM SULFID SLN	10	0.24	87.28
63	3350	COAL TAR DISTILLATE	10	0.24	87.51
64	3751	CRESOL	10	0.24	87.75
65	5005	FERRIC CHLORIDE SLN	10	0.24	87.99
66	4710	ETHYLENE	9	0.21	88.20
67	5125	FLAMMABLE LIQUID CR	9	0.21	88.41
68	5851	HYDROGEN PEROX 8-40	9	0.21	88.63
69	8330	PHENOL	9	0.21	88.84
70	8800	PROPYLENE OXIDE	9	0.21	89.05
71	9566	SODIUM HY SULFID SN	9	0.21	89.26
72	1318	ALUMINUM SULF SOLUT	8	0.19	89.45
73	1336	AMMON HYDROXIDE <45	8	0.19	89.64
74	6920	METHYL ACRYLATE INH	8	0.19	89.83
75	2070	BENZENE (BENZOL)	7	0.17	90.00
76	3180	CHLOROSULFONIC ACID	7	0.17	90.16
77	3735	CORR SOLID N.O.S.	7	0.17	90.33
78	3900	CYCLOHEXANE	7	0.17	90.49
79	4745	ETHYL ETHER	7	0.17	90.66
80	5014	FERROUS CHLORIDE SL	7	0.17	90.83

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
81	5860	HYDROGEN SULFIDE	7	0.17	90.99
82	6080	ISOPENTANE	7	0.17	91.16
83	8460	PHOSPHORUS WH/YLWET	7	0.17	91.32
84	9030	RESIN SOLUTION	7	0.17	91.49
85	1132	ACRYLIC ACID	6	0.14	91.63
86	2690	CARBON BISULFIDE	6	0.14	91.77
87	3587	COMP TR-WD KILL COR	6	0.14	91.91
88	4124	DICHLORO/METHY CHLO	6	0.14	92.05
89	4716	ETHYLENE DIBROMIDE	6	0.14	92.20
90	7276	MONOETHANOLAMINE	6	0.14	92.34
91	7720	NITROBENZENE LIQUID	6	0.14	92.48
92	1140	ACRYLONITRILE	5	0.12	92.60
93	1194	ALCOHOL, N.O.S.	5	0.12	92.72
94	1361	AMMON NITR SOL	5	0.12	92.84
95	2470	BUTYL ACETATE	5	0.12	92.95
96	4233	DIISOPROPYLETHER	5	0.12	93.07
97	5187	FORMALDEHYDE>110GL	5	0.12	93.19
98	5490	HEPTANE	5	0.12	93.31
99	8498	PINENE	5	0.12	93.43
100	8766	PROPIONIC ACID	5	0.12	93.54
101	10480	TRIMETHYLAMINE ANHY	5	0.12	93.66
102	2100	BENZINE	4	0.09	93.76
103	3500	COMP CLEANING LIQ F	4	0.09	93.85
104	5180	FLUOSULFONIC ACID	4	0.09	93.95
105	5225	FURFURAL	4	0.09	94.04
106	6085	ISOPENTANOIC ACID	4	0.09	94.14
107	6561	MERCAPTAN MIX >110	4	0.09	94.23
108	7090	METHYL MERCAPTAN	4	0.09	94.32
109	7930	OIL N.O.S.	4	0.09	94.42
110	8773	PROPYLENE DICHLORID	4	0.09	94.51
111	9890	SULFUR CHLORIDE	4	0.09	94.61
112	1431	AMMON THIOSULFATE	3	0.07	94.68
113	2120	BENZOYL CHLORIDE	3	0.07	94.75
114	2480	BUTYL MERCAPTAN	3	0.07	94.82
115	3075	CHLOROBENZENE	3	0.07	94.89
116	3771	CRUDE OIL PETROL	3	0.07	94.96
117	4662	ETHYL BENZENE	3	0.07	95.03
118	4711	ETHYLENE	3	0.07	95.11
119	5188	FORMALDEHYDE SOLUTI	3	0.07	95.18
120	5206	FUEL AVIATION TURBI	3	0.07	95.25

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
121	5770	HYDROFLUORIC AC SLN	3	0.07	95.32
122	5780	HYDROGEN FLORIDE	3	0.07	95.39
123	6056	ISOBUTYL ACETATE	3	0.07	95.46
124	6090	ISOPRENE	3	0.07	95.53
125	6110	ISOPROPYL ACETATE	3	0.07	95.60
126	6120	ISOPROPYL MERCAPTAN	3	0.07	95.67
127	7300	METHYLAMINE ANHYDR	3	0.07	95.74
128	7701	NITRIC ACID >40%	3	0.07	95.81
129	8040	OXYGEN PRESS LIQUID	3	0.07	95.89
130	8059	PAINT RELATED MAT	3	0.07	95.96
131	8400	PHOSPHORUS OXYCHLO	3	0.07	96.03
132	8450	PHOSPHORUS WH/YLDRY	3	0.07	96.10
133	9895	SULFUR CHLORID MONO	3	0.07	96.17
134	9920	SULFUR TRIOXIDE	3	0.07	96.24
135	10336	TOLUENE DIISOCYANAT	3	0.07	96.31
136	10568	TURPENTINE FLAM	3	0.07	96.38
137	10660	VINYL CHLORIDE	3	0.07	96.45
138	1120	ACID LIQUID N.O.S.	2	0.05	96.50
139	1305	ALUMINUM CHLORDE AN	2	0.05	96.55
140	1337	AMMON HYDROXIDE <12	2	0.05	96.59
141	1926	ASPHALT CUT BACK	2	0.05	96.64
142	2177	BIPYRIDILIUM PEST L	2	0.05	96.69
143	3175	CHLOROFORM	2	0.05	96.74
144	3270	CHROMIC ACID SOLUT	2	0.05	96.78
145	3380	COAL TAR OIL	2	0.05	96.83
146	4057	DICHLOROBENZENE LIQ	2	0.05	96.88
147	4162	DIETHYL KETONE	2	0.05	96.93
148	4723	ETHLGLYC 2ETHYL ETH	2	0.05	96.97
149	4725	ETHYLENE GLYCOL MON	2	0.05	97.02
150	5720	HCL SOLUTION	2	0.05	97.07
151	5730	HYDROCYANIC ACID LQ	2	0.05	97.12
152	6560	MERCAPTAN MIX ALIPH	2	0.05	97.16
153	7105	METHYL METHACRYL UN	2	0.05	97.21
154	7280	MONOETHYLAMINE	2	0.05	97.26
155	7521	NAPTHA CL	2	0.05	97.30
156	7535	NAPHTHALENE	2	0.05	97.35
157	8060	PAINT RELATED MAT	2	0.05	97.40
158	8160	PENTANE	2	0.05	97.45
159	8301	PETROLEUM DISTIL CL	2	0.05	97.49
160	8768	PROPYL ACETATE	2	0.05	97.54

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
161	8769	PROPYLAMINE	2	0.05	97.59
162	8770	PROPYL MERCAPTAN	2	0.05	97.64
163	8771	PROPYL ALCOHOL	2	0.05	97.68
164	9310	SILICON CHLORIDE	2	0.05	97.73
165	9440	SODIUM ALUM LIQUID	2	0.05	97.78
166	9711	SODIUM SULFIDE HYDR	2	0.05	97.82
167	10184	TETRAHYDROFURAN	2	0.05	97.87
168	10942	ZINC CHLORIDE SLN	2	0.05	97.92
169	1030	ACETONE OIL	1	0.02	97.94
170	1183	ALCOHOLIC BEVERAGE	1	0.02	97.97
171	1430	AMMON THIOCYANATE	1	0.02	97.99
172	1640	ANILINE OIL LIQUID	1	0.02	98.01
173	2068	BENZALDEHYDE	1	0.02	98.04
174	2476	BUTYL ETHER	1	0.02	98.06
175	2504	BUTYRIC ACID	1	0.02	98.08
176	2720	CO2 / NO2	1	0.02	98.11
177	2730	CO2 OXYGEN MIXTURE	1	0.02	98.13
178	3179	CHLOROPROPENE	1	0.02	98.16
179	3181	CHLORODIFLUOROMETH	1	0.02	98.18
180	3220	CHLORPICRIN LIQUID	1	0.02	98.20
181	3490	COMP CLEANING LIQ C	1	0.02	98.23
182	3585	COMP TR-WD KILL CL	1	0.02	98.25
183	3590	COMP TR-WD KILL FL	1	0.02	98.27
184	3600	COMP TR & WD KILLER	1	0.02	98.30
185	3660	NONFLAMMABLE GAS	1	0.02	98.32
186	3670	COMPRESSED GAS N.O.	1	0.02	98.34
187	3745	COSMETICS NOS LIQ	1	0.02	98.37
188	3748	CREOSOTE COAL TAR	1	0.02	98.39
189	3750	CROTONALDEHYDE	1	0.02	98.42
190	3850	SODIUM CYANIDE SOL	1	0.02	98.44
191	4061	DICHLOROBUTENE	1	0.02	98.46
192	4255	DIMETHYL CHLOROTHIO	1	0.02	98.49
193	4320	DIMETHYL SULFIDE	1	0.02	98.51
194	4418	DODECYLBENZENESULF	1	0.02	98.53
195	4616	EPICHLOROHYDRIN	1	0.02	98.56
196	4720	ETHYLENE DICHLORIDE	1	0.02	98.58
197	4724	ETHYLENE GLYCOL	1	0.02	98.60
198	4726	ETHLGLYC 1METH ETHR	1	0.02	98.63
199	4727	ETHLGLYC 1METH E AC	1	0.02	98.65
200	4735	ETHYL MERCAPTAN	1	0.02	98.68

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
201	4752	ETHYL HEXALDEHYDE	1	0.02	98.70
202	4790	ETHYL METHYL KETONE	1	0.02	98.72
203	4816	ETHYL SILICATE	1	0.02	98.75
204	5132	FLAMMABLE LIQUID	1	0.02	98.77
205	5133	FLAMMABLE SOLID COR	1	0.02	98.79
206	5140	FLAMMABLE SOLID N.O	1	0.02	98.82
207	5186	FORMALDEHYDE <110GL	1	0.02	98.84
208	5190	FORMIC ACID	1	0.02	98.87
209	5470	HELIUM	1	0.02	98.89
210	5496	HEXACHLOROCYCLOPEN	1	0.02	98.91
211	5574	HEXAMETHYLENE IMINE	1	0.02	98.94
212	5660	HYDRIODIC ACID	1	0.02	98.96
213	5840	HYDROGEN REFRIGERAT	1	0.02	98.98
214	5870	HYPOCHLORITE SOL	1	0.02	99.01
215	5953	INITIAT EXPL LEADAZ.	1	0.02	99.03
216	6057	ISOBUTYRIC ACID	1	0.02	99.05
217	6114	ISOPROPYLAMINE	1	0.02	99.08
218	6190	LAQUER BASE	1	0.02	99.10
219	6200	LAUROYL PEROXIDE	1	0.02	99.13
220	6562	MERCAPTAN MIX <110	1	0.02	99.15
221	6867	MESITYL OXIDE	1	0.02	99.17
222	6932	METHYL AMYL KETONE	1	0.02	99.20
223	6980	METHYL CHLORIDE	1	0.02	99.22
224	7062	METHYL ISOBUTYKET	1	0.02	99.24
225	7140	METHYLTRICHLOROSILN	1	0.02	99.27
226	7192	MINING REAGENT LIQ	1	0.02	99.29
227	7700	NITRIC ACID	1	0.02	99.31
228	7760	NITROGEN	1	0.02	99.34
229	7870	NITROUS OXIDE	1	0.02	99.36
230	7960	ORGANIC PHOSPHATE L	1	0.02	99.39
231	7994	ORM-A N.O.S.	1	0.02	99.41
232	8009	OXIDIZER CORROSIVE	1	0.02	99.43
233	8010	OXI MATERIAL N.O.S.	1	0.02	99.46
234	8076	PARAFORMALDEHYDE	1	0.02	99.48
235	8155	PENTACHLOROPHENOL	1	0.02	99.50
236	8332	PHENOL LIQUID or SO	1	0.02	99.53
237	8415	PHOSPHORUS PENTASUL	1	0.02	99.55
238	8520	POISONOUS LIQUID N.	1	0.02	99.57
239	8810	PYRIDINE	1	0.02	99.60
240	9552	SODIUM DICHROMATE	1	0.02	99.62

NUMBER OF LEAKS BY COMMODITY (1985-1989)

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
241	9574	SODIUM HYDROXID DRY	1	0.02	99.65
242	9876	SUBST NITROPHENOLFL	1	0.02	99.67
243	9878	SUBST NITROPHENOL L	1	0.02	99.69
244	9916	SULFUR SOLID	1	0.02	99.72
245	9918	SULFUR, MOLTEN	1	0.02	99.74
246	9932	SULFUROUS ACID	1	0.02	99.76
247	10041	TAR LIQUID CL	1	0.02	99.79
248	10088	TETRACHLOROETHYLEN	1	0.02	99.81
249	10230	THIONYL CHLORIDE	1	0.02	99.83
250	10330	TITANIUM TETRACHLOR	1	0.02	99.86
251	10409	1,1,1-TRICHLOROETHA	1	0.02	99.88
252	10465	TRIETHYLAMINE	1	0.02	99.91
253	10490	TRIMETHYLAMINE AQUE	1	0.02	99.93
254	10567	TURPENTINE COMBUST	1	0.02	99.95
255	10615	VALERIC ACID	1	0.02	99.98
256	10815	WHITE ACID	1	0.02	100.00
		TOTAL	4229		

NUMBER OF LEAKS BY COMMODITY 1985

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	9930	SULFURIC ACID	88	12.07	12.07
2	6300	LP GAS	70	9.60	21.67
3	5700	HYDROCHLORIC ACID	48	6.58	28.26
4	1620	AMMONIA ANHYDROUS	33	4.53	32.78
5	8365	PHOSPHORIC ACID	33	4.53	37.31
6	9575	SODIUM HYDROXIDE LQ	32	4.39	41.70
7	4005	DENATURED ALCOHOL	23	3.16	44.86
8	9874	STYRENE MONOMER INH	19	2.61	47.46
9	10650	VINYL ACETATE	19	2.61	50.07
10	10820	METHYL ALCOHOL	18	2.47	52.54
11	5130	FLAM LIQUIDS N.O.S.	17	2.33	54.87
12	8319	PETROLEUM NAPHTHA CL	14	1.92	56.79
13	4668	ETHYL ALCOHOL	12	1.65	58.44
14	8320	PETROLEUM NAPHTHA	12	1.65	60.08
15	3730	CORR LIQ N.O.S.	11	1.51	61.59
16	5853	HYDROGEN PEROX >52	11	1.51	63.10
17	3475	COMBUSTIBLE LIQ NOS	9	1.23	64.33
18	1010	ACETONE	8	1.10	65.43
19	2710	CO2 LIQUIFIED	8	1.10	66.53
20	7950	OLEUM	8	1.10	67.63
21	1190	ALCOHOL N.O.S.	7	0.96	68.59
22	1270	ALKA COR LIQ N.O.S.	7	0.96	69.55
23	2460	BUTADIENE INHIBITED	7	0.96	70.51
24	10890	XYLENE (XYLOL)	7	0.96	71.47
25	4661	ETHYL ACRYLATE INHB	6	0.82	72.29
26	4714	ETHYLENEDIAMINE	6	0.82	73.11
27	7100	METHYL METHACRYLATE	6	0.82	73.94
28	9760	SULFURIC ACID SPENT	6	0.82	74.76
29	1426	AMMONIUM SULFID SLN	5	0.69	75.45
30	2070	BENZENE (BENZOL)	4	0.55	75.99
31	2100	BENZINE	4	0.55	76.54
32	5851	HYDROGEN PEROX 8-40	4	0.55	77.09
33	6100	ISOPROPANOL	4	0.55	77.64
34	8628	POTASS HYDROXIDE LQ	4	0.55	78.19
35	1000	ACETALDEHYDE(ET AL)	3	0.41	78.60
36	1004	ACETIC ACID AQU SLN	3	0.41	79.01
37	1008	ACETIC ANHYDRIDE	3	0.41	79.42
38	1182	ALCOHOLIC BEVERAGE	3	0.41	79.84
39	1336	AMMON HYDROXIDE <45	3	0.41	80.25
40	1730	ARGON PRESS LIQUID	3	0.41	80.66
41	2463	BUTYL ALCOHOL	3	0.41	81.07

NUMBER OF LEAKS BY COMMODITY 1985

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	2690	CARBON BISULFIDE	3	0.41	81.48
43	3140	CHLORINE	3	0.41	81.89
44	4660	ETHYL ACETATE	3	0.41	82.30
45	4710	ETHYLENE	3	0.41	82.72
46	5360	GASOLINE including	3	0.41	83.13
47	5780	HYDROGEN FLORIDE	3	0.41	83.54
48	6080	ISOPENTANE	3	0.41	83.95
49	7040	METHYL ETHYL KETONE	3	0.41	84.36
50	7931	OIL NOS PETROL CL	3	0.41	84.77
51	8800	PROPYLENE OXIDE	3	0.41	85.19
52	1006	ACETIC ACID GLACIAL	2	0.27	85.46
53	1194	ALCOHOL, N.O.S.	2	0.27	85.73
54	1337	AMMON HYDROXIDE <12	2	0.27	86.01
55	1431	AMMON THIOSULFATE	2	0.27	86.28
56	2500	BUTRALDEHYDE	2	0.27	86.56
57	3180	CHLOROSULFONIC ACID	2	0.27	86.83
58	3351	COAL TAR DISTILL CL	2	0.27	87.11
59	4662	ETHYL BENZENE	2	0.27	87.38
60	4745	ETHYL ETHER	2	0.27	87.65
61	5202	FUEL OIL	2	0.27	87.93
62	5203	FUEL OIL 1,2,4,5,6	2	0.27	88.20
63	5730	HYDROCYANIC ACID LQ	2	0.27	88.48
64	5770	HYDROFLUORIC AC SLN	2	0.27	88.75
65	5800	HYDROFLUOSILIC ACID	2	0.27	89.03
66	6085	ISOPENTANOIC ACID	2	0.27	89.30
67	7276	MONOETHANOLAMINE	2	0.27	89.57
68	7720	NITROBENZENE LIQUID	2	0.27	89.85
69	8440	PHOSPHORUS TRICL2	2	0.27	90.12
70	8498	PINENE	2	0.27	90.40
71	8769	PROPYLAMINE	2	0.27	90.67
72	9900	SULFUR DIOXIDE	2	0.27	90.95
73	10340	TOLUENE	2	0.27	91.22
74	10480	TRIMETHYLAMINE ANHY	2	0.27	91.50
75	1140	ACRYLONITRILE	1	0.14	91.63
76	1305	ALUMINUM CHLORDE AN	1	0.14	91.77
77	1318	ALUMINUM SULF SOLUT	1	0.14	91.91
78	1361	AMMON NITR SOL	1	0.14	92.04
79	1430	AMMON THIOCYANATE	1	0.14	92.18
80	1926	ASPHALT CUT BACK	1	0.14	92.32
81	2120	BENZOYL CHLORIDE	1	0.14	92.46
82	2470	BUTYL ACETATE	1	0.14	92.59

NUMBER OF LEAKS BY COMMODITY 1985

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	2480	BUTYL MERCAPTAN	1	0.14	92.73
84	2711	CARBON DIOXIDE	1	0.14	92.87
85	3075	CHLOROBENZENE	1	0.14	93.00
86	3220	CHLORPICRIN LIQUID	1	0.14	93.14
87	3350	COAL TAR DISTILLATE	1	0.14	93.28
88	3585	COMP TR-WD KILL CL	1	0.14	93.42
89	3590	COMP TR-WD KILL FL	1	0.14	93.55
90	3750	CROTONALDEHYDE	1	0.14	93.69
91	3751	CRESOL	1	0.14	93.83
92	3770	CRUDE OIL PETROLEUM	1	0.14	93.96
93	4124	DICHLORO/METHY CHLO	1	0.14	94.10
94	4162	DIETHYL KETONE	1	0.14	94.24
95	4233	DIISOPROPYLETHER	1	0.14	94.38
96	4716	ETHYLENE DIBROMIDE	1	0.14	94.51
97	4723	ETHLGLYC 2ETHYL ETH	1	0.14	94.65
98	4724	ETHYLENE GLYCOL	1	0.14	94.79
99	4726	ETHLGLYC 1METH ETHR	1	0.14	94.92
100	5005	FERRIC CHLORIDE SLN	1	0.14	95.06
101	5125	FLAMMABLE LIQUID CR	1	0.14	95.20
102	5187	FORMALDEHYDE>110GL	1	0.14	95.34
103	5188	FORMALDEHYDE SOLUTI	1	0.14	95.47
104	5201	FUEL AVIATION TURBN	1	0.14	95.61
105	5206	FUEL AVIATION TURBI	1	0.14	95.75
106	5225	FURFURAL	1	0.14	95.88
107	5490	HEPTANE	1	0.14	96.02
108	5570	HEXAMETHYLENE DIA S	1	0.14	96.16
109	5580	HEXANE	1	0.14	96.30
110	5720	HCL SOLUTION	1	0.14	96.43
111	5852	HYDROGEN PEROX40-52	1	0.14	96.57
112	5860	HYDROGEN SULFIDE	1	0.14	96.71
113	6056	ISOBUTYL ACETATE	1	0.14	96.85
114	6090	ISOPRENE	1	0.14	96.98
115	6110	ISOPROPYL ACETATE	1	0.14	97.12
116	6200	LAUROYL PEROXIDE	1	0.14	97.26
117	6561	MERCAPTAN MIX >110	1	0.14	97.39
118	6920	METHYL ACRYLATE INH	1	0.14	97.53
119	6932	METHYL AMYL KETONE	1	0.14	97.67
120	7090	METHYL MERCAPTAN	1	0.14	97.81
121	7280	MONOETHYLAMINE	1	0.14	97.94
122	7300	METHYLAMINE ANHYDR	1	0.14	98.08
123	7700	NITRIC ACID	1	0.14	98.22

NUMBER OF LEAKS BY COMMODITY 1985

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	7870	NITROUS OXIDE	1	0.14	98.35
125	8495	PINE OIL	1	0.14	98.49
126	8766	PROPIONIC ACID	1	0.14	98.63
127	8768	PROPYL ACETATE	1	0.14	98.77
128	8771	PROPYL ALCOHOL	1	0.14	98.90
129	8773	PROPYLENE DICHLORID	1	0.14	99.04
130	8810	PYRIDINE	1	0.14	99.18
131	9310	SILICON CHLORIDE	1	0.14	99.31
132	9895	SULFUR CHLORID MONO	1	0.14	99.45
133	10336	TOLUENE DIISOCYANAT	1	0.14	99.59
134	10568	TURPENTINE FLAM	1	0.14	99.73
135	10660	VINYL CHLORIDE	1	0.14	99.86
136	10815	WHITE ACID	1	0.14	100.00
		TOTAL	729		

NUMBER OF LEAKS BY COMMODITY 1986

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	9930	SULFURIC ACID	92	12.28	12.28
2	6300	LP GAS	59	7.88	20.16
3	5700	HYDROCHLORIC ACID	56	7.48	27.64
4	1620	AMMONIA ANHYDROUS	52	6.94	34.58
5	9575	SODIUM HYDROXIDE LQ	52	6.94	41.52
6	8365	PHOSPHORIC ACID	41	5.47	47.00
7	10820	METHYL ALCOHOL	24	3.20	50.20
8	5130	FLAM LIQUIDS N.O.S.	23	3.07	53.27
9	4005	DENATURED ALCOHOL	16	2.14	55.41
10	8319	PETROLEUM NAPHTHA CL	15	2.00	57.41
11	9874	STYRENE MONOMER INH	15	2.00	59.41
12	1270	ALKA COR LIQ N.O.S.	13	1.74	61.15
13	3475	COMBUSTIBLE LIQ NOS	13	1.74	62.88
14	9760	SULFURIC ACID SPENT	13	1.74	64.62
15	10890	XYLENE (XYLOL)	11	1.47	66.09
16	3730	CORR LIQ N.O.S.	10	1.34	67.42
17	5852	HYDROGEN PEROX40-52	9	1.20	68.62
18	5853	HYDROGEN PEROX >52	9	1.20	69.83
19	2710	CO2 LIQUIFIED	7	0.93	70.76
20	4668	ETHYL ALCOHOL	7	0.93	71.70
21	5201	FUEL AVIATION TURBN	7	0.93	72.63
22	10650	VINYL ACETATE	7	0.93	73.56
23	8320	PETROLEUM NAPHTHA	6	0.80	74.37
24	8628	POTASS HYDROXIDE LQ	6	0.80	75.17
25	1008	ACETIC ANHYDRIDE	5	0.67	75.83
26	2463	BUTYL ALCOHOL	5	0.67	76.50
27	2711	CARBON DIOXIDE	5	0.67	77.17
28	4714	ETHYLENEDIAMINE	5	0.67	77.84
29	9566	SODIUM HY SULFID SN	5	0.67	78.50
30	10340	TOLUENE	5	0.67	79.17
31	2500	BUTRALDEHYDE	4	0.53	79.71
32	3140	CHLORINE	4	0.53	80.24
33	3500	COMP CLEANING LIQ F	4	0.53	80.77
34	5360	GASOLINE including	4	0.53	81.31
35	8330	PHENOL	4	0.53	81.84
36	1182	ALCOHOLIC BEVERAGE	3	0.40	82.24
37	1336	AMMON HYDROXIDE <45	3	0.40	82.64
38	1426	AMMONIUM SULFID SLN	3	0.40	83.04
39	1730	ARGON PRESS LIQUID	3	0.40	83.44
40	3180	CHLOROSULFONIC ACID	3	0.40	83.85
41	3350	COAL TAR DISTILLATE	3	0.40	84.25

NUMBER OF LEAKS BY COMMODITY 1986

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	4661	ETHYL ACRYLATE INHB	3	0.40	84.65
43	5005	FERRIC CHLORIDE SLN	3	0.40	85.05
44	5580	HEXANE	3	0.40	85.45
45	5800	HYDROFLUOSILIC ACID	3	0.40	85.85
46	5851	HYDROGEN PEROX 8-40	3	0.40	86.25
47	6100	ISOPROPANOL	3	0.40	86.65
48	7040	METHYL ETHYL KETONE	3	0.40	87.05
49	7931	OIL NOS PETROL CL	3	0.40	87.45
50	1004	ACETIC ACID AQU SLN	2	0.27	87.72
51	1010	ACETONE	2	0.27	87.98
52	1361	AMMON NITR SOL	2	0.27	88.25
53	2120	BENZOYL CHLORIDE	2	0.27	88.52
54	2177	BIPYRIDILIUM PEST L	2	0.27	88.79
55	2470	BUTYL ACETATE	2	0.27	89.05
56	3270	CHROMIC ACID SOLUT	2	0.27	89.32
57	4711	ETHYLENE	2	0.27	89.59
58	4716	ETHYLENE DIBROMIDE	2	0.27	89.85
59	4745	ETHYL ETHER	2	0.27	90.12
60	5125	FLAMMABLE LIQUID CR	2	0.27	90.39
61	5187	FORMALDEHYDE>110GL	2	0.27	90.65
62	6920	METHYL ACRYLATE INH	2	0.27	90.92
63	7930	OIL N.O.S.	2	0.27	91.19
64	7950	OLEUM	2	0.27	91.46
65	8460	PHOSPHORUS WH/YLWET	2	0.27	91.72
66	8498	PINENE	2	0.27	91.99
67	9895	SULFUR CHLORID MONO	2	0.27	92.26
68	9900	SULFUR DIOXIDE	2	0.27	92.52
69	1000	ACETALDEHYDE(ET AL)	1	0.13	92.66
70	1006	ACETIC ACID GLACIAL	1	0.13	92.79
71	1140	ACRYLONITRILE	1	0.13	92.92
72	2070	BENZENE (BENZOL)	1	0.13	93.06
73	2690	CARBON BISULFIDE	1	0.13	93.19
74	3351	COAL TAR DISTILL CL	1	0.13	93.32
75	3587	COMP TR-WD KILL COR	1	0.13	93.46
76	3751	CRESOL	1	0.13	93.59
77	3850	SODIUM CYANIDE SOL	1	0.13	93.73
78	3900	CYCLOHEXANE	1	0.13	93.86
79	4057	DICHLOROBENZENE LIQ	1	0.13	93.99
80	4061	DICHLOROBUTENE	1	0.13	94.13
81	4233	DIISOPROPYLETHER	1	0.13	94.26
82	4255	DIMETHYL CHLOROTHIO	1	0.13	94.39

NUMBER OF LEAKS BY COMMODITY 1986

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	4320	DIMETHYL SULFIDE	1	0.13	94.53
84	4418	DODECYLBENZENESULFO	1	0.13	94.66
85	4660	ETHYL ACETATE	1	0.13	94.79
86	4720	ETHYLENE DICHLORIDE	1	0.13	94.93
87	4727	ETHLGLYC 1METH E AC	1	0.13	95.06
88	4735	ETHYL MERCAPTAN	1	0.13	95.19
89	4816	ETHYL SILICATE	1	0.13	95.33
90	5186	FORMALDEHYDE <110GL	1	0.13	95.46
91	5188	FORMALDEHYDE SOLUTI	1	0.13	95.59
92	5190	FORMIC ACID	1	0.13	95.73
93	5202	FUEL OIL	1	0.13	95.86
94	5203	FUEL OIL 1,2,4,5,6	1	0.13	96.00
95	5457	HAZARD SUBST L/S	1	0.13	96.13
96	5470	HELIUM	1	0.13	96.26
97	5490	HEPTANE	1	0.13	96.40
98	5570	HEXAMETHYLENE DIA S	1	0.13	96.53
99	5860	HYDROGEN SULFIDE	1	0.13	96.66
100	6085	ISOPENTANOIC ACID	1	0.13	96.80
101	6561	MERCAPTAN MIX >110	1	0.13	96.93
102	6867	MESITYL OXIDE	1	0.13	97.06
103	7100	METHYL METHACRYLATE	1	0.13	97.20
104	7276	MONOETHANOLAMINE	1	0.13	97.33
105	7521	NAPTHA CL	1	0.13	97.46
106	7701	NITRIC ACID >40%	1	0.13	97.60
107	7702	NITRIC ACID FUMING	1	0.13	97.73
108	7720	NITROBENZENE LIQUID	1	0.13	97.86
109	7960	ORGANIC PHOSPHATE L	1	0.13	98.00
110	8060	PAINT RELATED MAT	1	0.13	98.13
111	8400	PHOSPHORUS OXYCHLOR	1	0.13	98.26
112	8440	PHOSPHORUS TRICL2	1	0.13	98.40
113	8495	PINE OIL	1	0.13	98.53
114	8770	PROPYL MERCAPTAN	1	0.13	98.67
115	8800	PROPYLENE OXIDE	1	0.13	98.80
116	9030	RESIN SOLUTION	1	0.13	98.93
117	9310	SILICON CHLORIDE	1	0.13	99.07
118	9552	SODIUM DICHROMATE	1	0.13	99.20
119	9878	SUBST NITROPHENOL L	1	0.13	99.33
120	9890	SULFUR CHLORIDE	1	0.13	99.47
121	10230	THIONYL CHLORIDE	1	0.13	99.60
122	10480	TRIMETHYLAMINE ANHY	1	0.13	99.73
123	10567	TURPENTINE COMBUST	1	0.13	99.87

NUMBER OF LEAKS BY COMMODITY 1986

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	10660	VINYL CHLORIDE	1	0.13	100.00
		TOTAL	749		

NUMBER OF LEAKS BY COMMODITY 1987

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	9930	SULFURIC ACID	72	9.17	9.17
2	1620	AMMONIA ANHYDROUS	66	8.41	17.58
3	5700	HYDROCHLORIC ACID	61	7.77	25.35
4	8365	PHOSPHORIC ACID	56	7.13	32.48
5	9575	SODIUM HYDROXIDE LQ	49	6.24	38.73
6	6300	LP GAS	40	5.10	43.82
7	5130	FLAM LIQUIDS N.O.S.	33	4.20	48.03
8	10820	METHYL ALCOHOL	24	3.06	51.08
9	4005	DENATURED ALCOHOL	18	2.29	53.38
10	8319	PETROLEUM NAPTHA CL	18	2.29	55.67
11	3730	CORR LIQ N.O.S.	17	2.17	57.83
12	9874	STYRENE MONOMER INH	15	1.91	59.75
13	3475	COMBUSTIBLE LIQ NOS	14	1.78	61.53
14	5459	HAZARD WASTE L/S	13	1.66	63.18
15	9760	SULFURIC ACID SPENT	13	1.66	64.84
16	2710	CO2 LIQUIFIED	11	1.40	66.24
17	8320	PETROLEUM NAPHTHA	10	1.27	67.52
18	2711	CARBON DIOXIDE	9	1.15	68.66
19	1270	ALKA COR LIQ N.O.S.	8	1.02	69.68
20	3140	CHLORINE	7	0.89	70.57
21	5203	FUEL OIL 1,2,4,5,6	7	0.89	71.47
22	6100	ISOPROPANOL	7	0.89	72.36
23	8440	PHOSPHORUS TRICL2	7	0.89	73.25
24	2460	BUTADIENE INHIBITED	6	0.76	74.01
25	5852	HYDROGEN PEROX40-52	6	0.76	74.78
26	5853	HYDROGEN PEROX >52	6	0.76	75.54
27	10340	TOLUENE	6	0.76	76.31
28	3770	CRUDE OIL PETROLEUM	5	0.64	76.94
29	5202	FUEL OIL	5	0.64	77.58
30	5800	HYDROFLUOSILIC ACID	5	0.64	78.22
31	7702	NITRIC ACID FUMING	5	0.64	78.85
32	8628	POTASS HYDROXIDE LQ	5	0.64	79.49
33	1000	ACETALDEHYDE(ET AL)	4	0.51	80.00
34	1318	ALUMINUM SULF SOLUT	4	0.51	80.51
35	1720	ARGON	4	0.51	81.02
36	4661	ETHYL ACRYLATE INHB	4	0.51	81.53
37	4714	ETHYLENEDIAMINE	4	0.51	82.04
38	5580	HEXANE	4	0.51	82.55
39	7950	OLEUM	4	0.51	83.06
40	10890	XYLENE (XYLOL)	4	0.51	83.57
41	1004	ACETIC ACID AQU SLN	3	0.38	83.95

NUMBER OF LEAKS BY COMMODITY 1987

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	1006	ACETIC ACID GLACIAL	3	0.38	84.33
43	1008	ACETIC ANHYDRIDE	3	0.38	84.71
44	1132	ACRYLIC ACID	3	0.38	85.10
45	3350	COAL TAR DISTILLATE	3	0.38	85.48
46	4745	ETHYL ETHER	3	0.38	85.86
47	5125	FLAMMABLE LIQUID CR	3	0.38	86.24
48	5201	FUEL AVIATION TURBN	3	0.38	86.62
49	5570	HEXAMETHYLENE DIA S	3	0.38	87.01
50	7931	OIL NOS PETROL CL	3	0.38	87.39
51	10650	VINYL ACETATE	3	0.38	87.77
52	1426	AMMONIUM SULFID SLN	2	0.25	88.03
53	2463	BUTYL ALCOHOL	2	0.25	88.28
54	3180	CHLOROSULFONIC ACID	2	0.25	88.54
55	3735	CORR SOLID N.O.S.	2	0.25	88.79
56	3900	CYCLOHEXANE	2	0.25	89.04
57	4668	ETHYL ALCOHOL	2	0.25	89.30
58	4725	ETHYLENE GLYCOL MON	2	0.25	89.55
59	5005	FERRIC CHLORIDE SLN	2	0.25	89.81
60	5180	FLUOSULFONIC ACID	2	0.25	90.06
61	5457	HAZARD SUBST L/S	2	0.25	90.32
62	7040	METHYL ETHYL KETONE	2	0.25	90.57
63	7701	NITRIC ACID >40%	2	0.25	90.83
64	8450	PHOSPHORUS WH/YLDRY	2	0.25	91.08
65	9890	SULFUR CHLORIDE	2	0.25	91.34
66	9900	SULFUR DIOXIDE	2	0.25	91.59
67	10184	TETRAHYDROFURAN	2	0.25	91.85
68	10336	TOLUENE DIISOCYANAT	2	0.25	92.10
69	10568	TURPENTINE FLAM	2	0.25	92.36
70	1010	ACETONE	1	0.13	92.48
71	1194	ALCOHOL, N.O.S.	1	0.13	92.61
72	1336	AMMON HYDROXIDE <45	1	0.13	92.74
73	1640	ANILINE OIL LIQUID	1	0.13	92.87
74	1730	ARGON PRESS LIQUID	1	0.13	92.99
75	1926	ASPHALT CUT BACK	1	0.13	93.12
76	2068	BENZALDEHYDE	1	0.13	93.25
77	2470	BUTYL ACETATE	1	0.13	93.38
78	2500	BUTRALDEHYDE	1	0.13	93.50
79	2504	BUTYRIC ACID	1	0.13	93.63
80	2720	CO2 / NO2	1	0.13	93.76
81	2730	CO2 OXYGEN MIXTURE	1	0.13	93.89
82	3175	CHLOROFORM	1	0.13	94.01

NUMBER OF LEAKS BY COMMODITY 1987

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	3351	COAL TAR DISTILL CL	1	0.13	94.14
84	3587	COMP TR-WD KILL COR	1	0.13	94.27
85	3600	COMP TR & WD KILLER	1	0.13	94.39
86	3660	NONFLAMMABLE GAS	1	0.13	94.52
87	3745	COSMETICS NOS LIQ	1	0.13	94.65
88	3751	CRESOL	1	0.13	94.78
89	4057	DICHLOROBENZENE LIQ	1	0.13	94.90
90	4660	ETHYL ACETATE	1	0.13	95.03
91	4710	ETHYLENE	1	0.13	95.16
92	4716	ETHYLENE DIBROMIDE	1	0.13	95.29
93	4723	ETHLGLYC 2ETHYL ETH	1	0.13	95.41
94	4752	ETHYL HEXALDEHYDE	1	0.13	95.54
95	5132	FLAMMABLE LIQUID	1	0.13	95.67
96	5187	FORMALDEHYDE>110GL	1	0.13	95.80
97	5188	FORMALDEHYDE SOLUTI	1	0.13	95.92
98	5206	FUEL AVIATION TURBI	1	0.13	96.05
99	5660	HYDRIODIC ACID	1	0.13	96.18
100	5851	HYDROGEN PEROX 8-40	1	0.13	96.31
101	5860	HYDROGEN SULFIDE	1	0.13	96.43
102	6057	ISOBUTYRIC ACID	1	0.13	96.56
103	6114	ISOPROPYLAMINE	1	0.13	96.69
104	6920	METHYL ACRYLATE INH	1	0.13	96.82
105	6980	METHYL CHLORIDE	1	0.13	96.94
106	7062	METHYL ISOBUTYKET	1	0.13	97.07
107	7100	METHYL METHACRYLATE	1	0.13	97.20
108	7140	METHYLTRICHLOROSILN	1	0.13	97.32
109	7192	MINING REAGENT LIQ	1	0.13	97.45
110	7280	MONOETHYLAMINE	1	0.13	97.58
111	7930	OIL N.O.S.	1	0.13	97.71
112	8009	OXIDIZER CORROSIVE	1	0.13	97.83
113	8010	OXI MATERIAL N.O.S.	1	0.13	97.96
114	8040	OXYGEN PRESS LIQUID	1	0.13	98.09
115	8059	PAINT RELATED MAT	1	0.13	98.22
116	8160	PENTANE	1	0.13	98.34
117	8330	PHENOL	1	0.13	98.47
118	8332	PHENOL LIQUID or SO	1	0.13	98.60
119	8400	PHOSPHORUS OXYCHLOR	1	0.13	98.73
120	8460	PHOSPHORUS WH/YLWET	1	0.13	98.85
121	8766	PROPIONIC ACID	1	0.13	98.98
122	8773	PROPYLENE DICHLORID	1	0.13	99.11
123	8800	PROPYLENE OXIDE	1	0.13	99.24

NUMBER OF LEAKS BY COMMODITY 1987

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	9030	RESIN SOLUTION	1	0.13	99.36
125	9566	SODIUM HY SULFID SN	1	0.13	99.49
126	9876	SUBST NITROPHENOLFL	1	0.13	99.62
127	9932	SULFUROUS ACID	1	0.13	99.75
128	10465	TRIETHYLAMINE	1	0.13	99.87
129	10942	ZINC CHLORIDE SLN	1	0.13	100.00
		TOTAL	785		

NUMBER OF LEAKS BY COMMODITY 1988

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	9930	SULFURIC ACID	117	12.90	12.90
2	5700	HYDROCHLORIC ACID	63	6.95	19.85
3	9575	SODIUM HYDROXIDE LQ	61	6.73	26.57
4	1620	AMMONIA ANHYDROUS	51	5.62	32.19
5	6300	LP GAS	50	5.51	37.71
6	5130	FLAM LIQUIDS N.O.S.	44	4.85	42.56
7	8365	PHOSPHORIC ACID	40	4.41	46.97
8	3730	CORR LIQ N.O.S.	26	2.87	49.83
9	2711	CARBON DIOXIDE	24	2.65	52.48
10	10820	METHYL ALCOHOL	23	2.54	55.02
11	9874	STYRENE MONOMER INH	16	1.76	56.78
12	5853	HYDROGEN PEROX >52	15	1.65	58.43
13	5203	FUEL OIL 1,2,4,5,6	14	1.54	59.98
14	3475	COMBUSTIBLE LIQ NOS	13	1.43	61.41
15	8319	PETROLEUM NAPHTHA CL	13	1.43	62.84
16	5457	HAZARD SUBST L/S	11	1.21	64.06
17	7950	OLEUM	11	1.21	65.27
18	8320	PETROLEUM NAPHTHA	11	1.21	66.48
19	2710	CO2 LIQUIFIED	10	1.10	67.59
20	4005	DENATURED ALCOHOL	10	1.10	68.69
21	5800	HYDROFLUOSILIC ACID	9	0.99	69.68
22	5360	GASOLINE including	8	0.88	70.56
23	1270	ALKA COR LIQ N.O.S.	7	0.77	71.33
24	4668	ETHYL ALCOHOL	7	0.77	72.11
25	1182	ALCOHOLIC BEVERAGE	6	0.66	72.77
26	4661	ETHYL ACRYLATE INHB	6	0.66	73.43
27	7100	METHYL METHACRYLATE	6	0.66	74.09
28	8495	PINE OIL	6	0.66	74.75
29	8628	POTASS HYDROXIDE LQ	6	0.66	75.41
30	1000	ACETALDEHYDE(ET AL)	5	0.55	75.96
31	1006	ACETIC ACID GLACIAL	5	0.55	76.52
32	1720	ARGON	5	0.55	77.07
33	4660	ETHYL ACETATE	5	0.55	77.62
34	7702	NITRIC ACID FUMING	5	0.55	78.17
35	9760	SULFURIC ACID SPENT	5	0.55	78.72
36	9900	SULFUR DIOXIDE	5	0.55	79.27
37	10890	XYLENE (XYLOL)	5	0.55	79.82
38	3140	CHLORINE	4	0.44	80.26
39	3770	CRUDE OIL PETROLEUM	4	0.44	80.71
40	4710	ETHYLENE	4	0.44	81.15
41	5014	FERROUS CHLORIDE SL	4	0.44	81.59

NUMBER OF LEAKS BY COMMODITY 1988

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	5852	HYDROGEN PEROX40-52	4	0.44	82.03
43	7040	METHYL ETHYL KETONE	4	0.44	82.47
44	1010	ACETONE	3	0.33	82.80
45	2460	BUTADIENE INHIBITED	3	0.33	83.13
46	3350	COAL TAR DISTILLATE	3	0.33	83.46
47	3751	CRESOL	3	0.33	83.79
48	3771	CRUDE OIL PETROL	3	0.33	84.12
49	4124	DICHLORO/METHY CHLO	3	0.33	84.45
50	4233	DIISOPROPYLETHER	3	0.33	84.79
51	5202	FUEL OIL	3	0.33	85.12
52	5225	FURFURAL	3	0.33	85.45
53	5570	HEXAMETHYLENE DIA S	3	0.33	85.78
54	5580	HEXANE	3	0.33	86.11
55	6100	ISOPROPANOL	3	0.33	86.44
56	6120	ISOPROPYL MERCAPTAN	3	0.33	86.77
57	6920	METHYL ACRYLATE INH	3	0.33	87.10
58	8330	PHENOL	3	0.33	87.43
59	8460	PHOSPHORUS WH/YLWET	3	0.33	87.76
60	9030	RESIN SOLUTION	3	0.33	88.09
61	9920	SULFUR TRIOXIDE	3	0.33	88.42
62	10340	TOLUENE	3	0.33	88.75
63	10650	VINYL ACETATE	3	0.33	89.08
64	1004	ACETIC ACID AQU SLN	2	0.22	89.31
65	1120	ACID LIQUID N.O.S.	2	0.22	89.53
66	1140	ACRYLONITRILE	2	0.22	89.75
67	1190	ALCOHOL N.O.S.	2	0.22	89.97
68	2463	BUTYL ALCOHOL	2	0.22	90.19
69	2480	BUTYL MERCAPTAN	2	0.22	90.41
70	2690	CARBON BISULFIDE	2	0.22	90.63
71	3351	COAL TAR DISTILL CL	2	0.22	90.85
72	3380	COAL TAR OIL	2	0.22	91.07
73	3587	COMP TR-WD KILL COR	2	0.22	91.29
74	3900	CYCLOHEXANE	2	0.22	91.51
75	4716	ETHYLENE DIBROMIDE	2	0.22	91.73
76	5005	FERRIC CHLORIDE SLN	2	0.22	91.95
77	5201	FUEL AVIATION TURBN	2	0.22	92.17
78	5490	HEPTANE	2	0.22	92.39
79	5860	HYDROGEN SULFIDE	2	0.22	92.61
80	6056	ISOBUTYL ACETATE	2	0.22	92.83
81	6090	ISOPRENE	2	0.22	93.05
82	6110	ISOPROPYL ACETATE	2	0.22	93.27

NUMBER OF LEAKS BY COMMODITY 1988

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	6561	MERCAPTAN MIX >110	2	0.22	93.50
84	7276	MONOETHANOLAMINE	2	0.22	93.72
85	7535	NAPHTHALENE	2	0.22	93.94
86	7720	NITROBENZENE LIQUID	2	0.22	94.16
87	8059	PAINT RELATED MAT	2	0.22	94.38
88	8766	PROPIONIC ACID	2	0.22	94.60
89	1008	ACETIC ANHYDRIDE	1	0.11	94.71
90	1030	ACETONE OIL	1	0.11	94.82
91	1132	ACRYLIC ACID	1	0.11	94.93
92	1431	AMMON THIOSULFATE	1	0.11	95.04
93	2470	BUTYL ACETATE	1	0.11	95.15
94	2500	BUTRALDEHYDE	1	0.11	95.26
95	3179	CHLOROPROPENE	1	0.11	95.37
96	3490	COMP CLEANING LIQ C	1	0.11	95.48
97	3748	CREOSOTE COAL TAR	1	0.11	95.59
98	4162	DIETHYL KETONE	1	0.11	95.70
99	4616	EPICHLOROHYDRIN	1	0.11	95.81
100	4662	ETHYL BENZENE	1	0.11	95.92
101	4790	ETHYL METHYL KETONE	1	0.11	96.03
102	5180	FLUOSULFONIC ACID	1	0.11	96.14
103	5459	HAZARD WASTE L/S	1	0.11	96.25
104	5496	HEXACHLOROCYCLOPENT	1	0.11	96.36
105	5574	HEXAMETHYLENE IMINE	1	0.11	96.47
106	5720	HCL SOLUTION	1	0.11	96.58
107	5770	HYDROFLUORIC AC SLN	1	0.11	96.69
108	5870	HYPOCHLORITE SOL	1	0.11	96.80
109	5953	INITIAT EXPL LEADAZ	1	0.11	96.91
110	6080	ISOPENTANE	1	0.11	97.02
111	6190	LAQUER BASE	1	0.11	97.13
112	6560	MERCAPTAN MIX ALIPH	1	0.11	97.24
113	6562	MERCAPTAN MIX <110	1	0.11	97.35
114	7090	METHYL MERCAPTAN	1	0.11	97.46
115	7105	METHYL METHACRYL UN	1	0.11	97.57
116	7300	METHYLAMINE ANHYDR	1	0.11	97.68
117	7521	NAPTHA CL	1	0.11	97.79
118	7760	NITROGEN	1	0.11	97.91
119	7930	OIL N.O.S.	1	0.11	98.02
120	7931	OIL NOS PETROL CL	1	0.11	98.13
121	8155	PENTACHLOROPHENOL	1	0.11	98.24
122	8301	PETROLEUM DISTIL CL	1	0.11	98.35
123	8400	PHOSPHORUS OXYCHLOR	1	0.11	98.46

NUMBER OF LEAKS BY COMMODITY 1988

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	8440	PHOSPHORUS TRICL2	1	0.11	98.57
125	8498	PINENE	1	0.11	98.68
126	8770	PROPYL MERCAPTAN	1	0.11	98.79
127	8771	PROPYL ALCOHOL	1	0.11	98.90
128	8773	PROPYLENE DICHLORID	1	0.11	99.01
129	8800	PROPYLENE OXIDE	1	0.11	99.12
130	9440	SODIUM ALUM LIQUID	1	0.11	99.23
131	9574	SODIUM HYDROXID DRY	1	0.11	99.34
132	9916	SULFUR SOLID	1	0.11	99.45
133	10041	TAR LIQUID CL	1	0.11	99.56
134	10409	1,1,1-TRICHLOROETHA	1	0.11	99.67
135	10480	TRIMETHYLAMINE ANHY	1	0.11	99.78
136	10490	TRIMETHYLAMINE AQUE	1	0.11	99.89
137	10942	ZINC CHLORIDE SLN	1	0.11	100.00
		TOTAL	907		

