

VAPOR CONTROL SYSTEM INSTALLATION

FOR BARGES: "7027" AND "7028"

CONOCO, INC.

I. INTENT AND TECHNICAL APPROACH

The enclosed information is being submitted to obtain approval for the installation and use of a vapor control system. The information is structured to address (1) the regulations of 33 CFR Parts 154, 155, 156, and 46 CFR Parts 30, 32, 35, and 39 as revised and amended June 21, 1990 (re: gasoline, crude oil, and benzene) and (2) the guidelines of the enclosure to USCG letter of 24 August 1993 and as revised 20 September 1993 (i.e., GUIDELINES FOR DETERMINING THE MAXIMUM LIQUID TRANSFER RATE FOR A TANK VESSEL TRANSFERRING A FLAMMABLE OR COMBUSTIBLE CARGO USING A VAPOR CONTROL SYSTEM). It is desired that U.S.C.G. authorize use of the vapor control system with all 46 CFR Subchapter "O" and "D" cargoes for which the system meets applicable regulations (e.g., benzene, gasoline, and crude oil) as well as other U.S.C.G. "inhouse" guidelines.

The technical approach used herein to determine maximum liquid transfer rate imposed by (a) the capacity of the cargo tank venting system [see 46 CFR 39.20-11], and (b) the pressure drop between the most remote tank and the shore connection [see 46 CFR 39.30-1(D)(3)] is summarized as follows:

1. Pertinent vessel and piping system parameters are obtained for (a) maximum design working pressure, (b) pressure vacuum valve setting and flow characteristics, and (c) piping system parameters (see APPENDIX E-1).
2. Cargoes for which the vapor control system is to be used are identified (see APPENDIX E-2).
3. Cargo data is obtained for (a) USCG vapor control system category, (b) specific gravity of cargo vapor, and (c) saturated vapor pressure at 115 degrees F (see APPENDIX E-2).
4. The vapor-air mix density, specific gravity, and growth rate (VGR) are determined for each cargo for which adequate data is available (see APPENDIX E-2).

II. BARGE TYPE AND DESCRIPTION:

The vessels of concern are a 297'-6" X 54'-0" X 12'-0", double side, double bottom, tank barges intended for service on rivers, lakes, bays and sounds. They are equipped with a raked end and a box end. Each barge has six (6) cargo tanks, and is served by a cargo pump, and a transverse load and unload header.

III. INDIVIDUAL BARGE DATA:

<u>NAME</u>	<u>BUILDER</u>	<u>HULL</u>
7027	TRINITY/ASHLAND CITY	4317
7028	TRINITY/ASHLAND CITY	4318

IV. CARGO PRODUCT(S):

The vapor control system is to be used with cargo product(s) listed in APPENDIX E and as otherwise authorized by U.S.C.G.

V. CARGO HOSES:

The vessels will not carry cargo vapor hoses. Accordingly, and with reference to 46 CFR 39.30-1(c), hoses are not included in the pressure drop calculations presented by this analysis.

VI. MAXIMUM DESIGN WORKING PRESSURE:

Per previous documentation the barge structure is reported to be suitable for a 3.0 PSIG MAXIMUM DESIGN WORKING PRESSURE.

(Note: This MAXIMUM DESIGN WORKING PRESSURE is considered appropriate for both pressure and vacuum conditions.)

VII. MAXIMUM LIQUID TRANSFER RATE:

The maximum liquid transfer rate (MLTR) is to be 5,000 BBL/HR unless otherwise limited by (1) the max capacity of the cargo tank venting system (see APPENDIX E-3), or (2) by the sum of the "shore connection pressure" plus the "pressure drop" from the most remote tank to the shore connection being in excess of 80% of the P/V setting as determined from the graphs of APPENDIX G for specific loading conditions.

5. The pressure drop across the PV valve, piping system losses, pressure at the tank most remote from the PV valve, and MAXIMUM LIQUID TRANSFER RATE as limited by the vapor control system are determined (see APPENDIX E-3).

These parameters are based on a vapor-air mix flow rate of "VGR" times a "liquid transfer rate" equal to the lesser of 5,000 BBL/HR (i.e., an owner/operator criteria) or the maximum flow rate which results in a pressure at the most remote tank not exceeding the cargo tank MAXIMUM DESIGN WORKING PRESSURE (see SECTION VI below).

6. A set of graphs is developed for various values of vapor growth rate (VGR) (see APPENDIX G). The values of VGR bracket the values determined in the above described analysis. Each set consists of five graphs - i.e., one graph for each of five conditions of pressure at the shore connection loading header ranging from -1.0 PSIG to 1.0 PSIG. Each graph shows the relationship between the "pressure drop" from the most remote tank to the shore connection and the "liquid flow rate" for a range of cargo vapor-air specific gravity. The pressure drop is based on a vapor-air mix flow rate of "VGR" times the noted liquid transfer rate.

Each graph page contains a description of the intended procedure for its use.

APPENDIX F provides a detailed illustration of the pressure drop calculation process.

APPENDIX H provides a detailed listing by cargo of the pressure drop from the most remote tank to the shore connection for a 1.0 PSIG pressure at the shore connection.

VIII. VAPOR CONTROL SYSTEM (46 CFR 39.20-1):

FIGURE 1 and TABLE LM-1 provide a diagram and list of material, respectively, of the vapor control system and related equipment.

When the vapor control system is to be used:

A. Pressure/vacuum valves (if any) other than the vapor control system pressure/vacuum valve(s) will be removed and the connections sealed with standard threaded pipe caps or equal.

B. Above-deck vapor piping will be lettered and painted in accordance with 46 CFR 39.20-1(d).

C. The shore connection flange will be in accordance with 46 CFR 39.20-1(f).

IX. CARGO GAUGING SYSTEM:

A. One (1) visual tank level indicator (i.e., sight glass) will be installed at the access hatch to each cargo tank to provide liquid level determination in accordance with 46 CFR 39.20-3(a). Descriptive literature is provided in TABLE LM-1 and in APPENDIX A.

B. One (1) high level indicating device (i.e., dipstick) will be installed in each cargo tank to indicate when the liquid level in the cargo tank is within about 3.28 feet of the tank top in accordance with 46 CFR 39.20-3 (b). Descriptive literature is provided in TABLE LM-1 and in APPENDIX B.

X. LIQUID OVERFILL PROTECTION (46 CFR 39.20-9):

Primary tank barge liquid overflow protection will be provided by installation of a high level alarm/shutdown system which complies with the requirements of 46 CFR 39.20-9 (b). Additional tank barge liquid overflow protection will be provided by installation of spill valves which comply with the requirements of 46 CFR 39.20-9(d). Each spill valve will serve two (2) cargo tanks (P/S) by use of an adapter. Descriptive literature on both protection measures is provided in TABLE LM-1 and in APPENDIX C.

Calculations for the allowable flow of the spill valve (without exceeding the MAX DESIGN WORKING PRESSURE) are provided as APPENDIX I; however, these flow rates do not govern the MAX LIQUID TRANSFER RATE since primary liquid overflow protection is provided by the high level alarm and shutdown system.

APPENDIX J provides a summary comparison of the spill valve and the P/V transfer rates.

XI. VAPOR OVERPRESSURE AND VACUUM PROTECTION (46 CFR 39.20-11):

To satisfy the requirements of 46 CFR 39.20-11, the cargo tank venting system is to be fitted with one (1) pressure vacuum relief valve. Descriptive literature is provided in TABLE LM-1 and in APPENDIX D. It will be installed in the above deck vapor control piping.

A. VAPOR OVERPRESSURE (LOADING) PROTECTION

APPENDIX E develops the maximum liquid (cargo loading) transfer rate for which the pressure in the cargo tank most remote from the P/V valve does not exceed the MAXIMUM DESIGN WORKING PRESSURE. The calculations therein are in general accordance with the USCG-provided GUIDELINES FOR DETERMINING THE MAXIMUM LIQUID TRANSFER RATE FOR A TANK VESSEL TRANSFERRING A FLAMMABLE OR COMBUSTIBLE CARGO USING A VAPOR CONTROL SYSTEM.

B. VAPOR VACUUM PROTECTION

It is possible that cargo loading may suddenly be stopped while the shore facility compressor continues to draw a vacuum. In that instance, the P/V valve is required to have sufficient vacuum capability to intake air in quantity equal to the MAXIMUM LIQUID TRANSFER RATE at a pressure (vacuum) which does not exceed the MAXIMUM DESIGN WORKING VACUUM.

With reference to the vacuum curve information in APPENDIX D, the P/V valve has the following vacuum capacity at a vacuum of -1.0 PSIG, a pressure which is less than the -3.0 PSIG MAXIMUM DESIGN WORKING VACUUM:

CARGO PRODUCT WITH HIGHEST REQ'D AIR FLOW RATE	HIGHEST REQUIRED AIR FLOW RATE (MATR)		PV VALVE VACUUM CAPACITY AIR	
	(BBL/HR)	(FT ³ /HR)	(BBL/HR)	(FT ³ /HR)
VARIOUS	5,000	28,074	5,877	33,000

Since the capacity at higher vacuum exceeds the highest required air flow rate, the cargo tank venting system will:

a. Prevent a vacuum in the cargo tank vapor space, whether generated by withdrawal of cargo or vapor at maximum rates, that exceeds the MAXIMUM DESIGN WORKING VACUUM for any tank connected to the vapor collection system; and

b. Not relieve at a vacuum corresponding to a vacuum in the cargo tank vapor space of less than 0.5 PSIG below atmospheric pressure.

XII. OPERATIONAL REQUIREMENTS (46 CFR 39.30-1):

To satisfy the requirements of 46 CFR 39.30-1(b) and (d), data is developed showing the relationship between "pressure drop" through the vapor control system from the most remote cargo tank to the vessel shore connection and "liquid transfer rate" for various values of vapor-air mix growth rate, vapor-air mix specific gravity, and pressure at the shore connection.

Detailed support calculations for the data are voluminous, and repetitive. Accordingly, an illustrative sample calculation and graph (vice complete calculations and graphs for all individual products) are provided as APPENDIX F. The calculation procedure is in general accordance with the USCG-provided GUIDELINES FOR DETERMINING THE MAXIMUM LIQUID TRANSFER RATE FOR A TANK VESSEL TRANSFERRING A FLAMMABLE OR COMBUSTIBLE CARGO USING A VAPOR CONTROL SYSTEM. Output results from the complete calculations are presented in the graphs of APPENDIX G. Further, a listing is provided, by cargo, of the pressure drop from the most remote cargo tank to the shore connection for a 1.0 PSIG pressure at the shore connection. Descriptive literature similar to those graphs and table is to be included in the vessel "TRANSFER PROCEDURES" by the owner-operator.

VAPOR CONTROL SYSTEM INSTALLATION

FOR BARGES: "7027" AND "7028"

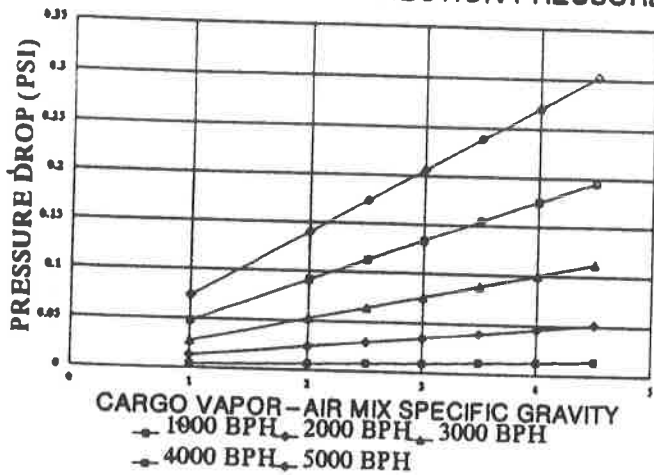
CONOCO, INC.

TABLE LM-1
LIST OF MATERIAL
FOR VAPOR CONTROL SYSTEM

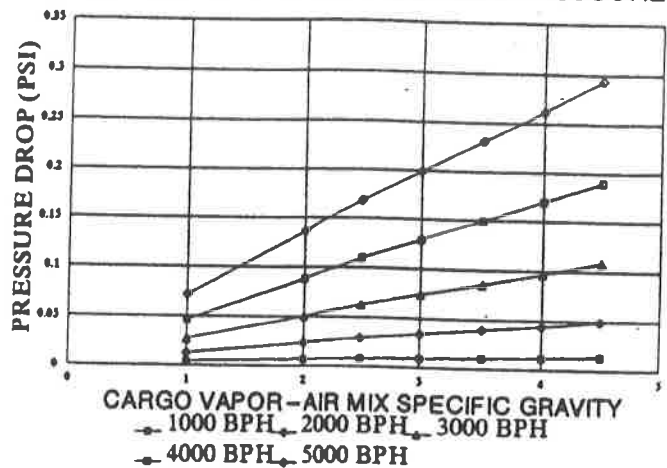
PIECE MARK	ITEM	QTY	SIZE	SPECIFICATION
12	PIPING FITTINGS FLANGES		8"	SCHED 40, STEEL, ASTM A-53 OR A-106 GRADE B 2" & SMALLER: 3000# FORGED STEEL SCR'D ASTM 105; AND 2 1/2" & LARGER: BUTT WELD SCHED 40 ASTM A234 GR B, ANSI B-16.9 150# SLIP-ON OR WELD NECK FLANGES, STEEL ASTM A-105, ANSI B-16.5; AND/OR 150# FF WELD NECK FLANGES, ASTM A 181
15	VALVE	3	8"	BUTTERFLY VALVE, STEEL W/S.S. TRIM, KEYSTONE OR EQUAL, 150#
16	P.V. VALVE	1	8"	MIDLAND, MODEL A-883, S.S., SET AT 1.5 PSIG PRESSURE, & -0.5 PSIG VACUUM
18	HIGH LEVEL INDICATING DEVICE	6	N/A	MIDLAND MODEL B-610, MAGNETIC DIPSTICK, 300 SERIES STAINLESS STEEL WETTED PARTS
19	HIGH LEVEL SENSOR ALARM & SHUTDOWN SYSTEM	1	N/A	MIDLAND MODEL B-595 TANK HIGH LEVEL AND OVERFILL SENSOR (ONE SENSOR IN EACH TANK)
20	SPILL VALVE	3	10"	MIDLAND MODEL A-7103, SET @ 1.75 PSIG
22	VISUAL TANK LEVEL INDICATOR	6	N/A	ERL MODEL SGM-1 MARINE SIGHT GLASS

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 100%

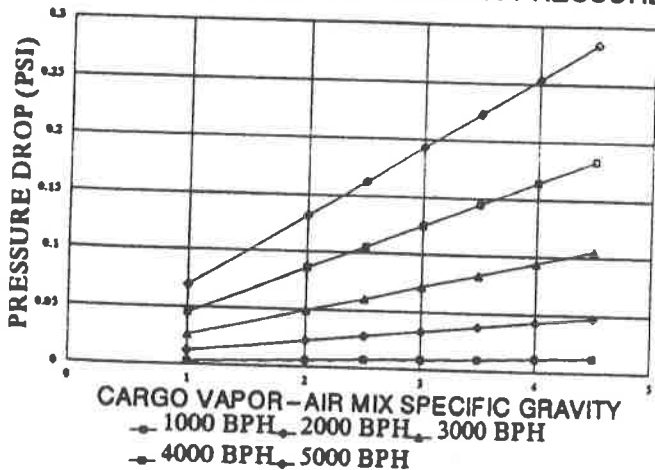
1.0 PSIG SHORE CONNECTION PRESSURE



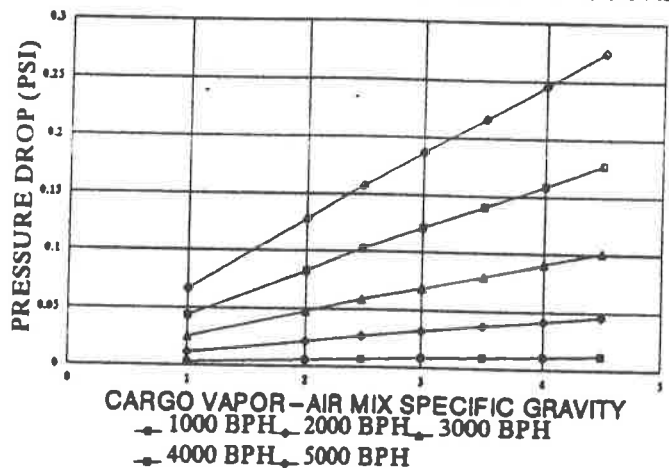
0.5 PSIG SHORE CONNECTION PRESSURE



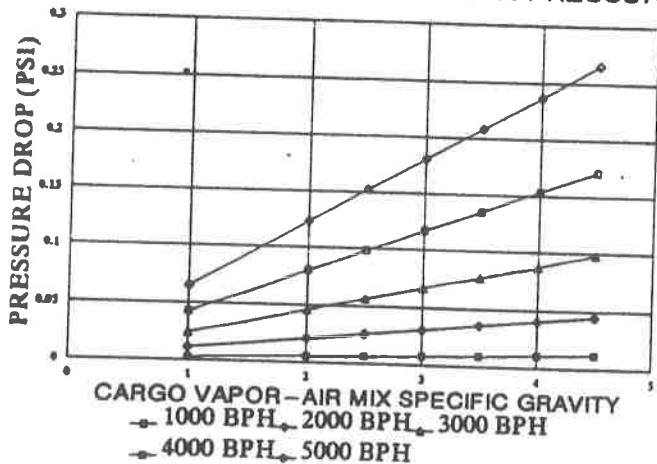
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE

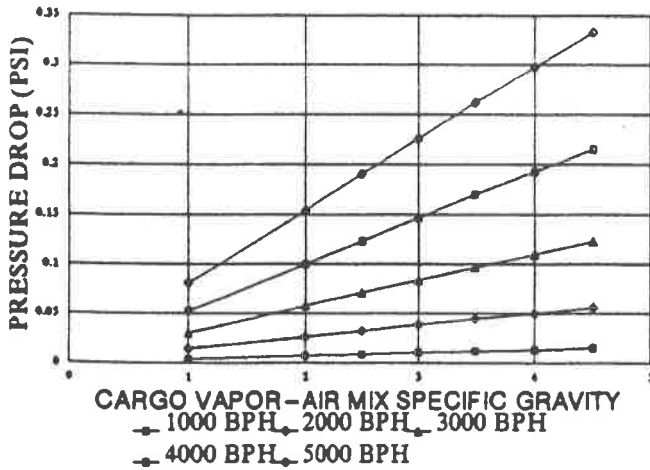


- DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:**
1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
 2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
 3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
 4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONN'N.
 5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONN'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

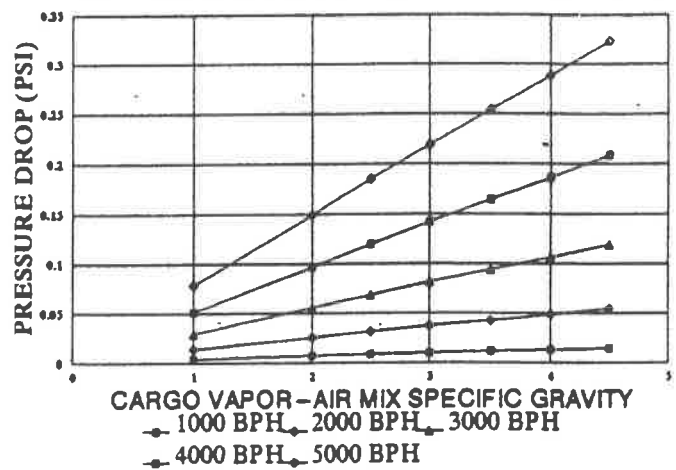
A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.
 B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 105%

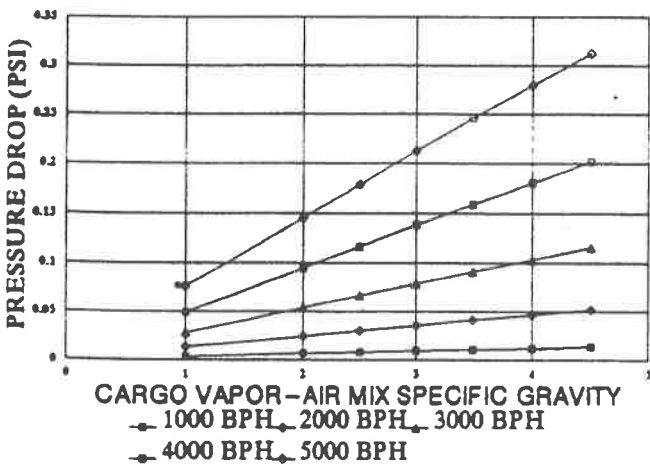
1.0 PSIG SHORE CONNECTION PRESSURE



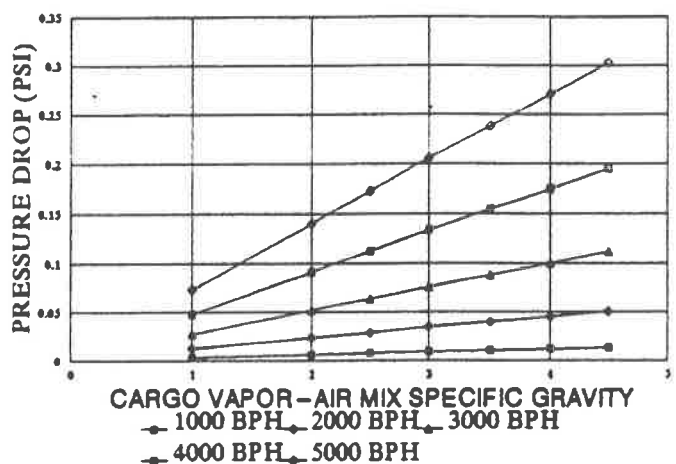
0.5 PSIG SHORE CONNECTION PRESSURE



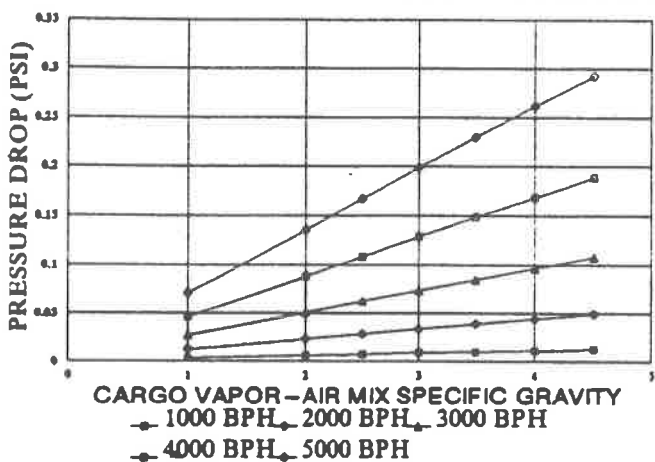
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



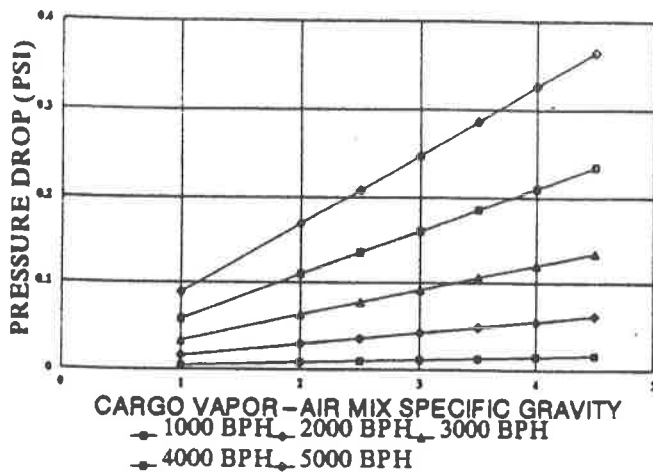
DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

1. OBTAIN: (a) VAP.-AIR MIX GROWTH RATE (VGR), (b) VAP.-AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

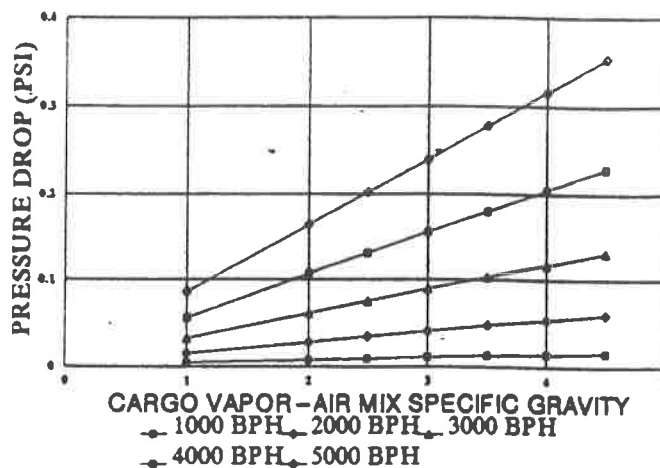
- A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.**
B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 110%

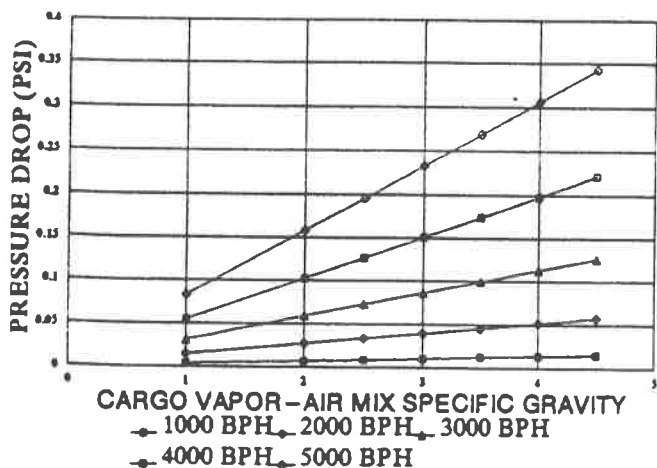
1.0 PSIG SHORE CONNECTION PRESSURE



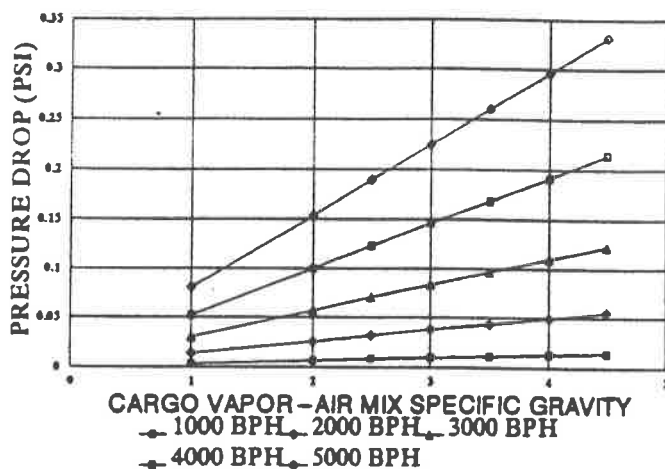
0.5 PSIG SHORE CONNECTION PRESSURE



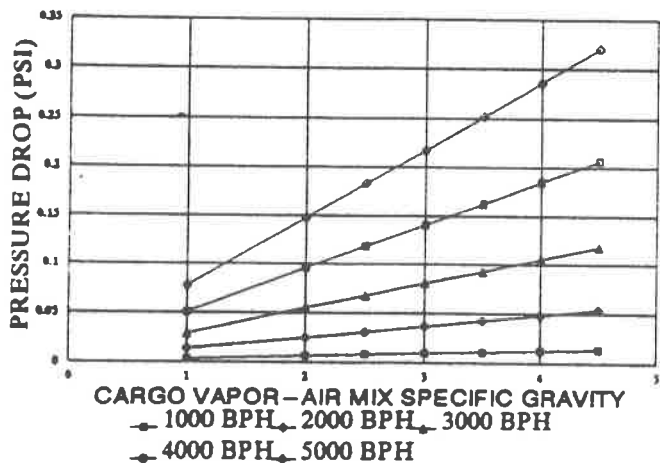
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



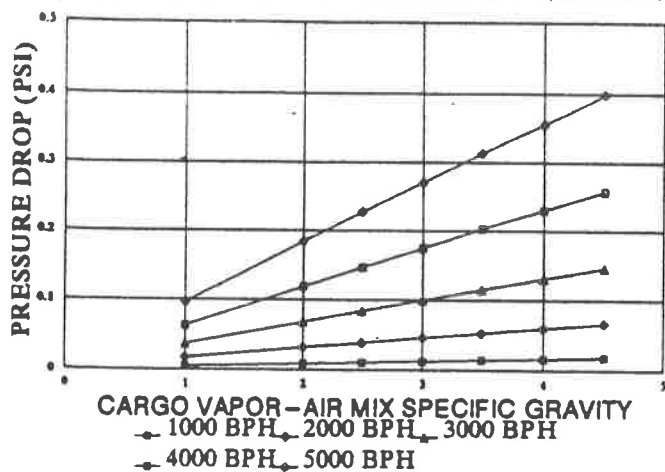
- DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:**
1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
 2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
 3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
 4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNec'N.
 5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNec'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.

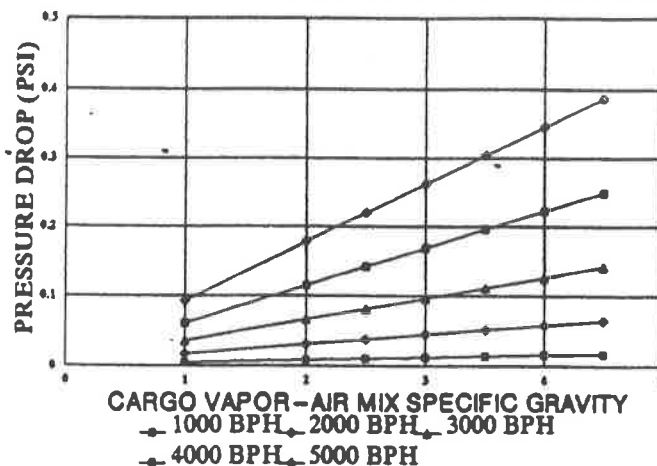
B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 115%

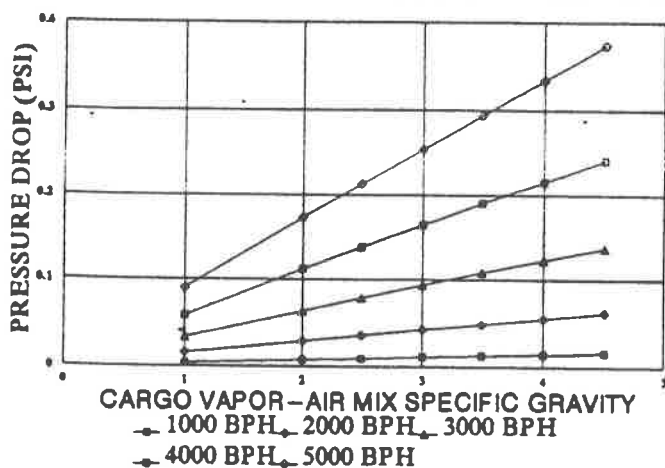
1.0 PSIG SHORE CONNECTION PRESSURE



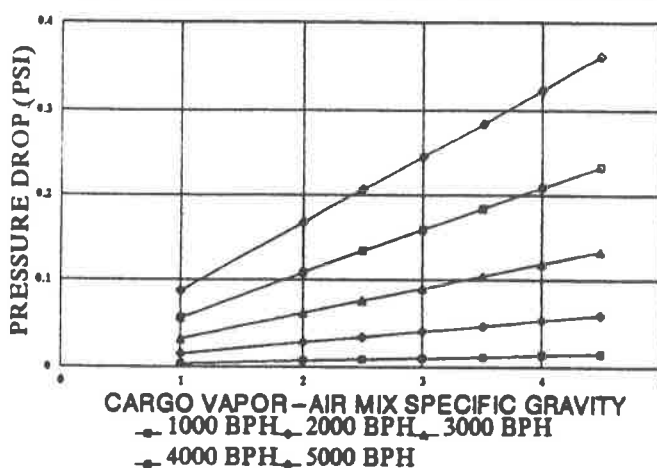
0.5 PSIG SHORE CONNECTION PRESSURE



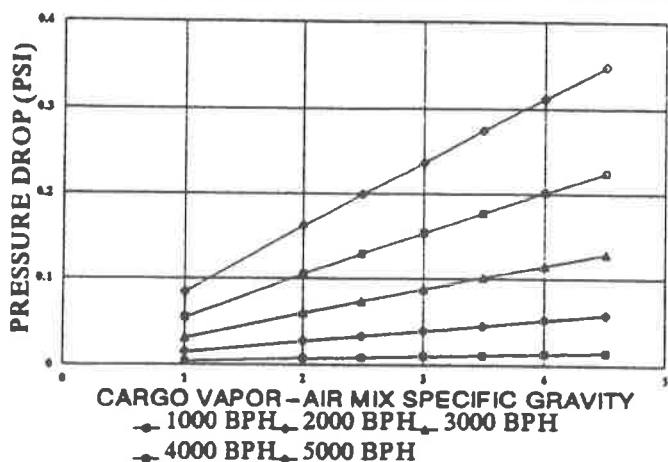
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



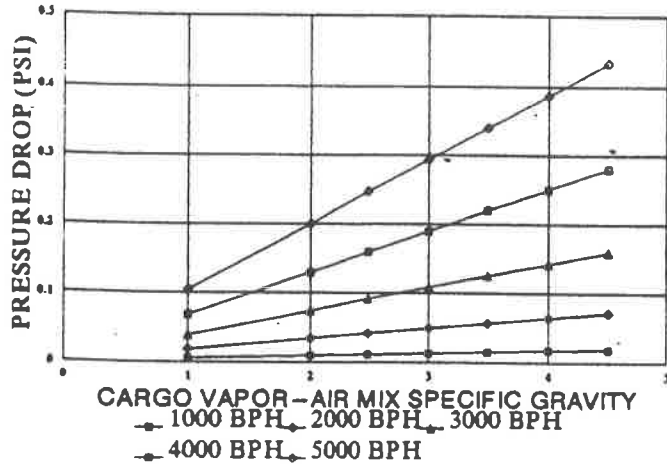
- DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:**
1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
 2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
 3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
 4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
 5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.

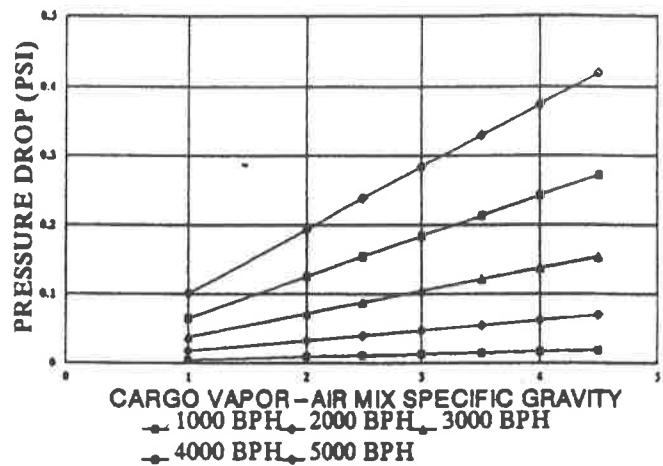
B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 120%

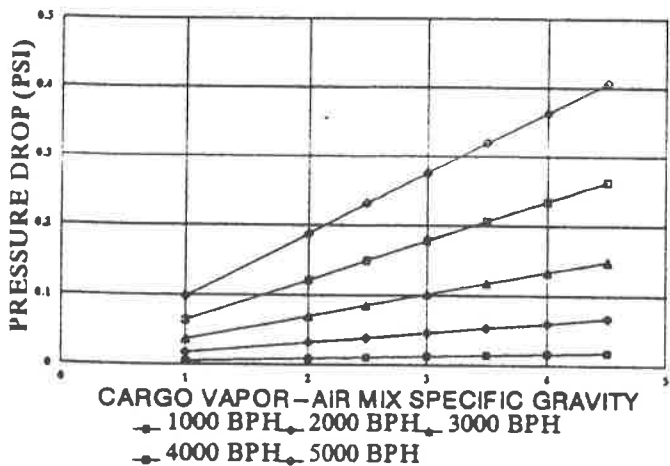
1.0 PSIG SHORE CONNECTION PRESSURE



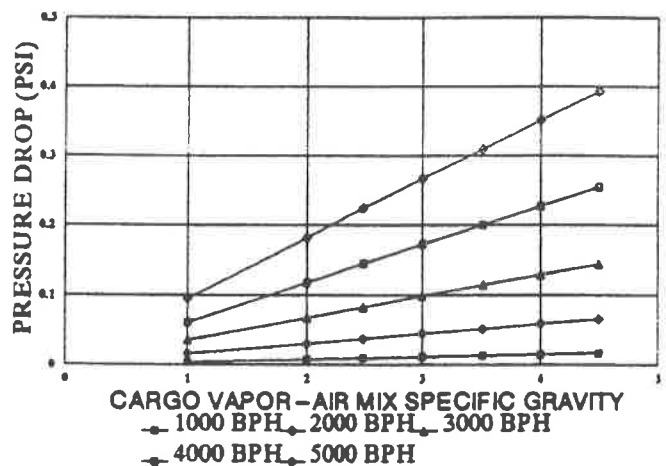
0.5 PSIG SHORE CONNECTION PRESSURE



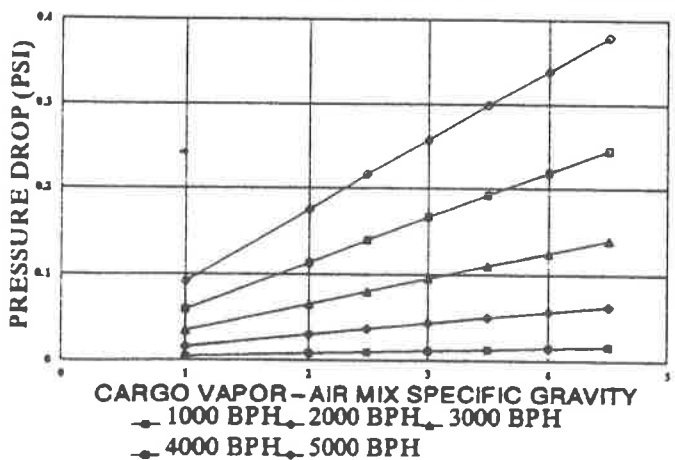
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



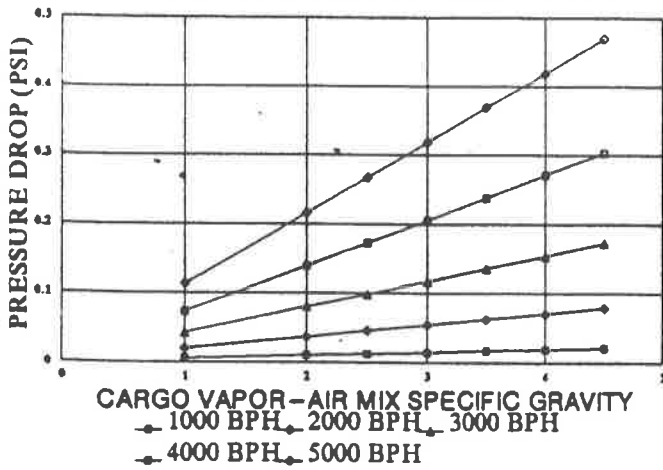
DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONN'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONN'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

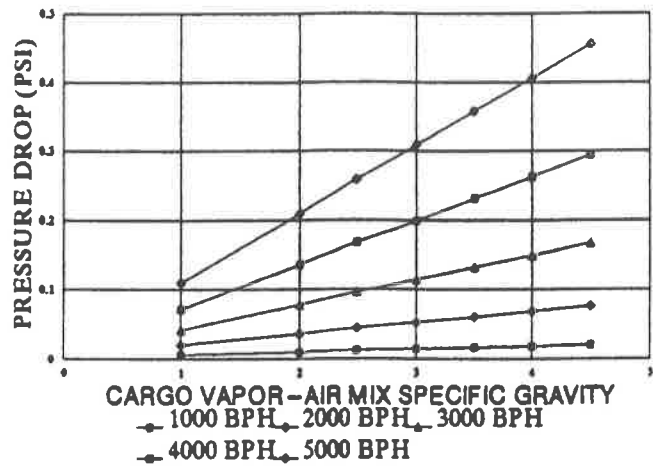
A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.
 B. PRESSURE DROP IS FOR CARGO VAPOR - AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 125%

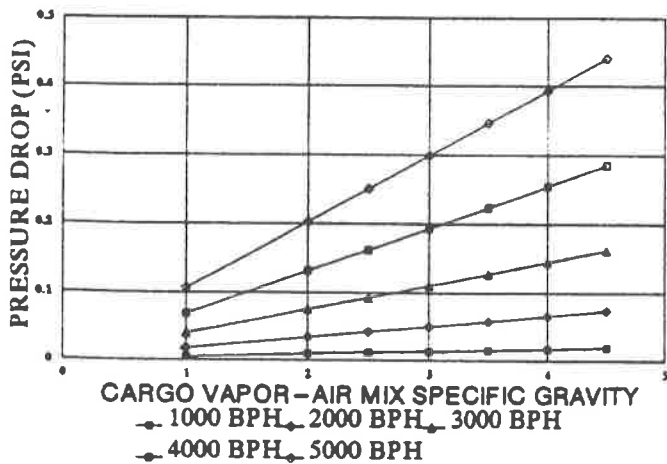
1.0 PSIG SHORE CONNECTION PRESSURE



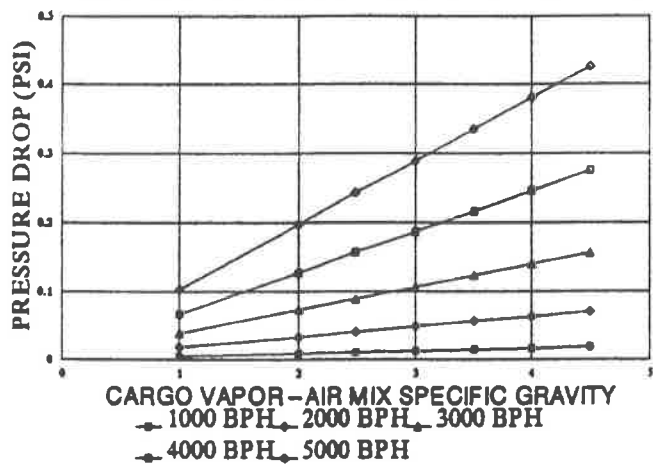
0.5 PSIG SHORE CONNECTION PRESSURE



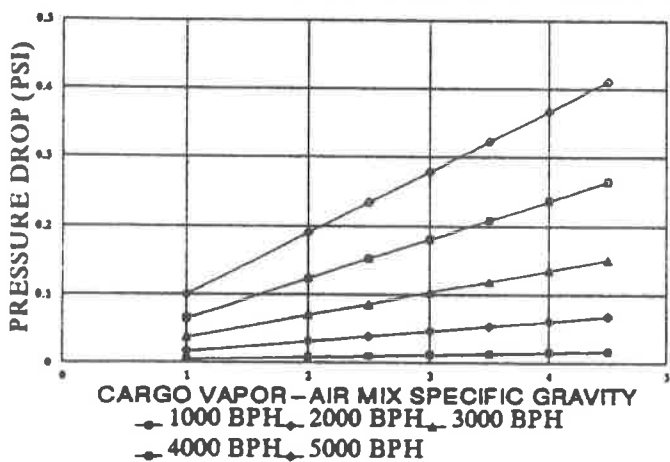
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



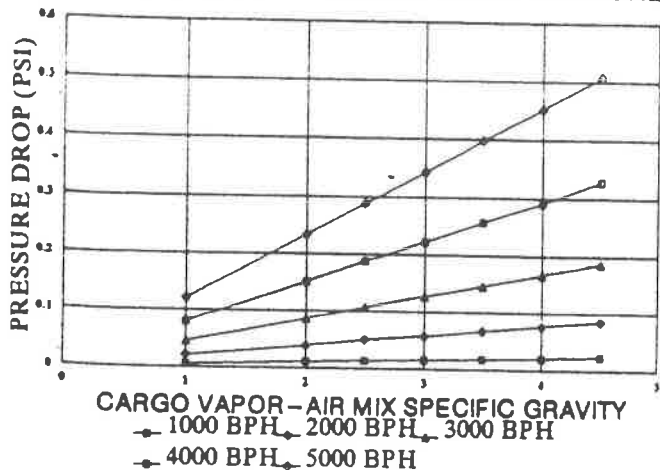
DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONN'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONN'N PRESSURE' IS LESS THAN 80% OF THE PV SETTING, THEN THE 'MLTR' IS OK.