NUMBER OF LEAKS BY COMMODITY 1989

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	5700	HYDROCHLORIC ACID	149	14.07	14.07
2	9930	SULFURIC ACID	128	12.09	26.16
3	9575	SODIUM HYDROXIDE LQ	71	6.70	32.86
4	6300	LP GAS	58	5.48	38.34
5	8365	PHOSPHORIC ACID	56	5.29	43.63
6	5130	FLAM LIQUIDS N.O.S.	52	4.91	48.54
7	1620	AMMONIA ANHYDROUS	51	4.82	53.35
8	2711	CARBON DIOXIDE	26	2.46	55.81
9	3475	COMBUSTIBLE LIQ NOS	25	2.36	58.17
10	10820	METHYL ALCOHOL	24	2.27	60.43
11	3730	CORR LIQ N.O.S.	23	2.17	62.61
12	9874	STYRENE MONOMER INH	21	1.98	64.59
13	8319	PETROLEUM NAPHTHA CL	19	1.79	66.38
14	2710	CO2 LIQUIFIED	17	1.61	67.99
15	4005	DENATURED ALCOHOL	17	1.61	69.59
16	10340	TOLUENE	12	1.13	70.73
17	4661	ETHYL ACRYLATE INHB	10	0.94	71.67
18	5457	HAZARD SUBST L/S	10	0.94	72.62
19	5853	HYDROGEN PEROX >52	10	0.94	73.56
20	9760	SULFURIC ACID SPENT	10	0.94	74.50
21	5203	FUEL OIL 1,2,4,5,6	9	0.85	75.35
22	5852	HYDROGEN PEROX40-52	9	0.85	76.20
23	6100	ISOPROPANOL	9	0.85	77.05
24	7950	OLEUM	9	0.85	77.90
25	8320	PETROLEUM NAPHTHA	9	0.85	78.75
26	1010	ACETONE	8	0.76	79.51
27	1730	ARGON PRESS LIQUID	8	0.76	80.26
28	3351	COAL TAR DISTILL CL	8	0.76	81.02
29	8628	POTASS HYDROXIDE LQ	8	0.76	81.78
30	4668	ETHYL ALCOHOL	7	0.66	82.44
31	1720	ARGON	5	0.47	82.91
32	2463	BUTYL ALCOHOL	5	0.47	83.38
33	3140	CHLORINE	5	0.47	83.85
34	3735	CORR SOLID N.O.S.	5	0.47	84.32
35	5800	HYDROFLUOSILIC ACID	5	0.47	84.80
36	10650	VINYL ACETATE	5	0.47	85.27
37	1182	ALCOHOLIC BEVERAGE	4	0.38	85.65
38	2460	BUTADIENE INHIBITED	4	0.38	86.02
39	3751	CRESOL	4	0.38	86.40
40	5459	HAZARD WASTE L/S	4	0.38	86.78
41	8440	PHOSPHORUS TRICL2	4	0.38	87.16

NUMBER OF LEAKS BY COMMODITY 1989

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	8495	PINE OIL	4	0.38	87.54
43	1008	ACETIC ANHYDRIDE	3	0.28	87.82
44	1318	ALUMINUM SULF SOLUT	3	0.28	88.10
45	2500	BUTRALDEHYDE	3	0.28	88.39
46	5014	FERROUS CHLORIDE SL	3	0.28	88.67
47	5125	FLAMMABLE LIQUID CR	3	0.28	88.95
48	5202	FUEL OIL	3	0.28	89.24
49	5570	HEXAMETHYLENE DIA S	3	0.28	89.52
50	6080	ISOPENTANE	3	0.28	89.80
51	7040	METHYL ETHYL KETONE	3	0.28	90.09
52	7100	METHYL METHACRYLATE	3	0.28	90.37
53	7931	OIL NOS PETROL CL	3	0.28	90.65
54	8800	PROPYLENE OXIDE	3	0.28	90.93
55	9566	SODIUM HY SULFID SN	3	0.28	91.22
56	1004	ACETIC ACID AQU SLN	2	0.19	91.41
57	1132	ACRYLIC ACID	2	0.19	91.60
58	1194	ALCOHOL, N.O.S.	2	0.19	91.78
59	1270	ALKA COR LIQ N.O.S.	2	0.19	91.97
60	1361	AMMON NITR SOL	2	0.19	92.16
61	2070	BENZENE (BENZOL)	2	0.19	92.35
62	3075	CHLOROBENZENE	2	0.19	92.54
63	3587	COMP TR-WD KILL COR	2	0.19	92.73
64	3900	CYCLOHEXANE	2	0.19	92.92
65	4124	DICHLORO/METHY CHLO	2	0.19	93.11
66	4714	ETHYLENEDIAMINE	2	0.19	93.30
67	5005	FERRIC CHLORIDE SLN	2	0.19	93.48
68	5580	HEXANE	2	0.19	93.67
69	5860	HYDROGEN SULFIDE	2	0.19	93.86
70	7090	METHYL MERCAPTAN	2	0.19	94.05
71	8040	OXYGEN PRESS LIQUID	2	0.19	94.24
72	9030	RESIN SOLUTION	2	0.19	94.43
73	9711	SODIUM SULFIDE HYDR	2	0.19	94.62
74	9900	SULFUR DIOXIDE	2	0.19	94.81
75	10890	XYLENE (XYLOL)	2	0.19	95.00
76	1000	ACETALDEHYDE(ET AL)	1	0.09	95.09
77	1006	ACETIC ACID GLACIAL	1	0.09	95.18
78	1140	ACRYLONITRILE	1	0.09	95.28
79	1183	ALCOHOLIC BEVERAGE	1	0.09	95.37
80	1190	ALCOHOL N.O.S.	1	0.09	95.47
81	1305	ALUMINUM CHLORDE AN	1	0.09	95.56
82	1336	AMMON HYDROXIDE <45	1	0.09	95.66

NUMBER OF LEAKS BY COMMODITY 1989

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	2476	BUTYL ETHER	1	0.09	95.75
84	3175	CHLOROFORM	1	0.09	95.85
85	3181	CHLORODIFLUOROMETHA	1	0.09	95.94
86	3670	COMPRESSED GAS N.O.	1	0.09	96.03
87	3770	CRUDE OIL PETROLEUM	1	0.09	96.13
88	4660	ETHYL ACETATE	1	0.09	96.22
89	4710	ETHYLENE	1	0.09	96.32
90	4711	ETHYLENE	1	0.09	96.41
91	5133	FLAMMABLE SOLID COR	1	0.09	96.51
92	5140	FLAMMABLE SOLID N.O	1	0.09	96.60
93	5180	FLUOSULFONIC ACID	1	0.09	96.70
94	5187	FORMALDEHYDE>110GL	1	0.09	96.79
95	5201	FUEL AVIATION TURBN	1	0.09	96.88
96	5206	FUEL AVIATION TURBI	1	0.09	96.98
97	5490	HEPTANE	1	0.09	97.07
98	5840	HYDROGEN REFRIGERAT	1	0.09	97.17
99	5851	HYDROGEN PEROX 8-40	1	0.09	97.26
100	6085	ISOPENTANOIC ACID	1	0.09	97.36
101	6560	MERCAPTAN MIX ALIPH	1	0.09	97.45
102	6920	METHYL ACRYLATE INH	1	0.09	97.55
103	7105	METHYL METHACRYL UN	1	0.09	97.64
104	7276	MONOETHANOLAMINE	1	0.09	97.73
105	7300	METHYLAMINE ANHYDR	1	0.09	97.83
106	7702	NITRIC ACID FUMING	1	0.09	97.92
107	7720	NITROBENZENE LIQUID	1	0.09	98.02
108	7994	ORM-A N.O.S.	1	0.09	98.11
109	8060	PAINT RELATED MAT	1	0.09	98.21
110	8076	PARAFORMALDEHYDE	1	0.09	98.30
111	8160	PENTANE	1	0.09	98.40
112	8301	PETROLEUM DISTIL CL	1	0.09	98.49
113	8330	PHENOL	1	0.09	98.58
114	8415	PHOSPHORUS PENTASUL	1	0.09	98.68
115	8450	PHOSPHORUS WH/YLDRY	1	0.09	98.77
116	8460	PHOSPHORUS WH/YLWET	1	0.09	98.87
117	8520	POISONOUS LIQUID N.	1	0.09	98.96
118	8766	PROPIONIC ACID	1	0.09	99.06
119	8768	PROPYL ACETATE	1	0.09	99.15
120	8773	PROPYLENE DICHLORID	1	0.09	99.25
121	9440	SODIUM ALUM LIQUID	1	0.09	99.34
122	9890	SULFUR CHLORIDE	1	0.09	99.43
123	9918	SULFUR, MOLTEN	1	0.09	99.53

NUMBER OF LEAKS BY COMMODITY 1989

NUM	CODE	COMMODITY NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	10088	TETRACHLOROETHYLENE	1	0.09	99.62
125	10330	TITANIUM TETRACHLOR	1	0.09	99.72
126	10480	TRIMETHYLAMINE ANHY	1	0.09	99.81
127	10615	VALERIC ACID	1	0.09	99.91
128	10660	VINYL CHLORIDE	1	0.09	100.00
		TOTAL	1059		

Appendix C

Detailed Listing of Releases by Tank Car Type, by Year, Totals
Source: HMIS (RSPA)

LEAKS BY TANK CAR TYPE
CAR TYPES SUMMARIZED
(1985-1989)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT
111 All Types	2,576	60.91%	60.91%
TANK CAR	961	22.72%	83.64%
112 All Types	350	8.28%	91.91%
105 All Types	217	5.13%	97.04%
103 All Types	97	2.29%	99.34%
113 All Types	8	0.19%	99.53%
114 All Types	6	0.14%	99.67%
115 All Types	5	0.12%	99.79%
104 All Types	3	0.07%	99.86%
110 All Types	2	0.05%	99.91%
109 All Types	2	0.05%	99.95%
106 All Types	1	0.02%	99.98%
107 All Types	1	0.02%	100.00%
TOTAL	4,229		

**LEAKS BY TANK CAR TYPE
DETAILED
(1985-1989)**

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT
103	5	0.12%	0.12%
103AALW	6	0.14%	0.26%
103ALW	13	0.31%	0.57%
103ANW	2	0.05%	0.62%
103AW	13	0.31%	0.92%
103BW	8	0.19%	1.11%
103EW	2	0.05%	1.16%
103W	48	1.14%	2.30%
104	2	0.05%	2.35%
104W	1	0.02%	2.37%
105	15	0.36%	2.73%
105A	1	0.02%	2.75%
105AW	201	4.76%	7.51%
106AW	1	0.02%	7.54%
107A	1	0.02%	7.56%
109AALW	2	0.05%	7.61%
110A	1	0.02%	7.63%
110AW	1	0.02%	7.66%
111A	43	1.02%	8.68%
111AALW	121	2.87%	11.54%
111AW	2412	57.17%	68.71%
112A	1	0.02%	68.74%
112AW	5	0.12%	68.86%
112J	4	0.09%	68.95%
112JW	241	5.71%	74.66%
112S	3	0.07%	74.73%
112SW	75	1.78%	76.51%
112T	13	0.31%	76.82%
112TW	8	0.19%	77.01%
113AW	1	0.02%	77.03%
113C120W	3	0.07%	77.10%
113CW	3	0.07%	77.17%
113DW	1	0.02%	77.20%
114AW	1	0.02%	77.22%
114JW	3	0.07%	77.29%
114T	2	0.05%	77.34%
115AW	5	0.12%	77.46%
TANK CAR	961	22.78%	100.00%
TOTAL	4,229		

LEAKS BY TANK CAR TYPE
DETAILED
(1985)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT	CUMULATIVE FREQUENCY
111AW	318	43.62%	43.62%	318
TANK CAR	244	33.47%	77.09%	562
112JW	57	7.82%	84.91%	619
105AW	31	4.25%	89.16%	650
111AALW	17	2.33%	91.50%	667
111A	14	1.92%	93.42%	681
112SW	11	1.51%	94.92%	692
103W	11	1.51%	96.43%	703
112T	5	0.69%	97.12%	708
103AW	4	0.55%	97.67%	712
103ALW	3	0.41%	98.08%	715
112AW	2	0.27%	98.35%	717
112TW	2	0.27%	98.63%	719
112J	2	0.27%	98.90%	721
103AALW	1	0.14%	99.04%	722
113AW	1	0.14%	99.18%	723
113CW	1	0.14%	99.31%	724
103EW	1	0.14%	99.45%	725
104	1	0.14%	99.59%	726
105	1	0.14%	99.73%	727
114JW	1	0.14%	99.86%	728
115AW	1	0.14%	100.00%	729

LEAKS BY TANK CAR TYPE
DETAILED
(1986)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT	CUMULATIVE FREQUENCY
111AW	356	47.53%	47.53%	356
TANK CAR	236	31.51%	79.04%	592
112JW	48	6.41%	85.45%	640
111AALW	26	3.47%	88.92%	666
105AW	22	2.94%	91.86%	688
111A	11	1.47%	93.32%	699
112SW	11	1.47%	94.79%	710
103W	10	1.34%	96.13%	720
103ALW	6	0.80%	96.93%	726
112TW	4	0.53%	97.46%	730
103AW	2	0.27%	97.73%	732
113C120W	2	0.27%	98.00%	734
103BW	2	0.27%	98.26%	736
112AW	1	0.13%	98.40%	737
107A	1	0.13%	98.53%	738
103ANW	1	0.13%	98.66%	739
112T	1	0.13%	98.80%	740
110A	1	0.13%	98.93%	741
106AW	1	0.13%	99.07%	742
103	1	0.13%	99.20%	743
103EW	1	0.13%	99.33%	744
103AALW	1	0.13%	99.47%	745
112S	1	0.13%	99.60%	746
112J	1	0.13%	99.73%	747
114JW	1	0.13%	99.87%	748
114T	1	0.13%	100.00%	749

LEAKS BY TANK CAR TYPE
DETAILED
(1987)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT	CUMULATIVE FREQUENCY
111AW	453	57.71%	57.71%	453
TANK CAR	163	20.76%	78.47%	616
105AW	39	4.97%	83.44%	655
112JW	39	4.97%	88.41%	694
112SW	19	2.42%	90.83%	713
111AALW	17	2.17%	92.99%	730
111A	10	1.27%	94.27%	740
105	9	1.15%	95.41%	749
103W	9	1.15%	96.56%	758
112T	6	0.76%	97.32%	764
103AW	3	0.38%	97.71%	767
103ALW	3	0.38%	98.09%	770
103BW	2	0.25%	98.34%	772
103AALW	2	0.25%	98.60%	774
112S	2	0.25%	98.85%	776
112A	1	0.13%	98.98%	777
103	1	0.13%	99.11%	778
112AW	1	0.13%	99.24%	779
104	1	0.13%	99.36%	780
103ANW	1	0.13%	99.49%	781
112J	1	0.13%	99.62%	782
104W	1	0.13%	99.75%	783
113C120W	1	0.13%	99.87%	784
115AW	1	0.13%	100.00%	785

LEAKS BY TANK CAR TYPE
DETAILED
(1988)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT	CUMULATIVE FREQUENCY
111AW	597	65.82%	65.82%	597
TANK CAR	121	13.34%	79.16%	718
105AW	56	6.17%	85.34%	774
112JW	47	5.18%	90.52%	821
111AALW	32	3.53%	94.05%	853
112SW	19	2.09%	96.14%	872
103W	11	1.21%	97.35%	883
103	3	0.33%	97.68%	886
105	3	0.33%	98.02%	889
112TW	2	0.22%	98.24%	891
113CW	2	0.22%	98.46%	893
103AW	2	0.22%	98.68%	895
103BW	2	0.22%	98.90%	897
112T	1	0.11%	99.01%	898
113DW	1	0.11%	99.12%	899
114AW	1	0.11%	99.23%	900
105A	1	0.11%	99.34%	901
114JW	1	0.11%	99.45%	902
109AALW	1	0.11%	99.56%	903
111A	1	0.11%	99.67%	904
103AALW	1	0.11%	99.78%	905
114T	1	0.11%	99.89%	906
115AW	1	0.11%	100.00%	907

LEAKS BY TANK CAR TYPE
DETAILED
(1989)

TANK CAR CLASS	# OF LEAKS	PERCENT	CUMULATIVE PERCENT	CUMULATIVE FREQUENCY
111AW	688	64.97%	64.97%	688
TANK CAR	197	18.60%	83.57%	885
105AW	53	5.00%	88.57%	938
112JW	50	4.72%	93.30%	988
111AALW	29	2.74%	96.03%	1,017
112SW	15	1.42%	97.45%	1,032
111A	7	0.66%	98.11%	1,039
103W	7	0.66%	98.77%	1,046
105	2	0.19%	98.96%	1,048
103BW	2	0.19%	99.15%	1,050
103AW	2	0.19%	99.34%	1,052
115AW	2	0.19%	99.53%	1,054
109AALW	1	0.09%	99.62%	1,055
112AW	1	0.09%	99.72%	1,056
110AW	1	0.09%	99.81%	1,057
103ALW	1	0.09%	99.91%	1,058
103AALW	1	0.09%	100.00%	1,059

Appendix D

Detailed Listing of Releases by Failure Code, by Year, Totals
Source: HMIS (RSPA)

LEAKS BY FAILURE CODES (1985-1989)

CAUSE COMBINATION	LEAKS	PERCENT
Loose Fitting, No Object	1613	38.1%
Defective Fitting, No Object	1430	33.8%
Loose Fitting, Defect Fitting, No Object	297	7.0%
Defect Fit, No Obj, Burst Inter Pressure	155	3.7%
No Cause Listed	140	3.3%
Venting, No Object, Burst Inter Pressure	100	2.4%
Burst Inter Pressure	72	1.7%
Defect Fit, Venting, No Object, Burst Inter Pressure	60	1.4%
Corrosion	54	1.3%
Loose Fitting, No Object, Burst Inter Pressure	34	0.8%
Other	274	6.5%
TOTAL	4229	100.0%

LEAKS BY FAILURE CODES (1985)

CAUSE COMBINATION	LEAKS	PERCENT
Loose Fitting, No Object	289	39.6%
Defective Fitting, No Object	216	29.6%
Defective Fitting, Loose Fitting, No Object	80	11.0%
No Cause Listed	40	5.5%
Venting, No Object, Burst Internal Pressure	17	2.3%
Defective Fitting, No Object, Burst Inter Pressure	16	2.2%
Burst Internal Pressure	9	1.2%
Loose Fitting, No Object, Burst Internal Pressure	8	1.1%
Defect Fitting, Venting, No Object, Burst Inter Pressure	6	0.8%
Corrosion	6	0.8%
Other	42	5.8%
TOTAL	729	100.0%

LEAKS BY FAILURE CODES (1986)

CAUSE COMBINATION	LEAKS	PERCENT
Loose Fitting, No Object	292	39.0%
Defective Fitting, No Object	222	29.6%
Defective Fitting, Loose Fitting, No Object	97	13.0%
Venting, No Object, Burst Internal Pressure	19	2.5%
Defective Fitting, No Object, Burst Inter Pressure	17	2.3%
No Cause Listed	15	2.0%
Defect Fitting, Venting, No Object, Burst Inter Pressure	15	2.0%
Corrosion	8	1.1%
Burst Internal Pressure	8	1.1%
Loose Fitting, No Object, Burst Internal Pressure	7	0.9%
Other	49	6.5%
Total	749	100.0%

LEAKS BY FAILURE CODES (1987)

CAUSE COMBINATION	LEAKS	PERCENT
Loose Fitting, No Object	334	42.5%
Defective Fitting, No Object	233	29.7%
Defective Fitting, Loose Fitting, No Object	42	5.4%
No Cause Listed	35	4.5%
Defective Fitting, No Object, Burst Inter Pressure	24	3.1%
Burst Internal Pressure	23	2.9%
Venting, No Object, Burst Internal Pressure	18	2.3%
Loose Fitting, No Object, Burst Internal Pressure	7	0.9%
No Object	6	0.8%
Corrosion	4	0.5%
Other	59	7.5%
Total	785	100.0%

LEAKS BY FAILURE CODES (1988)

CAUSE COMBINATION	LEAKS	PERCENT
Loose Fitting, No Object	356	39.3%
Defective Fitting, No Object	326	35.9%
Defective Fitting, No Object, Burst Inter Pressure	41	4.5%
Defective Fitting, Loose Fitting, No Object	29	3.2%
No Cause Listed	27	3.0%
Burst Internal Pressure	24	2.6%
Venting, No Object, Burst Internal Pressure	18	2.0%
Corrosion	15	1.7%
Defect Fitting, Venting, No Object, Burst Inter Pressure	14	1.5%
No Object	11	1.2%
Other	46	5.1%
Total	907	100.0%

LEAKS BY FAILURE CODES (1989)

CAUSE COMBINATION	LEAKS	PERCENT
Defective Fitting, No Object	433	40.9%
Loose Fitting, No Object	342	32.3%
Defective Fitting, No Object, Burst Inter Pressure	57	5.4%
Defective Fitting, Loose Fitting, No Object	49	4.6%
Venting, No Object, Burst Internal Pressure	28	2.6%
Defect Fitting, Venting, No Object, Burst Inter Pressure	24	2.3%
No Cause Listed	23	2.2%
Corrosion	17	1.6%
Struck, Puncture	10	0.9%
Burst Internal Pressure	8	0.8%
Other	67	6.3%
Total	1058	100.0%

Appendix E

Detailed Listing of Releases by Shipper, by Year, Totals
Source: HMIS (RSPA)

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	16259	OCCIDENTAL CHEMICAL CO	104	2.46	2.46
2	16668	PHELPS DODGE CORP	92	2.18	4.63
3	18887	UNION CARBIDE CORP	89	2.10	6.74
4	12836	DU PONT E I DE NEMOURS & C	84	1.99	8.73
5	10334	AMERICAN CYANAMID CO	79	1.87	10.59
6	12800	DOW CHEMICAL CO	68	1.61	12.20
7	18167	STAUFFER CHEMICAL CO	65	1.54	13.74
8	16307	OLIN CORP	63	1.49	15.23
9	19168	VULCAN MATERIALS CO	61	1.44	16.67
10	13298	FARMLAND INDUSTRIES INC	59	1.40	18.07
11	10579	ASARCO INC	54	1.28	19.34
12	13223	EXXON CHEMICAL CO	53	1.25	20.60
13	13495	FMC CORP	53	1.25	21.85
14	15760	MONSANTO CO	53	1.25	23.10
15	20303	TENNESSEE CHEM CO	51	1.21	24.31
16	20766	ARCO CHEM CO	49	1.16	25.47
17	16595	PENNWALT CORP	45	1.06	26.53
18	18500	TEXAS GULF INC	45	1.06	27.60
19	17657	SHELL CHEMICAL CO	42	0.99	28.59
20	20452	INTEROX AMERICA	41	0.97	29.56
21	20249	LCP CHEMICALS	40	0.95	30.50
22	16222	NOT REPORTED BY CARRIER	39	0.92	31.43
23	11696	CELANESE CHEMICAL CO	38	0.90	32.32
24	15165	LIQUID CARBONICS CORP	38	0.90	33.22
25	20895	VISTA CHEM CO	38	0.90	34.12
26	11186	BORDEN INC/CHEMICAL CO	36	0.85	34.97
27	17075	REAGENT CHEMICAL INC	36	0.85	35.82
28	11934	CHEVRON CHEMICAL CO	35	0.83	36.65
29	16831	PPG INDUSTRIES INC	35	0.83	37.48
30	10414	AMOCO CHEMICAL CORP	30	0.71	38.19
31	22922	BASF CHEMICAL	29	0.69	38.87
32	19955	TEXACO CHEMICAL	28	0.66	39.54
33	11610	CARDOX DIV CHEMTRON	27	0.64	40.18
34	20536	PVS CHEM	27	0.64	40.81
35	22302	GEORGIA GULF	27	0.64	41.45
36	17074	REAGENT CHEMICAL & RESEA	24	0.57	42.02
37	19793	SUN REFINING AND MARKETIN	24	0.57	42.59
38	10151	AGRICO CHEMICAL CO	23	0.54	43.13
39	10174	AIR PRODUCTS & CHEMICALS I	23	0.54	43.67
40	10251	ALLIED CHEMICAL CORP	23	0.54	44.22

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
41	10585	ASHLAND CHEMICAL CO	23	0.54	44.76
42	15722	MOBAY CHEMICAL CO	23	0.54	45.31
43	10370	AMERICAN OIL CO (AMOCO)	22	0.52	45.83
44	17284	ROHM & HAAS CO	22	0.52	46.35
45	18071	STALEY A E MANUFACTURING	22	0.52	46.87
46	17746	SIMPLOT J R CO	21	0.50	47.36
47	20718	UNOCAL CHEM DIV	21	0.50	47.86
48	11431	C F INDUSTRIES INC	20	0.47	48.33
49	14961	AIRCO INDUSTRIAL GASES	20	0.47	48.81
50	25945	HOECHST-CELANESE CHEM GR	20	0.47	49.28
51	10653	ATLANTIC RICHFIELD CO (ARC	19	0.45	49.73
52	22194	TENNESSEE EASTMAN	19	0.45	50.18
53	12991	ELDORADO CHEMICAL CO	17	0.40	50.58
54	18458	TENNECO OIL CO	17	0.40	50.98
55	20872	TEXASGULF CHEM INC (DIV TG	17	0.40	51.38
56	23792	LYONDELL PETROCHEMICAL	17	0.40	51.79
57	14479	IMC CHEMICAL GROUP INC	16	0.38	52.16
58	14975	KOPPERS CO INC	16	0.38	52.54
59	15546	MERICHEM CO	16	0.38	52.92
60	20101	CHEVRON USA	16	0.38	53.30
61	20905	ARCADIAN CORP	16	0.38	53.68
62	13224	EXXON CO	15	0.35	54.03
63	16680	PHILLIPS PETROLEUM CO	15	0.35	54.39
64	19788	TEXAS EASTMAN	15	0.35	54.74
65	19840	EXXON U S A	15	0.35	55.10
66	20466	CONOCO INC	15	0.35	55.45
67	13551	C I L CO	14	0.33	55.78
68	16899	PROCTOR & GAMBLE CO	14	0.33	56.11
69	24118	ARISTECH CHEM CORP	14	0.33	56.44
70	25087	PHILLIPS 66 COMPANY	14	0.33	56.77
71	19208	WANDA PETROLEUM CO	13	0.31	57.08
72	11436	C I L CHEMICALS INC	12	0.28	57.37
73	12719	DIAMOND SHAMROCK CORP	12	0.28	57.65
74	13940	GRAIN PROCESSING CORP	12	0.28	57.93
75	14886	KERR-MCGEE CHEMICAL CORP	12	0.28	58.22
76	18626	TOSCO CORPORATION	12	0.28	58.50
77	19685	ALLIED CORPORATION	12	0.28	58.78
78	19824	KOCH SULPHUR PRODUCTS	12	0.28	59.07
79	19966	AKZO CHEMICAL AMERICO	12	0.28	59.35
80	20815	FORMOSA PLACTICS CORP US	12	0.28	59.64

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
81	21951	TEXACO REFINING & MARKETIN	12	0.28	59.92
82	22758	CIL CORP OF AMERICA	12	0.28	60.20
83	24365	T H AGRICULTURE & NUTRITIO	12	0.28	60.49
84	10497	ARCHER-DANIELS-MIDLAND CO	11	0.26	60.75
85	17658	SHELL OIL CO	11	0.26	61.01
86	18490	TEXACO INC	11	0.26	61.27
87	21144	B P CHEMICALS	11	0.26	61.53
88	22138	GATX TERMINALS CLINTON	11	0.26	61.79
89	22178	COASTAL REFINING & MARKETI	11	0.26	62.05
90	12986	EL PASO PRODUCTS CO	10	0.24	62.28
91	13174	ETHYL CORPORATION	10	0.24	62.52
92	13765	GENERAL CHEMICAL CO	10	0.24	62.76
93	13929	GRACE W R & CO	10	0.24	62.99
94	15980	NATIONAL STARCH & CHEMICA	10	0.24	63.23
95	16793	POLYSAR LTD	10	0.24	63.47
96	18301	SUN OIL CO	10	0.24	63.70
97	18884	UNION CAMP CORP	10	0.24	63.94
98	19163	VULCAN CHEMICAL DIV VULCA	10	0.24	64.18
99	22713	STANDARD CHLORINE OF DELA	10	0.24	64.41
100	27484	HOWELL CHEM SYSTEMS	10	0.24	64.65
101	12814	KENNECOTT	9	0.21	64.86
102	13907	GOODRICH B F CO	9	0.21	65.07
103	14785	K A STEEL CHEMICAL CO	9	0.21	65.29
104	15726	MOBIL OIL CORP	8	0.21	65.50
105	17678	SHIPPER INFORMATION UNOBT	9	0.21	65.71
106	19532	WITCO CHEMICAL CORP	9	0.21	65.93
107	20432	EL PASO HYDRO CARBONS CO	9	0.21	66.14
108	20984	TEXAS PETROCHEMICALS COR	9	0.21	66.35
109	21274	THERMICE CORP	9	0.21	66.56
110	10862	BASF WYANDOTTE CORP	8	0.19	66.75
111	11699	CELANESE CORP	8	0.19	66.94
112	12618	DEGUSSA CORP	8	0.19	67.13
113	13389	FINA OIL CO	8	0.19	67.32
114	13766	GENERAL CHEMICAL CORP	8	0.19	67.51
115	14227	HERCULES INC	8	0.19	67.70
116	14366	HOWELL HYDROCARBONS INC	8	0.19	67.89
117	14447	I C I AMERICA INC	8	0.19	68.08
118	14867	KENNECOTT COPPER CORP	8	0.19	68.27
119	16660	PETROSAR LTD	8	0.19	68.46
120	17655	SHELL CANADA LTD	8	0.19	68.65

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
121	19396	WESTVACO CORP	8	0.19	68.83
122	20445	CLIMAX CHEMICAL CO.	8	0.19	69.02
123	20873	BELCHER OF NEW ENGLAND	8	0.19	69.21
124	21283	KIMBERLY CLARK CO	8	0.19	69.40
125	12935	EASTMAN CHEMICAL PRODUCT	7	0.17	69.57
126	15300	MAGMA COPPER CO	7	0.17	69.73
127	15762	MONTANA SULPHUR & CHEM C	7	0.17	69.90
128	16135	NORFOLK & WESTERN RAILWA	7	0.17	70.06
129	16280	OHIO OIL GATHERING CORP	7	0.17	70.23
130	18280	SUBURBAN PROPANE GAS CO	7	0.17	70.39
131	19021	USS AGRI-CHEMICALS CO	7	0.17	70.56
132	19233	WARREN PETROLEUM CORP	7	0.17	70.73
133	19690	UNION CHEM DIV	7	0.17	70.89
134	20147	MID CONTINENT COMMODITY E	7	0.17	71.06
135	20278	ADM CORN SWEETNERS	7	0.17	71.22
136	21331	PAK TANK CORP	7	0.17	71.39
137	22061	NEW ENERGY CO OF INDIANA	7	0.17	71.55
138	22670	U S INDUSTRIAL CHEMICAL	7	0.17	71.72
139	25105	FEDERAL PAPER BOARD CO IN	7	0.17	71.88
140	26136	ALLIED SIGNAL/BENDIX	7	0.17	72.05
141	26502	CANADIAN ELECTROLYTIC ZIN	7	0.17	72.22
142	10316	AMERADA HESS CORP	6	0.14	72.36
143	10586	ASHLAND OIL CO	6	0.14	72.50
144	10861	BASF AKTIENGESSELLSCHAFT	6	0.14	72.64
145	11054	BIG THREE INDUSTRIES INC	6	0.14	72.78
146	11695	CELANESE CANADA LTD	6	0.14	72.93
147	12156	COMINCO AMERICAN INC	6	0.14	73.07
148	12704	DEVON CHEMICALS INC	6	0.14	73.21
149	13821	GEORGIA PACIFIC CORP	6	0.14	73.35
150	14766	JONES-HAMILTON CO	6	0.14	73.49
151	15242	LUBRIZOL CORP	6	0.14	73.63
152	17753	SINCLAIR OIL CO	6	0.14	73.78
153	19015	US INDUSTRIAL CHEMICALS CO	6	0.14	73.92
154	19143	VIRGINIA CHEMICALS INC	6	0.14	74.06
155	19397	WEYERHAUSER CO	6	0.14	74.20
156	19403	WHEELING-PITTSBURGH STEEL	6	0.14	74.34
157	19837	HILL PETROLEUM	6	0.14	74.49
158	20186	BORG-WARNER CHEM	6	0.14	74.63
159	21325	ETHYL PETROLEUM ADDITIVES	6	0.14	74.77
160	22904	HIGH PLAINS CORP	6	0.14	74.91

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
161	23324	CEPEX INC	6	0.14	75.05
162	26252	CIL CORP OF CANADA	6	0.14	75.20
163	26521	GOODRICH CHEM	6	0.14	75.34
164	27816	PIONEER CHLORALKALI CO INC	6	0.14	75.48
165	10148	AGENT	5	0.12	75.60
166	11021	BETHLEHEM STEEL CORPORAT	5	0.12	75.72
167	11608	CARDON OIL CO	5	0.12	75.83
168	13603	FREEPORT CHEMICAL CO	5	0.12	75.95
169	13694	GAF CORP	5	0.12	76.07
170	14626	INTERNATIONAL PAPER CO	5	0.12	76.19
171	14956	KOCH CHEMICAL CO	5	0.12	76.31
172	15404	MARUBENI AMERICA CORP	5	0.12	76.42
173	15690	MINERAL RESEARCH & DEV CO	5	0.12	76.54
174	17337	RUBICON CHEMICALS INC	5	0.12	76.66
175	18295	SUN CHEMICAL CORP	5	0.12	76.78
176	18457	TENNECO CHEMICALS INC	5	0.12	76.90
177	18507	TEXAS OLEFIN CO	5	0.12	77.02
178	19825	SOHIO CHEMICAL CO	5	0.12	77.13
179	20045	CORN SWEETNERS	5	0.12	77.25
180	20051	KERLEY INDUSTRIES INC	5	0.12	77.37
181	22074	AMAX HOMESTAKE	5	0.12	77.49
182	22259	LCI LIMITED	5	0.12	77.61
183	22678	DUPONT CHEM	5	0.12	77.73
184	22735	KENNECOTT MINERALS	5	0.12	77.84
185	23312	LA ROCHE IND	5	0.12	77.96
186	23518	HUNTSMAN CHEM CO	5	0.12	78.08
187	23527	ST LOUIS TERMINAL CORP	5	0.12	78.20
188	23768	EDDY E B FOREST PROD LTD	5	0.12	78.32
189	24522	LAROCHE INDUSTRIES INC	5	0.12	78.43
190	10516	ARIZONA CHEMICAL CO	4	0.09	78.53
191	11461	CABOT CORP	4	0.09	78.62
192	11542	CANADIAN INDUSTRIES LTD	4	0.09	78.72
193	11780	CHAMPION INTERNATIONAL CO	4	0.09	78.81
194	11916	CHEMTECH INDUSTRIES INC	4	0.09	78.91
195	12954	CARBONAIRE INC	4	0.09	79.00
196	13474	FLORIDA DISTILLERS CO	4	0.09	79.10
197	14621	INTERNATIONAL MINERALS & C	4	0.09	79.19
198	14775	K & A STEEL	4	0.09	79.29
199	15162	LION OIL CO	4	0.09	79.38
200	15216	LOPEZ ALFOSO C	4	0.09	79.48

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
201	15718	mitsui & co inc	4	0.09	79.57
202	16201	northwest petrochemical	4	0.09	79.66
203	17116	reilly tar & chemical corp	4	0.09	79.76
204	17872	south hampton refinery	4	0.09	79.85
205	18239	stone container corp	4	0.09	79.95
206	18484	tesoro petroleum corp (a	4	0.09	80.04
207	18510	texas sulphur products c	4	0.09	80.14
208	18947	united refining co	4	0.09	80.23
209	19714	burlington northern rr c	4	0.09	80.33
210	19850	rohm and haas texas inc	4	0.09	80.42
211	19904	pekin energy	4	0.09	80.52
212	20515	mobile oil	4	0.09	80.61
213	21117	advanced aromatics inc	4	0.09	80.70
214	21295	tulsa chem	4	0.09	80.80
215	22619	reheis chem co	4	0.09	80.89
216	22669	ocelot chem	4	0.09	80.99
217	23006	dixie northern inc	4	0.09	81.08
218	23024	adm corp acct frt contro	4	0.09	81.18
219	23083	global petroleum	4	0.09	81.27
220	23115	anheasuer bush	4	0.09	81.37
221	23939	tonawanda coke corp	4	0.09	81.46
222	10210	alberta gas & chemical co	3	0.07	81.53
223	10211	alberta gas chemicals ltd	3	0.07	81.60
224	10310	amax zinc co inc	3	0.07	81.67
225	11160	boise cascade corp	3	0.07	81.75
226	11596	carbonic industries corp	3	0.07	81.82
227	11612	cargill inc	3	0.07	81.89
228	11880	chemical marketing servic	3	0.07	81.96
229	12772	dome petroleum	3	0.07	82.03
230	12937	eastman kodak co	3	0.07	82.10
231	13054	emery industries inc	3	0.07	82.17
232	14048	gulf oil corp	3	0.07	82.24
233	14177	hawkeye chemical co	3	0.07	82.31
234	14602	intercontinental term co	3	0.07	82.38
235	14879	kerley chemical corp	3	0.07	82.45
236	14962	koch refining co	3	0.07	82.53
237	15359	mapco inc	3	0.07	82.60
238	15724	mobil chemical co	3	0.07	82.67
239	15871	murphy oil co	3	0.07	82.74
240	15905	nalco chemical co	3	0.07	82.81

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
241	16642	PETRO CHEM CORP	3	0.07	82.88
242	16647	PETROLANE GAS SERVICE INC	3	0.07	82.95
243	16678	PHILLIPS CHEMICAL CO	3	0.07	83.02
244	16965	QUAKER CHEMICAL CORP	3	0.07	83.09
245	17508	SCOTT PAPER CO	3	0.07	83.16
246	18302	SUN OLIN CHEMICAL CO	3	0.07	83.23
247	18473	TERRA CHEMICAL CO	3	0.07	83.31
248	19101	VELSICOL CHEMICAL CORP	3	0.07	83.38
249	19103	VENTRON CORP	3	0.07	83.45
250	19234	WARREN S D CO	3	0.07	83.52
251	19285	WEBBER TANKS INC	3	0.07	83.59
252	20110	BADISCHE CORP	3	0.07	83.66
253	20698	MORTON THIOKOL INC	3	0.07	83.73
254	21925	USI CHEM CORP	3	0.07	83.80
255	22137	HALTERMAN	3	0.07	83.87
256	22297	GANTRADE	3	0.07	83.94
257	23029	CSX TRANSPORTATION	3	0.07	84.02
258	23055	MIDWEST GRAIN PRODUCTS	3	0.07	84.09
259	23265	J L M IND INC	3	0.07	84.16
260	23374	FALCONBRIDGE LTD	3	0.07	84.23
261	23613	BASE CORP/INMONT DIV	3	0.07	84.30
262	23931	ARGO CHEM CO	3	0.07	84.37
263	23965	CEDAR CHEM CO	3	0.07	84.44
264	25019	NEKOOSA PAPERS INC	3	0.07	84.51
265	25837	IMC FERTILIZER	3	0.07	84.58
266	26139	SCM ORGANICS	3	0.07	84.65
267	26179	MAPCO ALASKA PETROLEUM I	3	0.07	84.72
268	26833	NU WEST INDUSTRIES	3	0.07	84.80
269	26839	NITREX	3	0.07	84.87
270	27015	GLACIER AMMONIA	3	0.07	84.94
271	27378	QUANTUM CHEM	3	0.07	85.01
272	27446	CANADIAN PACIFIC FOREST PR	3	0.07	85.08
273	27550	MARYSVILLE UNDERGROUND	3	0.07	85.15
274	28092	KIND & KNOX	3	0.07	85.22
275	10444	ANDREWS PETROLEUM CO	2	0.05	85.27
276	10620	ATCHISON TOPEKA & SANTA FE	2	0.05	85.32
277	10668	ATLAS POWDER	2	0.05	85.36
278	10760	B P OIL CO (BRITISH PETROLEU	2	0.05	85.41
279	11188	BORG-WARNER CORP	2	0.05	85.46
280	11444	C P INORGANICS INC	2	0.05	85.50

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
281	11476	CAL-GAS	2	0.05	85.55
282	11979	CIBA-GEIGY CORP	2	0.05	85.60
283	12108	COLGATE-PALMOLIVE CO	2	0.05	85.65
284	12143	COLUMBIA NITROGEN CORP	2	0.05	85.69
285	12351	COSDEN OIL & CHEMICAL CO	2	0.05	85.74
286	12420	CROSS OIL & REFINING CO	2	0.05	85.79
287	12486	CYANAMID OF CANADA	2	0.05	85.84
288	12642	DELTA CHEMICALS INC	2	0.05	85.88
289	12750	DIVERSIFIED CHEMICALS CORP	2	0.05	85.93
290	13164	ESSO CHEMICAL	2	0.05	85.98
291	13534	ZINC ELECTROLYTIQUE	2	0.05	86.03
292	13776	GENERAL ELECTRIC CO	2	0.05	86.07
293	13778	GENERAL ENERGY CORP INC	2	0.05	86.12
294	13806	GENERAL TIRE & RUBBER CO	2	0.05	86.17
295	13909	GOODYEAR TIRE & RUBBER CO	2	0.05	86.21
296	14507	INCO CO	2	0.05	86.26
297	14664	ITOFCA INC	2	0.05	86.31
298	14759	JONES CHEMICAL CO INC	2	0.05	86.36
299	14773	JUPITER CHEMICAL INC	2	0.05	86.40
300	15019	LA GLORIA OIL & GAS CO	2	0.05	86.45
301	15215	LONZA INC	2	0.05	86.50
302	15363	MARATHON OIL CO	2	0.05	86.55
303	15652	MIDWEST SOLVENTS CO INC	2	0.05	86.59
304	15708	MISSOURI PACIFIC RAILROAD C	2	0.05	86.64
305	15902	N-REN CORPORATION	2	0.05	86.69
306	15945	NATIONAL COOP REFINING ASS	2	0.05	86.73
307	16031	NEPERA CHEMICAL CO INC	2	0.05	86.78
308	16179	NORTHERN PETRO-CHEMICAL	2	0.05	86.83
309	16656	PETROLITE CORP	2	0.05	86.88
310	16969	QUAKER OATS CO	2	0.05	86.92
311	17183	RHONE PULENC INC	2	0.05	86.97
312	17528	SEAGRAM JOSEPH E & SONS IN	2	0.05	87.02
313	17895	SOUTHERN CALIFORNIA CHEM	2	0.05	87.07
314	17918	SOUTHERN PACIFIC TRANSP C	2	0.05	87.11
315	18083	STANDARD CHLORINE	2	0.05	87.16
316	18132	MEAB POLYSAR LTD	2	0.05	87.21
317	18177	STEEL K A CHEMICAL	2	0.05	87.25
318	18188	STEPAN CHEMICAL	2	0.05	87.30
319	18362	SYNTEX AGRIBUSINESS INC	2	0.05	87.35
320	18528	THATCHER CHEMICAL CO	2	0.05	87.40

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
321	18733	TRIANGLE REFINERIES INC.	2	0.05	87.44
322	18806	U S CHEMICAL CORP	2	0.05	87.49
323	18897	UNION OIL CO	2	0.05	87.54
324	18900	UNION PACIFIC RAILROAD CO	2	0.05	87.59
325	19076	VAN WATERS & ROGERS	2	0.05	87.63
326	19081	VANGAS INC	2	0.05	87.68
327	19140	VININGS CHEMICAL COMPANY	2	0.05	87.73
328	19243	WASTE RESEARCH & RECLAMA	2	0.05	87.77
329	19694	AIR PRODUCTS SPECIALITY	2	0.05	87.82
330	19852	ENERGY SALES INCORPORATE	2	0.05	87.87
331	20077	CHEMLINK	2	0.05	87.92
332	20343	REGENT CHEM & RESEARCH IN	2	0.05	87.96
333	20472	SOUTH COAST TERMINAL	2	0.05	88.01
334	20854	PETRO SOURCE	2	0.05	88.06
335	20989	FERRELPETROL	2	0.05	88.11
336	21071	L T V STEEL CORP	2	0.05	88.15
337	21552	DAVISON TRANSPORT INC	2	0.05	88.20
338	21628	HIRAM WALKER & SONS INC	2	0.05	88.25
339	21766	PHILADELPHIA GAS WORKS	2	0.05	88.30
340	21989	WESTERN ZIRCONIUM	2	0.05	88.34
341	22202	COASTAL STATES MARKETING	2	0.05	88.39
342	22240	ALBRIGHT & WILSON INC	2	0.05	88.44
343	22253	PMC SPECIALTIES GROUP INC	2	0.05	88.48
344	22296	SP AGENT	2	0.05	88.53
345	22474	VENTURE OIL CO	2	0.05	88.58
346	22562	ADC LTD	2	0.05	88.63
347	22645	TROPICANA ENERGY	2	0.05	88.67
348	22700	KOCH HYDROCARBON	2	0.05	88.72
349	22864	SCM SPECIALTY CHEM	2	0.05	88.77
350	23079	CHEMBOND CORP	2	0.05	88.82
351	23092	SONNEBORN WITCO CHEM	2	0.05	88.86
352	23093	DOW CHEM CANADA	2	0.05	88.91
353	23120	SOUTHERN STATES PHOS & FE	2	0.05	88.96
354	23279	CRYSER ENERGY	2	0.05	89.00
355	23294	CHEMICAL PROCESSORS INC	2	0.05	89.05
356	23495	SCM GLIDDEN	2	0.05	89.10
357	23552	CYANAMID INC	2	0.05	89.15
358	23610	STANDARD OIL OF OHIO	2	0.05	89.19
359	23737	CHESAPEAKE CORP OF VA	2	0.05	89.24
360	23743	AMERICAN CHROME	2	0.05	89.29

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
361	23817	KAI-CHEM	2	0.05	89.34
362	24032	BY-PRODUCTS MANAGEMENT I	2	0.05	89.38
363	24048	ADM CORP	2	0.05	89.43
364	24246	ARMCO INC	2	0.05	89.48
365	24408	C H CHEMICALS INC	2	0.05	89.52
366	24496	PTW (PRODUCT TERMINALININ	2	0.05	89.57
367	24570	FRONTIER OIL & REFINING CO	2	0.05	89.62
368	24593	T & T CHEM OF MICHIGAN	2	0.05	89.67
369	24628	LAPLACE CHEMICAL	2	0.05	89.71
370	24652	AMERICAN SYNTHETIC RUBBE	2	0.05	89.76
371	24675	SOUTHERN WOOD PIEDMONT	2	0.05	89.81
372	24924	I C T	2	0.05	89.86
373	25214	SOUTHWESTERN OIL & CHEMIC	2	0.05	89.90
374	26165	ARCO PLASTICS	2	0.05	89.95
375	26213	TEXAS AROMATICS INC	2	0.05	90.00
376	26249	MOBILMINMINE	2	0.05	90.04
377	26493	CANADIAN ELECTRIC ZINC LTD	2	0.05	90.09
378	26511	CADENCE CHEM RESOURCES	2	0.05	90.14
379	26817	FERRELL GAS INC.	2	0.05	90.19
380	27045	G T W SPOT SHOP	2	0.05	90.23
381	27074	ROGUE VALLEY POLYMERS	2	0.05	90.28
382	27150	BULK DISTRIBUTION	2	0.05	90.33
383	27237	SURE-GROW SOLUTION	2	0.05	90.38
384	27414	STAR ENTERPRISE	2	0.05	90.42
385	27525	FARMERS COOP GRAIN ASSN	2	0.05	90.47
386	27584	ALLIED SIGNAL AEROSPACE C	2	0.05	90.52
387	27665	BIG RIVER CORP	2	0.05	90.57
388	28027	POWELL DUFFRYN TE	2	0.05	90.61
389	28035	MARSULEX INC	2	0.05	90.66
390	40019	AMERICAN SALES & PURCHASE	2	0.05	90.71
391	10070	ACETO CHEMICAL COMPANY IN	1	0.02	90.73
392	10074	ACKER & ACKER INC	1	0.02	90.75
393	10156	AGWAY INC	1	0.02	90.78
394	10157	AGWAY PETROLEUM CORP	1	0.02	90.80
395	10179	AIRCO INC	1	0.02	90.83
396	10262	ALLIED PAPER INC	1	0.02	90.85
397	10339	AMERICAN FARM LINES	1	0.02	90.87
398	10385	AMERICAN SMELTING & REF C	1	0.02	90.90
399	10464	APACHE POWDER COMPANY	1	0.02	90.92
400	10514	ARITECH CORP	1	0.02	90.94

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
401	10539	ARMCO STEEL CORP	1	0.02	90.97
402	10550	ARMSTRONG CORK COMPANY	1	0.02	90.99
403	10599	ASSOCIATED ENGR & MFG CO	1	0.02	91.01
404	10600	ASSOCIATED FREIGHT LINES	1	0.02	91.04
405	10652	ATLANTIC REFINING CO	1	0.02	91.06
406	10727	AVTEX FIBERS	1	0.02	91.09
407	10949	BELCHER OIL CO	1	0.02	91.11
408	11143	BN TRANSPORT INC	1	0.02	91.13
409	11187	BORDER CHEMICALS	1	0.02	91.16
410	11327	BUCKEYE GAS PRODUCTS	1	0.02	91.18
411	11328	BUCKMAN LABORATORIES INC	1	0.02	91.20
412	11421	C & S CHEMICAL & AIR EQUIP	1	0.02	91.23
413	11485	CALIFORNIA AMMONIA TRANSP	1	0.02	91.25
414	11510	CALZONA TANKWAYS INC	1	0.02	91.27
415	11538	U S I CORP	1	0.02	91.30
416	11575	CONSERVATION CHEM	1	0.02	91.32
417	11595	M B C CHEM	1	0.02	91.35
418	11603	D & H RAILROAD	1	0.02	91.37
419	11639	CAROLINA FREIGHT CARRIERS	1	0.02	91.39
420	11649	CARPENTER TECHNOLOGY CO	1	0.02	91.42
421	11712	CENTER PLAIN INDUSTRIES	1	0.02	91.44
422	11761	U S STEEL SUPPLY	1	0.02	91.46
423	11771	CFI	1	0.02	91.49
424	11832	CHEM PRO INC	1	0.02	91.51
425	11873	CHEMICAL ENTERPRISES INC	1	0.02	91.53
426	11879	CHEMICAL LEAMAN TANK LINE	1	0.02	91.56
427	11937	CHEVRON STANDARD CO	1	0.02	91.58
428	11959	CHINOOK INTERNATIONAL	1	0.02	91.61
429	12016	CLARK CHEMICAL CORP	1	0.02	91.63
430	12022	CLARK OIL & REFINING CORP	1	0.02	91.65
431	12117	COLONIAL OIL INDUSTRIES INC	1	0.02	91.68
432	12213	CONOCO CHEMICALS INC	1	0.02	91.70
433	12221	CONSERVE INC	1	0.02	91.72
434	12273	CONTINENTAL OIL CO	1	0.02	91.75
435	12386	INDIANAPOLIS WELDING SUP IN	1	0.02	91.77
436	12426	CROWLEY TAR PRODUCTS CO	1	0.02	91.79
437	12440	CROWN ZELLERBACH CORP	1	0.02	91.82
438	12563	DAVIS PETROLEUM INC	1	0.02	91.84
439	12565	DAVISON OIL CO	1	0.02	91.87
440	12615	DEFENSE FUELS CO	1	0.02	91.89

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
441	12631	DELCO FREIGHT LINES	1	0.02	91.91
442	12798	DOVER CHEMICAL CORP	1	0.02	91.94
443	12801	DOW CORNING CORP	1	0.02	91.96
444	12921	EASTERN CHEMICAL CO	1	0.02	91.98
445	12936	EASTMAN GELATINE CORP	1	0.02	92.01
446	12938	EASTMAN KODAK CO (TENNESSEE)	1	0.02	92.03
447	12985	EL PASO NATURAL GAS CO	1	0.02	92.05
448	13081	ENGELHARD MINERALS & CHEMICALS	1	0.02	92.08
449	13105	ENTERPRISE PRODUCTS CO	1	0.02	92.10
450	13189	EVANS COOPERAGE CO	1	0.02	92.13
451	13237	F M I S	1	0.02	92.15
452	13288	FARMERS & RANCHERS COOP	1	0.02	92.17
453	13290	FARMERS CHEMICAL CO	1	0.02	92.20
454	13297	FARMERS UNION OIL	1	0.02	92.22
455	13407	FIRESTONE CHEMICAL CORP	1	0.02	92.24
456	13412	FIRESTONE TIRE & RUBBER CO	1	0.02	92.27
457	13415	FIRST CHEMICAL CORP	1	0.02	92.29
458	13416	FIRST MISS CORP	1	0.02	92.32
459	13460	FLINT INK CO	1	0.02	92.34
460	13516	FORD MOTOR CO	1	0.02	92.36
461	13757	GENERAL AMERICAN TRANSPT	1	0.02	92.39
462	13792	GENERAL MOTORS CORP	1	0.02	92.41
463	13945	GRAND TRUNK WESTERN RR C	1	0.02	92.43
464	14004	GREEN BAY PACKAGING INC	1	0.02	92.46
465	14010	GREEN VALLEY CHEMICAL CORP	1	0.02	92.48
466	14049	GULF STATE INC	1	0.02	92.50
467	14079	HALL C P COMPANY	1	0.02	92.53
468	14098	HAMMERMILL PAPER CO	1	0.02	92.55
469	14308	CELANESE FIBER OPERATIONS	1	0.02	92.58
470	14320	HOME OIL CO	1	0.02	92.60
471	14325	CALHIO CHEM INC	1	0.02	92.62
472	14388	HUDSON TANK STORAGE CO	1	0.02	92.65
473	14475	ILLINOIS CENTRAL GULF RAILR	1	0.02	92.67
474	14530	INDUSTRIAL CHEMICAL (CORP)	1	0.02	92.69
475	14604	INTEREX CORP	1	0.02	92.72
476	14716	JENKINS OIL INC	1	0.02	92.74
477	14717	JENNISON-WRIGHT CORP	1	0.02	92.76
478	14799	KAISER AGRICULTURAL CHEMICALS	1	0.02	92.79
479	14800	KAISER ALUM & CHEMICAL CO	1	0.02	92.81
480	14802	KAISER CHEMICALS	1	0.02	92.84

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
481	14983	KRAFT INC	1	0.02	92.86
482	14985	KRAMER CHEMICALS INC	1	0.02	92.88
483	14988	KREVIT H & CO INC	1	0.02	92.91
484	15083	LEAF CO INC	1	0.02	92.93
485	15106	LEHN & FINK DIV STERLING DR	1	0.02	92.95
486	15119	LEVER BROTHERS COMPANY	1	0.02	92.98
487	15166	LIQUID CONTAINER CORP	1	0.02	93.00
488	15280	MCMILLAN BLOEDEL CONTAINERS	1	0.02	93.02
489	15326	MALLINCKRODT CHEMICAL WORKS	1	0.02	93.05
490	15339	MANCHESTER TANK & EQP CO	1	0.02	93.07
491	15348	MANN GEORGE & CO INC	1	0.02	93.10
492	15431	MATLACK INC	1	0.02	93.12
493	15456	MC COOK FARM SERVICE	1	0.02	93.14
494	15535	MERCK & CO INC	1	0.02	93.17
495	15680	MILLIKEN CO INC	1	0.02	93.19
496	15703	MISSISSIPPI CHEMICAL CORP	1	0.02	93.21
497	15727	MOBIL OIL CORP OF CANADA	1	0.02	93.24
498	15730	MOBILE CHEMICAL	1	0.02	93.26
499	15772	MONTROSE CHEMICAL CORP	1	0.02	93.28
500	15930	NATIONAL AMMONIA CO	1	0.02	93.31
501	16001	NAVAJO REFINING CO	1	0.02	93.33
502	16131	NORCO CORP	1	0.02	93.36
503	16251	O SULLIVAN CORPORATION	1	0.02	93.38
504	16278	OHIO MEDICAL PRODUCTS DIV	1	0.02	93.40
505	16301	OLD COLONY TRANSPORTATION	1	0.02	93.43
506	16366	OWENS-ILLINOIS INC	1	0.02	93.45
507	16384	P B & S CHEMICAL CO INC	1	0.02	93.47
508	16639	PETERSON PURITAN INC	1	0.02	93.50
509	16643	PETRO PRODUCTS INC	1	0.02	93.52
510	16851	PREFERRED PACKING CORP	1	0.02	93.54
511	16872	PRESSURE VESSEL SERVICE INC	1	0.02	93.57
512	16876	PRIDE REFINING CO INC	1	0.02	93.59
513	16938	PUBLICKER INDUSTRIES INC	1	0.02	93.62
514	16950	PUREGRO COMPANY	1	0.02	93.64
515	17114	REICHHOLD CHEMICALS INC	1	0.02	93.66
516	17151	REPUBLIC STEEL CORP	1	0.02	93.69
517	17244	ROBECO CHEMICALS INC	1	0.02	93.71
518	17331	ROYSTER CO	1	0.02	93.73
519	17477	SCHOLLE CORP	1	0.02	93.76
520	17498	SCM CORP	1	0.02	93.78

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
521	17652	SHEFFIELD CONTAINER CORP	1	0.02	93.80
522	17667	SHEREX CHEMICAL CO	1	0.02	93.83
523	17670	SHERWIN-WILLIAMS CO	1	0.02	93.85
524	17749	SIMPSON PAPER CO	1	0.02	93.88
525	17856	SONOCO PRODUCTS COMPAN	1	0.02	93.90
526	17922	SOUTHERN PROTECTIVE PROD	1	0.02	93.92
527	17923	SOUTHERN RAILWAY SYSTEM	1	0.02	93.95
528	18100	STANDARD OIL CO	1	0.02	93.97
529	18190	STEPHAN CHEMICAL	1	0.02	93.99
530	18199	STERLING CHEMICAL CO	1	0.02	94.02
531	18282	SUFFOLK CHEMICAL CO INC	1	0.02	94.04
532	18388	TAG CHEMICALS CO	1	0.02	94.06
533	18459	TENNESEE RIVER TERMINAL	1	0.02	94.09
534	18462	TENNESSEE FARMERS CO-OP	1	0.02	94.11
535	18480	TESORO PETROLEUM (REFININ	1	0.02	94.14
536	18498	TEXAS EASTERN TRANSMISSIO	1	0.02	94.16
537	18523	TEXTILE CHEMICAL CO INC	1	0.02	94.18
538	18547	THIOKOL CORP	1	0.02	94.21
539	18803	U S BORAX & CHEMICAL CORP	1	0.02	94.23
540	18815	U S GOVT - ARMY & AIR FORCE	1	0.02	94.25
541	18818	U S GOVT - BUR OF MINES	1	0.02	94.28
542	18885	UNION TEXAS PROD CORP	1	0.02	94.30
543	18886	COMMERCIAL ALCOHOL LTD	1	0.02	94.32
544	18903	UNION TANK CAR CO	1	0.02	94.35
545	18905	UNION TEXAS COMPANY	1	0.02	94.37
546	18906	UNION TEXAS PETRO DV ALLIE	1	0.02	94.40
547	18908	UNIROYAL INC	1	0.02	94.42
548	18961	UNITED STATES STEEL CORP	1	0.02	94.44
549	18963	UNITED STEEL CONTAINER CO	1	0.02	94.47
550	18982	UNIVERSAL OIL PRODUCTS CO	1	0.02	94.49
551	19022	USS CHEMICALS DIV US STEEL	1	0.02	94.51
552	19204	WALTER JIM RESOURCES INC	1	0.02	94.54
553	19226	UNITED STATES INDUSTRIAL C	1	0.02	94.56
554	19300	WELLAND CHEMICAL LTD	1	0.02	94.59
555	19309	GRANTRADE CORP	1	0.02	94.61
556	19386	WESTERN TAR PRODUCTS CO	1	0.02	94.63
557	19410	WHITAKER OIL CO	1	0.02	94.66
558	19570	WORTH CHEMICAL CORP	1	0.02	94.68
559	19575	WRIGHT CHEMICAL CO	1	0.02	94.70
560	19705	CHEVERON USA INC	1	0.02	94.73

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
561	19715	CONOCO REFINERY	1	0.02	94.75
562	19721	HILDITCH VINE AMERICA	1	0.02	94.77
563	19741	KALI CHEM	1	0.02	94.80
564	19764	CITGO	1	0.02	94.82
565	19784	TEXCO CHEM	1	0.02	94.85
566	19792	C H SPRAGUE & SON CO	1	0.02	94.87
567	19872	CLARK OIL CO	1	0.02	94.89
568	19917	S T SERVICES	1	0.02	94.92
569	19926	TEXACO USA PL2	1	0.02	94.94
570	19982	CHEM MOTOR	1	0.02	94.96
571	20021	CELANES MEXICAN SA	1	0.02	94.99
572	20034	TENNECO POLYMERS	1	0.02	95.01
573	20061	UNION FOUNDRY	1	0.02	95.03
574	20185	TIDE PRODUCT	1	0.02	95.06
575	20203	SEAPAC	1	0.02	95.08
576	20215	CANADIAN LIQUID	1	0.02	95.11
577	20306	PHILLIPS PIPE LINE	1	0.02	95.13
578	20469	RILEY TAR & CHEMICAL	1	0.02	95.15
579	20645	HORIZON CHEM	1	0.02	95.18
580	20670	K LINE	1	0.02	95.20
581	20826	Q O CHEMICALS	1	0.02	95.22
582	20871	BATH & HAMMONDSPT RR C	1	0.02	95.25
583	20894	BLASER & MERICLE INC	1	0.02	95.27
584	20956	ESSEX IND CHEM	1	0.02	95.29
585	20995	MONTANA REFINING	1	0.02	95.32
586	21065	A H MATHIEU CORP	1	0.02	95.34
587	21090	C F FORWARDING	1	0.02	95.37
588	21147	EASTERN PETROLEUM	1	0.02	95.39
589	21213	STOLT CONTAINERS	1	0.02	95.41
590	21227	SHRIEVE CHEM CO	1	0.02	95.44
591	21249	PETRO CANADA	1	0.02	95.46
592	21254	KLOCKNER CHEM	1	0.02	95.48
593	21316	BIG HORN	1	0.02	95.51
594	21319	I N L STEEL	1	0.02	95.53
595	21426	MOBILE OIL CANADA	1	0.02	95.55
596	21428	ELGIN RESOURCES	1	0.02	95.58
597	21445	ALPHA RESINS (TENNESSEE PL	1	0.02	95.60
598	21446	ALLEMANIA CHEM CO	1	0.02	95.63
599	21448	BIG 3 GAS CO	1	0.02	95.65
600	21532	CONAGRA INC	1	0.02	95.67

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
601	21899	BASF CANADA INC	1	0.02	95.70
602	21908	ADL-1 LTD	1	0.02	95.72
603	21952	AMERICAN INDUSTRIAL CHEM	1	0.02	95.74
604	21985	Y S LINE	1	0.02	95.77
605	22000	PENRECO DIV PENNZOIL CO	1	0.02	95.79
606	22053	SMELTERS INC	1	0.02	95.81
607	22066	CROP MATE	1	0.02	95.84
608	22086	CHEMPORT CHEM INC	1	0.02	95.86
609	22125	ARKANSAS EASTMAN CO	1	0.02	95.89
610	22174	SENGRAMS JOSEPH E & SON	1	0.02	95.91
611	22287	PHILLICHEMIC	1	0.02	95.93
612	22323	ALLIED ENERGY	1	0.02	95.96
613	22375	ETHYLPETADD	1	0.02	95.98
614	22378	CAROLINA NITROGEN CO	1	0.02	96.00
615	22385	BREA CHEM	1	0.02	96.03
616	22446	TRANSAMMONIA INC	1	0.02	96.05
617	22464	CROZELLER	1	0.02	96.07
618	22471	VULCAN WAREHOUSE	1	0.02	96.10
619	22515	CHEM ETHANOL PRODUCTS IN	1	0.02	96.12
620	22596	KEMIRA INC	1	0.02	96.15
621	22628	HERITAGE RAILWAY SERV	1	0.02	96.17
622	22648	ICG	1	0.02	96.19
623	22680	UNLOADING UNLIMITED	1	0.02	96.22
624	22699	PHILLIPETROL	1	0.02	96.24
625	22733	ARCO ALASKA INC	1	0.02	96.26
626	22839	AGRIFORM FARM SUPPLY	1	0.02	96.29
627	22846	LANDMARK GENETICS	1	0.02	96.31
628	22899	SOLVENT SERV INC	1	0.02	96.33
629	22907	ALLIED FIBERS & PLASTICS CO	1	0.02	96.36
630	22960	ROGERS GALVINIZING	1	0.02	96.38
631	22986	MIDLAND RESOURCES	1	0.02	96.41
632	23013	BAKE LITE THERMOSETS LTD	1	0.02	96.43
633	23057	PHOENIX CHEM LABS INC	1	0.02	96.45
634	23117	BOWATER CAROLINA CORP	1	0.02	96.48
635	23182	INTEROAMERIC	1	0.02	96.50
636	23230	CAPE IND	1	0.02	96.52
637	23250	BAYTANK	1	0.02	96.55
638	23302	CYANAMID INTER AMERICAN C	1	0.02	96.57
639	23371	DISTILLCO LTD	1	0.02	96.59
640	23420	WESTERN GAS PROCESSORS	1	0.02	96.62

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
641	23471	SPTCO	1	0.02	96.64
642	23568	BOTKIN GRAIN CO	1	0.02	96.67
643	23571	CONTINENTAL POLYMERS	1	0.02	96.69
644	23572	SALINAS ABELARDO A INC	1	0.02	96.71
645	23630	TRANSAMERICA TRANSPORT I	1	0.02	96.74
646	23698	CARMAR ASSOCIATES INC	1	0.02	96.76
647	23738	AMERICAN CHROME & CHEM	1	0.02	96.78
648	23746	ENRON CHEM CO	1	0.02	96.81
649	23770	MOBILE MACHINE MINERALS	1	0.02	96.83
650	23791	GRANITE CITY STEEL	1	0.02	96.86
651	23796	SOUTHSIDE RIVER RAIL	1	0.02	96.88
652	23919	JACQUIN FLORIDA DISTILLING	1	0.02	96.90
653	23960	AMOCO CANADA PETROLEUM	1	0.02	96.93
654	24064	CONTINENTAL NITROGEN & RE	1	0.02	96.95
655	24069	CONTICHIM NORTH AMERICAN	1	0.02	96.97
656	24090	AGRI-BASICS	1	0.02	97.00
657	24106	RESINALL CORP	1	0.02	97.02
658	24120	UNITANK TERMINAL SERV	1	0.02	97.04
659	24230	DIAMOND CHEM	1	0.02	97.07
660	24238	OLD WORLD TRADING CO	1	0.02	97.09
661	24263	FREEPORT MCMORAN GOLD C	1	0.02	97.12
662	24269	BERNUTH AGENCIES INC	1	0.02	97.14
663	24270	SETHNESS PRODUCTS CO	1	0.02	97.16
664	24295	INTERMODAL SYSTEMS INC	1	0.02	97.19
665	24372	EMERY CHEM	1	0.02	97.21
666	24379	AMERICAN NORIT CO	1	0.02	97.23
667	24393	HOTSCHT FIBERS	1	0.02	97.26
668	24412	NEBRASKA FARMLAND INDUS	1	0.02	97.28
669	24462	CAVENHAM FOREST	1	0.02	97.30
670	24542	REILLY INDUSTRIES	1	0.02	97.33
671	24548	PARK GRAIN	1	0.02	97.35
672	24571	TRI DELTA FERTILIZER	1	0.02	97.38
673	24629	CHARDONOL	1	0.02	97.40
674	24676	LINDEN CHEMICAL AND PLASTI	1	0.02	97.42
675	24751	A S ARCO INC	1	0.02	97.45
676	24789	UNION SHIPPER	1	0.02	97.47
677	24801	FARMLAND NITROGEN PLANT	1	0.02	97.49
678	24818	TEXOMAFARSUP	1	0.02	97.52
679	24848	CAIN CHEMICAL	1	0.02	97.54
680	24860	H.C. INDUSTRIES	1	0.02	97.56

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
681	24898	BULK INTERMODAL T	1	0.02	97.59
682	24911	COMINCO LTD	1	0.02	97.61
683	24933	JAMES RIVER CORP	1	0.02	97.64
684	24935	FLEXI FLOW TERMINAL	1	0.02	97.66
685	24944	TEX MART	1	0.02	97.68
686	24950	NORTHEFERTIL	1	0.02	97.71
687	24951	STAFFO COU FLO	1	0.02	97.73
688	24959	WOODGATE PETROLEUM	1	0.02	97.75
689	24994	ZACLON	1	0.02	97.78
690	25042	AUTO RESEARCH CO	1	0.02	97.80
691	25046	SEAGRAM DISTILLERS CO	1	0.02	97.82
692	25053	NORTH WPETROC	1	0.02	97.85
693	25077	WASHINGTON GAS CO	1	0.02	97.87
694	25175	ALPAC MARKETING SERVICE	1	0.02	97.90
695	25178	SPECTRON INC	1	0.02	97.92
696	25577	NUTRIUS INC	1	0.02	97.94
697	25843	GREAT LAKE FOREST PRODUC	1	0.02	97.97
698	25993	TEXAS SOLEFINS	1	0.02	97.99
699	26001	SOUTHERN RESINS COMPANY	1	0.02	98.01
700	26025	NUTRIUS INC	1	0.02	98.04
701	26068	HCH MARKETING	1	0.02	98.06
702	26075	PERIDOT CHEMICAL CO INC	1	0.02	98.08
703	26077	NU SOUTH IND	1	0.02	98.11
704	26079	ENENCO INC	1	0.02	98.13
705	26214	SWIDLRY	1	0.02	98.16
706	26215	TEXAS ALKYLs	1	0.02	98.18
707	26216	DELIVERY SWITCH	1	0.02	98.20
708	26220	MANUFACTURE CONSOL SERVI	1	0.02	98.23
709	26243	SMITH BOWMAN DIST	1	0.02	98.25
710	26305	ALLIED SIGN CORP	1	0.02	98.27
711	26321	EL PASO REFINING	1	0.02	98.30
712	26343	WEBBS SUPER GROW PRODUC	1	0.02	98.32
713	26386	CROP PRODUCTS SERVICES	1	0.02	98.34
714	26401	F M X CORP	1	0.02	98.37
715	26429	CANADIAN ELECTRIC ZINC, LTD	1	0.02	98.39
716	26569	ARGONAL & CO LTD	1	0.02	98.42
717	26574	SUNBELT CHEM	1	0.02	98.44
718	26576	BURKMAN LABORATORIES	1	0.02	98.46
719	26577	HULSON AG SERV	1	0.02	98.49
720	26618	SYNTEX/FREEPORT	1	0.02	98.51

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
721	26653	GREAT SOUTHERN PAPER CO	1	0.02	98.53
722	26686	NATIONAL CARBONIC	1	0.02	98.56
723	26729	VILLASANO Y CIA SA	1	0.02	98.58
724	26789	PRESERVATION PRODUCTS	1	0.02	98.60
725	26847	NATIONAL CARBON	1	0.02	98.63
726	26862	DESPACHOS DEL NORTE	1	0.02	98.65
727	26893	CHATTANOOGA CHEM CO	1	0.02	98.68
728	26897	CANADIAN OCCIDENTAL PETR	1	0.02	98.70
729	26972	KAISER ESTECH	1	0.02	98.72
730	26998	GULF RAILCAR INC	1	0.02	98.75
731	27010	CSX-SELAND INTERMODAL INC	1	0.02	98.77
732	27017	CLINCH RIVER CORP	1	0.02	98.79
733	27062	UPFS SIF NALCO	1	0.02	98.82
734	27100	DETSO TERMINAL	1	0.02	98.84
735	27101	L A COMPAGNIE	1	0.02	98.87
736	27123	TENOIL	1	0.02	98.89
737	27149	PBS CHEMICAL	1	0.02	98.91
738	27209	CROWLEY MARITIME	1	0.02	98.94
739	27243	LAREDO EXPORT	1	0.02	98.96
740	27260	OXYNGL	1	0.02	98.98
741	27268	MERIDIAN OIL	1	0.02	99.01
742	27320	CENTEN EXPRESS	1	0.02	99.03
743	27380	LDS TRUCK LINES	1	0.02	99.05
744	27396	OXY CITIES SERV	1	0.02	99.08
745	27398	AC BEROL CHEMICALS INC	1	0.02	99.10
746	27401	ALLIED TERMINALS INC	1	0.02	99.13
747	27431	P M C CORP	1	0.02	99.15
748	27442	CANS STATES	1	0.02	99.17
749	27456	UNION CAR CORP	1	0.02	99.20
750	27497	COLORADO REFINING CO	1	0.02	99.22
751	27532	LAIR PETROLEUM CO	1	0.02	99.24
752	27580	UCG ENERGY CORP	1	0.02	99.27
753	27767	MARKWEST HYDROCAR	1	0.02	99.29
754	27841	UNITED CARBON CORP	1	0.02	99.31
755	27885	GRAYSONIA NASHVILLE & ASH	1	0.02	99.34
756	27901	TERRA INTERNATIONAL	1	0.02	99.36
757	27908	NATIONAL SLURCH	1	0.02	99.39
758	27909	PUS CHEMICAL	1	0.02	99.41
759	27941	REILLY IND INC	1	0.02	99.43
760	27997	PENFORD PRODUCTS	1	0.02	99.46

NUMBER OF LEAKS BY SHIPPER (1985-1989)

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
761	28013	US AGRI CHEMICAL	1	0.02	99.48
762	28026	BIGTHRINDUST	1	0.02	99.50
763	28107	MICHIGAN RECOVERY	1	0.02	99.53
764	28811	EXCELLO	1	0.02	99.55
765	29811	AVGANIC INC	1	0.02	99.57
766	29815	DAKOTA GASIFICATION CO	1	0.02	99.60
767	29817	SAFBANK LINE	1	0.02	99.62
768	29831	GENTRADE	1	0.02	99.65
769	29854	KAMA CORP	1	0.02	99.67
770	29855	AUBURN FERTILIZER	1	0.02	99.69
771	29874	UP FREIGHT SERVICE	1	0.02	99.72
772	29875	S T SERVICES INC	1	0.02	99.74
773	29892	MACON KRAFT INC	1	0.02	99.76
774	29923	FLEXEL CORP	1	0.02	99.79
775	29953	C S I ALCOHOL	1	0.02	99.81
776	29963	GMANN	1	0.02	99.83
777	29972	COASTAL EAGLE POINT	1	0.02	99.86
778	30240	TRINITY CHEMICAL IND	1	0.02	99.88
779	30247	PAXTON FERTILIZER	1	0.02	99.91
780	30248	AIRCO GASES CANADA	1	0.02	99.93
781	30250	BUCHMAN LABORATORY	1	0.02	99.95
782	40003	SMC CHEMICALS INC	1	0.02	99.98
783	40059	ALTA GAS ETHYLENE CO	1	0.02	100.00
		TOTAL	4229		

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	10334	AMERICAN CYANAMID CO	21	2.88	2.88
2	18887	UNION CARBIDE CORP	21	2.88	5.76
3	11696	CELANESE CHEMICAL CO	19	2.61	8.37
4	16222	NOT REPORTED BY CARRIER	18	2.47	10.84
5	12836	DU PONT E I DE NEMOURS & CO	17	2.33	13.17
6	18167	STAUFFER CHEMICAL CO	16	2.19	15.36
7	13223	EXXON CHEMICAL CO	15	2.06	17.42
8	16668	PHELPS DODGE CORP	15	2.06	19.48
9	17657	SHELL CHEMICAL CO	14	1.92	21.40
10	18500	TEXAS GULF INC	14	1.92	23.32
11	20766	ARCO CHEM CO	14	1.92	25.24
12	12800	DOW CHEMICAL CO	13	1.78	27.02
13	16595	PENNWALT CORP	13	1.78	28.81
14	15760	MONSANTO CO	12	1.65	30.45
15	10174	AIR PRODUCTS & CHEMICALS INC	10	1.37	31.82
16	13495	FMC CORP	10	1.37	33.20
17	19208	WANDA PETROLEUM CO	10	1.37	34.57
18	20303	TENNESSEE CHEM CO	9	1.23	35.80
19	17284	ROHM & HAAS CO	8	1.10	36.90
20	19955	TEXACO CHEMICAL	8	1.10	38.00
21	20249	LCP CHEMICALS	8	1.10	39.09
22	20452	INTEROX AMERICA	8	1.10	40.19
23	18071	STALEY A E MANUFACTURING CO	7	0.96	41.15
24	10251	ALLIED CHEMICAL CORP	6	0.82	41.98
25	12719	DIAMOND SHAMROCK CORP	6	0.82	42.80
26	14366	HOWELL HYDROCARBONS INC	6	0.82	43.62
27	16307	OLIN CORP	6	0.82	44.44
28	16831	PPG INDUSTRIES INC	6	0.82	45.27
29	19168	VULCAN MATERIALS CO	6	0.82	46.09
30	19793	SUN REFINING AND MARKETING	6	0.82	46.91
31	20432	EL PASO HYDRO CARBONS CO	6	0.82	47.74
32	20872	TEXASGULF CHEM INC (DIV TGULF)	6	0.82	48.56
33	10653	ATLANTIC RICHFIELD CO (ARCO)	5	0.69	49.25
34	12986	EL PASO PRODUCTS CO	5	0.69	49.93
35	15722	MOBAY CHEMICAL CO	5	0.69	50.62
36	17074	REAGENT CHEMICAL & RESEARCH	5	0.69	51.30
37	17075	REAGENT CHEMICAL INC	5	0.69	51.99
38	19532	WITCO CHEMICAL CORP	5	0.69	52.67
39	19788	TEXAS EASTMAN	5	0.69	53.36
40	19824	KOCH SULPHUR PRODUCTS	5	0.69	54.05
41	20895	VISTA CHEM CO	5	0.69	54.73

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	21274	THERMICE CORP	5	0.69	55.42
43	10579	ASARCO INC	4	0.55	55.97
44	11934	CHEVRON CHEMICAL CO	4	0.55	56.52
45	16259	OCCIDENTAL CHEMICAL CO	4	0.55	57.06
46	16793	POLYSAR LTD	4	0.55	57.61
47	19015	US INDUSTRIAL CHEMICALS CO	4	0.55	58.16
48	19021	USS AGRI-CHEMICALS CO	4	0.55	58.71
49	19825	SOHIO CHEMICAL CO	4	0.55	59.26
50	19840	EXXON U S A	4	0.55	59.81
51	19904	PEKIN ENERGY	4	0.55	60.36
52	20278	ADM CORN SWEETNERS	4	0.55	60.91
53	21295	TULSA CHEM	4	0.55	61.45
54	22302	GEORGIA GULF	4	0.55	62.00
55	10497	ARCHER-DANIELS-MIDLAND CO	3	0.41	62.41
56	10862	BASF WYANDOTTE CORP	3	0.41	62.83
57	11186	BORDEN INC/CHEMICAL CO	3	0.41	63.24
58	13298	FARMLAND INDUSTRIES INC	3	0.41	63.65
59	13907	GOODRICH B F CO	3	0.41	64.06
60	13929	GRACE W R & CO	3	0.41	64.47
61	14048	GULF OIL CORP	3	0.41	64.88
62	14479	IMC CHEMICAL GROUP INC	3	0.41	65.29
63	14621	INTERNATIONAL MINERALS & CHEM	3	0.41	65.71
64	14766	JONES-HAMILTON CO	3	0.41	66.12
65	15726	MOBIL OIL CORP	3	0.41	66.53
66	16680	PHILLIPS PETROLEUM CO	3	0.41	66.94
67	17337	RUBICON CHEMICALS INC	3	0.41	67.35
68	17655	SHELL CANADA LTD	3	0.41	67.76
69	17746	SIMPLOT J R CO	3	0.41	68.18
70	18626	TOSCO CORPORATION	3	0.41	68.59
71	19233	WARREN PETROLEUM CORP	3	0.41	69.00
72	19285	WEBBER TANKS INC	3	0.41	69.41
73	20536	PVS CHEM	3	0.41	69.82
74	21951	TEXACO REFINING & MARKETING	3	0.41	70.23
75	22061	NEW ENERGY CO OF INDIANA	3	0.41	70.64
76	10151	AGRICO CHEMICAL CO	2	0.27	70.92
77	10585	ASHLAND CHEMICAL CO	2	0.27	71.19
78	11436	C I L CHEMICALS INC	2	0.27	71.47
79	11444	C P INORGANICS INC	2	0.27	71.74
80	12351	COSDEN OIL & CHEMICAL CO	2	0.27	72.02
81	12935	EASTMAN CHEMICAL PRODUCTS	2	0.27	72.29
82	13054	EMERY INDUSTRIES INC	2	0.27	72.57

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	13534	ZINC ELECTROLYTIQUE	2	0.27	72.84
84	13778	GENERAL ENERGY CORP INC	2	0.27	73.11
85	14227	HERCULES INC	2	0.27	73.39
86	14507	INCO CO	2	0.27	73.66
87	14879	KERLEY CHEMICAL CORP	2	0.27	73.94
88	14886	KERR-MCGEE CHEMICAL CORP	2	0.27	74.21
89	14975	KOPPERS CO INC	2	0.27	74.49
90	15165	LIQUID CARBONICS CORP	2	0.27	74.76
91	15242	LUBRIZOL CORP	2	0.27	75.03
92	16179	NORTHERN PETRO-CHEMICAL CO	2	0.27	75.31
93	16201	NORTHWEST PETROCHEMICAL CO	2	0.27	75.58
94	16678	PHILLIPS CHEMICAL CO	2	0.27	75.86
95	17753	SINCLAIR OIL CO	2	0.27	76.13
96	18132	MEAB POLYSAR LTD	2	0.27	76.41
97	18473	TERRA CHEMICAL CO	2	0.27	76.68
98	18884	UNION CAMP CORP	2	0.27	76.95
99	19101	VELSICOL CHEMICAL CORP	2	0.27	77.23
100	19690	UNION CHEM DIV	2	0.27	77.50
101	19850	ROHM AND HAAS TEXAS INC	2	0.27	77.78
102	19852	ENERGY SALES INCORPORATED	2	0.27	78.05
103	20051	KERLEY INDUSTRIES INC	2	0.27	78.33
104	20101	CHEVRON USA	2	0.27	78.60
105	20110	BADISCHE CORP	2	0.27	78.88
106	20815	FORMOSA PLACTICS CORP USA	2	0.27	79.15
107	22138	GATX TERMINALS CLINTON	2	0.27	79.42
108	22194	TENNESSEE EASTMAN	2	0.27	79.70
109	22474	VENTURE OIL CO	2	0.27	79.97
110	22645	TROPICANA ENERGY	2	0.27	80.25
111	10179	AIRCO INC	1	0.14	80.38
112	10211	ALBERTA GAS CHEMICALS LTD	1	0.14	80.52
113	10262	ALLIED PAPER INC	1	0.14	80.66
114	10310	AMAX ZINC CO INC	1	0.14	80.80
115	10316	AMERADA HESS CORP	1	0.14	80.93
116	10370	AMERICAN OIL CO (AMOCO)	1	0.14	81.07
117	10414	AMOCO CHEMICAL CORP	1	0.14	81.21
118	10516	ARIZONA CHEMICAL CO	1	0.14	81.34
119	10586	ASHLAND OIL CO	1	0.14	81.48
120	10599	ASSOCIATED ENGR & MFG CO	1	0.14	81.62
121	10620	ATCHISON TOPEKA & SANTA FE RY	1	0.14	81.76
122	11021	BETHLEHEM STEEL CORPORATION	1	0.14	81.89
123	11188	BORG-WARNER CORP	1	0.14	82.03

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	11431	C F INDUSTRIES INC	1	0.14	82.17
125	11575	CONSERVATION CHEM	1	0.14	82.30
126	11595	M B C CHEM	1	0.14	82.44
127	11603	D & H RAILROAD	1	0.14	82.58
128	11699	CELANESE CORP	1	0.14	82.72
129	11780	CHAMPION INTERNATIONAL CORP	1	0.14	82.85
130	11959	CHINOOK INTERNATIONAL	1	0.14	82.99
131	11979	CIBA-GEIGY CORP	1	0.14	83.13
132	12016	CLARK CHEMICAL CORP	1	0.14	83.26
133	12022	CLARK OIL & REFINING CORP	1	0.14	83.40
134	12156	COMINCO AMERICAN INC	1	0.14	83.54
135	12814	KENNECOTT	1	0.14	83.68
136	12937	EASTMAN KODAK CO	1	0.14	83.81
137	12938	EASTMAN KODAK CO (TENNESSEE)	1	0.14	83.95
138	12954	CARBONAIRE INC	1	0.14	84.09
139	12991	ELDORADO CHEMICAL CO	1	0.14	84.23
140	13174	ETHYL CORPORATION	1	0.14	84.36
141	13389	FINA OIL CO	1	0.14	84.50
142	13407	FIRESTONE CHEMICAL CORP	1	0.14	84.64
143	13416	FIRST MISS CORP	1	0.14	84.77
144	13474	FLORIDA DISTILLERS CO	1	0.14	84.91
145	13516	FORD MOTOR CO	1	0.14	85.05
146	13551	C I L CO	1	0.14	85.19
147	13603	FREEPORT CHEMICAL CO	1	0.14	85.32
148	13694	GAF CORP	1	0.14	85.46
149	13821	GEORGIA PACIFIC CORP	1	0.14	85.60
150	13909	GOODYEAR TIRE & RUBBER CO	1	0.14	85.73
151	13940	GRAIN PROCESSING CORP	1	0.14	85.87
152	14010	GREEN VALLEY CHEMICAL CORP	1	0.14	86.01
153	14308	CELANESE FIBER OPERATIONS	1	0.14	86.15
154	14325	CALHIO CHEM INC	1	0.14	86.28
155	14388	HUDSON TANK STORAGE CO	1	0.14	86.42
156	14447	I C I AMERICA INC	1	0.14	86.56
157	14530	INDUSTRIAL CHEMICAL (CORP)	1	0.14	86.69
158	14602	INTERCONTINENTAL TERM CO	1	0.14	86.83
159	14626	INTERNATIONAL PAPER CO	1	0.14	86.97
160	14867	KENNECOTT COPPER CORP	1	0.14	87.11
161	14956	KOCH CHEMICAL CO	1	0.14	87.24
162	14983	KRAFT INC	1	0.14	87.38
163	15162	LION OIL CO	1	0.14	87.52
164	15546	MERICHEM CO	1	0.14	87.65

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
165	15652	MIDWEST SOLVENTS CO INC	1	0.14	87.79
166	15708	MISSOURI PACIFIC RAILROAD CO	1	0.14	87.93
167	15718	ITSUI & CO INC	1	0.14	88.07
168	15724	MOBIL CHEMICAL CO	1	0.14	88.20
169	15727	MOBIL OIL CORP OF CANADA LTD	1	0.14	88.34
170	15762	MONTANA SULPHUR & CHEM CO	1	0.14	88.48
171	15772	MONTROSE CHEMICAL CORP	1	0.14	88.61
172	15902	N-REN CORPORATION	1	0.14	88.75
173	16031	NEPERA CHEMICAL CO INC	1	0.14	88.89
174	16135	NORFOLK & WESTERN RAILWAY CO	1	0.14	89.03
175	16278	OHIO MEDICAL PRODUCTS DV AIRC	1	0.14	89.16
176	16660	PETROSAR LTD	1	0.14	89.30
177	16938	PUBLICER INDUSTRIES INC	1	0.14	89.44
178	16969	QUAKER OATS CO	1	0.14	89.57
179	17116	REILLY TAR & CHEMICAL CORP	1	0.14	89.71
180	17151	REPUBLIC STEEL CORP	1	0.14	89.85
181	17477	SCHOLLE CORP	1	0.14	89.99
182	17895	SOUTHERN CALIFORNIA CHEM CO	1	0.14	90.12
183	18188	STEPAN CHEMICAL	1	0.14	90.26
184	18295	SUN CHEMICAL CORP	1	0.14	90.40
185	18301	SUN OIL CO	1	0.14	90.54
186	18457	TENNECO CHEMICALS INC	1	0.14	90.67
187	18458	TENNECO OIL CO	1	0.14	90.81
188	18498	TEXAS EASTERN TRANSMISSION	1	0.14	90.95
189	18510	TEXAS SULPHUR PRODUCTS CO	1	0.14	91.08
190	18733	TRIANGLE REFINERIES INC	1	0.14	91.22
191	18806	U S CHEMICAL CORP	1	0.14	91.36
192	18885	UNION TEXAS PROD CORP	1	0.14	91.50
193	18886	COMMERCIAL ALCOHOL LTD	1	0.14	91.63
194	18906	UNION TEXAS PETRO DV ALLIED CH	1	0.14	91.77
195	18961	UNITED STATES STEEL CORP	1	0.14	91.91
196	19022	USS CHEMICALS DIV US STEEL	1	0.14	92.04
197	19076	VAN WATERS & ROGERS	1	0.14	92.18
198	19143	VIRGINIA CHEMICALS INC	1	0.14	92.32
199	19226	UNITED STATES INDUSTRIAL CO	1	0.14	92.46
200	19309	GRANTRADE CORP	1	0.14	92.59
201	19397	WEYERHAUSER CO	1	0.14	92.73
202	19721	HILDITCH VINE AMERICA	1	0.14	92.87
203	19926	TEXACO USA PL2	1	0.14	93.00
204	19966	AKZO CHEMICAL AMERICO	1	0.14	93.14
205	19982	CHEM MOTOR	1	0.14	93.28

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
206	20021	CELANES MEXICAN SA	1	0.14	93.42
207	20034	TENNECO POLYMERS	1	0.14	93.55
208	20061	UNION FOUNDRY	1	0.14	93.69
209	20186	BORG-WARNER CHEM	1	0.14	93.83
210	20306	PHILLIPS PIPE LINE	1	0.14	93.96
211	20466	CONOCO INC	1	0.14	94.10
212	20469	RILEY TAR & CHEMICAL	1	0.14	94.24
213	20905	ARCADIAN CORP	1	0.14	94.38
214	20989	FERRELPETROL	1	0.14	94.51
215	20995	MONTANA REFINING	1	0.14	94.65
216	21254	KLOCKNER CHEM	1	0.14	94.79
217	21316	BIG HORN	1	0.14	94.93
218	21319	I N L STEEL	1	0.14	95.06
219	21331	PAK TANK CORP	1	0.14	95.20
220	21426	MOBILE OIL CANADA	1	0.14	95.34
221	21428	ELGIN RESOURCES	1	0.14	95.47
222	21899	BASF CANADA INC	1	0.14	95.61
223	21908	ADL-1 LTD	1	0.14	95.75
224	21925	USI CHEM CORP	1	0.14	95.89
225	21989	WESTERN ZIRCONIUM	1	0.14	96.02
226	22000	PENRECO DIV PENNZOIL CO	1	0.14	96.16
227	22053	SMELTERS INC	1	0.14	96.30
228	22066	CROPMATE	1	0.14	96.43
229	22074	AMAX HOMESTAKE	1	0.14	96.57
230	22086	CHEMPORT CHEM INC	1	0.14	96.71
231	22137	HALTERMAN	1	0.14	96.85
232	22174	SENGRAMS JOSEPH E & SON	1	0.14	96.98
233	22178	COASTAL REFINING & MARKETING	1	0.14	97.12
234	22202	COASTAL STATES MARKETING	1	0.14	97.26
235	22259	LCI LIMITED	1	0.14	97.39
236	22287	PHILLICHEMIC	1	0.14	97.53
237	22296	SP AGENT	1	0.14	97.67
238	22297	GANTRADE	1	0.14	97.81
239	22323	ALLIED ENERGY	1	0.14	97.94
240	22375	ETHYLPETADD	1	0.14	98.08
241	22378	CAROLINA NITROGEN CO	1	0.14	98.22
242	22385	BREA CHEM	1	0.14	98.35
243	22446	TRANSAMMONIA INC	1	0.14	98.49
244	22464	CROZELLER	1	0.14	98.63
245	22515	CHEM ETHANOL PRODUCTS INC	1	0.14	98.77
246	22562	ADC LTD	1	0.14	98.90

NUMBER OF LEAKS BY SHIPPER 1985

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
247	22596	KEMIRA INC	1	0.14	99.04
248	22619	REHEIS CHEM CO	1	0.14	99.18
249	22628	HERITAGE RAILWAY SERV	1	0.14	99.31
250	22648	ICG	1	0.14	99.45
251	22669	OCELOT CHEM	1	0.14	99.59
252	22670	U S INDUSTRIAL CHEMICAL	1	0.14	99.73
253	22699	PHILLIPETROL	1	0.14	99.86
254	22700	KOCH HYDROCARBON	1	0.14	100.00
		TOTAL	729		

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	18887	UNION CARBIDE CORP	26	3.47	3.47
2	10334	AMERICAN CYANAMID CO	19	2.54	6.01
3	16259	OCCIDENTAL CHEMICAL CO	19	2.54	8.54
4	18167	STAUFFER CHEMICAL CO	17	2.27	10.81
5	20452	INTEROX AMERICA	14	1.87	12.68
6	10370	AMERICAN OIL CO (AMOCO)	13	1.74	14.42
7	12800	DOW CHEMICAL CO	13	1.74	16.15
8	11934	CHEVRON CHEMICAL CO	10	1.34	17.49
9	13495	FMC CORP	10	1.34	18.83
10	16222	NOT REPORTED BY CARRIER	10	1.34	20.16
11	19168	VULCAN MATERIALS CO	10	1.34	21.50
12	20905	ARCADIAN CORP	10	1.34	22.83
13	10579	ASARCO INC	9	1.20	24.03
14	11186	BORDEN INC/CHEMICAL CO	9	1.20	25.23
15	12836	DU PONT E I DE NEMOURS & CO	9	1.20	26.44
16	15760	MONSANTO CO	9	1.20	27.64
17	16831	PPG INDUSTRIES INC	9	1.20	28.84
18	20895	VISTA CHEM CO	9	1.20	30.04
19	10414	AMOCO CHEMICAL CORP	8	1.07	31.11
20	13223	EXXON CHEMICAL CO	8	1.07	32.18
21	16668	PHELPS DODGE CORP	8	1.07	33.24
22	16899	PROCTOR & GAMBLE CO	8	1.07	34.31
23	20303	TENNESSEE CHEM CO	8	1.07	35.38
24	20766	ARCO CHEM CO	8	1.07	36.45
25	22194	TENNESSEE EASTMAN	8	1.07	37.52
26	22302	GEORGIA GULF	8	1.07	38.58
27	10174	AIR PRODUCTS & CHEMICALS INC	7	0.93	39.52
28	10251	ALLIED CHEMICAL CORP	7	0.93	40.45
29	16307	OLIN CORP	7	0.93	41.39
30	17657	SHELL CHEMICAL CO	7	0.93	42.32
31	18626	TOSCO CORPORATION	7	0.93	43.26
32	20249	LCP CHEMICALS	7	0.93	44.19
33	20718	UNOCAL CHEM DIV	7	0.93	45.13
34	20872	TEXASGULF CHEM INC (DIV TGULF)	7	0.93	46.06
35	12719	DIAMOND SHAMROCK CORP	6	0.80	46.86
36	19955	TEXACO CHEMICAL	6	0.80	47.66
37	11696	CELANESE CHEMICAL CO	5	0.67	48.33
38	13551	C I L CO	5	0.67	49.00
39	16595	PENNWALT CORP	5	0.67	49.67
40	16680	PHILLIPS PETROLEUM CO	5	0.67	50.33
41	18490	TEXACO INC	5	0.67	51.00

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	20101	CHEVRON USA	5	0.67	51.67
43	20536	PVS CHEM	5	0.67	52.34
44	23527	ST LOUIS TERMINAL CORP	5	0.67	53.00
45	10585	ASHLAND CHEMICAL CO	4	0.53	53.54
46	11431	C F INDUSTRIES INC	4	0.53	54.07
47	11610	CARDOX DIV CHEMTRON	4	0.53	54.61
48	11699	CELANESE CORP	4	0.53	55.14
49	13298	FARMLAND INDUSTRIES INC	4	0.53	55.67
50	13389	FINA OIL CO	4	0.53	56.21
51	14886	KERR-MCGEE CHEMICAL CORP	4	0.53	56.74
52	15546	MERICHEM CO	4	0.53	57.28
53	15722	MOBAY CHEMICAL CO	4	0.53	57.81
54	19793	SUN REFINING AND MARKETING	4	0.53	58.34
55	20186	BORG-WARNER CHEM	4	0.53	58.88
56	20466	CONOCO INC	4	0.53	59.41
57	22074	AMAX HOMESTAKE	4	0.53	59.95
58	22138	GATX TERMINALS CLINTON	4	0.53	60.48
59	22735	KENNECOTT MINERALS	4	0.53	61.01
60	10151	AGRICO CHEMICAL CO	3	0.40	61.42
61	11436	C I L CHEMICALS INC	3	0.40	61.82
62	11461	CABOT CORP	3	0.40	62.22
63	13174	ETHYL CORPORATION	3	0.40	62.62
64	13929	GRACE W R & CO	3	0.40	63.02
65	13940	GRAIN PROCESSING CORP	3	0.40	63.42
66	14961	AIRCO INDUSTRIAL GASES	3	0.40	63.82
67	17074	REAGENT CHEMICAL & RESEARCH	3	0.40	64.22
68	17075	REAGENT CHEMICAL INC	3	0.40	64.62
69	18457	TENNECO CHEMICALS INC	3	0.40	65.02
70	18458	TENNECO OIL CO	3	0.40	65.42
71	18484	TESORO PETROLEUM CORP (ALASKA)	3	0.40	65.82
72	21331	PAK TANK CORP	3	0.40	66.22
73	22758	CIL CORP OF AMERICA	3	0.40	66.62
74	23374	FALCONBRIDGE LTD	3	0.40	67.02
75	23518	HUNTSMAN CHEM CO	3	0.40	67.42
76	10497	ARCHER-DANIELS-MIDLAND CO	2	0.27	67.69
77	10586	ASHLAND OIL CO	2	0.27	67.96
78	11542	CANADIAN INDUSTRIES LTD	2	0.27	68.22
79	11612	CARGILL INC	2	0.27	68.49
80	11916	CHEMTECH INDUSTRIES INC	2	0.27	68.76
81	12986	EL PASO PRODUCTS CO	2	0.27	69.03
82	12991	ELDORADO CHEMICAL CO	2	0.27	69.29

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	13224	EXXON CO	2	0.27	69.56
84	13603	FREEPORT CHEMICAL CO	2	0.27	69.83
85	13694	GAF CORP	2	0.27	70.09
86	13776	GENERAL ELECTRIC CO	2	0.27	70.36
87	14956	KOCH CHEMICAL CO	2	0.27	70.63
88	15165	LIQUID CARBONICS CORP	2	0.27	70.89
89	15404	MARUBENI AMERICA CORP	2	0.27	71.16
90	15690	MINERAL RESEARCH & DEV CORP	2	0.27	71.43
91	15980	NATIONAL STARCH & CHEMICAL	2	0.27	71.70
92	16660	PETROSAR LTD	2	0.27	71.96
93	17284	ROHM & HAAS CO	2	0.27	72.23
94	17528	SEAGRAM JOSEPH E & SONS INC	2	0.27	72.50
95	17658	SHELL OIL CO	2	0.27	72.76
96	17753	SINCLAIR OIL CO	2	0.27	73.03
97	18071	STALEY A E MANUFACTURING CO	2	0.27	73.30
98	18083	STANDARD CHLORINE	2	0.27	73.56
99	18302	SUN OLIN CHEMICAL CO	2	0.27	73.83
100	18500	TEXAS GULF INC	2	0.27	74.10
101	18897	UNION OIL CO	2	0.27	74.37
102	18900	UNION PACIFIC RAILROAD CO	2	0.27	74.63
103	19081	VANGAS INC	2	0.27	74.90
104	19397	WEYERHAUSER CO	2	0.27	75.17
105	19532	WITCO CHEMICAL CORP	2	0.27	75.43
106	19685	ALLIED CORPORATION	2	0.27	75.70
107	19690	UNION CHEM DIV	2	0.27	75.97
108	19788	TEXAS EASTMAN	2	0.27	76.24
109	19824	KOCH SULPHUR PRODUCTS	2	0.27	76.50
110	20051	KERLEY INDUSTRIES INC	2	0.27	76.77
111	20147	MID CONTINENT COMMODITY EXCH	2	0.27	77.04
112	20432	EL PASO HYDRO CARBONS CO	2	0.27	77.30
113	20815	FORMOSA PLACTICS CORP USA	2	0.27	77.57
114	21951	TEXACO REFINING & MARKETING	2	0.27	77.84
115	22297	GANTRADE	2	0.27	78.10
116	22922	BASF CHEMICAL	2	0.27	78.37
117	23006	DIXIE NORTHERN INC	2	0.27	78.64
118	23024	ADM CORP ACCT FRT CONTROL	2	0.27	78.91
119	23092	SONNEBORN WITCO CHEM	2	0.27	79.17
120	23279	CRYSEN ENERGY	2	0.27	79.44
121	23552	CYANAMID INC	2	0.27	79.71
122	23610	STANDARD OIL OF OHIO	2	0.27	79.97
123	23817	KAI-CHEM	2	0.27	80.24

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	23931	ARGO CHEM CO	2	0.27	80.51
125	10210	ALBERTA GAS & CHEMICAL CO	1	0.13	80.64
126	10444	ANDREWS PETROLEUM CO	1	0.13	80.77
127	10514	ARITECH CORP	1	0.13	80.91
128	10516	ARIZONA CHEMICAL CO	1	0.13	81.04
129	10600	ASSOCIATED FREIGHT LINES	1	0.13	81.17
130	10653	ATLANTIC RICHFIELD CO (ARCO)	1	0.13	81.31
131	10727	AVTEX FIBERS	1	0.13	81.44
132	10862	BASF WYANDOTTE CORP	1	0.13	81.58
133	11021	BETHLEHEM STEEL CORPORATION	1	0.13	81.71
134	11054	BIG THREE INDUSTRIES INC	1	0.13	81.84
135	11327	BUCKEYE GAS PRODUCTS	1	0.13	81.98
136	11476	CAL-GAS	1	0.13	82.11
137	11485	CALIFORNIA AMMONIA TRANSPORT	1	0.13	82.24
138	11538	U S I CORP	1	0.13	82.38
139	11712	CENTER PLAIN INDUSTRIES	1	0.13	82.51
140	11780	CHAMPION INTERNATIONAL CORP	1	0.13	82.64
141	11979	CIBA-GEIGY CORP	1	0.13	82.78
142	12426	CROWLEY TAR PRODUCTS CO INC	1	0.13	82.91
143	12440	CROWN ZELLERBACH CORP	1	0.13	83.04
144	12563	DAVIS PETROLEUM INC	1	0.13	83.18
145	12615	DEFENSE FUELS CO	1	0.13	83.31
146	12631	DELCO FREIGHT LINES	1	0.13	83.44
147	12704	DEVON CHEMICALS INC	1	0.13	83.58
148	12935	EASTMAN CHEMICAL PRODUCTS	1	0.13	83.71
149	12937	EASTMAN KODAK CO	1	0.13	83.85
150	13081	ENGELHARD MINERALS & CHEM	1	0.13	83.98
151	13105	ENTERPRISE PRODUCTS CO	1	0.13	84.11
152	13237	F M I S	1	0.13	84.25
153	13297	FARMERS UNION OIL	1	0.13	84.38
154	13765	GENERAL CHEMICAL CO	1	0.13	84.51
155	13821	GEORGIA PACIFIC CORP	1	0.13	84.65
156	13907	GOODRICH B F CO	1	0.13	84.78
157	14227	HERCULES INC	1	0.13	84.91
158	14366	HOWELL HYDROCARBONS INC	1	0.13	85.05
159	14447	I C I AMERICA INC	1	0.13	85.18
160	14479	IMC CHEMICAL GROUP INC	1	0.13	85.31
161	14626	INTERNATIONAL PAPER CO	1	0.13	85.45
162	14785	K A STEEL CHEMICAL CO	1	0.13	85.58
163	14799	KAISER AGRICULTURAL CHEMICALS	1	0.13	85.71
164	14802	KAISER CHEMICALS	1	0.13	85.85