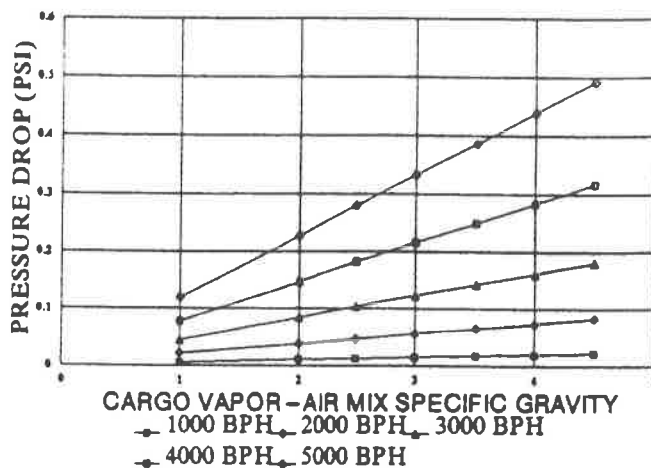
- A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.
- B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 130%

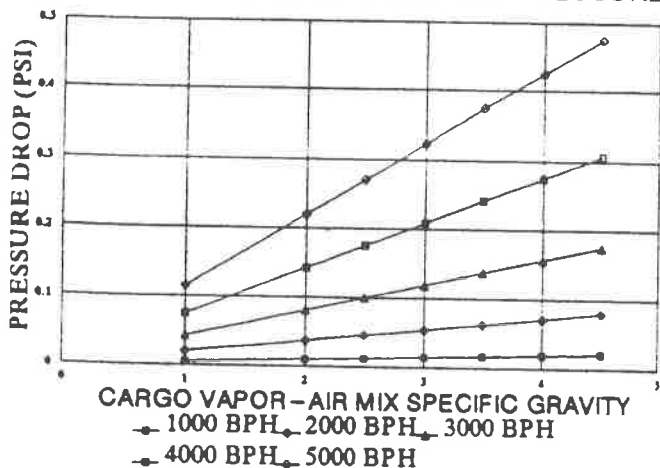
1.0 PSIG SHORE CONNECTION PRESSURE



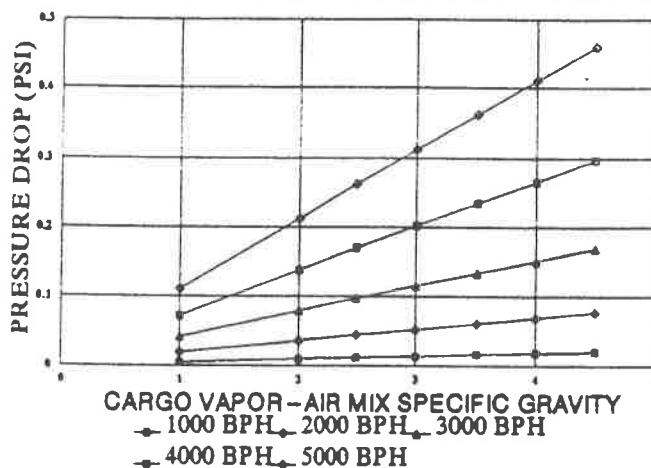
0.5 PSIG SHORE CONNECTION PRESSURE



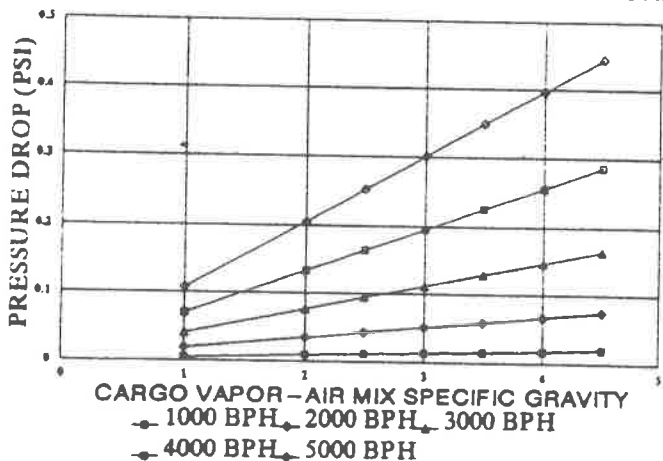
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

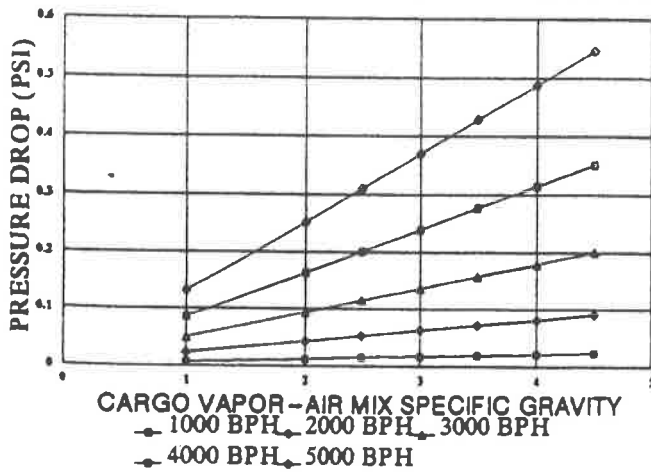
1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.

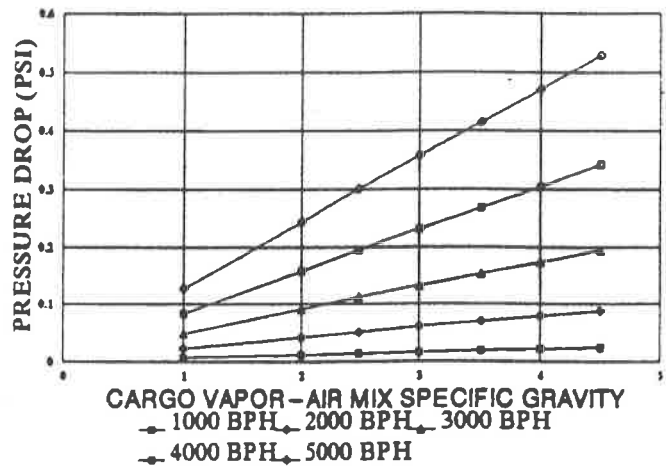
B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 135%

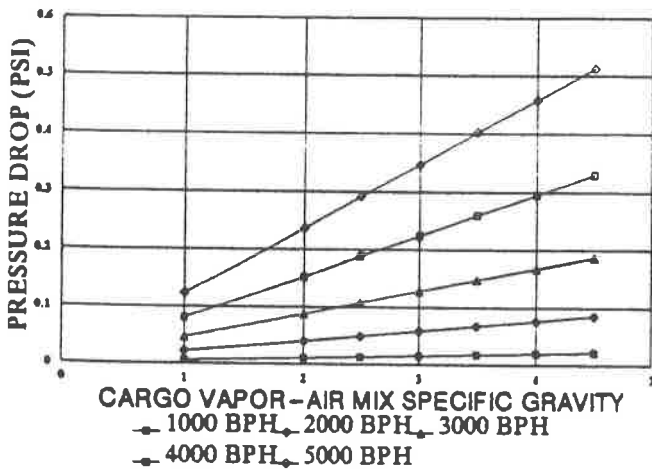
1.0 PSIG SHORE CONNECTION PRESSURE



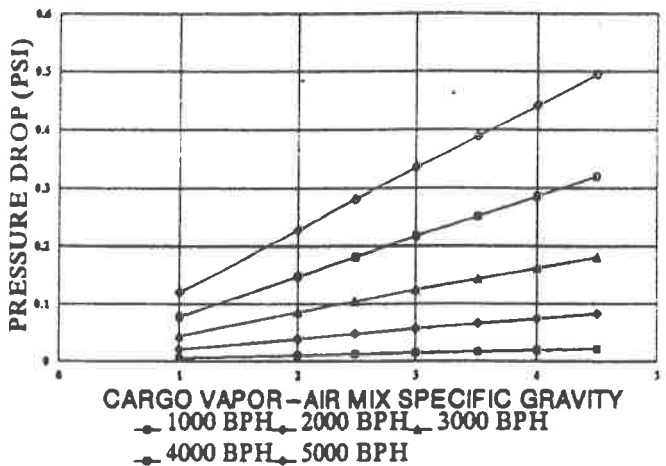
0.5 PSIG SHORE CONNECTION PRESSURE



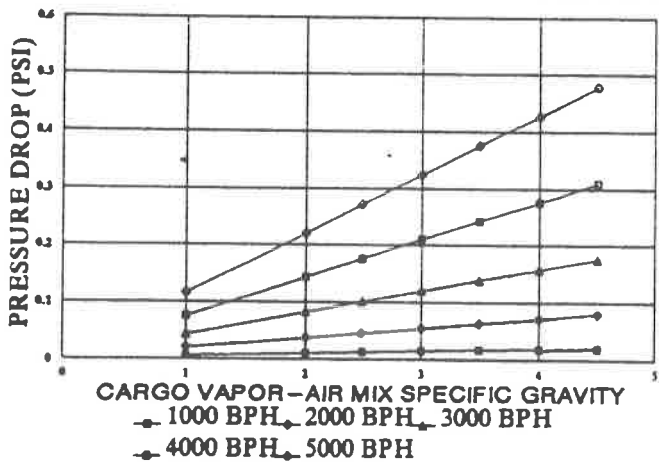
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

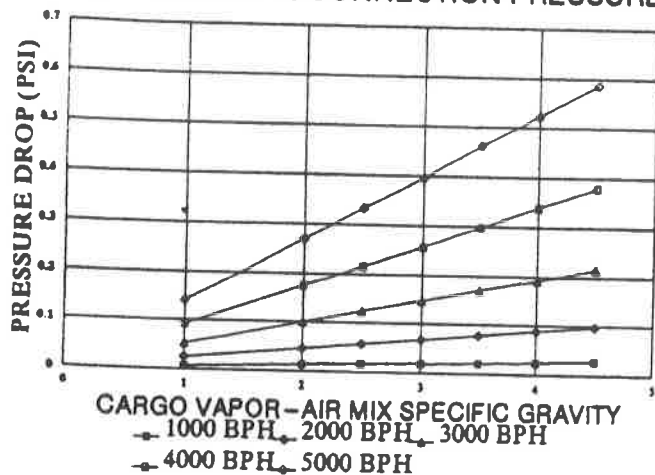
1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.

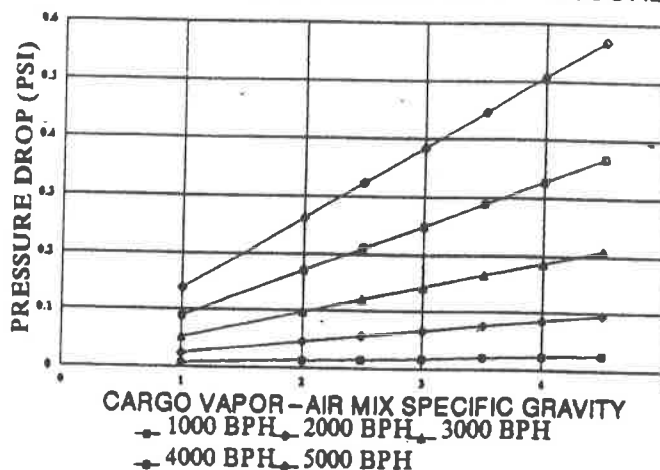
B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 140%

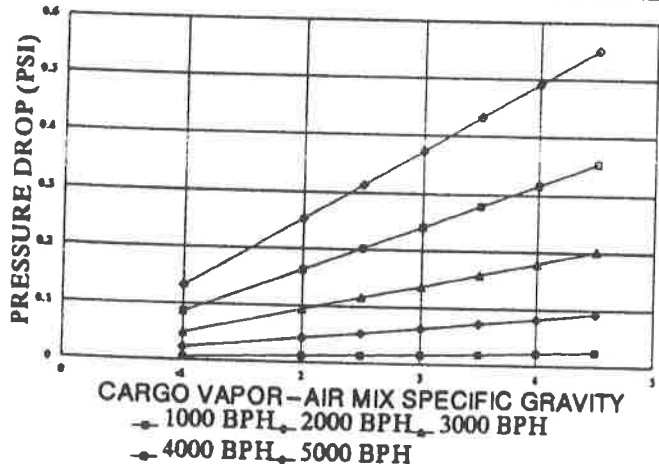
1.0 PSIG SHORE CONNECTION PRESSURE



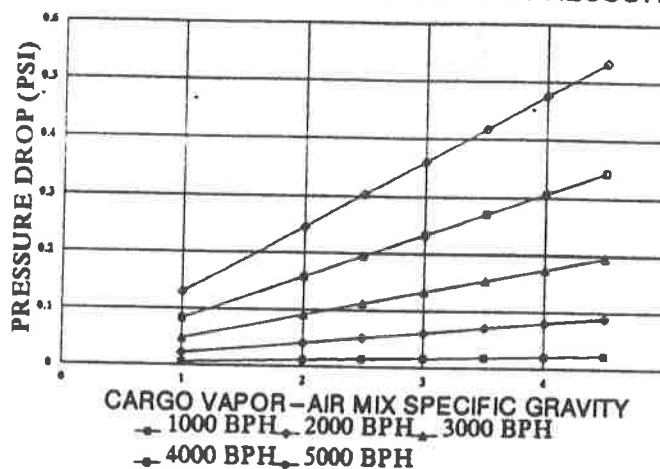
0.5 PSIG SHORE CONNECTION PRESSURE



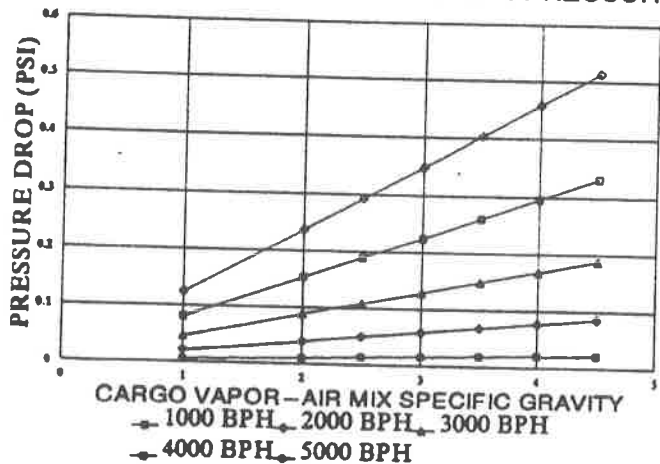
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



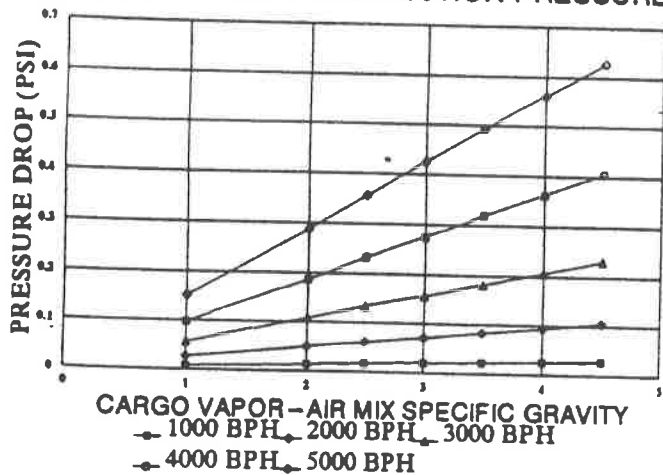
DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

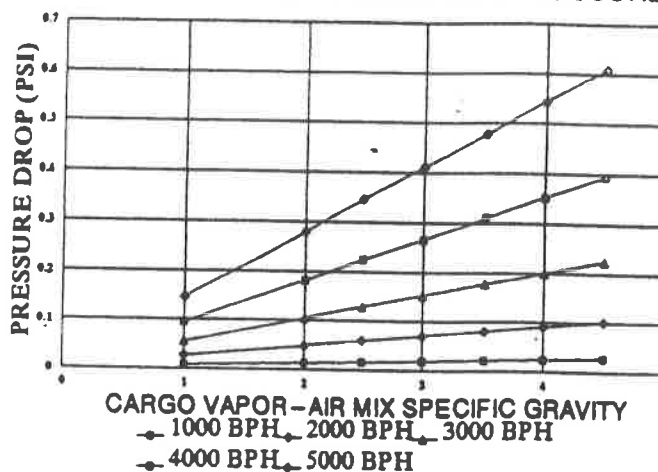
- A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.
 B. PRESSURE DROP IS FOR CARGO VAPOR-AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

GRAPH(S) FOR VAPOR GROWTH RATE (VGR) OF 145%

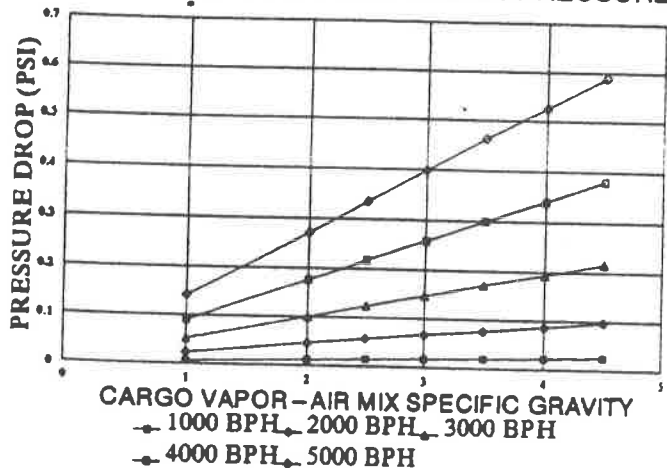
1.0 PSIG SHORE CONNECTION PRESSURE



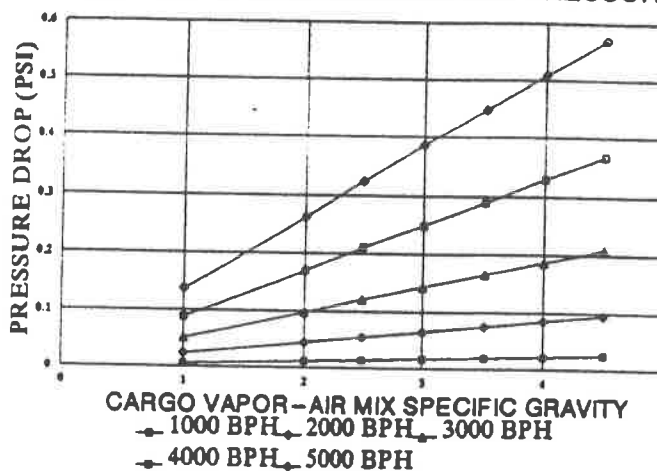
0.5 PSIG SHORE CONNECTION PRESSURE



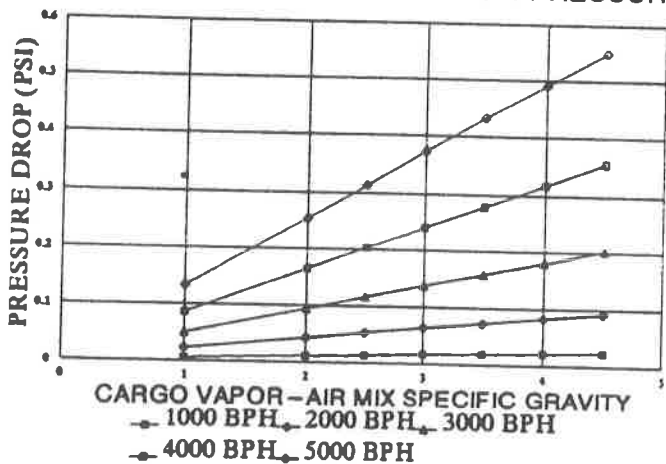
0.0 PSIG SHORE CONNECTION PRESSURE



-0.5 PSIG SHORE CONNECTION PRESSURE



-1.0 PSIG SHORE CONNECTION PRESSURE



DIRECTIONS: FOR THE CARGO TO BE TRANSFER'D:

1. OBTAIN: (a) VAP. - AIR MIX GROWTH RATE (VGR), (b) VAP. - AIR MIX SPECIFIC GRAVITY, (c) MAX LIQUID TRANSFER RATE (MLTR), & (d) PRESSURE TO BE MAINTAINED @ THE SHORE CONNECTION.
2. SELECT THE GRAPH PAGE THAT APPLIES TO THE LESSER OF THE SAME OR NEXT HIGHER 'VGR'.
3. FROM THAT PAGE, SELECT THE GRAPH THAT APPLIES TO THE NEXT HIGHER 'SHORE CONNECTION PRESSURE'.
4. ENTER THAT GRAPH WITH 'SPECIFIC GRAVITY' & 'MAX LIQUID TRANSFER RATE' TO DETERMINE 'PRESSURE DROP' FROM THE MOST REMOTE CARGO TANK TO THE SHORE CONNEC'N.
5. IF THE SUM OF 'PRESS. DROP' + 'SHORE CONNEC'N PRESSURE' IS LESS THAN 80% OF THE P/V SETTING, THEN THE 'MLTR' IS OK.

- A. FLOW RATES SHOWN HEREON (I.E., 'BPH') ARE LIQUID TRANSFER RATES.
 B. PRESSURE DROP IS FOR CARGO VAPOR - AIR MIX FLOW RATE OF 'VGR' TIMES THE LIQUID TRANSFER RATE, AND IS FROM MOST REMOTE TANK TO SHORE CONNECTION.

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM
 BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 DESIGN TEMPERATURE
 "TARGET" MAX LIQUID TRANSFER RATE
 CARGO TANK P/V SETTING
 PIPING SECTION I:

CARGO TANK OUTLET TO VAPOR RELIEF VALVE
 DISTANCE ENROUTE TO PV
 ENTRANCE LOSS (Ke)
 BEND LOSS (Kb)

VALVE LOSS (Kv)

EXIT LOSS (Kex)

PIPING SECTION II:

CARGO TANK OUTLET TO VAPOR RELIEF VALVE
 DISTANCE ENROUTE TO PV
 ENTRANCE LOSS (Ke)
 BEND LOSS (Kb)

VALVE LOSS (Kv)

EXIT LOSS (Kex)

CARGO VISCOSITY

- NOTES: 1. LIQUID SPECIFIC GRAVITY; MOLECULAR WEIGHT OF CARGO
 2. SPECIFIC GRAVITY OF CARGO VAPOR
 3. SATURATED VAPOR PRESSURE @ 115 F
 4. TOTAL VAPOR-AIR PRESSURE @ 115 F
 5. PARTIAL VOLUME OF VAPOR @ 115 F
 6. PARTIAL VOLUME OF AIR @ 115 F.
 7. AIR WEIGHT DENSITY @ 115 F
 & THE PRESSURE SETTING OF THE P/V
 8. VAPOR-AIR WEIGHT DENSITY @ 115 F & P/V PRESS SETTING
 9. VAPOR GROWTH RATE (SEE ALSO NOTE NO. 14)
 10. LIQUID TRANSFER RATE
 11. VAPOR-AIR MIXTURE FLOW RATE
 12. REQUIRED AIR EQUIVALENT FLOW RATE

TABLE I: INPUT DATA & NOTES

						MIDLAND 8" PV MODEL A883/A880	
						P/V VALVE DATA	
						FLOW RATE (SCFH/ 1000)	PRESSURE ACROSS PV (PSI)
(MDWP)	> =	3.000	PSIG				
(T)		115	F,				
(TMLTR)		5,000	BPH				
(Pp/v)		1.500	PSIG ---->	16.2	PSIA		
NOM I.D.		8	IN ---->	I.D.	7.981	IN	
ROUGHNESS		0.00015		AREA	0.347	FT^2	
				125	FT		
				0.5			
				QTY	LOSS	COEF	TOTAL
TEE (THRU RUN)		1	0.60	0.600	90EL LR 1	0.75	0.750
TEE (THRU BRANCH)		3	1.80	5.400	45 EL 0	0.40	0.000
OTHER		0	N/A	0.000	90 EL 0	N/A	0.000
TOTAL:		5	AVG:	1.350			
				QTY	LOSS	COEF	TOTAL
GATE		0	0.19	0.000			
BUTTERFLY		0	0.65	0.000			
OTHER		0	N/A	0.000			
		0	AVG:	0.000			
		0					
NOM I.D.		N/A	IN ---->	I.D.	0.000	IN	
ROUGHNESS		0.00015		AREA	0.000	FT^2	
				N/A	FT		
				0			
				QTY	LOSS	COEF	TOTAL
TEE (THRU RUN)		0	0.60	0.000	90EL LR 0	0.75	0.000
TEE (THRU BRANCH)		0	1.80	0.000	45 EL 0	0.40	0.000
OTHER		0	N/A	0.000	90 EL 0	N/A	0.000
TOTAL:		0	AVG:	0.000			
				QTY	LOSS	COEF	TOTAL
GATE		0	0.19	0.000			
BUTTERFLY		0	0.65	0.000			
OTHER		0	N/A	0.000			
		0	AVG:	0.000			
		0					
				0.01900	CENTIPOISE ---->	4E-07	LB SEC/FT^2

OBTAIN FROM REFERENCE SOURCE
 (CARGO MW / AIR MW), OR FM REF. SOURCE
 OBTAIN FROM REFERENCE SOURCE
 EST'D TO BE SAME AS P/V SETTING (Pp/v)
 Vv,115 / Pt,115
 (Pt,115 - Pv,115) / Pt,115
 Mwa * Pp/v Mwa = MOLEC. WT. OF AIR
 = 28.97
 10.72*(460+T)
 Wv-a,115 [(SQv*Vv,115)+Va,115]*(0.0047*Pp/v)
 VGR ESTIMATED TO BE 1 + (0.25*Pv,115/12.5)
 Q1
 Qv-a Q1 * VGR
 Qa Qv-a*(Wv-a,115/Wa,115)^.5

13. USCG VAP COLLECT'N SYS. CARGO CATEGORIES
- NO ADD'L VCS REQMTS ABOVE THOSE FOR BENZENE, GASOLINE & CRUDE OIL
 - POLYMERIZES
 - HGHLY TOXIC
 - POLYMERIZES & HIGHLY TOXIC
 - HIGH VAPOR GROWTH RATE
 - HIGH VAP GROWTH RATE & HIGHLY TOXIC
 - HIGH VAP GROWTH RATE & POLYMERIZES
 - MORE INFO NEEDED BEFORE REQMTS CAN BE DETERMINED
14. VGR = 1.25 FOR GASOLINE, CRUDE OIL, AND BENZENE.
 15. NF/NC = NON-FLAMMABLE/NON-COMBUSTIBLE

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY,
SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc	SPECIF GRAV OF VAPOR SGv	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (3) (15) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT DENSITY ● 115 F Wa, 115 (7) (LBm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY ● 115 F Mv-a, 115 (8) (LBm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wa, 115 (9)	VAPOR- AIR MIX GROWTH RATE VGR (9)

46 CFR SUBCHAPT O, TABLE 151													

ACETIC ACID	AAC	1.05	1	60.052	2.07	0.92	16.200	0.057	0.943	0.076	0.081	1.061	1.018
ACETIC ANHYDRIDE	ACA	1.08	1	102.050	3.50	0.40	16.200	0.025	0.975	0.076	0.081	1.062	1.008
ACETONITRILE	ATN	0.78	3	41.053	1.41	0.03	16.200	0.002	0.998	0.076	0.076	1.001	1.001
ACRYLIC ACID	ACR	1.05	2	72.064	2.48	0.40	16.200	0.025	0.975	0.076	0.079	1.037	1.008
ACRYLONITRILE	ACN	0.81	4	53.064	1.80	5.00	16.200	0.309	0.691	0.076	0.095	1.247	1.100
ADIPONITRILE	ADN	0.95	1	108.000	3.73	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
ALUMINUM SULFATE SOLUTION	ASX	1.76											
AMINOETHYLETHANOLAMINE	AEE	1.03	1	104.150	3.59	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
AMMONIUM BISULFITE SOLN (70% OR LESS)	ABX	1.44	1			NF/NC							
AMMONIUM HYDROXIDE (28% OR LESS NH3)	AMH		3	35.050	1.21	NF/NC							
ANTHRACENE OIL (COAL TAR FRACTION)	AHO												
BENZENE	BNZ	0.88	1	78.114	2.80	4.50	16.200	0.278	0.722	0.076	0.114	1.500	1.250
BENZENE HYDROCARBON MIXTURES (W/ACETYLENES) (W/10% BENZENE OR MORE)	BHA	0.84	1		2.80	7.30	16.200	0.451	0.549	0.076	0.138	1.811	1.146
BENZENE HYDROCARBON MIXTURES (W/10% BENZENE OR MORE)	BHB	0.84	1		2.80	7.30	16.200	0.451	0.549	0.076	0.138	1.811	1.146
BENZENE, TOLUENE, XYLENE MIXTURES (HAVING 10% BENZENE OR MORE)	BTX	0.84	1	106.080	2.80	7.30	16.200	0.451	0.549	0.076	0.138	1.811	1.146
iso-BUTYL ACRYLATE	BAI	0.88	2	128.170	4.42	0.60	16.200	0.037	0.963	0.076	0.086	1.127	1.012
n-BUTYL ACRYLATE	BTC	0.90	2	128.170	4.40	0.40	16.200	0.025	0.975	0.076	0.083	1.084	1.008
BUTYL ACRYLATE (SEE ISO- & N- BUTYL ACRYLATE)	BAR	0.90	2		4.42	0.60	16.200	0.037	0.963	0.076	0.086	1.127	1.012
BUTYL METHACRYLATE	BMH	0.88	2	142.200	4.90	0.29	16.200	0.018	0.982	0.076	0.081	1.070	1.006
iso-BUTYRALDEHYDE	BAD	0.80	1	72.107	2.50	7.80	16.200	0.481	0.519	0.076	0.131	1.722	1.156
n-BUTYRALDEHYDE	BTR	0.80	1	72.107	2.50	7.80	16.200	0.481	0.519	0.076	0.131	1.722	1.156
BUTYRALDEHYDES (CRUDE)	BFA	0.82	1	72.060	2.48	8.00	16.200	0.494	0.506	0.076	0.132	1.731	1.160
BUTYRALDEHYDE (ISO-, N-)	BAE	0.82	1		2.48	8.00	16.200	0.494	0.506	0.076	0.132	1.731	1.160
CAMPHOR OIL (LIGHT)	CPO	0.92	8										
CARBON TETRACHLORIDE	CBT	1.59	3	153.820	5.31	NF/NC							
CAUSTIC POTASH SOLUTION	CPS	1.50	1			NF/NC							
CAUSTIC SODA SOLUTION	CSS	1.50	1			NF/NC							
CHLOROBENZENE	CRB	1.11	1	112.559	3.88	0.80	16.200	0.049	0.951	0.076	0.087	1.142	1.016
CHLOROFORM	CRF	1.48	3	119.380	4.12	NF/NC							
CHLOROSULFONIC ACID	CSA	1.79											
COAL TAR NAPHTHA SOLVENT	NCT	0.88	1		3.66	0.20	16.200	0.012	0.988	0.076	0.079	1.033	1.004
CREOSOTE (COAL TAR)	CCT	1.07	1		3.72	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
CREOSOTE (WOOD)	CWD	1.07	1		3.72	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
CRESOLS (ALL ISOMERS)	CRS	1.05	1	108.130	3.72	0.06	16.200	0.004	0.996	0.076	0.077	1.010	1.001
CRESOLS WITH LESS THAN 5% PHENOL (SEE CRESOLS (ALL ISOMERS))	CRS	1.05	1										
CRESOLS WITH 5% OR MORE PHENOL (SEE PHENOL)	CFP	1.07	3		3.72	0.05	16.200	0.003	0.997	0.076	0.077	1.008	1.001
CRESYLATE SPENT CAUSTIC	CSC	1.55	1			NF/NC							
CRESYLIC ACID, SODIUM SALT SOLUTION, SEE CRESYLATE SPENT CAUSTIC	CAK (TAR ?)		1										
CROTONALDEHYDE	CTA	0.85	4	70.050	2.41	2.00	16.200	0.123	0.877	0.076	0.089	1.174	1.040

L-2-c

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R OF CARGO MWC	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (15) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT ● 115 F Wa, 115 (7) (LBm/ FT ³)	VAPOR- AIR MIX WEIGHT ● 115 F Wv-a, 115 (8) (LBm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY ● 115 F Wv-a, 115/ Wa, 115	VAPOR- AIR MIX GROWTH RATE VGR (9)
CYCLOHEXANONE	CCH	0.95	1	98.145	3.40	0.02	16.200	0.001	0.999	0.076	0.076	1.003	1.000
CYCLOHEXYLAMINE	CHA	0.87	1		3.42	0.62	16.200	0.038	0.962	0.076	0.083	1.093	1.012
DECYL ACRYLATE (iso-, n-)	DAT	0.89	2	212.330	7.30	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.000
DICHLOROBENZENE (ALL ISOMERS)	DBX	1.30	3		5.07	0.10	16.200	0.006	0.994	0.076	0.078	1.025	1.002
1,1-DICHLOROETHANE	DCH	1.18	1	98.960	3.41	9.90	16.200	0.611	0.389	0.076	0.188	2.473	1.198
2,2-DICHLOROETHYL ETHER	DEE	1.22	1	143.000	4.90	0.04	16.200	0.002	0.998	0.076	0.077	1.010	1.001
DICHLOROMETHANE (ALSO KNOWN AS METHYLENE CHLORIDE)	DCM	1.32	5	84.940	2.93	NF/NC							
2,4-DICHLOROPHENOXYACETIC ACID DIETHANOLAMINE SALT SOLUTION	DDE												
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION	DAD		1										
2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	NDTI												
1,1-,1,2- OR 1,3- DICHLOROPROPANE	DPX	1.16	3	112.960	3.90	6.30	16.200	0.389	0.611	0.076	0.162	2.128	1.126
1,3-DICHLOROPROPENE	DPU	1.23	4	110.980	3.84	5.50	16.200	0.340	0.660	0.076	0.150	1.964	1.110
DICHLOROPROPENE, DICHLOROPROPANE MIXTURES	DMK	1.21	1		3.90	6.30	16.200	0.389	0.611	0.076	0.162	2.128	1.126
2,2-DICHLOROPROPIONIC ACID	DCN												
DIETHANOLAMINE	DEA	1.09	1	105.140	3.65	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
DIETHYLAMINE	DEN	0.71	3	73.139	2.50	1.00	16.200	0.062	0.938	0.076	0.083	1.093	1.020
DIETHYLENTRIAMINE	DET	0.96	1	103.170	3.48	0.04	16.200	0.002	0.998	0.076	0.077	1.006	1.001
DIETHYL ETHER, SEE ETHYL ETHER	DEH			74.123	2.56								
DIISOBUTYLAMINE	DBU	0.75	3	129.247	4.46	0.46	16.200	0.028	0.972	0.076	0.084	1.098	1.009
DIISOPROPANOLAMINE	DIP	0.98	1	133.190	4.59	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
DIISOPROPYLAMINE	DIA	0.72	3	101.193	3.50	3.70	16.200	0.228	0.772	0.076	0.120	1.571	1.074
N,N-DIMETHYLACETAMIDE	DAC	0.95	3		3.00	0.20	16.200	0.012	0.988	0.076	0.078	1.025	1.004
DIMETHYLETHANOLAMINE	DMB	0.89	1		3.03	0.50	16.200	0.031	0.969	0.076	0.081	1.063	1.010
DIMETHYLFORMAMIDE	DMF	0.95	1	73.090	2.51	0.30	16.200	0.019	0.981	0.076	0.078	1.028	1.006
1,4-DIOXANE	DOX	1.04	1		3.03	1.84	16.200	0.114	0.886	0.076	0.094	1.231	1.037
DI-N-PROPYLAMINE	DNA	0.74	3	58.080	3.50	1.50	16.200	0.093	0.907	0.076	0.094	1.232	1.030
ETHANOLAMINE	MEA	1.02	1	61.080	2.10	0.03	16.200	0.002	0.998	0.076	0.076	1.002	1.001
ETHYL ACRYLATE	EAC	0.93	2	100.118	3.50	2.00	16.200	0.123	0.877	0.076	0.100	1.309	1.040
ETHYLAMINE SOLUTION (72% OR LESS)	EAN	0.80	6	45.060	1.56	15.50	16.200	0.957	0.043	0.076	0.117	1.536	1.310
N-ETHYL-BUTYLAMINE	EBA	0.74	3	101.190	3.50	1.20	16.200	0.074	0.926	0.076	0.090	1.185	1.024
N-ETHYLCYCLOHEXYLAMINE	ECC	0.86	1	127.140	4.40	0.50	16.200	0.031	0.969	0.076	0.084	1.105	1.010
ETHYLENE CYANOHYDRIN	ETC	1.04	1	71.080	2.45	0.01	16.200	0.001	0.999	0.076	0.076	1.001	1.000
ETHYLENEDIAMINE	EDA	0.91	1	60.099	2.10	0.90	16.200	0.056	0.944	0.076	0.081	1.061	1.018
ETHYLENE DIBROMIDE	EDB	2.17				NF/NC							
ETHYLENE DICHLORIDE	EDC	1.26	1	98.960	3.42	4.00	16.200	0.247	0.753	0.076	0.122	1.598	1.080
ETHYLENE GLYCOL PROPYL ETHER	EGP	0.91	1		4.80	0.60	16.200	0.037	0.963	0.076	0.087	1.141	1.012
2-ETHYLHEXYL ACRYLATE	EAI	0.89	2	184.200	6.35	0.02	16.200	0.001	0.999	0.076	0.077	1.007	1.000
ETHYLIDENE NORBORNENE	ENB	0.90	3		4.10	0.33	16.200	0.020	0.980	0.076	0.081	1.063	1.007
ETHYL METHACRYLATE	ETM	0.92	2		3.94	1.00	16.200	0.062	0.938	0.076	0.090	1.182	1.020
2-ETHYL-3-PROPYLACROLEIN	EPA	0.85	1	126.190	4.35	0.12	16.200	0.007	0.993	0.076	0.078	1.025	1.002
FERRIC CHLORIDE SOLUTIONS	FCS												
FORMALDEHYDE SOLUTION (37% TO 50%)	FMS	1.13	1		1.03	0.15	16.200	0.009	0.991	0.076	0.076	1.000	1.003

E-2-b

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. CAT.	MOLEC'R WEIGHT OF CARGO Mwc	SPECIF GRAV OF CARGO SGv	SATUR'D VAPOR PRESS Pv, 115 F	TOTAL VAP-AIR PRESS Pt, 115 F	PARTIAL VOLUME OF VAPOR Vv, 115 F	PARTIAL VOLUME OF AIR Va, 115 F	AIR WEIGHT DENSITY Na, 115 F	VAPOR-AIR MIX WEIGHT DENSITY Mw-a, 115 F	VAPOR-AIR MIX SPECIFIC GRAVITY Wa, 115 F	VAPOR-AIR MIX GROWTH RATE VGR
FORMIC ACID	FMA	1.22	1		1.60	2.10	16.200	0.130	0.870	0.076	0.082	1.078	1.042
FURFURAL	FFA	1.20	1	96.085	3.31	0.15	16.200	0.009	0.991	0.076	0.078	1.021	1.003
GLUTARALDEHYDE SOLUTION (50% OR LESS)	GTA		1			NF/NC							
HEXAMETHYLENEDIAMINE SOLUTION	HMC	0.93	1	116.140	4.00	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
HEXAMETHYLENEMINE	HMI	0.88	1		1.00	0.50	16.200	0.031	0.969	0.076	0.076	1.000	1.010
HYDROCHLORIC ACID SPENT (15% OR LESS)	HCS	1.21											
ISOPENTALDEHYDE (MIXED ISOMERS) (SEE VALERALDEHYDE (ISO-, N-))													
ISOPRENE	IPR	0.69	7	68.120	2.35	23.00	16.200	1.420	-0.420	0.076	0.222	2.917	1.460
KRAFT PULPING LIQUORS (FREE ALKALI CONTENT 3% OR MORE) (INCLUDING:KPL)													
MESITYL OXIDE	MSO	0.86	1		3.50	0.67	16.200	0.041	0.959	0.076	0.084	1.103	1.013
METHYL ACRYLATE	MAM	0.95	2	86.091	3.00	4.10	16.200	0.253	0.747	0.076	0.115	1.506	1.082
METHYLCYCLOPENTADIENE DIMER	MCK	0.94	1		0.93	0.15	16.200	0.009	0.991	0.076	0.076	0.999	1.003
METHYL DIETHANOLAMINE	MDE	1.04	1		4.10	0.10	16.200	0.006	0.994	0.076	0.078	1.019	1.002
2-METHYL-5-ETHYLPYRIDINE	MEP	0.92	1	121.000	4.18	0.16	16.200	0.010	0.990	0.076	0.079	1.031	1.003
METHYLENE CHLORIDE (SEE DICHLOROMETHANE)													
METHYL METHACRYLATE	MAM	0.94	2	100.110	3.45	2.02	16.200	0.125	0.875	0.076	0.099	1.306	1.040
2-METHYLPYRIDINE	MPR	0.95	3	93.129	3.20	0.50	16.200	0.031	0.969	0.076	0.081	1.068	1.010
alpha-METHYLSTYRENE	MSR	0.89	2	118.179	4.08	0.40	16.200	0.025	0.975	0.076	0.082	1.076	1.008
MORPHOLINE	MPL	1.00	1	87.122	3.00	0.80	16.200	0.049	0.951	0.076	0.084	1.099	1.016
NITRIC ACID (70% OR LESS)	NCD												
NITROPROPANE (-1, OR -2)	NPM	0.99	1	89.090	3.06	1.05	16.200	0.065	0.935	0.076	0.086	1.134	1.021
OCTYL NITRATES (ALL ISOMERS)	ONE	1.00	1		6.00	0.31	16.200	0.019	0.981	0.076	0.083	1.096	1.006
OLEUM	OLM	1.98			2.76	0.01	16.200	0.001	0.999	0.076	0.076	1.001	1.000
PENTACHLOROETHANE	PCE	1.67											
1, 3-PENTADIENE	PDE	0.68	7	68.060	2.36	17.06	16.200	1.053	-0.053	0.076	0.185	2.432	1.341
PERCHLOROETHYLENE (SAME AS TETRACHLOROETHYLENE)	PER	1.62	1	165.820	5.72								
PHOSPHORIC ACID	PAC	1.83											
POLYETHYLENE POLYAMINES	PEB	0.99	1		5.00	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
POLYMETHYLENE POLYPHENYL ISOCYANATE	PPI	1.20	1		13.79	0.00							
POTASSIUM HYDROXIDE SOLUTION (SEE CAUSTIC POTASH SOLUTION)													
iso-PROPANOLAMINE	MPA	0.96	1	76.000	2.59	0.08	16.200	0.005	0.995	0.076	0.077	1.008	1.002
PROPANOLAMINE (iso-, n-)	PAX	0.96	1		2.59	0.08	16.200	0.005	0.995	0.076	0.077	1.008	1.002
PROPIONIC ACID	PNA	1.00	1	74.080	2.56	0.30	16.200	0.019	0.981	0.076	0.078	1.029	1.006
iso-PROPYLAMINE	IPP	0.69	5	59.112	2.04	23.42	16.200	1.446	-0.446	0.076	0.191	2.504	1.468
iso-PROPYL ETHER	IPE	0.72	1		3.50	6.64	16.200	0.410	0.590	0.076	0.154	2.025	1.133
PYRIDINE	PRD	0.98	1	79.102	2.72	1.30	16.200	0.080	0.920	0.076	0.087	1.138	1.026
SODIUM ALUMINATE SOLUTION	SAU												
SODIUM CHLORATE SOLUTION (50% OR LESS)	SDD	1.63	1										
SODIUM DICHROMATE SOL'N (70% OR LESS)	SDL												
SODIUM HYDROXIDE SOLUTION (SEE CAUSTIC SODA SOLUTION)													
SODIUM HYPOCHLORITE SOL'N (15% OR LESS)	SHP	1.10											
SODIUM SULFIDE, HYDROSULFIDE SOLUTIONS (H2S 15 PPM OR LESS)	SSH	1.32											