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
165	14962	KOCH REFINING CO	1	0.13	85.98
166	14975	KOPPERS CO INC	1	0.13	86.11
167	15019	LA GLORIA OIL & GAS CO	1	0.13	86.25
168	15106	LEHN & FINK DIV STERLING DRUGS	1	0.13	86.38
169	15162	LION OIL CO	1	0.13	86.52
170	15242	LUBRIZOL CORP	1	0.13	86.65
171	15300	MAGMA COPPER CO	1	0.13	86.78
172	15348	MANN GEORGE & CO INC	1	0.13	86.92
173	15363	MARATHON OIL CO	1	0.13	87.05
174	15680	MILLIKEN CO INC	1	0.13	87.18
175	15762	MONTANA SULPHUR & CHEM CO	1	0.13	87.32
176	15930	NATIONAL AMMONIA CO	1	0.13	87.45
177	16201	NORTHWEST PETROCHEMICAL CO	1	0.13	87.58
178	16366	OWENS-ILLINOIS INC	1	0.13	87.72
179	16384	P B & S CHEMICAL CO INC	1	0.13	87.85
180	16678	PHILLIPS CHEMICAL CO	1	0.13	87.98
181	16793	POLYSAR LTD	1	0.13	88.12
182	16950	PUREGRO COMPANY	1	0.13	88.25
183	17114	REICHHOLD CHEMICALS INC	1	0.13	88.38
184	17116	REILLY TAR & CHEMICAL CORP	1	0.13	88.52
185	17337	RUBICON CHEMICALS INC	1	0.13	88.65
186	17655	SHELL CANADA LTD	1	0.13	88.79
187	17667	SHEREX CHEMICAL CO	1	0.13	88.92
188	17918	SOUTHERN PACIFIC TRANSP CO	1	0.13	89.05
189	18190	STEPHAN CHEMICAL	1	0.13	89.19
190	18282	SUFFOLK CHEMICAL CO INC	1	0.13	89.32
191	18295	SUN CHEMICAL CORP	1	0.13	89.45
192	18301	SUN OIL CO	1	0.13	89.59
193	18362	SYNTEX AGRIBUSINESS INC	1	0.13	89.72
194	18459	TENNESEE RIVER TERMINAL	1	0.13	89.85
195	18507	TEXAS OLEFIN CO	1	0.13	89.99
196	18510	TEXAS SULPHUR PRODUCTS CO	1	0.13	90.12
197	18806	U S CHEMICAL CORP	1	0.13	90.25
198	18818	U S GOVT - BUR OF MINES	1	0.13	90.39
199	18884	UNION CAMP CORP	1	0.13	90.52
200	18908	UNIROYAL INC	1	0.13	90.65
201	18947	UNITED REFINING CO	1	0.13	90.79
202	18982	UNIVERSAL OIL PRODUCTS CO	1	0.13	90.92
203	19021	USS AGRI-CHEMICALS CO	1	0.13	91.05
204	19143	VIRGINIA CHEMICALS INC	1	0.13	91.19
205	19163	VULCAN CHEMICAL DIV VULCAN MF	1	0.13	91.32

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
206	19233	WARREN PETROLEUM CORP	1	0.13	91.46
207	19234	WARREN S D CO	1	0.13	91.59
208	19403	WHEELING-PITTSBURGH STEEL CO	1	0.13	91.72
209	19410	WHITAKER OIL CO	1	0.13	91.86
210	19575	WRIGHT CHEMICAL CO	1	0.13	91.99
211	19714	BURLINGTON NORTHERN RR CO	1	0.13	92.12
212	19825	SOHIO CHEMICAL CO	1	0.13	92.26
213	19850	ROHM AND HAAS TEXAS INC	1	0.13	92.39
214	20045	CORN SWEETNERS	1	0.13	92.52
215	20110	BADISCHE CORP	1	0.13	92.66
216	20278	ADM CORN SWEETNERS	1	0.13	92.79
217	20698	MORTON THIOKOL INC	1	0.13	92.92
218	20984	TEXAS PETROCHEMICALS CORP	1	0.13	93.06
219	20989	FERRELPETROL	1	0.13	93.19
220	21071	L T V STEEL CORP	1	0.13	93.32
221	21090	C F FORWARDING	1	0.13	93.46
222	21227	SHRIEVE CHEM CO	1	0.13	93.59
223	21249	PETRO CANADA	1	0.13	93.73
224	21274	THERMICE CORP	1	0.13	93.86
225	22061	NEW ENERGY CO OF INDIANA	1	0.13	93.99
226	22125	ARKANSAS EASTMAN CO	1	0.13	94.13
227	22240	ALBRIGHT & WILSON INC	1	0.13	94.26
228	22471	VULCAN WAREHOUSE	1	0.13	94.39
229	22619	REHEIS CHEM CO	1	0.13	94.53
230	22669	OCELOT CHEM	1	0.13	94.66
231	22670	U S INDUSTRIAL CHEMICAL	1	0.13	94.79
232	22678	DUPONT CHEM	1	0.13	94.93
233	22680	UNLOADING UNLIMITED	1	0.13	95.06
234	22839	AGRIFORM FARM SUPPLY	1	0.13	95.19
235	22864	SCM SPECIALTY CHEM	1	0.13	95.33
236	22904	HIGH PLAINS CORP	1	0.13	95.46
237	22907	ALLIED FIBERS & PLASTICS CO	1	0.13	95.59
238	22960	ROGERS GALVINIZING	1	0.13	95.73
239	22986	MIDLAND RESOURCES	1	0.13	95.86
240	23013	BAKE LITE THERMOSFTS LTD	1	0.13	96.00
241	23079	CHEMBOND CORP	1	0.13	96.13
242	23093	DOW CHEM CANADA	1	0.13	96.26
243	23115	ANHEASUER BUSH	1	0.13	96.40
244	23120	SOUTHERN STATES PHOS & FERTZ	1	0.13	96.53
245	23182	INTEROAMERIC	1	0.13	96.66
246	23250	BAYTANK	1	0.13	96.80

NUMBER OF LEAKS BY SHIPPER 1986

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
247	23265	J L M IND INC	1	0.13	96.93
248	23312	LA ROCHE IND	1	0.13	97.06
249	23324	CEPEX INC	1	0.13	97.20
250	23371	DISTILLCO LTD	1	0.13	97.33
251	23420	WESTERN GAS PROCESSORS	1	0.13	97.46
252	23471	SPTCO	1	0.13	97.60
253	23568	BOTKIN GRAIN CO	1	0.13	97.73
254	23571	CONTINENTAL POLYMERS	1	0.13	97.86
255	23572	SALINAS ABELARDO A INC	1	0.13	98.00
256	23698	CARMAR ASSOCIATES INC	1	0.13	98.13
257	23737	CHESAPEAKE CORP OF VA	1	0.13	98.26
258	23738	AMERICAN CHROME & CHEM	1	0.13	98.40
259	23743	AMERICAN CHROME	1	0.13	98.53
260	23746	ENRON CHEM CO	1	0.13	98.67
261	23768	EDDY E B FOREST PROD LTD	1	0.13	98.80
262	23770	MOBILE MACHINE MINERALS	1	0.13	98.93
263	23791	GRANITE CITY STEEL	1	0.13	99.07
264	23792	LYONDELL PETROCHEMICAL	1	0.13	99.20
265	23796	SOUTHSIDE RIVER RAIL	1	0.13	99.33
266	23919	JACQUIN FLORIDA DISTILLING CO	1	0.13	99.47
267	23939	TONAWANDA COKE CORP	1	0.13	99.60
268	23960	AMOCO CANADA PETROLEUM CO L	1	0.13	99.73
269	24263	FREEPORT MCMORAN GOLD CO	1	0.13	99.87
270	25945	HOECHST-CELANESE CHEM GROUP	1	0.13	100.00
		TOTAL	749		

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	16259	OCCIDENTAL CHEMICAL CO	23	2.93	2.93
2	12836	DU PONT E I DE NEMOURS & CO	20	2.55	5.48
3	13298	FARMLAND INDUSTRIES INC	18	2.29	7.77
4	18887	UNION CARBIDE CORP	16	2.04	9.81
5	10334	AMERICAN CYANAMID CO	15	1.91	11.72
6	11186	BORDEN INC/CHEMICAL CO	15	1.91	13.63
7	15760	MONSANTO CO	15	1.91	15.54
8	18167	STAUFFER CHEMICAL CO	15	1.91	17.45
9	10579	ASARCO INC	14	1.78	19.24
10	13223	EXXON CHEMICAL CO	12	1.53	20.76
11	19168	VULCAN MATERIALS CO	12	1.53	22.29
12	20303	TENNESSEE CHEM CO	12	1.53	23.82
13	24365	T H AGRICULTURE & NUTRITION CO	12	1.53	25.35
14	12800	DOW CHEMICAL CO	11	1.40	26.75
15	13495	FMC CORP	11	1.40	28.15
16	10414	AMOCO CHEMICAL CORP	10	1.27	29.43
17	11696	CELANESE CHEMICAL CO	10	1.27	30.70
18	16307	OLIN CORP	10	1.27	31.97
19	18500	TEXAS GULF INC	10	1.27	33.25
20	20766	ARCO CHEM CO	10	1.27	34.52
21	11431	C F INDUSTRIES INC	9	1.15	35.67
22	14479	IMC CHEMICAL GROUP INC	9	1.15	36.82
23	15165	LIQUID CARBONICS CORP	9	1.15	37.96
24	20249	LCP CHEMICALS	9	1.15	39.11
25	11934	CHEVRON CHEMICAL CO	8	1.02	40.13
26	13224	EXXON CO	8	1.02	41.15
27	16831	PPG INDUSTRIES INC	8	1.02	42.17
28	17746	SIMPLOT J R CO	8	1.02	43.18
29	20536	PVS CHEM	8	1.02	44.20
30	20895	VISTA CHEM CO	8	1.02	45.22
31	16668	PHELPS DODGE CORP	7	0.89	46.11
32	17075	REAGENT CHEMICAL INC	7	0.89	47.01
33	22178	COASTAL REFINING & MARKETING	7	0.89	47.90
34	16222	NOT REPORTED BY CARRIER	6	0.76	48.66
35	17657	SHELL CHEMICAL CO	6	0.76	49.43
36	20452	INTEROX AMERICA	6	0.76	50.19
37	23792	LYONDELL PETROCHEMICAL	6	0.76	50.96
38	12704	DEVON CHEMICALS INC	5	0.64	51.59
39	14961	AIRCO INDUSTRIAL GASES	5	0.64	52.23
40	18458	TENNECO OIL CO	5	0.64	52.87
41	21325	ETHYL PETROLEUM ADDITIVES INC	5	0.64	53.50
42	22302	GEORGIA GULF	5	0.64	54.14

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
43	22922	BASF CHEMICAL	5	0.64	54.78
44	12991	ELDORADO CHEMICAL CO	4	0.51	55.29
45	16280	OHIO OIL GATHERING CORP	4	0.51	55.80
46	16680	PHILLIPS PETROLEUM CO	4	0.51	56.31
47	17284	ROHM & HAAS CO	4	0.51	56.82
48	17658	SHELL OIL CO	4	0.51	57.32
49	19788	TEXAS EASTMAN	4	0.51	57.83
50	20101	CHEVRON USA	4	0.51	58.34
51	20718	UNOCAL CHEM DIV	4	0.51	58.85
52	20905	ARCADIAN CORP	4	0.51	59.36
53	22194	TENNESSEE EASTMAN	4	0.51	59.87
54	23083	GLOBAL PETROLEUM	4	0.51	60.38
55	24118	ARISTECH CHEM CORP	4	0.51	60.89
56	10585	ASHLAND CHEMICAL CO	3	0.38	61.27
57	11699	CELANESE CORP	3	0.38	61.66
58	11880	CHEMICAL MARKETING SERVICE	3	0.38	62.04
59	13765	GENERAL CHEMICAL CO	3	0.38	62.42
60	14886	KERR-MCGEE CHEMICAL CORP	3	0.38	62.80
61	14975	KOPPERS CO INC	3	0.38	63.18
62	15359	MAPCO INC	3	0.38	63.57
63	15718	mitsui & co inc	3	0.38	63.95
64	15980	NATIONAL STARCH & CHEMICAL	3	0.38	64.33
65	16899	PROCTOR & GAMBLE CO	3	0.38	64.71
66	19840	EXXON U S A	3	0.38	65.10
67	19955	TEXACO CHEMICAL	3	0.38	65.48
68	20445	CLIMAX CHEMICAL CO.	3	0.38	65.86
69	20872	TEXASGULF CHEM INC (DIV TGULF)	3	0.38	66.24
70	20873	BELCHER OF NEW ENGLAND	3	0.38	66.62
71	21951	TEXACO REFINING & MARKETING	3	0.38	67.01
72	22713	STANDARD CHLORINE OF DELAWA	3	0.38	67.39
73	23312	LA ROCHE IND	3	0.38	67.77
74	23324	CEPEX INC	3	0.38	68.15
75	10151	AGRICO CHEMICAL CO	2	0.25	68.41
76	10174	AIR PRODUCTS & CHEMICALS INC	2	0.25	68.66
77	10586	ASHLAND OIL CO	2	0.25	68.92
78	10862	BASF WYANDOTTE CORP	2	0.25	69.17
79	11021	BETHLEHEM STEEL CORPORATION	2	0.25	69.43
80	11160	BOISE CASCADE CORP	2	0.25	69.68
81	11610	CARDOX DIV CHEMTRON	2	0.25	69.94
82	11780	CHAMPION INTERNATIONAL CORP	2	0.25	70.19
83	12935	EASTMAN CHEMICAL PRODUCTS	2	0.25	70.45
84	13174	ETHYL CORPORATION	2	0.25	70.70

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
85	13551	C I L CO	2	0.25	70.96
86	13603	FREEPORT CHEMICAL CO	2	0.25	71.21
87	13821	GEORGIA PACIFIC CORP	2	0.25	71.47
88	13940	GRAIN PROCESSING CORP	2	0.25	71.72
89	14227	HERCULES INC	2	0.25	71.97
90	14766	JONES-HAMILTON CO	2	0.25	72.23
91	16595	PENNWALT CORP	2	0.25	72.48
92	17655	SHELL CANADA LTD	2	0.25	72.74
93	17872	SOUTH HAMPTON REFINERY	2	0.25	72.99
94	18301	SUN OIL CO	2	0.25	73.25
95	18507	TEXAS OLEFIN CO	2	0.25	73.50
96	19143	VIRGINIA CHEMICALS INC	2	0.25	73.76
97	20147	MID CONTINENT COMMODITY EXCH	2	0.25	74.01
98	20466	CONOCO INC	2	0.25	74.27
99	20472	SOUTH COAST TERMINAL	2	0.25	74.52
100	20698	MORTON THIOKOL INC	2	0.25	74.78
101	21144	B P CHEMICALS	2	0.25	75.03
102	21331	PAK TANK CORP	2	0.25	75.29
103	22061	NEW ENERGY CO OF INDIANA	2	0.25	75.54
104	22259	LCI LIMITED	2	0.25	75.80
105	22670	U S INDUSTRIAL CHEMICAL	2	0.25	76.05
106	22678	DUPONT CHEM	2	0.25	76.31
107	22904	HIGH PLAINS CORP	2	0.25	76.56
108	23024	ADM CORP ACCT FRT CONTROL	2	0.25	76.82
109	24496	PTW (PRODUCT TERMINALINING WI)	2	0.25	77.07
110	24652	AMERICAN SYNTHETIC RUBBER	2	0.25	77.32
111	25087	PHILLIPS 66 COMPANY	2	0.25	77.58
112	10070	ACETO CHEMICAL COMPANY INC	1	0.13	77.71
113	10074	ACKER & ACKER INC	1	0.13	77.83
114	10148	AGENT	1	0.13	77.96
115	10251	ALLIED CHEMICAL CORP	1	0.13	78.09
116	10316	AMERADA HESS CORP	1	0.13	78.22
117	10339	AMERICAN FARM LINES	1	0.13	78.34
118	10385	AMERICAN SMELTING & REF CO	1	0.13	78.47
119	10497	ARCHER-DANIELS-MIDLAND CO	1	0.13	78.60
120	10516	ARIZONA CHEMICAL CO	1	0.13	78.73
121	10652	ATLANTIC REFINING CO	1	0.13	78.85
122	10668	ATLAS POWDER	1	0.13	78.98
123	11054	BIG THREE INDUSTRIES INC	1	0.13	79.11
124	11143	BN TRANSPORT INC	1	0.13	79.24
125	11328	BUCKMAN LABORATORIES INC	1	0.13	79.36
126	11436	C I L CHEMICALS INC	1	0.13	79.49

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
127	11510	CALZONA TANKWAYS INC	1	0.13	79.62
128	11612	CARGILL INC	1	0.13	79.75
129	11649	CARPENTER TECHNOLOGY CORP	1	0.13	79.87
130	11832	CHEM PRO INC	1	0.13	80.00
131	11916	CHEMTECH INDUSTRIES INC	1	0.13	80.13
132	11937	CHEVRON STANDARD CO	1	0.13	80.25
133	12156	COMINCO AMERICAN INC	1	0.13	80.38
134	12221	CONSERVE INC	1	0.13	80.51
135	12618	DEGUSSA CORP	1	0.13	80.64
136	12642	DELTA CHEMICALS INC	1	0.13	80.76
137	12772	DOME PETROLEUM	1	0.13	80.89
138	12801	DOW CORNING CORP	1	0.13	81.02
139	12814	KENNECOTT	1	0.13	81.15
140	12937	EASTMAN KODAK CO	1	0.13	81.27
141	12985	EL PASO NATURAL GAS CO	1	0.13	81.40
142	12986	EL PASO PRODUCTS CO	1	0.13	81.53
143	13054	EMERY INDUSTRIES INC	1	0.13	81.66
144	13164	ESSO CHEMICAL	1	0.13	81.78
145	13694	GAF CORP	1	0.13	81.91
146	13766	GENERAL CHEMICAL CORP	1	0.13	82.04
147	13907	GOODRICH B F CO	1	0.13	82.17
148	13929	GRACE W R & CO	1	0.13	82.29
149	14049	GULF STATE INC	1	0.13	82.42
150	14177	HAWKEYE CHEMICAL CO	1	0.13	82.55
151	14320	HOME OIL CO	1	0.13	82.68
152	14366	HOWELL HYDROCARBONS INC	1	0.13	82.80
153	14602	INTERCONTINENTAL TERM CO	1	0.13	82.93
154	14626	INTERNATIONAL PAPER CO	1	0.13	83.06
155	14759	JONES CHEMICAL CO INC	1	0.13	83.18
156	14773	JUPITER CHEMICAL INC	1	0.13	83.31
157	14775	K & A STEEL	1	0.13	83.44
158	14879	KERLEY CHEMICAL CORP	1	0.13	83.57
159	14956	KOCH CHEMICAL CO	1	0.13	83.69
160	14988	KREVIT H & CO INC	1	0.13	83.82
161	15019	LA GLORIA OIL & GAS CO	1	0.13	83.95
162	15166	LIQUID CONTAINER CORP	1	0.13	84.08
163	15280	MCMILLAN BLOEDEL CONTAINERS	1	0.13	84.20
164	15326	MALLINCKRODT CHEMICAL WORKS	1	0.13	84.33
165	15546	MERICHEM CO	1	0.13	84.46
166	15690	MINERAL RESEARCH & DEV CORP	1	0.13	84.59
167	15722	MOBAY CHEMICAL CO	1	0.13	84.71
168	15726	MOBIL OIL CORP	1	0.13	84.84

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
169	15762	MONTANA SULPHUR & CHEM CO	1	0.13	84.97
170	15871	MURPHY OIL CO	1	0.13	85.10
171	15902	N-REN CORPORATION	1	0.13	85.22
172	15905	NALCO CHEMICAL CO	1	0.13	85.35
173	15945	NATIONAL COOP REFINING ASSO	1	0.13	85.48
174	16131	NORCO CORP	1	0.13	85.61
175	16201	NORTHWEST PETROCHEMICAL CO	1	0.13	85.73
176	16301	OLD COLONY TRANSPORTATION C	1	0.13	85.86
177	16642	PETRO CHEM CORP	1	0.13	85.99
178	16643	PETRO PRODUCTS INC	1	0.13	86.11
179	16660	PETROSAR LTD	1	0.13	86.24
180	16872	PRESSURE VESSEL SERVICE INC	1	0.13	86.37
181	16876	PRIDE REFINING CO INC	1	0.13	86.50
182	17074	REAGENT CHEMICAL & RESEARCH	1	0.13	86.62
183	17116	REILLY TAR & CHEMICAL CORP	1	0.13	86.75
184	17331	ROYSTER CO	1	0.13	86.88
185	17508	SCOTT PAPER CO	1	0.13	87.01
186	17678	SHIPPER INFORMATION UNOBTAINB	1	0.13	87.13
187	17895	SOUTHERN CALIFORNIA CHEM CO	1	0.13	87.26
188	18071	STALEY A E MANUFACTURING CO	1	0.13	87.39
189	18188	STEPAN CHEMICAL	1	0.13	87.52
190	18199	STERLING CHEMICAL CO	1	0.13	87.64
191	18239	STONE CONTAINER CORP	1	0.13	87.77
192	18295	SUN CHEMICAL CORP	1	0.13	87.90
193	18302	SUN OLIN CHEMICAL CO	1	0.13	88.03
194	18457	TENNECO CHEMICALS INC	1	0.13	88.15
195	18473	TERRA CHEMICAL CO	1	0.13	88.28
196	18528	THATCHER CHEMICAL CO	1	0.13	88.41
197	18626	TOSCO CORPORATION	1	0.13	88.54
198	18903	UNION TANK CAR CO	1	0.13	88.66
199	18947	UNITED REFINING CO	1	0.13	88.79
200	18963	UNITED STEEL CONTAINER CORP	1	0.13	88.92
201	19076	VAN WATERS & ROGERS	1	0.13	89.04
202	19163	VULCAN CHEMICAL DIV VULCAN MF	1	0.13	89.17
203	19208	WANDA PETROLEUM CO	1	0.13	89.30
204	19300	WELLAND CHEMICAL LTD	1	0.13	89.43
205	19396	WESTVACO CORP	1	0.13	89.55
206	19397	WEYERHAUSER CO	1	0.13	89.68
207	19715	CONOCO REFINERY	1	0.13	89.81
208	19872	CLARK OIL CO	1	0.13	89.94
209	19966	AKZO CHEMICAL AMERICO	1	0.13	90.06
210	20045	CORN SWEETNERS	1	0.13	90.19

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
211	20051	KERLEY INDUSTRIES INC	1	0.13	90.32
212	20185	TIDE PRODUCT	1	0.13	90.45
213	20186	BORG-WARNER CHEM	1	0.13	90.57
214	20203	SEAPAC	1	0.13	90.70
215	20215	CANADIAN LIQUID	1	0.13	90.83
216	20278	ADM CORN SWEETNERS	1	0.13	90.96
217	20343	REGENT CHEM & RESEARCH INC	1	0.13	91.08
218	20432	EL PASO HYDRO CARBONS CO	1	0.13	91.21
219	20815	FORMOSA PLACTICS CORP USA	1	0.13	91.34
220	20871	BATH & HAMMONDSPO RT RR CO	1	0.13	91.47
221	21071	L T V STEEL CORP	1	0.13	91.59
222	21274	THERMICE CORP	1	0.13	91.72
223	21552	DAVISON TRANSPORT INC	1	0.13	91.85
224	21628	HIRAM WALKER & SONS INC	1	0.13	91.97
225	21925	USI CHEM CORP	1	0.13	92.10
226	21985	Y S LINE	1	0.13	92.23
227	22137	HALTERMAN	1	0.13	92.36
228	22138	GATX TERMINALS CLINTON	1	0.13	92.48
229	22253	PMC SPECIALTIES GROUP INC	1	0.13	92.61
230	22296	SP AGENT	1	0.13	92.74
231	22619	REHEIS CHEM CO	1	0.13	92.87
232	22669	OCELOT CHEM	1	0.13	92.99
233	22733	ARCO ALASKA INC	1	0.13	93.12
234	22758	CIL CORP OF AMERICA	1	0.13	93.25
235	23115	ANHEASUER BUSH	1	0.13	93.38
236	23294	CHEMICAL PROCESSORS INC	1	0.13	93.50
237	23302	CYANAMID INTER AMERICAN CORP	1	0.13	93.63
238	23518	HUNTSMAN CHEM CO	1	0.13	93.76
239	23613	BASE CORP/INMONT DIV	1	0.13	93.89
240	23630	TRANSAMERICA TRANSPORT INC	1	0.13	94.01
241	23768	EDDY E B FOREST PROD LTD	1	0.13	94.14
242	24048	ADM CORP	1	0.13	94.27
243	24064	CONTINENTAL NITROGEN & RESOU	1	0.13	94.39
244	24069	CONTICHIM NORTH AMERICAN	1	0.13	94.52
245	24090	AGRI-BASICS	1	0.13	94.65
246	24106	RESINALL CORP	1	0.13	94.78
247	24120	UNITANK TERMINAL SERV	1	0.13	94.90
248	24230	DIAMOND CHEM	1	0.13	95.03
249	24238	OLD WORLD TRADING CO	1	0.13	95.16
250	24246	ARMCO INC	1	0.13	95.29
251	24269	BERNUTH AGENCIES INC	1	0.13	95.41
252	24270	SETHNESS PRODUCTS CO	1	0.13	95.54

NUMBER OF LEAKS BY SHIPPER 1987

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
253	24295	INTERMODAL SYSTEMS INC	1	0.13	95.67
254	24379	AMERICAN NORIT CO	1	0.13	95.80
255	24393	HOTSCHT FIBERS	1	0.13	95.92
256	24408	C H CHEMICALS INC	1	0.13	96.05
257	24412	NEBRASKA FARMLAND INDUS	1	0.13	96.18
258	24462	CAVENHAM FOREST	1	0.13	96.31
259	24548	PARK GRAIN	1	0.13	96.43
260	24570	FRONTIER OIL & REFINING CO	1	0.13	96.56
261	24571	TRI DELTA FERTILIZER	1	0.13	96.69
262	24593	T & T CHEM OF MICHIGAN	1	0.13	96.82
263	24628	LAPLACE CHEMICAL	1	0.13	96.94
264	24629	CHARDONOL	1	0.13	97.07
265	24675	SOUTHERN WOOD PIEDMONT CO	1	0.13	97.20
266	24676	LINDEN CHEMICAL AND PLASTICS	1	0.13	97.32
267	24751	A S ARCO INC	1	0.13	97.45
268	24789	UNION SHIPPER	1	0.13	97.58
269	24801	FARMLAND NITROGEN PLANT	1	0.13	97.71
270	24818	TEXOMAFARSUP	1	0.13	97.83
271	24898	BULK INTERMODAL T	1	0.13	97.96
272	24911	COMINCO LTD	1	0.13	98.09
273	24924	I C T	1	0.13	98.22
274	24935	FLEXI FLOW TERMINAL	1	0.13	98.34
275	24944	TEX MART	1	0.13	98.47
276	24950	NORTHEFERTIL	1	0.13	98.60
277	24951	STAFFO COU FLO	1	0.13	98.73
278	24959	WOODGATE PETROLEUM	1	0.13	98.85
279	24994	ZACLON	1	0.13	98.98
280	25019	NEKOOSA PAPERS INC	1	0.13	99.11
281	25042	AUTO RESEARCH CO	1	0.13	99.24
282	25053	NORTH WPETROC	1	0.13	99.36
283	25077	WASHINGTON GAS CO	1	0.13	99.49
284	25105	FEDERAL PAPER BOARD CO INC	1	0.13	99.62
285	25178	SPECTRON INC	1	0.13	99.75
286	25214	SOUTHWESTERN OIL & CHEMICAL	1	0.13	99.87
287	25577	NUTRIUS INC	1	0.13	100.00
		TOTAL	785		

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	16668	PHELPS DODGE CORP	23	2.54	2.54
2	16259	OCCIDENTAL CHEMICAL CO	21	2.32	4.85
3	12836	DU PONT E I DE NEMOURS & CO	20	2.21	7.06
4	16307	OLIN CORP	19	2.09	9.15
5	13298	FARMLAND INDUSTRIES INC	15	1.65	10.80
6	12800	DOW CHEMICAL CO	14	1.54	12.35
7	18167	STAUFFER CHEMICAL CO	14	1.54	13.89
8	10151	AGRICO CHEMICAL CO	13	1.43	15.33
9	15165	LIQUID CARBONICS CORP	13	1.43	16.76
10	10579	ASARCO INC	12	1.32	18.08
11	15760	MONSANTO CO	12	1.32	19.40
12	19168	VULCAN MATERIALS CO	12	1.32	20.73
13	20303	TENNESSEE CHEM CO	12	1.32	22.05
14	13495	FMC CORP	10	1.10	23.15
15	16595	PENNWALT CORP	10	1.10	24.26
16	18887	UNION CARBIDE CORP	10	1.10	25.36
17	20718	UNOCAL CHEM DIV	10	1.10	26.46
18	10334	AMERICAN CYANAMID CO	9	0.99	27.45
19	11610	CARDOX DIV CHEMTRON	9	0.99	28.45
20	20895	VISTA CHEM CO	9	0.99	29.44
21	22922	BASF CHEMICAL	9	0.99	30.43
22	10414	AMOCO CHEMICAL CORP	8	0.88	31.31
23	10653	ATLANTIC RICHFIELD CO (ARCO)	8	0.88	32.19
24	13223	EXXON CHEMICAL CO	8	0.88	33.08
25	17657	SHELL CHEMICAL CO	8	0.88	33.96
26	18500	TEXAS GULF INC	8	0.88	34.84
27	20249	LCP CHEMICALS	8	0.88	35.72
28	10251	ALLIED CHEMICAL CORP	7	0.77	36.49
29	19685	ALLIED CORPORATION	7	0.77	37.27
30	20536	PVS CHEM	7	0.77	38.04
31	20984	TEXAS PETROCHEMICALS CORP	7	0.77	38.81
32	23792	LYONDELL PETROCHEMICAL	7	0.77	39.58
33	25945	HOECHST-CELANESE CHEM GROUP	7	0.77	40.35
34	11436	C I L CHEMICALS INC	6	0.66	41.01
35	11934	CHEVRON CHEMICAL CO	6	0.66	41.68
36	12991	ELDORADO CHEMICAL CO	6	0.66	42.34
37	16831	PPG INDUSTRIES INC	6	0.66	43.00
38	17075	REAGENT CHEMICAL INC	6	0.66	43.66
39	18280	SUBURBAN PROPANE GAS CORP	6	0.66	44.32
40	20815	FORMOSA PLACTICS CORP USA	6	0.66	44.98
41	25087	PHILLIPS 66 COMPANY	6	0.66	45.65

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	10585	ASHLAND CHEMICAL CO	5	0.55	46.20
43	11608	CARDON OIL CO	5	0.55	46.75
44	14975	KOPPERS CO INC	5	0.55	47.30
45	16135	NORFOLK & WESTERN RAILWAY CO	5	0.55	47.85
46	17284	ROHM & HAAS CO	5	0.55	48.40
47	18301	SUN OIL CO	5	0.55	48.95
48	19793	SUN REFINING AND MARKETING	5	0.55	49.50
49	19955	TEXACO CHEMICAL	5	0.55	50.06
50	20466	CONOCO INC	5	0.55	50.61
51	20766	ARCO CHEM CO	5	0.55	51.16
52	11186	BORDEN INC/CHEMICAL CO	4	0.44	51.60
53	11696	CELANESE CHEMICAL CO	4	0.44	52.04
54	12618	DEGUSSA CORP	4	0.44	52.48
55	14867	KENNECOTT COPPER CORP	4	0.44	52.92
56	15216	LOPEZ ALFOSO C	4	0.44	53.36
57	17746	SIMPLIT J R CO	4	0.44	53.80
58	18458	TENNECO OIL CO	4	0.44	54.24
59	18884	UNION CAMP CORP	4	0.44	54.69
60	19966	AKZO CHEMICAL AMERICO	4	0.44	55.13
61	20452	INTEROX AMERICA	4	0.44	55.57
62	20873	BELCHER OF NEW ENGLAND	4	0.44	56.01
63	21144	B P CHEMICALS	4	0.44	56.45
64	22302	GEORGIA GULF	4	0.44	56.89
65	22758	CIL CORP OF AMERICA	4	0.44	57.33
66	25105	FEDERAL PAPER BOARD CO INC	4	0.44	57.77
67	10174	AIR PRODUCTS & CHEMICALS INC	3	0.33	58.10
68	10370	AMERICAN OIL CO (AMOCO)	3	0.33	58.43
69	11431	C F INDUSTRIES INC	3	0.33	58.77
70	12156	COMINCO AMERICAN INC	3	0.33	59.10
71	13551	C I L CO	3	0.33	59.43
72	13765	GENERAL CHEMICAL CO	3	0.33	59.76
73	13766	GENERAL CHEMICAL CORP	3	0.33	60.09
74	13929	GRACE W R & CO	3	0.33	60.42
75	13940	GRAIN PROCESSING CORP	3	0.33	60.75
76	14479	IMC CHEMICAL GROUP INC	3	0.33	61.08
77	14785	K A STEEL CHEMICAL CO	3	0.33	61.41
78	15546	MERICHEM CO	3	0.33	61.74
79	15980	NATIONAL STARCH & CHEMICAL	3	0.33	62.07
80	16280	OHIO OIL GATHERING CORP	3	0.33	62.40
81	16680	PHILLIPS PETROLEUM CO	3	0.33	62.73
82	17074	REAGENT CHEMICAL & RESEARCH	3	0.33	63.07

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
83	17658	SHELL OIL CO	3	0.33	63.40
84	17678	SHIPPER INFORMATION UNOBTAINED	3	0.33	63.73
85	18071	STALEY A E MANUFACTURING CO	3	0.33	64.06
86	19396	WESTVACO CORP	3	0.33	64.39
87	19403	WHEELING-PITTSBURGH STEEL CO	3	0.33	64.72
88	19837	HILL PETROLEUM	3	0.33	65.05
89	20147	MID CONTINENT COMMODITY EXCH	3	0.33	65.38
90	21283	KIMBERLY CLARK CO	3	0.33	65.71
91	22670	U S INDUSTRIAL CHEMICAL	3	0.33	66.04
92	24118	ARISTECH CHEM CORP	3	0.33	66.37
93	24522	LAROCHE INDUSTRIES INC	3	0.33	66.70
94	26136	ALLIED SIGNAL/BENDIX	3	0.33	67.03
95	26179	MAPCO ALASKA PETROLEUM INC	3	0.33	67.36
96	26252	CIL CORP OF CANADA	3	0.33	67.70
97	10211	ALBERTA GAS CHEMICALS LTD	2	0.22	67.92
98	10497	ARCHER-DANIELS-MIDLAND CO	2	0.22	68.14
99	11596	CARBONIC INDUSTRIES CORP	2	0.22	68.36
100	12486	CYANAMID OF CANADA	2	0.22	68.58
101	12814	KENNECOTT	2	0.22	68.80
102	12935	EASTMAN CHEMICAL PRODUCTS	2	0.22	69.02
103	12954	CARBONAIR INC	2	0.22	69.24
104	12986	EL PASO PRODUCTS CO	2	0.22	69.46
105	13174	ETHYL CORPORATION	2	0.22	69.68
106	13474	FLORIDA DISTILLERS CO	2	0.22	69.90
107	14626	INTERNATIONAL PAPER CO	2	0.22	70.12
108	14962	KOCH REFINING CO	2	0.22	70.34
109	15300	MAGMA COPPER CO	2	0.22	70.56
110	15722	MOBAY CHEMICAL CO	2	0.22	70.78
111	15726	MOBIL OIL CORP	2	0.22	71.00
112	15762	MONTANA SULPHUR & CHEM CO	2	0.22	71.22
113	15905	NALCO CHEMICAL CO	2	0.22	71.44
114	16647	PETROLANE GAS SERVICE INC	2	0.22	71.66
115	16899	PROCTOR & GAMBLE CO	2	0.22	71.89
116	18177	STEEL K A CHEMICAL	2	0.22	72.11
117	18239	STONE CONTAINER CORP	2	0.22	72.33
118	18295	SUN CHEMICAL CORP	2	0.22	72.55
119	18490	TEXACO INC	2	0.22	72.77
120	18507	TEXAS OLEFIN CO	2	0.22	72.99
121	18510	TEXAS SULPHUR PRODUCTS CO	2	0.22	73.21
122	18947	UNITED REFINING CO	2	0.22	73.43
123	19015	US INDUSTRIAL CHEMICALS CO	2	0.22	73.65

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
124	19021	USS AGRI-CHEMICALS CO	2	0.22	73.87
125	19208	WANDA PETROLEUM CO	2	0.22	74.09
126	19233	WARREN PETROLEUM CORP	2	0.22	74.31
127	19397	WEYERHAUSER CO	2	0.22	74.53
128	19694	AIR PRODUCTS SPECIALITY	2	0.22	74.75
129	19788	TEXAS EASTMAN	2	0.22	74.97
130	19824	KOCH SULPHUR PRODUCTS	2	0.22	75.19
131	20045	CORN SWEETNERS	2	0.22	75.41
132	20101	CHEVRON USA	2	0.22	75.63
133	20515	MOBILE OIL	2	0.22	75.85
134	21766	PHILADELPHIA GAS WORKS	2	0.22	76.08
135	21951	TEXACO REFINING & MARKETING	2	0.22	76.30
136	22194	TENNESSEE EASTMAN	2	0.22	76.52
137	22259	LCI LIMITED	2	0.22	76.74
138	22713	STANDARD CHLORINE OF DELAWA	2	0.22	76.96
139	23006	DIXIE NORTHERN INC	2	0.22	77.18
140	23324	CEPEX INC	2	0.22	77.40
141	23768	EDDY E B FOREST PROD LTD	2	0.22	77.62
142	26139	SCM ORGANICS	2	0.22	77.84
143	26165	ARCO PLASTICS	2	0.22	78.06
144	26213	TEXAS AROMATICS INC	2	0.22	78.28
145	26249	MOBILMINMINE	2	0.22	78.50
146	26493	CANADIAN ELECTRIC ZINC LTD	2	0.22	78.72
147	26502	CANADIAN ELECTROLYTIC ZINC	2	0.22	78.94
148	26521	GOODRICH CHEM	2	0.22	79.16
149	26817	FERRELL GAS INC.	2	0.22	79.38
150	27074	ROGUE VALLEY POLYMERS	2	0.22	79.60
151	27150	BULK DISTRIBUTION	2	0.22	79.82
152	10156	AGWAY INC	1	0.11	79.93
153	10157	AGWAY PETROLEUM CORP	1	0.11	80.04
154	10210	ALBERTA GAS & CHEMICAL CO	1	0.11	80.15
155	10310	AMAX ZINC CO INC	1	0.11	80.26
156	10444	ANDREWS PETROLEUM CO	1	0.11	80.37
157	10464	APACHE POWDER COMPANY	1	0.11	80.49
158	10516	ARIZONA CHEMICAL CO	1	0.11	80.60
159	10550	ARMSTRONG CORK COMPANY	1	0.11	80.71
160	10620	ATCHISON TOPEKA & SANTA FE RY	1	0.11	80.82
161	10862	BASF WYANDOTTE CORP	1	0.11	80.93
162	10949	BELCHER OIL CO	1	0.11	81.04
163	11054	BIG THREE INDUSTRIES INC	1	0.11	81.15
164	11188	BORG-WARNER CORP	1	0.11	81.26

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
165	11476	CAL-GAS	1	0.11	81.37
166	11542	CANADIAN INDUSTRIES LTD	1	0.11	81.48
167	11695	CELANESE CANADA LTD	1	0.11	81.59
168	11873	CHEMICAL ENTERPRISES INC	1	0.11	81.70
169	12108	COLGATE-PALMOLIVE CO	1	0.11	81.81
170	12273	CONTINENTAL OIL CO	1	0.11	81.92
171	12420	CROSS OIL & REFINING CO	1	0.11	82.03
172	12642	DELTA CHEMICALS INC	1	0.11	82.14
173	12772	DOME PETROLEUM	1	0.11	82.25
174	12936	EASTMAN GELATINE CORP	1	0.11	82.36
175	13164	ESSO CHEMICAL	1	0.11	82.47
176	13189	EVANS COOPERAGE CO	1	0.11	82.58
177	13224	EXXON CO	1	0.11	82.69
178	13288	FARMERS & RANCHERS COOP ASS	1	0.11	82.80
179	13389	FINA OIL CO	1	0.11	82.91
180	13412	FIRESTONE TIRE & RUBBER CO	1	0.11	83.02
181	13415	FIRST CHEMICAL CORP	1	0.11	83.13
182	13694	GAF CORP	1	0.11	83.24
183	13757	GENERAL AMERICAN TRANSPTN CO	1	0.11	83.35
184	13806	GENERAL TIRE & RUBBER CO	1	0.11	83.46
185	13907	GOODRICH B F CO	1	0.11	83.57
186	13909	GOODYEAR TIRE & RUBBER CO	1	0.11	83.68
187	13945	GRAND TRUNK WESTERN RR CO	1	0.11	83.79
188	14227	HERCULES INC	1	0.11	83.90
189	14447	I C I AMERICA INC	1	0.11	84.01
190	14475	ILLINOIS CENTRAL GULF RAILROAD	1	0.11	84.12
191	14621	INTERNATIONAL MINERALS & CHEM	1	0.11	84.23
192	14664	ITOFCA INC	1	0.11	84.34
193	14766	JONES-HAMILTON CO	1	0.11	84.45
194	14800	KAISER ALUM & CHEMICAL CORP	1	0.11	84.56
195	14886	KERR-MCGEE CHEMICAL CORP	1	0.11	84.67
196	15215	LONZA INC	1	0.11	84.79
197	15242	LUBRIZOL CORP	1	0.11	84.90
198	15363	MARATHON OIL CO	1	0.11	85.01
199	15404	MARUBENI AMERICA CORP	1	0.11	85.12
200	15431	MATLACK INC	1	0.11	85.23
201	15456	MC COOK FARM SERVICE	1	0.11	85.34
202	15535	MERCK & CO INC	1	0.11	85.45
203	15690	MINERAL RESEARCH & DEV CORP	1	0.11	85.56
204	15703	MISSISSIPPI CHEMICAL CORP	1	0.11	85.67
205	15708	MISSOURI PACIFIC RAILROAD CO	1	0.11	85.78

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
206	15871	MURPHY OIL CO	1	0.11	85.89
207	15945	NATIONAL COOP REFINING ASSO	1	0.11	86.00
208	16001	NAVAJO REFINING CO	1	0.11	86.11
209	16222	NOT REPORTED BY CARRIER	1	0.11	86.22
210	16251	O SULLIVAN CORPORATION	1	0.11	86.33
211	16660	PETROSAR LTD	1	0.11	86.44
212	16851	PREFERRED PACKING CORP	1	0.11	86.55
213	16965	QUAKER CHEMICAL CORP	1	0.11	86.66
214	16969	QUAKER OATS CO	1	0.11	86.77
215	17183	RHONE PULENC INC	1	0.11	86.88
216	17508	SCOTT PAPER CO	1	0.11	86.99
217	17652	SHEFFIELD CONTAINER CORP	1	0.11	87.10
218	17655	SHELL CANADA LTD	1	0.11	87.21
219	17670	SHERWIN-WILLIAMS CO	1	0.11	87.32
220	17753	SINCLAIR OIL CO	1	0.11	87.43
221	17872	SOUTH HAMPTON REFINERY	1	0.11	87.54
222	17918	SOUTHERN PACIFIC TRANSP CO	1	0.11	87.65
223	18100	STANDARD OIL CO	1	0.11	87.76
224	18462	TENNESSEE FARMERS CO-OP	1	0.11	87.87
225	18480	TESORO PETROLEUM (REFINING)	1	0.11	87.98
226	18484	TESORO PETROLEUM CORP (ALASKA)	1	0.11	88.09
227	18528	THATCHER CHEMICAL CO	1	0.11	88.20
228	18547	THIOKOL CORP	1	0.11	88.31
229	18733	TRIANGLE REFINERIES INC	1	0.11	88.42
230	18803	U S BORAX & CHEMICAL CORP	1	0.11	88.53
231	19101	VELSICOL CHEMICAL CORP	1	0.11	88.64
232	19140	VININGS CHEMICAL COMPANY	1	0.11	88.75
233	19143	VIRGINIA CHEMICALS INC	1	0.11	88.86
234	19163	VULCAN CHEMICAL DIV VULCAN MF	1	0.11	88.97
235	19204	WALTER JIM RESOURCES INC DEL	1	0.11	89.08
236	19234	WARREN S D CO	1	0.11	89.20
237	19243	WASTE RESEARCH & RECLAMATIO	1	0.11	89.31
238	19570	WORTH CHEMICAL CORP	1	0.11	89.42
239	19741	KALI CHEM	1	0.11	89.53
240	19784	TEXCO CHEM	1	0.11	89.64
241	19792	C H SPRAGUE & SON CO	1	0.11	89.75
242	19840	EXXON U S A	1	0.11	89.86
243	20278	ADM CORN SWEETNERS	1	0.11	89.97
244	20445	CLIMAX CHEMICAL CO.	1	0.11	90.08
245	20645	HORIZON CHEM	1	0.11	90.19
246	20670	K LINE	1	0.11	90.30

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
247	20826	Q O CHEMICALS	1	0.11	90.41
248	20854	PETRO SOURCE	1	0.11	90.52
249	20872	TEXASGULF CHEM INC (DIV TGULF)	1	0.11	90.63
250	20905	ARCADIAN CORP	1	0.11	90.74
251	21213	STOLT CONTAINERS	1	0.11	90.85
252	21331	PAK TANK CORP	1	0.11	90.96
253	21445	ALPHA RESINS (TENNESSEE PLANT)	1	0.11	91.07
254	21446	ALLEMANIA CHEM CO	1	0.11	91.18
255	21448	BIG 3 GAS CO	1	0.11	91.29
256	21552	DAVISON TRANSPORT INC	1	0.11	91.40
257	21925	USI CHEM CORP	1	0.11	91.51
258	21989	WESTERN ZIRCONIUM	1	0.11	91.62
259	22138	GATX TERMINALS CLINTON	1	0.11	91.73
260	22253	PMC SPECIALTIES GROUP INC	1	0.11	91.84
261	22619	REHEIS CHEM CO	1	0.11	91.95
262	22669	OCELOT CHEM	1	0.11	92.06
263	22678	DUPONT CHEM	1	0.11	92.17
264	22735	KENNECOTT MINERALS	1	0.11	92.28
265	22864	SCM SPECIALTY CHEM	1	0.11	92.39
266	22904	HIGH PLAINS CORP	1	0.11	92.50
267	23055	MIDWEST GRAIN PRODUCTS	1	0.11	92.61
268	23057	PHOENIX CHEM LABS INC	1	0.11	92.72
269	23117	BOWATER CAROLINA CORP	1	0.11	92.83
270	23120	SOUTHERN STATES PHOS & FERTZ	1	0.11	92.94
271	23265	J L M IND INC	1	0.11	93.05
272	23294	CHEMICAL PROCESSORS INC	1	0.11	93.16
273	23312	LA ROCHE IND	1	0.11	93.27
274	23737	CHESAPEAKE CORP OF VA	1	0.11	93.38
275	23743	AMERICAN CHROME	1	0.11	93.50
276	23939	TONAWANDA COKE CORP	1	0.11	93.61
277	23965	CEDAR CHEM CO	1	0.11	93.72
278	24032	BY-PRODUCTS MANAGEMENT INC	1	0.11	93.83
279	24246	ARMCO INC	1	0.11	93.94
280	24408	C H CHEMICALS INC	1	0.11	94.05
281	24593	T & T CHEM OF MICHIGAN	1	0.11	94.16
282	24628	LAPLACE CHEMICAL	1	0.11	94.27
283	24675	SOUTHERN WOOD PIEDMONT CO	1	0.11	94.38
284	24860	H.C. INDUSTRIES	1	0.11	94.49
285	24924	I C T	1	0.11	94.60
286	24933	JAMES RIVER CORP	1	0.11	94.71
287	25019	NEKOOSA PAPERS INC	1	0.11	94.82

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
288	25175	ALPAC MARKETING SERVICE	1	0.11	94.93
289	25837	IMC FERTILIZER	1	0.11	95.04
290	25843	GREAT LAKE FOREST PRODUCTS	1	0.11	95.15
291	25993	TEXAS SOLEFINS	1	0.11	95.26
292	26214	SWIDLRY	1	0.11	95.37
293	26215	TEXAS ALKYLs	1	0.11	95.48
294	26216	DELIVERY SWITCH	1	0.11	95.59
295	26220	MANUFACTURE CONSOL SERVICE	1	0.11	95.70
296	26243	SMITH BOWMAN DIST	1	0.11	95.81
297	26305	ALLIED SIGN CORP	1	0.11	95.92
298	26321	EL PASO REFINING	1	0.11	96.03
299	26343	WEBBS SUPER GROW PRODUCTS	1	0.11	96.14
300	26386	CROP PRODUCTS SERVICES	1	0.11	96.25
301	26401	F M X CORP	1	0.11	96.36
302	26429	CANADIAN ELECTRIC ZINC, LTD	1	0.11	96.47
303	26511	CADENCE CHEM RESOURCES	1	0.11	96.58
304	26569	ARGONAL & CO LTD	1	0.11	96.69
305	26574	SUNBELT CHEM	1	0.11	96.80
306	26576	BURKMAN LABORATORIES	1	0.11	96.91
307	26577	HULSON AG SERV	1	0.11	97.02
308	26618	SYNTEX/FREEPORT	1	0.11	97.13
309	26686	NATIONAL CARBONIC	1	0.11	97.24
310	26729	VILLASANO Y CIA SA	1	0.11	97.35
311	26789	PRESERVATION PRODUCTS	1	0.11	97.46
312	26833	NU WEST INDUSTRIES	1	0.11	97.57
313	26839	NITREX	1	0.11	97.69
314	26847	NATIONAL CARBON	1	0.11	97.80
315	26862	DESPACHOS DEL NORTE	1	0.11	97.91
316	26893	CHATTANOOGA CHEM CO	1	0.11	98.02
317	26897	CANADIAN OCCIDENTAL PETROLEU	1	0.11	98.13
318	26972	KAISER ESTECH	1	0.11	98.24
319	26998	GULF RAILCAR INC	1	0.11	98.35
320	27010	CSX-SELAND INTERMODAL INC	1	0.11	98.46
321	27015	GLACIER AMMONIA	1	0.11	98.57
322	27017	CLINCH RIVER CORP	1	0.11	98.68
323	27045	G T W SPOT SHOP	1	0.11	98.79
324	27100	DETSO TERMINAL	1	0.11	98.90
325	27101	L A COMPAGNIE	1	0.11	99.01
326	27123	TENOIL	1	0.11	99.12
327	27149	PBS CHEMICAL	1	0.11	99.23
328	27237	SURE-GROW SOLUTION	1	0.11	99.34