E-2-c

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	CHRS	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST. CAT.	MOLEC'R WEIGHT OF CARGO MMc	SPECIF GRAV OF CARGO SGv	SATUR'D VAPOR PRESS @ 115 F Pv, 115	TOTAL VAP-AIR PRESS @ 115 F Pt, 115	PARTIAL VOLUME OF VAP @ 115 F Vv, 115	PARTIAL VOLUME OF AIR @ 115 F Va, 115	AIR WEIGHT DENSITY @ 115 F Wa, 115	VAPOR-AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115	VAPOR-AIR MIX SPECIFIC GRAVITY Wv-a, 115 / Wa, 115	VAPOR-AIR MIX GROWTH RATE VGR
		(1)	(13)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9)
						(PSIA)	(PSIA)			(LBm/FT ³)	(LBm/FT ³)		
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (15 PPM<H2S<200 PPM)	SSI	1.32											
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (H2S GREATER THAN 200 PPM)	SSJ	1.32											
SODIUM THIOCYANATE SOLUTION (56% OR LESS)	STS												
STYRENE MONOMER	STY	0.92		104.150	3.60	0.40	16.200	0.025	0.975	0.076	0.081	1.064	1.000
SULFURIC ACID	SFA	1.84			3.40	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
SULFURIC ACID, SPENT	SAC	1.39				0.01	16.200	0.001	0.999	0.076	0.076	0.999	1.000
1,1,2,2-TETRACHLOROETHANE (ACETYLENE TETRACHLORIDE)	TEC	1.59		147.410	5.09								
TETRAETHYLENEPENTAMINE	TTP	1.00	1		6.80	0.00	16.200	0.000	1.000	0.076	0.076	1.000	1.000
TETRAHYDROFURAN	THF	0.89	1	72.107	1.35	8.50	16.200	0.525	0.475	0.076	0.090	1.184	1.170
1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)	TCM	1.44	1	133.390	4.60	1.02	16.200	0.063	0.937	0.076	0.093	1.227	1.020
TRICHLOROETHANE (SEE 1,1,2-TRICHLOROETHANE)													
TRICHLOROETHYLENE	TCL	1.46	1	131.380	4.50	3.46	16.200	0.214	0.786	0.076	0.133	1.748	1.069
1,2,3-TRICHLOROPROPANE	TCN	1.39	3	147.432	5.60	0.15	16.200	0.009	0.991	0.076	0.079	1.043	1.003
TRIETHANOLAMINE	TEA	1.13	1	149.190	5.14	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
TRIETHYLENETETRAMINE	TEN	0.73	3	101.193	3.49	2.50	16.200	0.154	0.846	0.076	0.105	1.384	1.050
UREA, AMMONIUM NITRATE SOL'N (CONTAINING MORE THAN 2% NH3)	TET	0.98	1	146.240	5.04	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
VALERALDEHYDE (iso-, n-)	UAS		1										
VALERALDEHYDE (iso-)		0.79	1	86.134	3.00	5.00	16.200	0.309	0.691	0.076	0.123	1.617	1.100
VALERALDEHYDE (n-)	IVA	0.79	1		3.00	5.00	16.200	0.309	0.691	0.076	0.123	1.617	1.100
VANILLAN BLACK LIQUOR (FREE ALKALI CONTENT 3% OR MORE)	VAL	0.84	1		5.93	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
VINYL ACETATE	VBL		1										
VINYLTOLUENE	VAM	0.94	2	86.091	2.97	5.80	16.200	0.358	0.642	0.076	0.130	1.705	1.116
	VNT	0.90	2		4.08	0.12	16.200	0.007	0.993	0.076	0.078	1.023	1.002

E-2-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO Mw	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (15) (PSIA)	,TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP @ 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR @ 115 F Va, 115 (6)	AIR WEIGHT DENSITY @ 115 F Wa, 115 (7) (Lbm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115 (8) (Lbm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAPOR- AIR MIX GROWTH RATE VGR (9)

46 CFR SUBCHAPT O BUT NOT TABLE 151													

1,1-DICHLOROPROPANE	DPB	1.16	3		3.90	6.30	16.200	0.309	0.611	0.076	0.162	2.120	1.126
1,1,1-TRICHLOROETHANE		1.51	1	133.390	4.60	NF/NC							
1,2-DICHLOROPROPANE	DPP	1.16	3		3.50	2.60	16.200	0.160	0.840	0.076	0.107	1.401	1.052
1,3-CYCLOPENTADIENE			1										
1,3-DICHLOROPROPANE	DPC	1.16	3		3.90	3.80	16.200	0.235	0.765	0.076	0.128	1.680	1.076
2-METHYL-2-HYDROXY-3-BUTYNE	MHB	0.86	1		2.90	1.14	16.200	0.070	0.930	0.076	0.086	1.134	1.023
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70%)	DDA												
3-PENTENENITRILE	PNT (CRUDE ?)		8										
AEROTHEME TT (1,1,1-TRICHLOROETHANE)			8	133.390	4.60								
ALKYLBENZENE			1										
AMINOETHYLPIPERAZINE	AEP		1										
BENZENE RAFFINATE (ASSUME VAPOR PROPERTIES SIMILAR TO BENZENE)		0.70			2.80	4.50	16.200	0.278	0.722	0.076	0.114	1.500	1.250
BENZENE SULFONYL CHLORIDE	BSC	1.38	1		6.09	0.00	16.200	0.000	1.000	0.076	0.076	1.000	1.000
BENZYL ACETATE	BZE	1.04	1		5.18	0.02	16.200	0.001	0.999	0.076	0.077	1.005	1.000
BENZYL CHLORIDE (STABILIZED)	BCL	1.10	4		4.36	0.09	16.200	0.006	0.994	0.076	0.078	1.019	1.002
BUTANOL			1										
BUTYL ETHER (n-)	BTE	0.77	3		4.50	0.40	16.200	0.025	0.975	0.076	0.083	1.086	1.000
BUTYLENE OXIDE (1,2-)	BTO	0.83	2		2.49	9.18	16.200	0.567	0.433	0.076	0.140	1.844	1.184
BUTYRIC ACID	BRA	0.96	1		3.00	0.07	16.200	0.004	0.996	0.076	0.077	1.009	1.001
CARBOLIC ACID	CBO	1.04	3		3.25	0.06	16.200	0.004	0.996	0.076	0.077	1.008	1.001
CHLOROACETIC ACID (80% OR LESS)	CHM	1.58			3.26	0.01	16.200	0.001	0.999	0.076	0.076	1.001	1.000
CHLOROPROPIONIC ACID (2- OR 3-)	CPM	1.26	1		3.70	0.02	16.200	0.001	0.999	0.076	0.076	1.003	1.000
CHLOROTOLUENE (m-)	CTM	1.07	1		4.40	0.32	16.200	0.020	0.980	0.076	0.081	1.067	1.006
CHLOROTOLUENE (o-)	CTO	1.08	1		4.40	0.32	16.200	0.020	0.980	0.076	0.081	1.067	1.006
CHLOROTOLUENE (p)	CRN	1.07	1		4.36	0.09	16.200	0.006	0.994	0.076	0.078	1.019	1.002
CHLOROTOLUENES (MIXED ISOMERS)	CHI	1.08	1		4.40	0.53	16.200	0.033	0.967	0.076	0.085	1.111	1.011
CREOSOTE (ALL ISOMERS)	CCW	1.07	1		3.72	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
CRESYLIC ACID TAR	CRX	1.05	1		1.00	0.10	16.200	0.006	0.994	0.076	0.076	1.000	1.002
CYCLOHEPTANE	CYE	0.81	1		3.39	1.40	16.200	0.086	0.914	0.076	0.092	1.207	1.020
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE	CYX	0.95	1		3.38	1.00	16.200	0.062	0.938	0.076	0.087	1.147	1.020
CYCLOHEXYL ACETATE	CYC	0.97	1		4.90	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
CYCLOPENTADIENE, STYRENE, BENZENE MIXTURE	CSB	1.50	1		4.55	4.50	16.200	0.278	0.722	0.076	0.151	1.986	1.090
CYCLOPENTANE	CYP	0.74	1		2.40	13.15	16.200	0.812	0.188	0.076	0.163	2.136	1.263
DECAHOIC ACID	DCO	5.94	1		5.93	0.00							
DI 2 ETHYLHEXYL PHTHALATE (SEE ALSO ETHYLHEXYL PHTHALATE)		0.98											
DICHLOROISOPROPYL ETHER (2,2'-)	DCI	1.11	1		5.90	0.06	16.200	0.004	0.996	0.076	0.078	1.010	1.001
DICHLOROPROPANE		1.16											
DICHLOROPROPENE		1.23											
DIETHYL SULFATE	DSU	1.18	1		5.30	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000

E-2-a

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC' R WEIGHT OF CARGO MMc (1)	'SPECIF GRAV OF CARGO VAPOR SGv (2)	SATUR'D VAPOR PRESS @ 115 F (3)	TOTAL VAP-AIR PRESS @ 115 F (4)	PARTIAL VOLUME OF VAP @ 115 F (5)	PARTIAL VOLUME OF AIR @ 115 F (6)	AIR WEIGHT DENSITY @ 115 F (7)	VAPOR-AIR MIX WEIGHT DENSITY @ 115 F (8)	VAPOR-AIR MIX SPECIFIC GRAVITY @ 115 F (9)	VAPOR-AIR MIX GROWTH RATE (10)
DIETHYLETHANOLAMINE													
DODECYL BENZENE	DAR	0.89	1		4.03	0.18	16.200	0.011	0.989	0.076	0.079	1.034	1.00
DODECYLDIMETHYLAMINE TETRADECYLDIMETHYLAMINE MIXTURE			1										
DRIPOLENE	DOT												
ETHANOL (see ethyl alcohol)			1										
ETHYL BROMIDE			1	46.069	1.59								
ETHYL TERT-BUTYL ETHER			8	108.966	3.76								
ETHYLAMINE	EBE	0.73	1		3.50	5.00	16.200	0.309	0.691	0.076	0.135	1.772	1.100
ETHYLENE DICHLORIDE 1,1,2-TRICHLOROETHANE MIXTURE	EAM	0.80	6	45.085	1.55	40.80	16.200	2.519	-1.519	0.076	0.102	2.305	1.816
ETHYL MERCAPTAN (SAME AS ETHANETHIOL)	ETX	1.44	1		4.60	3.70	16.200	0.228	0.772	0.076	0.139	1.822	1.074
ETHYLPHENOL			6										
FORMALDEHYDE SOLUTION (50% OR MORE), METHANOL MIXTURES	EPL	1.04	1		4.21	0.02	16.200	0.001	0.999	0.076	0.076	1.004	1.000
HYDROSULFIDE	MTM	0.79	1		1.10	6.63	16.200	0.409	0.591	0.076	0.079	1.041	1.133
INDENES			8										
ISOBUTYL ACETATE			8										
ISOPRENE, PENTADIENE MIXTURE	IBA			116.160	4.01	0.36	16.200	0.022	0.978	0.076	0.081	1.068	1.007
ISO-PROPYL ALCOHOL	IPN												
LAURIC ACID	LRA	0.79	1	60.096	2.07	3.00	16.200	0.185	0.815	0.076	0.091	1.199	1.060
METHACRYLONITRILE	MET	0.80	2	6.910	0.00	3.39	16.200	0.209	0.791	0.076	0.097	1.274	1.068
METHANOL			2		2.31								
METHYL STYRENE			1	32.042	1.11								
METHYL STYRENE, INDENES, ALKYL BENZENE MIXTURES			2										
METHYLCYCLOHEXANE	MIA												
METHYLHEXANE (SAME AS HEPTANE)	MCY	0.77	1		3.40	2.37	16.200	0.146	0.854	0.076	0.103	1.351	1.047
MONOETHANOLAMINE			1										
MONOISOPROPANOLAMINE	MEA	1.02		61.084	2.11	0.10	16.200	0.006	0.994	0.076	0.077	1.007	1.002
NAPHTHALENE (MOLTEN)		0.96		75.110	2.59	0.20	16.200	0.012	0.988	0.076	0.078	1.020	1.004
NEODECANOIC ACID	NTM	1.15	1		4.41	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
NITRILOTRIACETIC ACID	NEA	0.92	1		6.00	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
NITROPHENOL (MOLTEN)	NAA (4SALTS ?		8										
NITROPROPANE (60%), NITROETHANE (40%) MIXTURE	NTP	1.49	1		4.79	0.00	16.200						
NITROTOLUENE (o-,p-)	NNM	1.05	1		3.06	1.10	16.200	0.068	0.932	0.076	0.087	1.140	1.022
PARALDEHYDE	NIT	1.16	1		4.72	0.02	16.200	0.001	0.999	0.076	0.076	1.005	1.000
POLYGLYCERINE, SODIUM SALT SOLN (CONTAINING 3% OR MORE SODIUM HYDROXYDE)	PDH	0.99	1		4.55	8.30	16.200	0.512	0.488	0.076	0.215	2.819	1.166
PROPIONALDEHYDE	PAD	0.81	2		2.00	13.76	16.200	0.849	0.151	0.076	0.141	1.849	1.275
PROPIONIC ANHYDRIDE	PAH	1.01	1		4.50	0.11	16.200	0.007	0.993	0.076	0.078	1.024	1.002
PROPIONITRILE	PCN	0.70	1		1.90	1.17	16.200	0.072	0.928	0.076	0.081	1.065	1.023
PROPYLAMINE (n-)	PRA	0.72	1		2.04	13.55	16.200	0.836	0.164	0.076	0.142	1.870	1.271
PROPYLBENZENE			1		0.20	4.14	16.200	0.256	0.744	0.076	0.061	0.796	1.083
PYROLYSIS GASOLINE (GREATER THAN 5% BENZENE)	GPY	0.84	1		2.80	7.30	16.200	0.451	0.549	0.076	0.138	1.811	1.146
PYROLYSIS RESIDUAL FUELS		0.89											
SEWAGE, RAW	SWR												

E-2-5

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY,
SPECIFIC GRAVITY, & VAPOR GROWTH RATE

C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO Mw	SPECIP GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (3) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT DENSITY ● 115 F Wa, 115 (7) (Lbm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY ● 115 F Mv-a, 115 (8) (Lbm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Mv-a, 115/ Wa, 115	VAPOF AIR MIX GROWT RATE VGR (9)
	SODIUM SULFIDE (SOLID IN WATER)	SDS	1.53	0								
	STYRENE	STY	0.92	2	104.152	3.60	0.40	16.200	0.025	0.975	0.076	0.001
	STYRENE CRUDE	STX	0.92	2		3.60	0.40	16.200	0.025	0.975	0.076	0.001
	STYRENE TAR	STT										
	TETRAMETHYLBENZENE (1,2,3,5-)	TTB	0.89	1		4.20	0.14	16.200	0.009	0.991	0.076	0.070
	TOLUIDINE (o-)	TLI	1.00	1		3.69	0.01	16.200	0.001	0.999	0.076	0.076
	TRICHLOROBENZENE (1,2,4-)	TCB	1.45	1		6.25	0.03	16.200	0.002	0.998	0.076	0.077
	TRIIISOPROPANOLAMINE SALT OF 2,4-DICHLOROPHENOXY ACETIC ACID SOL'N			1								
	TRIPHENYLBORANE	TPE		0								
	UNDECANOIC ACID	UDA	0.89	1		6.42	0.00					
	HYDROCARBON 5-9	HPN	0.85	1		3.40	4.40	16.200	0.272	0.728	0.076	0.126
												1.652
												1.000

E-2-4

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC., "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST. CAT. (13)	MOLEC'R WEIGHT OF CARGO MWC (1)	SPECIF GRAV OF CARGO VAPOR SGV (2)	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (3)	TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4)	PARTIAL VOLUME OF VAP OF 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR OF 115 F Va, 115 (6)	AIR WEIGHT @ 115 F Wa, 115 (7)	VAPOR-AIR MIX DENSITY @ 115 F Wv-a, 115 (8)	VAPOR-AIR MIX SPECIFIC GRAVITY @ 115 F Wv-a, 115/ Wa, 115 (9)	VAPOR-AIR MIX GROWTH RATE (10)

46 CFR SUBCHAPTER D, TABLE 30.25-1													

Acetone	ACT	0.79	1	58.080	2.00	10.00	16.200	0.617	0.383	0.076	0.123	1.617	1.200
Acetophenone	ACP	1.03	1	120.060	4.14	0.60	16.200	0.037	0.963	0.076	0.085	1.116	1.012
Acetyl Tributyl Citrate		1.05		402.460	13.89								
Acrylonitrile-Styrene Copolymer dispersion in Polyether Polyol	ALE												
Alcohols (C13 and above)	ALY												
Alcoholic beverages, N.O.S.													
Alcohol (C6 - C17) (secondary) Poly(3-6)ethoxylates													
Alcohol (C12 - C15) Poly(1-3)ethoxylates													
Alcohol (C12 - C15) Poly(3-11)ethoxylates													
Alkenylsuccinic acid													
Alkenylsuccinic Anhydride													
Alkyl (C9 - C17) Benzenes	AKB												
Alkylbenzenesulfonic acid (4% or less)	ABS												
Alkyl Phthalates (n-)													
Alkyl Succinate Formaldehyde Hydr- oxyamino condensate (3.2% or less)													
Aminoethyldiethanolamine, Aminoethylethanolamine solution													
Amyl Acetate (commercial, iso-, n-, sec-)	AEC	0.87	1		4.50	2.02	16.200	0.125	0.875	0.076	0.109	1.436	1.040
AMYL ACETATE (n-)	AML	0.88	1		4.48	0.33	16.200	0.020	0.980	0.076	0.082	1.071	1.007
AMYL ACETATE (iso-)	IAT	0.88	1		4.48	0.33	16.200	0.020	0.980	0.076	0.082	1.071	1.007
Amyl alcohol (iso-, n-, sec-, primary) (SEE ALSO IAA)	AAI	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
Amyl alcohol (n-)	AAN	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
Amyl alcohol (tert-)	AAI	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
AMYL ALCOHOL, PRIMARY	APM	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
AMYL ALCOHOL, (sec-)	ASE	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
Amylene	AMZ	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
AMYL ALCOHOL, (iso-)	IAA	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
Amyl Methyl Ketone	AMK	0.82	1		3.04	0.30	16.200	0.019	0.981	0.076	0.079	1.038	1.006
Amyl Tallate													
Asphalt	ASP	1.04											
ASPHALT BLENDING STOCKS: Roofers flux	ARF												
ASPHALT BLENDING STOCKS: Straight run residue	ASR												
Behenyl alcohol													
Benzene Tricarboxylic acid Trioctyl Ester													
Benzyl alcohol													
Bicyclic Terpenel Polyamide salt	BAL	1.05	1	108.140	3.73	0.10	16.200	0.006	0.994	0.076	0.077	1.017	1.002
Brake fluid base mixtures (containing Poly(2-8)alkylene (C2-C3)	gBFX												
Butane	BMX	1.03											
Butene, SEE BUTYLENE													
Butene Oligomer	BOL												

E-2-1

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; *7027* AND *7028*

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc (1)	SPECIF GRAV OF CARGO VAPOR SGv (2)	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (3) (PSIA)	TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP @ 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR @ 115 F Va, 115 (6)	AIR WEIGHT DENSITY @ 115 F Wa, 115 (7) (Lbm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115 (8) (Lbm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAP MI GRO RA' VG (9)
Butyl Acetate (iso-, n-)	BAX	0.87	1	116.160	4.00	0.60	16.200	0.037	0.963	0.076	0.085	1.111	1.01
BUTYL ACETATE (N-)	BCN	0.88	1		4.00	0.80	16.200	0.049	0.951	0.076	0.087	1.148	1.01
Butyl Acetate (sec-)	BTA	0.89	1		4.00	1.50	16.200	0.093	0.907	0.076	0.097	1.278	1.03
Butyl alcohol (iso-, n-, sec-, tert-)			1		2.60	0.90	16.200	0.056	0.944	0.076	0.083	1.089	1.01
BUTYL ALCOHOL (ISO-)	IAL	0.81	1		2.60	0.90	16.200	0.056	0.944	0.076	0.083	1.089	1.01
BUTYL ALCOHOL (N-)	BAN	0.81	1		2.60	0.50	16.200	0.031	0.969	0.076	0.080	1.049	1.01
BUTYL ALCOHOL (SEC-)	BAS	0.81	1		2.60	1.30	16.200	0.080	0.920	0.076	0.086	1.128	1.02
BUTYL ALCOHOL (TERT-)	BAT	0.78	1		2.60	2.80	16.200	0.173	0.827	0.076	0.097	1.277	1.05
Butyl Benzyl Phthalate	BPH	1.12	1		10.80	0.01	16.200	0.001	0.999	0.076	0.077	1.006	1.00
Butylene Glycol	BTN												
1,3-Butylene Glycol, SEE BUTYLENE GLYCOL	BUG												
Butylene Polyglycol, SEE BUTYLENE GLYCOL													
iso-Butyl Formate				102.134	3.53								
n-Butyl Formate													
Butyl Heptyl Ketone													
Butyl Methyl Ketone, SEE METHYL BUTYL KETONE	BHK												
Butyl Stearate													
Butyl Toluene													
Butyrolactone (gamma)	BUE	0.85	1		5.11	0.10	16.200	0.006	0.994	0.076	0.078	1.025	1.002
Calcium Alkylphenate	BLA												
Calcium Alkyl Salicylate													
Calcium Amino Nonyl Phenolate													
Calcium Carboxylate													
Caprolactam solutions													
Carbon black base	CLS	1.02	1		3.90	0.05	16.200	0.003	0.997	0.076	0.077	1.009	1.001
Cetyl alcohol (HEXADECANOL) SEE ALCOHOLS (C13 AND ABOVE)		0.90											
Cetyl-Stearal alcohol													
Cleaning spirit (unleaded)													
Coal tar													
Cumene	COR	1.11											
Cycloaliphatic resins	CUM	0.86	1	120.090	4.20	0.60	16.200	0.037	0.963	0.076	0.085	1.119	1.012
Cyclohexane													
Cyclohexanol	CHK	0.78	1	84.162	2.90	4.50	16.200	0.278	0.722	0.076	0.116	1.528	1.090
1,3-Cyclopentadiene dimer (molten)	CHN	0.95	1	100.160	3.45	0.15	16.200	0.009	0.991	0.076	0.078	1.023	1.003
Cyclopentadiene polymers, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	CPD	0.69	2		4.55	0.25	16.200	0.015	0.985	0.076	0.080	1.055	1.005
Cymene (para-)													
Decahydronaphthalene	CMP	0.86	1		4.62	0.11	16.200	0.007	0.993	0.076	0.078	1.025	1.002
Decaldehyde (iso-)	DHN	0.89	1		4.76	0.10	16.200	0.006	0.994	0.076	0.078	1.023	1.002
Decaldehyde (n-)	IDA	0.83	1		5.00	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Decane	DAL	0.83	1		5.01	0.00							
Decene	DDC												
	DCE	0.74	1		4.80	0.12	16.200	0.007	0.993	0.076	0.078	1.028	1.002

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC., "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'W R OF CARGO MWC	SPECIF GRAV OF CARGO VAPOR	SATUR'D	TOTAL	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAPOR-
						VAPOR PRESS ● 115 F Pv, 115 (15) (PSIA)	VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	VOLUME OF VAP ● 115 F Vv, 115 (5)	VOLUME OF AIR ● 115 F Va, 115 (6)	WEIGHT DENSITY ● 115 F Wv, 115 (7) (LBm/ FT ³)	AIR MIX WEIGHT DENSITY ● 115 F Wv-a, 115 (8) (LBm/ FT ³)	AIR MIX SPECIFIC GRAVITY ● 115 F Wv-a, 115 (9)	VAPOR MIX GROWTH RATE VGR (9)
Decyl alcohol (all isomers) (DECANOL)	DAK	0.83	1	158.170	5.30	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
DECYL ALCOHOL (iso-)	ISA	0.83	1		5.30	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
DECYL ALCOHOL (n-)	DAN	0.83	1		5.30	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Decylbenzene (n-)	DBZ	0.86	1		7.52	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Detergent Alkylate													
Diacetone alcohol													
Dialkyl (C10-C14) Benzenes	DAA	0.97	1		4.00	0.10	16.200	0.006	0.994	0.076	0.078	1.019	1.002
Dialkyl (C7-C13) Phthalates	DAB												
Dibutyl Carbinol	DAH												
Dibutyl Phthalate (ortho-)	DPA	1.05	1	278.350	9.59	0.00							
Dicyclopentadiene, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	DPT	0.98	2		4.55	0.25	16.200	0.015	0.985	0.076	0.080	1.055	1.005
Diethylbenzene	DEB	0.87	1		4.62	0.08	16.200	0.005	0.995	0.076	0.078	1.010	1.002
Diethylene Glycol	DEG	1.12	1	106.122	3.66	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Diethylene Glycol Butyl Ether	DME	0.95	1		5.50	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Diethylene Glycol Butyl Ether Acetate	DEM												
Diethylene Glycol Dibutyl Ether	DIG												
Diethylene Glycol Diethyl Ether													
Diethylene Glycol Ethyl Ether	DGE												
Diethylene Glycol Ethyl Ether Acetate	DGA	0.99	1		4.62	0.02	16.200	0.001	0.999	0.076	0.076	1.004	1.000
Diethylene Glycol Methyl Ether	DGM	1.03	1		4.14	0.03	16.200	0.002	0.998	0.076	0.077	1.006	1.001
Diethylene Glycol Methyl Ether Acetate	DGR												
Diethylene Glycol Phenyl Ether	DGP												
Diethylene Glycol Phthalate	DGL												
Di-(2-ethylhexyl)adipate	DEH												
Di-(2-ethylhexyl)phthalate	DIE												
Diethyl Phthalate	DPH												
Diglycidyl Ether of Bisphenol A	BDE												
Diheptyl Phthalate	DHP												
Dihexyl Phthalate	DHA												
Diisobutylcarbinol	DBC	0.81	1		4.97	0.09	16.200	0.006	0.994	0.076	0.078	1.022	1.002
Diisobutylene	DBL	0.72	1		3.86	2.00	16.200	0.123	0.877	0.076	0.103	1.353	1.040
Diisobutyl Ketone	DIK	0.81	1		4.90	0.16	16.200	0.010	0.990	0.076	0.079	1.039	1.003
Diisobutyl Phthalate	DIT												
Diisodecyl Phthalate	DID												
Diisononyl Adipate	DNY												
Diisononyl Phthalate	DIN												
Diisocetyl Phthalate	DIO												
Diisopropylbenzene (all isomers)	DIX	0.86	1		5.60	0.03	16.200	0.002	0.998	0.076	0.077	1.009	1.001
Diisopropyl Naphthalene	DII												
Dimethyl Adipate	DLA												
Dimethylbenzene													
Dimethyl Glutarate	DGT												

E-2-A

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C R I S	LIQUID SPECIF. GRAVITY	USCO VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO Mw	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (3) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT DENSITY ● 115 F Wa, 115 (7) (Lbm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY ● 115 F Wv-a, 115 (8) (Lbm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAPOR- AIR MIX GROWTH RATE VGR (9)
Dimethyl Phthalate	DTL	1.19	1		6.69	0.00							
Dimethyl Polysiloxane	DMP												
2,2-Dimethylpropane-1,3-diol	DDI												
Dimethyl Succinate	DSE												
Dinonyl Phthalate	DIF	0.97	1		14.40	0.01	16.200	0.001	0.999	0.076	0.077	1.008	1.000
Di(octylphenyl)amine													
Diocetyl Phthalate	DOP	0.98	1		13.47	0.00							
Dipentene	DPN	0.84	1		4.90	0.10	16.200	0.006	0.994	0.076	0.078	1.024	1.002
Diphenyl	DIL	0.99	1	154.212	5.31	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Diphenyl, Diphenyl Ether mixture	DDO	1.07	1		5.86	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Diphenyl Ether	DPE	1.07	1	170.211	5.87	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Diphenyl Ether, Biphenyl Ether mixture	DOB												
Dipropylene Glycol	DPG	1.03	1		4.63	0.07	16.200	0.004	0.996	0.076	0.077	1.016	1.001
Dipropylene Glycol Dibenzoate	DGY												
Dipropylene Glycol Methyl Ether	DPY												
DISTILLATES: Flashed feed stocks	DPP	0.75	1		3.40	2.30	16.200	0.142	0.858	0.076	0.102	1.341	1.046
DISTILLATES: Straight run	DSR	0.73	1		3.40	2.30	16.200	0.142	0.858	0.076	0.102	1.341	1.046
Ditridecyl Phthalate	DTP												
Diundecyl Phthalate	DUP												
Dodecane (all isomers)	DOC			170.340	5.88								
Dodecanol	DDN			186.339	6.43								
Dodecene (all isomers)	DOZ	0.76	1	168.324	5.81	0.02	16.200	0.001	0.999	0.076	0.077	1.006	1.000
DODECENE	DOD	0.76	1		5.81	0.02	16.200	0.001	0.999	0.076	0.077	1.006	1.000
Dodecylbenzene	DDB	0.86			8.40	4.70	16.200	0.290	0.710	0.076	0.240	3.147	1.094
Dodecyl Phenol	DOL												
Drilling mud (low toxicity) (if flammable or combustible)/ Epoxyated linear alcohols, C11-C15													
Ethane	ETH	0.47		30.070	1.04								
2-Ethoxyethanol	EEO	1.04											
2-Ethoxyethyl Acetate	EEA	1.04											
Ethoxylated alcohols, C11-C15, SEE THE ALCOHOL POLYETHOXYLATES													
Ethoxy Triglycol (crude)	ETG	1.02	1		6.14	0.00							
Ethyl Acetate	ETA	0.90	1	88.107	3.04	4.50	16.200	0.278	0.722	0.076	0.119	1.567	1.090
Ethyl Acetoacetate	EAA	1.03	1		4.48	0.20	16.200	0.012	0.988	0.076	0.079	1.043	1.004
Ethyl alcohol (ETHANOL)	EAL	0.79	1	46.050	1.60	3.50	16.200	0.216	0.784	0.076	0.086	1.130	1.070
Ethyl Amyl Ketone	EAK												
Ethyl Benzene	ETB	0.87	1	106.168	3.56	0.60	16.200	0.037	0.963	0.076	0.083	1.095	1.012
Ethyl Butanol	EBT	0.83	1		3.52	0.12	16.200	0.007	0.993	0.076	0.078	1.019	1.002
Ethyl Butyrate	EBR	0.88	1	116.160	4.00	1.00	16.200	0.062	0.938	0.076	0.090	1.185	1.020
Ethyl Cyclohexane	ECY	0.79	1		3.87	0.50	16.200	0.031	0.969	0.076	0.083	1.089	1.010
Ethylene	ETL			28.054	0.97								
Ethylene Carbonate													

E-2-9

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'W R OF CARGO MWC	SPECIF GRAV OF VAPOR SGV	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (15) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT DENSITY ● 115 F Ma, 115 (7) (LBm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY ● 115 F Mv-a, 115 (8) (LBm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY ● 115 F Mv-a, 115/ Ma, 115	VAPOR- AIR MIX GROWTH RATE VGR (9)
Ethylene Glycol	EGL	1.13	1	62.069	2.21	0.01	16.200	0.001	0.999	0.076	0.076	1.001	1.000
Ethylene Glycol Acetate	EGO												
Ethylene Glycol Butyl Ether	EGM												
ETHYLENE GLYCOL BUTYL ETHER ACETATE	EMA	0.94	1		5.52	0.05	16.200	0.003	0.997	0.076	0.077	1.014	1.001
Ethylene Glycol Ether Acetate													
Ethylene Glycol Tert-Butyl Ether													
Ethylene Glycol Diacetate	EGY	1.10	1		5.03	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Ethylene Glycol Dibutyl Ether	EGB												
Ethylene Glycol Ethyl Ether, SEE 2-ETHOXYETHANOL	EGP												
Ethylene Glycol Ethyl Ether Acetate, SEE 2-ETHOXYETHYL ACETATE	EGA												
Ethylene Glycol Isopropyl Ether	EGI												
Ethylene Glycol Methyl Butyl Ether													
Ethylene Glycol Methyl Ether	EME	1.10	1		4.80	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Ethylene Glycol Methyl Ether Acetate	EGT												
Ethylene Glycol Phenyl Ether	EPE	1.10	1		4.80	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Ethylene Glycol Phenyl Ether, Diethylene Glycol Phenyl Ether mixt	EDX												
Ethylene-Propylene Copolymer (in liquid mixtures)													
Ethyl-3-Ethoxypropionate	EEP												
2-Ethylhexaldehyde, SEE OCTYL ALDEHYDES	EHA	0.82	1		4.41	0.17	16.200	0.010	0.990	0.076	0.079	1.036	1.003
2-Ethylhexanoic acid	EHO												
2-Ethylhexanol, SEE OCTANOL (ALL ISOMERS)	EHX	0.84	1	130.230	4.50	0.02	16.200	0.001	0.999	0.076	0.076	1.004	1.000
Ethylhexoic acid, SEE 2-ETHYLHEXANOIC ACID													
Ethyl Hexyl Phthalate (SEE ALSO DI 2-ETHYLHEXYL PHTHALATE)	EHE												
Ethyl Hexyl Tallate	EHT												
Ethyl Propionate	EPR	0.89	1		1.60	3.50	16.200	0.216	0.784	0.076	0.086	1.130	1.070
Ethyl Toluene	ETE	0.88	1		4.15	0.28	16.200	0.017	0.983	0.076	0.080	1.054	1.006
Fatty acid (saturated, C13 and above)													
Fatty acid Amides													
Formamide	FAM	1.13	1		1.55	0.10	16.200	0.006	0.994	0.076	0.076	1.003	1.002
Furfuryl Alcohol	FAL	1.13	1		3.40	0.05	16.200	0.003	0.997	0.076	0.077	1.007	1.001
Gas oil, cracked	GOC												
GASOLINE BLENDING STOCKS: Alkylates	GAK	0.75	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINE BLENDING STOCKS: Reformates	GRP	0.80	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINES: Automotive (containing not over 4.23 grams lead per gal)	GAT	0.74	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINES: Aviation (containing not over 4.86 grams lead per gal)	GAV	0.71	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINES: Casinghead (natural)	GCS	0.67	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINES: Polymer	GPL	0.75	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
GASOLINES: Straight run	GSR	0.75	1		3.40	12.50	16.200	0.772	0.228	0.076	0.217	2.852	1.250
Glycerine	GCR	1.26	1		3.17	0.00							
Glycerol, SEE GLYCERINE													
Glycerol Polyalkoxylate				92.095	3.18								
Glycerol Triacetate													

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY,
SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MwC	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS ● 115 F Pv, 115 (15) (PSIA)	TOTAL VAP-AIR PRESS ● 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP ● 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR ● 115 F Va, 115 (6)	AIR WEIGHT DENSITY ● 115 F Wa, 115 (7) (LBm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY ● 115 F Wv-a, 115 (8) (LBm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAPO AIR MIX GROW RATI VGR (9)
Glycidyl Ester of Tertiary Carboxylic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETIC ACID													
Glycidyl Ester of Tridecyl Acetic acid													
Glycidyl Ester of Versatic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETIC ACID													
Glycol Diacetate, SEE ETHYLENE GLYCOL DIACETATE													
Glycols, Resins and Solvents mixtures													
Glycol Triacetate, SEE GLYCERYL TRIACETATE													
Glyoxal solution (40% or less)													
Grease													
Heptadecane													
Heptane (all isomers) (METHYHEXANE)	HMX	0.68	1	100.120	3.45	2.50	16.200	0.154	0.846	0.076	0.105	1.370	1.050
HEPTANE (N-)	HPT	0.68	1		3.45	2.50	16.200	0.154	0.846	0.076	0.105	1.370	1.050
Heptanoic acid	HEP	0.92	1		4.49	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Heptanol (all isomers)	HTX	0.82	1		4.00	0.04	16.200	0.002	0.998	0.076	0.077	1.007	1.001
HEPTANOL	HTN	0.82	1		4.00	0.04	16.200	0.002	0.998	0.076	0.077	1.007	1.001
Heptene (all isomers)	HPX	0.70	2		3.40	2.90	16.200	0.179	0.821	0.076	0.109	1.430	1.058
HEPTENE (1-)	HTE	0.70	1		3.40	2.80	16.200	0.173	0.827	0.076	0.108	1.415	1.056
Heptyl Acetate	HPE	0.88	1		5.50	0.10	16.200	0.006	0.994	0.076	0.078	1.028	1.002
Herbicide (C15 -N22 -NO2 -CI), SEE METOLACHLOR													
Hexaethylene Glycol													
Hexamethylene Glycol													
Hexamethylenetetramine solutions	HTS												
Hexane (all isomers)	HXS	0.66	1	86.110	3.00	7.00	16.200	0.432	0.568	0.076	0.142	1.864	1.140
HEXANE	HXA	0.66	1		3.00	7.00	16.200	0.432	0.568	0.076	0.142	1.864	1.140
Hexanoic acid	HXA	0.93	1		4.00	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Hexanol	HXN	0.82	1		3.52	1.00	16.200	0.062	0.938	0.076	0.088	1.156	1.020
Hexene (all isomers)	HEX	0.67	2	84.090	2.90	8.00	16.200	0.494	0.506	0.076	0.148	1.938	1.160
HEXENE (1-)	HXE	0.67	1		2.90	8.20	16.200	0.506	0.494	0.076	0.149	1.962	1.164
HEXENE (2-)	HXT	0.67	1		2.90	8.20	16.200	0.506	0.494	0.076	0.149	1.962	1.164
Hexyl Acetate	HAE												
Hexylene Glycol	HXG	0.92	4		1.10	0.01	16.200	0.001	0.999	0.076	0.076	1.000	1.000
Mog Grease, SEE LARD													
2-Hydroxy-4-(methylthio)butanoic acid	HBA												
HYDROCARBON 5-9 (MOVED TO SUB-O, NON TABLE 151, 6/24/95)	HPN												
Hydroxy terminated Polybutadiene, SEE POLYBUTADIENE, HYDROXYL TERMINATED/													
Isophorone	IPH	0.93	1		4.75	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
JET FUELS: JP-1 (Kerosene)	JPO	0.80	1		4.50	0.14	16.200	0.009	0.991	0.076	0.078	1.030	1.003
JET FUELS: JP-3	JPT	0.80	1		4.50	8.51	16.200	0.525	0.475	0.076	0.216	2.839	1.170
JET FUELS: JP-4	JPF	0.81	1		4.00	3.40	16.200	0.210	0.790	0.076	0.124	1.630	1.068
JET FUELS: JP-5 (Kerosene, heavy)	JPV	0.82	1		4.00	0.10	16.200	0.006	0.994	0.076	0.078	1.019	1.002
JET FUELS: JP-8	JPE		1										
Kerosene	KRS	0.81	1		4.50	0.15	16.200	0.009	0.991	0.076	0.079	1.032	1.003
Lactic acid													

E-2-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST. CAT.	MOLEC' R WEIGHT OF CARGO MMc	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS @ 115 F Pv, 115	TOTAL VAP-AIR PRESS @ 115 F Pt, 115	PARTIAL VOLUME OF VAP @ 115 F Vv, 115	PARTIAL VOLUME OF AIR @ 115 F Va, 115	AIR WEIGHT DENSITY @ 115 F Wa, 115	VAPOR-AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115	VAPOR-AIR MIX SPECIFIC GRAVITY @ 115 F Wv-a, 115/ Wa, 115	VAPOR-AIR MIX GROWTH RATE @ 115 F VGR
Lard						(15)	(PSIA)			(LBm/ FT ³)	(LBm/ FT ³)		
Latex, liquid synthetic, including: Styrene-Butadien rubber	LLS												
Latex, liquid synthetic, including: Carboxylated Styrene-Butadien Copolymer													
Magnesium Nonyl Phenol Sulfide													
Magnesium Sulfonate	MSE												
Maleic Anhydride Copolymer													
2-Mercaptobenzothiazol (in liquid mixtures)													
Methane	MTH			16.043	0.55								
3-Methoxy-1-Butanol													
3-Methoxybutyl Acetate	MOA												
1-Methoxy-2-Propyl Acetate	MPO												
Methoxy Triglycol, SEE TRIETHYLENE GLYCOL METHYL ETHER	MTG												
Methyl Acetate	MTT	0.92	1	74.080	2.60	6.10	16.200	0.377	0.623	0.076	0.122	1.603	1.122
Methyl Acetoacetate	MAB												
Methyl alcohol (SEE METHANOL)	MAL	0.79	1		1.10	6.63	16.200	0.409	0.591	0.076	0.079	1.041	1.133
Methyl Amyl Acetate	MAC	0.86	1		4.97	0.33	16.200	0.020	0.980	0.076	0.082	1.081	1.007
Methyl Amyl alcohol	MAA	0.81	1		3.52	0.43	16.200	0.027	0.973	0.076	0.081	1.067	1.009
Methyl Amyl Ketone	MAK			114.188	3.94								
Methyl Butanol, SEE THE AMYL ALCOHOLS													
Methyl Butanol	MBL												
Methyl n-Butyl Ketone	MBK	0.81	1	100.160	3.50	0.97	16.200	0.060	0.940	0.076	0.088	1.150	1.019
Methyl Butynol	MBY												
Methyl Butyrate	MBU	0.90	1	102.134	3.53	1.26	16.200	0.078	0.922	0.076	0.091	1.197	1.025
Methyl Ethyl Ketone	MEK	0.80	1	72.107	2.50	4.50	16.200	0.278	0.722	0.076	0.108	1.417	1.090
Methyl Formal (DIMETHYL FORMAL)	MTP	0.86	1		2.60	15.42	16.200	0.952	0.048	0.076	0.192	2.523	1.308
Methyl Heptyl Ketone	MHK	0.83	1		4.90	0.06	16.200	0.004	0.996	0.076	0.077	1.014	1.001
Methyl Isobutyl Carbinol, SEE METHYL AMYL ALCOHOL	MIC	0.84											
Methyl Isobutyl Ketone	MIK	0.80	1	100.160	3.45	1.15	16.200	0.071	0.929	0.076	0.089	1.174	1.023
3-Methyl-3-Methoxybutanol													
3-Methyl-3-Methoxybutyl Acetate													
1-Methyl Naphthalene	MNA	1.02	1		4.91	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Methyl Pentene													
2-METHYL-1-PENTENE	MPN	0.69	1		2.90	6.30	16.200	0.389	0.611	0.076	0.132	1.739	1.126
5-METHYL-1-PENTENE	MTN	0.67	1		2.90	8.49	16.200	0.524	0.476	0.076	0.152	1.996	1.170
N-Methyl-2-Pyrrolidone	MPY												
Methyl Tert-Butyl Ether (MTBE)	MBE	0.74	1		3.10	0.04	16.200	0.002	0.998	0.076	0.077	1.005	1.001
Metolachlor	MCO												
Mineral spirits	MNS	0.75	1		4.30	0.20	16.200	0.012	0.988	0.076	0.079	1.041	1.004
Myrcene	MRE	0.80	1		4.70	0.17	16.200	0.010	0.990	0.076	0.079	1.039	1.003
NAPHTHA: Aromatic (Having less than 10% Benzene)		.6	.85	1									
NAPHTHA: Cracking fraction		.6	.85	1									
NAPHTHA: Heavy		.6	.85	1									

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCO VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (3) (PSIA)	TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP @ 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR @ 115 F Va, 115 (6)	AIR WEIGHT DENSITY @ 115 F Wa, 115 (7) (LBm/FT ³)	VAPOR-AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115 (8) (LBm/FT ³)	VAPOR-AIR MIX SPECIFIC GRAVITY Wv-a, 115 / Wa, 115	VAPOR-AIR MIX GROWTH RATE VGR (9)
NAPHTHA: Paraffinic		.6	.85	1									
NAPHTHA: Petroleum	PTN	.6	.85	1									
NAPHTHA: Solvent	NSV	0.87	1		3.50	0.20	16.200	0.012	0.988	0.076	0.078	1.031	1.004
NAPHTHA: Stoddard solvent	NSS	0.78	1		4.30	0.20	16.200	0.012	0.988	0.076	0.079	1.041	1.004
NAPHTHA: Varnish makers' and painters' (75t)	NVM	0.77	1		4.30	0.19	16.200	0.012	0.988	0.076	0.079	1.039	1.004
Naphthalene Sulfonic acid-Formaldehyde Copolymer, Sodium salt	NFNS												
Naphthenic acid	NTI	1.02											
Nonane (all isomers)	NAX	0.72	1	128.259	4.40	0.27	16.200	0.017	0.983	0.076	0.080	1.057	1.005
NONANE	NAN	0.72	1		4.40	0.27	16.200	0.017	0.983	0.076	0.080	1.057	1.005
Nonanoic acid (all isomers)	NNA												
Nonanoic, Tridecanoic acid mixture													
Nonene	NON	0.73	2	126.140	4.30	0.35	16.200	0.022	0.978	0.076	0.082	1.071	1.007
Nonyl alcohol (all isomers)	NNS	0.94	1	144.160	5.00	0.10	16.200	0.006	0.994	0.076	0.078	1.025	1.002
NONYL ALCOHOL	NNN	0.94	1		5.00	0.10	16.200	0.006	0.994	0.076	0.078	1.025	1.002
NONYL ALCOHOL (iso-)	NNI	0.94	1		5.00	0.10	16.200	0.006	0.994	0.076	0.078	1.025	1.002
Nonyl Methacrylate Monomer													
Nonyl Phenol	NNP	0.95	1		7.60	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.000
Nonyl Phenol Poly(4-12)ethoxylates	NPE												
Nonyl Phenol Sulfide (90% or less)													
Noxious liquid, N.O.S. (17) ("Trade name," contains "principal components"), Category D (if f													
Non-Noxious liquid, N.O.S. (18) ("Trade name," contains principal components"), Appendix III													
Octadecane													
Octadecenoamide solution (Oleamide)	ODD												
Octane (all isomers)	OAX	0.70	1		3.90	0.79	16.200	0.049	0.951	0.076	0.087	1.141	1.016
OCTANE	OAN	0.70			3.90	0.79	16.200	0.049	0.951	0.076	0.087	1.141	1.016
Octanoic acid (all isomers)	OAA	0.91	1		5.00	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Octanol (all isomers)	OCX	0.83	1		4.48	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
OCTANOL	OTA	0.83	1		4.48	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Octene (all isomers)	OTX	0.72	2	122.200	3.90	0.90	16.200	0.056	0.944	0.076	0.088	1.161	1.018
OCTENE (1-)	OTE	0.72	1		3.86	1.00	16.200	0.062	0.938	0.076	0.090	1.177	1.020
Octyl Acetate													
Octyl alcohol (iso-, n-) (all isomers), SEE OCTANOL (ALL ISOMERS)	OCX	0.83	1		4.48	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
OCTYL ALCOHOL	IOA	0.83	1		4.48	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Octyl Aldehydes	OAL												
Octyl Decyl Adipate	ODA												
Octyl Epoxytallate	OET												
Octyl Phthalate. SEE DI-(2-ETHYLHEXYL) PHTHALATE													
OIL, EDIBLE: Babassu	OBB												
OIL, EDIBLE: Beechnut													
OIL, EDIBLE: Castor	OCA												
OIL, EDIBLE: Cocoa butter													
OIL, EDIBLE: Coconut	OCC	0.95											

E-2-0

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; *7027* AND *7028*

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D	TOTAL	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAPOR-
						VAPOR PRESS @ 115 F (3) Pv, 115 (15) (PSIA)	VAP-AIR PRESS @ 115 F (4) Pt, 115 (PSIA)	VOLUME OF VAP @ 115 F (5) Vv, 115	VOLUME OF AIR @ 115 F (6) Va, 115	WEIGHT DENSITY @ 115 F (7) Wa, 115 (LBm/ FT ³)	AIR MIX WEIGHT DENSITY @ 115 F (8) Wv-a, 115 (LBm/ FT ³)	AIR MIX SPECIFIC GRAVITY Wa, 115	AIR MIX GROWTH RATE VGR (9)
OIL, EDIBLE: Cod liver													
OIL, EDIBLE: Corn	OCO	0.96											
OIL, EDIBLE: Cottonseed	OCS												
OIL, EDIBLE: Fish, N.O.S.	OFS	0.96											
OIL, EDIBLE: Grapeseed													
OIL, EDIBLE: Groundnut													
OIL, EDIBLE: Hazelnut													
OIL, EDIBLE: Lard	OLD												
OIL, EDIBLE: Maize													
OIL, EDIBLE: Mustard seed													
OIL, EDIBLE: Nutmeg Butter													
OIL, EDIBLE: Olive	OOL												
OIL, EDIBLE: Palm	OPM												
OIL, EDIBLE: Palm kernel	OPO												
OIL, EDIBLE: Peanut	OPN												
OIL, EDIBLE: Poppy													
OIL, EDIBLE: Raisin seed													
OIL, EDIBLE: Rice bran	ORP												
OIL, EDIBLE: Safflower	OSP												
OIL, EDIBLE: Salad													
OIL, EDIBLE: Sesame													
OIL, EDIBLE: Soya bean	OSB	0.96											
OIL, EDIBLE: Sunflower, SEE SUNFLOWER SEED		0.95											
OIL, EDIBLE: Sunflower seed	OSN												
OIL, EDIBLE: Tucum	OTC												
OIL, EDIBLE: Vegetable, N.O.S.	OVQ	0.96											
OIL, EDIBLE: Walnut													
OIL, FUEL: No. 1 (Kerosene)	OON												
OIL, FUEL: No. 1-D	OOD												
OIL, FUEL: No. 2	OTW	0.88	1		8.00	0.56	16.200	0.035	0.965	0.076	0.095	1.242	1.011
OIL, FUEL: No. 2-D	OTD												
OIL, FUEL: No. 4	OFR	0.90	1		3.40	0.15	16.200	0.009	0.991	0.076	0.078	1.022	1.003
OIL, FUEL: No. 5	OFV	0.94	1		3.40	0.15	16.200	0.009	0.991	0.076	0.078	1.022	1.003
OIL, FUEL: No. 6	OSX	0.95	1		3.40	0.15	16.200	0.009	0.991	0.076	0.078	1.022	1.003
OIL, MISC: Absorption	OAS												
OIL, MISC: Aliphatic													
OIL, MISC: Animal, N.O.S.													
OIL, MISC: Aromatic													
OIL, MISC: Aviation F2300													
OIL, MISC: Clarified	OCF												
OIL, MISC: Coal													
OIL, MISC: Coconut oil, esterified, SEE COCONUT OIL, FATTY ACID METHYL ESTER													

E-2-p

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID	USCG	MOLEC'R	SPECIF	SATUR'D	TOTAL	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAPOR-
		SPECIF. GRAVITY	VAP COL. SYST CAT.	WEIGHT OF CARGO Mw	GRAV OF CARGO SGv	VAPOR PRESS Pv, 115 (3) (15) (PSIA)	VAP-AIR PRESS Pt, 115 (4) (PSIA)	VOLUME OF VAP OF VAP Vv, 115 (5)	VOLUME OF AIR OF AIR Va, 115 (6)	WEIGHT DENSITY Ww, 115 (7) (Lbm/ FT ³)	WEIGHT DENSITY Wv-a, 115 (8) (Lbm/ FT ³)	SPECIFIC GRAVITY Wv-a, 115/ Ww, 115	GROWTH RATE VGR (9)
OIL, MISC: Coconut oil, fatty acid													
OIL, MISC: Coconut oil, fatty acid Methyl Ester													
OIL, MISC: Coconut oil, Methyl Ester, SEE COCONUT OIL FATTY ACID METHYL ESTER													
OIL, MISC: Cottonseed, fatty acid, SEE COTTONSEED OIL, FATTY ACIDCPY			0.95										
OIL, MISC: Croton													
OIL, MISC: Crude													
OIL, MISC: Diesel			0.90	1	3.40	0.15	16.200	0.009	0.991	0.076	0.070	1.022	1.250
OIL, MISC: Gas, low pour													
OIL, MISC: Gas, low sulfur													
OIL, MISC: Heartcut distillate													
OIL, MISC: Lanolin													
OIL, MISC: Linseed													
OIL, MISC: Lubricating													
OIL, MISC: Mineral													
OIL, MISC: Mineral seal													
OIL, MISC: Motor													
OIL, MISC: Neatsfoot													
OIL, MISC: Oiticica													
OIL, MISC: Palm oil, fatty acid Methyl Ester			0.95										
OIL, MISC: Palm oil, Methyl Ester, SEE SEE PALM OIL, FATTY ACID MOPE													
OIL, MISC: Penetrating													
OIL, MISC: Perilla													
OIL, MISC: Pilchard													
OIL, MISC: Pine													
OIL, MISC: Range													
OIL, MISC: Residual													
OIL, MISC: Resin													
OIL, MISC: Resinous petroleum			1.02	1	1.00	0.15	16.200	0.009	0.991	0.076	0.076	1.000	1.003
OIL, MISC: Road													
OIL, MISC: Rosin													
OIL, MISC: Seal													
OIL, MISC: Soapstock													
OIL, MISC: Soya bean (epoxidized)													
OIL, MISC: Sperm													
OIL, MISC: Spindle													
OIL, MISC: Spray													
OIL, MISC: Tall													
OIL, MISC: Tall, fatty acid													
OIL, MISC: Tanner's													
OIL, MISC: Transformer													
OIL, MISC: Tung													
OIL, MISC: Turbine			0.87	1	5.40	0.30	16.200	0.019	0.981	0.076	0.082	1.082	1.006

E-2-4

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID	USCG	MOLEC'R	SPECIF	SATUR'D,	TOTAL	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAPOR-
		SPECIF. GRAVITY	VAP COL.	WEIGHT OF CARGO MwC	GRAV OF CARGO SGV	PRESS VAPOR Pv, 115 (15) (PSIA)	PRESS VAP-AIR Pt, 115 (4) (PSIA)	VOLUME OF VAP Vv, 115 (5)	VOLUME OF AIR Va, 115 (6)	WEIGHT DENSITY W, 115 (7) (Lbm/ FT ³)	WEIGHT DENSITY Wv-a, 115 (8) (Lbm/ FT ³)	SPECIFIC GRAVITY Wv-a, 115/ W, 115	AIR MIX GRAVITY	AIR MI GROW RA'
OIL, MISC: Whale													
OIL, MISC: White (mineral)													
OIL, MISC: Wood													
alpha-Olefins (C13 - C18)	OAM												
Olefins (C13 and above, all isomers)		0.72											
Oleic acid	OLA												
Oleyl alcohol (OCTADECENOL), SEE ALCOHOLS (C13 AND ABOVE)													
Organic Amine 70, SEE AMINOETHYLDIETHANOLAMINE, AMINOETHYL-ETHANOLAMINE SOLUTION													
Palm Stearin	PMS												
n-Paraffins (C10 - C20)	PFN												
Pentadecanol, SEE SEE ALCOHOLS (C13 AND ABOVE)	PDC	0.83	1		7.88	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.00
Pentaethylene Glycol	PEP												
Pentaethylenhexamine	PTY	0.63	5	72.090	2.48	21.00	16.200	1.296	-0.296	0.076	0.222	2.919	1.42
Pentane (all isomers)	IPT	0.62	5		2.48	27.00	16.200	1.667	-0.667	0.076	0.264	3.467	1.54
PENTANE (iso-)	PTA	0.63	1		2.50	20.44	16.200	1.262	-0.262	0.076	0.220	2.893	1.40
PENTANE (n-)													
Pentanoic acid	PTX	0.64	1		2.40	24.90	16.200	1.537	-0.537	0.076	0.240	3.152	1.49
Pentene (all isomers)	PTE	0.64	1		2.40	24.90	16.200	1.537	-0.537	0.076	0.240	3.152	1.49
PENTENE (1-)													
Petrolatum	PTL												
1-Phenyl-1-Xylyl Ethane	PXE												
Phosphosulfurized Bicyclic Terpene													
Phthalate plasticizers, SEE INDIVIDUAL PHTHALATES													
Pinene	PIN	0.86	1		4.70	0.35	16.200	0.022	0.978	0.076	0.082	1.080	1.00
Polyalkenyl Succinic Anhydride Amine													
Polyalkylene Glycols, Polyalkylene Glycol Monoalkyl Ethers mixtur	PPX												
Polyalkylene Oxide Polyol	PAO	1.04											
Polamine, Amide mixture													
Polybutadiene, Hydroxyl terminated													
Polybutene	PLB	0.91	1		79.30	0.01	16.200	0.001	0.999	0.076	0.080	1.048	1.00
Polydimethylsiloxane		1.04											
Polyethylene Glycol		1.04											
Polyethylene Glycol Dimethyl Ether													
Polyglycerol													
Polyisobutylene, SEE POLYBUTENE													
Polymerized Esters													
Poly(20)oxyethylene Sorbitan Monooleate	PSM												
Polypropylene	PLP												
Polypropylene Glycol	PGC	1.01	1		1.00	0.10	16.200	0.006	0.994	0.076	0.076	1.000	1.00
Polypropylene Glycol Methyl Ether	PGM	0.92	1		3.11	0.80	16.200	0.049	0.951	0.076	0.084	1.104	1.01
Polysiloxane													
Polystyrene Diakyl Maleate													

E-2-n

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID	USCG	MOLEC'R	SPECIF	SATUR'D	TOTAL	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAPOR-
		SPECIF. GRAVITY	VAP COL. SYST CAT.	WEIGHT OF CARGO MWC	GRAV OF CARGO VAPOR SGV	VAPOR PRESS Pv, 115 (3) (15) (PSIA)	VAP-AIR PRESS Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP Vv, 115 (5)	PARTIAL VOLUME OF AIR Va, 115 (6)	WEIGHT DENSITY Ww, 115 (7) (Lbm/ FT ³)	WEIGHT DENSITY Wv-a, 115 (8) (Lbm/ FT ³)	SPECIFIC GRAVITY Wa, 115	MIX RATE VGR (9)
Potassium Oleate	POE												
Propane	PRP	1.04		44.094	1.52								
n-Propoxypropanol	PXP												
Propyl Acetate (iso-)	IAC	0.89	1		3.52	1.80	16.200	0.111	0.889	0.076	0.097	1.280	1.036
Propyl Acetate (n-)	PAT	0.80	1		3.52	1.85	16.200	0.114	0.886	0.076	0.098	1.280	1.037
Propyl alcohol (iso-)	IPA	0.79	1		2.07	3.00	16.200	0.185	0.815	0.076	0.091	1.198	1.060
Propyl alcohol (n-)	PAL	0.80	1		2.07	1.20	16.200	0.074	0.926	0.076	0.082	1.079	1.024
Propylbenzene (n-)	PBZ	0.86	1	60.060	4.14	0.20	16.200	0.012	0.988	0.076	0.079	1.039	1.004
iso-Propylcyclohexane	IPX	0.80	1	126.243	4.35	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Propylene	PPL	1.04		42.081	1.45								
Propylene-Butylene Copolymer	PBP												
Propylene Dimer	PDR												
Propylene Glycol (1,2-PROPANDIOL)	PPG	1.04	1	76.060	2.62	0.01	16.200	0.001	0.999	0.076	0.076	1.001	1.000
Propylene Glycol Monoalkyl Ether	PGE												
Propylene Glycol Ethyl Ether	PGY												
Propylene Glycol Methyl Ether	PME	0.92	1		3.11	0.70	16.200	0.043	0.957	0.076	0.083	1.091	1.014
Propylene Polymer (in liquid mixtures)													
Propylene Tetramer	PIT	0.29		156.310	1.00	0.02	16.200	0.001	0.999	0.076	0.076	1.000	1.000
Propylene Trimer	PTR												
Pseudocumene, SEE TRIMETHYLBENZENES													
Rum													
Sodium Acetate, Glycol, water solutions													
Sodium Acetate solution	SAN												
Sodium Benzoate solution	SBN												
Sodium Sulfonate													
Stearic acid	SRA												
Stearyl alcohol (Octadecanol)													
Sulfolane	SFL	1.26	1		4.14	0.01	16.200	0.001	0.999	0.076	0.076	1.002	1.000
Tallow	TLO												
Tallow alcohol, SEE ALCOHOLS (C13 AND ABOVE)													
Tallow fatty acid	TFD												
Tallow Alkyl Nitrile													
Tetradecanol	TTN	0.82	1		7.39	0.00							
1-Tetradecene, SEE THE OLEFIN OR ALPHA-OLEFIN ENTRIES	TTD	0.77	1		6.77	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.000
Tetradecylbenzene	TBD												
Tetraethylene Glycol	TTG	1.12	1		6.70	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.000
Tetrahydronaphthalene	THN	0.97	1		4.56	0.04	16.200	0.002	0.998	0.076	0.077	1.009	1.001
Tetrapropylbenzene, SEE ALKYL(C9-C17) BENZENES													
Toluene	TOL	0.87	1	92.141	3.14	1.50	16.200	0.093	0.907	0.076	0.091	1.198	1.030
Triarylphosphate													
Tributyl Phosphate	TBP												
Tricresyl Phosphate (less than 1% of the ortho isomer)	TCP	1.16	1		12.69	0.01	16.200	0.001	0.999	0.076	0.077	1.007	1.000

E-2-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCG VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc	SPECIF GRAV OF CARGO VAPOR SGv	SATUR'D VAPOR PRESS @ 115 F (3) (15) (PSIA)	TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4) (PSIA)	PARTIAL VOLUME OF VAP @ 115 F (5)	PARTIAL VOLUME OF AIR @ 115 F (6)	AIR WEIGHT DENSITY @ 115 F (7) (Lbm/ FT ³)	VAPOR- AIR MIX WEIGHT DENSITY @ 115 F (8) (Lbm/ FT ³)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAPOR AIR MIX GROWTH RATE VGR
Tridecane	TRD	0.76	1		6.40	0.02	16.200	0.001	0.999	0.076	0.077	1.007	1.000
Tridecanoic acid													
Tridecanol, SEE ALCOHOLS (C13 AND ABOVE)	TDN	0.85	1		6.91	0.01	16.200	0.001	0.999	0.076	0.076	1.004	1.000
1-Tridecene	TDC	0.77	1		6.29	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Tridecylbenzene	TRB												
Triethylbenzene	TEB	0.86	1		5.60	0.02	16.200	0.001	0.999	0.076	0.077	1.006	1.000
Triethylene Glycol	TEG	1.12	1		5.17	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Triethylene Glycol Butyl Ether													
Triethylene Glycol Butyl Ether mixture		1.04											
Triethylene Glycol di-(2-ethylbutyrate)	TGD												
Triethylene Glycol Ether mixture													
Triethylene Glycol Ethyl Ether	TGE												
Triethylene Glycol Methyl Ether													
Triethyl Phosphate	TPS	1.07			6.28	0.02	16.200	0.001	0.999	0.076	0.077	1.007	1.000
Triisooctyl Trimellitate													
Triisopropanolamine	TIP	1.02	8	191.270	6.60								
Trimethylbenzenes (all isomers)	TRE	0.89	1		4.20	0.14	16.200	0.009	0.991	0.076	0.078	1.028	1.001
TRIMETHYL BENZENE (1,2,5-)	TMB	0.89	1		4.14	0.14	16.200	0.009	0.991	0.076	0.078	1.027	1.001
TRIMETHYL BENZENE (1,2,3-)	TMD	0.89	1		4.14	0.14	16.200	0.009	0.991	0.076	0.078	1.027	1.001
TRIMETHYL BENZENE (1,2,4-) (PSEUDOCUMENE)	TME	0.89	1		4.14	0.14	16.200	0.009	0.991	0.076	0.078	1.027	1.001
Trimethylol Propane Polyethoxylate	TPR												
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate													
2,2,4-Trimethyl-3-pentanol-1-isobutyrate	TMP												
Tripropylene, SEE PROPYLENE TRIMER													
Tripropylene Glycol	TGC												
Tripropylene Glycol Methyl Ether	TGM												
Trixylenyl Phosphate	TRP	1.16	1		14.20	0.00							
Turpentine	TPT												
Turpentine substitute (White spirit), SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)													
Undecanol													
Undecene (1-)	UDC	0.75	1		5.32	0.05	16.200	0.003	0.997	0.076	0.077	1.013	1.001
Undecyl alcohol	UND	0.84	1		5.94	0.01	16.200	0.001	0.999	0.076	0.076	1.003	1.000
Undecylbenzene	UDB												
Vinyl Acetate-fumarate Copolymer													
Waxes:	WAX												
WAXES: Candelilla													
WAXES: Carnauba	WAX, WCA												
WAXES: Paraffin	WAX, WPF												
WAXES: Petroleum													
White spirit, SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)													
White spirit (low (15 - 20%) aromatic)	WSL												
Wine, SEE ALCOHOLIC BEVERAGES, N.O.S.													

E-2-X

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY,
SPECIFIC GRAVITY, & VAPOR GROWTH RATE

CARGO	C H R I S	LIQUID SPECIF. GRAVITY	USCO VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MMc (1)	SPECIF GRAV OF CARGO VAPOR SGv (2)	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (3)	TOTAL VAP-AIR PRESS @ 115 F Pt, 115 (4)	PARTIAL VOLUME OF VAP @ 115 F Vv, 115 (5)	PARTIAL VOLUME OF AIR @ 115 F Va, 115 (6)	AIR WEIGHT DENSITY @ 115 F Wa, 115 (7)	VAPOR- AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115 (8)	VAPOR- AIR MIX SPECIFIC GRAVITY Wv-a, 115/ Wa, 115	VAPOR AIR MIX GROWTH RATE VGR (9)
Wool grease													
Xylenes (ortho-, meta-, para-)	XLX	0.89	1	106.168	3.66	0.51	16.200	0.031	0.969	0.076	0.083	1.084	1.010
XYLENE (M-)	XLM	0.87	1		3.66	0.51	16.200	0.031	0.969	0.076	0.083	1.084	1.010
XYLENE (O-)	XLO	0.89	1		3.66	0.40	16.200	0.025	0.975	0.076	0.081	1.066	1.009
XYLENE (P-)	XLP	0.86	1		3.66	0.51	16.200	0.031	0.969	0.076	0.083	1.084	1.010
XYLENOL	XYL	1.01	1		3.66	0.10	16.200	0.006	0.994	0.076	0.077	1.016	1.002
Zinc Dialkyldithiophosphate													

E-2-v

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE II: VAPOR-AIR MIX DENSITY, SPECIFIC GRAVITY, & VAPOR GROWTH RATE

C H R I S	LIQUID SPECIF. GRAVITY	USCO VAP COL. SYST CAT.	MOLEC'R WEIGHT OF CARGO MWC	SPECIF. GRAV OF CARGO VAPOR SGV	SATUR'D VAPOR PRESS @ 115 F Pv, 115 (3) (15) (PSIA)	TOTAL VAP-AIR PRESS @ 115 F Pc, 115 (4) (PSIA)	PARTIAL	PARTIAL	AIR	VAPOR-	VAPOR-	VAP-
							VOLUME OF VAP @ 115 F Vv, 115 (5)	VOLUME OF AIR @ 115 F Va, 115 (6)	WEIGHT DENSITY @ 115 F Wa, 115 (7) (Lbm/ FT ³)	AIR MIX WEIGHT DENSITY @ 115 F Wv-a, 115 (8) (Lbm/ FT ³)	AIR MIX SPECIFIC GRAVITY @ 115 F Ma, 115 (9)	AI MI GROWTH RATE @ 115 F Vg (10)
46 CFR SUBCHAPTER D, BUT NOT TABLE 30.25-1												
	ARS	1.02	1	1.00	0.15	16.200	0.009	0.991	0.076	0.076	1.000	1.00
	ARS	1.02	1	1.00	0.15	16.200	0.009	0.991	0.076	0.076	1.000	1.00
			8									

E-2-v

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX LIQUID TRANSP RATE (MLTR) Q1 (10) (BBL/ HR)	VAPOR- AIR MIX FLOW RATE Qv-a (11) (BBL/ HR)	REQUIRED AIR EQUIVALENT Qa (12) (BBL/ HR)	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS		PIPE SECT II: LOSS		GRAND TOTAL LOSS Htot- I+II (FT)	TO P/V Wv-a.11 Ploss (PSI)	PRESS @ TANK PV * Ptk (PSI)	I PC MD	
						TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)							
ACETIC ACID	AAC	5,000	5092	5244	29446	1.635	*****	88.7	*****	0.0	88.7	0.050	1.68	OK
ACETIC ANHYDRIDE	ACA	5,000	5040	5193	29150	1.635	*****	87.0	*****	0.0	87.0	0.049	1.68	OK
ACETONITRILE	ATN	5,000	5003	5005	28101	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
ACRYLIC ACID	ACR	5,000	5040	5131	28810	1.635	*****	87.1	*****	0.0	87.1	0.048	1.68	OK
ACRYLONITRILE	ACN	5,000	5500	6142	34483	1.665	*****	102.3	*****	0.0	102.3	0.067	1.73	OK
ADIPONITRILE	ADN	5,000	5001	5005	28103	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
ALUMINUM SULFATE SOLUTION	ASX													
AMINOETHYLETHANOLAMINE	ASE	5,000	5001	5005	28101	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
AMMONIUM BISULFITE SOLN (70% OR LESS)	ABX													
AMMONIUM HYDROXIDE (28% OR LESS NH3)	AMH													
ANTHRACENE OIL (COAL TAR FRACTION)	AHO													
BENZENE	BNZ	5,000	6250	7655	42978	1.725	*****	130.3	*****	0.0	130.3	0.103	1.83	OK
BENZENE HYDROCARBON MIXTURES (M/ACETYLENES) (M/10% BENZENE OR MORSHA	5,000	5730	7711	43296	1.725	*****	108.9	*****	0.0	108.9	0.104	1.83	OK	
BENZENE HYDROCARBON MIXTURES (M/10% BENZENE OR MORE)	BHB	5,000	5730	7711	43296	1.725	*****	108.9	*****	0.0	108.9	0.104	1.83	OK
BENZENE, TOLUENE, XYLENE MIXTURES (HAVING 10% BENZENE OR MORE)	BTX	5,000	5730	7711	43296	1.725	*****	108.9	*****	0.0	108.9	0.104	1.83	OK
iso-BUTYL ACRYLATE	BAI	5,000	5060	5371	30156	1.665	*****	87.4	*****	0.0	87.4	0.052	1.72	OK
n-BUTYL ACRYLATE	BTC	5,000	5040	5247	29462	1.635	*****	86.9	*****	0.0	86.9	0.050	1.68	OK
BUTYL ACRYLATE (SEE ISO- & N- BUTYL ACRYLATE)	BAR	5,000	5060	5371	30156	1.665	*****	87.4	*****	0.0	87.4	0.052	1.72	OK
BUTYL METHACRYLATE	BMH	5,000	5029	5202	29205	1.635	*****	86.6	*****	0.0	86.6	0.049	1.68	OK
iso-BUTYRALDEHYDE	BAD	5,000	5780	7585	42589	1.725	*****	111.1	*****	0.0	111.1	0.101	1.83	OK
n-BUTYRALDEHYDE	BTR	5,000	5780	7585	42589	1.725	*****	111.1	*****	0.0	111.1	0.101	1.83	OK
BUTYRALDEHYDES (CRUDE)	BFA	5,000	5800	7631	42843	1.725	*****	111.9	*****	0.0	111.9	0.102	1.83	OK
BUTYRALDEHYDE (ISO-, N-)	BAE	5,000	5800	7631	42843	1.725	*****	111.9	*****	0.0	111.9	0.102	1.83	OK
CAMPHOR OIL (LIGHT)	CPO													
CARBON TETRACHLORIDE	CBT													
CAUSTIC POTASH SOLUTION	CPS													
CAUSTIC SODA SOLUTION	CSS													
CHLOROBENZENE	CRB	5,000	5080	5429	30483	1.665	*****	88.1	*****	0.0	88.1	0.053	1.72	OK
CHLOROFORM	CRF													
CHLOROSULFONIC ACID	CSA													
COAL TAR NAPHTHA SOLVENT	NCT	5,000	5020	5102	28645	1.635	*****	86.4	*****	0.0	86.4	0.047	1.68	OK
CREOSOTE (COAL TAR)	CCT	5,000	5001	5005	28103	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
CREOSOTE (WOOD)	CWD	5,000	5001	5005	28103	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
CRESOLS (ALL ISOMERS)	CRS	5,000	5006	5031	28248	1.635	*****	86.1	*****	0.0	86.1	0.046	1.68	OK
CRESOLS WITH LESS THAN 5% PHENOL (SEE CREOSOLS (ALL ISOMERS))	CRS													
CRESOLS WITH 5% OR MORE PHENOL (SEE PHENOL)	CFP	5,000	5005	5026	28219	1.635	*****	86.1	*****	0.0	86.1	0.046	1.68	OK
CRESYLATE SPENT CAUSTIC	CSC													
CRESYLIC ACID, SODIUM SALT SOLUTION, SEE CRESYLATE SPENT CAUSTIC	CAX													
CROTONALDEHYDE	CTA	5,000	5200	5635	31636	1.665	*****	92.3	*****	0.0	92.3	0.057	1.72	OK

E-3-a

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	LIQUID TRANSF RATE (MLTR) (10) (BBL/ HR)	VAPOR- AIR MIX FLOW RATE (BBL/ HR)	REQUIRED AIR		PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS		PIPE SECT II: LOSS		PRESS DRO THRU PIP'G REMO TANK WV-a,11 Ploss (PSI)	PRESS @ REMO TANK PV + Ptk (PSI)	Pt MD
				EQUIVALENT			TOTAL	TOTAL	GRAND	TO P/V			
				Qa (12) (BBL/ HR)	(FT^3/ HR)		LOSS Htot I (FT)	LOSS Htot II (FT)	TOTAL LOSS Htot- I+II (FT)	P/V Ploss (PSI)			
CYCLOHEXANONE	...												
CYCLOHEXYLAMINE	CCH	5,000	5002	5009	28126	1.635	86.0	0.0	86.0	0.046	1.68	OK	
DECYL ACRYLATE (iso-, n-)	CHA	5,000	5062	5291	29709	1.635	87.6	0.0	87.6	0.051	1.69	OK	
DICHLOROBENZENE (ALL ISOMERS)	DAT	5,000	5001	5011	28134	1.635	86.0	0.0	86.0	0.046	1.68	OK	
1,1-DICHLOROETHANE	DBX	5,000	5010	5073	28481	1.635	86.1	0.0	86.1	0.047	1.68	OK	
2,2-DICHLOROETHYL ETHER	DCH	5,000	5990	9419	52886	1.785	117.3	0.0	117.3	0.153	1.94	OK	
DICHLOROMETHANE (ALSO KNOWN AS METHYLENE CHLORIDE)	DCE	5,000	5004	5028	28231	1.635	86.1	0.0	86.1	0.046	1.68	OK	
2,4-DICHLOROPHENOXYACETIC ACID DIETHANOLAMINE SALT SOLUTION	DCM												
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION	DDE												
2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	DAD												
1,1-,1,2- OR 1,3- DICHLOROPROPANE	DDTI												
1,3-DICHLOROPROPENE	DPX	5,000	5630	8213	46110	1.755	104.5	0.0	104.5	0.118	1.87	OK	
DICHLOROPROPENE, DICHLOROPROPANE MIXTURES	DPU	5,000	5550	7778	43673	1.725	102.0	0.0	102.0	0.106	1.83	OK	
2,2-DICHLOROPROPIONIC ACID	DMX	5,000	5630	8213	46110	1.755	104.5	0.0	104.5	0.118	1.87	OK	
DIETHANOLAMINE	DCN												
DIETHYLAMINE	DEA	5,000	5001	5005	28102	1.635	86.0	0.0	86.0	0.046	1.68	OK	
DIETHYLENTRIAMINE	DEN	5,000	5100	5331	29931	1.635	88.9	0.0	88.9	0.051	1.69	OK	
DIETHYL ETHER, SEE ETHYL ETHER	DET	5,000	5004	5019	28182	1.635	86.1	0.0	86.1	0.046	1.68	OK	
DIISOBUTYLAMINE	DEH												
DIISOPROPANOLAMINE	DBU	5,000	5046	5288	29691	1.635	87.0	0.0	87.0	0.051	1.69	OK	
DIISOPROPYLAMINE	DIP	5,000	5001	5007	28110	1.635	86.0	0.0	86.0	0.046	1.68	OK	
N,N-DIMETHYLACETAMIDE	DIA	5,000	5370	6731	37791	1.695	96.8	0.0	96.8	0.080	1.78	OK	
DIMETHYLETHANOLAMINE	DAC	5,000	5020	5082	28532	1.635	86.5	0.0	86.5	0.047	1.68	OK	
DIMETHYLFORMAMIDE	DMB	5,000	5050	5206	29229	1.635	87.3	0.0	87.3	0.049	1.68	OK	
1,4-DIOXANE	DMP	5,000	5030	5100	28634	1.635	86.8	0.0	86.8	0.047	1.68	OK	
DI-N-PROPYLAMINE	DOX	5,000	5184	5751	32288	1.665	91.3	0.0	91.3	0.059	1.72	OK	
ETHANOLAMINE	DNA	5,000	5150	5715	32088	1.665	90.1	0.0	90.1	0.059	1.72	OK	
ETHYL ACRYLATE	MEA	5,000	5003	5008	28119	1.635	86.0	0.0	86.0	0.046	1.68	OK	
ETHYLAMINE SOLUTION (72% OR LESS)	EAC	5,000	5200	5949	33399	1.665	91.4	0.0	91.4	0.063	1.73	OK	
N-ETHYLBUTYLAMINE	EAN	5,000	6550	8117	45576	1.755	142.7	0.0	142.7	0.118	1.87	OK	
N-ETHYLCYCLOHEXYLAMINE	EBA	5,000	5120	5574	31296	1.665	89.5	0.0	89.5	0.056	1.72	OK	
ETHYLENE CYANOHYDRIN	ECC	5,000	5050	5308	29805	1.635	87.1	0.0	87.1	0.051	1.69	OK	
ETHYLENEDIAMINE	ETC	5,000	5001	5003	28092	1.635	86.0	0.0	86.0	0.046	1.68	OK	
ETHYLENE DIBROMIDE	EDA	5,000	5090	5243	29439	1.635	88.7	0.0	88.7	0.050	1.68	OK	
ETHYLENE DICHLORIDE	EDB												
ETHYLENE GLYCOL PROPYL ETHER	EDC	5,000	5400	6825	38322	1.695	97.5	0.0	97.5	0.082	1.78	OK	
2-ETHYLBUTYL ACRYLATE	EOP	5,000	8060	5404	30344	1.665	87.4	0.0	87.4	0.053	1.72	OK	
ETHYLIDENE NORBORNENE	EAI	5,000	5002	5019	28177	1.635	86.0	0.0	86.0	0.046	1.68	OK	
ETHYL METHACRYLATE	ENB	5,000	5033	5190	29137	1.635	86.7	0.0	86.7	0.049	1.68	OK	
2-ETHYL-3-PROPYLACROLEIN	ETM	5,000	5100	5544	31125	1.665	88.8	0.0	88.8	0.055	1.72	OK	
FERRIC CHLORIDE SOLUTIONS	EPA	5,000	5012	5074	28488	1.635	86.2	0.0	86.2	0.047	1.68	OK	
FORMALDEHYDE SOLUTION (37% TO 50%)	FCS												
	FMS	5,000	5015	5016	28162	1.635	86.4	0.0	86.4	0.046	1.68	OK	

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR EQUIVALENT	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot = I+II (FT)	PRESS DROPS THRU PIP'G THRU REMOTE TANK PV * Ploss (PSI)	PRESS @ TANK PV * Ptk (PSI)	P	
		LIQUID TRANSF RATE (MLTR) Q1 (10) (BBL/ HR)	AIR MIX FLOW RATE Qv-a (11) (BBL/ HR)			TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)							
		Qa (12) (BBL/ HR)	(FT ³ / HR)											
FORMIC ACID	FMA	5,000	5210	5409	30369	1.665	*****	92.7	*****	0.0	92.7	0.053	1.72	C
FURFURAL	FPA	5,000	5015	5068	20457	1.635	*****	86.3	*****	0.0	86.3	0.047	1.68	C
GLUTARALDEHYDE SOLUTION (50% OR LESS)	GTA													
HEXAMETHYLENEDIAMINE SOLUTION	HMC	5,000	5001	5006	20105	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	O
HEXAMETHYLENIMINE	HMI	5,000	5050	5050	20354	1.635	*****	87.6	*****	0.0	87.6	0.046	1.68	O
HYDROCHLORIC ACID SPENT (15% OR LESS)	HCS													
ISOPENTALDEHYDE (MIXED ISOMERS) (SEE VALERALDEHYDE (ISO-, N-))	IPR	5,000	7300	12467	69999	1.890	*****	172.3	*****	0.0	172.3	0.266	2.16	O
ISOPRENE	KPL													
KRAFT PULPING LIQUORS (FREE ALKALI CONTENT 3% OR MORE) (INCLUDING:KPL)	MSO	5,000	5067	5323	29884	1.635	*****	87.7	*****	0.0	87.7	0.051	1.69	O
MESITYL OXIDE	MAM	5,000	5410	6640	37279	1.695	*****	98.2	*****	0.0	98.2	0.078	1.77	O
METHYL ACRYLATE	MCK	5,000	5015	5013	20148	1.635	*****	86.4	*****	0.0	86.4	0.046	1.68	O
METHYLCYCLOPENTADIENE DIMER	MDE	5,000	5010	5058	20397	1.635	*****	86.2	*****	0.0	86.2	0.046	1.68	O
METHYL DIETHANOLAMINE	MEP	5,000	5016	5094	28602	1.635	*****	86.4	*****	0.0	86.4	0.047	1.68	O
2-METHYL-5-ETHYLPYRIDINE	MMM	5,000	5202	5944	33372	1.665	*****	91.5	*****	0.0	91.5	0.063	1.73	O
METHYLENE CHLORIDE (SEE DICHLOROMETHANE)	MPR	5,000	5050	5219	29301	1.635	*****	87.3	*****	0.0	87.3	0.049	1.68	O
METHYL METHACRYLATE	MSR	5,000	5040	5228	29354	1.635	*****	86.9	*****	0.0	86.9	0.049	1.68	O
2-METHYLPYRIDINE	MPL	5,000	5080	5325	29898	1.635	*****	88.2	*****	0.0	88.2	0.051	1.69	O
alpha-METHYLSTYRENE	NCD													
MORPHOLINE	NPM	5,000	5105	5435	30516	1.665	*****	89.0	*****	0.0	89.0	0.053	1.72	OK
NITRIC ACID (70% OR LESS)	ONE	5,000	5031	5266	29568	1.635	*****	86.6	*****	0.0	86.6	0.050	1.69	OK
NITROPROPANE (-1, OR -2)	OLM	5,000	5001	5004	28094	1.635	*****	86.0	*****	0.0	86.0	0.045	1.68	OK
OCTYL NITRATES (ALL ISOMERS)	PCE													
OLEUM	PDE	5,000	6706	10458	58720	1.815	*****	146.7	*****	0.0	146.7	0.189	2.00	OK
PENTACHLOROETHANE	PER													
1, 3-PENTADIENE	PAC													
PERCHLOROETHYLENE (SAME AS TETRACHLOROETHYLENE)	PEB	5,000	5001	5007	20114	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
PHOSPHORIC ACID	PPI													
POLYETHYLENE POLYAMINES	MPA	5,000	5008	5028	20228	1.635	*****	86.2	*****	0.0	86.2	0.046	1.68	OK
POLYMETHYLENE POLYPHENYL ISOCYANATE	PAX	5,000	5008	5028	20228	1.635	*****	86.2	*****	0.0	86.2	0.046	1.68	OK
POTASSIUM HYDROXIDE SOLUTION (SEE CAUSTIC POTASH SOLUTION)	PNA	5,000	5030	5102	20647	1.635	*****	86.8	*****	0.0	86.8	0.047	1.68	OK
iso-PROPANOLAMINE	IPP	5,000	7342	11619	65233	1.890	*****	175.0	*****	0.0	175.0	0.232	2.12	OK
PROPANOLAMINE (iso-, n-)	IPE	5,000	5664	8060	45251	1.755	*****	106.0	*****	0.0	106.0	0.113	1.87	OK
PROPIONIC ACID	PRD	5,000	5130	5473	30727	1.665	*****	89.8	*****	0.0	89.8	0.054	1.72	OK
iso-PROPYLAMINE	SAU													
iso-PROPYL ETHER	SDD													
PYRIDINE	SDL													
SODIUM ALUMINATE SOLUTION	SHP													
SODIUM CHLORATE SOLUTION (50% OR LESS)	SSH													
SODIUM DICHROMATE SOL'N (70% OR LESS)														
SODIUM HYDROXIDE SOLUTION (SEE CAUSTIC SODA SOLUTION)														
SODIUM HYPOCHLORITE SOL'N (15% OR LESS)														
SODIUM SULFIDE, HYDROSULFIDE SOLUTIONS (H2S 15 PPM OR LESS)														

E-3-C

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX VAPOR-		REQUIRED AIR		PRESS ACROSS VALVE	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS I+II (FT)	PRESS TO P/V TANK @ Pv = 11 Ploss Ptk (PSI)	PRESS @ REMOTE TANK (PSI)	
	LIQUID TRANSF RATE (MLTR)	AIR MIX FLOW RATE (Qv-a)	EQUIVALENT (Qa)	(FT ³ /HR)		TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)						
	(10) (BBL/HR)	(11) (BBL/HR)	(12) (BBL/HR)										
					(PSI)								
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (15 PPM<H2S<200 PPM)	SSS												
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (H2S GREATER THAN 200 PPM)	SSJ												
SODIUM THIOCYANATE SOLUTION (56% OR LESS)	STS												
STYRENE MONOMER	STY	5,000	5040	5199	29191	1.635	*****	87.0	*****	0.0	87.0	0.049	1.60
SULFURIC ACID	SFA	5,000	5001	5005	28100	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
SULFURIC ACID, SPENT	SAC	5,000	5001	5000	28070	1.635	*****	86.0	*****	0.0	86.0	0.045	1.60
1,1,2,2-TETRACHLOROETHANE (ACETYLENE TETRACHLORIDE)	TEC												
TETRAETHYLENEPENTAMINE	TTP	5,000	5000	5001	28079	1.635	*****	86.0	*****	0.0	86.0	0.045	1.60
TETRAHYDROFURAN	THP	5,000	5850	6365	35735	1.695	*****	115.7	*****	0.0	115.7	0.072	1.77
1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)	TCM	5,000	5102	5651	31727	1.665	*****	88.4	*****	0.0	88.4	0.057	1.72
TRICHLOROETHANE (SEE 1,1,2-TRICHLOROETHANE)	TCL	5,000	5346	7067	39679	1.695	*****	95.3	*****	0.0	95.3	0.088	1.70
TRICHLOROETHYLENE	TCN	5,000	5015	5121	28751	1.635	*****	86.3	*****	0.0	86.3	0.048	1.60
1,2,3-TRICHLOROPROPANE	TEA	5,000	5001	5007	28115	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
TRIETHANOLAMINE	TEN	5,000	5250	6177	34681	1.665	*****	93.2	*****	0.0	93.2	0.068	1.73
TRIETHYLAMINE	TET	5,000	5001	5007	28114	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
TRIETHYLENETETRAMINE	UAS												
UREA, AMMONIUM NITRATE SOL'N (CONTAINING MORE THAN 2% NH3)		5,000	5500	6995	39272	1.695	*****	101.2	*****	0.0	101.2	0.087	1.70
VALERALDEHYDE (iso-, n-)	IVA	5,000	5500	6995	39272	1.695	*****	101.2	*****	0.0	101.2	0.087	1.70
VALERALDEHYDE (iso-)	VAL	5,000	5001	5009	28122	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
VALERALDEHYDE (n-)	VBL												
VANILLAN BLACK LIQUOR (FREE ALKALI CONTENT 3% OR MORE)	VAM	5,000	5580	7287	40913	1.725	*****	103.0	*****	0.0	103.0	0.094	1.82
VINYL ACETATE	VNT	5,000	5012	5069	28460	1.635	*****	86.2	*****	0.0	86.2	0.047	1.60
VINYLTOLUENE													

E-3-d

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR EQUIVALENT (FT ³ /HR)	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot I+II (FT)	PRESS DROP THRU PIP'G REMOTE TANK Mv-a, 11 * Htot Ploss (PSI)	PRESS @ REMOTE TANK PV + Ptk (PSI)	OK	
		LIQUID TRANSF RATE (MLTR (10) (BBL/ HR)	AIR MIX FLOW RATE (11) (BBL/ HR)			TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)							
		Q1 (10) (BBL/ HR)	Qv-a (11) (BBL/ HR)			Qa (12) (BBL/ HR)								
46 CFR SUBCHAPT O BUT NOT TABLE 151														
1,1-DICHLOROPROPANE	DPB	5,000	5630	8213	46110	1.755	*****	104.5	*****	0.0	104.5	0.110	1.87	OK
1,1,1-TRICHLOROETHANE														
1,2-DICHLOROPROPANE	DPP	5,000	5260	6227	34960	1.665	*****	93.2	*****	0.0	93.2	0.069	1.73	OK
1,3-CYCLOPENTADIENE														
1,3-DICHLOROPROPANE	DPC	5,000	5380	6974	39156	1.695	*****	96.5	*****	0.0	96.5	0.086	1.78	OK
2-METHYL-2-HYDROXY-3-BUTYNE	MHB	5,000	5114	5445	30573	1.665	*****	89.3	*****	0.0	89.3	0.054	1.72	OK
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70%)	DDA													
3-PENTENITRILE	PNT													
AEROTHEME TT (1,1,1-TRICHLOROETHANE)														
ALKYLBENZENE														
AMINOTHYLPYPERAZINE	AEP	5,000	6250	7655	42970	1.725	*****	130.3	*****	0.0	130.3	0.103	1.83	OK
BENZENE RAFFINATE (ASSUME VAPOR PROPERTIES SIMILAR TO BENZENE)	BSC	5,000	5000	5001	28070	1.635	*****	86.0	*****	0.0	86.0	0.045	1.60	OK
BENZENE SULFONYL CHLORIDE	BZE	5,000	5002	5015	28157	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
BENZYL ACETATE	BCL	5,000	5009	5056	28385	1.635	*****	86.2	*****	0.0	86.2	0.046	1.60	OK
BENZYL CHLORIDE (STABILIZED)														
BUTANOL														
BUTYL ETHER (n-)														
BUTYLENE OXIDE (1,2-)	BTE	5,000	5040	5253	29495	1.635	*****	86.9	*****	0.0	86.9	0.050	1.60	OK
BUTYRIC ACID	BTO	5,000	5910	8037	45125	1.755	*****	115.9	*****	0.0	115.9	0.113	1.87	OK
CARBOLIC ACID	BRA	5,000	5007	5029	28234	1.635	*****	86.2	*****	0.0	86.2	0.046	1.60	OK
CHLOROACETIC ACID (80% OR LESS)	CBO	5,000	5006	5027	28224	1.635	*****	86.1	*****	0.0	86.1	0.046	1.60	OK
CHLOROPROPIONIC ACID (2- OR 3-)	CFM	5,000	5001	5005	28099	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
CHLOROTOLUENE (m-)	CFM	5,000	5002	5010	28131	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
CHLOROTOLUENE (o-)	CTM	5,000	5032	5198	29186	1.635	*****	86.7	*****	0.0	86.7	0.049	1.60	OK
CHLOROTOLUENE (p)	CTO	5,000	5032	5198	29186	1.635	*****	86.7	*****	0.0	86.7	0.049	1.60	OK
CHLOROTOLUENES (MIXED ISOMERS)	CRN	5,000	5009	5056	28385	1.635	*****	86.2	*****	0.0	86.2	0.046	1.60	OK
CREOSOTE (ALL ISOMERS)	CHI	5,000	5053	5327	29907	1.635	*****	87.2	*****	0.0	87.2	0.051	1.69	OK
CRESYLIC ACID TAR	CCW	5,000	5001	5005	28103	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
CYCLOHEPTANE	CRX	5,000	5010	5010	28130	1.635	*****	86.3	*****	0.0	86.3	0.046	1.60	OK
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE	CYE	5,000	5140	5646	31700	1.665	*****	89.7	*****	0.0	89.7	0.057	1.72	OK
CYCLOHEXYL ACETATE	CYX	5,000	5100	5462	30666	1.665	*****	88.8	*****	0.0	88.8	0.054	1.72	OK
CYCLOPENTADIENE, STYRENE, BENZENE MIXTURE	CYC	5,000	5001	5007	28113	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
CYCLOPENTANE	CSB	5,000	5450	7681	43124	1.725	*****	98.3	*****	0.0	98.3	0.103	1.83	OK
DECANOIC ACID	CYP	5,000	6315	9230	51825	1.785	*****	131.0	*****	0.0	131.0	0.148	1.93	OK
DI 2 ETHYLHEXYL PHTHALATE (SEE ALSO ETHYLHEXYL PHTHALATE)	DCO													
DICHLOROISOPROPYL ETHER (2,2'-)	DCI	5,000	5006	5051	28361	1.635	*****	86.1	*****	0.0	86.1	0.046	1.60	OK
DICHLOROPROPANE														
DICHLOROPROPENE														
DIETHYL SULFATE	DSU	5,000	5001	5008	28116	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK

W-3-a

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR		PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS		PIPE SECT II: LOSS		GRAND TOTAL LOSS Htot-I+II (FT)	PRESS DROP THRU PIP'G REMO TANK WV-a,11 * Htot Ploss (PSI)	PRESS @ REMO TANK PV * Ploss Ptk (PSI)	Pt ME
		LIQUID	AIR	EQUIVALENT	FM REMOTE TK		FM REMOTE TK							
		TRANSF RATE (MLTR) S (10) (BBL/ HR)	MIX FLOW RATE (11) (BBL/ HR)	Qa (12) (FT^3/ HR)	TO PV		TO PV							
DIETHYLETHANOLAMINE	DAE	5,000	5018	5102	28645	1.635	86.4	0.0	86.4	0.047	1.68	0		
DODECYL BENZENE	DOT													
DODECYLDIMETHYLAMINE TETRADECYLDIMETHYLAMINE MIXTURE														
DRIPOLENE														
ETHANOL (see ethyl alcohol)														
ETHYL BROMIDE														
ETHYL TERT-BUTYL ETHER	EBE	5,000	5500	7321	41103	1.725	100.6	0.0	100.6	0.094	1.82	0		
ETHYLAMINE	EAM	5,000	9080	14023	78736	1.975	266.3	0.0	266.3	0.336	2.31	0		
ETHYLENE DICHLORIDE 1,1,2-TRICHLOROETHANE MIXTURE	ETX	5,000	5370	7249	40700	1.725	95.9	0.0	95.9	0.092	1.82	0		
ETHYLMERCAPTAN (SAME AS ETHANETHIOL)														
ETHYLPHENOL	EPL	5,000	5002	5012	28140	1.635	86.0	0.0	86.0	0.046	1.68	0		
FORMALDEHYDE SOLUTION (50% OR MORE), METHANOL MIXTURES	MTM	5,000	5663	5778	32440	1.665	109.5	0.0	109.5	0.060	1.73	0		
HYDROSULFIDE														
INDENES														
ISOBUTYL ACETATE	IBA	5,000	5036	5204	29218	1.635	86.8	0.0	86.8	0.049	1.68	0		
ISOPRENE, PENTADIENE MIXTURE	IPN	5,000	5300	5803	32584	1.665	95.4	0.0	95.4	0.060	1.73	0		
ISO-PROPYL ALCOHOL	LRA													
LAURIC ACID	MET	5,000	5339	6027	33837	1.665	96.4	0.0	96.4	0.065	1.73	0		
METHACRYLONITRILE														
METHANOL														
METHYL STYRENE														
METHYL STYRENE, INDENES, ALKYL BENZENE MIXTURES	MIA													
METHYLCYCLOHEXANE	MCY	5,000	5237	6087	34178	1.665	92.7	0.0	92.7	0.066	1.73	0		
METHYLHEXANE (SAME AS HEPTANE)														
MONOETHANOLAMINE	MEA	5,000	5010	5027	28226	1.635	86.3	0.0	86.3	0.046	1.68	0		
MONOISOPROPANOLAMINE		5,000	5020	5069	28461	1.635	86.5	0.0	86.5	0.047	1.68	0		
NAPHTHALENE (MOLTEN)	NTM	5,000	5001	5006	28109	1.635	86.0	0.0	86.0	0.046	1.68	0		
NEODECANOIC ACID	NEA	5,000	5001	5009	28122	1.635	86.0	0.0	86.0	0.046	1.68	0		
NITRILOTRIACETIC ACID	NAA													
NITROPHENOL (MOLTEN)	NTP													
NITROPROPANE (60%), NITROETHANE (40%) MIXTURE	NNM	5,000	5110	5456	30632	1.665	89.1	0.0	89.1	0.054	1.72	0		
NITROTOLUENE (o-,p-)	NIT	5,000	5002	5014	28149	1.635	86.0	0.0	86.0	0.046	1.68	0		
PARALDEHYDE	PDH	5,000	5830	9788	54958	1.785	110.7	0.0	110.7	0.165	1.95	0		
POLYGLYCERINE, SODIUM SALT SOLN (CONTAINING 3% OR MORE SODIUM HYDROXIDE)	PAD	5,000	6376	8671	48684	1.755	134.3	0.0	134.3	0.131	1.89	0		
PROPIONALDEHYDE	PAH	5,000	5011	5070	28467	1.635	86.2	0.0	86.2	0.047	1.68	0		
PROPIONIC ANHYDRIDE	PCN	5,000	5117	5281	29649	1.635	89.6	0.0	89.6	0.050	1.69	0		
PROPIONITRILE	PCN	5,000	5117	5281	29649	1.635	89.6	0.0	89.6	0.050	1.69	0		
PROPYLAMINE (n-)	PRA	5,000	6355	8690	48792	1.755	133.1	0.0	133.1	0.132	1.89	0		
PROPYLBENZENE		5,000	5414	4829	27113	1.635	101.7	0.0	101.7	0.043	1.68	0		
PYROLYSIS GASOLINE (GREATER THAN 5% BENZENE)	GPY	5,000	5730	7711	43296	1.725	108.9	0.0	108.9	0.104	1.83	0		
PYROLYSIS RESIDUAL FUELS														
SEWAGE, RAW	SHR													

11-3-5

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809; CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VOR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX LIQUID TRANSFER RATE (MLTR) (10) (BBL/HR)	VAPOR-MIX FLOW RATE (Qv-a) (11) (BBL/HR)	REQUIRED AIR EQUIVALENT		PRESS ACROSS PV VALVE (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV	PIPE SECT II: LOSS FM REMOTE TK TO PV	GRAND TOTAL LOSS Htot-I+II (FT)	PRESS DROP THRU PIP'G REMOTE TANK TO P/V	PRESS @ REMOTE TANK PV - Ploss Ptk	I (Pt) MD		
			Qa (12) (BBL/HR)	(FT ³ /HR)		TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)		(PSI)	(PSI)			
SODIUM SULFIDE (SOLID IN WATER)	SDS												
STYRENE	STY 5,000	5040	5199	29192	1.635	*****	87.0	*****	0.0	87.0	0.049	1.60	OK
STYRENE CRUDE	STX 5,000	5040	5199	29192	1.635	*****	87.0	*****	0.0	87.0	0.049	1.60	OK
STYRENE TAR	STT												
TETRAMETHYLBENZENE (1,2,3,5-)	TTB 5,000	5014	5083	28539	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60	OK
TOLUIDINE (o-)	TLI 5,000	5001	5005	28102	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
TRICHLOROBENZENE (1,2,4-)	TCB 5,000	5003	5027	28226	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
TRIIISOPROPANOLAMINE SALT OF 2,4-DICHLOROPHENOXY ACETIC ACID SOL'N	TPE												
TRIPHENYLBORANE	UDA												
UNDECANOIC ACID	UDA												
HYDROCARBON 5-9	HFN 5,000	5440	6992	39256	1.695	*****	99.0	*****	0.0	99.0	0.086	1.70	OK

E-3-9

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR EQUIVALENT	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot-I+II (FT)	PRESS DROP THRU REMOTE TANK TO P/V * Htot Ploss (PSI)	PRESS @ REMOTE TANK * Pv + Ptk (PSI)	Pt MD	
		LIQUID TRANSF RATE (MLTR)	AIR MIX FLOW RATE (BBL/HR)			TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)							
46 CFR SUBCHAPTER D, TABLE 30.25-1														
Acetone	ACT	5,000	6000	7630	42842	1.725	*****	119.7	*****	0.0	119.7	0.102	1.83	OK
Acetophenone	ACP	5,000	5060	5346	30017	1.665	*****	87.4	*****	0.0	87.4	0.052	1.72	OK
Acetyl Tributyl Citrate														
Acrylonitrile-Styrene Copolymer dispersion in Polyether Polyol	ALE													
Alcohols (C13 and above)	ALY													
Alcoholic beverages, N.O.S.														
Alcohol (C6 - C17) (secondary) Poly(3-6)ethoxylates														
Alcohol (C12 - C15) Poly(1-3)ethoxylates														
Alcohol (C12 - C15) Poly(3-11)ethoxylates														
Alkenylsuccinic acid														
Alkenylsuccinic Anhydride														
Alkyl (C9 - C17) Bensenes	AKB													
Alkylbensenesulfonic acid (4% or less)	ABS													
Alkyl Phthalates (n-)														
Alkyl Succinate Formaldehyde Hydr- oxyamino condensate (3.2% or less)														
Aminoethyl diethanolamine, Aminoethyl ethanolamine solution														
Amyl Acetate (commercial, iso-, n-, sec-)	AEC	5,000	5202	6235	35005	1.695	*****	91.1	*****	0.0	91.1	0.069	1.76	OK
AMYL ACETATE (n-)	AML	5,000	5033	5208	29243	1.635	*****	86.7	*****	0.0	86.7	0.049	1.68	OK
AMYL ACETATE (iso-)	IAT	5,000	5033	5208	29243	1.635	*****	86.7	*****	0.0	86.7	0.049	1.68	OK
Amyl alcohol (iso-, n-, sec-, primary) (SEE ALSO IAA)	AAI	5,000	5030	5124	28770	1.635	*****	86.8	*****	0.0	86.8	0.048	1.68	OK
Amyl alcohol (n-)	AAN	5,000	5030	5124	28770	1.635	*****	86.8	*****	0.0	86.8	0.048	1.68	OK
Amyl alcohol (tert-)	AAI													
AMYL ALCOHOL, PRIMARY	APM	5,000	5030	5124	28770	1.635	*****	86.8	*****	0.0	86.8	0.048	1.68	OK
AMYL ALCOHOL, (sec-)	ASE	5,000	5030	5124	28770	1.635	*****	86.8	*****	0.0	86.8	0.048	1.68	OK
Amylene	AMZ													
AMYL ALCOHOL, (iso-)	IAA	5,000	5030	5124	28770	1.635	*****	86.8	*****	0.0	86.8	0.048	1.68	OK
Amyl Methyl Ketone	AMK													
Amyl Tallate														
Asphalt	ASP													
ASPHALT BLENDING STOCKS: Roofers flux	ARF													
ASPHALT BLENDING STOCKS: Straight run residue	ASR													
Behenyl alcohol														
Benzene Tricarboxylic acid Trioctyl Ester														
Benzyl alcohol	BAL	5,000	5010	5052	28366	1.635	*****	86.2	*****	0.0	86.2	0.046	1.68	OK
Bicyclic Terpenel Polyamide salt														
Brake fluid base mixtures (containing Poly(2-8)alkylene (C2-C3)	gBFX													
Butane	BMX													
Butene, SEE BUTYLENE														
Butene Oligomer	BOL													

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR		PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot = I+II (FT)	PRESS DROP THRU PIP'G REMOE TANK TO P/V PV * Htot Ploss Ptk (PSI)	PRESS @ REMOE TANK PV * Ploss Ptk (PSI)
		LIQUID TRANSF RATE (MLTR) Q1 (10) (BBL/ HR)	AIR MIX FLOW RATE Qv-a (11) (BBL/ HR)	EQUIVALENT Qa (12) (BBL/ HR)	(FT ³ / HR)		TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)					
Butyl Acetate (iso-, n-)	BAX	5,000	5060	5334	29947	1.635	87.5	0.0	87.5	0.051	1.69		
BUTYL ACETATE (N-)	BCN	5,000	5080	5443	30562	1.665	88.1	0.0	88.1	0.053	1.72		
Butyl Acetate (sec-)	BTA	5,000	5150	5822	32686	1.665	90.1	0.0	90.1	0.061	1.73		
Butyl alcohol (iso-, n-, sec-, tert-)		5,000	5090	5311	29822	1.635	88.6	0.0	88.6	0.051	1.69		
BUTYL ALCOHOL (ISO-)	IAL	5,000	5090	5311	29822	1.635	88.6	0.0	88.6	0.051	1.69		
BUTYL ALCOHOL (N-)	BAN	5,000	5050	5173	29046	1.635	87.4	0.0	87.4	0.048	1.68		
BUTYL ALCOHOL (SEC-)	BAS	5,000	5130	5449	30597	1.665	89.8	0.0	89.8	0.054	1.72		
BUTYL ALCOHOL (TERT-)	BAT	5,000	5280	5966	33495	1.665	94.7	0.0	94.7	0.064	1.73		
Butyl Benzyl Phthalate	BPH	5,000	5001	5016	28164	1.635	86.0	0.0	86.0	0.046	1.68		
Butylene	BTN												
Butylene Glycol	BUG												
1,3-Butylene Glycol, SEE BUTYLENE GLYCOL													
Butylene Polyglycol, SEE BUTYLENE GLYCOL													
iso-Butyl Formate													
n-Butyl Formate													
Butyl Heptyl Ketone													
Butyl Methyl Ketone, SEE METHYL BUTYL KETONE	BHK												
Butyl Stearate													
Butyl Toluene													
Butyrolactone (gamma)	BUE	5,000	5010	5073	28484	1.635	86.1	0.0	86.1	0.047	1.68		
Calcium Alkylphenate	BLA												
Calcium Alkyl Salicylate													
Calcium Amino Nonyl Phenolate													
Calcium Carboxylate													
Caprolactam solutions													
Carbon black base													
Cetyl alcohol (HEXADECANOL) SEE ALCOHOLS (C13 AND ABOVE)													
Cetyl Stearyl alcohol													
Cleaning spirit (unleaded)													
Coal tar													
Cumene	COR												
Cycloaliphatic resins	CUM	5,000	5060	5352	30047	1.665	87.4	0.0	87.4	0.052	1.72	OH	
Cyclohexane													
Cyclohexanol	CHX	5,000	5450	6736	37823	1.695	99.7	0.0	99.7	0.081	1.78	OH	
1,3-Cyclopentadiene dimer (molten)	CHN	5,000	5015	5072	28475	1.635	86.3	0.0	86.3	0.047	1.68	OH	
Cyclopentadiene polymers, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	CPD	5,000	5025	5161	28976	1.635	86.5	0.0	86.5	0.048	1.68	OH	
Cymene (para-)													
Decahydronaphthalene	CMP	5,000	5011	5072	28479	1.635	86.2	0.0	86.2	0.047	1.68	OH	
Decaldehyde (iso-)	DHN	5,000	5010	5068	28454	1.635	86.1	0.0	86.1	0.047	1.68	OH	
Decaldehyde (n-)	IDA	5,000	5001	5007	28114	1.635	86.0	0.0	86.0	0.046	1.68	OH	
Decane	DAL												
Decene	DDC												
	DCE	5,000	5012	5082	28534	1.635	86.2	0.0	86.2	0.047	1.68	OH	

E-3-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC., "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX LIQUID TRANSF RATE (MLTR) (10) (BBL/HR)	VAPOR- AIR MIX FLOW RATE (11) (BBL/HR)	REQUIRED AIR EQUIVALENT (12) (BBL/HR)	PRESS ACROSS PV VALVE (13) (PT ³ /HR)	PRESS (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS I+II (PT)	PRESS DROP THRU PIP'G REMOTE TANK (PSI)	PRESS @ REMOTE TANK (PSI)
						TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)	TOTAL LOSS Htot= I+II (PT)	PV Pck			
Decyl alcohol (all isomers) (DECANOL)	DAX 5,000	5001	5008	20116	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
DECYL ALCOHOL (iso-)	ISA 5,000	5001	5008	20116	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
DECYL ALCOHOL (n-)	DAN 5,000	5001	5008	20116	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Decylbenzene (n-)	DBZ 5,000	5001	5011	20135	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Detergent Alkylate												
Diacetone alcohol	DAA 5,000	5010	5056	20389	1.635	*****	86.2	*****	0.0	86.2	0.046	1.60
Dialkyl (C10-C14) Benzene	DAB											
Dialkyl (C7-C13) Phthalates	DAH											
Dibutyl Carbinol												
Dibutyl Phthalate (ortho-)	DPA											
Dicyclopentadiene, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	DPT 5,000	5025	5161	20976	1.635	*****	86.5	*****	0.0	86.5	0.046	1.60
Diethylbenzene	DEB 5,000	5008	5053	20369	1.635	*****	86.1	*****	0.0	86.1	0.046	1.60
Diethylene Glycol	DEG 5,000	5001	5005	20102	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Diethylene Glycol Butyl Ether	DME 5,000	5001	5008	20118	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Diethylene Glycol Butyl Ether Acetate	DEM											
Diethylene Glycol Dibutyl Ether	DIG											
Diethylene Glycol Diethyl Ether												
Diethylene Glycol Ethyl Ether	DGE											
Diethylene Glycol Ethyl Ether Acetate	DGA 5,000	5002	5013	20147	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Diethylene Glycol Methyl Ether	DOM 5,000	5003	5018	20172	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Diethylene Glycol Methyl Ether Acetate	DOR											
Diethylene Glycol Phenyl Ether	DOP											
Diethylene Glycol Phthalate	DGL											
Di-(2-ethylhexyl)adipate	DEH											
Di-(2-ethylhexyl)phthalate	DIE											
Diethyl Phthalate	DPH											
Diglycidyl Ether of Bisphenol A	BDE											
Diheptyl Phthalate	DHP											
Dihexyl Phthalate	DHA											
Diisobutylcarbinol	DBC 5,000	5009	5064	20432	1.635	*****	86.1	*****	0.0	86.1	0.047	1.60
Diisobutylene	DBL 5,000	5200	6049	33962	1.665	*****	91.4	*****	0.0	91.4	0.065	1.73
Diisobutyl Ketone	DIK 5,000	5016	5112	20700	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60
Diisobutyl Phthalate	DIT											
Diisodecyl Phthalate	DID											
Diisononyl Adipate	DNY											
Diisononyl Phthalate	DIN											
Diisooctyl Phthalate	DIO											
Diisopropylbenzene (all isomers)	DIX 5,000	5003	5024	20210	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Diisopropyl Naphthalene	DII											
Dimethyl Adipate	DLA											
Dimethylbenzene												
Dimethyl Glutarate	DGT											

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" = MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		PIPE SECT I: LOSS		PIPE SECT II: LOSS		GRAND TOTAL LOSS Htot-I-II (FT)	PRESS THRU PIP'G TANK REMOTE Mv-a, 11 * Htot Ploss (PSI)	PRESS @ TANK REMOTE Pv - P Ptk (PSI)	P M			
		LIQUID	AIR	REQUIRED AIR	PRESS	FM REMOTE TK TO PV	FM REMOTE TK TO PV							
		TRANSF	MIX	EQUIVALENT	ACROSS	TOTAL	TOTAL							
		RATE	FLOW		PV	LOSS	LOSS							
(MLTR)	RATE		VALVE	HtotI	HtotII									
Q1	Qv-a	Qa	PV											
(10)	(11)	(12)	VALVE											
(BBL/ HR)	(BBL/ HR)	(BBL/ HR)	PSI	(FT ³ / HR)	(PSI)	(FT)	(FT)	(FT)	(PSI)	(PSI)				
Dimethyl Phthalate	DTL													
Dimethyl Polysiloxane	DMP													
2,2-Dimethylpropane-1,3-diol	DDI													
Dimethyl Succinate	DSE													
Dinonyl Phthalate	DIP	5,000	5001	5022	28195	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
Di(octylphenyl)amine	DOP													
Diocetyl Phthalate	DPN	5,000	5010	5070	28466	1.635	*****	86.1	*****	0.0	86.1	0.047	1.68	0
Dipentene	DIL	5,000	5001	5008	28116	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
Diphenyl	DDO	5,000	5001	5009	28121	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
Diphenyl, Diphenyl Ether mixture	DPE	5,000	5001	5009	28121	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
Diphenyl Ether	DOB													
Diphenyl Ether, Biphenyl Ether mixture	DFG	5,000	5007	5046	28332	1.635	*****	86.1	*****	0.0	86.1	0.046	1.68	0
Dipropylene Glycol	DGY													
Dipropylene Glycol Dibenzoate	DPY													
Dipropylene Glycol Methyl Ether	DPP	5,000	5230	6056	34002	1.665	*****	92.5	*****	0.0	92.5	0.066	1.73	0
DISTILLATES: Flashed feed stocks	DSR	5,000	5230	6056	34002	1.665	*****	92.5	*****	0.0	92.5	0.066	1.73	0
DISTILLATES: Straight run	DTP													
Ditridecyl Phthalate	DUP													
Diundecyl Phthalate	DOC													
Dodecane (all isomers)	DDN													
Dodecanol	DOZ	5,000	5002	5017	28168	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
Dodecane (all isomers)	DOD	5,000	5002	5017	28168	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	0
DODECENE	DDB	5,000	5470	9704	54482	1.785	*****	97.4	*****	0.0	97.4	0.162	1.95	0
Dodecylbenzene	DOL													
Dodecyl Phenol	ETH													
Drilling mud (low toxicity) (if flammable or combustible)/	EEO													
Epoxyated linear alcohols, C11-C15	EEA													
Ethane	ETG													
2-Ethoxyethanol	ETA	5,000	5450	6822	38301	1.695	*****	99.3	*****	0.0	99.3	0.082	1.78	OK
2-Ethoxyethyl Acetate	EAA	5,000	5020	5127	28785	1.635	*****	86.4	*****	0.0	86.4	0.048	1.68	OK
Ethoxylated alcohols, C11-C15, SEE THE ALCOHOL POLYETHOXYLATES	EAL	5,000	5350	5686	31926	1.665	*****	97.7	*****	0.0	97.7	0.058	1.72	OK
Ethoxy Triglycol (crude)	EAK													
Ethyl Acetate	ETB	5,000	5060	5295	29727	1.635	*****	87.5	*****	0.0	87.5	0.051	1.69	OK
Ethyl Acetoacetate	EBA	5,000	5012	5059	28402	1.635	*****	86.3	*****	0.0	86.3	0.046	1.68	OK
Ethyl alcohol (ETHANOL)	EBR	5,000	5100	5552	31174	1.665	*****	88.8	*****	0.0	88.8	0.056	1.72	OK
Ethyl Amyl Ketone	ECY	5,000	5050	5269	29503	1.635	*****	87.2	*****	0.0	87.2	0.050	1.69	OK
Ethyl Benzene	ETL													
Ethyl Butanol														
Ethyl Butyrate														
Ethyl Cyclohexane														
Ethylene														
Ethylene Carbonate														

11-3-82

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; *7027* AND *7028*

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX LIQUID TRANSP RATE (MLTR) (10) (BBL/ HR)	VAPOR- AIR MIX FLOW RATE Qv-a (11) (BBL/ HR)	REQUIRED AIR		PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS		PIPE SECT II: LOSS		GRAND TOTAL LOSS Htot- I+II (FT)	PRESS DROPT THRU PIP'G REMOTE TANK TO P/V Wv-a,11 * Htot Ploss (PSI)	PRESS @ TANK PV * Ploss Pck (PSI)
				EQUIVALENT			TOTAL	TOTAL					
				(FT ³ / HR)	(FT ³ / HR)		LOSS HtotI (FT)	LOSS HtotII (FT)					
Ethylene Glycol	EGL	5,000	5001	5003	28089	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Ethylene Glycol Acetate	EOG												
Ethylene Glycol Butyl Ether	EQM												
ETHYLENE GLYCOL BUTYL ETHER ACETATE	EQA												
Ethylene Glycol Ether Acetate	EGB												
Ethylene Glycol Tert-Butyl Ether	EGD												
Ethylene Glycol Diacetate	EGY	5,000	5001	5007	28114	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Ethylene Glycol Dibutyl Ether	EGH												
Ethylene Glycol Ethyl Ether, SEE 2-ETHOXYETHANOL	EGJ												
Ethylene Glycol Ethyl Ether Acetate, SEE 2-ETHOXYETHYL ACETATE	EGA												
Ethylene Glycol Isopropyl Ether	EGI												
Ethylene Glycol Methyl Butyl Ether	EME	5,000	5001	5007	28112	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Ethylene Glycol Methyl Ether	EGT												
Ethylene Glycol Methyl Ether Acetate	EET												
Ethylene Glycol Phenyl Ether	EPE	5,000	5001	5007	28112	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Ethylene Glycol Phenyl Ether, Diethylene Glycol Phenyl Ether mixt	EDX												
Ethylene-Propylene Copolymer (in liquid mixtures)	EPD												
Ethyl-3-Ethoxypropionate	EEP												
2-Ethylhexaldehyde, SEE OCTYL ALDEHYDES	EHA	5,000	5017	5106	28668	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60
2-Ethylhexanoic acid	EHO												
2-Ethylhexanol, SEE OCTANOL (ALL ISOMERS)	EHN	5,000	5002	5013	28145	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60
Ethylhexoic acid, SEE 2-ETHYLHEXANOIC ACID													
Ethyl Hexyl Phthalate (SEE ALSO DI 2-ETHYLHEXYL PHTHALATE)	EHE												
Ethyl Hexyl Tallate	EHT												
Ethyl Propionate	EPR	5,000	5350	5606	31926	1.665	*****	97.7	*****	0.0	97.7	0.058	1.72
Ethyl Toluene	ETE	5,000	5028	5163	28989	1.635	*****	86.6	*****	0.0	86.6	0.048	1.60
Fatty acid (saturated, C13 and above)													
Fatty acid Amides													
Formamide	FAM	5,000	5010	5019	28177	1.635	*****	86.3	*****	0.0	86.3	0.046	1.60
Furfuryl Alcohol	FAL	5,000	5005	5024	28205	1.635	*****	86.1	*****	0.0	86.1	0.046	1.60
Gas oil, cracked	GOC												
GASOLINE BLENDING STOCKS: Alkylates	GAK	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINE BLENDING STOCKS: Reformates	GRP	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINES: Automotive (containing not over 4.23 grams lead per gal)	GAT	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINES: Aviation (containing not over 4.86 grams lead per gal)	GAV	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINES: Casinghead (natural)	GCS	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINES: Polymer	GPL	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
GASOLINES: Straight run	GSR	5,000	6250	10555	59261	1.815	*****	127.0	*****	0.0	127.0	0.191	2.01
Glycerine	GCR												
Glycerol, SEE GLYCERINE													
Glycerol Polyalkoxylate													
Glycerol Triacetate													

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX LIQUID TRANSF RATE (MLTR)	VAPOR- AIR MIX FLOW RATE (10) (BBL/HR)	REQUIRED AIR EQUIVALENT (12) (FT ³ /HR)	PRESS ACROSS PV VALVE (PSI)	PIPE SECT I: LOSS FM REMOTE TK. TO PV		PIPE SECT II: LOSS FM REMOTE TK. TO PV		GRAND TOTAL LOSS Htot-I+II (FT)	PRESS THRU PIP'G REMOTE TANK TO P/V (PSI)	PRESS @ REMOTE TANK (PSI)	PI Pk	
					TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)							
Glycidyl Ester of Tertiary Carboxylic acid, SEE GLYCIDYL ESTER OF TRI													
Glycidyl Ester of Tridecyl Acetic acid													
Glycidyl Ester of Versatic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETI													
Glycol Diacetate, SEE ETHYLENE GLYCOL DIACETATE													
Glycols, Resins and Solvents mixtures													
Glycol Triacetate, SEE GLYCERYL TRIACETATE													
Glyoxal solution (40% or less)													
Grease													
Heptadecane													
Heptane (all isomers) (METHYHEXANE)	HMX 5,000	5250	6163	34604	1.665	*****	93.2	*****	0.0	93.2	0.068	1.73	OK
HEPTANE (N-)	HPT 5,000	5250	6163	34604	1.665	*****	93.2	*****	0.0	93.2	0.068	1.73	OK
Heptanoic acid	HEP 5,000	5001	5006	28109	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
Heptanol (all isomers)	HTX 5,000	5004	5023	28200	1.635	*****	86.1	*****	0.0	86.1	0.046	1.68	OK
HEPTANOL	HTN 5,000	5004	5023	28200	1.635	*****	86.1	*****	0.0	86.1	0.046	1.68	OK
Heptene (all isomers)	HPX 5,000	5290	6325	35513	1.695	*****	94.2	*****	0.0	94.2	0.071	1.77	OK
HEPTENE (1-)	HTE 5,000	5280	6280	35262	1.695	*****	93.9	*****	0.0	93.9	0.070	1.77	OK
Heptyl Acetate	HPE 5,000	5010	5079	28518	1.635	*****	86.1	*****	0.0	86.1	0.047	1.68	OK
Herbicide (C15 -H22 -NO2 -Cl), SEE METOLACHLOR													
Hexaethylene Glycol													
Hexamethylene Glycol													
Hexamethylenetetramine solutions													
Hexane (all isomers)	HTS												
HEXANE	HXS 5,000	5700	7783	43696	1.725	*****	107.8	*****	0.0	107.8	0.106	1.83	OK
Hexanoic acid	HXA 5,000	5700	7783	43696	1.725	*****	107.8	*****	0.0	107.8	0.106	1.83	OK
Hexanol	HXO 5,000	5001	5006	28105	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
Hexene (all isomers)	HXM 5,000	5100	5482	30782	1.665	*****	88.8	*****	0.0	88.8	0.054	1.72	OK
HEXENE (1-)	HXM 5,000	5000	8075	45338	1.755	*****	111.3	*****	0.0	111.3	0.114	1.87	OK
HEXENE (2-)	HXB 5,000	5820	8152	45769	1.755	*****	111.9	*****	0.0	111.9	0.116	1.87	OK
Hexyl Acetate	HXT 5,000	5820	8152	45769	1.755	*****	111.9	*****	0.0	111.9	0.116	1.87	OK
Hexylene Glycol	HAE												
Hog Grease, SEE LARD	HXG 5,000	5001	5001	28080	1.635	*****	86.0	*****	0.0	86.0	0.045	1.68	OK
2-Hydroxy-4-(methylthio)butanoic acid													
HYDROCARBON 5-9 (MOVED TO SUB-0, NON TABLE 151, 6/24/95)	HBA												
Hydroxy terminated Polybutadiene, SEE POLYBUTADIENE, HYDROXYL TERMINA	HPN												
Isophorone	IPH 5,000	5001	5007	28111	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
JET FUELS: JP-1 (Kerosene)	JPO 5,000	5014	5089	28575	1.635	*****	86.3	*****	0.0	86.3	0.047	1.68	OK
JET FUELS: JP-3	JPT 5,000	5851	9858	55348	1.815	*****	111.5	*****	0.0	111.5	0.167	1.98	OK
JET FUELS: JP-4	JPP 5,000	5340	6817	38275	1.695	*****	95.4	*****	0.0	95.4	0.082	1.78	OK
JET FUELS: JP-5 (Kerosene, heavy)	JPV 5,000	5010	5056	28389	1.635	*****	86.2	*****	0.0	86.2	0.046	1.68	OK
JET FUELS: JP-8	JPE												
Kerosene	KRS 5,000	5015	5096	28610	1.635	*****	86.3	*****	0.0	86.3	0.047	1.68	OK
Lactic acid													

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX VAPOR-		REQUIRED AIR EQUIVALENT	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot-I+II (PT)	PRESS DROP THRU PIP'G REMOTE TANK TO P/V Wv-a,11 * Htot Ploss (PSI)	PRESS @ REMOTE TANK PV * P Ptk (PSI)
	LIQUID TRANSF RATE (MLTR) (10) (BBL/HR)	AIR MIX FLOW RATE Qv-a (11) (BBL/HR)			TOTAL LOSS HtotI (PT)	TOTAL LOSS HtotII (PT)					
	Qa (12) (BBL/HR)	(PT ³ /HR)									
Lard											
Latex, liquid synthetic, including: Styrene-Butadien rubber											
Latex, liquid synthetic, including: Carboxylated Styrene-Butadien Cop											
Magnesium Nonyl Phenol Sulfide											
Magnesium Sulfonate											
Maleic Anhydride Copolymer											
2-Mercaptobenzothiazol (in liquid mixtures)											
Methane											
3-Methoxy-1-Butanol											
3-Methoxybutyl Acetate											
1-Methoxy-2-Propyl Acetate											
Methoxy Triglycol, SEE TRIETHYLENE GLYCOL METHYL ETHER											
Methyl Acetate											
Methyl Acetoacetate											
Methyl alcohol (SEE METHANOL)											
Methyl Amyl Acetate											
Methyl Amyl alcohol											
Methyl Amyl Ketone											
Methyl Butanol, SEE THE AMYL ALCOHOLS											
Methyl Butanol											
Methyl n-Butyl Ketone											
Methyl Butynol											
Methyl Butyrate											
Methyl Ethyl Ketone											
Methyl Formal (DIMETHYL FORMAL)											
Methyl Heptyl Ketone											
Methyl Isobutyl Carbinol, SEE METHYL AMYL ALCOHOL											
Methyl Isobutyl Ketone											
3-Methyl-3-Methoxybutanol											
3-Methyl-3-Methoxybutyl Acetate											
1-Methyl Naphthalene											
Methyl Pentene											
2-METHYL-1-PENTENE											
5-METHYL-1-PENTENE											
N-Methyl-2-Pyrrolidone											
Methyl Tert-Butyl Ether (MTBE)											
Metalchlor											
Mineral spirits											
Myrcene											
NAPHTHA: Aromatic (Having less than 10% Benzene)											
NAPHTHA: Cracking fraction											
NAPHTHA: Heavy											

W-3-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX VAPOR-		PIPE SECT I: LOSS FM REMOTE TK TO PV				PIPE SECT II: LOSS FM REMOTE TK TO PV				PRESS DROP THRU PIP'G REMOTE TANK TO P/V * Mtot Ploss	PRESS @ REMOTE TANK PV * Ploss	P			
	C	H	R	I	S	REQUIRED AIR EQUIVALENT	PRESS ACROSS PV VALVE	TOTAL LOSS	TOTAL LOSS	GRAND TOTAL LOSS				TANK REMOTE		
															LIQUID TRANSF RATE (MLTR/HR)	AIR MIX FLOW RATE (Qv-a) (BBL/HR)
NAPHTHA: Paraffinic	PTN															
NAPHTHA: Petroleum	NSV 5,000	5020	5097	28617	1.635	*****	86.4	*****	0.0	86.4	0.047	1.60	C			
NAPHTHA: Solvent	NSS 5,000	5020	5121	28754	1.635	*****	86.4	*****	0.0	86.4	0.048	1.60	C			
NAPHTHA: Stoddard solvent	NVM 5,000	5019	5115	28720	1.635	*****	86.4	*****	0.0	86.4	0.047	1.60	C			
NAPHTHA: Varnish makers' and painters' (75%)	solNFS															
Naphthalene Sulfonic acid-Formaldehyde Copolymer, Sodium salt	NTI															
Naphthenic acid	NAX 5,000	5027	5168	29014	1.635	*****	86.6	*****	0.0	86.6	0.048	1.60	OK			
Nonane (all isomers)	NAN 5,000	5027	5168	29014	1.635	*****	86.6	*****	0.0	86.6	0.048	1.60	OK			
Nonane	NNA															
Nonanoic acid (all isomers)	NON 5,000	5035	5211	29260	1.635	*****	86.8	*****	0.0	86.8	0.049	1.60	OK			
Nonanoic, Tridecanoic acid mixture	NNS 5,000	5010	5072	28475	1.635	*****	86.1	*****	0.0	86.1	0.047	1.60	OK			
Nonene	NNN 5,000	5010	5072	28475	1.635	*****	86.1	*****	0.0	86.1	0.047	1.60	OK			
Nonyl alcohol (all isomers)	NNI 5,000	5010	5072	28475	1.635	*****	86.1	*****	0.0	86.1	0.047	1.60	OK			
NONYL ALCOHOL	NON															
NONYL ALCOHOL (iso-)	NNS															
Nonyl Methacrylate Monomer	NNN															
Nonyl Phenol	NNI															
Nonyl Phenol Poly(4-12)ethoxylates	NNP 5,000	5001	5011	28136	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
Nonyl Phenol Sulfide (90% or less)	NPE															
Noxious liquid, N.O.S. (17) ("Trade name," contains principal compone																
Non-Noxious liquid, N.O.S. (18) ("Trade name," contains principal com																
Octadecene																
Octadecenoamide solution (Oleamide)																
Octane (all isomers)	ODD															
OCTANE	OAX 5,000	5079	5426	30467	1.665	*****	88.1	*****	0.0	88.1	0.053	1.72	OK			
Octanoic acid (all isomers)	OAN 5,000	5079	5426	30467	1.665	*****	88.1	*****	0.0	88.1	0.053	1.72	OK			
Octanol (all isomers)	OAA 5,000	5001	5007	28114	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
OCTANOL	OCX 5,000	5001	5006	28109	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
Octene (all isomers)	OTA 5,000	5001	5006	28109	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
OCTENE (1-)	OTX 5,000	5090	5485	30795	1.665	*****	88.5	*****	0.0	88.5	0.054	1.72	OK			
Octyl Acetate	OTE 5,000	5100	5532	31060	1.665	*****	88.8	*****	0.0	88.8	0.055	1.72	OK			
Octyl alcohol (iso-, n-) (all isomers), SEE OCTANOL (ALL ISOMERS)	OCX 5,000	5001	5006	28109	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
OCTYL ALCOHOL	IOA 5,000	5001	5006	28109	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK			
Octyl Aldehydes	OAL															
Octyl Decyl Adipate	ODA															
Octyl Epoxystallate	OET															
Octyl Phthalate. SEE DI-(2-ETHYLHEXYL) PHTHALATE																
OIL, EDIBLE: Babassu	OBB															
OIL, EDIBLE: Beechnut																
OIL, EDIBLE: Castor																
OIL, EDIBLE: Cocoa butter	OCA															
OIL, EDIBLE: Coconut	OCC															

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX LIQUID TRANSFER RATE (MLTR) (10) (BBL/HR)	VAPOR-AIR MIX FLOW RATE (Qv-a) (11) (BBL/HR)	REQUIRED AIR EQUIVALENT (Qa) (12) (BBL/HR)	PRESS ACROSS PV VALVE (13) (FT ³ /HR)	PRESS (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS (FT)	TO P/V TANK * Htot I-II (FT)	PRESSURE REMOTE TANK (PSI)	PRESSURE @ REMOTE TANK (PSI)	OK
						TOTAL LOSS	HtotI	TOTAL LOSS	HtotII					
						(FT)	(FT)	(FT)	(FT)					
OIL, EDIBLE: Cod liver														
OIL, EDIBLE: Corn														
OIL, EDIBLE: Cottonseed														
OIL, EDIBLE: Fish, N.O.S.														
OIL, EDIBLE: Grapeseed														
OIL, EDIBLE: Groundnut														
OIL, EDIBLE: Hazelnut														
OIL, EDIBLE: Lard														
OIL, EDIBLE: Maize														
OIL, EDIBLE: Mustard seed														
OIL, EDIBLE: Nutmeg Butter														
OIL, EDIBLE: Olive														
OIL, EDIBLE: Palm														
OIL, EDIBLE: Palm kernel														
OIL, EDIBLE: Peanut														
OIL, EDIBLE: Poppy														
OIL, EDIBLE: Raisin seed														
OIL, EDIBLE: Rice bran														
OIL, EDIBLE: Safflower														
OIL, EDIBLE: Salad														
OIL, EDIBLE: Sesame														
OIL, EDIBLE: Soya bean														
OIL, EDIBLE: Sunflower, SEE SUNFLOWER SEED														
OIL, EDIBLE: Sunflower seed														
OIL, EDIBLE: Tucum														
OIL, EDIBLE: Vegetable, N.O.S.														
OIL, EDIBLE: Walnut														
OIL, FUEL: No. 1 (Kerosene)														
OIL, FUEL: No. 1-D														
OIL, FUEL: No. 2														
OIL, FUEL: No. 2-D														
OIL, FUEL: No. 4														
OIL, FUEL: No. 5														
OIL, FUEL: No. 6														
OIL, MISC: Absorption														
OIL, MISC: Aliphatic														
OIL, MISC: Animal, N.O.S.														
OIL, MISC: Aromatic														
OIL, MISC: Aviation F2300														
OIL, MISC: Clarified														
OIL, MISC: Coal														
OIL, MISC: Coconut oil, esterified, SEE COCONUT OIL, FATTY ACID METHY														

11-3-78

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	MAX LIQUID TRANSF RATE (MLTR/HR)	VAPOR- AIR MIX FLOW RATE (Qv-a) (BBL/HR)	REQUIRED AIR EQUIVALENT (Qa) (BBL/HR)	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS I+II (FT)	PRESS DROP THRU PIP'G REMOTE TANK TO P/V (PSI)	PRESS @ REMOTE TANK (PSI)	Pt MD	
					TOTAL LOSS (FT)	HtotI	TOTAL LOSS (FT)	HtotII					
OIL, MISC: Coconut oil, fatty acid													
OIL, MISC: Coconut oil, fatty acid Methyl Ester													
OIL, MISC: Coconut oil, Methyl Ester, SEE COCONUT OIL FATTY ACID METH													
OIL, MISC: Cottonseed, fatty acid, SEE COTTONSEED OIL, FATTY ACIDCFY													
OIL, MISC: Croton													
OIL, MISC: Crude													
OIL, MISC: Diesel	OIL 5,000	6250	6319	35479	1.695	*****	132.7	*****	0.0	132.7	0.072	1.77	OK
OIL, MISC: Gas, low pour	ODS 5,000	5069	5322	29000	1.635	*****	87.8	*****	0.0	87.8	0.051	1.69	OK
OIL, MISC: Gas, low sulfur													
OIL, MISC: Heartcut distillate													
OIL, MISC: Lanolin													
OIL, MISC: Linseed													
OIL, MISC: Lubricating													
OIL, MISC: Mineral	OLB 5,000	5015	5015	28150	1.635	*****	86.4	*****	0.0	86.4	0.046	1.68	OK
OIL, MISC: Mineral seal													
OIL, MISC: Motor													
OIL, MISC: Neatsfoot													
OIL, MISC: Oiticica													
OIL, MISC: Palm oil, fatty acid Methyl Ester													
OIL, MISC: Palm oil, Methyl Ester, SEE SEE PALM OIL, FATTY ACID MOPE													
OIL, MISC: Penetrating													
OIL, MISC: Perilla													
OIL, MISC: Pilchard													
OIL, MISC: Pine													
OIL, MISC: Range													
OIL, MISC: Residual													
OIL, MISC: Resin													
OIL, MISC: Resinous petroleum	ORS 5,000	5015	5015	28150	1.635	*****	86.4	*****	0.0	86.4	0.046	1.68	OK
OIL, MISC: Road													
OIL, MISC: Rosin													
OIL, MISC: Seal													
OIL, MISC: Soapstock													
OIL, MISC: Soya bean (epoxidized)													
OIL, MISC: Sperm													
OIL, MISC: Spindle													
OIL, MISC: Spray													
OIL, MISC: Tall													
OIL, MISC: Tall, fatty acid													
OIL, MISC: Tanner's													
OIL, MISC: Transformer													
OIL, MISC: Tung													
OIL, MISC: Turbine	OTB 5,000	5030	5231	29370	1.635	*****	86.6	*****	0.0	86.6	0.050	1.68	OK