NUMBER OF LEAKS BY SHIPPER 1988

NUM	ID	SHIPNAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
329	27243	LAREDO EXPORT	1	0.11	99.45
330	27260	OXYNGL	1	0.11	99.56
331	27378	QUANTUM CHEM	1	0.11	99.67
332	27380	LDS TRUCK LINES	1	0.11	99.78
333	27525	FARMERS COOP GRAIN ASSN	1	0.11	99.89
334	27532	LAIR PETROLEUM CO	1	0.11	100.00
		TOTAL	907		

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	16668	PHELPS DODGE CORP	39	3.68	3.68
2	16259	OCCIDENTAL CHEMICAL CO	37	3.49	7.18
3	16307	OLIN CORP	21	1.98	9.16
4	19168	VULCAN MATERIALS CO	21	1.98	11.14
5	13298	FARMLAND INDUSTRIES INC	19	1.79	12.94
6	12836	DU PONT E I DE NEMOURS & CO	18	1.70	14.64
7	12800	DOW CHEMICAL CO	17	1.61	16.24
8	18887	UNION CARBIDE CORP	16	1.51	17.75
9	10334	AMERICAN CYANAMID CO	15	1.42	19.17
10	10579	ASARCO INC	15	1.42	20.59
11	16595	PENNWALT CORP	15	1.42	22.00
12	17075	REAGENT CHEMICAL INC	15	1.42	23.42
13	22922	BASF CHEMICAL	13	1.23	24.65
14	11610	CARDOX DIV CHEMTRON	12	1.13	25.78
15	13495	FMC CORP	12	1.13	26.91
16	14961	AIRCO INDUSTRIAL GASES	12	1.13	28.05
17	15165	LIQUID CARBONICS CORP	12	1.13	29.18
18	17074	REAGENT CHEMICAL & RESEARCH	12	1.13	30.31
19	20766	ARCO CHEM CO	12	1.13	31.44
20	25945	HOECHST-CELANESE CHEM GROUP	12	1.13	32.58
21	15722	MOBAY CHEMICAL CO	11	1.04	33.62
22	18500	TEXAS GULF INC	11	1.04	34.66
23	13223	EXXON CHEMICAL CO	10	0.94	35.60
24	20303	TENNESSEE CHEM CO	10	0.94	36.54
25	27484	HOWELL CHEM SYSTEMS	10	0.94	37.49
26	10585	ASHLAND CHEMICAL CO	9	0.85	38.34
27	18071	STALEY A E MANUFACTURING CO	9	0.85	39.19
28	19793	SUN REFINING AND MARKETING	9	0.85	40.04
29	20452	INTEROX AMERICA	9	0.85	40.89
30	20249	LCP CHEMICALS	8	0.76	41.64
31	11934	CHEVRON CHEMICAL CO	7	0.66	42.30
32	15546	MERICHEM CO	7	0.66	42.97
33	17657	SHELL CHEMICAL CO	7	0.66	43.63
34	19163	VULCAN CHEMICAL DIV VULCAN MF	7	0.66	44.29
35	19840	EXXON U S A	7	0.66	44.95
36	20895	VISTA CHEM CO	7	0.66	45.61
37	24118	ARISTECH CHEM CORP	7	0.66	46.27
38	10861	BASF AKTIENGESELLSCHAFT	6	0.57	46.84
39	16831	PPG INDUSTRIES INC	6	0.57	47.40
40	17746	SIMPLOT J R CO	6	0.57	47.97
41	19955	TEXACO CHEMICAL	6	0.57	48.54
42	19966	AKZO CHEMICAL AMERICA	6	0.57	49.10

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
43	22302	GEORGIA GULF	6	0.57	49.67
44	25087	PHILLIPS 66 COMPANY	6	0.57	50.24
45	27816	PIONEER CHLORALKALI CO INC	6	0.57	50.80
46	10370	AMERICAN OIL CO (AMOCO)	5	0.47	51.27
47	10653	ATLANTIC RICHFIELD CO (ARCO)	5	0.47	51.75
48	11186	BORDEN INC/CHEMICAL CO	5	0.47	52.22
49	11695	CELANESE CANADA LTD	5	0.47	52.69
50	12814	KENNECOTT	5	0.47	53.16
51	14447	I C I AMERICA INC	5	0.47	53.64
52	14785	K A STEEL CHEMICAL CO	5	0.47	54.11
53	14975	KOPPERS CO INC	5	0.47	54.58
54	15760	MONSANTO CO	5	0.47	55.05
55	16793	POLYSAR LTD	5	0.47	55.52
56	17678	SHIPPER INFORMATION UNOBTAINED	5	0.47	56.00
57	21144	B P CHEMICALS	5	0.47	56.47
58	21283	KIMBERLY CLARK CO	5	0.47	56.94
59	22713	STANDARD CHLORINE OF DELAWARE	5	0.47	57.41
60	26502	CANADIAN ELECTROLYTIC ZINC	5	0.47	57.88
61	10148	AGENT	4	0.38	58.26
62	10316	AMERADA HESS CORP	4	0.38	58.64
63	12991	ELDORADO CHEMICAL CO	4	0.38	59.02
64	13224	EXXON CO	4	0.38	59.40
65	13766	GENERAL CHEMICAL CORP	4	0.38	59.77
66	15300	MAGMA COPPER CO	4	0.38	60.15
67	16222	NOT REPORTED BY CARRIER	4	0.38	60.53
68	18458	TENNECO OIL CO	4	0.38	60.91
69	18490	TEXACO INC	4	0.38	61.28
70	19396	WESTVACO CORP	4	0.38	61.66
71	20445	CLIMAX CHEMICAL CO.	4	0.38	62.04
72	20536	PVS CHEM	4	0.38	62.42
73	21117	ADVANCED AROMATICS INC	4	0.38	62.80
74	22758	CIL CORP OF AMERICA	4	0.38	63.17
75	26136	ALLIED SIGNAL/BENDIX	4	0.38	63.55
76	26521	GOODRICH CHEM	4	0.38	63.93
77	10151	AGRICOLA CHEMICAL CO	3	0.28	64.21
78	10414	AMOCO CHEMICAL CORP	3	0.28	64.49
79	10497	ARCHER-DANIELS-MIDLAND CO	3	0.28	64.78
80	11054	BIG THREE INDUSTRIES INC	3	0.28	65.06
81	11431	C F INDUSTRIES INC	3	0.28	65.34
82	12618	DEGUSSA CORP	3	0.28	65.63
83	13551	C I L CO	3	0.28	65.91
84	13765	GENERAL CHEMICAL CO	3	0.28	66.19

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
85	13907	GOODRICH B F CO	3	0.28	66.48
86	13940	GRAIN PROCESSING CORP	3	0.28	66.76
87	14775	K & A STEEL	3	0.28	67.04
88	14867	KENNECOTT COPPER CORP	3	0.28	67.33
89	15726	MOBIL OIL CORP	3	0.28	67.61
90	16660	PETROSAR LTD	3	0.28	67.89
91	17284	ROHM & HAAS CO	3	0.28	68.18
92	18167	STAUFFER CHEMICAL CO	3	0.28	68.46
93	18884	UNION CAMP CORP	3	0.28	68.74
94	19103	VENTRON CORP	3	0.28	69.03
95	19685	ALLIED CORPORATION	3	0.28	69.31
96	19690	UNION CHEM DIV	3	0.28	69.59
97	19714	BURLINGTON NORTHERN RR CO	3	0.28	69.88
98	19824	KOCH SULPHUR PRODUCTS	3	0.28	70.16
99	19837	HILL PETROLEUM	3	0.28	70.44
100	20101	CHEVRON USA	3	0.28	70.73
101	20466	CONOCO INC	3	0.28	71.01
102	22138	GATX TERMINALS CLINTON	3	0.28	71.29
103	22178	COASTAL REFINING & MARKETING	3	0.28	71.58
104	22194	TENNESSEE EASTMAN	3	0.28	71.86
105	23029	CSX TRANSPORTATION	3	0.28	72.14
106	23792	LYONDELL PETROCHEMICAL	3	0.28	72.43
107	26252	CIL CORP OF CANADA	3	0.28	72.71
108	27446	CANADIAN PACIFIC FOREST PRODU	3	0.28	72.99
109	27550	MARYSVILLE UNDERGROUND	3	0.28	73.28
110	28092	KIND & KNOX	3	0.28	73.56
111	10251	ALLIED CHEMICAL CORP	2	0.19	73.75
112	10760	B P OIL CO (BRITISH PETROLEUM)	2	0.19	73.94
113	12143	COLUMBIA NITROGEN CORP	2	0.19	74.13
114	12750	DIVERSIFIED CHEMICALS CORP	2	0.19	74.32
115	13174	ETHYL CORPORATION	2	0.19	74.50
116	13389	FINA OIL CO	2	0.19	74.69
117	13821	GEORGIA PACIFIC CORP	2	0.19	74.88
118	14177	HAWKEYE CHEMICAL CO	2	0.19	75.07
119	14227	HERCULES INC	2	0.19	75.26
120	14886	KERR-MCGEE CHEMICAL CORP	2	0.19	75.45
121	15162	LION OIL CO	2	0.19	75.64
122	15242	LUBRIZOL CORP	2	0.19	75.83
123	15404	MARUBENI AMERICA CORP	2	0.19	76.02
124	15724	MOBIL CHEMICAL CO	2	0.19	76.20
125	15762	MONTANA SULPHUR & CHEM CO	2	0.19	76.39
126	15980	NATIONAL STARCH & CHEMICAL	2	0.19	76.58

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
127	16642	PETRO CHEM CORP	2	0.19	76.77
128	16656	PETROLITE CORP	2	0.19	76.96
129	16965	QUAKER CHEMICAL CORP	2	0.19	77.15
130	17658	SHELL OIL CO	2	0.19	77.34
131	19403	WHEELING-PITTSBURGH STEEL CO	2	0.19	77.53
132	19532	WITCO CHEMICAL CORP	2	0.19	77.71
133	19788	TEXAS EASTMAN	2	0.19	77.90
134	20077	CHEMLINK	2	0.19	78.09
135	20515	MOBILE OIL	2	0.19	78.28
136	21274	THERMICE CORP	2	0.19	78.47
137	21951	TEXACO REFINING & MARKETING	2	0.19	78.66
138	22904	HIGH PLAINS CORP	2	0.19	78.85
139	23055	MIDWEST GRAIN PRODUCTS	2	0.19	79.04
140	23115	ANHEASUER BUSH	2	0.19	79.23
141	23495	SCM GLIDDEN	2	0.19	79.41
142	23613	BASE CORP/INMONT DIV	2	0.19	79.60
143	23939	TONAWANDA COKE CORP	2	0.19	79.79
144	23965	CEDAR CHEM CO	2	0.19	79.98
145	24522	LAROCHE INDUSTRIES INC	2	0.19	80.17
146	25105	FEDERAL PAPER BOARD CO INC	2	0.19	80.36
147	25837	IMC FERTILIZER	2	0.19	80.55
148	26833	NU WEST INDUSTRIES	2	0.19	80.74
149	26839	NITREX	2	0.19	80.93
150	27015	GLACIER AMMONIA	2	0.19	81.11
151	27378	QUANTUM CHEM	2	0.19	81.30
152	27414	STAR ENTERPRISE	2	0.19	81.49
153	27584	ALLIED SIGNAL AEROSPACE CO	2	0.19	81.68
154	27665	BIG RIVER CORP	2	0.19	81.87
155	28027	POWELL DUFFRYN TE	2	0.19	82.06
156	28035	MARSULEX INC	2	0.19	82.25
157	40019	AMERICAN SALES & PURCHASE	2	0.19	82.44
158	10174	AIR PRODUCTS & CHEMICALS INC	1	0.09	82.53
159	10210	ALBERTA GAS & CHEMICAL CO	1	0.09	82.63
160	10310	AMAX ZINC CO INC	1	0.09	82.72
161	10539	ARMCO STEEL CORP	1	0.09	82.81
162	10586	ASHLAND OIL CO	1	0.09	82.91
163	10668	ATLAS POWDER	1	0.09	83.00
164	10862	BASF WYANDOTTE CORP	1	0.09	83.10
165	11021	BETHLEHEM STEEL CORPORATION	1	0.09	83.19
166	11160	BOISE CASCADE CORP	1	0.09	83.29
167	11187	BORDER CHEMICALS	1	0.09	83.38
168	11421	C & S CHEMICAL & AIR EQUIP	1	0.09	83.48

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
169	11461	CABOT CORP	1	0.09	83.57
170	11542	CANADIAN INDUSTRIES LTD	1	0.09	83.66
171	11596	CARBONIC INDUSTRIES CORP	1	0.09	83.76
172	11639	CAROLINA FREIGHT CARRIERS CORP	1	0.09	83.85
173	11761	U S STEEL SUPPLY	1	0.09	83.95
174	11771	CFI	1	0.09	84.04
175	11879	CHEMICAL LEAMAN TANK LINES INC	1	0.09	84.14
176	11916	CHEMTECH INDUSTRIES INC	1	0.09	84.23
177	12108	COLGATE-PALMOLIVE CO	1	0.09	84.32
178	12117	COLONIAL OIL INDUSTRIES INC	1	0.09	84.42
179	12156	COMINCO AMERICAN INC	1	0.09	84.51
180	12213	CONOCO CHEMICALS INC	1	0.09	84.61
181	12386	INDIANAPOLIS WELDING SUP INC	1	0.09	84.70
182	12420	CROSS OIL & REFINING CO	1	0.09	84.80
183	12565	DAVISON OIL CO	1	0.09	84.89
184	12772	DOVE PETROLEUM	1	0.09	84.99
185	12798	DOVER CHEMICAL CORP	1	0.09	85.08
186	12921	EASTERN CHEMICAL CO	1	0.09	85.17
187	12954	CARBONAIRES INC	1	0.09	85.27
188	13290	FARMERS CHEMICAL CO	1	0.09	85.36
189	13460	FLINT INK CO	1	0.09	85.46
190	13474	FLORIDA DISTILLERS CO	1	0.09	85.55
191	13792	GENERAL MOTORS CORP	1	0.09	85.65
192	13806	GENERAL TIRE & RUBBER CO	1	0.09	85.74
193	14004	GREEN BAY PACKAGING INC	1	0.09	85.84
194	14079	HALL C P COMPANY	1	0.09	85.93
195	14098	HAMMERMILL PAPER CO	1	0.09	86.02
196	14602	INTERCONTINENTAL TERM CO	1	0.09	86.12
197	14604	INTEREX CORP	1	0.09	86.21
198	14664	ITOFCA INC	1	0.09	86.31
199	14716	JENKINS OIL INC	1	0.09	86.40
200	14717	JENNISON-WRIGHT CORP	1	0.09	86.50
201	14759	JONES CHEMICAL CO INC	1	0.09	86.59
202	14773	JUPITER CHEMICAL INC	1	0.09	86.69
203	14956	KOCH CHEMICAL CO	1	0.09	86.78
204	14985	KRAMER CHEMICALS INC	1	0.09	86.87
205	15083	LEAF CO INC	1	0.09	86.97
206	15119	LEVER BROTHERS COMPANY	1	0.09	87.06
207	15215	LONZA INC	1	0.09	87.16
208	15339	MANCHESTER TANK & EQP CO	1	0.09	87.25
209	15652	MIDWEST SOLVENTS CO INC	1	0.09	87.35
210	15690	MINERAL RESEARCH & DEV CORP	1	0.09	87.44

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
211	15730	MOBILE CHEMICAL	1	0.09	87.54
212	15871	MURPHY OIL CO	1	0.09	87.63
213	16031	NEPERA CHEMICAL CO INC	1	0.09	87.72
214	16135	NORFOLK & WESTERN RAILWAY CO	1	0.09	87.82
215	16639	PETERSON PURITAN INC	1	0.09	87.91
216	16647	PETROLANE GAS SERVICE INC	1	0.09	88.01
217	16899	PROCTOR & GAMBLE CO	1	0.09	88.10
218	17116	REILLY TAR & CHEMICAL CORP	1	0.09	88.20
219	17183	RHONE PULENC INC	1	0.09	88.29
220	17244	ROBECO CHEMICALS INC	1	0.09	88.39
221	17337	RUBICON CHEMICALS INC	1	0.09	88.48
222	17498	SCM CORP	1	0.09	88.57
223	17508	SCOTT PAPER CO	1	0.09	88.67
224	17655	SHELL CANADA LTD	1	0.09	88.76
225	17749	SIMPSON PAPER CO	1	0.09	88.86
226	17753	SINCLAIR OIL CO	1	0.09	88.95
227	17856	SONOCO PRODUCTS COMPANY	1	0.09	89.05
228	17872	SOUTH HAMPTON REFINERY	1	0.09	89.14
229	17922	SOUTHERN PROTECTIVE PRODUCT	1	0.09	89.24
230	17923	SOUTHERN RAILWAY SYSTEM	1	0.09	89.33
231	18239	STONE CONTAINER CORP	1	0.09	89.42
232	18280	SUBURBAN PROPANE GAS CORP	1	0.09	89.52
233	18301	SUN OIL CO	1	0.09	89.61
234	18362	SYNTEX AGRIBUSINESS INC	1	0.09	89.71
235	18388	TAG CHEMICALS CO	1	0.09	89.80
236	18523	TEXTILE CHEMICAL CO INC	1	0.09	89.90
237	18626	TOSCO CORPORATION	1	0.09	89.99
238	18815	U S GOVT - ARMY & AIR FORCE EX	1	0.09	90.09
239	18905	UNION TEXAS COMPANY	1	0.09	90.18
240	19140	VININGS CHEMICAL COMPANY	1	0.09	90.27
241	19143	VIRGINIA CHEMICALS INC	1	0.09	90.37
242	19233	WARREN PETROLEUM CORP	1	0.09	90.46
243	19234	WARREN S D CO	1	0.09	90.56
244	19243	WASTE RESEARCH & RECLAMATIO	1	0.09	90.65
245	19386	WESTERN TAR PRODUCTS CORP	1	0.09	90.75
246	19705	CHEVERON USA INC	1	0.09	90.84
247	19764	CITGO	1	0.09	90.93
248	19850	ROHM AND HAAS TEXAS INC	1	0.09	91.03
249	19917	S T SERVICES	1	0.09	91.12
250	20045	CORN SWEETNERS	1	0.09	91.22
251	20343	REGENT CHEM & RESEARCH INC	1	0.09	91.31
252	20815	FORMOSA PLACTICS CORP USA	1	0.09	91.41

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
253	20854	PETRO SOURCE	1	0.09	91.50
254	20873	BELCHER OF NEW ENGLAND	1	0.09	91.60
255	20894	BLASER & MERICLE INC	1	0.09	91.69
256	20956	ESSEX IND CHEM	1	0.09	91.78
257	20984	TEXAS PETROCHEMICALS CORP	1	0.09	91.88
258	21065	A H MATHIEU CORP	1	0.09	91.97
259	21147	EASTERN PETROLEUM	1	0.09	92.07
260	21325	ETHYL PETROLEUM ADDITIVES INC	1	0.09	92.16
261	21532	CONAGRA INC	1	0.09	92.26
262	21628	HIRAM WALKER & SONS INC	1	0.09	92.35
263	21952	AMERICAN INDUSTRIAL CHEM CO	1	0.09	92.45
264	22061	NEW ENERGY CO OF INDIANA	1	0.09	92.54
265	22137	HALTERMAN	1	0.09	92.63
266	22202	COASTAL STATES MARKETING	1	0.09	92.73
267	22240	ALBRIGHT & WILSON INC	1	0.09	92.82
268	22562	ADC LTD	1	0.09	92.92
269	22678	DUPONT CHEM	1	0.09	93.01
270	22700	KOCH HYDROCARBON	1	0.09	93.11
271	22846	LANDMARK GENETICS	1	0.09	93.20
272	22899	SOLVENT SERV INC	1	0.09	93.30
273	23079	CHEMBOND CORP	1	0.09	93.39
274	23093	DOW CHEM CANADA	1	0.09	93.48
275	23230	CAPE IND	1	0.09	93.58
276	23265	J L M IND INC	1	0.09	93.67
277	23518	HUNTSMAN CHEM CO	1	0.09	93.77
278	23768	EDDY E B FOREST PROD LTD	1	0.09	93.86
279	23931	ARGO CHEM CO	1	0.09	93.96
280	24032	BY-PRODUCTS MANAGEMENT INC	1	0.09	94.05
281	24048	ADM CORP	1	0.09	94.15
282	24372	EMERY CHEM	1	0.09	94.24
283	24542	REILLY INDUSTRIES	1	0.09	94.33
284	24570	FRONTIER OIL & REFINING CO	1	0.09	94.43
285	24848	CAIN CHEMICAL	1	0.09	94.52
286	25019	NEKOOSA PAPERS INC	1	0.09	94.62
287	25046	SEAGRAM DISTILLERS CO	1	0.09	94.71
288	25214	SOUTHWESTERN OIL & CHEMICAL	1	0.09	94.81
289	26001	SOUTHERN RESINS COMPANY	1	0.09	94.90
290	26025	NUTRIUS INC	1	0.09	95.00
291	26068	HCH MARKETING	1	0.09	95.09
292	26075	PERIDOT CHEMICAL CO INC	1	0.09	95.18
293	26077	NU SOUTH IND	1	0.09	95.28
294	26079	ENENCO INC	1	0.09	95.37

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
295	26139	SCM ORGANICS	1	0.09	95.47
296	26511	CADENCE CHEM RESOURCES	1	0.09	95.56
297	26653	GREAT SOUTHERN PAPER CO	1	0.09	95.66
298	27045	G T W SPOT SHOP	1	0.09	95.75
299	27062	UPFS SIF NALCO	1	0.09	95.85
300	27209	CROWLEY MARITIME	1	0.09	95.94
301	27237	SURE-GROW SOLUTION	1	0.09	96.03
302	27268	MERIDIAN OIL	1	0.09	96.13
303	27320	CENTEN EXPRESS	1	0.09	96.22
304	27396	OXY CITIES SERV	1	0.09	96.32
305	27398	AC BEROL CHEMICALS INC	1	0.09	96.41
306	27401	ALLIED TERMINALS INC	1	0.09	96.51
307	27431	P M C CORP	1	0.09	96.60
308	27442	CANS STATES	1	0.09	96.70
309	27456	UNION CAR CORP	1	0.09	96.79
310	27497	COLORADO REFINING CO	1	0.09	96.88
311	27525	FARMERS COOP GRAIN ASSN	1	0.09	96.98
312	27580	UCG ENERGY CORP	1	0.09	97.07
313	27767	MARKWEST HYDROCAR	1	0.09	97.17
314	27841	UNITED CARBON CORP	1	0.09	97.26
315	27885	GRAYSONIA NASHVILLE & ASHDOW	1	0.09	97.36
316	27901	TERRA INTERNATIONAL	1	0.09	97.45
317	27908	NATIONAL SLURCH	1	0.09	97.54
318	27909	PUS CHEMICAL	1	0.09	97.64
319	27941	REILLY IND INC	1	0.09	97.73
320	27997	PENFORD PRODUCTS	1	0.09	97.83
321	28013	US AGRI CHEMICAL	1	0.09	97.92
322	28026	BIGTHRINDUST	1	0.09	98.02
323	28107	MICHIGAN RECOVERY	1	0.09	98.11
324	28811	EXCELLO	1	0.09	98.21
325	29811	AVGANIC INC	1	0.09	98.30
326	29815	DAKOTA GASIFICATION CO	1	0.09	98.39
327	29817	SAFBANK LINE	1	0.09	98.49
328	29831	GENTRADE	1	0.09	98.58
329	29854	KAMA CORP	1	0.09	98.68
330	29855	AUBURN FERTILIZER	1	0.09	98.77
331	29874	UP FREIGHT SERVICE	1	0.09	98.87
332	29875	S T SERVICES INC	1	0.09	98.96
333	29892	MACON KRAFT INC	1	0.09	99.06
334	29923	FLEXEL CORP	1	0.09	99.15
335	29953	C S I ALCOHOL	1	0.09	99.24
336	29963	GMANN	1	0.09	99.34

NUMBER OF LEAKS BY SHIPPER 1989

NUM	ID	SHIPPER'S NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
337	29972	COASTAL EAGLE POINT	1	0.09	99.43
338	30240	TRINITY CHEMICAL IND	1	0.09	99.53
339	30247	PAXTON FERTILIZER	1	0.09	99.62
340	30248	AIRCO GASES CANADA	1	0.09	99.72
341	30250	BUCHMAN LABORATORY	1	0.09	99.81
342	40003	SMC CHEMICALS INC	1	0.09	99.91
343	40059	ALTA GAS ETHYLENE CO	1	0.09	100.00
		TOTAL	1059		

Appendix F

**Detailed Listing of Releases by Carrier, by Year, Totals
Source: HMIS (RSPA)**

NUMBER OF LEAKS BY CARRIER (1985-1989)

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	23029	CSX TRANSPORTATION	701	16.58	16.58
2	18900	UNION PACIFIC RAILROAD CO	602	14.24	30.81
3	19709	CONSOLIDATED RAIL CORP	470	11.11	41.92
4	17923	SOUTHERN RAILWAY SYSTEM	421	9.96	51.88
5	17918	SOUTHERN PACIFIC TRANSP CO	406	9.60	61.48
6	16135	NORFOLK & WESTERN RAILWAY CO	235	5.56	67.04
7	10620	ATCHISON TOPEKA & SANTA FE RY	230	5.44	72.48
8	14358	HOUSTON BELT & TERMINAL RWY	137	3.24	75.72
9	19714	BURLINGTON NORTHERN RR CO	129	3.05	78.77
10	14475	ILLINOIS CENTRAL GULF RAILROAD	93	2.20	80.96
11	19823	SEABOARD SYSTEM RAILROAD	63	1.49	82.45
12	13945	GRAND TRUNK WESTERN RR CO	51	1.21	83.66
13	11927	CHESSIE SYSTEM	49	1.16	84.82
14	16805	PORT TERMINAL RAILROAD ASSN	49	1.16	85.98
15	24133	SPRINGFIELD TERMINAL RR	47	1.11	87.09
16	11941	CHICAGO & NORTHWESTERN TRAN	43	1.02	88.11
17	15708	MISSOURI PACIFIC RAILROAD CO	43	1.02	89.12
18	10802	BALTIMORE & OHIO RAILROAD CO	40	0.95	90.07
19	13029	ELGIN JOLIET & EASTERN RY CO	35	0.83	90.90
20	14816	KANSAS CITY SOUTHERN RWY CO	33	0.78	91.68
21	17859	SOO LINE RAILROAD CO	33	0.78	92.46
22	17203	RICHMOND FREDERICKSBG PTMC R	31	0.73	93.19
23	10206	ALASKA RAILROAD	25	0.59	93.78
24	23008	MIDSOUTH RAIL CORP	24	0.57	94.35
25	11197	BOSTON & MAINE CORP	19	0.45	94.80
26	12628	DELAWARE & HUDSON RAILWAY CO	16	0.38	95.18
27	11922	CHESAPEAKE & OHIO RWY CO	15	0.35	95.53
28	17417	SANTA FE RAILWAY CO	11	0.26	95.79
29	26841	BUFFALO & PITTSBURGH RAILROAD	8	0.19	95.98
30	17917	SOUTHERN PACIFIC CO	7	0.17	96.15
31	21123	NORFOLK SOUTHERN CORP	7	0.17	96.31
32	12667	DENVER & RIO GRANDE WESTERN R	6	0.14	96.45
33	14815	KANSAS CITY SOUTHERN LINES	6	0.14	96.59
34	15317	MAINE CENTRAL RAILROAD CO	6	0.14	96.74
35	15762	MONTANA SULPHUR & CHEM CO	6	0.14	96.88
36	18467	TERMINAL RAILROAD ASSOCIATION	6	0.14	97.02
37	19080	MANUFACTURERS RAILWAY CO	6	0.14	97.16
38	26151	TERMINAL RAILWAY	6	0.14	97.30
39	10295	ALTON & SOUTHERN RAILWAY CO	5	0.12	97.42
40	10370	AMERICAN OIL CO (AMOCO)	4	0.09	97.52

NUMBER OF LEAKS BY CARRIER (1985-1989)

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
41	11084	BIRMINGHAM SOUTHERN RAILROAD	4	0.09	97.61
42	11748	CENTRAL VERMONT RAILWAY INC	4	0.09	97.71
43	12216	CONRAIL	4	0.09	97.80
44	15707	MISSOURI KANSAS TEXAS RAILROAD	4	0.09	97.90
45	40100	SAN DIEGO & IMPERIAL VALLEY RR	4	0.09	97.99
46	16732	PITTSBURGH & LAKE ERIE RR	3	0.07	98.06
47	23748	ALLEGHENY RAILROAD CO	3	0.07	98.13
48	26385	UNION RAILROAD CO	3	0.07	98.20
49	29812	CENTRAL MICHIGAN RAILWAY	3	0.07	98.27
50	10633	ATLANTA & ST ANDREWS BAY RR CO	2	0.05	98.32
51	10814	BANGOR & AROOSTOOK RR	2	0.05	98.37
52	11431	C F INDUSTRIES INC	2	0.05	98.42
53	11771	CFI	2	0.05	98.46
54	15475	MC KESSON CHEMICAL CO	2	0.05	98.51
55	16155	NORTH LOUISIANA & GULF RR CO	2	0.05	98.56
56	16207	NORTHWESTERN CHEMICAL CO	2	0.05	98.61
57	16595	PENNWALT CORP	2	0.05	98.65
58	19101	VELSICOL CHEMICAL CORP	2	0.05	98.70
59	22713	STANDARD CHLORINE OF DELAWAR	2	0.05	98.75
60	23534	G T W RAILROAD CO	2	0.05	98.79
61	24997	CHICAGO MISSOURI & WESTERN RR	2	0.05	98.84
62	26644	ST MARYS RAILROAD	2	0.05	98.89
63	26744	MONTANA RAIL LINK	2	0.05	98.94
64	30256	NEW YORK SUSQUEHANNA & WESTE	2	0.05	98.98
65	10334	AMERICAN CYANAMID CO	1	0.02	99.01
66	10515	ARIZONA AGROCHEMICAL CORP	1	0.02	99.03
67	10968	THE BELT RR CO OF CHIC	1	0.02	99.05
68	11374	BURLINGTON NORTHERN INC	1	0.02	99.08
69	11475	CAL-CUSTOM HAWK	1	0.02	99.10
70	11544	CANADIAN NATIONAL RAILWAY INC	1	0.02	99.13
71	11832	CHEM PRO INC	1	0.02	99.15
72	12618	DEGUSSA CORP	1	0.02	99.17
73	12852	DULUTH WINNIPEG & PCF RY CO	1	0.02	99.20
74	14520	INDIANA HARBOR BELT RR CO	1	0.02	99.22
75	14759	JONES CHEMICALS INC	1	0.02	99.24
76	15424	MATADOR SERVICE INC	1	0.02	99.27
77	15612	ENTERPRISE TRANS CO	1	0.02	99.29
78	15769	MONTGOMERY TANK LINES INC	1	0.02	99.31
79	16134	NORFOLK & PORTSMOUTH BLT LN R	1	0.02	99.34
80	16472	PARGAS INC	1	0.02	99.36
81	16647	PETROLANE GAS SERVICE INC	1	0.02	99.39

NUMBER OF LEAKS BY CARRIER (1985-1989)

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
82	16927	PROVIDENCE & WORCESTER RR CO	1	0.02	99.41
83	17198	RICHARDSON CO	1	0.02	99.43
84	17746	SIMPLOT J R CO	1	0.02	99.46
85	17928	SOUTHERN STATES COOPERATIVE	1	0.02	99.48
86	18053	ST LOUIS SOUTHWESTERN RR CO	1	0.02	99.50
87	18280	SUBURBAN PROPANE GAS CORP	1	0.02	99.53
88	18562	THOMPSON-HAYWARD CHEMICAL C	1	0.02	99.55
89	19076	VAN WATERS & ROGERS	1	0.02	99.57
90	19163	VULCAN CHEMICAL DIV VULCAN MFG	1	0.02	99.60
91	19358	WESTERN FARM SERVICE INC	1	0.02	99.62
92	19707	HIGHWAY OIL (APEX)	1	0.02	99.65
93	19802	SAUDER INDUSTRIES	1	0.02	99.67
94	21425	HARBOR BELT LINE RR	1	0.02	99.69
95	22514	CORINTH & COUNCE RAILROAD	1	0.02	99.72
96	23294	CHEMICAL PROCESSORS INC	1	0.02	99.74
97	24030	MINNESOTA SOLVENTS & CHEM COR	1	0.02	99.76
98	24311	CHICAGO CENTRAL & PACIFIC RR	1	0.02	99.79
99	25041	CHICAGO SOUTH SHORE & SOUTH B	1	0.02	99.81
100	25883	EASTERN SHORE RAILROAD	1	0.02	99.83
101	26071	WISCONSIN CENTRAL LTD	1	0.02	99.86
102	27048	GENESEE & WYOMING RAILROAD CO	1	0.02	99.88
103	27108	GUILFORD TRANSPORTATION IND	1	0.02	99.91
104	27118	PADUCAH & LOUISVILLE RAILWAY	1	0.02	99.93
105	27278	SAVANNAH STATE DOCKS RR CO	1	0.02	99.95
106	27957	PROTEIN TECHNOLOGIES INT'L	1	0.02	99.98
107	28152	WASHINGTON CENTRAL RAILROAD	1	0.02	100.00
		TOTAL	4229		

Number of Leaks by Carrier 1985

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	17918	SOUTHERN PACIFIC TRANSP CO	161	22.09	22.09
2	17923	SOUTHERN RAILWAY SYSTEM	91	12.48	34.57
3	19709	CONSOLIDATED RAIL CORP	68	9.33	43.90
4	16135	NORFOLK & WESTERN RAILWAY C	45	6.17	50.07
5	10802	BALTIMORE & OHIO RAILROAD CO	36	4.94	55.01
6	15708	MISSOURI PACIFIC RAILROAD CO	35	4.80	59.81
7	14475	ILLINOIS CENTRAL GULF RAILROA	34	4.66	64.47
8	19823	SEABOARD SYSTEM RAILROAD	33	4.53	69.00
9	10620	ATCHISON TOPEKA & SANTA FE RY	28	3.84	72.84
10	14358	HOUSTON BELT & TERMINAL RWY	28	3.84	76.68
11	18900	UNION PACIFIC RAILROAD CO	24	3.29	79.97
12	11927	CHESSIE SYSTEM	22	3.02	82.99
13	19714	BURLINGTON NORTHERN RR CO	21	2.88	85.87
14	13945	GRAND TRUNK WESTERN RR CO	15	2.06	87.93
15	11922	CHESAPEAKE & OHIO RWY CO	13	1.78	89.71
16	13029	ELGIN JOLIET & EASTERN RY CO	9	1.23	90.95
17	17203	RICHMOND FREDERICKSBG PTMC	9	1.23	92.18
18	11941	CHICAGO & NORTHWESTERN TRA	7	0.96	93.14
19	16805	PORT TERMINAL RAILROAD ASSN	6	0.82	93.96
20	11197	BOSTON & MAINE CORP	4	0.55	94.51
21	17417	SANTA FE RAILWAY CO	4	0.55	95.06
22	19080	MANUFACTURERS RAILWAY CO	3	0.41	95.47
23	10814	BANGOR & AROOSTOOK RR	2	0.27	95.75
24	12667	DENVER & RIO GRANDE WESTERN	2	0.27	96.02
25	15317	MAINE CENTRAL RAILROAD CO	2	0.27	96.30
26	15475	MC KESSON CHEMICAL CO	2	0.27	96.57
27	15707	MISSOURI KANSAS TEXAS RAILRO	2	0.27	96.85
28	16207	NORTHWESTERN CHEMICAL CO	2	0.27	97.12
29	10334	AMERICAN CYANAMID CO	1	0.14	97.26
30	10633	ATLANTA & ST ANDREWS BAY RR	1	0.14	97.39
31	11084	BIRMINGHAM SOUTHERN RAILROA	1	0.14	97.53
32	11475	CAL-CUSTOM HAWK	1	0.14	97.67
33	12628	DELAWARE & HUDSON RAILWAY C	1	0.14	97.81
34	14815	KANSAS CITY SOUTHERN LINES	1	0.14	97.94
35	15424	MATADOR SERVICE INC	1	0.14	98.08
36	15762	MONTANA SULPHUR & CHEM CO	1	0.14	98.22
37	16155	NORTH LOUISIANA & GULF RR CO	1	0.14	98.35
38	16472	PARGAS INC	1	0.14	98.49
39	16647	PETROLANE GAS SERVICE INC	1	0.14	98.63
40	16732	PITTSBURGH & LAKE ERIE RR	1	0.14	98.77
41	17198	RICHARDSON CO	1	0.14	98.90

Number of Leaks by Carrier 1985

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	17746	SIMPLOT J R CO	1	0.14	99.04
43	17859	SOO LINE RAILROAD CO	1	0.14	99.18
44	18467	TERMINAL RAILROAD ASSOCIATIO	1	0.14	99.31
45	19358	WESTERN FARM SERVICE INC	1	0.14	99.45
46	19707	HIGHWAY OIL (APEX)	1	0.14	99.59
47	19802	SAUDER INDUSTRIES	1	0.14	99.73
48	21425	HARBOR BELT LINE RR	1	0.14	99.86
49	22514	CORINTH & COUNCE RAILROAD	1	0.14	100.00
		TOTAL	729		

Number of Leaks by Carrier 1986

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	17918	SOUTHERN PACIFIC TRANSP CO	105	14.02	14.02
2	18900	UNION PACIFIC RAILROAD CO	86	11.48	25.50
3	17923	SOUTHERN RAILWAY SYSTEM	79	10.55	36.05
4	19709	CONSOLIDATED RAIL CORP	72	9.61	45.66
5	16135	NORFOLK & WESTERN RAILWAY CO	63	8.41	54.07
6	23029	CSX TRANSPORTATION	63	8.41	62.48
7	19823	SEABOARD SYSTEM RAILROAD	30	4.01	66.49
8	10620	ATCHISON TOPEKA & SANTA FE RY	29	3.87	70.36
9	14358	HOUSTON BELT & TERMINAL RWY	26	3.47	73.83
10	11927	CHESSIE SYSTEM	25	3.34	77.17
11	14475	ILLINOIS CENTRAL GULF RAILROAD	19	2.54	79.71
12	19714	BURLINGTON NORTHERN RR CO	15	2.00	81.71
13	16805	PORT TERMINAL RAILROAD ASSN	13	1.74	83.45
14	13945	GRAND TRUNK WESTERN RR CO	12	1.60	85.05
15	13029	ELGIN JOLIET & EASTERN RY CO	11	1.47	86.52
16	17203	RICHMOND FREDERICKSBG PTMC R	10	1.34	87.85
17	17859	SOO LINE RAILROAD CO	10	1.34	89.19
18	11197	BOSTON & MAINE CORP	9	1.20	90.39
19	14816	KANSAS CITY SOUTHERN RWY CO	8	1.07	91.46
20	15708	MISSOURI PACIFIC RAILROAD CO	8	1.07	92.52
21	17417	SANTA FE RAILWAY CO	7	0.93	93.46
22	10206	ALASKA RAILROAD	5	0.67	94.13
23	10370	AMERICAN OIL CO (AMOCO)	4	0.53	94.66
24	10802	BALTIMORE & OHIO RAILROAD CO	4	0.53	95.19
25	15317	MAINE CENTRAL RAILROAD CO	4	0.53	95.73
26	23008	MIDSOUTH RAIL CORP	4	0.53	96.26
27	11941	CHICAGO & NORTHWESTERN TRAN	3	0.40	96.66
28	14815	KANSAS CITY SOUTHERN LINES	3	0.40	97.06
29	11084	BIRMINGHAM SOUTHERN RAILROAD	2	0.27	97.33
30	11922	CHESAPEAKE & OHIO RWY CO	2	0.27	97.60
31	15707	MISSOURI KANSAS TEXAS RAILROAD	2	0.27	97.86
32	18467	TERMINAL RAILROAD ASSOCIATION	2	0.27	98.13
33	23534	G T W RAILROAD CO	2	0.27	98.40
34	23748	ALLEGHENY RAILROAD CO	2	0.27	98.67
35	10515	ARIZONA AGROCHEMICAL CORP	1	0.13	98.80
36	11748	CENTRAL VERMONT RAILWAY INC	1	0.13	98.93
37	12628	DELAWARE & HUDSON RAILWAY CO	1	0.13	99.07
38	15762	MONTANA SULPHUR & CHEM CO	1	0.13	99.20
39	16155	NORTH LOUISIANA & GULF RR CO	1	0.13	99.33
40	16927	PROVIDENCE & WORCESTER RR CO	1	0.13	99.47
41	17928	SOUTHERN STATES COOPERATIVE	1	0.13	99.60

Number of Leaks by Carrier 1986

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	19080	MANUFACTURERS RAILWAY CO	1	0.13	99.73
43	19101	VELSICOL CHEMICAL CORP	1	0.13	99.87
44	24030	MINNESOTA SOLVENTS & CHEM COR	1	0.13	100.00
		TOTAL	749		

Number of Leaks by Carrier 1987

NUM.	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	18900	UNION PACIFIC RAILROAD CO	158	20.13	20.13
2	23029	CSX TRANSPORTATION	145	18.47	38.60
3	19709	CONSOLIDATED RAIL CORP	78	9.94	48.54
4	17923	SOUTHERN RAILWAY SYSTEM	74	9.43	57.96
5	10620	ATCHISON TOPEKA & SANTA FE RY	54	6.88	64.84
6	17918	SOUTHERN PACIFIC TRANSP CO	45	5.73	70.57
7	16135	NORFOLK & WESTERN RAILWAY CO	42	5.35	75.92
8	19714	BURLINGTON NORTHERN RR CO	28	3.57	79.49
9	14475	ILLINOIS CENTRAL GULF RAILROAD	20	2.55	82.04
10	14358	HOUSTON BELT & TERMINAL RWY	18	2.29	84.33
11	16805	PORT TERMINAL RAILROAD ASSN	17	2.17	86.50
12	11941	CHICAGO & NORTHWESTERN TRAN	15	1.91	88.41
13	13945	GRAND TRUNK WESTERN RR CO	12	1.53	89.94
14	14816	KANSAS CITY SOUTHERN RWY CO	11	1.40	91.34
15	24133	SPRINGFIELD TERMINAL RR	9	1.15	92.48
16	11197	BOSTON & MAINE CORP	6	0.76	93.25
17	17917	SOUTHERN PACIFIC CO	6	0.76	94.01
18	10206	ALASKA RAILROAD	5	0.64	94.65
19	12628	DELAWARE & HUDSON RAILWAY CO	5	0.64	95.29
20	21123	NORFOLK SOUTHERN CORP	5	0.64	95.92
21	23008	MIDSOUTH RAIL CORP	5	0.64	96.56
22	12216	CONRAIL	4	0.51	97.07
23	13029	ELGIN JOLIET & EASTERN RY CO	3	0.38	97.45
24	17859	SOO LINE RAILROAD CO	3	0.38	97.83
25	11927	CHESSIE SYSTEM	2	0.25	98.09
26	11832	CHEM PRO INC	1	0.13	98.22
27	12618	DEGUSSA CORP	1	0.13	98.34
28	14759	JONES CHEMICALS INC	1	0.13	98.47
29	14815	KANSAS CITY SOUTHERN LINES	1	0.13	98.60
30	15762	MONTANA SULPHUR & CHEM CO	1	0.13	98.73
31	16134	NORFOLK & PORTSMOUTH BLT LN R	1	0.13	98.85
32	16732	PITTSBURGH & LAKE ERIE RR	1	0.13	98.98
33	17203	RICHMOND FREDERICKSBG PTMC R	1	0.13	99.11
34	18562	THOMPSON-HAYWARD CHEMICAL C	1	0.13	99.24
35	19076	VAN WATERS & ROGERS	1	0.13	99.36
36	19080	MANUFACTURERS RAILWAY CO	1	0.13	99.49
37	19163	VULCAN CHEMICAL DIV VULCAN MFG	1	0.13	99.62
38	24311	CHICAGO CENTRAL & PACIFIC RR	1	0.13	99.75
39	24997	CHICAGO MISSOURI & WESTERN RR	1	0.13	99.87
40	25041	CHICAGO SOUTH SHORE & SOUTH B	1	0.13	100.00
		TOTAL	785		

Number of Leaks by Carrier 1988

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	23029	CSX TRANSPORTATION	232	25.58	25.58
2	18900	UNION PACIFIC RAILROAD CO	149	16.43	42.01
3	19709	CONSOLIDATED RAIL CORP	109	12.02	54.02
4	17923	SOUTHERN RAILWAY SYSTEM	86	9.48	63.51
5	17918	SOUTHERN PACIFIC TRANSP CO	53	5.84	69.35
6	10620	ATCHISON TOPEKA & SANTA FE RY	48	5.29	74.64
7	16135	NORFOLK & WESTERN RAILWAY CO	48	5.29	79.93
8	14358	HOUSTON BELT & TERMINAL RWY	35	3.86	83.79
9	24133	SPRINGFIELD TERMINAL RR	20	2.21	86.00
10	19714	BURLINGTON NORTHERN RR CO	19	2.09	88.09
11	16805	PORT TERMINAL RAILROAD ASSN	10	1.10	89.20
12	17859	SOO LINE RAILROAD CO	10	1.10	90.30
13	12628	DELAWARE & HUDSON RAILWAY CO	9	0.99	91.29
14	11941	CHICAGO & NORTHWESTERN TRAN	8	0.88	92.17
15	13945	GRAND TRUNK WESTERN RR CO	7	0.77	92.94
16	10206	ALASKA RAILROAD	6	0.66	93.61
17	13029	ELGIN JOLIET & EASTERN RY CO	6	0.66	94.27
18	14816	KANSAS CITY SOUTHERN RWY CO	6	0.66	94.93
19	14475	ILLINOIS CENTRAL GULF RAILROAD	5	0.55	95.48
20	12667	DENVER & RIO GRANDE WESTERN R	4	0.44	95.92
21	26151	TERMINAL RAILWAY	4	0.44	96.36
22	10295	ALTON & SOUTHERN RAILWAY CO	3	0.33	96.69
23	18467	TERMINAL RAILROAD ASSOCIATION	3	0.33	97.02
24	23008	MIDSOUTH RAIL CORP	3	0.33	97.35
25	11748	CENTRAL VERMONT RAILWAY INC	2	0.22	97.57
26	15762	MONTANA SULPHUR & CHEM CO	2	0.22	97.80
27	17203	RICHMOND FREDERICKSBG PTMC R	2	0.22	98.02
28	26841	BUFFALO & PITTSBURGH RAILROAD	2	0.22	98.24
29	10633	ATLANTA & ST ANDREWS BAY RR CO	1	0.11	98.35
30	10968	THE BELT RR CO OF CHIC	1	0.11	98.46
31	11084	BIRMINGHAM SOUTHERN RAILROAD	1	0.11	98.57
32	11544	CANADIAN NATIONAL RAILWAY INC	1	0.11	98.68
33	17917	SOUTHERN PACIFIC CO	1	0.11	98.79
34	18280	SUBURBAN PROPANE GAS CORP	1	0.11	98.90
35	19101	VELSICOL CHEMICAL CORP	1	0.11	99.01
36	23294	CHEMICAL PROCESSORS INC	1	0.11	99.12
37	23748	ALLEGHENY RAILROAD CO	1	0.11	99.23
38	24997	CHICAGO MISSOURI & WESTERN RR	1	0.11	99.34
39	26385	UNION RAILROAD CO	1	0.11	99.45
40	26644	ST MARYS RAILROAD	1	0.11	99.56
41	26744	MONTANA RAIL LINK	1	0.11	99.67

Number of Leaks by Carrier 1988

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	27048	GENESEE & WYOMING RAILROAD CO	1	0.11	99.78
43	27108	GUILFORD TRANSPORTATION IND	1	0.11	99.89
44	27278	SAVANNAH STATE DOCKS RR CO	1	0.11	100.00
		TOTAL	907		

Number of Leaks by Carrier 1989

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
1	23029	CSX TRANSPORTATION	261	24.65	24.65
2	18900	UNION PACIFIC RAILROAD CO	185	17.47	42.12
3	19709	CONSOLIDATED RAIL CORP	143	13.50	55.62
4	17923	SOUTHERN RAILWAY SYSTEM	91	8.59	64.21
5	10620	ATCHISON TOPEKA & SANTA FE RY	71	6.70	70.92
6	19714	BURLINGTON NORTHERN RR CO	46	4.34	75.26
7	17918	SOUTHERN PACIFIC TRANSP CO	42	3.97	79.23
8	16135	NORFOLK & WESTERN RAILWAY CO	37	3.49	82.72
9	14358	HOUSTON BELT & TERMINAL RWY	30	2.83	85.55
10	24133	SPRINGFIELD TERMINAL RR	18	1.70	87.25
11	14475	ILLINOIS CENTRAL GULF RAILROAD	15	1.42	88.67
12	23008	MIDSOUTH RAIL CORP	12	1.13	89.80
13	11941	CHICAGO & NORTHWESTERN TRAN	10	0.94	90.75
14	10206	ALASKA RAILROAD	9	0.85	91.60
15	17203	RICHMOND FREDERICKSBG PTMC R	9	0.85	92.45
16	17859	SOO LINE RAILROAD CO	9	0.85	93.30
17	14816	KANSAS CITY SOUTHERN RWY CO	8	0.76	94.05
18	13029	ELGIN JOLIET & EASTERN RY CO	6	0.57	94.62
19	26841	BUFFALO & PITTSBURGH RAILROAD	6	0.57	95.18
20	13945	GRAND TRUNK WESTERN RR CO	5	0.47	95.66
21	40100	SAN DIEGO & IMPERIAL VALLEY RR	4	0.38	96.03
22	16805	PORT TERMINAL RAILROAD ASSN	3	0.28	96.32
23	29812	CENTRAL MICHIGAN RAILWAY	3	0.28	96.60
24	10295	ALTON & SOUTHERN RAILWAY CO	2	0.19	96.79
25	11431	C F INDUSTRIES INC	2	0.19	96.98
26	11771	CFI	2	0.19	97.17
27	16595	PENNWALT CORP	2	0.19	97.36
28	21123	NORFOLK SOUTHERN CORP	2	0.19	97.55
29	22713	STANDARD CHLORINE OF DELAWAR	2	0.19	97.73
30	26151	TERMINAL RAILWAY	2	0.19	97.92
31	26385	UNION RAILROAD CO	2	0.19	98.11
32	30256	NEW YORK SUSQUEHANNA & WESTE	2	0.19	98.30
33	11374	BURLINGTON NORTHERN INC	1	0.09	98.40
34	11748	CENTRAL VERMONT RAILWAY INC	1	0.09	98.49
35	12852	DULUTH WINNIPEG & PCF RY CO	1	0.09	98.58
36	14520	INDIANA HARBOR BELT RR CO	1	0.09	98.68
37	14815	KANSAS CITY SOUTHERN LINES	1	0.09	98.77
38	15612	ENTERPRISE TRANS CO	1	0.09	98.87
39	15762	MONTANA SULPHUR & CHEM CO	1	0.09	98.96
40	15769	MONTGOMERY TANK LINES INC	1	0.09	99.06
41	16732	PITTSBURGH & LAKE ERIE RR	1	0.09	99.15

Number of Leaks by Carrier 1989

NUM	CARRID	CARRIER NAME	# OF LEAKS	PERCENT	CUMUL. PERCENT
42	18053	ST LOUIS SOUTHWESTERN RR CO	1	0.09	99.25
43	19080	MANUFACTURERS RAILWAY CO	1	0.09	99.34
44	25883	EASTERN SHORE RAILROAD	1	0.09	99.43
45	26071	WISCONSIN CENTRAL LTD	1	0.09	99.53
46	26644	ST MARYS RAILROAD	1	0.09	99.62
47	26744	MONTANA RAIL LINK	1	0.09	99.72
48	27118	PADUCAH & LOUISVILLE RAILWAY	1	0.09	99.81
49	27957	PROTEIN TECHNOLOGIES INT'L	1	0.09	99.91
50	28152	WASHINGTON CENTRAL RAILROAD	1	0.09	100.00
		TOTAL	1059		

Appendix G

AAR Manual of Standards and Recommended Practices

Section 1.4 Dated 9/1/85 as amended through 12/1/88

SECTION 1.4.