E-3-9

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VOR" @ MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX LIQUID TRANSF RATE (MLTR Q1 (10) (BBL/ HR)	VAPOR- AIR MIX FLOW RATE Qv-a (11) (BBL/ HR)	REQUIRED AIR EQUIVALENT Qa (12) (BBL/ HR)	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot- I+II (FT)	PRESS DROP THRU PIP'G REMOTE TANK @ Htot Loss (PSI)	PRESS @ REMOTE TANK Loss Ptk (PSI)	Pt MD	
						TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)							
OIL, MISC: Whale														
OIL, MISC: White (mineral)														
OIL, MISC: Wood														
alpha-Olefins (C13 - C18)														
Olefins (C13 and above, all isomers)	OAM													
Oleic acid	OLA													
Oleyl alcohol (OCTADECENOL), SEE ALCOHOLS (C13 AND ABOVE)														
Organic Amine 70, SEE AMINOETHYLDIETHANOLAMINE, AMINOETHYL-ETHANOLAMI														
Palm Stearin	PMS													
n-Paraffins (C10 - C20)	PFN													
Pentadecanol, SEE SEE ALCOHOLS (C13 AND ABOVE)	PDC	5,000	5001	5012	28139	1.635	*****	86.0	*****	0.0	86.0	0.046	1.68	OK
Pentaethylene Glycol														
Pentaethylenehexamine	PEP													
Pentane (all isomers)	PTY	5,000	7100	12130	68103	1.890	*****	163.1	*****	0.0	163.1	0.252	2.14	OK
PENTANE (iso-)	IPT	5,000	7700	14337	80495	2.015	*****	190.5	*****	0.0	190.5	0.349	2.36	OK
PENTANE (n-)	PTA	5,000	7044	11980	67265	1.890	*****	160.5	*****	0.0	160.5	0.246	2.14	OK
Pentanoic acid														
Pentene (all isomers)	PTX	5,000	7490	13298	74660	1.930	*****	180.9	*****	0.0	180.9	0.301	2.23	OK
PENTENE (1-)	PTE	5,000	7490	13298	74660	1.930	*****	180.9	*****	0.0	180.9	0.301	2.23	OK
Petrolatum	PTL													
1-Phenyl-1-Xylyl Ethane	PXE													
Phosphosulfurized Bicyclic Terpene														
Phthalate plasticizers, SEE INDIVIDUAL PHTHALATES														
Pinene	PIN	5,000	5035	5232	29378	1.635	*****	86.7	*****	0.0	86.7	0.050	1.68	OK
Polyalkenyl Succinic Anhydride Amine														
Polyalkylene Glycols, Polyalkylene Glycol Monoalkyl Ethers mixtur	PPX													
Polyalkylene Oxide Polyol	PAO													
Palamine, Amide mixture														
Polybutadiene, Hydroxyl terminated														
Polybutene	PLB	5,000	5001	5121	28750	1.635	*****	85.7	*****	0.0	85.7	0.048	1.68	OK
Polydimethylsiloxane														
Polyethylene Glycol														
Polyethylene Glycol Dimethyl Ether														
Polyglycerol														
Polyisobutylene, SEE POLYBUTENE														
Polymerized Esters														
Poly(20)oxyethylene Sorbitan Monooleate	PSM													
Polypropylene	PLP													
Polypropylene Glycol	PGC	5,000	5010	5010	28130	1.635	*****	86.3	*****	0.0	86.3	0.046	1.68	OK
Polypropylene Glycol Methyl Ether	PGM	5,000	5080	5338	29972	1.635	*****	88.2	*****	0.0	88.2	0.051	1.69	OK
Polysiloxane														
Polystyrene Diakyl Maleate														

E-3-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX VAPOR-		REQUIRED AIR EQUIVALENT	PRESS ACROSS PV VALVE (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot-I+II (FT)	PRESS DROP THRU PIP'G TO P/V TANK REMOTE * Htot (PSI)	PRESS @ TANK REMOTE PV + Ploss P (PSI)
		LIQUID TRANSF RATE (MLTR) (10) (BBL/HR)	AIR MIX FLOW RATE (Qv-a) (11) (BBL/HR)			TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)					
OIL, MISC: Whale												
OIL, MISC: White (mineral)												
OIL, MISC: Wood												
alpha-Olefins (C13 - C18)												
Olefins (C13 and above, all isomers)												
Oleic acid												
Oleyl alcohol (OCTADECENOL), SEE ALCOHOLS (C13 AND ABOVE)												
Organic Amine 70, SEE AMINOETHYLDIETHANOLAMINE, AMINOETHYL-ETHANOLAMI												
Palm Stearin												
n-Paraffins (C10 - C20)												
Pentadecanol, SEE ALCOHOLS (C13 AND ABOVE)												
Pentaethylene Glycol	PDC	5,000	5001	5012	28139	1.635	86.0	0.0	86.0	0.046	1.68	O
Pentaethylenhexamine												
Pentane (all isomers)	PEP											
PENTANE (iso-)	PTY	5,000	7100	12130	68103	1.890	163.1	0.0	163.1	0.252	2.14	OI
PENTANE (n-)	IPT	5,000	7700	14337	80495	2.015	190.5	0.0	190.5	0.349	2.36	OI
Pentanoic acid	PTA	5,000	7044	11980	67265	1.890	160.5	0.0	160.5	0.246	2.14	OI
Pentene (all isomers)												
PENTENE (1-)	PTX	5,000	7490	13298	74660	1.930	180.9	0.0	180.9	0.301	2.23	OI
Petrolatum	PTE	5,000	7490	13298	74660	1.930	180.9	0.0	180.9	0.301	2.23	OI
1-Phenyl-1-Xylyl Ethane	PTL											
Phosphosulfurized Bicyclic Terpene	PXE											
Phthalate plasticizers, SEE INDIVIDUAL PHTHALATES												
Pinene												
Polyalkenyl Succinic Anhydride Amine	PIN	5,000	5035	5232	29378	1.635	86.7	0.0	86.7	0.050	1.68	OK
Polyalkylene Glycols, Polyalkylene Glycol Monoalkyl Ethers mixture	PPX											
Polyalkylene Oxide Polyol	PAO											
Polamine, Amide mixture												
Polybutadiene, Hydroxyl terminated												
Polybutene												
Polydimethylsiloxane	PLB	5,000	5001	5121	28750	1.635	85.7	0.0	85.7	0.048	1.68	OK
Polyethylene Glycol												
Polyethylene Glycol Dimethyl Ether												
Polyglycerol												
Polyisobutylene, SEE POLYBUTENE												
Polymerized Esters												
Poly(20)oxyethylene Sorbitan Monooleate	PSM											
Polypropylene	PLP											
Polypropylene Glycol	PGC	5,000	5010	5010	28130	1.635	86.3	0.0	86.3	0.046	1.68	OK
Polypropylene Glycol Methyl Ether	POM	5,000	5080	5338	29972	1.635	88.2	0.0	88.2	0.051	1.69	OK
Polysiloxane												
Polystyrene Diakyl Maleate												

B-3-2

CALCULATIONS FOR CAPACITY OF CARGO TANK VENTING SYSTEM

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE III: MAX PRESSURE @ REMOTE TANK FOR "VGR" * MAX ALLOWABLE LIQUID TRANSFER RATE

CARGO	C H R I S	MAX LIQUID TRANSF RATE (MLTR)		VAPOR- AIR MIX FLOW RATE (BBL/HR)		REQUIRED AIR EQUIVALENT (BBL/HR)	REQUIRED AIR EQUIVALENT (FT ³ /HR)	PRESS ACROSS PV VALVE (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV	PIPE SECT II: LOSS FM REMOTE TK TO PV	GRAND TOTAL LOSS Htot-I+II (FT)	TO P/V TANK Wv-a, 11 Ploss Ptk (PSI)	REMOTE TANK PRESSURE (PSI)	OK
		Q1 (10) (BBL/HR)	Qv-a (11) (BBL/HR)	Qa (12) (BBL/HR)	(FT ³ /HR)	(PSI)	TOTAL LOSS Htot I (FT)	TOTAL LOSS Htot II (FT)						
Potassium Oleate	POK													
Propene	PRP													
n-Propoxypropanol	PXP													
Propyl Acetate (iso-)	IAC 5,000	5180	5861	32905	1.665	91.1								
Propyl Acetate (n-)	PAT 5,000	5185	5884	33036	1.665	91.3			0.0	91.1	0.062	1.73	OK	
Propyl alcohol (iso-)	IPA 5,000	5300	5801	32573	1.665	95.4			0.0	91.3	0.062	1.73	OK	
Propyl alcohol (n-)	PAL 5,000	5120	5319	29865	1.635	89.6			0.0	95.4	0.060	1.73	OK	
Propylbenzene (n-)	PBZ 5,000	5020	5116	28727	1.635	86.4			0.0	89.6	0.051	1.69	OK	
iso-Propylcyclohexane	IPX 5,000	5001	5006	28108	1.635	86.0			0.0	86.4	0.047	1.68	OK	
Propylene	PPL													
Propylene-Butylene Copolymer	PBP													
Propylene Dimer	PDR													
Propylene Glycol (1,2-PROPANDIOL)	PPG 5,000	5001	5004	28093	1.635	86.0			0.0	86.0	0.046	1.68	OK	
Propylene Glycol Monoalkyl Ether	PGE													
Propylene Glycol Ethyl Ether	PGY													
Propylene Glycol Methyl Ether	PME 5,000	5070	5296	29736	1.635	87.9			0.0	87.9	0.051	1.69	OK	
Propylene Polymer (in liquid mixtures)	PTT 5,000	5002	5002	28085	1.635	86.0			0.0	86.0	0.045	1.68	OK	
Propylene Tetramer	PTR													
Propylene Trimer														
Pseudocumene, SEE TRIMETHYLBENZENES														
Rum														
Sodium Acetate, Glycol, water solutions														
Sodium Acetate solution														
Sodium Benzoate solution	SAN													
Sodium Sulfonate	SBN													
Stearic acid														
Stearyl alcohol (Octadecanol)	SRA													
Sulfolane														
Tallow														
Tallow alcohol, SEE ALCOHOLS (C13 AND ABOVE)	SFL 5,000	5001	5006	28106	1.635	86.0			0.0	86.0	0.046	1.68	OK	
Tallow fatty acid	TLO													
Tallow Alkyl Nitrile														
Tetradecanol	TFD													
1-Tetradecene, SEE THE OLEFIN OR ALPHA-OLEFIN ENTRIES	TTN													
Tetradecylbenzene	TTD 5,000	5001	5010	28129	1.635	86.0			0.0	86.0	0.046	1.68	OK	
Tetraethylene Glycol	TBD													
Tetrahydronaphthalene	TTG 5,000	5001	5010	28128	1.635	86.0			0.0	86.0	0.046	1.68	OK	
Tetrapropylbenzene, SEE ALKYL(C9-C17) BENZENES	THN 5,000	5004	5026	28219	1.635	86.1			0.0	86.1	0.046	1.68	OK	
Toluene	TOL 5,000	5150	5637	31651	1.665	90.6			0.0	90.6	0.057	1.72	OK	
Triaryphosphate	TBP													
Tributyl Phosphate	TCP 5,000	5001	5019	28180	1.635	86.0			0.0	86.0	0.046	1.68	OK	
Tricresyl Phosphate (less than 1% of the ortho isomer)														

3-5

TABLE II: MAX PRESSURE @ REMOTE TANK FOR "VGR" * ALLOWABLE LIQUID TRANSFER RATE

BARGES: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO

CARGO	MAX LIQUID TRANSF RATE (MLTR) (10) (BBL/HR)	VAPOR- AIR MIX FLOW RATE (11) (BBL/HR)	REQUIRED AIR EQUIVALENT (12) (BBL/HR)	PRESS ACROSS PV VALVE PV (PSI)	PIPE SECT I: LOSS FM REMOTE TK TO PV		PIPE SECT II: LOSS FM REMOTE TK TO PV		GRAND TOTAL LOSS Htot-I-II (FT)	RESS DROPS THRU PIP'G REMOTE TANK TO P/V * Htot Ploss (PSI)	PRESS @ REMOTE TANK Ploss Ptk (PSI)	IS Ptk MDW	
					TOTAL LOSS HtotI (FT)	TOTAL LOSS HtotII (FT)							
Tridecane	TRD 5,000	5002	5019	28178	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Tridecanoic acid	TDN 5,000	5001	5010	28130	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Tridecanol, SEE ALCOHOLS (C13 AND ABOVE)	TDC 5,000	5001	5009	28125	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
1-Tridecane	TRB												
Tridecylbenzene	TEB 5,000	5002	5016	28164	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Triethylbenzene	TEG 5,000	5001	5008	28115	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Triethylene Glycol													
Triethylene Glycol Butyl Ether													
Triethylene Glycol Butyl Ether mixture													
Triethylene Glycol di-(2-ethylbutyrate)	TGD												
Triethylene Glycol Ether mixture													
Triethylene Glycol Ethyl Ether	TGE												
Triethylene Glycol Methyl Ether													
Triethyl Phosphate	TPS 5,000	5002	5018	28176	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Triisooctyl Trimellitate													
Triisopropanolamine	TIP												
Trimethylbenzenes (all isomers)	TRB 5,000	5014	5083	28539	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60	OK
TRIMETHYL BENZENE (1,2,5-)	TMB 5,000	5014	5082	28531	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60	OK
TRIMETHYL BENZENE (1,2,3-)	TMD 5,000	5014	5082	28531	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60	OK
TRIMETHYL BENZENE (1,2,4-) (PSEUDOCUMENE)	TME 5,000	5014	5082	28531	1.635	*****	86.3	*****	0.0	86.3	0.047	1.60	OK
Trimethylol Propane Polyethoxylate	TPR												
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate													
2,2,4-Trimethyl-3-pentanol-1-isobutyrate	TMP												
Tripropylene, SEE PROPYLENE TRIMER													
Tripropylene Glycol	TGC												
Tripropylene Glycol Methyl Ether	TGM												
Trixylenyl Phosphate	TRP												
Turpentine	TPT												
Turpentine substitute (White spirit), SEE WHITE SPIRIT (LOW (15-20%))													
Undecanol	UDC 5,000	5005	5038	28288	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Undecene (1-)	UND 5,000	5001	5009	28122	1.635	*****	86.0	*****	0.0	86.0	0.046	1.60	OK
Undecyl alcohol													
Undecylbenzene	UDB												
Vinyl Acetate-fumerate Copolymer													
Waxes:	WAX												
WAXES: Candelilla													
WAXES: Carnauba	WAX,												
WAXES: Paraffin	WAX,												
WAXES: Petroleum													
White spirit, SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)													
White spirit (low (15 - 20%) aromatic)	WSL												
Wine, SEE ALCOHOLIC BEVERAGES, N.O.S.													

E-3-2

SUMMARY TABLE FOR "GASOLINE"

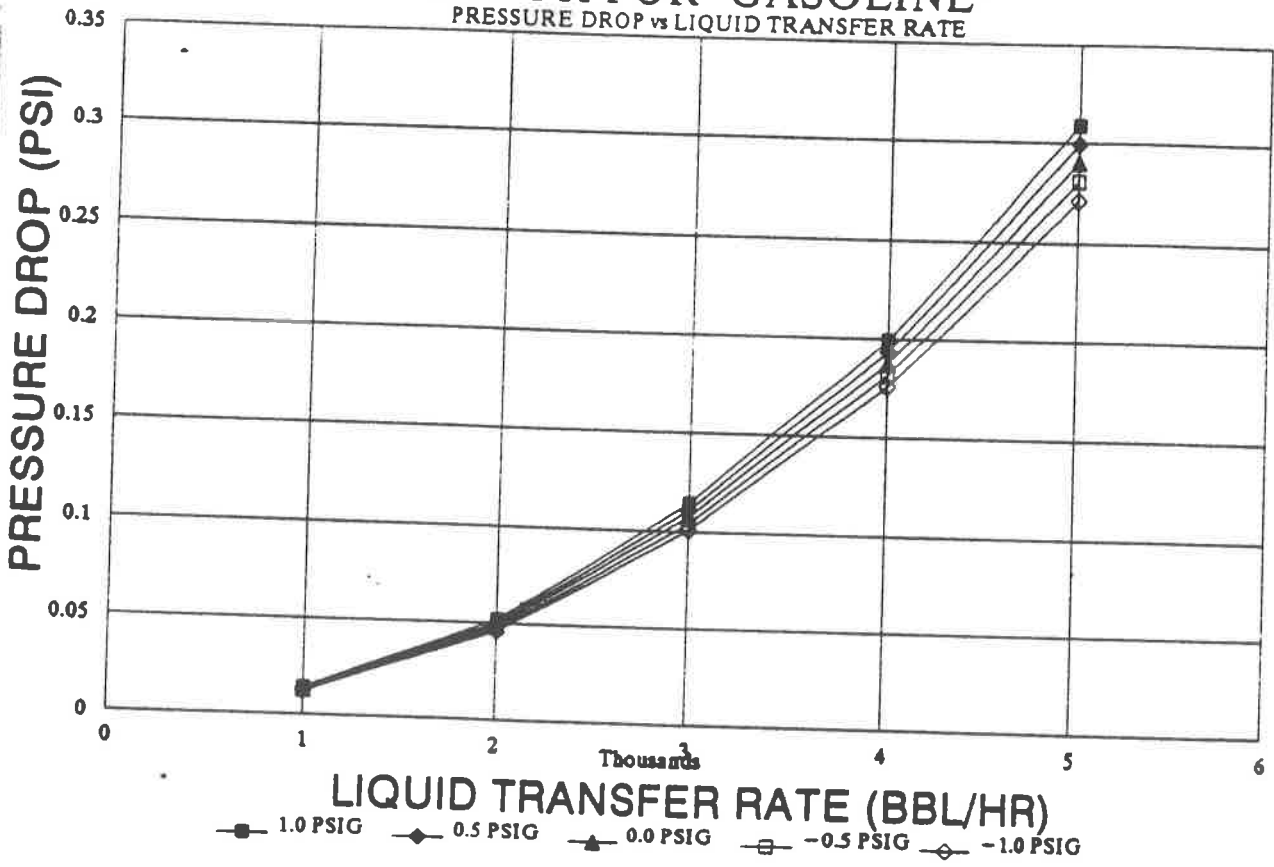
(VGR = 1.25) (S.G.mtx = 2.911)

PRESSURE DROP VS LIQUID TRANSFER RATE
 FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR CONNECTION
 PRESSURE DROP IS BASED ON VAPOR-AIR MIX @ VGR * THE INDICATED LIQUID TRANSFER RATE
 (TABULATED DATA IS FOR THE INDICATED PRESSURE AT THE SHORE CONNECTION)

LIQUID TRANSFER RATE				PRESSURE DROP (PSI)				
PERCENT MAX XFER RATE	LIQUID BBL PER HR	LIQUID GAL PER MIN	LIQUID CU FT PER MIN	1.0 PSIG PRESS. ● VAP. CONN.	0.5 PSIG PRESS. ● VAP. CONN.	0.0 PSIG PRESS. ● VAP. CONN.	-0.5 PSIG PRESS. ● VAP. CONN.	-1.0 PSIG PRESS. ● VAP. CONN.
20	1000.0	700.00	93.6	0.0137	0.0133	0.0129	0.0125	0.0121
40	2000.0	1400.00	187.2	0.0521	0.0505	0.0491	0.0474	0.0461
60	3000.0	2100.00	280.7	0.1143	0.1106	0.1074	0.1037	0.1004
80	4000.0	2800.00	374.3	0.1996	0.1936	0.1877	0.1817	0.1758
100 *	5000.0	3500.00	467.9	0.3067	0.2994	0.2900	0.2805	0.2711

* MAXIMUM LIQUID TRANSFER RATE

GRAPH FOR "GASOLINE"
 PRESSURE DROP vs LIQUID TRANSFER RATE



PRESSURE DROP IS BASED ON VAPOR-AIR MIX @ VGR * THE INDICATED LIQUID TRANSFER RATE
 (TABULATED DATA IS FOR THE INDICATED PRESSURE AT THE SHORE CONNECTION)
 (VGR = 1.25) (S.G.mtx = 2.911)

DATA FOR VAPOR-AIR MIX PRESSURE DROP VS LIQUID TRANSFER RATE
FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION
CARGO = "GASOLINE" VGR = 1.25

TP	ITEM	DATA "SOURCE"	SYMBOL	UNITS	20 PERCENT VGR*MAX TRANSFER RATE	40 PERCENT VGR*MAX TRANSFER RATE	60 PERCENT VGR*MAX TRANSFER RATE	80 PERCENT VGR*MAX TRANSFER RATE	100 PERCENT VGR*MAX TRANSFER RATE
PRESSURE AT VESSEL VAPOR CONNECTION IS ASSUMED = 1.0 PSIG -----									
CARGO:									
A	"GASOLINE"								
B	SPEC GRAV VAP-AIR MIX	INPUT	SG		2.911	2.911	2.911	2.911	2.911
C	SPEC WT VAP-AIR MIX	(SEE NOTE b)	Wg/Wa	LBS/CU FT	0.215	0.215	0.215	0.215	0.215
D	ABS VISCOS. VAP-AIR MIX	INPUT (SEE NOTE c)	u	CENTIPOISE	0.0190	0.0190	0.0190	0.0190	0.0190
E	"	D*2.09E-5	"	# SEC/FT^2	3.97E-07	3.97E-07	3.97E-07	3.97E-07	3.97E-07
BARGE:									
F	VGR*MAX ALLOW TRANS RATE	INPUT	F	BBL/HR	6250	6250	6250	6250	6250
G	% OF VGR*MAX ALLOW TRANS RATE	x % * F	Fcg	BBL/HR	1250	2500	3750	5000	6250
H	"	G*42/60	"	GAL/MIN	875	1750	2625	3500	4375
I	"	H/(7.48*60)	"	CU FT/SEC	1.950	3.899	5.849	7.799	9.748
SHORE CONNECTION									
J	PRESSURE @ REQ'D FLOW	INPUT	P2	PSIG	1.0	1.0	1.0	1.0	1.0
K	"	J+14.7	"	PSIA	15.7	15.7	15.7	15.7	15.7
L	"	K*144	"	PSPA	2260.8	2260.8	2260.8	2260.8	2260.8
VAP RECOV'Y PIPING: SECTION I									
M	INSIDE DIAMETER	INPUT	ID	INCHES	7.981	7.981	7.981	7.981	7.981
N	"	M/12	"	FEET	0.6651	0.6651	0.6651	0.6651	0.6651
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.3474	0.3474	0.3474	0.3474	0.3474
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	280	280	280	280	280
ANALYSIS: SECTION I									
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	5.61	11.22	16.84	22.45	28.06
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0.5	0.5	0.5	0.5	0.5
T	COEFF.: HEAD LOSS, BENDS	INPUT (SEE NOTE e)	KB		0.972	0.972	0.972	0.972	0.972
U	NO. OF BENDS	INPUT	N		9	9	9	9	9
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0.65	0.65	0.65	0.65	0.65
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.245	0.978	2.201	3.912	6.113
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	4.279	17.116	38.512	68.465	106.977
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.318	1.271	2.861	5.086	7.947
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AB	REYNOLDS NO.	R*N*C/E*32.2	R		6.28E+04	1.26E+05	1.88E+05	2.51E+05	3.14E+05
AC	RELATIVE ROUGHNESS	P/N	e/D		0.00023	0.00023	0.00023	0.00023	0.00023
AD	MOODY DIAG FRICTION FACTOR	INPUT	f		0.02118	0.01892	0.01783	0.01711	0.01670
AE	HEAD LOSS: PIPE	DD*(Q/W)*(R^2/2*32.2)	HP	FT PROD. (GAS)	4.361	15.579	33.045	56.352	85.949
AF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	9.203	34.945	76.618	133.816	206.985
VAP RECOV'Y PIPING: SECTION II									
M	INSIDE DIAMETER	INPUT	ID	INCHES	1.0E-14	1.0E-14	1.0E-14	1.0E-14	1.0E-14
N	"	M/12	"	FEET	0.0000	0.0000	0.0000	0.0000	0.0000
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.0000	0.0000	0.0000	0.0000	0.0000
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	0	0	0	0	0
ANALYSIS: SECTION II									
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	*****	*****	*****	*****	*****
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0	0	0	0	0
T	COEFF.: HEAD LOSS, PER BEND	INPUT (SEE NOTE e)	KB		0.000	0.000	0.000	0.000	0.000
U	NO. OF BENDS	INPUT	N		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0	0	0	0	0
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AB	REYNOLDS NO.	R*N*C/E*32.2	R		N/A	N/A	N/A	N/A	N/A
AC	RELATIVE ROUGHNESS	P/N	e/D		1.8E+11	1.8E+11	1.8E+11	1.8E+11	1.8E+11
AD	MOODY DIAG FRICTION FACTOR	INPUT	f		N/A	N/A	N/A	N/A	N/A
AE	HEAD LOSS: PIPE	DD*(Q/W)*(R^2/2*32.2)	HP	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AG	HEAD LOSS: GRAND TOTAL	FF(I) + FF(II)	HLtot	FT PROD. (GAS)	9.203	34.945	76.618	133.816	206.985
AH	PRESSURE @ TANK	(SEE NOTE f)	P1	PSPA	2262.78	2268.31	2277.26	2289.54	2305.26
AI	"	GG/144	"	PSIA	15.71	15.75	15.81	15.90	16.01
AJ	"	HH-14.7	"	PSIG	1.01	1.05	1.11	1.20	1.31
AK	(P1 - P2) / P1	(HH-K) / HH			0.14	0.34	0.74	1.34	1.94
AL	(P1 - P2) / P1 < 10% ??				YES	YES	YES	YES	YES
AM	(P1 - P2)	(II-J)		PSI	0.0137	0.0521	0.1143	0.1996	0.3087

DATA FOR VAPOR-AIR MIX PRESSURE DROP VS LIQUID TRANSFER RATE
FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION

CARGO = "GASOLINE" VGR = 1.25

PRESSURE AT VESSEL VAPOR CONNECTION IS ASSUMED = 0.5 PSIG

VP	ITEM	DATA "SOURCE"	SYMBOL	UNITS	20 PERCENT VGR*MAX TRANSFER RATE	40 PERCENT VGR*MAX TRANSFER RATE	60 PERCENT VGR*MAX TRANSFER RATE	80 PERCENT VGR*MAX TRANSFER RATE	100 PERCENT VGR*MAX TRANSFER RATE
CARGO:									
A	"GASOLINE"								
B	SPEC GRAV VAP-AIR MIX	INPUT	SG		2.911	2.911	2.911	2.911	2.911
C	SPEC WT VAP-AIR MIX	(SEE NOTE b)	W _s /W _{av}	LBS/CU FT	0.208	0.208	0.208	0.208	0.208
D	ABS VISCOS. VAP-AIR MIX	INPUT (SEE NOTE c)	u	CENTIPOISE	0.0190	0.0190	0.0190	0.0190	0.0190
E	"	D*2.09E-5	"	# SEC/FT^2	3.97E-07	3.97E-07	3.97E-07	3.97E-07	3.97E-07
BARGE:									
F	VGR*MAX ALLOW TRANS RATE	INPUT	F	BBL/HR	6250	6250	6250	6250	6250
G	% OF VGR*MAX ALLOW TRANS RATE	x % * F	Fcg	BBL/HR	1250	2500	3750	5000	6250
H	"	G*42/60	"	GAL/MIN	875	1750	2625	3500	4375
I	"	H/(7.48*60)	"	CU FT/SEC	1.950	3.899	5.849	7.799	9.748
SHORE CONNECTION									
J	SETTING	INPUT	P2	PSIG	0.5	0.5	0.5	0.5	0.5
K	"	J*14.7	"	PSIA	15.2	15.2	15.2	15.2	15.2
L	"	K*144	"	PSFA	2188.8	2188.8	2188.8	2188.8	2188.8
VAP RECOV'Y PIPING: SECTION I									
M	INSIDE DIAMETER	INPUT	ID	INCHES	7.981	7.981	7.981	7.981	7.981
N	"	M/12	"	FEET	0.6651	0.6651	0.6651	0.6651	0.6651
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.3474	0.3474	0.3474	0.3474	0.3474
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	280	280	280	280	280
ANALYSIS: SECTION I									
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	5.61	11.22	16.84	22.45	28.06
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0.5	0.5	0.5	0.5	0.5
T	COEFF.: HEAD LOSS, BENDS	INPUT (SEE NOTE e)	KB		0.972	0.972	0.972	0.972	0.972
U	NO. OF BENDS	INPUT	N		9	9	9	9	9
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0.65	0.65	0.65	0.65	0.65
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.245	0.978	2.201	3.912	6.113
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	4.279	17.116	38.512	68.465	106.977
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.318	1.271	2.861	5.086	7.947
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AB	REYNOLDS NO.	R*N*C/E*32.2	R		6.08E+04	1.22E+05	1.82E+05	2.43E+05	3.04E+05
AC	RELATIVE ROUGHNESS	P/N	e/D		0.000226	0.000226	0.000226	0.000226	0.000226
AD	MOODY DIAG FRICTION FACTOR	INPUT	f		0.02131	0.01892	0.01783	0.01719	0.01676
AE	HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	4.388	15.579	33.045	56.627	86.252
AF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	9.230	34.945	76.618	134.090	207.289
VAP RECOV'Y PIPING: SECTION II									
M	INSIDE DIAMETER	INPUT	ID	INCHES	1.0E-14	1.0E-14	1.0E-14	1.0E-14	1.0E-14
N	"	M/12	"	FEET	0.0000	0.0000	0.0000	0.0000	0.0000
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.0000	0.0000	0.0000	0.0000	0.0000
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	0	0	0	0	0
ANALYSIS: SECTION II									
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	.....	.....	.....	.....	.....
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0	0	0	0	0
T	COEFF.: HEAD LOSS, PER BEND	INPUT (SEE NOTE e)	KB		0.000	0.000	0.000	0.000	0.000
U	NO. OF BENDS	INPUT	N		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0	0	0	0	0
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AB	REYNOLDS NO.	R*N*C/E*32.2	R		N/A	N/A	N/A	N/A	N/A
AC	RELATIVE ROUGHNESS	P/N	e/D		1.8E+11	1.8E+11	1.8E+11	1.8E+11	1.8E+11
AD	MOODY DIAG FRICTION FACTOR	INPUT	f		N/A	N/A	N/A	N/A	N/A
AE	HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AG	HEAD LOSS: GRAND TOTAL	FF(I) + FF(II)	HLtot	FT PROD. (GAS)	9.230	34.945	76.618	134.090	207.289
AH	PRESSURE @ TANK	(SEE NOTE f)	P1	PSPA	2190.72	2196.07	2204.73	2216.68	2231.91
AI	"	GG/144	"	PSIA	15.21	15.25	15.31	15.39	15.50
AJ	"	HH-14.7	"	PSIG	0.51	0.55	0.61	0.69	0.80
AK	(P1 - P2) / P1	(HH-K) / HH	"		0.1%	0.3%	0.7%	1.3%	1.9%
AL	(P1 - P2) / P1 < 10% ??				YES	YES	YES	YES	YES
AM	(P1 - P2)	(II-J)		PSI	0.0133	0.0505	0.1106	0.1936	0.2994

DATA FOR VAPOR-AIR MIX PRESSURE DROP VS LIQUID TRANSFER RATE FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION

CARGO = "GASOLINE"

VGR =

1.25

PRESSURE AT VESSEL VAPOR CONNECTION IS ASSUMED =

0.0 PSIG

TP	ITEM	DATA "SOURCE"	SYMBOL	UNITS	20 PERCENT VGR*MAX TRANSFER RATE	40 PERCENT VGR*MAX TRANSFER RATE	60 PERCENT VGR*MAX TRANSFER RATE	80 PERCENT VGR*MAX TRANSFER RATE	100 PERCENT VGR*MAX TRANSFER RATE
	CARGO:								
	"GASOLINE"								
B	SPEC GRAV VAP-AIR MIX	INPUT	SG		2.911	2.911	2.911	2.911	2.911
C	SPEC WT VAP-AIR MIX	(SEE NOTE b)	W _s /W _{av}	LBS/CU FT	0.201	0.201	0.201	0.201	0.201
D	ABS VISCOS. VAP-AIR MIX	INPUT (SEE NOTE c)	u	CENTIPOISE	0.0190	0.0190	0.0190	0.0190	0.0190
E		D*2.09E-5	"	# SEC/FT^2	3.97E-07	3.97E-07	3.97E-07	3.97E-07	3.97E-07
	BARGE:								
F	VGR*MAX ALLOW TRANS RATE	INPUT	F	BBL/HR	6250	6250	6250	6250	6250
G	% OF VGR*MAX ALLOW TRANS RATE	x % * F	Fcg	BBL/HR	1250	2500	3750	5000	6250
H		G*42/60	"	GAL/MIN	875	1750	2625	3500	4375
I		H/(7.48*60)	"	CU FT/SEC	1.950	3.899	5.849	7.799	9.748
	SHORE CONNECTION								
J	SETTING	INPUT	P2	PSIG	0.0	0.0	0.0	0.0	0.0
K		J +14.7	"	PSIA	14.7	14.7	14.7	14.7	14.7
L		K*144	"	PSFA	2116.8	2116.8	2116.8	2116.8	2116.8
	VAP RECOV'Y PIPING: SECTION I								
M	INSIDE DIAMETER	INPUT	ID	INCHES	7.981	7.981	7.981	7.981	7.981
N		M/12	"	FEET	0.6651	0.6651	0.6651	0.6651	0.6651
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.3474	0.3474	0.3474	0.3474	0.3474
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	280	280	280	280	280
	ANALYSIS: SECTION I								
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	5.61	11.22	16.84	22.45	28.06
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0.5	0.5	0.5	0.5	0.5
T	COEFF.: HEAD LOSS, BENDS	INPUT (SEE NOTE e)	KB		0.972	0.972	0.972	0.972	0.972
U	NO. OF BENDS	INPUT	N		9	9	9	9	9
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0.65	0.65	0.65	0.65	0.65
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.245	0.978	2.201	3.912	6.113
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	4.279	17.116	38.512	68.465	106.977
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.318	1.271	2.861	5.086	7.947
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
BB	REYNOLDS NO.	R*N*C/E*32.2	R		5.88E+04	1.18E+05	1.76E+05	2.35E+05	2.94E+05
CC	RELATIVE ROUGHNESS	P/N	e/D		0.000226	0.000226	0.000226	0.000226	0.000226
DD	MOODY DIAG FRICTION FACTOR	INPUT	f		0.02145	0.01918	0.01797	0.01728	0.01682
EE	HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	4.416	15.795	33.304	56.920	86.572
FF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	9.258	35.161	76.877	134.383	207.609
	VAP RECOV'Y PIPING: SECTION II								
M	INSIDE DIAMETER	INPUT	ID	INCHES	1.0E-14	1.0E-14	1.0E-14	1.0E-14	1.0E-14
N		M/12	"	FEET	0.0000	0.0000	0.0000	0.0000	0.0000
O	INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.0000	0.0000	0.0000	0.0000	0.0000
P	ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
Q	LENGTH	INPUT (SEE NOTE d)	L	FEET	0	0	0	0	0
	ANALYSIS: SECTION II								
R	VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	.....	.....	.....	.....	.....
S	COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0	0	0	0	0
T	COEFF.: HEAD LOSS, PER BEND	INPUT (SEE NOTE e)	KB		0.000	0.000	0.000	0.000	0.000
U	NO. OF BENDS	INPUT	N		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
V	COEFF.: HEAD LOSS, VALVE	INPUT	KV		0	0	0	0	0
W	COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
X	HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Y	HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
Z	HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
AA	HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
BB	REYNOLDS NO.	R*N*C/E*32.2	R		N/A	N/A	N/A	N/A	N/A
CC	RELATIVE ROUGHNESS	P/N	e/D		1.8E+11	1.8E+11	1.8E+11	1.8E+11	1.8E+11
DD	MOODY DIAG FRICTION FACTOR	INPUT	f		N/A	N/A	N/A	N/A	N/A
EE	HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
FF	HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
GG	HEAD LOSS: GRAND TOTAL	FF(I) + FF(II)	HLtot	FT PROD. (GAS)	9.258	35.161	76.877	134.383	207.609
HH	PRESSURE @ TANK	(SEE NOTE f)	P1	PSFA	2118.66	2123.87	2132.26	2143.83	2158.55
II		GG/144	"	PSIA	14.71	14.75	14.81	14.89	14.99
JJ	(P1 - P2) / P1	HH-14.7	"	PSIG	0.01	0.05	0.11	0.19	0.29
KK	(P1 - P2) / P1 < 10% ??	(HH-K) / HH	"		0.1%	0.3%	0.7%	1.3%	1.9%
PP	(P1 - P2)	(II-J)		PSI	YES	YES	YES	YES	YES
					0.0129	0.0491	0.1074	0.1877	0.2900

DATA FOR VAPOR-AIR MIX PRESSURE DROP VS LIQUID TRANSFER RATE FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION

CARGO = "GASOLINE" VGR = 1.25

PRESSURE AT VESSEL VAPOR CONNECTION IS ASSUMED = -0.5 PSIG

ITEM	DATA "SOURCE"	SYMBOL	UNITS	20 PERCENT VGR*MAX TRANSFER RATE	40 PERCENT VGR*MAX TRANSFER RATE	60 PERCENT VGR*MAX TRANSFER RATE	80 PERCENT VGR*MAX TRANSFER RATE	100 PERCENT VGR*MAX TRANSFER RATE
CARGO:								
"GASOLINE"								
SPEC GRAV VAP-AIR MIX	INPUT	SG		2.911	2.911	2.911	2.911	2.911
SPEC WT VAP-AIR MIX	(SEE NOTE b)	W _v /W _{av}	LBS/CU FT	0.194	0.194	0.194	0.194	0.194
ABS VISCOS. VAP-AIR MIX	INPUT (SEE NOTE c)	u	CENTIPOISE	0.0190	0.0190	0.0190	0.0190	0.0190
	D*2.09E-5	*	# SEC/FT ²	3.97E-07	3.97E-07	3.97E-07	3.97E-07	3.97E-07
BARGE:								
VGR*MAX ALLOW TRANS RATE	INPUT	P	BBL/HR	6250	6250	6250	6250	6250
% OF VGR*MAX ALLOW TRANS RATE	x % * P	Fcg	BBL/HR	1250	2500	3750	5000	6250
	G*42/60	*	GAL/MIN	875	1750	2625	3500	4375
	H/(7.48*60)	*	CU FT/SEC	1.950	3.899	5.849	7.799	9.748
SHORE CONNECTION								
SETTING	INPUT	P2	PSIG	-0.5	-0.5	-0.5	-0.5	-0.5
	J +14.7	*	PSIA	14.2	14.2	14.2	14.2	14.2
	K*144	*	PSFA	2044.8	2044.8	2044.8	2044.8	2044.8
VAP RECOV'Y PIPING: SECTION I								
INSIDE DIAMETER	INPUT	ID	INCHES	7.981	7.981	7.981	7.981	7.981
	M/12	*	FEET	0.6651	0.6651	0.6651	0.6651	0.6651
INSIDE AREA	3.14159*N ² /4	IA	SQ FT	0.3474	0.3474	0.3474	0.3474	0.3474
ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
LENGTH	INPUT (SEE NOTE d)	L	FEET	280	280	280	280	280
ANALYSIS: SECTION I								
VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	5.61	11.22	16.84	22.45	28.06
COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0.5	0.5	0.5	0.5	0.5
COEFF.: HEAD LOSS, BENDS	INPUT (SEE NOTE e)	KB		0.972	0.972	0.972	0.972	0.972
NO. OF BENDS	INPUT	N		9	9	9	9	9
COEFF.: HEAD LOSS, VALVE	INPUT	KV		0.65	0.65	0.65	0.65	0.65
COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
HEAD LOSS: ENTRANCE	S*(R ² /2*32.2)	HE	FT PROD. (GAS)	0.245	0.978	2.201	3.912	6.113
HEAD LOSS: BENDS	U*T*(R ² /2*32.2)	HB	FT PROD. (GAS)	4.279	17.116	38.512	68.465	106.977
HEAD LOSS: VALVE	V*(R ² /2*32.2)	HV	FT PROD. (GAS)	0.318	1.271	2.861	5.086	7.947
HEAD LOSS: EXIT	W*(R ² /2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
REYNOLDS NO.	R=N*C/E*32.2	R		5.68E+04	1.14E+05	1.70E+05	2.27E+05	2.84E+05
RELATIVE ROUGHNESS	P/N	e/D		0.000226	0.000226	0.000226	0.000226	0.000226
MOODY DIAG FRICTION FACTOR	INPUT	f		0.02159	0.01918	0.01797	0.01737	0.01689
HEAD LOSS: PIPE	DD*(Q/N)*(R ² /2*32.2)	HP	FT PROD. (GAS)	4.446	15.795	33.304	57.233	86.910
HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	9.287	35.161	76.877	134.697	207.947
VAP RECOV'Y PIPING: SECTION II								
INSIDE DIAMETER	INPUT	ID	INCHES	1.0E-14	1.0E-14	1.0E-14	1.0E-14	1.0E-14
	M/12	*	FEET	0.0000	0.0000	0.0000	0.0000	0.0000
INSIDE AREA	3.14159*N ² /4	IA	SQ FT	0.0000	0.0000	0.0000	0.0000	0.0000
ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
LENGTH	INPUT (SEE NOTE d)	L	FEET	0	0	0	0	0
ANALYSIS: SECTION II								
VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	*****	*****	*****	*****	*****
COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0	0	0	0	0
COEFF.: HEAD LOSS, PER BEND	INPUT (SEE NOTE e)	KB		0.000	0.000	0.000	0.000	0.000
NO. OF BENDS	INPUT	N		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
COEFF.: HEAD LOSS, VALVE	INPUT	KV		0	0	0	0	0
COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
HEAD LOSS: ENTRANCE	S*(R ² /2*32.2)	HE	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: BENDS	U*T*(R ² /2*32.2)	HB	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: VALVE	V*(R ² /2*32.2)	HV	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: EXIT	W*(R ² /2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
REYNOLDS NO.	R=N*C/E*32.2	R		N/A	N/A	N/A	N/A	N/A
RELATIVE ROUGHNESS	P/N	e/D		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
MOODY DIAG FRICTION FACTOR	INPUT	f		N/A	N/A	N/A	N/A	N/A
HEAD LOSS: PIPE	DD*(Q/N)*(R ² /2*32.2)	HP	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: GRAND TOTAL	FP(I) + FP(II)	HLtot	FT PROD. (GAS)	9.287	35.161	76.877	134.697	207.947
PRESSURE @ TANK	(SEE NOTE f)	P1	PSFA	2046.60	2051.63	2059.74	2070.97	2085.20
	GG/144	*	PSIA	14.21	14.25	14.30	14.38	14.48
	HH-14.7	*	PSIG	-0.49	-0.45	-0.40	-0.32	-0.22
(P1 - P2) / P1	(HH-K) / HH	*		0.14	0.34	0.74	1.34	1.94
(P1 - P2) / P1 < 10% ??				YES	YES	YES	YES	YES
(P1 - P2)	(II-J)		PSI	0.0125	0.0474	0.1037	0.1817	0.2805

DATA FOR VAPOR-AIR MIX PRESSURE DROP VS LIQUID TRANSFER RATE
FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION

CARGO = "GASOLINE"
PRESSURE AT VESSEL VAPOR CONNECTION IS ASSUMED =

VGR = 1.25
-1.0 PSIG

ITEM	DATA "SOURCE"	SYMBOL	UNITS	20 PERCENT VGR*MAX TRANSFER RATE	40 PERCENT VGR*MAX TRANSFER RATE	60 PERCENT VGR*MAX TRANSFER RATE	80 PERCENT VGR*MAX TRANSFER RATE	100 PERCENT VGR*MAX TRANSFER RATE
CARGO								
"GASOLINE"								
SPEC GRAV VAP-AIR MIX	INPUT	SG		2.911	2.911	2.911	2.911	2.911
SPEC WT VAP-AIR MIX	(SEE NOTE b)	W ₀ /W _{av}	LBS/CU FT	0.187	0.187	0.187	0.187	0.187
ABS VISCOS. VAP-AIR MIX	INPUT (SEE NOTE c)	u	CENTIPOISE	0.0190	0.0190	0.0190	0.0190	0.0190
	D*2.09E-5	*	# SEC/FT^2	3.97E-07	3.97E-07	3.97E-07	3.97E-07	3.97E-07
BARGE:								
VGR*MAX ALLOW TRANS RATE	INPUT	F	BBL/HR	6250	6250	6250	6250	6250
% OF VGR*MAX ALLOW TRANS RATE	x % * P	Fcg	BBL/HR	1250	2500	3750	5000	6250
	G*42/60	*	GAL/MIN	875	1750	2625	3500	4375
	H/(7.48*60)	*	CU FT/SEC	1.950	3.899	5.849	7.799	9.748
SHORE CONNECTION								
SETTING	INPUT	P2	PSIG	-1.0	-1.0	-1.0	-1.0	-1.0
	J+14.7	*	PSIA	13.7	13.7	13.7	13.7	13.7
	K*144	*	PSFA	1972.8	1972.8	1972.8	1972.8	1972.8
VAP RECOV'Y PIPING: SECTION I								
INSIDE DIAMETER	INPUT	ID	INCHES	7.981	7.981	7.981	7.981	7.981
	M/12	*	FEET	0.6651	0.6651	0.6651	0.6651	0.6651
INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.3474	0.3474	0.3474	0.3474	0.3474
ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
LENGTH	INPUT (SEE NOTE d)	L	FEET	280	280	280	280	280
ANALYSIS: SECTION I								
VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	5.61	11.22	16.84	22.45	28.06
COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0.5	0.5	0.5	0.5	0.5
COEFF.: HEAD LOSS, BENDS	INPUT (SEE NOTE e)	KB		0.972	0.972	0.972	0.972	0.972
NO. OF BENDS	INPUT	N		9	9	9	9	9
COEFF.: HEAD LOSS, VALVE	INPUT	KV		0.65	0.65	0.65	0.65	0.65
COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.245	0.978	2.201	3.912	6.113
HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	4.279	17.116	38.512	68.465	106.977
HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.318	1.271	2.861	5.086	7.947
HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
REYNOLDS NO.	R*N*C/E*32.2	R		5.48E+04	1.10E+05	1.64E+05	2.19E+05	2.74E+05
RELATIVE ROUGHNESS	P/N	e/D		0.000226	0.000226	0.000226	0.000226	0.000226
MOODY DIAG FRICTION FACTOR	INPUT	f		0.02174	0.01948	0.01813	0.01748	0.01695
HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	4.477	16.041	33.587	57.570	87.268
HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	9.318	35.407	77.160	135.033	208.305
VAP RECOV'Y PIPING: SECTION II								
INSIDE DIAMETER	INPUT	ID	INCHES	1.0E-14	1.0E-14	1.0E-14	1.0E-14	1.0E-14
	M/12	*	FEET	0.0000	0.0000	0.0000	0.0000	0.0000
INSIDE AREA	3.14159*N^2/4	IA	SQ FT	0.0000	0.0000	0.0000	0.0000	0.0000
ROUGHNESS OF PIPE	INPUT	e	FEET	0.00015	0.00015	0.00015	0.00015	0.00015
LENGTH	INPUT (SEE NOTE d)	L	FEET	0	0	0	0	0
ANALYSIS: SECTION II								
VELOC. THRU VAP REC PIPING	I/O	V	FT/SEC	.....	.....	.....	.....	.....
COEFF.: HEAD LOSS, ENTRANCE	INPUT	KE		0	0	0	0	0
COEFF.: HEAD LOSS, PER BEND	INPUT (SEE NOTE e)	KB		0.000	0.000	0.000	0.000	0.000
NO. OF BENDS	INPUT	N		1.0E-11	1.0E-11	1.0E-11	1.0E-11	1.0E-11
COEFF.: HEAD LOSS, VALVE	INPUT	KV		0	0	0	0	0
COEFF.: HEAD LOSS, EXIT	INPUT	KX		0	0	0	0	0
HEAD LOSS: ENTRANCE	S*(R^2/2*32.2)	HE	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: BENDS	U*T*(R^2/2*32.2)	HB	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: VALVE	V*(R^2/2*32.2)	HV	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: EXIT	W*(R^2/2*32.2)	HX	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
REYNOLDS NO.	R*N*C/E*32.2	R		N/A	N/A	N/A	N/A	N/A
RELATIVE ROUGHNESS	P/N	e/D		1.8E+11	1.8E+11	1.8E+11	1.8E+11	1.8E+11
MOODY DIAG FRICTION FACTOR	INPUT	f		N/A	N/A	N/A	N/A	N/A
HEAD LOSS: PIPE	DD*(Q/N)*(R^2/2*32.2)	HP	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: TOTAL	X+Y+Z+AA+EE	HL	FT PROD. (GAS)	0.000	0.000	0.000	0.000	0.000
HEAD LOSS: GRAND TOTAL	PF(I) + PF(II)	HLtot	FT PROD. (GAS)	9.318	35.407	77.160	135.033	208.305
PRESSURE @ TANK	(SEE NOTE f)	P1	PSFA	1974.55	1979.44	1987.26	1998.11	2011.84
	GG/144	*	PSIA	13.71	13.75	13.80	13.88	13.97
	HH-14.7	*	PSIG	-0.99	-0.95	-0.90	-0.82	-0.73
	(HH-K) / HH	*		0.18	0.38	0.78	1.38	1.98
(P1 - P2) / P1				YES	YES	YES	YES	YES
(P1 - P2) / P1 < 10% ??				0.0121	0.0461	0.1004	0.1758	0.2711
(P1 - P2)	(II-J)		PSI					

A FOR TRANSFER RATE VS PRESSURE DROP

NOTES:

1. 46 CFR 39.30.1 (b) REQUIRES THAT, FOR GASOLINE, CRUDE OIL, AND BENZENE, PRESSURE DROP THROUGH THE VAPOR COLLECTION SYSTEM FROM THE MOST REMOTE CARGO TANK TO THE VESSEL VAPOR CONNECTION MUST BE DETERMINED BASED ON A 50 PERCENT CARGO VAPOR AND AIR MIXTURE. PER DALTON'S LAW OF PARTIAL PRESSURES, AND ASSUMING THE MIXTURE IS 50/50 BY VOLUME, THE SPECIFIC GRAVITY OF THE MIXTURE CAN BE DETERMINED AS FOLLOWS:
 $SG_{mix} = \{ (N/2) * MW_{air} \} + \{ (N/2) * MW_{cargo} \} / (N * MW_{air})$ WHERE
 N = TOTAL NO. MOLECULES PER UNIT VOLUME
 MW_{air} = MOLECULAR WEIGHT OF AIR
 MW_{cargo} = MOLECULAR WEIGHT OF CARGO VAPOR

$SG_{mix} = 0.5 * (MW_{air} + MW_{cargo}) / MW_{air}$
 A CORRESPONDING RELATIONSHIP IN TERMS OF SPECIFIC GRAVITY IS:

$SG_{mix} = (SG_{air} + SG_{cargo}) / 2$
 FOR PRODUCTS OTHER THAN THOSE CITED ABOVE, THE SPECIFIC GRAVITY OF THE MIX CAN BE DETERMINED AS:

$SG_{mix} = Wv-a,115 / Wa,115$ WHERE
 $Wv-a,115$ = VAPOR-AIR MIX WEIGHT DENSITY, & $Wa-115$ = AIR WEIGHT DENSITY, BOTH AT 115 DEG F.

b. THE SPECIFIC WEIGHT OF THE VAPOR/AIR MIXTURE IS OBTAINED BY MULTIPLYING THE SPECIFIC GRAVITY OF THE VAPOR/AIR MIXTURE BY THE WEIGHT OF AIR AS OBTAINED FROM THE FORMULA IN CRANE T.P. 410 (PAGE A-10) [I.E.,
 $Ws = (M * P) / (10.72 * T)$ WHERE M IS THE MOLECULAR WEIGHT OF AIR (28.97), P IS PRESSURE IN PSIA (SEE BELOW), AND T IS ABSOLUTE TEMPERATURE IN RANKINE (F + 460) WITH T = 115 DEGREES FAHRENHEIT PER USCG GUIDANCE.

IF $(P1 - P2) / P1 < 10\%$ THE ASSUMPTION THAT $Ws = Ws1 = Ws2$ (WITH $Ws2$ EVALUATED @ P2) CAN BE CONSIDERED TO BE APPROPRIATE; OTHERWISE, A SECOND ITERATION SHOULD BE PERFORMED USING

$Ws = Ws_{av} = (Ws1 + Ws2) / 2$ (WITH $Ws1$ EVALUATED @ P1 AND $Ws2$ @ P2).

c. THE PRECISE VISCOSITY OF THE CARGO VAPOR-AIR MIXTURE IS NOT KNOWN; HOWEVER, THE VISCOSITY OF AIR @ 100 DEGREES F IS 0.019 CENTIPOISE (SEE CRANE T.P. 410 (PAGE A-5).

FOR PURPOSES OF THESE CALCULATIONS, ASSUMPTION THAT THE VISCOSITY OF THE CARGO-AIR MIXTURE IS THAT OF AIR AT 100 DEGREES F IS CONSIDERED REASONABLE.

FOR REFERENCE AND COMPARISON, REPRESENTATIVE VALUES OF ABSOLUTE (DYNAMIC) VISCOSITY OF VARIOUS HYDROCARBON VAPOR AND NATURAL GASES MAY BE FOUND IN CRANE T.P. 410 (PAGE A-5).

"LENGTH" IS THE DISTANCE BETWEEN THE MOST REMOTE CARGO TANK VAPOR INLET AND THE VESSEL'S VAPOR CONNECTION, AND IS ESTIMATED CONSERVATIVELY HIGH.

BEND HEAD LOSS ASSUMES

SECTION I:

	QTY	LOSS COEFF.	QT	LOSS COEFF.
TEE (THRU RUN)	3	0.60	90 DEG EL L.R.1	0.75
TEE (THRU BRANCH)	3	1.80	90 DEG EL	0 N/A
OTHER	0	0.75	45 DEG EL L.R.2	0.40
TOTAL QTY FITTINGS:	9		AVERAGE COEFF.:	0.972

SECTION II:

TEE (THRU RUN)	0	0.6	90 DEG EL L.R.0	0.75
TEE (THRU BRANCH)	0	1.8	90 DEG EL	0 N/A
OTHER	0	0.75	45 DEG EL L.R.0	0.40
TOTAL QTY FITTINGS:	0		AVERAGE COEFF.:	0.000

BASED ON FROM DARCY'S EQUATION:

$P1 - P2 = Ws * f * Leq * [V^2 / (2 * G)] / D$ (ADJUSTED AS REQ'D FOR UNIT COMPATIBILITY)

CALCULATIONS FOR PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VESSEL VAPOR SHORE CONNECTION
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE IV: INPUT DATA & NOTES

(MDWP)	> =	N/A	PSIG							
(T)		115	F							
(TMLTR)		5000	BPH							
(Pa/c)		1.00	PSIG	---->	15.7	PSIA				
NOM I.D.		8	IN	----->	I.D.	7.981	IN			
ROUGHNESS		0.00015			AREA	0.347	FT ²			
		280	FT							
		0.5								
		QTY	LOSS COEF		TOTAL					
TEE (THRU RUN)		3	0.60		1.800	90 DEG EL L.R.		QTY	LOSS COEFF	TOTAL
TEE (THRU BRANCH)		3	1.80		5.400	90 DEG EL		1	0.75	0.750
OTHER		0	0.75		0.000	45 DEG EL L.R.		0	N/A	0.000
TOTAL:		9	AVG:		0.972			2	0.40	0.800
		QTY	LOSS COEF		TOTAL					
GATE	*	0	0.19		0.000					
BUTTERFLY	*	1	0.65		0.650					
OTHER	*	0	N/A		0.000					
		1	AVG:		0.650					
		0								
NOM I.D.		N/A	IN	----->	I.D.	0.000	IN			
ROUGHNESS		0.00015			AREA	0.000	FT ²			
		0	FT							
		0								
		QTY	LOSS COEF		TOTAL			QTY	LOSS COEFF	TOTAL
TEE (THRU RUN)		0	0.60		0.000	90 DEG EL L.R.		0	0.75	0.000
TEE (THRU BRANCH)		0	1.80		0.000	90 DEG EL		0	N/A	0.000
OTHER		0	0.75		0.000	45 DEG EL L.R.		0	0.40	0.000
TOTAL:		0	AVG:		0.000					
		QTY	LOSS COEF		TOTAL					
GATE	*	0	0.19		0.000					
BUTTERFLY	*	0	0.65		0.000					
OTHER	*	0	N/A		0.000					
		0	AVG:		0.000					
		0								
		0.019	CP	---->	3.97E-07	LB SEC/FT ²				

MAX DESIGN WORKING PRESS
 DESIGN TEMPERATURE
 "TARGET" MAX LIQUID TRANSFER RATE
 PRESSURE AT VESSEL VAPOR SHORE CONNECTION
 PIPING SECTION I:

MOST REMOTE CARGO TANK OUTLET TO SHORE CONN
 DISTANCE ENROUTE TO PV
 ENTRANCE LOSS (Ke)
 BEND LOSS (Kb)

VALVE LOSS (Kv)

EXIT LOSS (Kex)
 PIPING SECTION II:

MOST REMOTE CARGO TANK OUTLET TO SHORE CONN
 DISTANCE ENROUTE TO PV
 ENTRANCE LOSS (Ke)
 BEND LOSS (Kb)

VALVE LOSS (Kv)

EXIT LOSS (Kex)
 CARGO VISCOSITY

- NOTES: 1. LIQUID SPECIFIC GRAVITY; MOLECULAR WEIGHT OF CARGO
 2. SPECIFIC GRAVITY OF CARGO VAPOR
 3. SATURATED VAPOR PRESSURE @ 115 F
 4. TOTAL VAPOR-AIR PRESSURE @ 115 F
 5. PARTIAL VOLUME OF VAPOR @ 115 F
 6. PARTIAL VOLUME OF AIR @ 115 F
 7. AIR WEIGHT DENSITY @ 115 F & SHORE CONN. PRESS.

8. VAPOR-AIR WEIGHT DENSITY @ 115 F & SHORE CONN. PRESS.
 9. VAPOR GROWTH RATE (SEE ALSO NOTE NO. 14)
 10. LIQUID TRANSFER RATE
 11. VAPOR-AIR MIXTURE FLOW RATE
 12. REQUIRED AIR EQUIVALENT FLOW RATE

OBTAIN FROM REFERENCE SOURCE
 (CARGO MW / AIR MW), OR FM REF. SOURCE
 OBTAIN FROM REFERENCE SOURCE
 EST'D TO BE SAME SHORE PRESS (Pa/c)
 $Pv, 115 / Pt, 115$
 $Vv, 115 / Pt, 115$
 $Va, 115 / (Pt, 115 - Pv, 115) / Pt, 115$
 $Ma, 115 = Mw * Pa/c$ $Mw = MOLEC. WT. OF AIR$

 $10.72 * (460 + T)$
 $[(SGv * Vv, 115) + Va, 115] * (0.0047 * Pa/c)$
 VGR ESTIMATED TO BE $1 + (0.25 * Pv, 115 / 12.5)$
 $Q1 = VGR$
 $Qv-a = Q1 * VGR$
 $Qa = Qv-a * (Wv-a, 115 / Ma, 115) ^ .5$

13. USCG VAP COLLECT'N SYS. CARGO CATEGORIES
 1. NO ADD'L VCS REQMTS ABOVE THOSE FOR BENZENE, GASOLINE & CRUDE OIL
 2. POLYMERIZES
 3. HIGHLY TOXIC
 4. POLYMERIZES & HIGHLY TOXIC
 5. HIGH VAPOR GROWTH RATE
 6. HIGH VAP GROWTH RATE & HIGHLY TOXIC
 7. HIGH VAP GROWTH RATE & POLYMERIZES
 8. MORE INFO NEEDED BEFORE REQMTS CAN BE DETERMINED
 14. VGR = 1.25 FOR GASOLINE, CRUDE OIL, AND BENZENE.
 15. NF/NC = NON-FLAMMABLE/NON-COMBUSTIBLE

BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

CARGO

46 CFR SUBCHAPT D, TABLE 151

C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX LIQUID TRANSF RATE (MLTR) 1,000 (BBL/ HR)	MAX LIQUID TRANSF RATE (MLTR) 2,000 (BBL/ HR)	MAX LIQUID TRANSF RATE (MLTR) 3,000 (BBL/ HR)	MAX LIQUID TRANSF RATE (MLTR) 4,000 (BBL/ HR)	MAX LIQUID TRANSF RATE (MLTR) 5,000 (BBL/ HR)
AAC	0.004	0.014	0.030	0.052	0.080
ACA	0.004	0.014	0.030	0.051	0.079
ATN	0.003	0.013	0.028	0.048	0.074
ACR	0.004	0.013	0.029	0.050	0.077
ACN	0.005	0.019	0.041	0.071	0.109
ADN	0.003	0.013	0.028	0.048	0.074
ASX					
AEE	0.003	0.013	0.028	0.048	0.074
ABX					
AMH					
AHO					
BHZ	0.008	0.028	0.062	0.108	0.166
BHA	0.008	0.029	0.063	0.109	0.168
BHB	0.008	0.029	0.063	0.109	0.168
BTX	0.008	0.029	0.063	0.109	0.168
BAI	0.004	0.015	0.032	0.055	0.084
BTC	0.004	0.014	0.030	0.052	0.080
BAR	0.004	0.015	0.032	0.055	0.084
BMH	0.004	0.014	0.030	0.052	0.079
BAD	0.007	0.028	0.061	0.106	0.163
BTR	0.007	0.028	0.061	0.106	0.163
BFA	0.008	0.028	0.062	0.107	0.165
BAE	0.008	0.028	0.062	0.107	0.165
CPO					
CBT					
CPS					
CSS					
CRB	0.004	0.015	0.032	0.056	0.086
CRP					
CSA					
NCT	0.004	0.013	0.029	0.050	0.076
CCT	0.003	0.013	0.028	0.048	0.074
CND	0.003	0.013	0.028	0.048	0.074
CRS	0.004	0.013	0.028	0.048	0.074
CRS					
CPP	0.004	0.013	0.028	0.048	0.074
CSC					
CAX					
CYA	0.004	0.016	0.035	0.060	0.093
CCR	0.003	0.013	0.028	0.048	0.074
CHA	0.004	0.014	0.031	0.053	0.082
DAT	0.003	0.013	0.028	0.048	0.074
DBX	0.004	0.013	0.028	0.049	0.075
DCH	0.011	0.042	0.092	0.161	0.247
DEE	0.004	0.013	0.028	0.048	0.074
DCM					
DOE					
DAD					
DTI					
DPK	0.009	0.032	0.071	0.123	0.190
DFU	0.008	0.029	0.064	0.111	0.171
DMX	0.009	0.032	0.071	0.123	0.190
DCW					
DEA	0.003	0.013	0.028	0.048	0.074
DEH	0.004	0.014	0.031	0.054	0.083
DET	0.003	0.013	0.028	0.048	0.074
DEH					
DBU	0.004	0.014	0.031	0.053	0.082
DIP	0.003	0.013	0.028	0.048	0.074

BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

CARGO	C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
		MAX LIQUID TRANSP RATE (MLTR)	MAX LIQUID TRANSP RATE (MLTR)	MAX LIQUID TRANSP RATE (MLTR)	MAX LIQUID TRANSP RATE (MLTR)	MAX LIQUID TRANSP RATE (MLTR)
		1,000 (BBL/ HR)	2,000 (BBL/ HR)	3,000 (BBL/ HR)	4,000 (BBL/ HR)	5,000 (BBL/ HR)
DIISOPROPYLAMINE						
N,N-DIMETHYLACETAMIDE	DIA	0.006	0.022	0.048	0.085	0.130
DIMETHYLETHANOLAMINE	DAC	0.004	0.013	0.028	0.049	0.076
DIMETHYLFORMAMIDE	DMB	0.004	0.014	0.030	0.052	0.079
1,4-DIOXANE	DMP	0.004	0.013	0.029	0.050	0.076
DI-N-PROPYLAMINE	DOX	0.004	0.017	0.036	0.062	0.096
ETHANOLAMINE	DNA	0.004	0.016	0.036	0.062	0.095
ETHYL ACRYLATE	MBA	0.003	0.013	0.028	0.048	0.074
ETHYLAMINE SOLUTION (72% OR LESS)	EAC	0.005	0.018	0.038	0.067	0.103
N-ETHYLBUTYLAMINE	EAN	0.008	0.032	0.070	0.121	0.187
N-ETHYLCYCLOHEXYLAMINE	EBA	0.004	0.016	0.034	0.059	0.091
ETHYLENE CYANOHYDRIN	ECC	0.004	0.014	0.031	0.054	0.082
ETHYLENEDIAMINE	ETC	0.003	0.013	0.028	0.048	0.073
ETHYLENE DIBROMIDE	EDA	0.004	0.014	0.030	0.052	0.080
ETHYLENE DICHLORIDE	EDB					
ETHYLENE GLYCOL PROPYL ETHER	EDC	0.006	0.023	0.050	0.086	0.133
2-ETHYLHEXYL ACRYLATE	EGP	0.004	0.015	0.032	0.055	0.085
ETHYLIDENE NORBORNENE	EAI	0.003	0.013	0.028	0.048	0.074
ETHYL METHACRYLATE	ENB	0.004	0.014	0.030	0.051	0.079
2-ETHYL-3-PROPYLACROLEIN	ETM	0.004	0.016	0.034	0.058	0.090
FERRIC CHLORIDE SOLUTIONS	EPA	0.004	0.013	0.028	0.049	0.076
FORMALDEHYDE SOLUTION (37% TO 50%)	PCS					
FORMIC ACID	FMS	0.003	0.013	0.028	0.048	0.074
FURFURAL	FMA	0.004	0.015	0.032	0.056	0.085
GLUTARALDEHYDE SOLUTION (50% OR LESS)	PFA	0.004	0.013	0.028	0.049	0.075
HEXAMETHYLENEDIAMINE SOLUTION	GTA					
HEXAMETHYLENEIMINE	HMC	0.003	0.013	0.028	0.048	0.074
HYDROCHLORIC ACID SPENT (15% OR LESS)	HMI	0.004	0.013	0.028	0.049	0.075
ISOPENTALDEHYDE (MIXED ISOMERS) (SEE VALERALDEHYDE (ISO-, N-))	HCS					
ISOPRENE						
KRAFT PULPING LIQUORS (FREE ALKALI CONTENT >= 3% (INCL'G: BLACK, GREEN OR WHITE))	IPR	0.019	0.072	0.158	0.277	0.428
MESITYL OXIDE	KPL					
METHYL ACRYLATE	MBO	0.004	0.014	0.031	0.054	0.083
METHYLCYCLOPENTADIENE DIMER	MMM	0.006	0.022	0.047	0.082	0.126
METHYL DIETHANOLAMINE	MCK	0.003	0.013	0.028	0.048	0.074
2-METHYL-5-ETHYLPYRIDINE	MDE	0.004	0.013	0.028	0.049	0.075
METHYLENE CHLORIDE (SEE DICHLOROMETHANE)	MEP	0.004	0.013	0.029	0.050	0.076
METHYL METHACRYLATE						
2-METHYLPYRIDINE	MMM	0.005	0.018	0.038	0.066	0.103
alpha-METHYLSTYRENE	MPR	0.004	0.014	0.030	0.052	0.080
MORPHOLINE	MSR	0.004	0.014	0.030	0.052	0.080
NITRIC ACID (70% OR LESS)	MPL	0.004	0.014	0.031	0.054	0.083
NITROPROPANE (-1, OR -2)	NCD					
OCTYL NITRATES (ALL ISOMERS)	NPM	0.004	0.015	0.032	0.056	0.086
OLEFIM	ONE	0.004	0.014	0.030	0.053	0.081
PENTACHLOROSTHANE	OLM	0.003	0.013	0.028	0.048	0.074
1, 3-PENTADIENE	PCE					
PERCHLOROETHYLENE (SAME AS TETRACHLOROETHYLENE)	PDE	0.014	0.051	0.112	0.197	0.304
PHOSPHORIC ACID	PER					
POLYETHYLENE POLYAMINES	PAC					
POLYMETHYLENE POLYPHENYL ISOCYANATE	PEB	0.003	0.013	0.028	0.048	0.074
POTASSIUM HYDROXIDE SOLUTION (SEE CAUSTIC POTASH SOLUTION)	PPI	0.003	0.013	0.028	0.048	0.073
iso-PROPANOLAMINE						
PROPANOLAMINE (iso-, n-)	MPA	0.004	0.013	0.028	0.048	0.074
PROPIONIC ACID	PAI	0.004	0.013	0.028	0.048	0.074
iso-PROPYLAMINE	PMA	0.004	0.013	0.029	0.050	0.076
iso-PROPYL ETHER	IPP	0.017	0.063	0.138	0.241	0.373
PYRIDINE	IPB	0.008	0.031	0.068	0.119	0.183
SODIUM ALUMINATE SOLUTION	PRD	0.004	0.015	0.033	0.057	0.087
SODIUM CHLORATE SOLUTION (50% OR LESS)	SAU					
SODIUM DICHROMATE SOL'N (70% OR LESS)	SDD					
SODIUM HYDROXIDE SOLUTION (SEE CAUSTIC SODA SOLUTION)	SDL					

BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
	1,000 (BBL/ HR)	2,000 (BBL/ HR)	3,000 (BBL/ HR)	4,000 (BBL/ HR)	5,000 (BBL/ HR)
SHP					
SSH					
SSI					
SSJ					
STS					
STY	0.004	0.014	0.030	0.052	0.079
SPA	0.003	0.013	0.028	0.048	0.074
SAC	0.003	0.013	0.028	0.048	0.073
TEC					
TTP	0.003	0.013	0.028	0.048	0.073
THP	0.005	0.020	0.044	0.076	0.117
TCM	0.004	0.016	0.035	0.060	0.093
TCL	0.007	0.024	0.053	0.092	0.142
TCN	0.004	0.013	0.029	0.050	0.077
TEA	0.003	0.013	0.028	0.048	0.074
TEN	0.005	0.019	0.041	0.071	0.110
TET	0.003	0.013	0.028	0.048	0.074
UAS					
IVA	0.006	0.024	0.052	0.091	0.140
VAL	0.006	0.024	0.052	0.091	0.140
VBL	0.003	0.013	0.028	0.048	0.074
VAM	0.007	0.026	0.056	0.098	0.151
VNT	0.004	0.013	0.028	0.049	0.075

CARGO

SODIUM HYPOCHLORITE SOL'N (15% OR LESS)
 SODIUM SULFIDE, HYDROSULFIDE SOLUTIONS (H2S 15 PPM OR LESS)
 SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (15 PPM<H2S<200 PPM)
 SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (H2S GREATER THAN 200 PPM)
 SODIUM THIOCYANATE SOLUTION (56% OR LESS)
 STYRENE MONOMER
 SULFURIC ACID
 SULFURIC ACID, SPENT
 1,1,2,2-TETRACHLOROETHANE (ACETYLENE TETRACHLORIDE)
 TETRAETHYLENEPENTAMINE
 TETRAHYDROPURAN
 1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)
 TRICHLOROETHANE (SEE 1,1,2-TRICHLOROETHANE)
 TRICHLOROETHYLENE
 1,2,3-TRICHLOROPROPANE
 TRIETHANOLAMINE
 TRIETHYLAMINE
 TRIETHYLENETETRAMINE
 UREA, AMMONIUM NITRATE SOL'N (CONTAINING MORE THAN 2% NH3)
 VALERALDEHYDE (iso-, n-)
 VALERALDEHYDE (iso-)
 VALERALDEHYDE (n-)
 VANILLAN BLACK LIQUOR (FREE ALKALI CONTENT 3% OR MORE)
 VINYL ACETATE
 VINYL TOLUENE

CARGO: C9809: CONOCO, INC.; '7027' AND '7028'

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

CARGO	C H R I S	20.0t	40.0t	60.0t	80.0t	100.0t
		MAX LIQUID TRANSF RATE (MLTR) (BBL/HR)	MAX LIQUID TRANSF RATE (MLTR) (BBL/HR)	MAX LIQUID TRANSF RATE (MLTR) (BBL/HR)	MAX LIQUID TRANSF RATE (MLTR) (BBL/HR)	MAX LIQUID TRANSF RATE (MLTR) (BBL/HR)
46 CFR SUBCHAPT O BUT NOT TABLE 151						
1,1-DICHLOROPROPANE	DPB	0.009	0.032	0.071	0.123	0.190
1,1,1-TRICHLOROETHANE						
1,2-DICHLOROPROPANE	DPP	0.005	0.019	0.042	0.073	0.112
1,3-CYCLOPENTADIENE						
1,3-DICHLOROPROPANE	DPC	0.006	0.024	0.052	0.090	0.139
2-METHYL-2-HYDROXY-3-BUTYNE	MHB	0.004	0.015	0.032	0.056	0.086
2,4-DICHLOROPHENOXACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70% OR LESS)	DDA					
3-PENTHENITRILE	PNT					
AEROTHE TT (1,1,1-TRICHLOROETHANE)						
ALKYLBENZENE	ASP	0.008	0.028	0.062	0.108	0.165
AMINOTHYLPYPERAZINE	BSC	0.003	0.013	0.028	0.048	0.073
BENZENE RAFFINATE (ASSUME VAPOR PROPERTIES SIMILAR TO BENZENE)	BZE	0.003	0.013	0.028	0.048	0.074
BENZENE SULFONYL CHLORIDE	BCL	0.004	0.013	0.028	0.049	0.075
BENZYL ACETATE						
BENZYL CHLORIDE (STABILIZED)	BTE	0.004	0.014	0.030	0.053	0.082
BUTANOL	BTO	0.008	0.031	0.068	0.118	0.182
BUTYL ETHER (n-)	BRA	0.004	0.013	0.028	0.048	0.074
BUTYLENE OXIDE (1,2-)	CBO	0.004	0.013	0.028	0.048	0.074
BUTYRIC ACID	CBM	0.003	0.013	0.028	0.048	0.074
CARBOLIC ACID	CFM	0.003	0.013	0.028	0.048	0.074
CHLOROACETIC ACID (80% OR LESS)	CTM	0.004	0.014	0.030	0.051	0.079
CHLOROPROPIONIC ACID (2- OR 3-)	CTO	0.004	0.014	0.030	0.051	0.079
CHLOROTOLUENE (m-)	CRN	0.004	0.013	0.028	0.049	0.075
CHLOROTOLUENE (o-)	CHI	0.004	0.014	0.031	0.054	0.083
CHLOROTOLUENE (p)	CCW	0.003	0.013	0.028	0.048	0.074
CHLOROTOLUENES (MIXED ISOMERS)	CRX	0.003	0.013	0.028	0.048	0.074
CREOSOTE (ALL ISOMERS)	CYE	0.004	0.016	0.035	0.060	0.093
CRESYLIC ACID TAR	CYX	0.004	0.015	0.033	0.057	0.087
CYCLOHEPTANE	CYC	0.003	0.013	0.028	0.048	0.074
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE	CSB	0.008	0.028	0.062	0.108	0.167
CYCLOHEXYL ACETATE	CYP	0.011	0.040	0.088	0.155	0.235
CYCLOPENTADIENE, STYRENE, BENZENE MIXTURE	DCO	0.003	0.013	0.028	0.048	0.073
CYCLOPENTANE						
DECAHOIC ACID	DCI	0.004	0.013	0.028	0.049	0.075
DI 2 ETHYLHEXYL PHTHALATE (SEE ALSO ETHYLHEXYL PHTHALATE)						
DICHLOROISOPROPYL ETHER (2,2'-)	DSU	0.003	0.013	0.028	0.048	0.074
DICHLOROPROPANE	DAB	0.004	0.013	0.029	0.050	0.076
DICHLOROPROPENE						
DIETHYL SULFATE	DOT					
DIETHYLETHANOLAMINE						
DODECYL BENZENE	EDE	0.007	0.026	0.057	0.099	0.152
DODECYLDIMETHYLAMINE TETRADECYLDIMETHYLAMINE MIXTURE	EAM	0.024	0.090	0.199	0.348	0.539
DRIPOLENE	ETX	0.007	0.026	0.056	0.097	0.149
ETHANOL (see ethyl alcohol)						
ETHYL BROMIDE	EPL	0.003	0.013	0.028	0.048	0.074
ETHYL TERT-BUTYL ETHER	MTM	0.005	0.017	0.036	0.063	0.097
ETHYLAMINE						
ETHYLENE DICHLORIDE 1,1,2-TRICHLOROETHANE MIXTURE	IBA	0.004	0.014	0.030	0.052	0.079
ETHYLMERCAPTAN (SAME AS ETHANETHIOL)	IPW	0.005	0.017	0.037	0.064	0.098
ETHYLPHENOL						
FORMALDEHYDE SOLUTION (50% OR MORE), METHANOL MIXTURES	LRA	0.005	0.018	0.039	0.068	0.105
HYDROSULFIDE						
INDENES						
ISOBUTYL ACETATE						
ISOPRENE, PENTADIENE MIXTURE						
ISO-PROPYL ALCOHOL						
LAURIC ACID						
METHACRYLONITRILE						
METHANOL						

BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
	1,000 (BBL/HR)	2,000 (BBL/HR)	3,000 (BBL/HR)	4,000 (BBL/HR)	5,000 (BBL/HR)
METHYL STYRENE					
METHYL STYRENE, INDENES, ALKYL BENZENE MIXTURES					
METHYLCYCLOHEXANE					
METHYLHEXANE (SAME AS HEPTANE)					
MONOETHANOLAMINE					
MONOISOPROPANOLAMINE					
NAPHTHALENE (MOLTEN)					
NEODECANOIC ACID					
NITRILOTRIACETIC ACID					
NITROPHENOL (MOLTEN)					
NITROPROPANE (60%), NITROETHANE (40%) MIXTURE					
NITROTOLUENE (o-,p-)					
PARALDEHYDE					
POLYGLYCERINE, SODIUM SALT SOLN (CONTAINING 3% OR MORE SODIUM HYDROXIDE)					
PROPIONALDEHYDE					
PROPIONIC ANHYDRIDE					
PROPIONITRILE					
PROPYLAMINE (n-)					
PROPYLBENZENE					
PYROLYSIS GASOLINE (GREATER THAN 5% BENZENE)					
PYROLYSIS RESIDUAL FUELS					
SEWAGE, RAW					
SODIUM SULFIDE (SOLID IN WATER)					
STYRENE					
STYRENE CRUDE					
STYRENE TAR					
TETRAMETHYLBENZENE (1,2,3,5-)					
TOLUIDINE (o-)					
TRICHLOROBENZENE (1,2,4-)					
TRIIISOPROPANOLAMINE SALT OF 2,4-DICHLOROPHENOXY ACETIC ACID SOL'N					
TRIPHENYLBORANE					
UNDECANOIC ACID					
HYDROCARBON 5-9					
MIA					
MCY	0.005	0.018	0.040	0.070	0.107
MEA	0.004	0.013	0.028	0.048	0.074
NTM	0.003	0.013	0.028	0.048	0.075
NEA	0.003	0.013	0.028	0.048	0.074
NAA					0.074
NTP					
KRM	0.004	0.015	0.033	0.056	0.087
NIT	0.003	0.013	0.028	0.048	0.074
PDH	0.012	0.045	0.099	0.172	0.267
PGS					
PAD	0.010	0.036	0.079	0.137	0.212
PAH	0.004	0.013	0.028	0.049	0.075
PCN	0.004	0.014	0.031	0.053	0.081
PRA	0.010	0.036	0.079	0.138	0.213
	0.003	0.012	0.026	0.045	0.069
GPY	0.008	0.029	0.063	0.109	0.168
SWR					
SDS					
STY	0.004	0.014	0.030	0.052	0.079
STX	0.004	0.014	0.030	0.052	0.079
STT					
TTB	0.004	0.013	0.028	0.049	0.076
TLI	0.003	0.013	0.028	0.048	0.074
TCB	0.004	0.013	0.028	0.048	0.074
TPE					
UDA	0.003	0.013	0.028	0.048	0.073
HPN	0.006	0.024	0.052	0.091	0.140

BARGE: C9809: CONOCO, INC.; *7027* AND *7028*

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX	MAX	MAX	MAX	MAX
C	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
H	TRANSP	TRANSP	TRANSP	TRANSP	TRANSP
R	RATE	RATE	RATE	RATE	RATE
I	(MLTR)	(MLTR)	(MLTR)	(MLTR)	(MLTR)
S	1,000	2,000	3,000	4,000	5,000
	(BBL/HR)	(BBL/HR)	(BBL/HR)	(BBL/HR)	(BBL/HR)

CARGO

46 CFR SUBCHAPTER D, TABLE 30.25-1

Acetone					
Acetophenone					
Acetyl Tributyl Citrate	ACT	0.008	0.028	0.062	0.107
Acrylonitrile-Styrene Copolymer dispersion in Polyether Polyol	ACP	0.004	0.014	0.031	0.054
Alcohols (C13 and above)					
Alcoholic beverages, N.O.S.	ALE				
Alcohol (C6 - C17) (secondary) Poly(3-6)ethoxylates	ALY				
Alcohol (C12 - C15) Poly(1-3)ethoxylates					
Alcohol (C12 - C15) Poly(3-11)ethoxylates					
Alkenylsuccinic acid					
Alkenylsuccinic Anhydride					
Alkyl (C9 - C17) Benzenes					
Alkylbenzenesulfonic acid (4% or less)	AKB				
Alkyl Phthalates (n-)	ABS				
Alkyl Succinate Formaldehyde Hydr- oxyamino condensate (3.2% or less)					
Aminoethyldiethanolamine, Aminoethylethanolamine solution					
Amyl Acetate (commercial, iso-, n-, sec-)					
AMYL ACETATE (n-)	ARC	0.005	0.019	0.042	0.073
AMYL ACETATE (iso-)	AML	0.004	0.014	0.030	0.052
Amyl alcohol (iso-, n-, sec-, primary) (SEE ALSO IAA)	IAT	0.004	0.014	0.030	0.052
Amyl alcohol (n-)	AAI	0.004	0.013	0.029	0.050
Amyl alcohol (tert-)	AAN	0.004	0.013	0.029	0.050
AMYL ALCOHOL, PRIMARY	AAI				
AMYL ALCOHOL, (sec-)	APM	0.004	0.013	0.029	0.050
Amylene	ASE	0.004	0.013	0.029	0.050
AMYL ALCOHOL, (iso-)	AMZ				
Amyl Methyl Ketone	IAA	0.004	0.013	0.029	0.050
Amyl Tallate	AMK				
Asphalt					
ASPHALT BLENDING STOCKS: Roofers flux	ASP				
ASPHALT BLENDING STOCKS: Straight run residue	ARF				
Behenyl alcohol	ASR				
Benzene Tricarboxylic acid Trioctyl Ester					
Benzyl alcohol					
Bicyclic Terpenel Polyamide salt	BAL	0.004	0.013	0.028	0.049
Brake fluid base mixtures (containing Poly(2-8)alkylene (C2-C3) glycols, Polyalkyls)	BFX				
Butane					
Butene, SEE BUTYLENE					
Butene Oligomer					
Butyl Acetate (iso-, n-)	BOL				
BUTYL ACETATE (N-)	BAX	0.004	0.014	0.031	0.054
Butyl Acetate (sec-)	BCN	0.004	0.015	0.032	0.056
Butyl alcohol (iso-, n-, sec-, tert-)	STA	0.005	0.017	0.037	0.064
BUTYL ALCOHOL (ISO-)		0.004	0.014	0.031	0.054
BUTYL ALCOHOL (N-)	IAL	0.004	0.014	0.031	0.054
BUTYL ALCOHOL (SEC-)	BAW	0.004	0.014	0.029	0.051
BUTYL ALCOHOL (TERT-)	BAS	0.004	0.015	0.032	0.056
Butyl Benzyl Phthalate	BAT	0.005	0.018	0.039	0.067
Butylene	BPH	0.003	0.013	0.028	0.048
Butylene Glycol	BTN				
1,3-Butylene Glycol, SEE BUTYLENE GLYCOL	BUG				
Butylene Polyglycol, SEE BUTYLENE GLYCOL					
iso-Butyl Formate					
n-Butyl Formate					
Butyl Heptyl Ketone					
Butyl Methyl Ketone, SEE METHYL BUTYL KETONE	BHK				
Butyl Stearate					
Butyl Toluene					
Butyrolactone (gamma)	BUE	0.004	0.013	0.028	0.049
	BLA				

BARGE: C9809: CONOCO, INC.; '7027' AND '7028'

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

C H R I S	CARGO	20.0t	40.0t	60.0t	80.0t	100.0t
		MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
		1,000 (BBL/HR)	2,000 (BBL/HR)	3,000 (BBL/HR)	4,000 (BBL/HR)	5,000 (BBL/HR)
	Calcium Alkylphenate					
	Calcium Alkyl Salicylate					
	Calcium Amino Nonyl Phenolate					
	Calcium Carboxylate					
	Caprolactam solutions					
	Carbon black base					
	Cetyl alcohol (HEXADECANOL) SEE ALCOHOLS (C13 AND ABOVE)					
	Cetyl-Stearal alcohol					
	Cleaning spirit (unleaded)					
	Coal tar					
	Cumene					
	Cycloaliphatic resins					
	Cyclohexane					
	Cyclohexanol					
	1,3-Cyclopentadiene dimer (molten)					
	Cyclopentadiene polymers, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)					
	Cymene (para-)					
	Decahydronaphthalene					
	Decaldehyde (iso-)					
	Decaldehyde (n-)					
	Decane					
	Decene					
	Decyl alcohol (all isomers) (DECANOL)					
	DECYL ALCOHOL (iso-)					
	DECYL ALCOHOL (n-)					
	Decylbenzene (n-)					
	Detergent Alkylate					
	Diacetone alcohol					
	Dialkyl (C10-C14) Benzenes					
	Dialkyl (C7-C13) Phthalates					
	Dibutyl Carbinol					
	Dibutyl Phthalate (ortho-)					
	Dicyclopentadiene, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)					
	Diethylbenzene					
	Diethylene Glycol					
	Diethylene Glycol Butyl Ether					
	Diethylene Glycol Butyl Ether Acetate					
	Diethylene Glycol Dibutyl Ether					
	Diethylene Glycol Diethyl Ether					
	Diethylene Glycol Ethyl Ether					
	Diethylene Glycol Ethyl Ether Acetate					
	Diethylene Glycol Methyl Ether					
	Diethylene Glycol Methyl Ether Acetate					
	Diethylene Glycol Phenyl Ether					
	Diethylene Glycol Phthalate					
	Di-(2-ethylhexyl)adipate					
	Di-(2-ethylhexyl)phthalate					
	Diethyl Phthalate					
	Diglycidyl Ether of Bisphenol A					
	Dibethyl Phthalate					
	Dihexyl Phthalate					
	Diisobutylcarbinol					
	Diisobutylene					
	Diisobutyl Ketone					
	Diisobutyl Phthalate					
	Diisodecyl Phthalate					
	Diisononyl Adipate					
	Diisononyl Phthalate					
	Diisocetyl Phthalate					
	Diisopropylbenzene (all isomers)					
	Diisopropyl Naphthalene					
	Dimethyl Adipate					
CLS		0.004	0.013	0.028	0.048	0.074
COR						
COM		0.004	0.014	0.031	0.054	0.084
CHK		0.006	0.022	0.048	0.085	0.130
CHW		0.004	0.013	0.028	0.049	0.075
CPD		0.004	0.014	0.029	0.051	0.078
OMP		0.004	0.013	0.028	0.049	0.075
DNW		0.004	0.013	0.028	0.049	0.075
IDA		0.003	0.013	0.028	0.048	0.074
DAL		0.003	0.013	0.028	0.048	0.073
DOC						
DCE		0.004	0.013	0.028	0.049	0.075
DAX		0.003	0.013	0.028	0.048	0.074
ISA		0.003	0.013	0.028	0.048	0.074
DAN		0.003	0.013	0.028	0.048	0.074
DBZ		0.003	0.013	0.028	0.048	0.074
DAA		0.004	0.013	0.028	0.049	0.075
DAB						
DAH						
DPA						
DPT		0.004	0.014	0.029	0.051	0.078
DEB		0.004	0.013	0.028	0.049	0.075
DEG		0.003	0.013	0.028	0.048	0.074
DME		0.003	0.013	0.028	0.048	0.074
DEM						
DIG						
DGE						
DGA		0.003	0.013	0.028	0.048	0.074
DGM		0.003	0.013	0.028	0.048	0.074
DGR						
DGP						
DGL						
DEH						
DIE						
DPH						
BDP						
DEP						
DEA						
DBC		0.004	0.013	0.028	0.049	0.075
DBL		0.005	0.018	0.040	0.069	0.106
DIX		0.004	0.013	0.029	0.050	0.077
DIT						
DID						
DFY						
DIN						
DIO						
DIX		0.004	0.013	0.028	0.048	0.074
DII						
DIA						

BARGE: C9809: COMOCO, INC.; '7027' AND '7028'

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SMOKE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