PROCEDURES FOR SECURING APPROVAL

1.4.1. SUBMISSION OF APPLICATIONS

1.4.1.1.

To secure approval as required by 1.3.6. of this Specification and DOT-179.3, application for approval of designs and material for fabrication must be submitted by the applicant to the Secretary, the Bureau of Explosives and the Tank Car Committee on Form AAR 4-2, and when required by AAR Specification M-1001, to other appropriate committees for approval of brake systems and car structure. Repetitive design applications for approval will include complete supporting data for committee review. Applicants must submit two copies of application with one set of drawings to the Secretary, and one copy of application with one set of drawings to each member of the Tank Car Committee and to the Bureau of Explosives. The RPI representative should not receive applications and drawings. Applications must include prints of drawings and calculations folded to approximately $8\frac{1}{2} \times 11$ inches in size. All prints must be marked with the application number with which they are submitted.

1.4.1.2. PRECEDENT APPROVAL

Precedent approval may be requested on car designs where the tank and attachments thereto do not incorporate major changes from designs previously approved and where the entire car meets all currently applicable AAR and DOT specification requirements. Drawings that clarify changes within the scope of precedent approval may be attached.

Form AAR 4-2 must be submitted in duplicate to the Secretary with a copy to each member of the Tank Car Committee and a copy to the Bureau of Explosives, clearly indicating precedent approval has been requested. All drawing numbers relative to the application submitted must be indicated with reference to a precedent application. Design deviations from a precedent application must be summarized and such summary must accompany Form AAR 4-2.

Design differences from approved precedent designs which categorize applications for which precedent approval may be requested are as follows:

1. A change in tank volume created by a longitudinal dimension change provided truck capacity or rail load limit is not increased.
2. A change in arrangement, or number of runs of external or internal heater systems including deletion of the entire heater system.
3. A change in design of safety appliances or in appurtenances used for loading and unloading such as ladders, platforms, railings and hand-holds as covered by Appendix S. This applies only to the construction of new cars.
4. A reduction in truck capacity or rail load limit.
5. A minor change in approved fittings, nozzles, cutouts, reinforcements, covers and protective housings.
6. A change in approved insulation material or thickness.
7. A change in design of car structure not affecting support of tank.
8. A change in design or location of brake arrangement or brake system supports.

Appendix H

Examples of Tank Car Loading Checklists

TANK CAR INSPECTION GUIDE

ROUTING

CAR NUMBER	_____	PRODUCT	_____
	LAST DUE		LAST DUE
FRA INSP	_____	PAINT DATE	_____
COT & S	_____	TYPE	_____
TANK TEST	_____	PAINTED AT	_____
@ PSI	_____	LINING DATE	_____
VALVE TEST	_____	TYPE	_____
@ PSI	_____	LINED AT	_____
COILS TEST	_____	CHLORINE TANK CARS	_____
I.D.T	_____	WATER CAP. #	_____
JOURNAL REPACK	_____	FLO VALVE	_____
OR LUBE	_____		_____
GALLONS CAP	_____	BOTTOM PROTEC'N	_____
LIGHT WEIGHT	_____	☐ Valve ☐ Sump	_____
DATE	_____ @ _____	☐ Washout ☐ Other	_____

CC - _____

DOT CLASS _____

BUILT DATE _____

RECOMMENDED DISPO.	RATING
☐ Wash./Lin'g Insp.	
☐ Painting	OUT- A
☐ Relining	SIDE
☐ Mechanical	SHOP B
☐ Inside Repair - Red	
☐ Field Repair - Red	C
☐ Load Site - White	D

	O.K.	NEEDS ATTENTION		O.K.	NEEDS ATTENTION
TRUCKS:			DRAFT GEAR/COUPLERS:		
Center Plant	_____	_____	Draft/Gear	_____	_____
Truck Bolster Pocket	_____	_____	Couplers/Type	_____	_____
Truck Bolster	_____	_____	Striker Plates	_____	_____
Body Bolster	_____	_____	Carrying Iron	_____	_____
Truck Side Frame	_____	_____	Uncoupling Rod	_____	_____
Side Bearings	_____	_____	Slot Bar	_____	_____
Truck Springs	_____	_____	Lugs	_____	_____
Car Wheels	_____	_____	Draft Gear Carrying Plate	_____	_____
Bolster Column Guide Lugs	_____	_____	Yokes	_____	_____
Journal Box Covers	_____	_____			
Journal Bearings	_____	_____	AIR BRAKES:		
Roller Bearings	_____	_____	ABD Valve	_____	_____
			Brake Cylinder	_____	_____
UNDERFRAME:			Cylinder Reservoir	_____	_____
Center Sill	_____	_____	Brake Rods	_____	_____
Center Anchorage	_____	_____	Brake Shoes	_____	_____
Anchor Bands	_____	_____	Hand Brake Assembly	_____	_____
End Sills	_____	_____	Train Line	_____	_____
Runaways	_____	_____	Angle Cock	_____	_____
Wheel Guard Rails	_____	_____			
Bottom Outlet	_____	_____	DOMES:		
			Hand Rails	_____	_____
MISCELLANEOUS:			Platform Grating	_____	_____
Grab Handles	_____	_____			
Hand Rails	_____	_____	PAINT:	Good _____	Fair _____
Ladders	_____	_____			Poor _____
Placard Holders	_____	_____	STENCILS:	Legible _____	Poor _____
Defect Card Holder	_____	_____			
Routing Boards	_____	_____	CLEANED	_____	
Supports & Hangers	_____	_____			
Tank Car Jacket	_____	_____	PURGED	_____	
Tank	_____	_____			

ADDED COMMENTS.

SAFE FOR ENTRY

YES

NO

I certify this car has been inspected on this date and the defects recorded.

Date _____ Signed: _____ At: _____

TANK CAR EXTERIOR COATING INSPECTION

ROUTING
Original -

CAR NUMBER _____

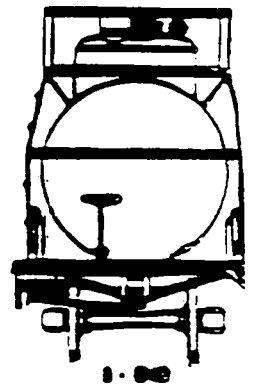
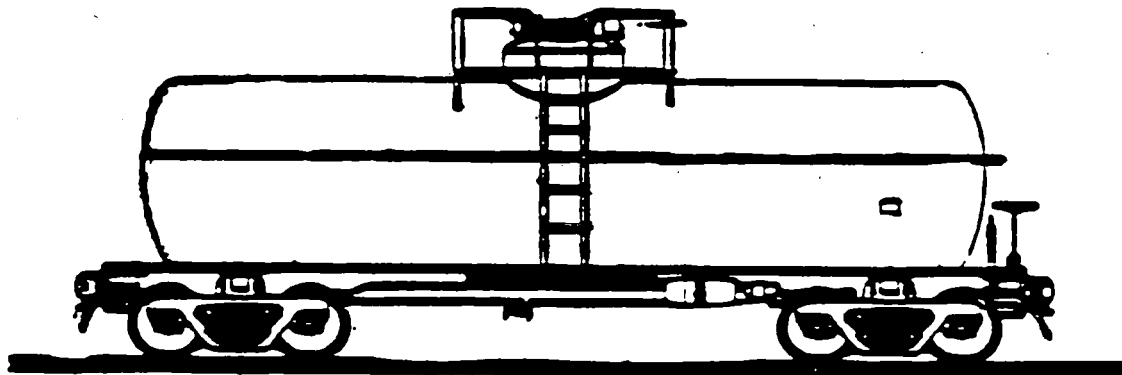
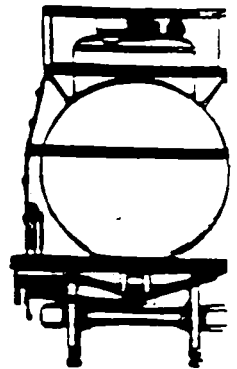
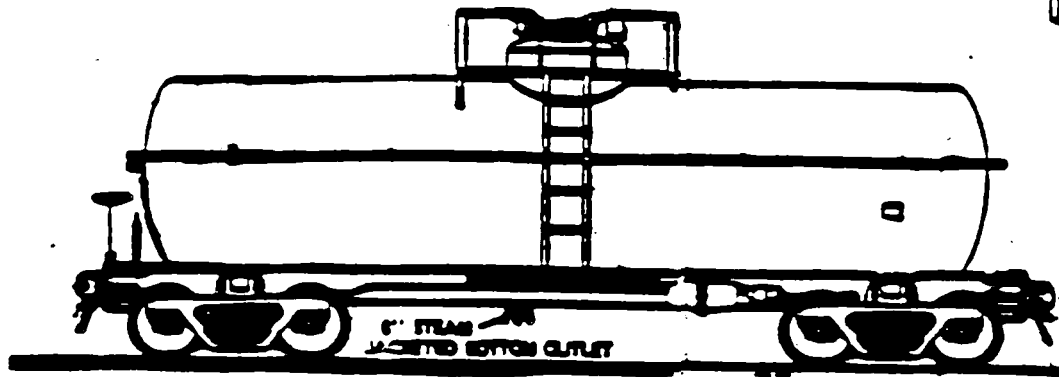
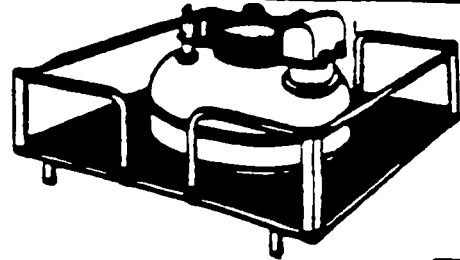
DATE COATED _____

TYPE COATING _____

COATED AT _____

INSP AT _____

PRODUCT _____



REMARKS: _____

certify this car has been inspected on this date and defects recorded.

Date: _____

Signed: _____

TANKCAR LOADING INFORMATION

DATE _____

CUSTOMER	STG. LOADED FROM	
TANKCAR NUMBER	PRODUCT	LBS LOADED

1. Footvalve operates and in closed position. _____
2. Auxiliary valve open during loading and closed after loading plug in valve. _____
3. Manway cover gasket and bolts in good condition. _____
4. Inside of tank clean. _____
5. After loading, all manway cover bolts tight. Wash down any spillage. _____
6. Air induction valve closed and plugged. _____
7. Top unloading valve closed and plugged. _____
8. Product sample clean, clear and no specks. _____
9. Rupture disc checked or replaced. _____
10. After tankcar is loaded pressure test to 40 lbs. _____
11. Pressure bleed off of car. _____
12. Proper placards on car. _____
13. Double check that correct product has been loaded. _____
14. All paperwork and samples to Lab. _____

Signature of Loader

REV: 10/20/88

DATE: _____

FERRIC CHLORIDE RAILCAR LOADING AND INSPECTION REPORT

RAILCAR NO: _____

DATE LOADED: _____ DATE SHIPPED: _____

LOADED BY: _____ DESTINATION: _____

SPECIFIC GRAVITY: _____ % FeCl₃: _____ % FeCl₂: _____ % HCl: _____ % SOLIDS: _____**PRIOR TO LOADING (CIRCLE ONE)**

RAILCAR RETURNED W/TEFLON NUTS, BOLTS, WASHERS	YES/NO	REPLACED W/TEFLON NUTS, BOLTS, WASHERS	YES/NO
FIXED CENTER LEAD GATE CLOSED	YES/NO	NORTHWEST WHEEL OF LEAD CAR SKATED	YES/NO
CENTER LEAD DERAIL LOCKED	YES/NO	SAFETY SHOWER CHECKED	YES/NO
CAR ON "DO NOT LOAD" LIST	YES/NO	EYEWASH CHECKED	YES/NO
CAR SPOTTED ON	11/11A	HANDBRAKE SET	YES/NO

ID NUMBER AND DOME INSPECTION

DOT SPECIFICATION NUMBER:	4" FeCl ₃ STENCIL	LABEL
CHECK ONE: 2 DOME PIPE 3 DOME PIPE	T SPOOL CONDITION:	
DISC OK YES/NO	NEW DISC YES/NO	
RUPTURE DISC INSPECTION: SEAL OK YES/NO	NEW SEAL YES/NO	DISC RATING NO:
DOME RUBBER CONDITION: POOR/FAIR/GOOD	SAFETY CHAINS FOR RETAINING RUPTURE DISC ASSEMBLY AND BLANK FOR AIR STANDPIPES	
STANDPIPE CONDITION:	SECURED: YES/NO	

OPERATOR: _____ DATE: _____ SHIFT: _____

LOADING

CAR CONTAINS HEEL YES/NO	AMOUNT:	LOADED FROM: A202	SALES POND 201
LIGHT WEIGHT:	INCHES STICK MEASURE:	GALS OUTAGE TABLE:	
ACTUAL NET WEIGHT		ACTUAL GROSS WEIGHT GOAL 258,000 LBS	
GALS X LBS/GALLON =		(DO NOT EXCEED 263,000 LBS):	LBS
CAR HOLDS PRESSURE	YES/NO	TYPE OF LEAKS:	
LIST BOLTS REPLACED:		P T FITTING REMOVED	YES/NO
ALL BOLTS TIGHTENED	YES/NO	OPERATOR:	

FINAL INSPECTION (AFTER LOADING)

DEBRIS REMOVED	YES/NO	PRODUCT TAG CLEAN	YES/NO
1 CLEAN UNLOADING AIR SIGN	YES/NO	4 CORROSIVE PLACARDS (UN 2582)	YES/NO
SHORT BOLTS (1/8" OF BOLT MUST BE SHOWING)		FeCl ₃ WASHED OFF CAR	YES/NO
EXCESSIVE WASHER ON ANY FLANGES	YES/NO		

OPERATOR: _____ DATE: _____ SHIFT: _____

INSPECTION FOR DAMAGES CAUSED BY COLLISION OR ROUGH HANDLING (CHECK OR EXPLAIN)

ITEM

OKAY

DEFECTS

- DOT Specification number on tank.
- Couplers - bent or worn.
- Couplers pins - missing or broken.
- Cotter pins - missing or broken.
- Air hoses - damaged or outdated (expired 8 years).
- Air lines - damaged.
- Angle cocks - broken or missing.
- Draft gear assembly nuts and bolts.
- Center or stub sill condition.
- Tank bolster condition.
- Tank center plate condition.
- Truck center bowl condition.
- Handbrake and assembly and chain grid condition.
- Platform grating and safety hand & foot rails at end of car.
- Flanges, rims or wheels - chipped or cracked.
- Springs - out of place, missing, broken or excessively weak.
- Brake shoes - missing, worn, broken (CI 1/2", Composite 3/8")
- Tank or tank jacket - damaged.
- Side or end ladders - damaged.
- Platform grating/safety hand rails at loading port.
- Tank tie downs - cracked or loose.
- Truck bolster and side frame condition.
- Roller bearing - cap screw, locking plate, adapter condition.

Stenciling:

FeCl₃ and "NOT FOR FLAMMABLE LIQUIDS".
"DO NOT WELD ON TANK"

Air Brake Control System (see AAR Manual for periodic attention):

- Cleaned, Oiled, Tested & Stenciled (COT&S).
- In Date Test & Stenciled (IDT&S).

- Lubrication (Lub) refers to roller bearings (see AAR Manual).

IF THERE ARE ANY DOUBTS ABOUT INSPECTION OF RAILCARS, PLEASE REFER TO THE RAILCAR INSPECTION TRAINING SPECIFICATION SHEET.

9/27/88

TO:

RAILCAR CHECK SHEET
CARS TO BE SHOPPED FOR MAINTENANCE

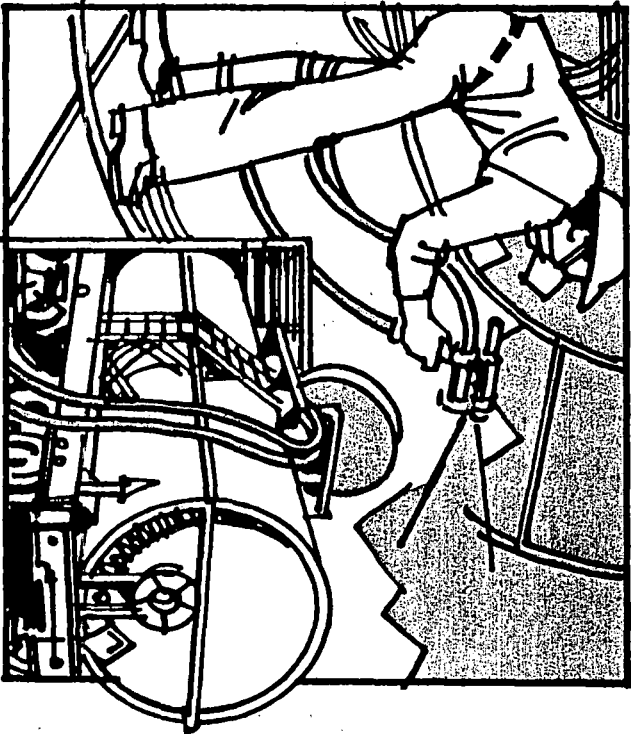
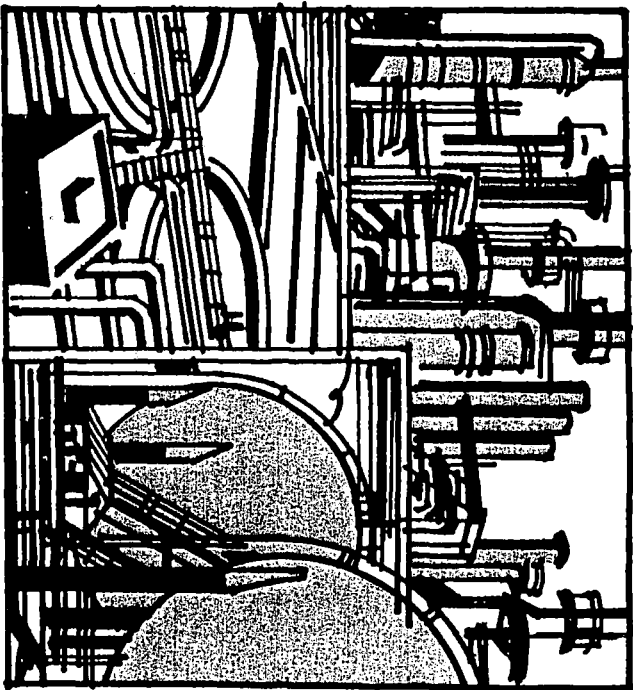
CHECKED BY
(Initial)

1. Railcar No: _____
2. Corrosive Placards on Residue Side. _____
3. Open loading dome and check for heel. (Car Must Not Leave
Plant With Any Heel in the tank.) Pump off any heel. _____
4. Secure dome lid. Tighten all bolts, loading lid, rupture
disc and air flange. _____
5. Safety chains in good condition and in place. _____
6. Handrail safety chains in place. _____

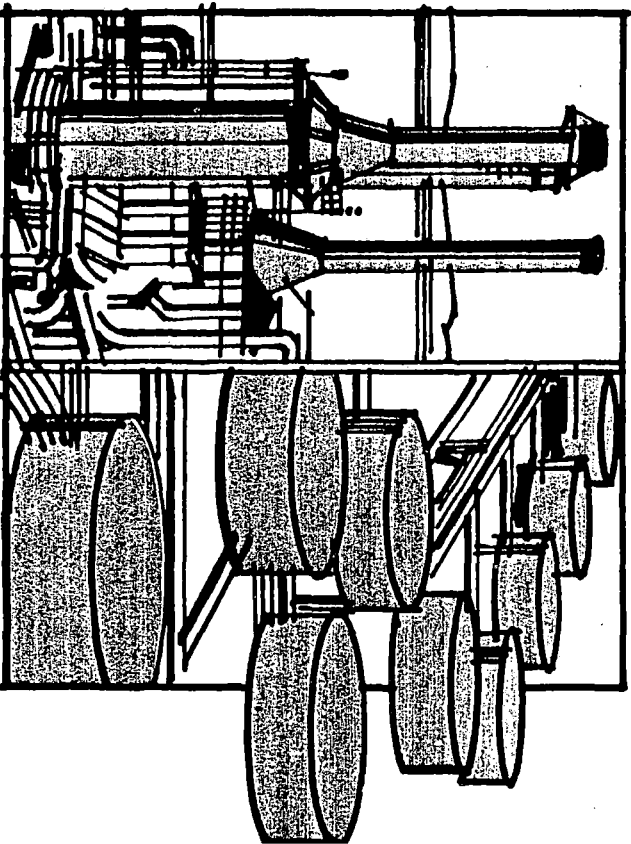
OPERATOR: _____

DATE: _____

Appendix I
Typical Tank Car Lining Literature



TANK LININGS AND CHEMICAL RESISTANT COATINGS



FUTURA

COATINGS INC.

TANK LININGS AND CHEMICAL RESISTANT COATINGS

Futura's "ULTRA-LINE" group of chemical resistant tank linings and coatings are designed for long-term service through a broad spectrum of chemicals and severely corrosive environments. The performance factors of ULTRA-LINE coatings begin where most other coatings systems leave off, making them the most outstanding chemical resistant coatings available. Their properties of high solids, high film build, and ambient cure result in easy, economical, and efficient application. For maximum performance in areas requiring corrosion or abrasion protection, select a Futura ULTRA-LINE coating system.

BENEFITS AND SAVINGS

FULL ARRAY OF COATINGS: The ULTRA-LINE group consists of coatings designed for application in a variety of specific industries. Various recommendations are outlined for each coating system in Table 1. Within each industry are coatings designed for various uses including floors, walls, ceilings, storage, transport, and process facilities. Since some coatings perform in a variety of applications, consult Futura for a recommendation of appropriate coatings for your specific needs.

AMBIENT CURE: ULTRA-LINE coatings are designed to cure at ambient temperatures. Since no baking is necessary to force a cure, ULTRA-LINE coatings save time and energy and prevent heat damage to foam insulation used on tank exteriors.

CHEMICAL AND CORROSION RESISTANCE: The ULTRA-LINE group is designed to resist corrosion caused by a variety of chemicals, including various acids, alkalies, bleaches, salts, and solvents. A detailed listing of chemical resistance for ULTRA-LINE coatings is found in Table 2.

USDA APPROVALS: Some members of the ULTRA-LINE group are approved by the USDA for use in the food industry. This group includes coatings designed for liquid immersion service, dry powder applications, and protection for floors, walls, and ceilings. These coatings also meet the requirements of the FDA Registrar. All coatings recommended in Table 1 for the food, beverage, and pharmaceutical industries are approved by the USDA.

TABLE 1 — COATING SYSTEM RECOMMENDATIONS

TYPE APPLICATION	100	352	356M	367	368	370	372	390	393	399	805	890	6000
Chemical & Petro Chem.	X	X	X	X			X	X		X	X	X	X
Mining & Refining		X	X					X		X			X
Pulp & Paper		X	X	X				X	X	X	X		
Water & Waste Treatment	X	X	X			X		X		X		X	X
Agricultural		X	X					X	X	X	X		
Textile Manufacturing								X	X	X			
Steel Mills								X		X			X
Food, Beverage, Pharmaceutical USDA Approved				X	X	X		X				X	

X Most Highly Recommended

ULTRA-LINE COATING SYSTEMS

PRODUCT DESCRIPTIONS

ULTRA-LINE 100: This highly impact resistant, inorganic zinc silicate coating is specially designed for the lining of steel tanks used for storage of aliphatic, aromatic, ketone, chlorinated, and other aggressive solvents.

ULTRA-LINE 352: A tough, high build, coal tar epoxy that provides economical chemical and water resistance in immersion or maintenance applications.

ULTRA-LINE 356M: This high solids, high build coal tar epoxy provides tough corrosion resistance in brine and water immersion and is formulated in a convenient one to one mixing ratio.

ULTRA-LINE 367: A general purpose epoxy lining for chemical resistance, potable water, and food processing applications. It is an excellent choice on rail tank cars, truck transports, storage tanks, pipes, and duct work.

ULTRA-LINE 368: A high solids, heavy-duty tank lining which forms a high gloss, "tile-like" finish for easy cleanability and sanitation. Originally created for the beverage industry, it is a specific for wine, citrus, grape, other fruit juices, and syrup storage applications.

ULTRA-LINE 370: This chemical resistant epoxy coating is unexcelled in potable water and salt water immersion applications. Its general properties are useful in transport, floor, wall, and ceiling applications.

ULTRA-LINE 372: This epoxy coating is formulated for jet and aviation fuel tank lining applications. It provides excellent resistance to aromatic and aliphatic hydro-

carbons and light and heavy oils. Complies with MIL-C-4556D Specifications.

ULTRA-LINE 390: An ultra heavy-duty epoxy with outstanding resistance to a wide variety of acids, alkalies, salts, and solvents. It is useful in immersion, floor, wall, and ceiling applications.

ULTRA-LINE 393: A high solids, heavy-duty epoxy coating specifically designed to have excellent resistance to organic and inorganic acids.

ULTRA-LINE 399: A chemically setting epoxy which cures at ambient temperatures and equals or outperforms high temperature baked, phenolic modified coatings in resisting aggressive acids, alkalies, salts, oxidizing agents, and solvents.

ULTRA-LINE 805: A highly impermeable butyl rubber coating designed to resist strong acids, alkalies, aggressive salts, and oxidizing agents. This flexible coating absorbs vibration and resists wear.

ULTRA-LINE 890: This synthetic rubber coating displays high elongation, flexibility, and a wide operating temperature range. It is unaffected by long-term immersion in water, resists a wide spectrum of chemicals, and performs extremely well on clarifiers and in water treatment facilities.

ULTRA-LINE 6000: A 100% solids, fast-setting urethane elastomer with unexcelled flexibility, abrasion, and impact resistance. It resists a variety of chemicals and is useful in lining storage vessels, hopper cars, conveyors, and slurry conveyance systems.

RELATED PRODUCT GROUPS

Futura offers other product lines to complement the ULTRA-LINE tank lining group. Two of these are outlined below. Our experience in these areas makes us the one supplier for all your coatings needs. For information on the product groups described below, write or call Futura today.



Wear and Abrasion Resistant Coatings

This series of advanced urethane elastomers is designed specifically to solve severe wet and dry abrasion problems in a variety of applications and environments.



Foam Insulation Coatings

Futura has a full line of elastomeric coatings for the protection of urethane foam tank insulation. These range from low permeable butyl rubbers to high gloss aliphatic urethanes.

TABLE 2 CHEMICAL RESISTANCE CHART

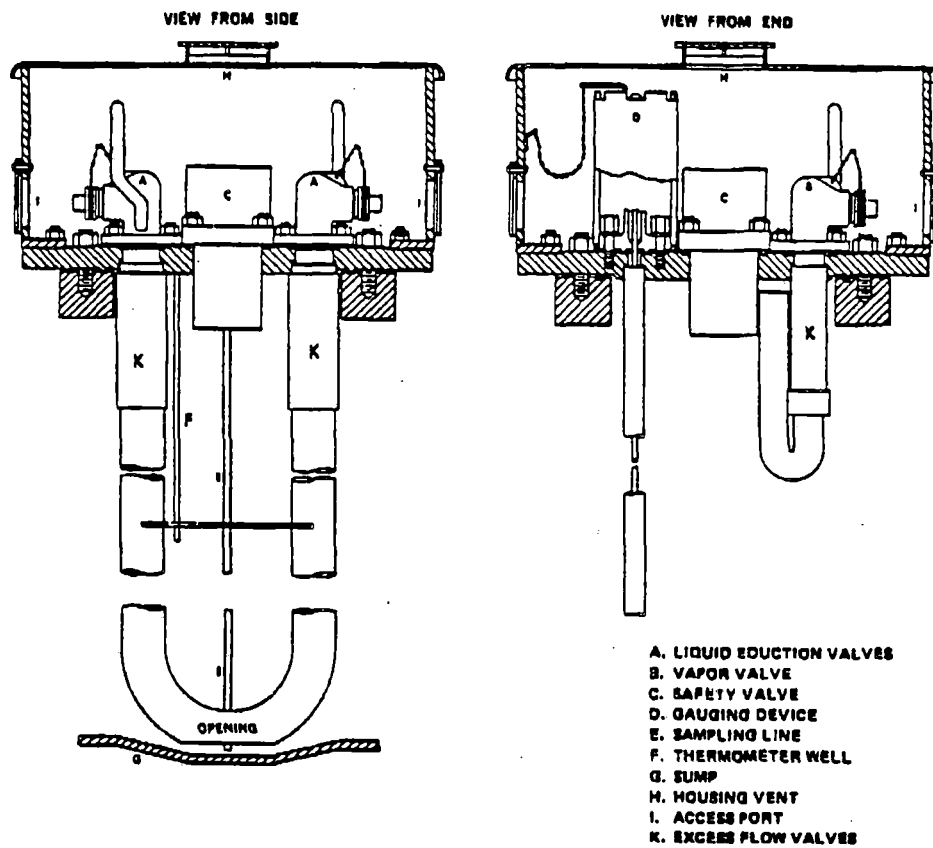
	100	350	356	367	368	370	372	380	383	389	805	890	6000*		100	350	356	367	368	370	372	380	383	389	805	890	6000*		100	350	356	367	368	370	372	380	383	389	805	890	6000*									
ACIDS														Sodium Sulfide, 50%															Hexane																					
Acetic, 5%		U	U	L	S			L	S	S	S	S																	Isophorone	S	S	S	S			S	S	S	S											
Acetic, 10%				U	S			U	S	S	S	S			BLEACHES AND OXIDANTS														Isopropyl Alcohol	S		S					S	L	S											
Acrylic Acid, 5%				U				U	S	S	U	S			Ammonium Persulfate		S	S	S			S	S	S	S	S			Kerosene	S	S	S	S			S	S	S	S											
Boric, 10%		S	S	S				S	S	S	S	S			Calcium Chlorate		S	S	S			S	S	S	S	S			Methyl Alcohol	S		L	S			L	U	S												
Butyric, 50%				S				S	S	S	S	S			Calcium Hypochlorite		S	S	S			S	S	S	S	S			Methyl Cellosolve	S		S				S	S	S												
Carbolic (See Phenol)															Chlorine Dioxide, 10%		S	S	S			S	S	S	S	S			Methyl Cellosolve Acetate	S		S				S	S	S												
Carbonic (Sat.)		S	S	S				S	S	S	S	S			Chlorine Water (Sat.)		S	S	S			S	S	S	S	S			Methylene Chloride	S		U				U	U	U												
Chloroacetic, 5%				L				L	L	S	S				Hydrogen Peroxide, 30%		L	L	S			S	S	S	S	S			Methyl Ethyl Ketone	S		L				L	L	S												
Chromic, 5%				U				U	U	L	U				Potassium Permanganate		S	S	S			S	S	S	S	S			Methyl Iso Butyl Ketone	S		L				L	U	L												
Citric, 5%		S	S	S				S	S	S	S	S			Sodium Chlorate, 50%		S	S	S			S	S	S	S	S			Naphtha	S	S	S	S			S	S	S	S											
Formic, 5%				U				U	L	S	L				Sodium Hypochlorite, 10%		L	L	S			S	S	S	S	S			Nitrobenzene	S		L				U	U	S												
Hydrochloric, 5%		L	L	L				L	S	S	S	S			SALTS														Perchloroethylene	S																				
Hydrochloric, 10%		U	U	L				L	S	S	L	S			Aluminum Chloride		U	S	S	S		S	S	S	S	S	S			Styrene	S		L				S	U	S											
Hydrochloric, 37%		U	U	U				U	U	L	U				Ammonium Nitrate		U	S	S	S		S	S	S	S	S	S			Tetrahydrofuran	S		U				U	U	U											
Hydrofluoric, 10%		U	U	L				L	S	S	S				Ammonium Sulfate		U	S	S	S		S	S	S	S	S	S			Toluene	S	S	S	S			S	S	S	S										
Lactic, 10%		S	S	S				S	S	S	S	S			Calcium Chloride		U	S	S	S		S	S	S	S	S	S			Trichloroethylene	S		L				U	U	S											
Maleic, Dry		S	S	S				S	S	S	S	S			Calcium Chloride		U	S	S	S		S	S	S	S	S	S			Trichloroethane	S		L				U	U	S											
Maleic, 10%		S	S	S				S	S	S	S	S			Calcium Sulfate		U	S	S	S		S	S	S	S	S	S			Turpentine	S	S	S	S			S	S	S	S										
Nitric, 5%		S	S	S				S	S	S	S	S			Magnesium Chloride		U	S	S	S		S	S	S	S	S	S			VM & P	S	S	S	S			S	S	S	S										
Nitric, 10%		L	L	S				S	S	S	S				Magnesium Sulfate		U	S	S	S		S	S	S	S	S	S			Xylene	S	S	S	S			S	S	S	S										
Nitric, 20%				L				L	S	S	S				Potassium Chloride		U	S	S	S		S	S	S	S	S	S																							
Oleic		S	S	S				S	S	S	S	S			Potassium Dichromate		U	S	S	S		S	S	S	S	S	S			MISCELLANEOUS COMPOUNDS																				
Oxalic, Dry		S	S	S				S	S	S	S	S			Potassium Nitrate		U	S	S	S		S	S	S	S	S	S			Axtrex 4L		S	S	S				S	S	S	S									
P Toluene Sulfonic		S	S	S				S	S	S	S				Potassium Sulfate		U	S	S	S		S	S	S	S	S	S			Acetaldehyde	S	U	U	U				U	U	U										
Perchloric								S	S	S					Sodium Chloride		U	S	S	S		S	S	S	S	S	S			Acetonitrile	S	L	L	U				U	U	L										
Phenol, 5%		U	U	U				U	L	L	S				Sodium Nitrate		U	S	S	S		S	S	S	S	S	S			Acrylonitrile	S	U	U	U				U	U	U										
Phenol, 10%		U	U	U				U	U	U	L				Sodium Sulfate		U	S	S	S		S	S	S	S	S	S			Aniline		U	U	U				U	U	L	S									
Phosphoric, 10%		L	L	S				S	S	S	S	S			SOLVENTS														Aviation Gas	S						S	S													
Phosphoric, 20%		U	U	L				S	S	S	S	S			Acetone		S		U			U	U	L					Bicep		L	L	S				S	S	S											
Phosphoric, 50%		U	U	L				S	L	S	S				Allyl Acetate		S		L			L	U	S					Crude Oil		S	S	S				S	S	S											
Phosphoric, 85%		U	U	U				L	L	L	S				Allyl Alcohol		S		L			L	U	S					Dichloropropane		U	U	U				L	L	S											
Phthalic (Dry)		S	S	S				S	S	S	S	S			Amyl Acetate		S		L			L	U	S					DDP		S	S	S	S	S	S	S	S	S											
Sulfuric, 10%		L	L	S				S	S	S	S	S			Benzene		S		L			S	U	S					Duel BE		S	S	S				S	S	S	S										
Sulfuric, 20%		L	L	S				S	S	S	S	S			Butyl Acetate		S		S			S	S	S					Epichlorohydrin		S	U	U	U				U	U	U										
Sulfuric, 50%		U	U	L				L	L	S	S	S			Butyl Alcohol		S		L			L	U	S					Ethyl Acrylate								L	U	S											
Sulfuric, 98%									L	L					Butyl Cellosolve		S		S			S	S	S					Ethylene Dichloride		S	U	U	U				U	U	U										
Sulfurous (Sat.)								S	S	S	S				Butyl Cellosolve Acetate		S		S			S	S	S					Formaldehyde, 37%			U	U	S				U	U	S	S									
Tartaric Acid, 10%		S	S	S				S	S	S	S	S			Carbon Tetrachloride		S		S			S	S	S					Gasohol				S				S													
Tannic, 10%		S	S	S				S	S	S	S	S			Carbitol		S		L			L	U	S					JP-4 Fuel								S													
ALKALI														Carbon Tetrabromide		S																																		
Aluminum Hydroxide (Dry)		S	S	S				S	S	S	S	S			Cellosolve		S		S			S	S	S					Latex (Acidic)				S				S	S	S	S										
Ammonium Bicarbonate, 50%		S	S	S				S	S	S	S	S			Cellosolve Acetate		S		S			S	S	S					Latex (Alkaline)								S	S	S	S										
Ammonium Carbonate, 50%		S	S	S				S	S	S	S	S			Chlorobenzene		S		U			U	U	S					Methyl Acrylate		S	U	U	U				U	U	L										
Aqueous Ammonia, 10%		S	S	S				S	S	S	S	S			Chloroform		S		U			U	U	U					Phosphorus Trichloride		U	U	U				L	L	S											
Aqueous Ammonia, 28%		S	S	S				S	S	S	S	S			Cyclohexane		S	S	S	S		S	S	S	S				Roundup		S	S	S				S	S	S											
Barium Carbonate, 50%		S	S	S				S	S	S	S	S			Cyclohexanol		S												Skydrol		S	S	S				S	S	S											
Barium Hydroxide, 10%		S	S	S				S	S	S	S	S			Cyclohexanone		S												TCP		S	S	S				S	S	S											
Calcium Hydroxide, 25%		S	S	S				S	S	S	S	S			Carbon Disulfide		S																																	

Appendix J

Rail Tank Car Loading/Unloading Fittings

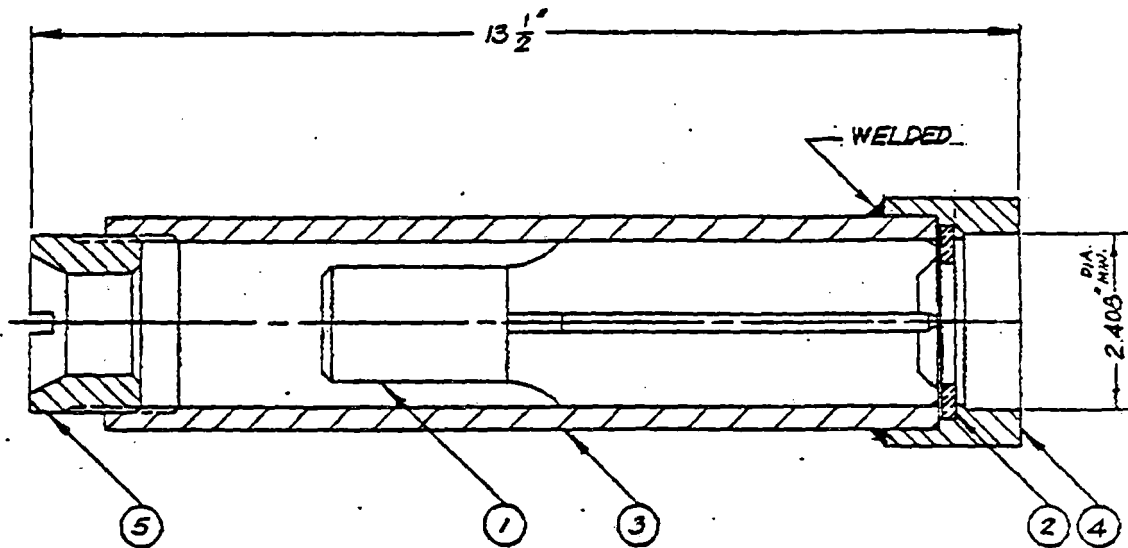
The tank car fittings on pressurized tank cars consist of one safety relief valve, one vapor line valve, two liquid (eduction) line valves, a gaging device, a thermometer well, and a sample line connection. The fittings are fastened to the manway cover plate. The eduction (liquid) and vapor lines are equipped with excess flow-check valves which are located at the cover plate inside the tank car. The eduction lines have pipes extending from the excess flow check valves to the bottom of the car. The liquid and vapor lines are equipped with valves external to the tank used to connect loading and unloading lines. The assembly of these devices is shown in Figure J.1. The excess flow check valve (Figure J.2) and tank car angle valve (Figure J.3) is connected to the manway as shown in Figure J.4.

Figure J.1



Standard tank car pressure fittings

Figure J.2



NO.	NAME	VALVE A-134 W
		MATERIAL PART NO.
1	FLOAT	MAIL IRON 130-1-MI
2	WASHER	STEEL 130-2-CS
3	BODY	STEEL 134-3-CS
4	COUPLING	STEEL 135-4-CS
5	PLUG	STEEL 134-5-CS

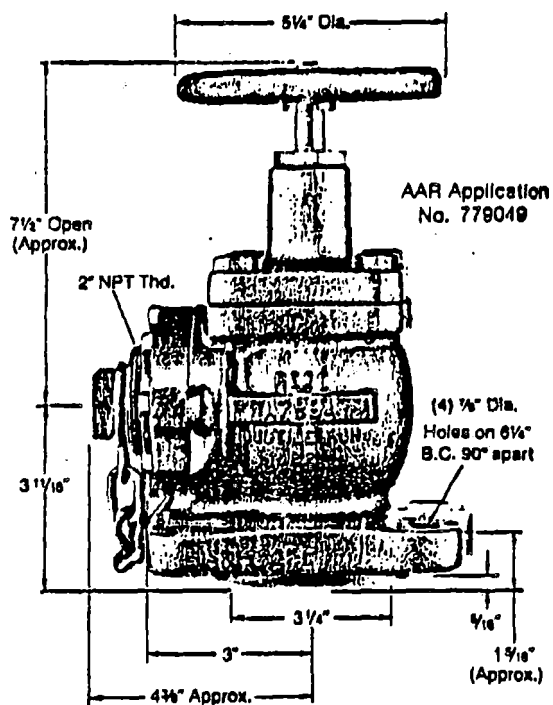
MAX. CAPACITY - 780 GPM OF PROPANE

PROCOR PART NO 308-2620.

		MATERIAL	MIDLAND MFG. CORP.	
		SEE TABLE	SKOKIE, ILL.	
		REMOVE ALL BURRS. BREAK ALL EDGES & CORNERS	EXCESS FLOW CHECK VALVE	
		STD. TOLERANCES UNLESS SPECIFIED	SCALE HALF	DRAWN BY CP
		DECIMAL ± .005 FRACTIONS ± .015	DATE 9-13-80	REVISION
REVISION		DATE BY	A-134 W	

Midland excess flow check valve

Figure J.3



TA7894P 2" Tank Car Angle Valve
FLOW CHARACTERISTICS
 (In gallons per minute)

Pressure Drop Across Valve PSIG	H ₂ O (Water)	LP-Gas (Propane)	NH ₃ (Anhydrous Ammonia)
1	80	112	102
2	113	158	145
3	139	195	178
4	160	224	205
5	180	224	205
10	253	354	324
20	358	501	458
50	566	792	724

Appendix K

**Measured Flows and Temperatures;
ESV Tests, August 25, 1989, CFB Gagetown**

Nomenclature refers to Figure 5-5.

Test 1. Flow A ---> B; fitted pneumatic ESV-1

- Flow meter A (UNB)
- Ta
- Tb
- Tf

Test 2. Flow B ---> A; fitted pneumatic ESV-1

- Flow meter A (UNB)
- Flow meter B (NBP)
- Ta
- Tb
- Tf

Test 2a. Flow B ---> A; fitted pneumatic ESV-1

- Flow meter A (UNB)
- Flow meter B (NBP)
- Ta
- Tb
- Tb

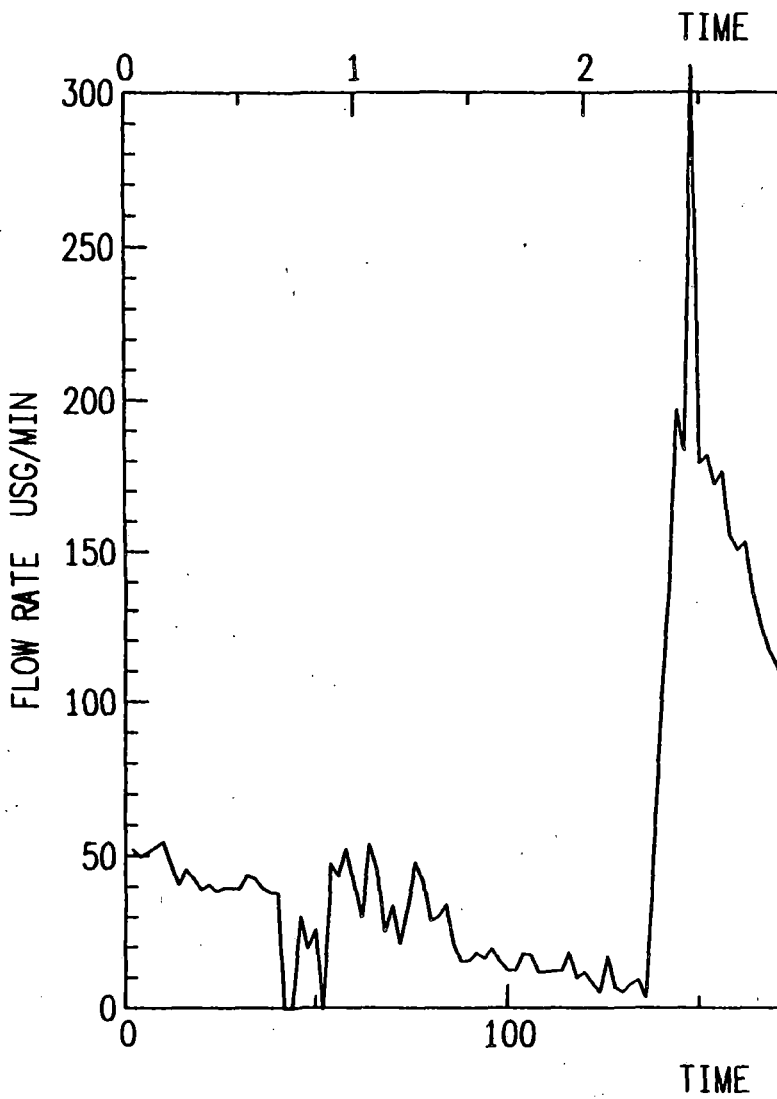
Test 3. Flow B ---> A; no ESV-1

- Flow meter A (UNB)
- Flow meter B (NBP)
- Ta
- Tb
- Tf

Test 4. Flow A ---> B; no ESV-1

- Flow meter A (UNB)
- Flow meter B (NBP)
- Ta
- Tf

Test 1, Flow A ----> B, LPG Flow Rate, Measuring Station A



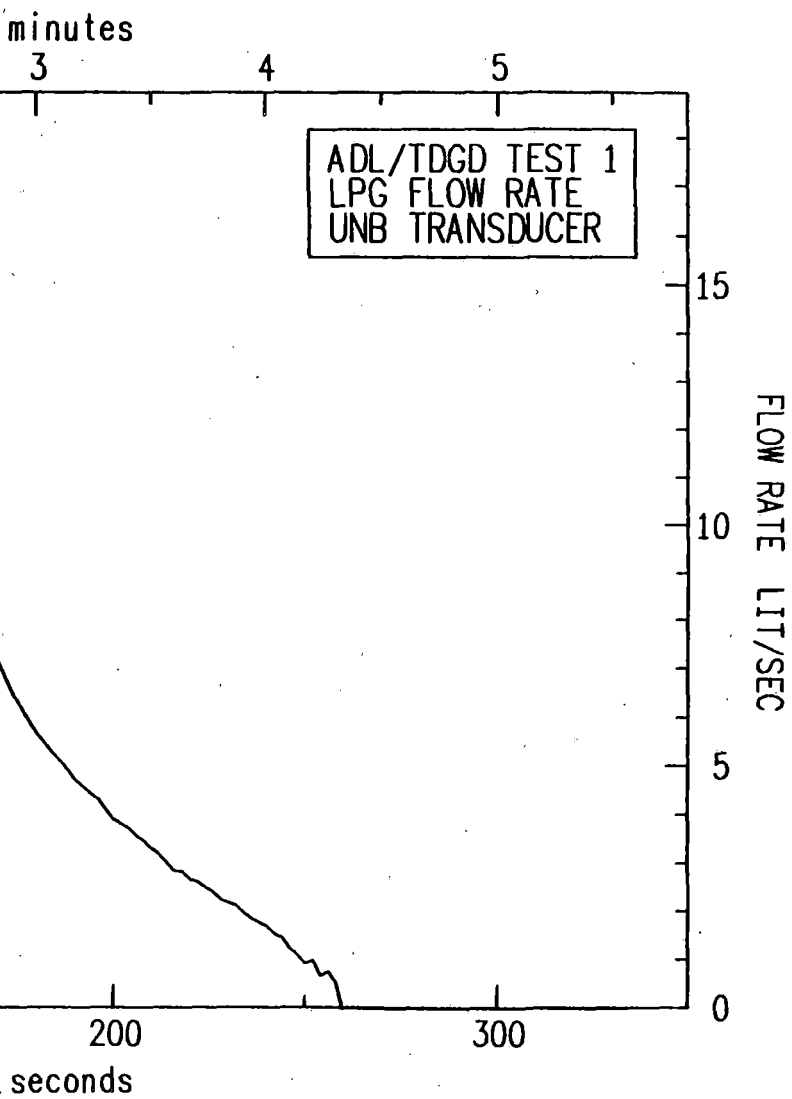


Figure K.1.1

Test 1, Flow A ---> B, Temperature, Measuring Station Ta

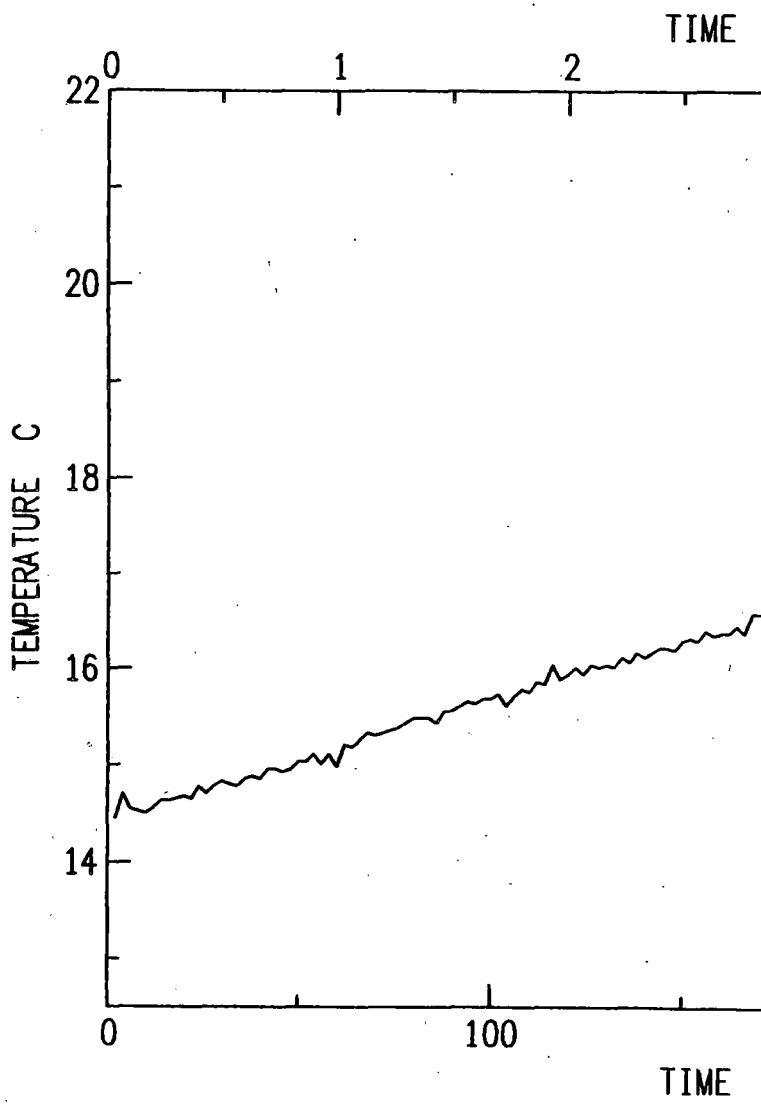
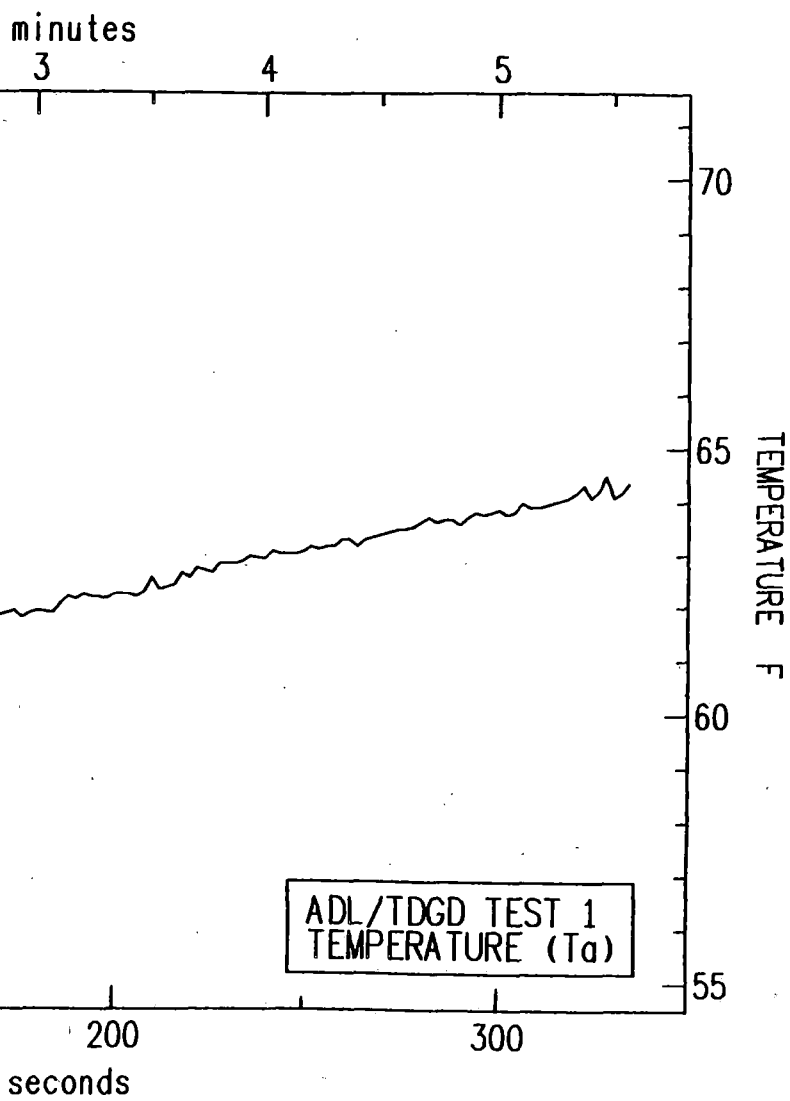


Figure K.1.2



Test 1, Flow A ---> B, Temperature, Measuring Station Tb

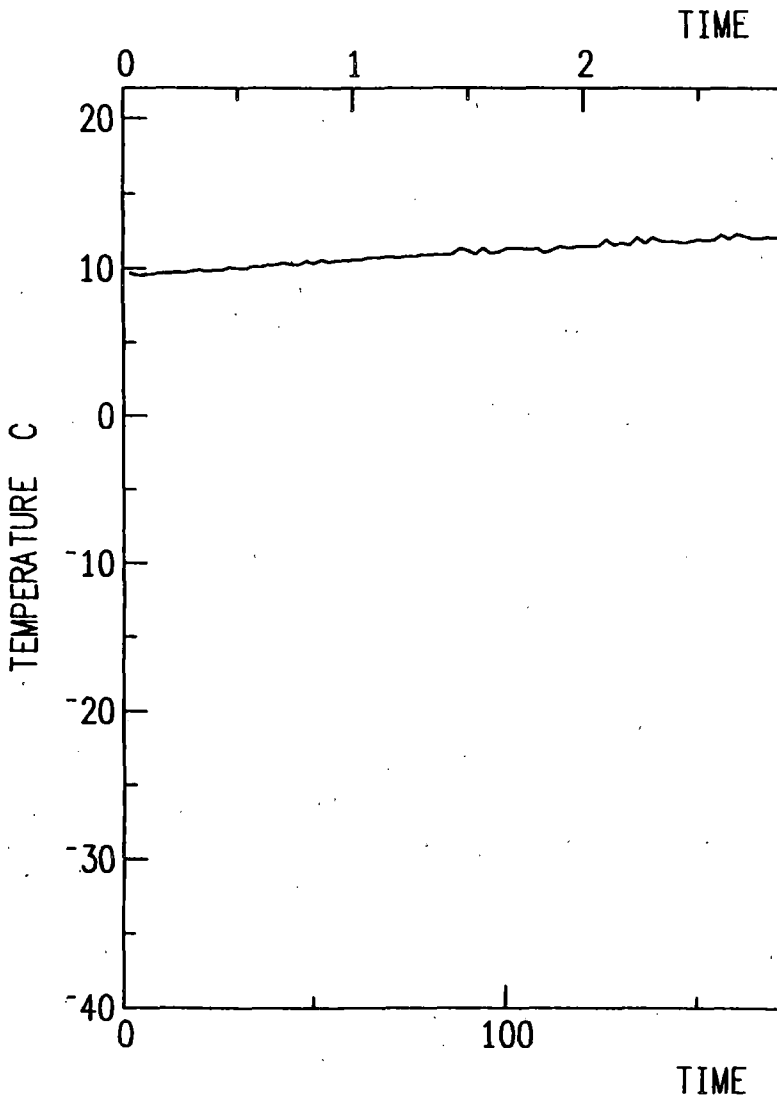
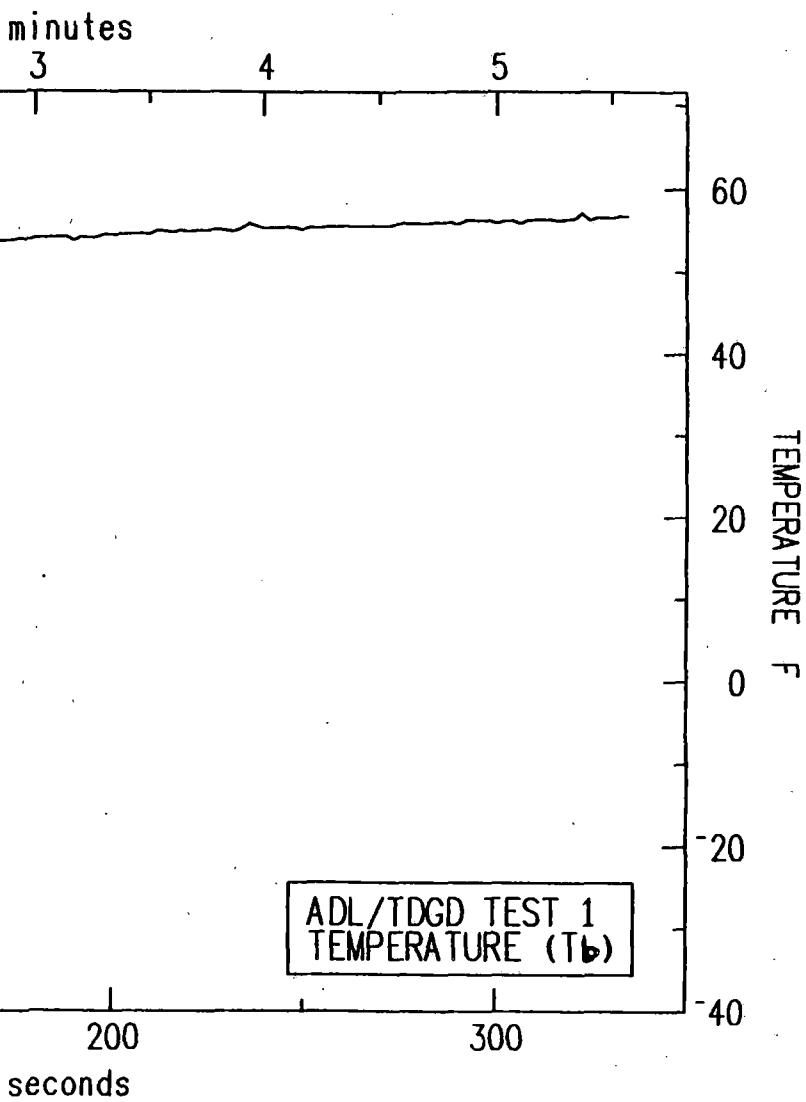


Figure K.1.3



Test 1, Flow A ----> B, Temperature, Measuring Station Tf

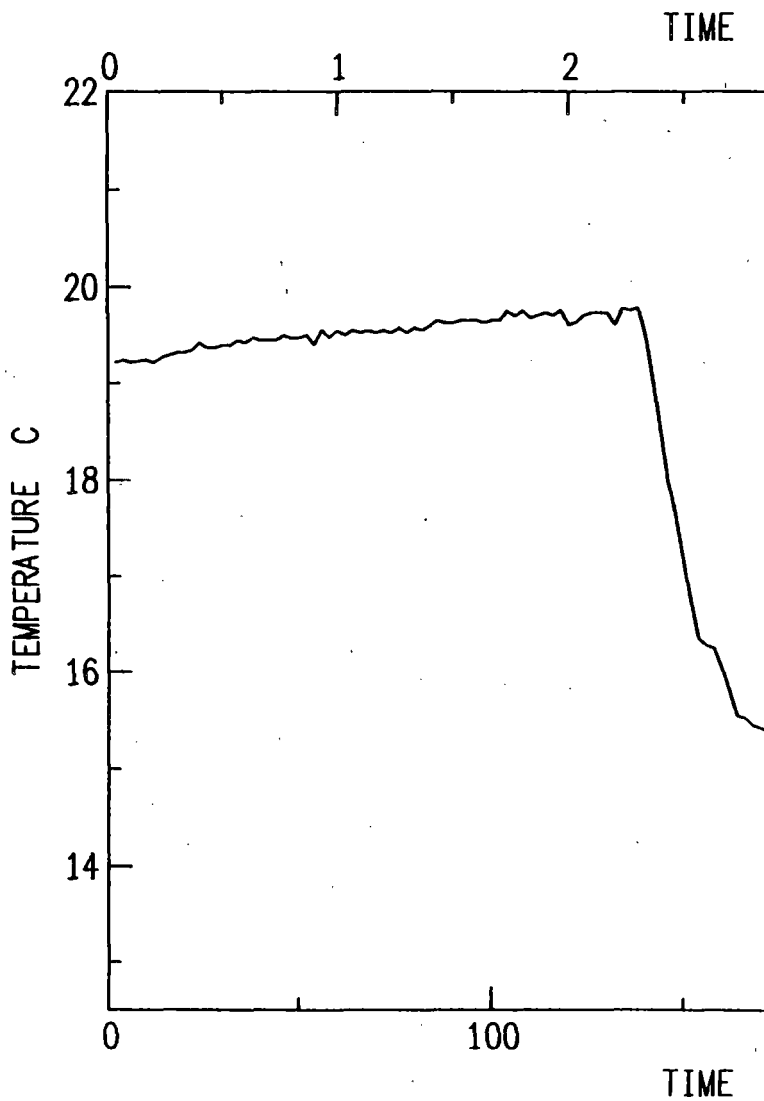
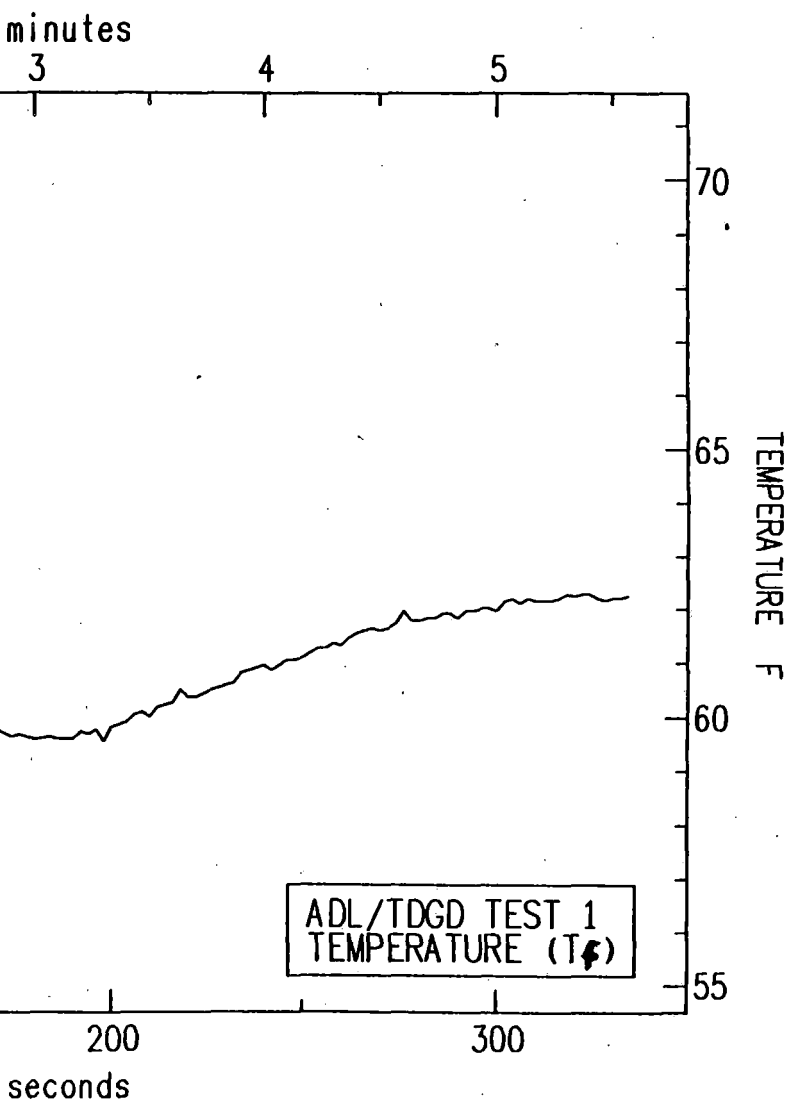
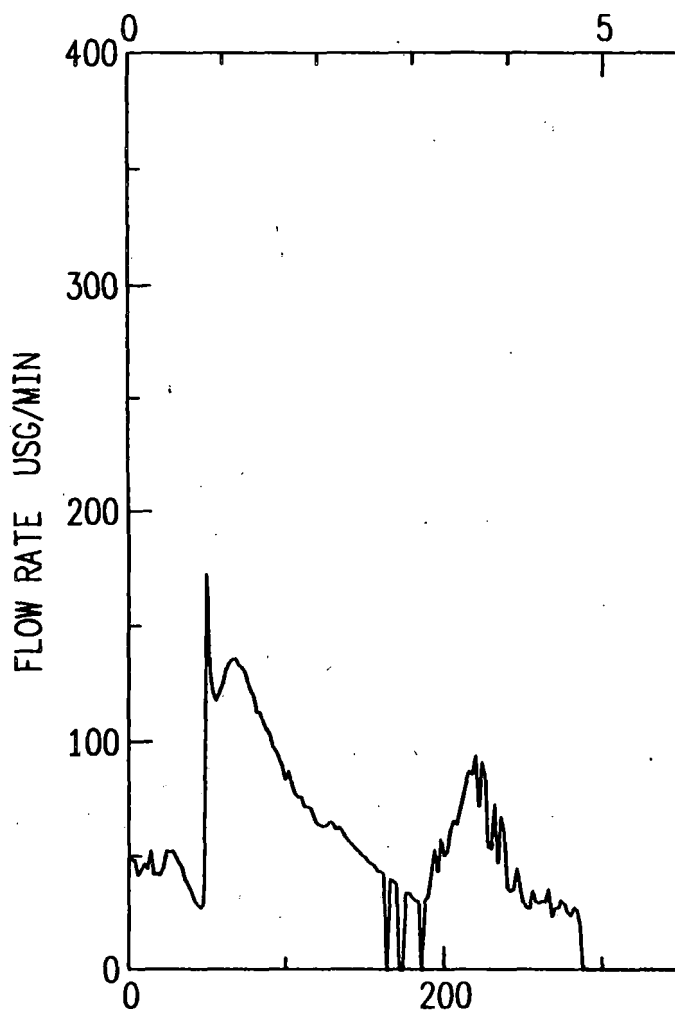


Figure K.1.4



Test 2, Flow B ---> A, LPG Flow Rate, Measuring Station A



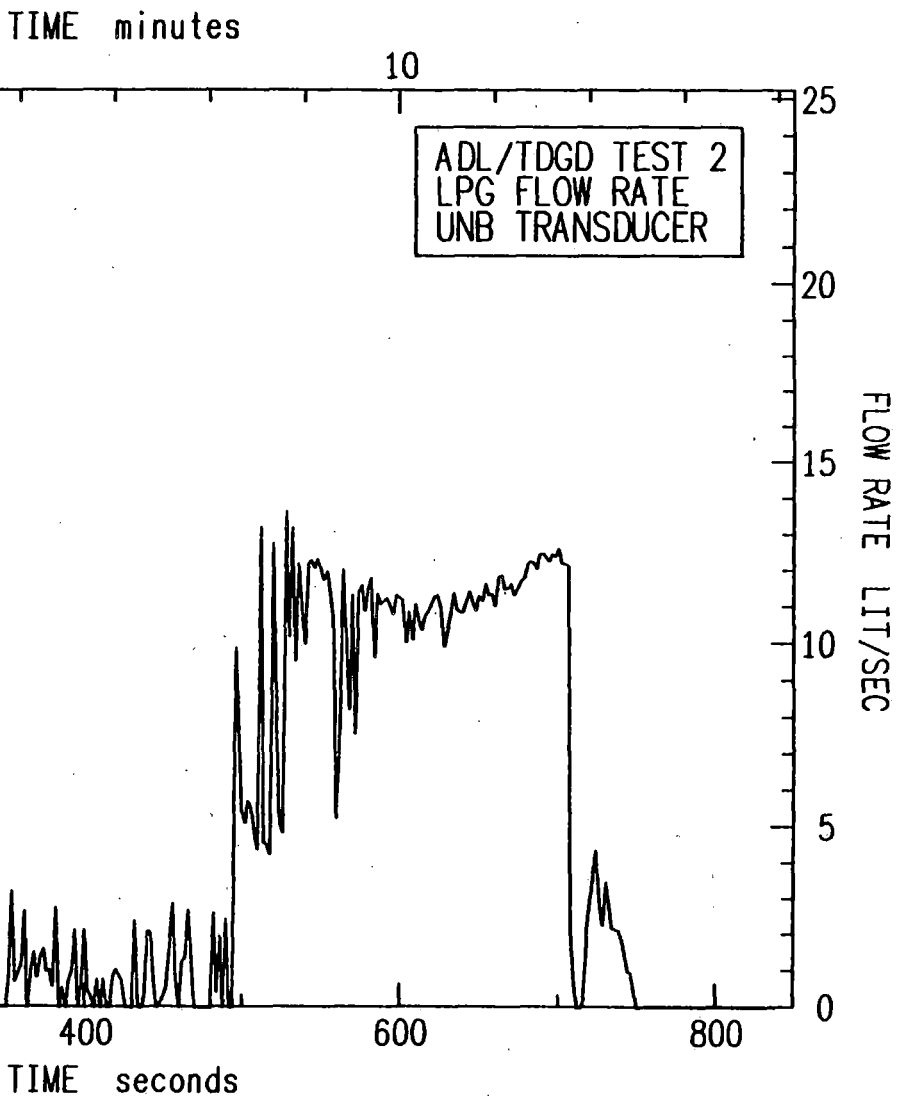


Figure K.2.1

Test 2, Flow B ----> A, LPG Flow Rate, Measuring Station B

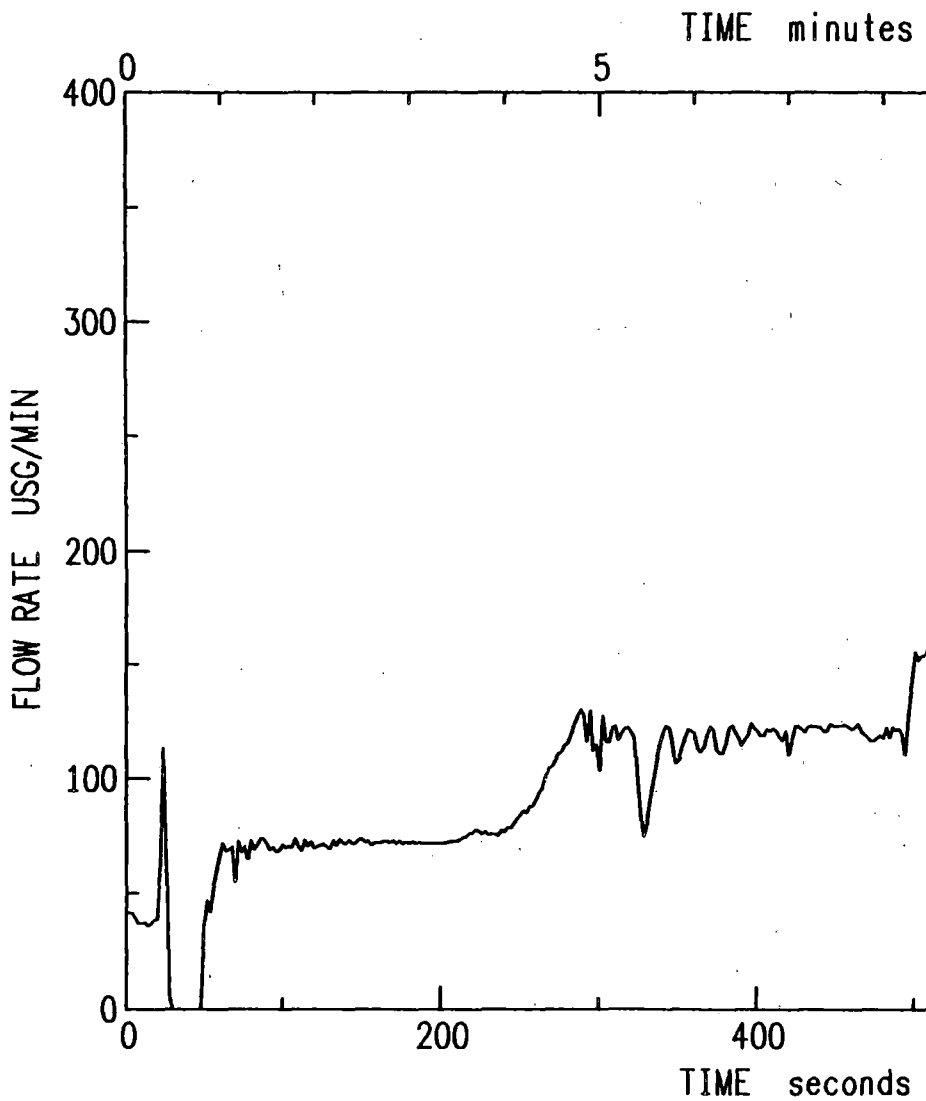
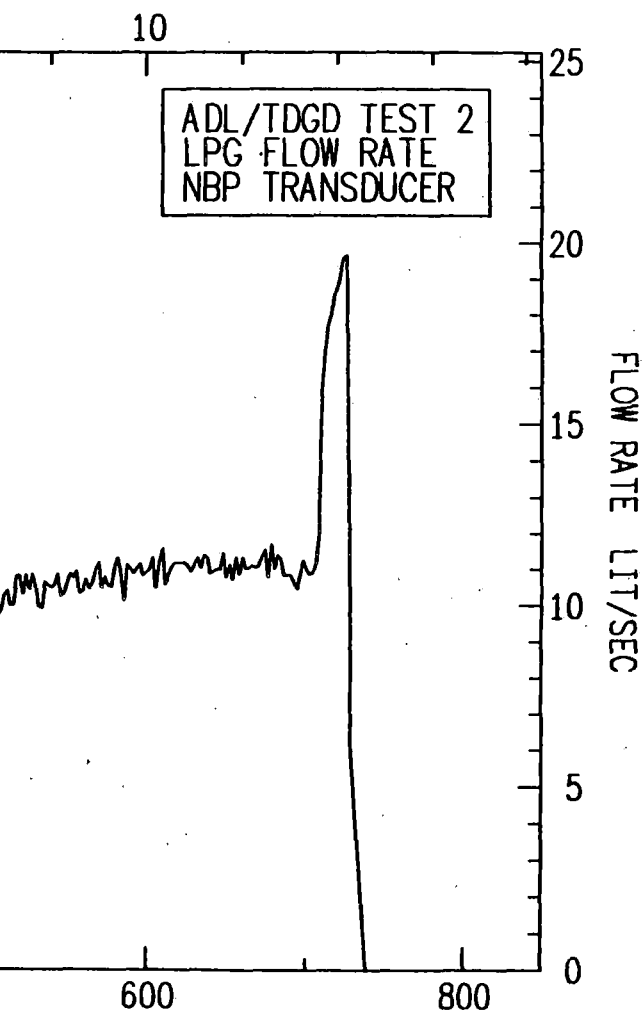


Figure K.2.2



Test 2, Flow B ----> A, Temperature, Measuring Station Ta

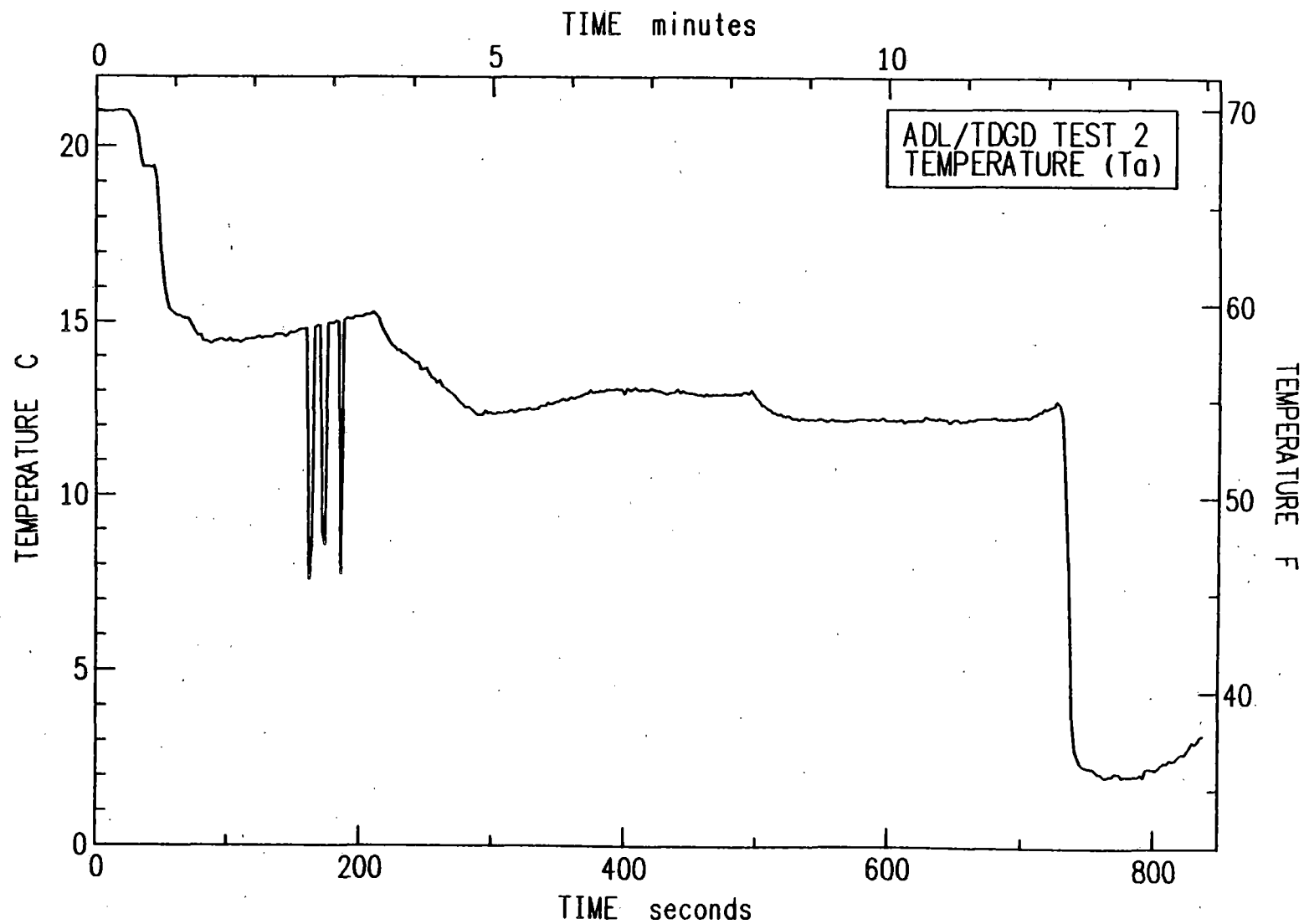


Figure K.2.3

Test 2, Flow B ----> A, Temperature, Measuring Station Tb

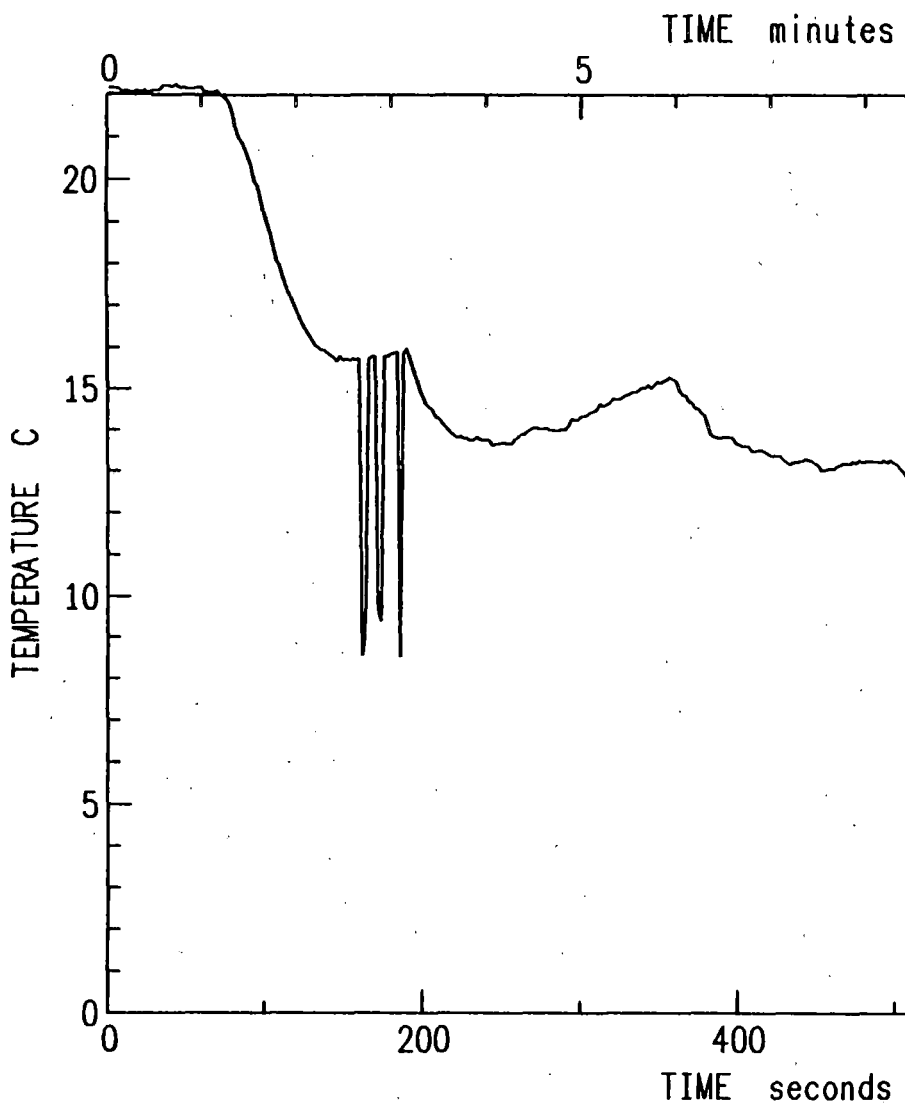


Figure K.2.4

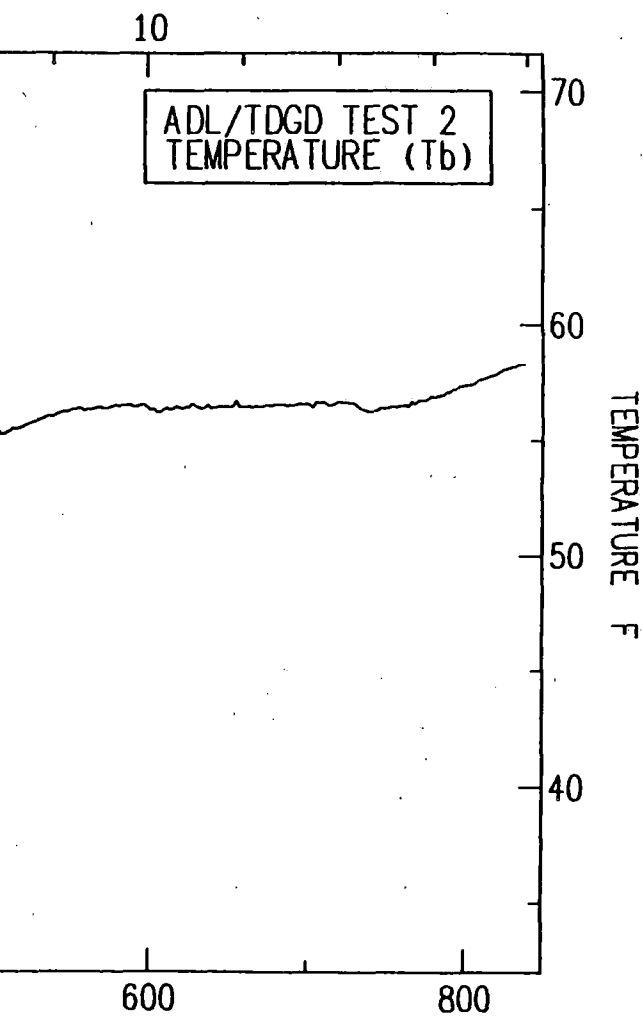
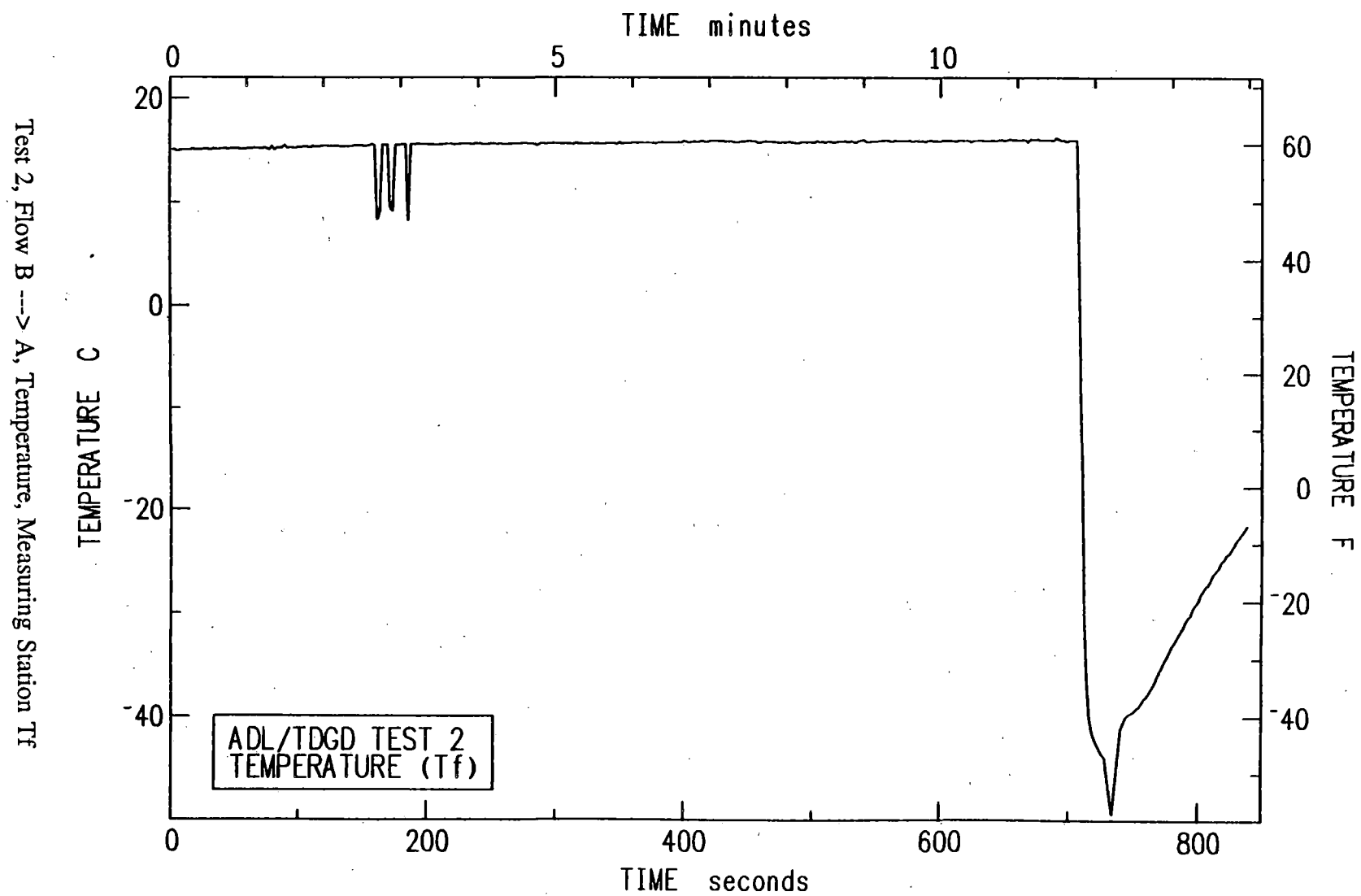


Figure K.2.5



Test 2a, Flow B ---> A, LPG Flow Rate, Measuring Station A

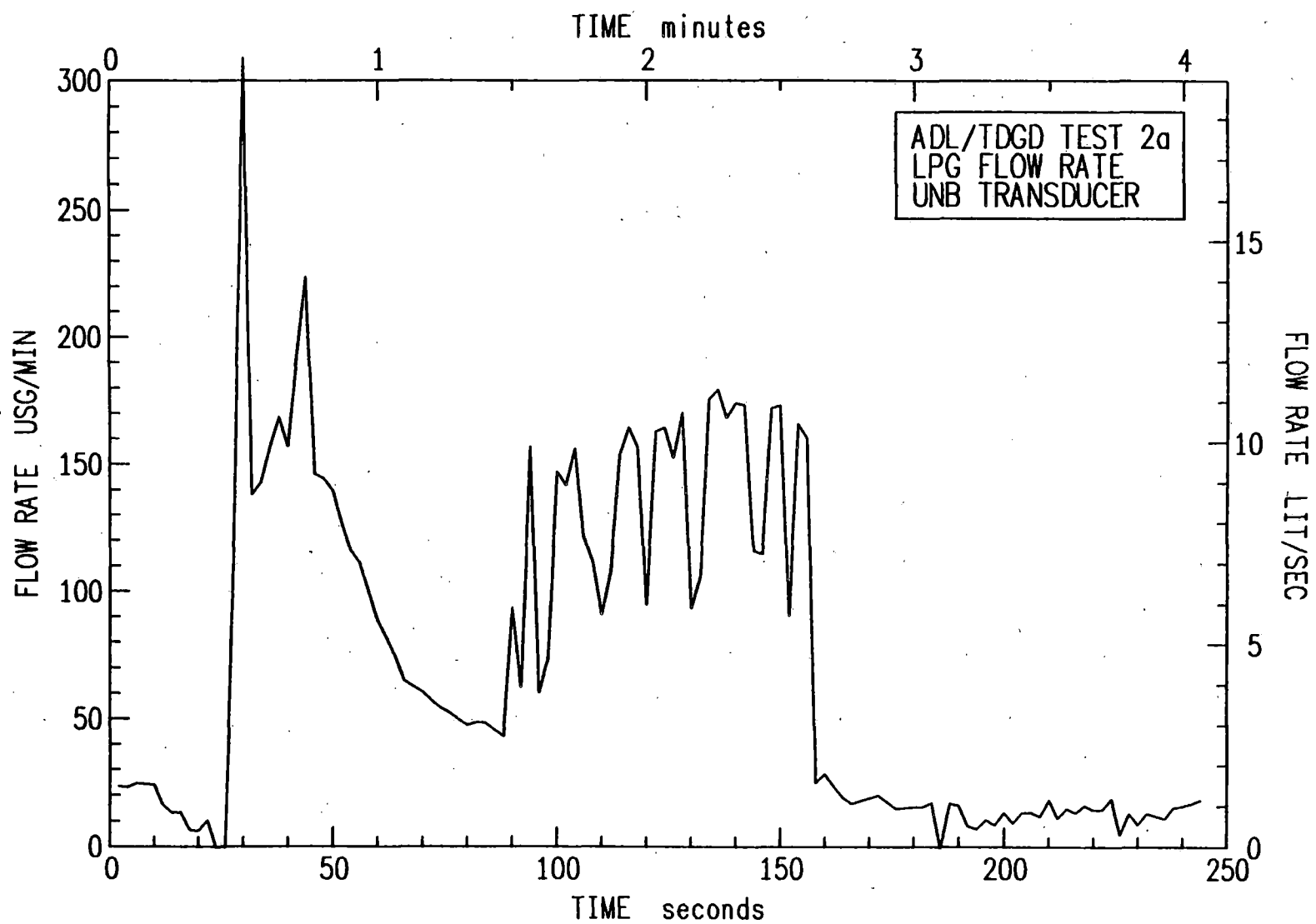


Figure K.2a.1

Test 2a, Flow B ----> A, LPG Flow Rate, Measuring Station B

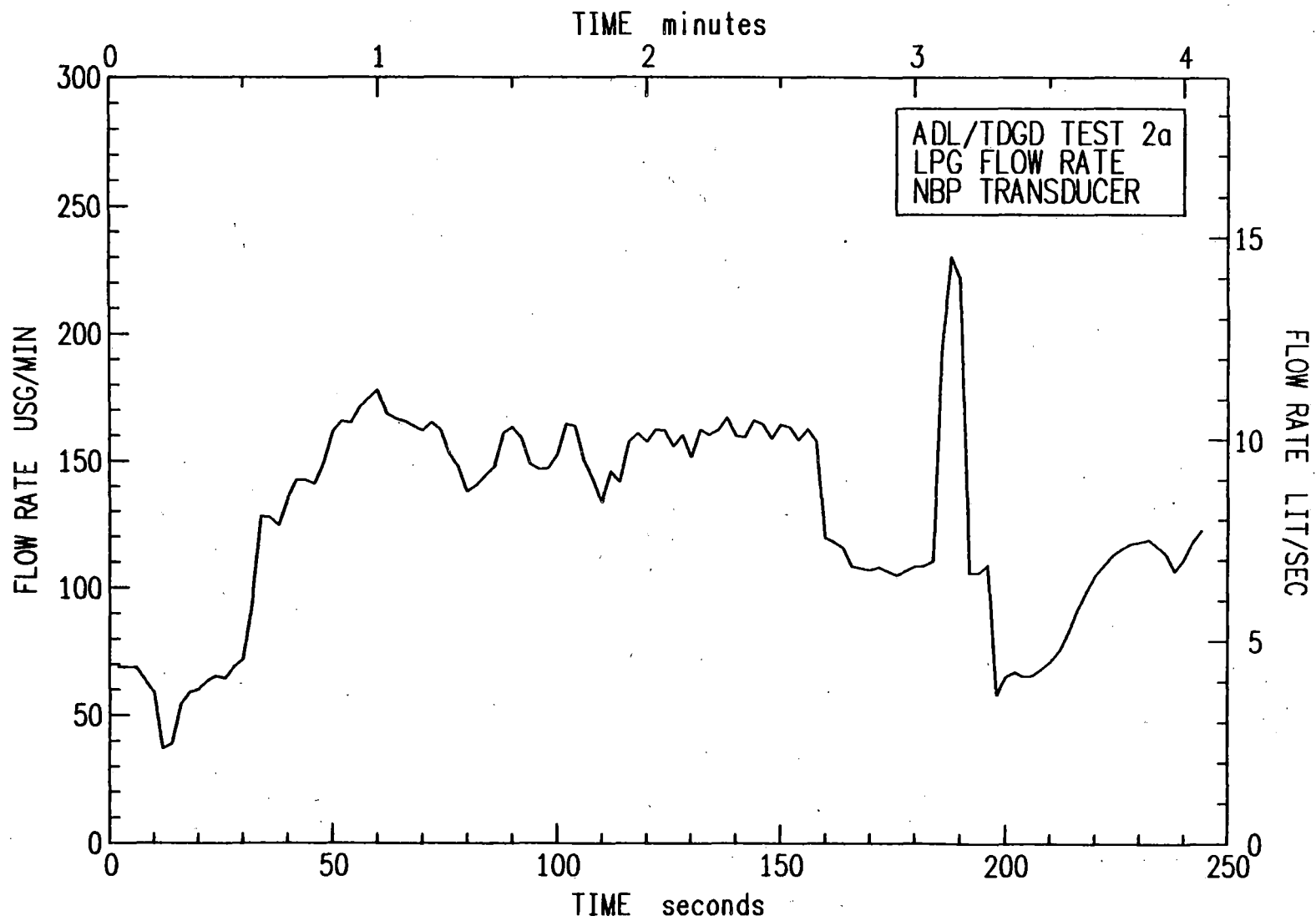


Figure K.2a.2

Test 2a, Flow B ----> A, Temperature, Measuring Station Ta

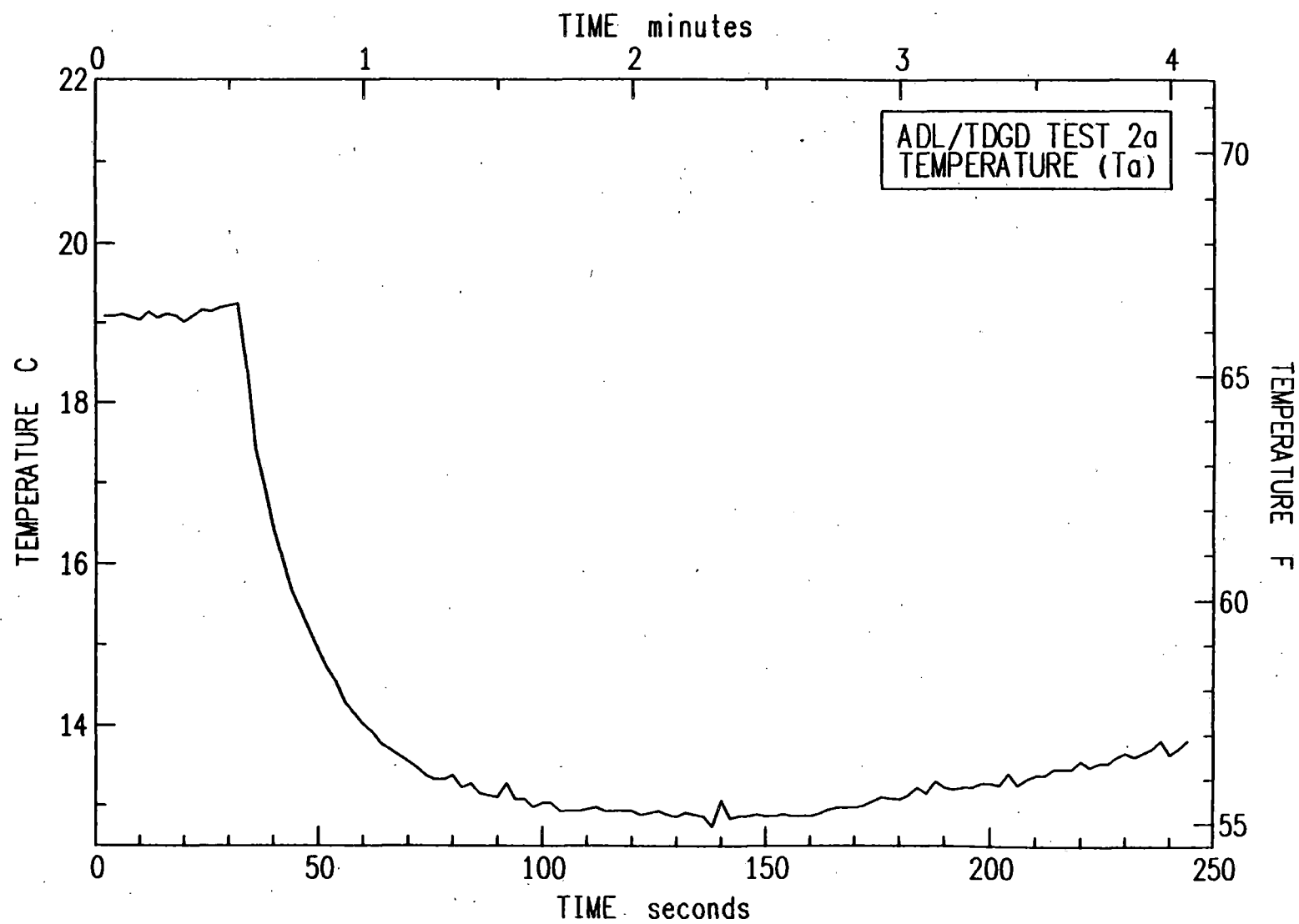


Figure K.2a.3

Test 2a, Flow B ----> A, Temperature, Measuring Station Tb

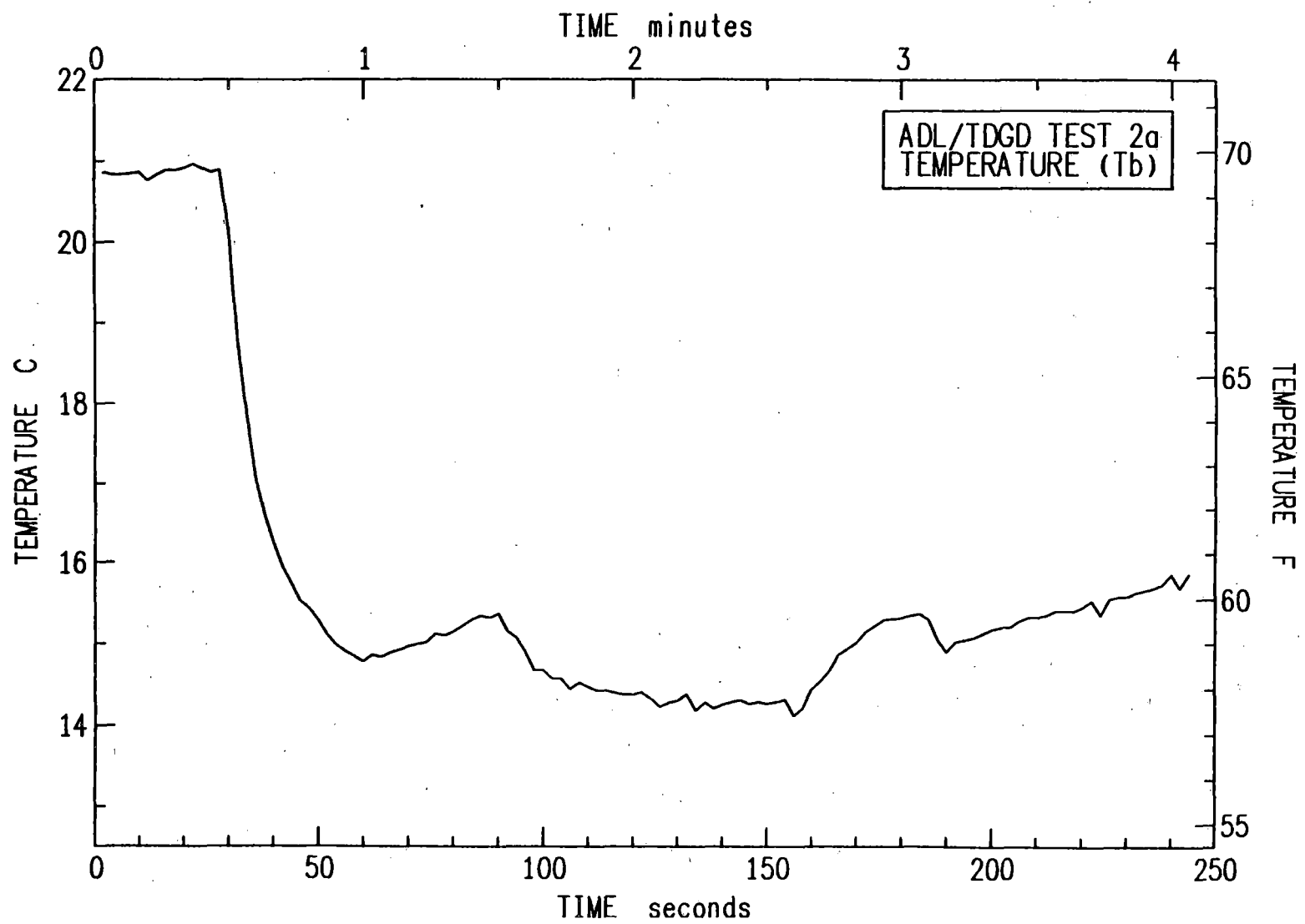
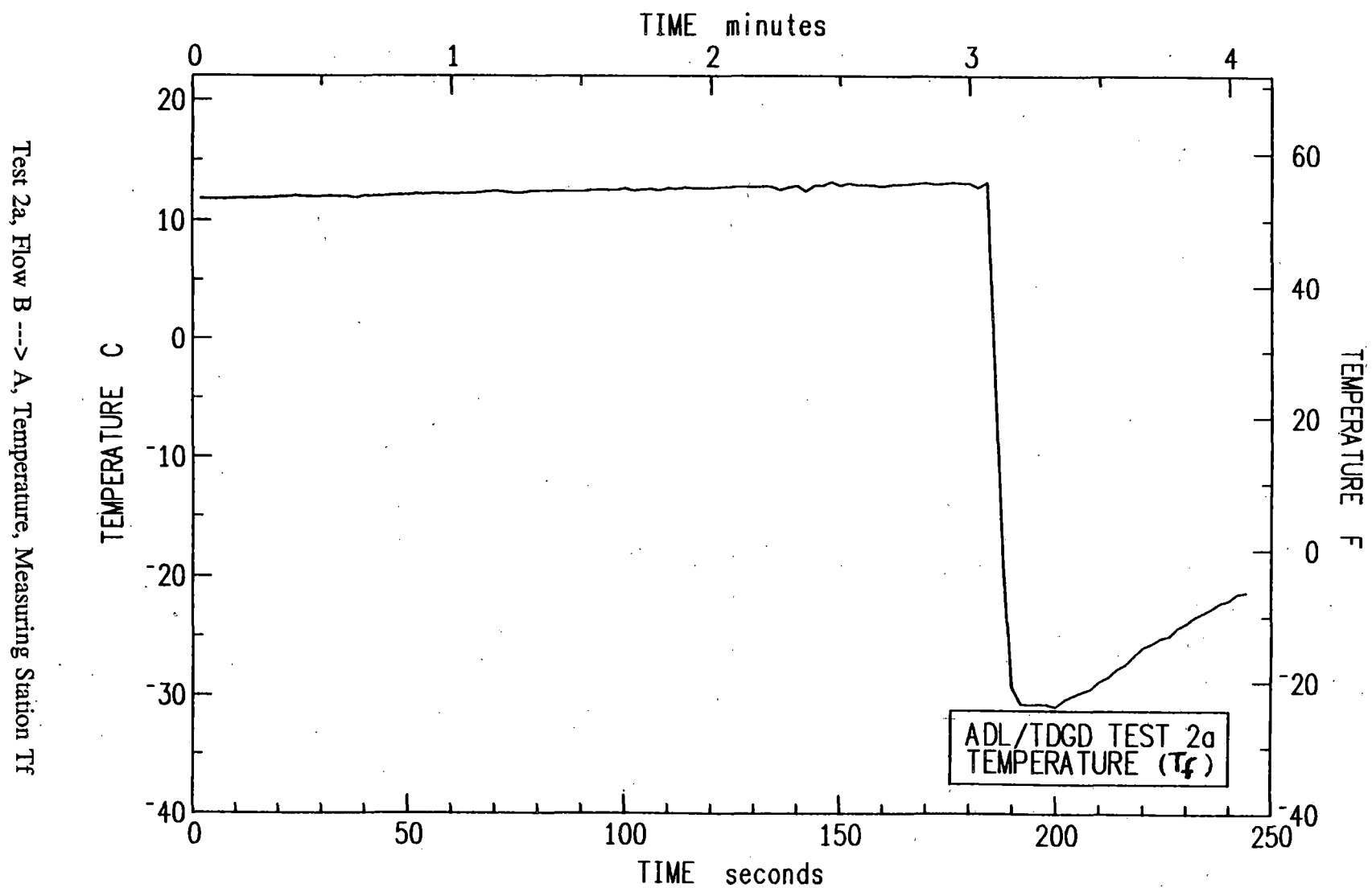


Figure K.2a.4

Figure K.2a.5



Test 3, Flow B ---> A, LPG Flow Rate, Measuring Station A

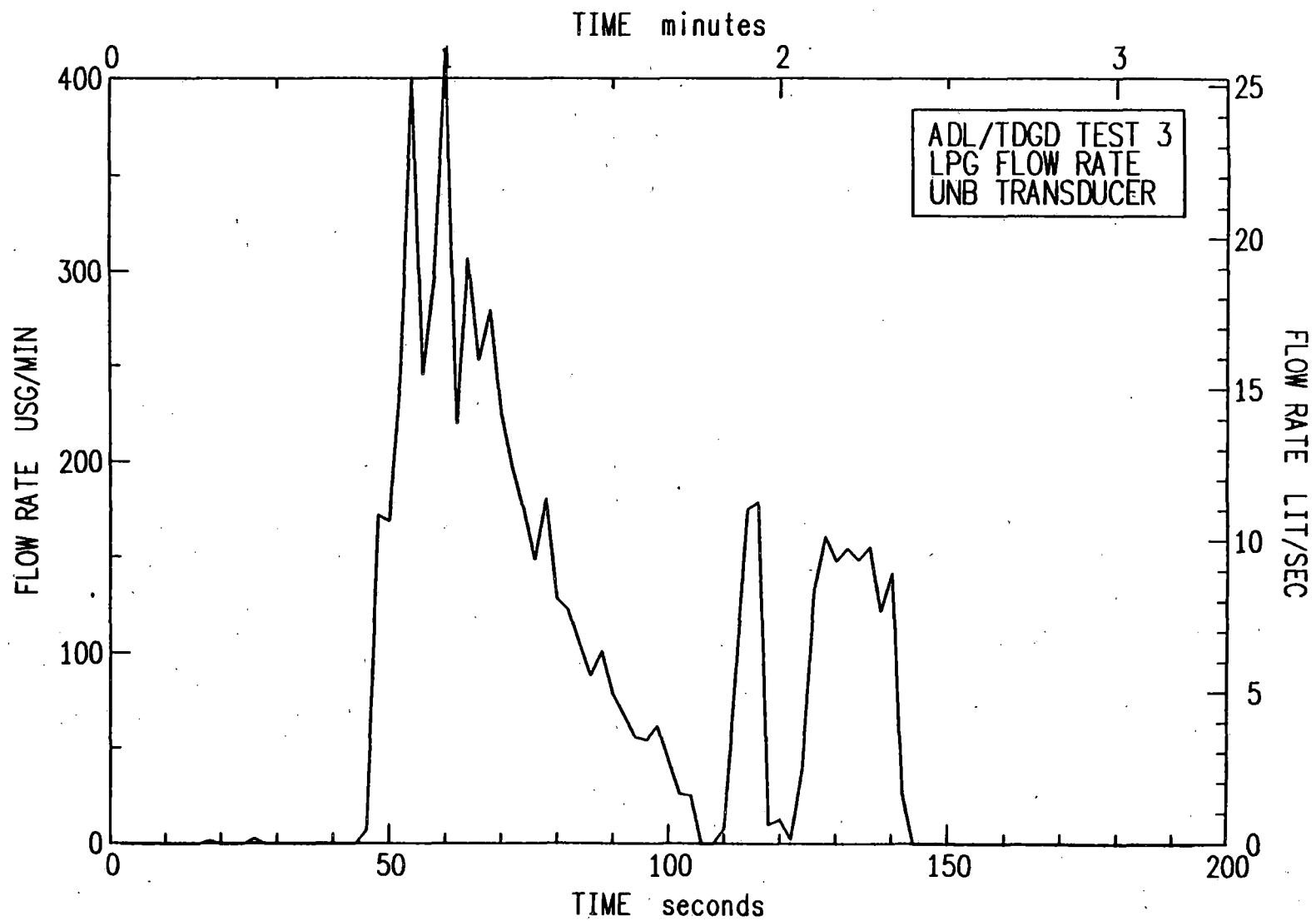


Figure K.3.1

Test 3, Flow B ---> A, LPG Flow Rate, Measuring Station B

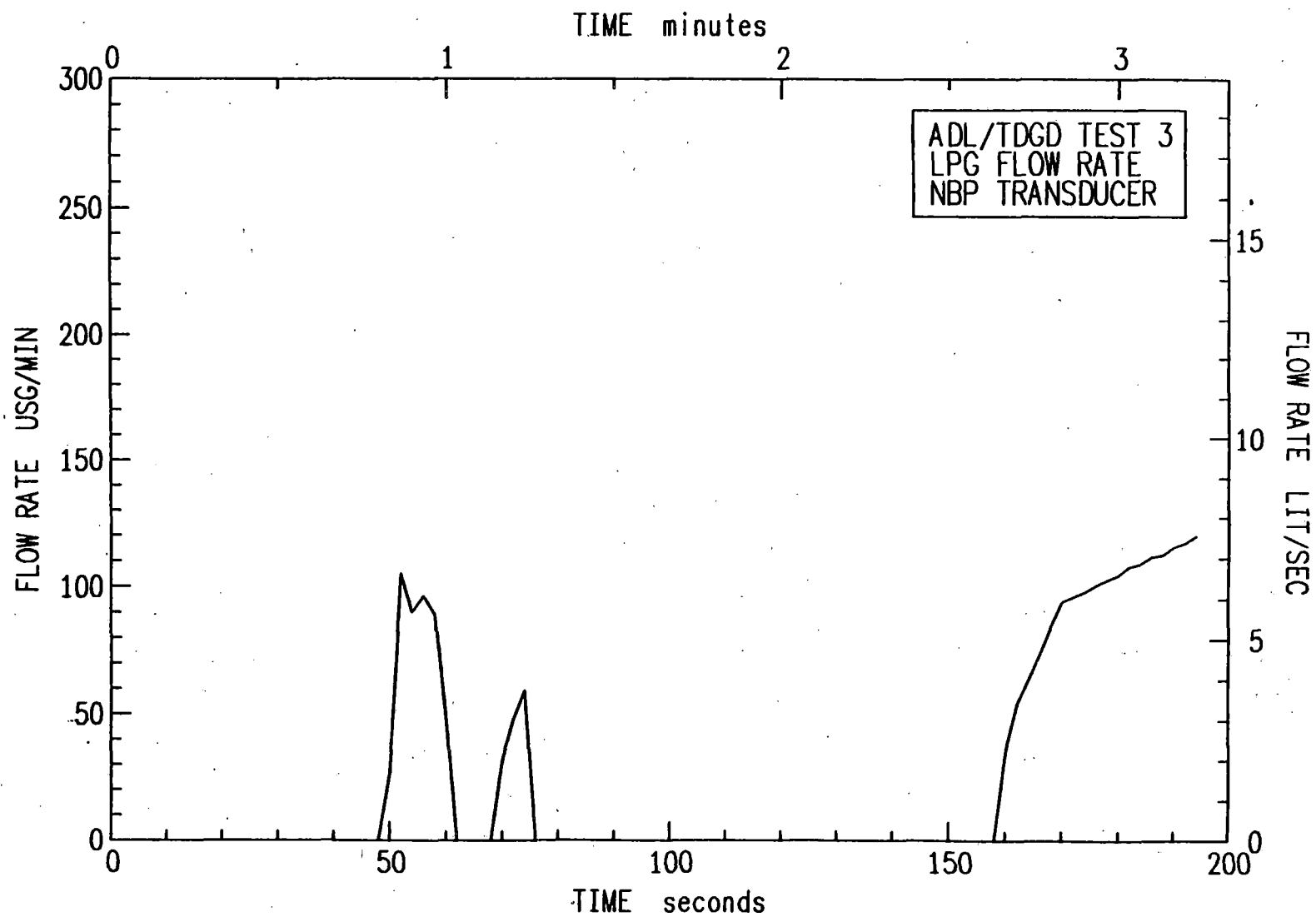
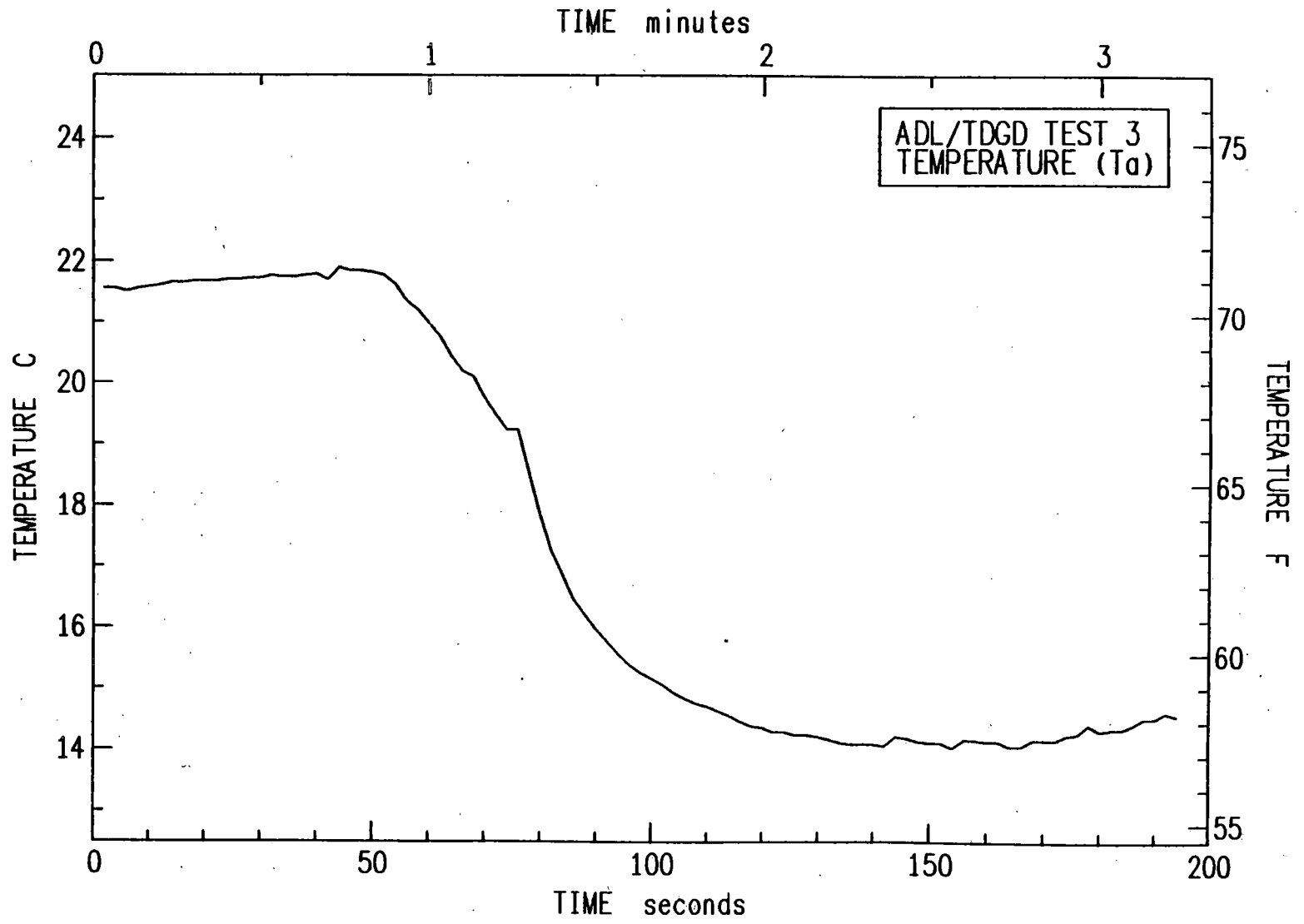


Figure K.3.2

Figure K.3.3



Test 3, Flow B ----> A, Temperature, Measuring Station Ta

Test 3, Flow B ----> A, Temperature, Measuring Station Tb

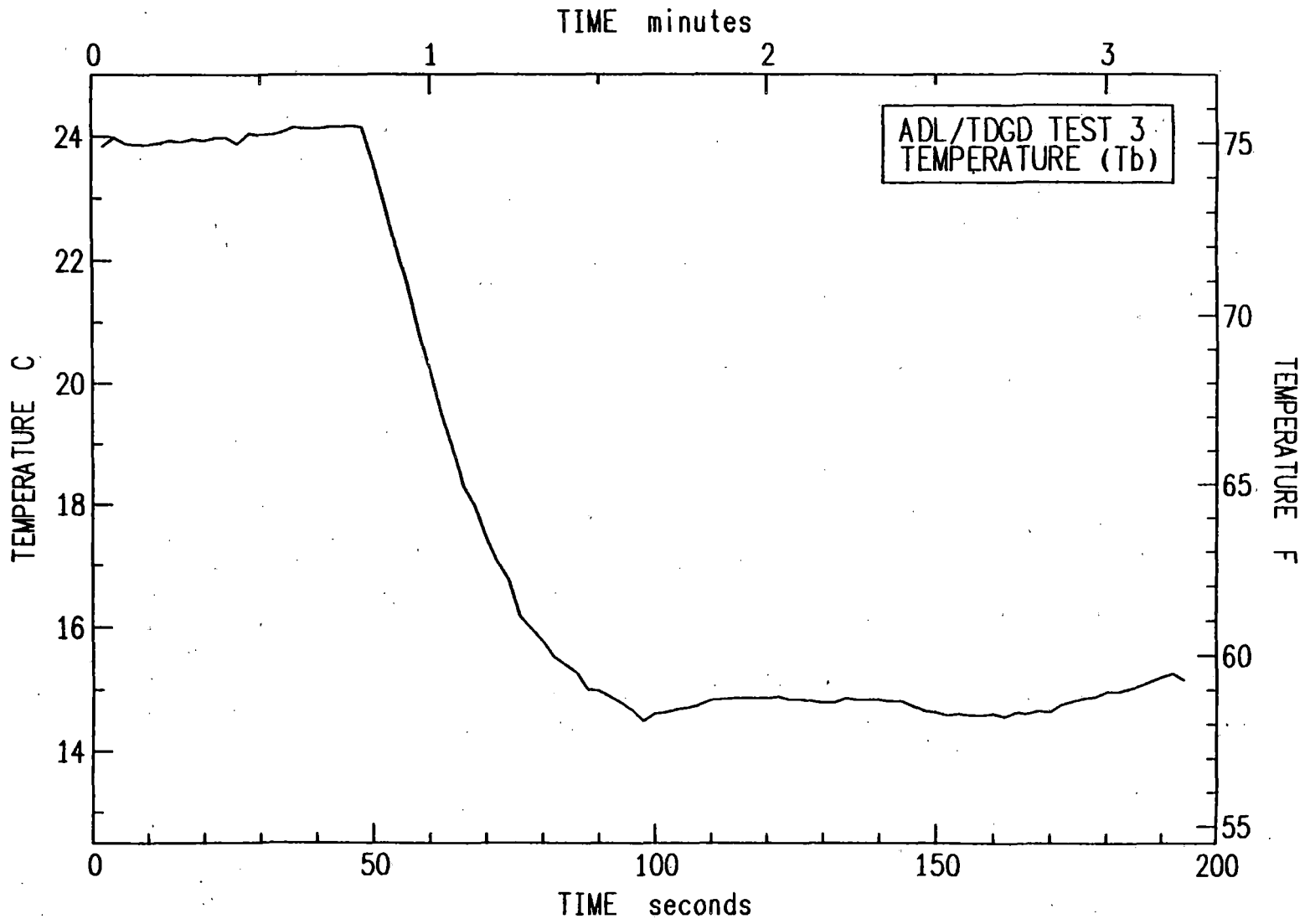


Figure K.3.4

Test 3, Flow B ---> A, Temperature, Measuring Station Tf

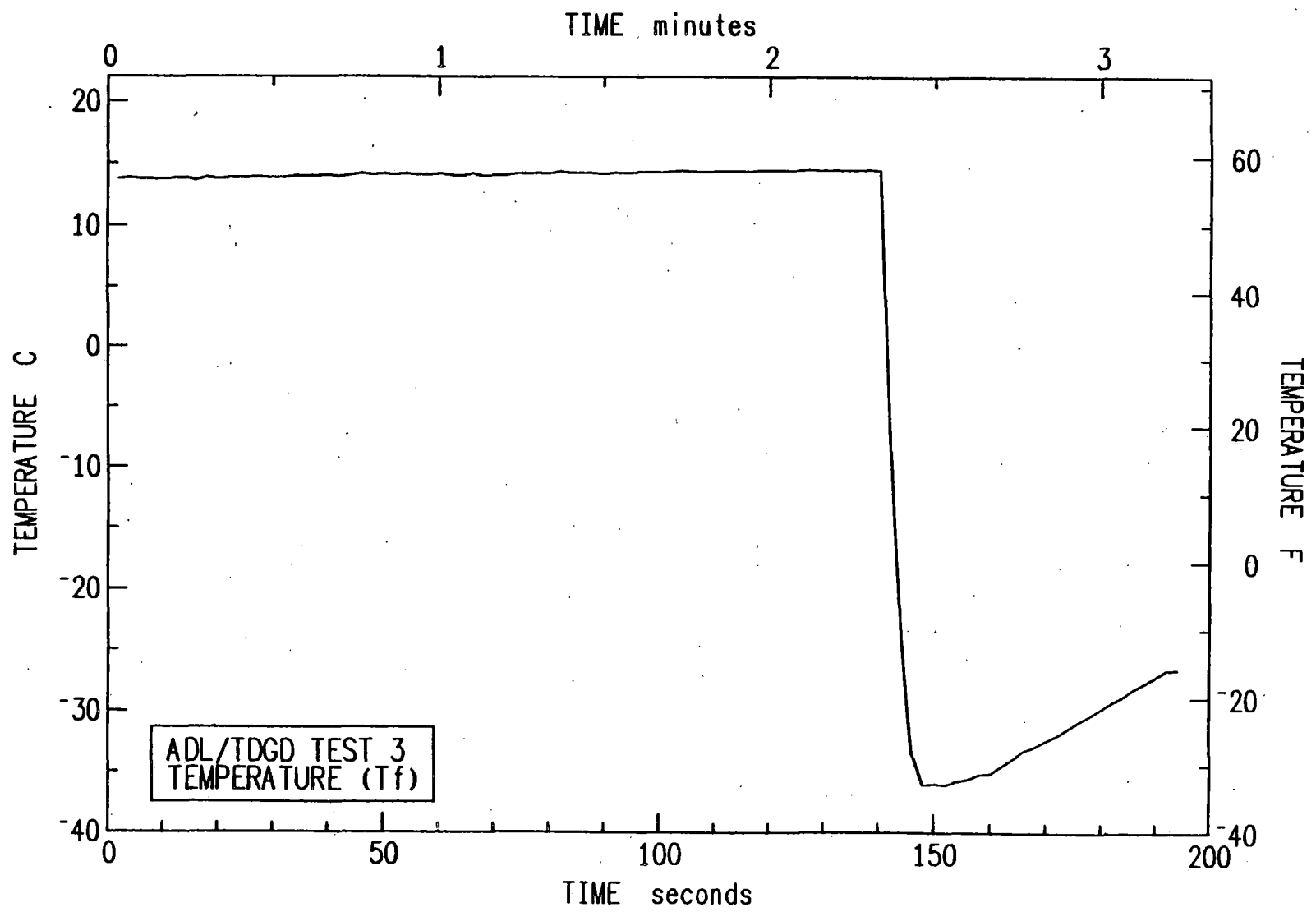
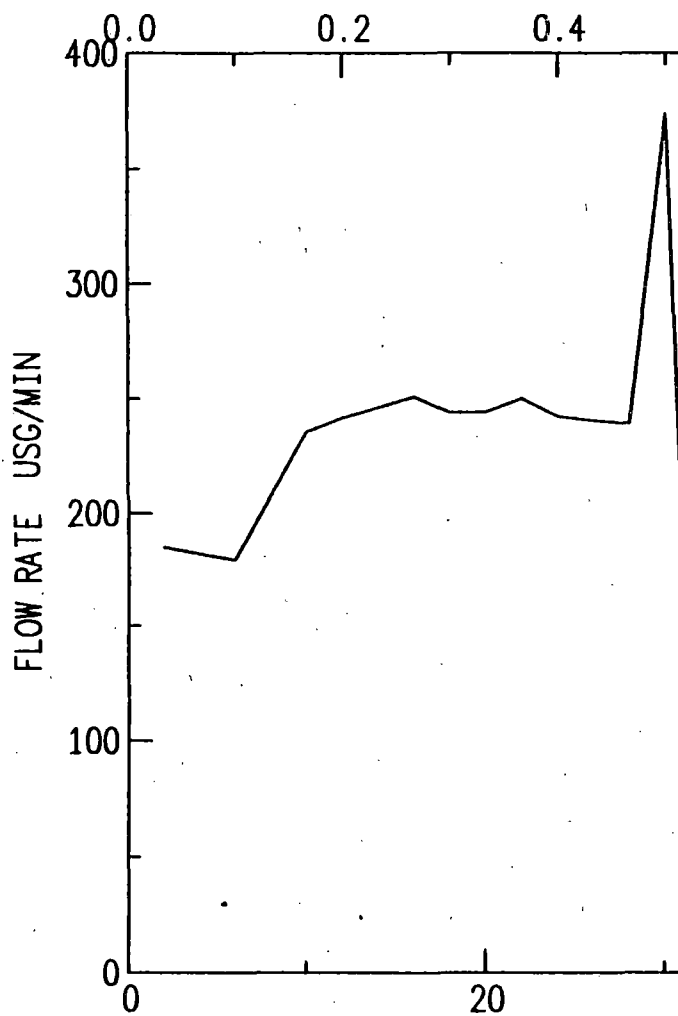


Figure K.3.5

Test 4, Flow A ---> B, LPG Flow Rate, Measuring Station A



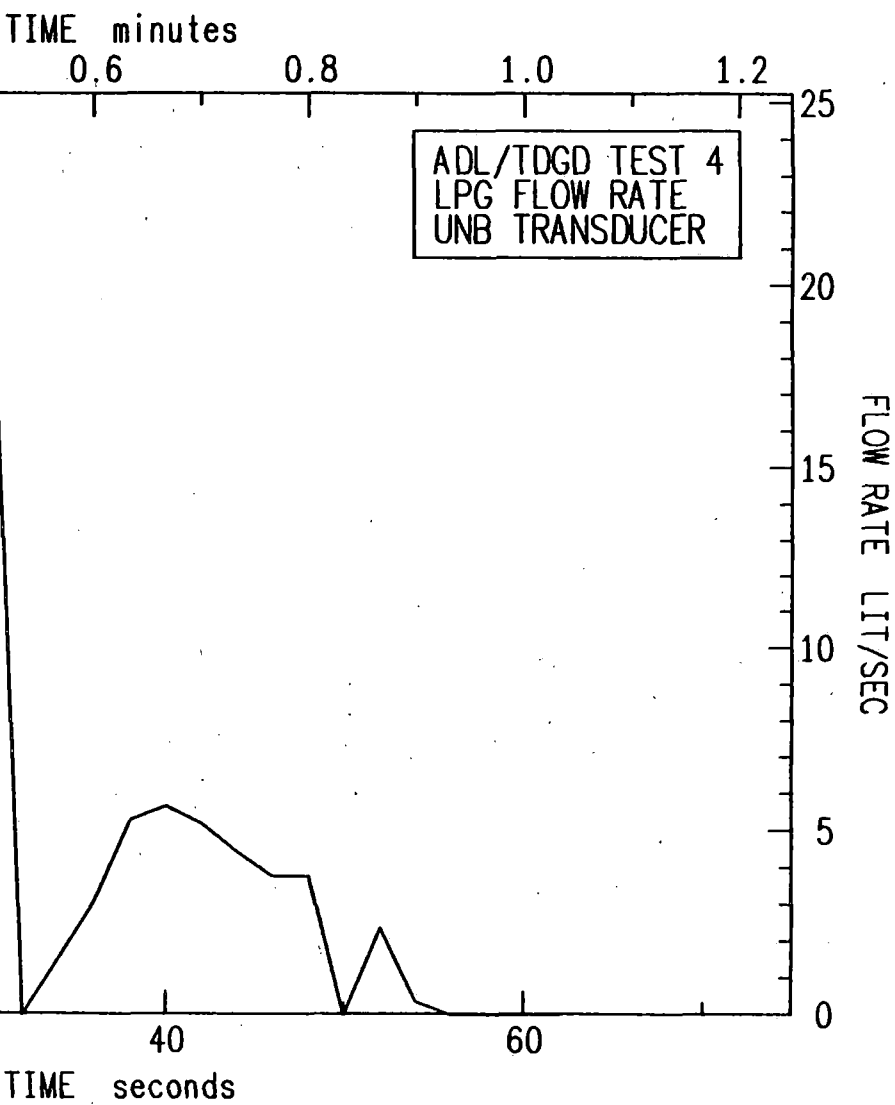


Figure K.4.1

Test 4, Flow A ----> B, LPG Flow Rate, Measuring Station B

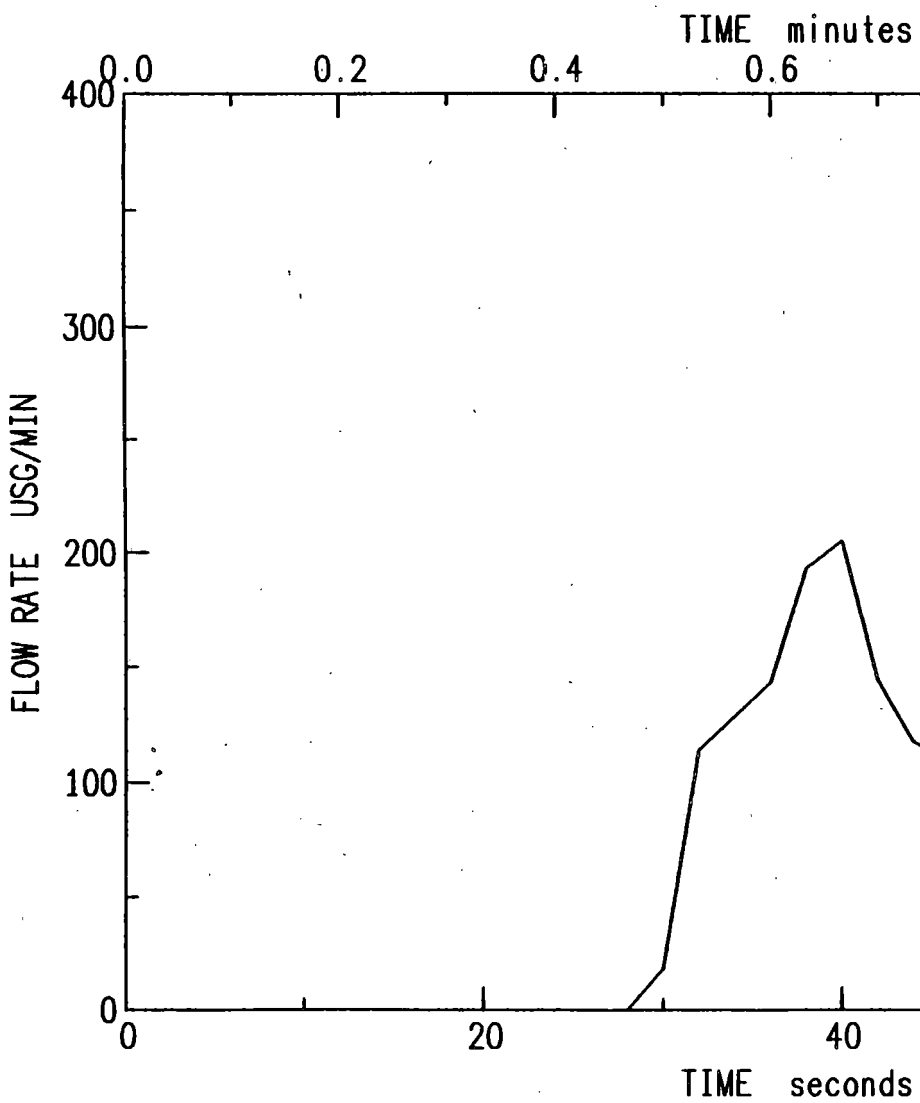
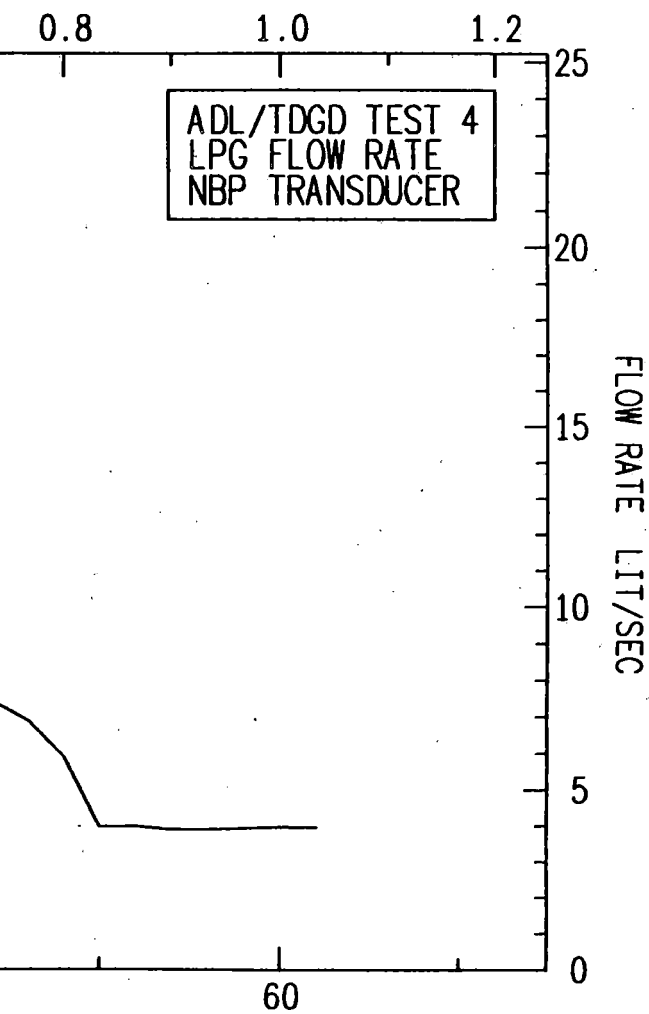
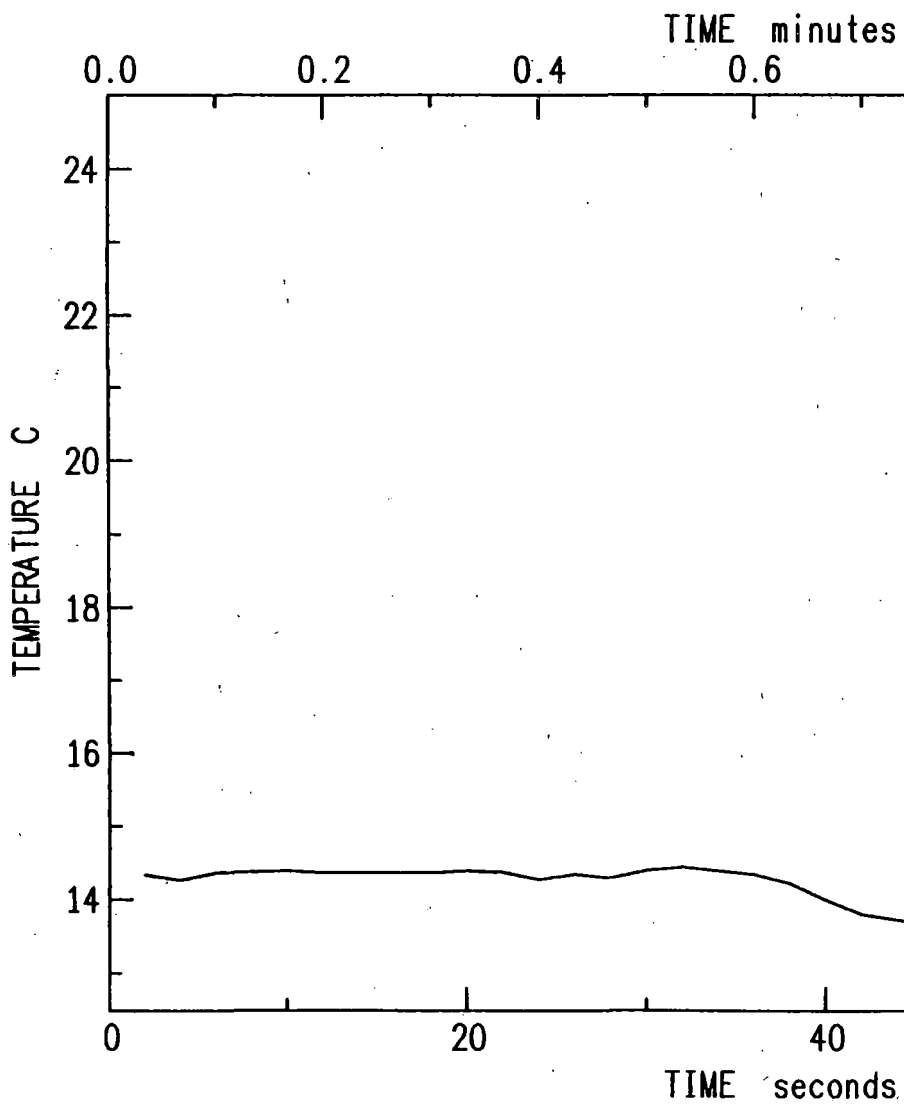


Figure K.4.2



Test 4, Flow A ----> B, Temperature, Measuring Station Ta



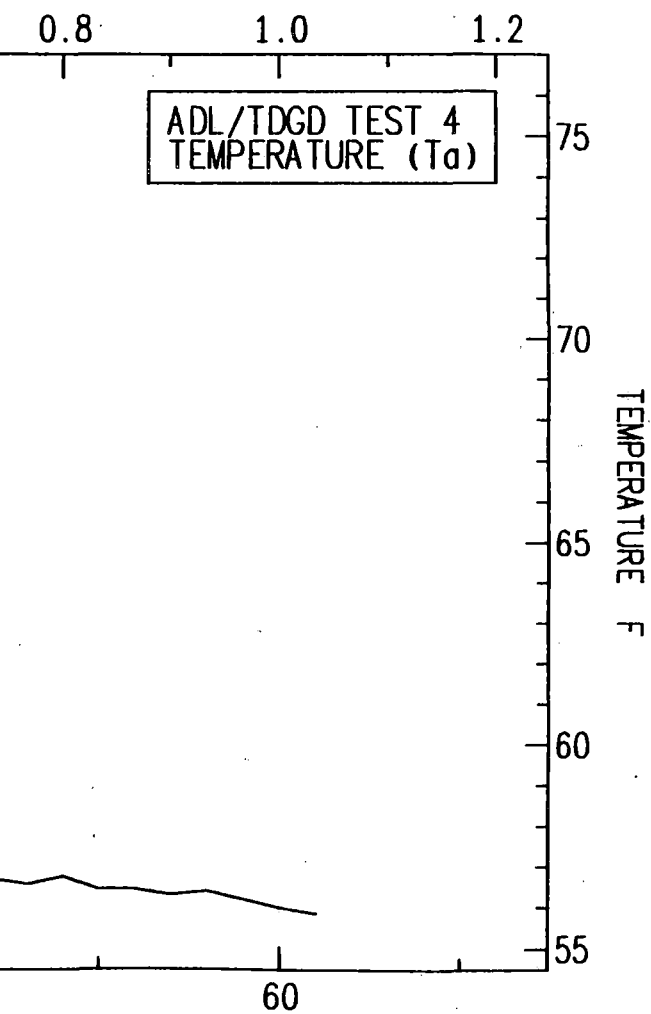
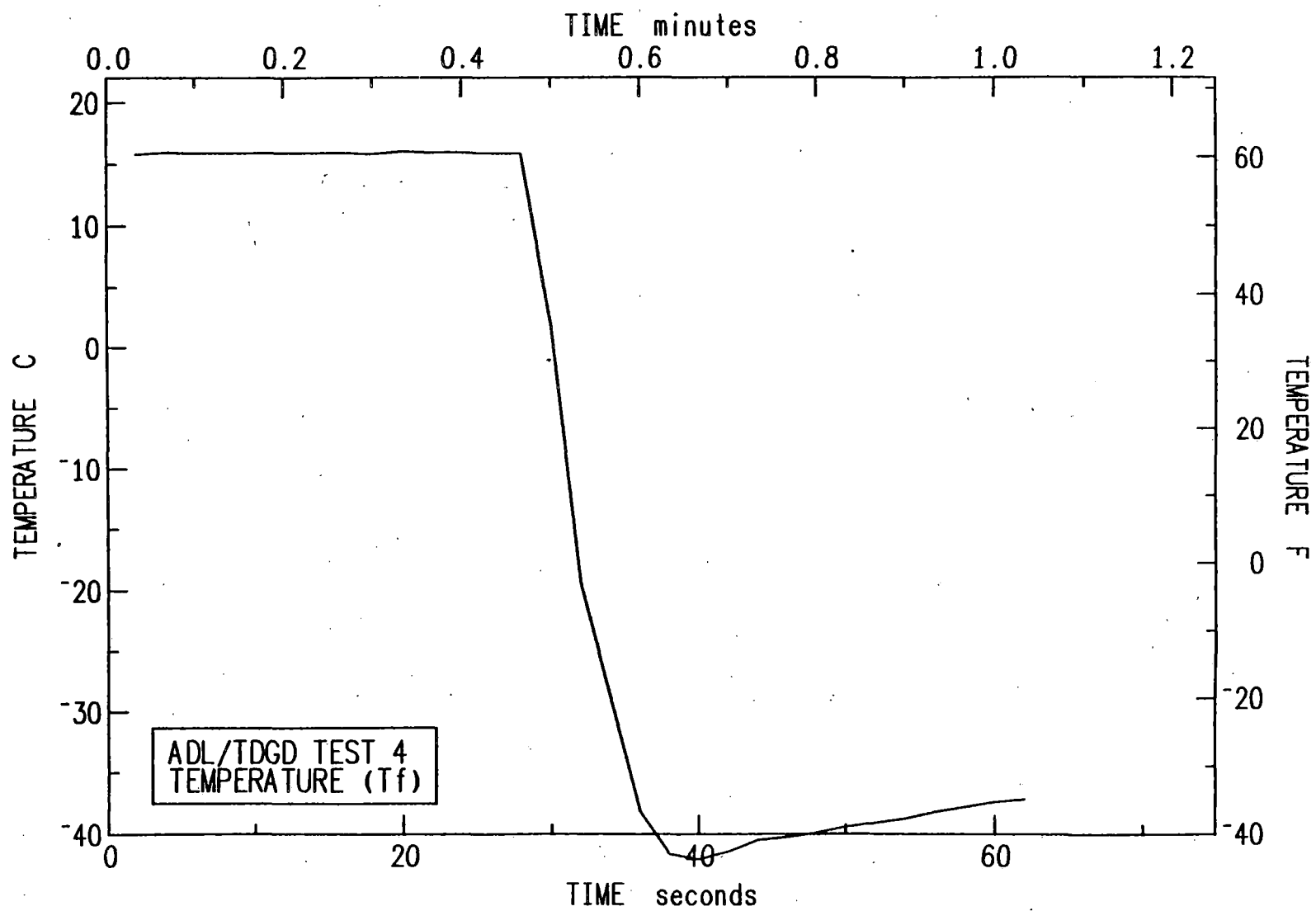


Figure K.4.3

Figure K.4.4



Test 4, Flow A ----> B, Temperature, Measuring Station Tf

Appendix L
Flow Meter Calibration

The flow meters were standard inflange 50 mm diameter orifices installed in a length of 75 mm diameter pipe. The extent of the upstream and downstream lengths from the flange prior to connection to the 50 mm pipelines was not sufficient to fully establish flow. Consequently, the orifice meter assembly was water calibrated utilizing a V-notch weir. A comparison between the standard ASME flow equation and that obtained in the calibration for transducer A is shown in Figure L.1.

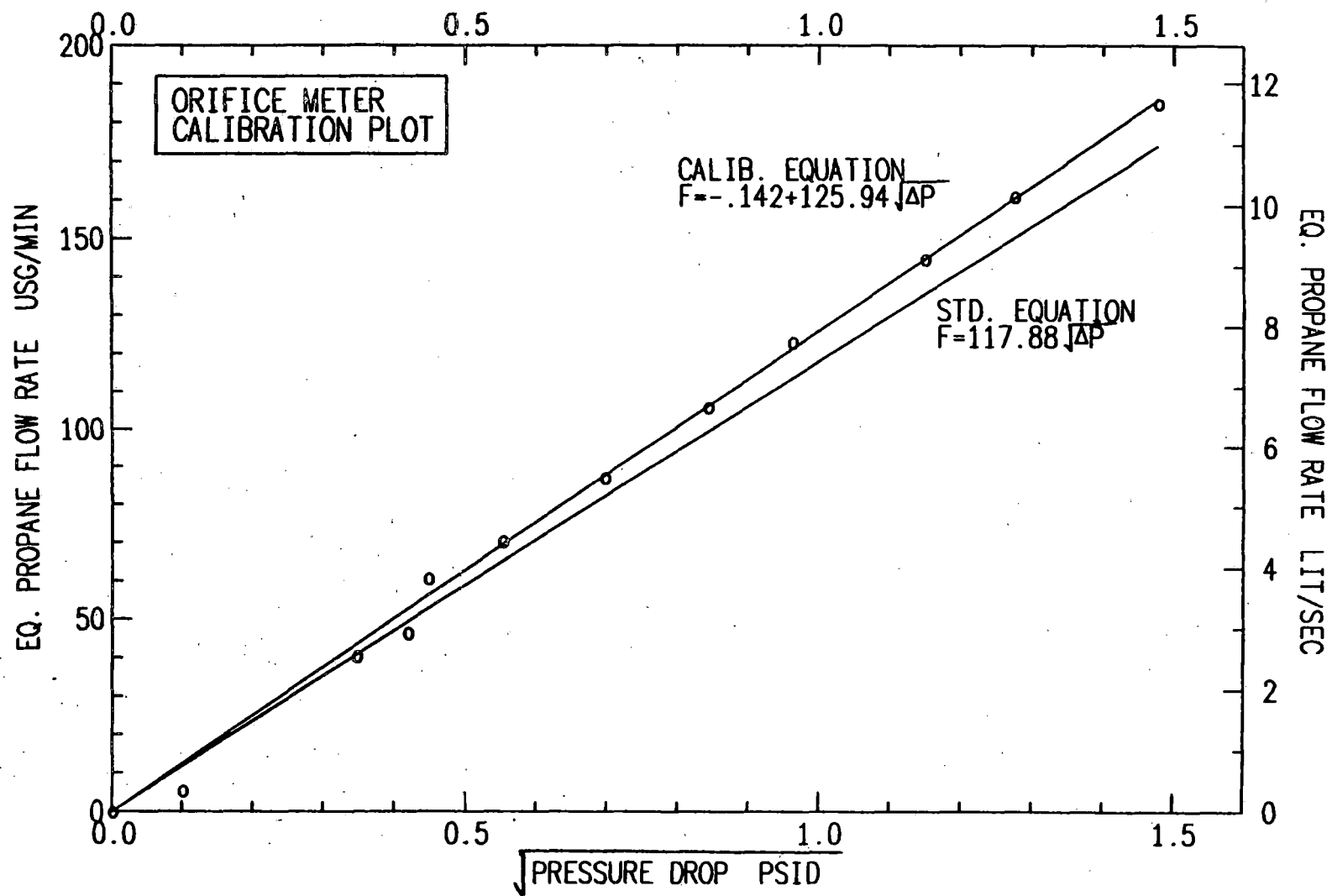
The transducers utilized in the tests consisted of an EMI SE 21/V + 5 psid + 0.5% f.s.d. pressure transducer (line A) and a Statham 0-5 inch water + 0.25% f.s.d. pressure transducer (line B).



TIME
10/1/1910

10/1/1910

Figure L.1



Calibration of Transducer A shown as Equivalent USGPM of Propane

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(Appendices), US DOT, FRA, Arthur D Little, 1990 -
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