C H R I S	CARGO	20.0%	40.0%	60.0%	80.0%	100.0%
		MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
		1,000 (BBL/HR)	2,000 (BBL/HR)	3,000 (BBL/HR)	4,000 (BBL/HR)	5,000 (BBL/HR)
	Dimethylbenzene					
	Dimethyl Glutarate					
	Dimethyl Phthalate					
	Dimethyl Polysiloxane					
	2,2-Dimethylpropane-1,3-diol					
	Dimethyl Succinate					
	Dinonyl Phthalate					
	Di(octylphenyl)amine					
	Diocetyl Phthalate					
	Dipentene					
	Diphenyl					
	Diphenyl, Diphenyl Ether mixture					
	Diphenyl Ether					
	Diphenyl Ether, Biphenyl Ether mixture					
	Dipropylene Glycol					
	Dipropylene Glycol Dibenzoate					
	Dipropylene Glycol Methyl Ether					
	DISTILLATES: Flashed feed stocks					
	DISTILLATES: Straight run					
	Ditridecyl Phthalate					
	Diundecyl Phthalate					
	Dodecane (all isomers)					
	Dodecanol					
	Dodecene (all isomers)					
	DODECENE					
	Dodecylbenzene					
	Dodecyl Phenol					
	Drilling mud (low toxicity) (if flammable or combustible)/					
	Epoxyated linear alcohols, C11-C15					
	Ethane					
	2-Ethoxyethanol					
	2-Ethoxyethyl Acetate					
	Ethoxylated alcohols, C11-C15, SEE THE ALCOHOL POLYETHOXYLATES					
	Ethoxy Triglycol (crude)					
	Ethyl Acetate					
	Ethyl Acetoacetate					
	Ethyl alcohol (ETHANOL)					
	Ethyl Amyl Ketone					
	Ethyl Benzene					
	Ethyl Butanol					
	Ethyl Butyrate					
	Ethyl Cyclohexane					
	Ethylene					
	Ethylene Carbonate					
	Ethylene Glycol					
	Ethylene Glycol Acetate					
	Ethylene Glycol Butyl Ether					
	ETHYLENE GLYCOL BUTYL ETHER ACETATE					
	Ethylene Glycol Ether Acetate					
	Ethylene Glycol Tert-Butyl Ether					
	Ethylene Glycol Diacetate					
	Ethylene Glycol Dibutyl Ether					
	Ethylene Glycol Ethyl Ether, SEE 2-ETHOXYETHANOL					
	Ethylene Glycol Ethyl Ether Acetate, SEE 2-ETHOXYETHYL ACETATE					
	Ethylene Glycol Isopropyl Ether					
	Ethylene Glycol Methyl Butyl Ether					
	Ethylene Glycol Methyl Ether					
	Ethylene Glycol Methyl Ether Acetate					
	Ethylene Glycol Phenyl Ether					
	Ethylene Glycol Phenyl Ether, Diethylene Glycol Phenyl Ether mixture					
	Ethylene-Propylene Copolymer (in liquid mixtures)					
	Ethyl-3-Ethoxypropionate					
	DOT					
	DTL					
	DMP	0.003	0.013	0.028	0.048	0.073
	DDI					
	DSE					
	DIP	0.004	0.013	0.028	0.048	0.074
	DOP	0.003	0.013	0.028	0.048	0.073
	DPW	0.004	0.013	0.028	0.049	0.075
	DIL	0.003	0.013	0.028	0.048	0.074
	DDO	0.003	0.013	0.028	0.048	0.074
	DPE	0.003	0.013	0.028	0.048	0.074
	DOB					
	DPG	0.004	0.013	0.028	0.049	0.075
	DGY					
	DPY					
	DPP	0.005	0.018	0.040	0.069	0.106
	DSR	0.005	0.018	0.040	0.069	0.106
	DTP					
	DUP					
	DOC					
	DDW					
	DOZ	0.003	0.013	0.028	0.048	0.074
	DOD	0.003	0.013	0.028	0.048	0.074
	DOB	0.012	0.044	0.097	0.169	0.262
	DOL					
	ETH					
	EBO					
	EEA					
	ETG	0.003	0.013	0.028	0.048	0.073
	ETA	0.006	0.023	0.050	0.087	0.133
	EAA	0.004	0.013	0.029	0.050	0.077
	EAL	0.004	0.016	0.035	0.061	0.094
	EAK					
	ETS	0.004	0.014	0.031	0.053	0.082
	EST	0.004	0.013	0.028	0.049	0.075
	EBR	0.004	0.016	0.034	0.058	0.090
	ECY	0.004	0.014	0.031	0.053	0.081
	ETL					
	EGL	0.003	0.013	0.028	0.048	0.073
	EGO					
	EGM					
	EGA	0.004	0.013	0.028	0.049	0.075
	EGY	0.003	0.013	0.028	0.048	0.074
	EGB					
	EGP					
	EGA					
	EGI					
	EGE	0.003	0.013	0.028	0.048	0.074
	EGT					
	EGF	0.003	0.013	0.028	0.048	0.074
	EGX					
	KEP					

BARGE: C9809: CONOCO, INC., "7027" AND "7028"

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

C H R I S	CARGO	20.0%	40.0%	60.0%	80.0%	100.0%
		MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
	Nonyl Phenol					
	Nonyl Phenol Poly(4-12)ethoxylates					
	Nonyl Phenol Sulfide (90% or less)					
	Toxic liquid, N.O.S. (17) ("Trade name," contains "principal components"), Category					
	Non-Toxic liquid, N.O.S. (18) ("Trade name," contains principal components"), Appe					
	Octadecane					
	Octadecenoamide solution (Oleanide)					
	Octane (all isomers)					
	OCTANE					
	Octanoic acid (all isomers)					
	Octanol (all isomers)					
	OCTANOL					
	Octene (all isomers)					
	OCTENE (1-)					
	Octyl Acetate					
	Octyl alcohol (iso-, n-) (all isomers), SEE OCTANOL (ALL ISOMERS)					
	OCTYL ALCOHOL					
	Octyl Aldehydes					
	Octyl Decyl Adipate					
	Octyl Epoxystallate					
	Octyl Phthalate. SEE DI-(2-ETHYLHEXYL) PHTHALATE					
	OIL, EDIBLE: Babassu					
	OIL, EDIBLE: Beechnut					
	OIL, EDIBLE: Castor					
	OIL, EDIBLE: Cocoa butter					
	OIL, EDIBLE: Coconut					
	OIL, EDIBLE: Cod liver					
	OIL, EDIBLE: Corn					
	OIL, EDIBLE: Cottonseed					
	OIL, EDIBLE: Fish, N.O.S.					
	OIL, EDIBLE: Grapeseed					
	OIL, EDIBLE: Groundnut					
	OIL, EDIBLE: Hazelnut					
	OIL, EDIBLE: Lard					
	OIL, EDIBLE: Maize					
	OIL, EDIBLE: Mustard seed					
	OIL, EDIBLE: Nutmeg Butter					
	OIL, EDIBLE: Olive					
	OIL, EDIBLE: Palm					
	OIL, EDIBLE: Palm kernel					
	OIL, EDIBLE: Peanut					
	OIL, EDIBLE: Poppy					
	OIL, EDIBLE: Raisin seed					
	OIL, EDIBLE: Rice bran					
	OIL, EDIBLE: Safflower					
	OIL, EDIBLE: Salad					
	OIL, EDIBLE: Sesame					
	OIL, EDIBLE: Soya bean					
	OIL, EDIBLE: Sunflower, SEE SUNFLOWER SEED					
	OIL, EDIBLE: Sunflower seed					
	OIL, EDIBLE: Tucum					
	OIL, EDIBLE: Vegetable, N.O.S.					
	OIL, EDIBLE: Walnut					
	OIL, FUEL: No. 1 (Kerosene)					
	OIL, FUEL: No. 1-D					
	OIL, FUEL: No. 2					
	OIL, FUEL: No. 2-D					
	OIL, FUEL: No. 4					
	OIL, FUEL: No. 5					
	OIL, FUEL: No. 6					
	OIL, MISC: Absorption					
	OIL, MISC: Aliphatic					

BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
	1,000 (BBL/HR)	2,000 (BBL/HR)	3,000 (BBL/HR)	4,000 (BBL/HR)	5,000 (BBL/HR)
Tetradecylbenzene					
Tetraethylene Glycol	TED				
Tetrahydronaphthalene	TTG	0.003	0.013	0.028	0.048
Tetrapropylbenzene, SEE ALKYL(C9-C17) BENZENES	THN	0.004	0.013	0.028	0.048
Toluene					
Triarylphosphate	TOL	0.004	0.016	0.035	0.060
Tributyl Phosphate					
Tricresyl Phosphate (less than 1% of the ortho isomer)	TBP				
Tridecane	TCP	0.003	0.013	0.028	0.048
Tridecanoic acid	TRD	0.003	0.013	0.028	0.048
Tridecanol, SEE ALCOHOLS (C13 AND ABOVE)					
1-Tridecene	TDN	0.003	0.013	0.028	0.048
Tridecylbenzene	TDC	0.003	0.013	0.028	0.048
Triethylbenzene	TRB				
Triethylene Glycol	TEB	0.003	0.013	0.028	0.048
Triethylene Glycol Butyl Ether	TEG	0.003	0.013	0.028	0.048
Triethylene Glycol Butyl Ether mixture					
Triethylene Glycol di-(2-ethylbutyrate)					
Triethylene Glycol Ether mixture	TGD				
Triethylene Glycol Ethyl Ether					
Triethylene Glycol Methyl Ether	TGE				
Triethyl Phosphate					
Triisooctyl Trimellitate	TPS	0.003	0.013	0.028	0.048
Triisopropanolamine					
Trimethylbenzenes (all isomers)	TIP				
TRIMETHYL BENZENE (1,2,5-)	TRB	0.004	0.013	0.028	0.049
TRIMETHYL BENZENE (1,2,3-)	TMB	0.004	0.013	0.028	0.049
TRIMETHYL BENZENE (1,2,4-) (PSEUDOCUMENE)	TMD	0.004	0.013	0.028	0.049
Trimethylol Propane Polyethoxylate	TME	0.004	0.013	0.028	0.049
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate	TPR				
2,2,4-Trimethyl-3-pentanol-1-isobutyrate					
Tripropylene, SEE PROPYLENE TRIMER	TMP				
Tripropylene Glycol					
Tripropylene Glycol Methyl Ether	TGC				
Trixylenyl Phosphate	TGM				
Turpentine	TRP				
Turpentine substitute (White spirit), SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)	TPT				
Undecanol					
Undecene (1-)					
Undecyl alcohol	UDC	0.004	0.013	0.028	0.049
Undecylbenzene	UND	0.003	0.013	0.028	0.048
Vinyl Acetate-fumarate Copolymer	UDB				
Waxes:					
WAXES: Candelilla	WAX				
WAXES: Carnauba					
WAXES: Paraffin	WAX				
WAXES: Petroleum	WAX				
White spirit, SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)					
White spirit (low (15 - 20%) aromatic)					
Wine, SEE ALCOHOLIC BEVERAGES, N.O.S.	WSL				
Wool grease					
Xylenes (ortho-, meta-, para-)					
XYLENE (M-)	XLX	0.004	0.014	0.030	0.053
XYLENE (O-)	XLM	0.004	0.014	0.030	0.053
XYLENE (P-)	XLO	0.004	0.014	0.030	0.052
XYLENOL	XLP	0.004	0.014	0.030	0.053
Zinc Dialkyldithiophosphate	XYL	0.004	0.013	0.028	0.049

RANGE: C9809: CONOCO, INC.; "7027" AND "7028"

TABLE V: SUMMARY OF PRESSURE DROP FROM MOST REMOTE CARGO TANK TO VAPOR SHORE CONNECTION

C H R I S	20.0%	40.0%	60.0%	80.0%	100.0%
	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)	MAX LIQUID TRANSF RATE (MLTR)
	1,000	2,000	3,000	4,000	5,000
	(BBL/ HR)	(BBL/ HR)	(BBL/ HR)	(BBL/ HR)	(BBL/ HR)

(SEE "TABLE IV" FOR APPLICABLE CONDITIONS)

CARGO

46 CFR SUBCHAPTER D, BUT NOT TABLE 30.25-1

AROMATIC RESIN OIL 60	ARS	0.003	0.013	0.028	0.048	0.074
AROMATIC RESIN OIL 80	ARS	0.003	0.013	0.028	0.048	0.074
AROMATIC RESIN OILS						

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS	(MDWP)	3,000 PSIG
SPILL VALVE SET PRESSURE	(Ps/v)	1,750 PSIG
CARGO TANK P/V SETTING	(Pp/v)	1,500 PSIG
"TARGET" MAX LIQUID TRANSFER RATE	(TMLTR)	5,000 BPH
SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE	(Qw)max	6,750 BPH

CARGO	C R I S	LIQUID SPECIFIC GRAVITY	CARGO MAX LIQUID TRANSFER RATE (Q1)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{1.5}	Qw <= (Qw)max

46 CFR SUBCHAPTER O, TABLE 151

ACETIC ACID	AAC	1.05	5,000	5,123	OK
ACETIC ANHYDRIDE	ACA	1.08	5,000	5,203	OK
ACETONITRILE	ATN	0.78	5,000	4,416	OK
ACRYLIC ACID	ACE	1.05	5,000	5,123	OK
ACRYLONITRILE	ACN	0.81	5,000	4,500	OK
ADIPONITRILE	ADN	0.95	5,000	4,873	OK
ALUMINUM SULFATE SOLUTION	ASX	1.76	5,000	6,633	OK
AMINOSTHYLETHANOLAMINE	AEE	1.03	5,000	5,070	OK
AMMONIUM BISULFITE SOLN (70% OR LESS)	ABX	1.44	5,000	6,000	OK
AMMONIUM HYDROXIDE (28% OR LESS NH3)	AMH				
ANTHRACENE OIL (COAL TAR FRACTION)	AHO				
BENZENE	BNZ	0.88	5,000	4,688	OK
BENZENE HYDROCARBON MIXTURES (W/ACETYLENES) (W/10% BENZENE OR MORE)	BHA	0.84	5,000	4,583	OK
BENZENE HYDROCARBON MIXTURES (W/10% BENZENE OR MORE)	BHB	0.84	5,000	4,583	OK
BENZENE, TOLUENE, XYLENE MIXTURES (HAVING 10% BENZENE OR MORE)	BTX	0.84	5,000	4,583	OK
iso-BUTYL ACRYLATE	BAI	0.88	5,000	4,690	OK
n-BUTYL ACRYLATE	BTC	0.90	5,000	4,741	OK
BUTYL ACRYLATE (SEE ISO- & N- BUTYL ACRYLATE)	BAR	0.90	5,000	4,743	OK
BUTYL METHACRYLATE	BME	0.88	5,000	4,690	OK
iso-BUTYRALDEHYDE	BAD	0.80	5,000	4,481	OK
n-BUTYRALDEHYDE	BTR	0.80	5,000	4,472	OK
BUTYRALDEHYDES (CRUDE)	BFA	0.82	5,000	4,528	OK
BUTYRALDEHYDE (ISO-, N-)	BAE	0.82	5,000	4,528	OK
CAMPHOR OIL (LIGHT)	CPO	0.92	5,000	4,804	OK
CARBON TETRACHLORIDE	CBT	1.59	5,000	6,305	OK
CAUSTIC POTASH SOLUTION	CPS	1.50	5,000	6,124	OK
CAUSTIC SODA SOLUTION	CSS	1.50	5,000	6,124	OK
CHLOROBENZENE	CRB	1.11	5,000	5,268	OK
CHLOROFORM	CRF	1.48	5,000	6,083	OK
CHLOROSULFONIC ACID	CSA	1.79	5,000	6,690	OK
COAL TAR NAPHTHA SOLVENT	NCT	0.88	5,000	4,690	OK
CREOSOTE (COAL TAR)	CCT	1.07	5,000	5,172	OK
CREOSOTE (WOOD)	CWD	1.07	5,000	5,172	OK
CREOLS (ALL ISOMERS)	CRS	1.05	5,000	5,123	OK
CREOLS WITH LESS THAN 5% PHENOL (SEE CREOLS (ALL ISOMERS))	CRS	1.05	5,000	5,123	OK
CREOLS WITH 5% OR MORE PHENOL (SEE PHENOL)	CRS	1.05	5,000	5,123	OK
CRESYLATE SPENT CAUSTIC	CFP	1.07	5,000	5,172	OK
CRESYLIC ACID, SODIUM SALT SOLUTION, SEE CRESYLATE SPENT CAUSTIC	CSC	1.55	5,000	6,225	OK
CROTONALDEHYDE.	CAX (TAR ?)				
CYCLOHEXANONE	CTA	0.85	5,000	4,610	OK
CYCLOHEXYLAMINE	CCH	0.95	5,000	4,873	OK
DECYL ACRYLATE (iso-, n-)	CHA	0.87	5,000	4,664	OK
DICHLOROBENZENE (ALL ISOMERS)	DAT	0.89	5,000	4,717	OK
1,1-DICHLOROETHANE	DBX	1.30	5,000	5,701	OK
2,2-DICHLOROETHYL ETHER	DCH	1.18	5,000	5,431	OK
DICHLOROMETHANE (ALSO KNOWN AS METHYLENE CHLORIDE)	DDE	1.22	5,000	5,523	OK
2,4-DICHLOROPHENOXYACETIC ACID DIETHANOLAMINE SALT SOLUTION	DCH	1.32	5,000	5,745	OK
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION	DDB				
2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	DAD				
1,1-,1,2- OR 1,3- DICHLOROPROPANE	DTI				
1,3-DICHLOROPROPENE	DFX	1.16	5,000	5,385	OK
DICHLOROPROPENE, DICHLOROPROPANE MIXTURES	DFU	1.23	5,000	5,545	OK
	DMX	1.21	5,000	5,500	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 "TARGET" MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (Ps/v) 1,750 PSIG
 (Pp/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Qv)max 6,750 BPH

CARGO	C H R I S	LIQUID	CARGO	EQUIVALENT	Qv <= (Qv) max
		SPECIFIC GRAVITY (1)	MAX LIQUID TRANSFER RATE (Q1) (BPH)	WATER LIQUID TRANSFER RATE (BPH)	
2,2-DICHLOROPROPIONIC ACID	DCN				
DIETHANOLAMINE	DEA	1.09	5,000	5,220	OK
DIETHYLAMINE	DEN	0.71	5,000	4,213	OK
DIETHYLENTRIAMINE	DET	0.96	5,000	4,899	OK
DIETHYL ETHER, SEE ETHYL ETHER	DEH				
DIISOBUTYLAMINE	DBU	0.75	5,000	4,330	OK
DIISOPROPANOLAMINE	DIP	0.98	5,000	4,950	OK
DIISOPROPYLAMINE	DIA	0.72	5,000	4,243	OK
N,N-DIMETHYLACETAMIDE	DAC	0.95	5,000	4,873	OK
DDIMETHYLETHANOLAMINE	DMB	0.89	5,000	4,717	OK
DDIMETHYLFORMAMIDE	DMP	0.95	5,000	4,873	OK
1,4-DIOXANE	DOX	1.04	5,000	5,099	OK
DI-N-PROPYLAMINE	DNA	0.74	5,000	4,301	OK
ETHANOLAMINE	MEA	1.02	5,000	5,050	OK
ETHYL ACRYLATE	EAC	0.93	5,000	4,822	OK
ETHYLAMINE SOLUTION (72% OR LESS)	EAN	0.80	5,000	4,472	OK
N-ETHYLBUTYLAMINE	EBA	0.74	5,000	4,301	OK
N-ETHYLCYCLOHEXYLAMINE	ECC	0.86	5,000	4,637	OK
ETHYLENE CYANOHYDRIN	ETC	1.04	5,000	5,099	OK
ETHYLENEDIAMINE	EDA	0.91	5,000	4,770	OK
ETHYLENE DIBROMIDE	EDB	2.17	4,582	6,750	OK
ETHYLENE DICHLORIDE	EDC	1.26	5,000	5,612	OK
ETHYLENE GLYCOL PROPYL ETHER	EGP	0.91	5,000	4,770	OK
2-ETHYLHEXYL ACRYLATE	EAI	0.89	5,000	4,717	OK
ETHYLIDENE NORBORNENE	ENB	0.90	5,000	4,743	OK
ETHYL METHACRYLATE	ETM	0.92	5,000	4,796	OK
2-ETHYL-3-PROPYLACROLEIN	EPA	0.85	5,000	4,610	OK
FERRIC CHLORIDE SOLUTIONS	PCS				
FORMALDEHYDE SOLUTION (37% TO 50%)	FMS	1.13	5,000	5,315	OK
FORMIC ACID	FMA	1.22	5,000	5,523	OK
FORMAL	FFA	1.20	5,000	5,477	OK
GLUTARALDEHYDE SOLUTION (50% OR LESS)	GTA				
HEXAMETHYLENEDIAMINE SOLUTION	HMC	0.93	5,000	4,822	OK
HEXAMETHYLENEMINE	HMI	0.88	5,000	4,690	OK
HYDROCHLORIC ACID SPENT (15% OR LESS)	HCS	1.21	5,000	5,500	OK
ISOPENTALDEHYDE (MIXED ISOMERS) (SEE VALERALDEHYDE (ISO-, N-))	IPR	0.69	5,000	4,153	OK
ISOPRENE	GREKPL				
KRAFT PULPING LIQUORS (FREE ALKALI CONTENT 3% OR MORE) (INCLUDING: BLACK, GREY)	MEO	0.86	5,000	4,637	OK
MESITYL OXIDE	MAM	0.95	5,000	4,873	OK
METHYL ACRYLATE	MCK	0.94	5,000	4,848	OK
METHYLCYCLOPENTADIENE DIMER	MDE	1.04	5,000	5,099	OK
METHYL DIETHANOLAMINE	MEP	0.92	5,000	4,796	OK
2-METHYL-5-ETHYLPYRIDINE	MMH	0.94	5,000	4,848	OK
METHYLENE CHLORIDE (SEE DICHLOROMETHANE)	MFR	0.95	5,000	4,873	OK
METHYL METHACRYLATE	MER	0.89	5,000	4,717	OK
2-METHYLPYRIDINE	MPL	1.00	5,000	5,000	OK
alpha-METHYLSTYRENE	MCD				
MORPHOLINE	NPM	0.99	5,000	4,975	OK
NITRIC ACID (70% OR LESS)	ONE	1.00	5,000	5,000	OK
NITROPROPANE (-1, OR -2)	OLM	1.98	4,797	6,750	OK
NITROPROPANE (ALL ISOMERS)	PCE	1.67	5,000	6,461	OK
OCTYL NITRATES (ALL ISOMERS)	PDE	0.68	5,000	4,123	OK
OLEUM	PER	1.62	5,000	6,364	OK
PENTACHLOROETHANE					
1,3-PENTADIENE					
PERCHLOROETHYLENE (SAME AS TETRACHLOROETHYLENE)					

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809, CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 "TARGET" MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (Ps/v) 1,750 PSIG
 (Pp/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Qv)max 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY	CARGO MAX LIQUID TRANSFER RATE (Q1)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{1.5}	Qw <= (Qv) max
PHOSPHORIC ACID					
POLYETHYLENE POLYAMINES	PAC	1.83	4,990	6,750	OK
POLYMETHYLENE POLYPHENYL ISOCYANATE	PEB	0.99	5,000	4,975	OK
POTASSIUM HYDROXIDE SOLUTION (SEE CAUSTIC POTASH SOLUTION)	PPI	1.20	5,000	5,477	OK
iso-PROPANOLAMINE					
PROPANOLAMINE (iso-, n-)	MPA	0.96	5,000	4,899	OK
PROPIONIC ACID	PAX	0.96	5,000	4,899	OK
iso-PROPYLAMINE	PKA	1.00	5,000	5,000	OK
iso-PROPYL ETHER	IPP	0.69	5,000	4,153	OK
PYRIDINE	IPE	0.72	5,000	4,243	OK
SODIUM ALUMINATE SOLUTION	PRD	0.98	5,000	4,950	OK
SODIUM CHLORATE SOLUTION (50% OR LESS)	SAU				
SODIUM DICHROMATE SOL'N (70% OR LESS)	SDD	1.63	5,000	6,384	OK
SODIUM HYDROXIDE SOLUTION (SEE CAUSTIC SODA SOLUTION)	SDL				
SODIUM HYPOCHLORITE SOL'N (15% OR LESS)					
SODIUM SULFIDE, HYDROSULFIDE SOLUTIONS (H2S 15 PPM OR LESS)	SHP	1.10	5,000	5,244	OK
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (15 PPM < H2S < 200 PPM)	SSH	1.32	5,000	5,745	OK
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (H2S GREATER THAN 200 PPM)	SSI	1.32	5,000	5,745	OK
SODIUM THIOCYANATE SOLUTION (56% OR LESS)	SSJ	1.32	5,000	5,745	OK
STYRENE MONOMER	STS				
SULFURIC ACID	STY	0.92	5,000	4,796	OK
SULFURIC ACID, SPENT	SPA	1.84	4,976	6,750	OK
1,1,2,2-TETRACHLOROETHANE (ACETYLENE TETRACHLORIDE)	SAC	1.39	5,000	5,895	OK
TETRAETHYLENEPENTAMINE	TEC	1.59	5,000	6,311	OK
TETRAHYDROFURAN	TTP	1.00	5,000	5,000	OK
1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)	THP	0.89	5,000	4,717	OK
TRICHLOROETHANE (SEE 1,1,2-TRICHLOROETHANE)	TCM	1.44	5,000	6,000	OK
TRICHLOROETHYLENE					
1,2,3-TRICHLOROPROPANE	TCL	1.46	5,000	6,042	OK
TRITHANOLAMINE	TCN	1.39	5,000	5,895	OK
TRIETHYLAMINE	TEA	1.13	5,000	5,315	OK
TRIETHYLENETETRAMINE	TEN	0.73	5,000	4,272	OK
UREA, AMMONIUM NITRATE SOL'N (CONTAINING MORE THAN 2% NH3)	TET	0.98	5,000	4,950	OK
VALERALDEHYDE (iso-, n-)	QAS				
VALERALDEHYDE (iso-)					
VALERALDEHYDE (n-)					
VANILLAN BLACK LIQUOR (FREE ALKALI CONTENT 3% OR MORE)	IVA	0.79	5,000	4,444	OK
VINYL ACETATE	VAL	0.84	5,000	4,444	OK
VINYLTOLUENE	VBL				
	VAM	0.94	5,000	4,848	OK
	VNT	0.90	5,000	4,743	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; '7027' AND '7028'

MAX DESIGN WORKING PRESS	(MDWP)	3.000 PSIG
SPILL VALVE SET PRESSURE	(Ps/v)	1.750 PSIG
CARGO TANK P/V SETTING	(Pp/v)	1.500 PSIG
"TARGET" MAX LIQUID TRANSFER RATE	(TMLTR)	5,000 BPH
SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE	(Qw) MAX	6,750 BPH

CARGO	C H R I S	LIQUID	CARGO	EQUIVALENT	Qw <= (Qw) MAX
		SPECIFIC GRAVITY (1)	MAX LIQUID TRANSFER RATE (Q1) (BPH)	WATER - LIQUID TRANSFER RATE (BPH)	

46 CFR SUBCHAPT O BUT NOT TABLE 151

1,1-DICHLOROPROPANE	DPB	1.16	5,000	5,385	OK
1,1,1-TRICHLOROETHANE				6,144	OK
1,2-DICHLOROPROPANE	DPP	1.16	5,000	5,385	OK
1,3-CYCLOPENTADIENE					
1,3-DICHLOROPROPANE					
2-METHYL-2-HYDROXY-3-BUTYNE	DPC	1.16	5,000	5,385	OK
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70% OR LESS)	MEB	0.86	5,000	4,637	OK
3-PENTAMETHYLENE	DDA				OK
AEROTHERS TT (1,1,1-TRICHLOROETHANE)	FMT (CRUDE ?)				
ALKYLBENZENE					
AMINOSTHYLPIPERAZINE	AEP				
BENZENE RAFFINATE (ASSUME VAPOR PROPERTIES SIMILAR TO BENZENE)					
BENZENE SULFONYL CHLORIDE	BSC	0.70	5,000	4,183	OK
BENZYL ACETATE	BZE	1.38	5,000	5,874	OK
BENZYL CHLORIDE (STABILIZED)	BZE	1.04	5,000	5,099	OK
BUTANOL	BCL	1.10	5,000	5,244	OK
BUTYL ESTER (n-)					
BUTYLENE OXIDE (1,2-)	BTE	0.77	5,000	4,387	OK
BUTYRIC ACID	BTO	0.83	5,000	4,555	OK
CARBOIC ACID	BRA	0.96	5,000	4,899	OK
CHLOROACETIC ACID (80% OR LESS)	CBO	1.04	5,000	5,099	OK
CHLOROPROPIONIC ACID (2- OR 3-)	CHM	1.58	5,000	6,285	OK
CHLOROTOLUENE (m-)	CPM	1.26	5,000	5,612	OK
CHLOROTOLUENE (o-)	CTM	1.07	5,000	5,172	OK
CHLOROTOLUENE (p)	CTO	1.08	5,000	5,196	OK
CHLOROTOLUENES (MIXED ISOMERS)	CRN	1.07	5,000	5,172	OK
CREOSOTE (ALL ISOMERS)	CHI	1.08	5,000	5,196	OK
CRESTYLIC ACID TAR	CCW	1.07	5,000	5,172	OK
CYCLOHEPTANE	CRK	1.05	5,000	5,123	OK
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE	CYE	0.81	5,000	4,500	OK
CYCLOHEXYL ACETATE	CYX	0.95	5,000	4,873	OK
CYCLOPENTADIENE, STYRENE, BENZENE MIXTURE	CYC	0.97	5,000	4,924	OK
CYCLOPENTANE	CSB	1.50	5,000	6,124	OK
DECANOIC ACID	CYP	0.74	5,000	4,301	OK
DI 2 ETHYLHEXYL PHTHALATE (SEE ALSO ETHYLHEXYL PHTHALATE)	DCO	5.94	2,770	6,750	OK
DICHLOROISOPROPYL ETHER (2,2'-)		0.98	5,000	4,955	OK
DICHLOROPROPANE	DCI	1.11	5,000	5,268	OK
DICHLOROPROPENE		1.16	5,000	5,385	OK
DIETHYL SULFATE		1.23	5,000	5,545	OK
DIETHYLETHANOLAMINE	DSU	1.18	5,000	5,431	OK
DODECYL BENZENE	DAE	0.89	5,000	4,717	OK
DODECYLDIMETHYLAMINE TETRADECYLDIMETHYLAMINE MIXTURE					
DRIFOLENE	DOT				
ETHANOL (see ethyl alcohol)					
ETHYL BROMIDE					
ETHYL TERT-BUTYL ETHER					
ETHYLAMINE	EBE	0.73	5,000	4,272	OK
ETHYLENE DICHLORIDE 1,1,2-TRICHLOROETHANE MIXTURE	EAM	0.80	5,000	4,472	OK
ETHYLAMERCAPTAN (SAME AS ETHANETHIOL)	ETX	1.44	5,000	6,000	OK
ETHYLPHENOL					
FORMALDEHYDE SOLUTION (50% OR MORE), METHANOL MIXTURES	EPL	1.04	5,000	5,099	OK
HYDROSULFIDE	MTM	0.79	5,000	4,444	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 "TARGET" MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3.000 PSIG
 (Ps/v) 1.750 PSIG
 (Pp/v) 1.500 PSIG
 (TMLTR) 5,000 BPH
 (Qv)max 6,750 BPH

CARGO

C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{0.5} (BPH)	Qw <= (Qv) max
-----------------------	--------------------------------------	---	--	----------------

46 CFR SUBCHAPTER D, TABLE 30.25-1

Acetone				
Acetophenone	ACT	0.79	5,000	4,450 OK
Acetyl Tributyl Citrate	ACP	1.03	5,000	5,065 OK
Acrylonitrile-Styrene Copolymer dispersion in Polyether Polyol		1.05	5,000	5,114 OK
Alcohols (C13 and above)	ALE			
Alcoholic beverages, N.O.S.	ALY			
Alcohol (C6 - C17) (secondary) Poly(3-6)ethoxylates				
Alcohol (C12 - C15) Poly(1-3)ethoxylates				
Alcohol (C12 - C15) Poly(3-11)ethoxylates				
Alkenylsuccinic acid				
Alkenylsuccinic Anhydride				
Alkyl (C9 - C17) Benzenes				
Alkylbenzenesulfonic acid (4% or less)	AKB			
Alkyl Phthalates (n-)	ABS			
Alkyl Succinate Formaldehyde Hydr- oxyamino condensate (3.2% or less)				
Aminoethyldiethanolamine, Aminoethylethanolamine solution				
Amyl Acetate (commercial, iso-, n-, sec-)				
AMYL ACETATE (n-)	ABC	0.87	5,000	4,664 OK
AMYL ACETATE (iso-)	AMC	0.88	5,000	4,690 OK
Amyl alcohol (iso-, n-, sec-, primary) (SEE ALSO IAA)	IAT	0.88	5,000	4,690 OK
Amyl alcohol (n-)	AAI	0.82	5,000	4,528 OK
Amyl alcohol (tert-)	AAN	0.82	5,000	4,528 OK
AMYL ALCOHOL, PRIMARY	AAJ			
AMYL ALCOHOL, (sec-)	APM	0.82	5,000	4,528 OK
Amylene	ASE	0.82	5,000	4,528 OK
AMYL ALCOHOL, (iso-)	AMZ			
Amyl Methyl Ketone	IAA	0.82	5,000	4,528 OK
Amyl Tallate	AMK			
Asphalt				
ASPHALT BLENDING STOCKS: Roofers flux	ASP	1.04	5,000	5,087 OK
ASPHALT BLENDING STOCKS: Straight run residue	ARF			
Behenyl alcohol	ASR			
Benzene Tricarboxylic acid Trioctyl Ester				
Benzyll alcohol				
Bicyclic Terpenel Polyamide salt	BAL	1.05	5,000	5,123 OK
Brake fluid base mixtures (containing Poly(2-8)alkylene (C2-C3) glycols, Pol	BPX			
Butane				
Butene, SEE BUTYLENE				
Butene Oligomer	BMX	1.03	5,000	5,074 OK
Butyl Acetate (iso-, n-)	BOL			
BUTYL ACETATE (N-)	BAX	0.87	5,000	4,664 OK
Butyl Acetate (sec-)	BCN	0.88	5,000	4,690 OK
Butyl alcohol (iso-, n-, sec-, tert-)	STA	0.89	5,000	4,717 OK
BUTYL ALCOHOL (ISO-)				
BUTYL ALCOHOL (N-)	IAL	0.81	5,000	4,500 OK
BUTYL ALCOHOL (SEC-)	BAW	0.81	5,000	4,500 OK
BUTYL ALCOHOL (TERT-)	BAS	0.81	5,000	4,500 OK
Butyl Benzyl Phthalate	BAT	0.78	5,000	4,416 OK
Butylene	BPH	1.12	5,000	5,292 OK
Butylene Glycol	BTW			
1,3-Butylene Glycol, SEE BUTYLENE GLYCOL	BUG			
Butylene Polyglycol, SEE BUTYLENE GLYCOL				

CALCULATIONS FOR CAPACITY OF SPILL VALVE
BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS (MDWP) 3,000 PSIG
 SPILL VALVE SET PRESSURE (Ps/v) 1,750 PSIG
 CARGO TANK P/V SETTING (Pp/v) 1,500 PSIG
 "TARGET" MAX LIQUID TRANSFER RATE (TMLTR) 5,000 BPH
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE (Qv) max 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw=(Q1)*SG1*.5 (BPH)	Qw<=(Qv) max
iso-Butyl Formate					
n-Butyl Formate					
Butyl Heptyl Ketone					
Butyl Methyl Ketone, SEE METHYL BUTYL KETONE	BHK				
Butyl Stearate					
Butyl Toluene					
Butyrolactone (gamma)	BOE	0.85	5,000	4,610	OK
Calcium Alkylphenate	BLA				
Calcium Alkyl Salicylate					
Calcium Amino Nonyl Phenolate					
Calcium Carboxylate					
Caprolactam solutions					
Carbon black base	CLS	1.02	5,000	5,050	OK
Cetyl alcohol (HEXADECANOL) SEE ALCOHOLS (C13 AND ABOVE)		0.90	5,000	4,743	OK
Cetyl-Stearal alcohol					
Cleaning spirit (unleaded)					
Coal tar					
Cumene	COR	1.11	5,000	5,268	OK
Cycloaliphatic resins	COM	0.86	5,000	4,640	OK
Cyclohexane					
Cyclohexanol	CHK	0.78	5,000	4,413	OK
1,3-Cyclopentadiene dimer (molten)	CHN	0.95	5,000	4,873	OK
Cyclopentadiene polymers, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	CPD	0.69	5,000	4,153	OK
Cymene (para-)					
Decahydronaphthalene	CHP	0.86	5,000	4,637	OK
Decaldehyde (iso-)	CHN	0.89	5,000	4,717	OK
Decaldehyde (n-)	IDA	0.83	5,000	4,555	OK
Decane	DAL	0.83	5,000	4,555	OK
Decene	DDC				
Decyl alcohol (all isomers) (DECANOL)	DCE	0.74	5,000	4,301	OK
DECYL ALCOHOL (iso-)	DAK	0.83	5,000	4,555	OK
DECYL ALCOHOL (n-)	ISA	0.83	5,000	4,555	OK
Decylbenzene (n-)	DAN	0.83	5,000	4,555	OK
Detergent Alkylate	DBZ	0.86	5,000	4,637	OK
Diacetone alcohol					
Dialkyl (C10-C14) Benzenes	DAA	0.97	5,000	4,933	OK
Dialkyl (C7-C13) Phthalates	DAB				
Dibutyl Carbinol	DAR				
Dibutyl Phthalate (ortho-)					
Dicyclopentadiene, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	DPA	1.05	5,000	5,123	OK
Diethylbenzene	DPT	0.98	5,000	4,950	OK
Diethylene Glycol	DEB	0.87	5,000	4,664	OK
Diethylene Glycol Butyl Ether	DEG	1.12	5,000	5,292	OK
Diethylene Glycol Butyl Ether Acetate	DME	0.95	5,000	4,873	OK
Diethylene Glycol Dibutyl Ether	DEM				
Diethylene Glycol Diethyl Ether	DIG				
Diethylene Glycol Ethyl Ether					
Diethylene Glycol Ethyl Ether Acetate	DGE				
Diethylene Glycol Methyl Ether	DGA	0.99	5,000	4,975	OK
Diethylene Glycol Methyl Ether Acetate	DGM	1.03	5,000	5,074	OK
Diethylene Glycol Phenyl Ether	DGR				
Diethylene Glycol Phthalate	DGP				
Di-(2-ethylhexyl) adipate	DGL				
Di-(2-ethylhexyl) phthalate	DEN				
Diethyl Phthalate	DIE				
	DPH				

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS	(MDWP)	3,000 PSIG
SPILL VALVE SET PRESSURE	(Ps/v)	1,750 PSIG
CARGO TANK P/V-SETTING	(Pp/v)	1,500 PSIG
"TARGET" MAX LIQUID TRANSFER RATE	(TMLTR)	5,000 BPH
SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE	(Qw) MAX	6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE $Q_w = (Q1) \cdot SG1^{0.5}$ (BPH)	Qw <= (Qw) MAX
Diglycidyl Ether of Bisphenol A	DEE				
Diheptyl Phthalate	DEP				
Dihexyl Phthalate	DEA				
Diisobutylcarbinol	DBC	0.81	5,000	4,500	OK
Diisobutylene	DBL	0.72	5,000	4,243	OK
Diisobutyl Ketone	DIK	0.81	5,000	4,500	OK
Diisobutyl Phthalate	DIT				
Diisodecyl Phthalate	DID				
Diisononyl Adipate	DMY				
Diisononyl Phthalate	DIN				
Diisocetyl Phthalate	DIO				
Diisopropylbenzene (all isomers)	DIX	0.86	5,000	4,637	OK
Diisopropyl Naphthalene	DII				
Dimethyl Adipate	DLA				
Dimethylbenzene					
Dimethyl Glutarate	DGT				
Dimethyl Phthalate	DTL	1.19	5,000	5,454	OK
Dimethyl Polysiloxane	DMP				
2,2-Dimethylpropane-1,3-diol	DDI				
Dimethyl Succinate	DSE				
Dinonyl Phthalate	DIP	0.97	5,000	4,924	OK
Di(octylphenyl)amine					
Diocetyl Phthalate	DOP	0.98	5,000	4,950	OK
Dipentene	DPN	0.84	5,000	4,583	OK
Diphenyl	DIL	0.99	5,000	4,975	OK
Diphenyl, Diphenyl Ether mixture	DDO	1.07	5,000	5,172	OK
Diphenyl Ether	DPE	1.07	5,000	5,172	OK
Diphenyl Ether, Biphenyl Ether mixture	DOB				
Dipropylene Glycol	DPG	1.03	5,000	5,074	OK
Dipropylene Glycol Dibenzoate	DGY				
Dipropylene Glycol Methyl Ether	DPY				
DISTILLATES: Flashed feed stocks	DFF	0.75	5,000	4,330	OK
DISTILLATES: Straight run	DSR	0.73	5,000	4,272	OK
Ditridecyl Phthalate	DTP				
Diundecyl Phthalate	DUP				
Dodecane (all isomers)	DOC				
Dodecanol	DEW				
Dodecene (all isomers)	DOZ	0.76	5,000	4,359	OK
DODECENE	DCD	0.76	5,000	4,359	OK
Dodecylbenzene	DOB	0.86	5,000	4,637	OK
Dodecyl Phenol	DOL				
Drilling mud (low toxicity) (if flammable or combustible)/					
Epoxyated linear alcohols, C11-C15					
Ethane	ETH	0.47	5,000	3,410	OK
2-Ethoxyethanol	EEO	1.04	5,000	5,099	OK
2-Ethoxyethyl Acetate	EEA	1.04	5,000	5,099	OK
Ethoxyated alcohols, C11-C15, SEE THE ALCOHOL POLYETHOXYLATES					
Ethoxy Triglycol (crude)	ETG	1.02	5,000	5,050	OK
Ethyl Acetate	ETA	0.90	5,000	4,743	OK
Ethyl Acetoacetate	EAA	1.03	5,000	5,074	OK
Ethyl alcohol (ETHANOL)	EAL	0.79	5,000	4,441	OK
Ethyl Amyl Ketone	EAK				
Ethyl Benzene	ETB	0.87	5,000	4,664	OK
Ethyl Butanol	ETB	0.83	5,000	4,555	OK
Ethyl Butyrate	EBR	0.88	5,000	4,690	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; *7027* AND *7028*

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 TARGET MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (P₀/v) 1,750 PSIG
 (P_p/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Q_w)_{max} 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY	CARGO MAX LIQUID TRANSFER RATE (Q _L)	EQUIVALENT WATER LIQUID TRANSFER RATE Q _w = (Q _L) * SG _L ^{0.5}	Q _w <= (Q _w) _{max}
Ethyl Cyclohexane	ECY	0.79	5,000	4,444	OK
Ethylene	ETL				
Ethylene Carbonate					
Ethylene Glycol					
Ethylene Glycol Acetate	EGL	1.13	5,000	5,315	OK
Ethylene Glycol Butyl Ether	EGO				
ETHYLENE GLYCOL BUTYL ETHER ACETATE	EGM				
Ethylene Glycol Ether Acetate	EGA	0.94	5,000	4,848	OK
Ethylene Glycol Tert-Butyl Ether					
Ethylene Glycol Diacetate					
Ethylene Glycol Dibutyl Ether	EGY	1.10	5,000	5,244	OK
Ethylene Glycol Ethyl Ether, SEE 2-ETHOXYETHANOL	EGE				
Ethylene Glycol Ethyl Ether Acetate, SEE 2-ETHOXYETHYL ACETATE	EGP				
Ethylene Glycol Isopropyl Ether	EGA				
Ethylene Glycol Methyl Butyl Ether	EGI				
Ethylene Glycol Methyl Ether					
Ethylene Glycol Methyl Ether Acetate	EME	1.10	5,000	5,244	OK
Ethylene Glycol Phenyl Ether	EGT				
Ethylene Glycol Phenyl Ether, Diethylene Glycol Phenyl Ether mixture	EPE	1.10	5,000	5,244	OK
Ethylene-Propylene Copolymer (in liquid mixtures)	EDX				
Ethyl-3-Ethoxypropionate					
2-Ethylhexaldehyde, SEE OCTYL ALDEHYDES	EEP				
2-Ethylhexanoic acid	EHA	0.82	5,000	4,528	OK
2-Ethylhexanol, SEE OCTANOL (ALL ISOMERS)	EHO				
Ethylhexoic acid, SEE 2-ETHYLHEXANOIC ACID	EHX	0.84	5,000	4,583	OK
Ethyl Hexyl Phthalate (SEE ALSO DI 2-ETHYLHEXYL PHTHALATE)					
Ethyl Hexyl Tallate	EHE				
Ethyl Propionate	EHT				
Ethyl Toluene	EPR	0.89	5,000	4,717	OK
Fatty acid (saturated, C13 and above)	ETE	0.88	5,000	4,690	OK
Fatty acid Amides					
Formamide					
Furfuryl Alcohol	FAM	1.13	5,000	5,315	OK
Gas oil, cracked	FAL	1.13	5,000	5,315	OK
GASOLINE BLENDING STOCKS: Alkylates	GOC				
GASOLINE BLENDING STOCKS: Reformates	GAK	0.75	5,000	4,330	OK
GASOLINES: Automotive (containing not over 4.23 grams lead per gallon)	GRF	0.80	5,000	4,472	OK
GASOLINES: Aviation (containing not over 4.86 grams lead per gallon)	GAT	0.74	5,000	4,301	OK
GASOLINES: Aviation (containing not over 4.86 grams lead per gallon) Aviatio	GAV	0.71	5,000	4,213	OK
GASOLINES: Casinghead (natural)	GCS	0.67	5,000	4,093	OK
GASOLINES: Polymer	GPL	0.75	5,000	4,330	OK
GASOLINES: Straight run	GSR	0.75	5,000	4,330	OK
Glycerine	GCR	1.26	5,000	5,612	OK
Glycerol, SEE GLYCERINE					
Glycerol Polyalkoxylate					
Glycerol Triacetate					
Glycidyl Ester of Tertiary Carboxylic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETIC ACID					
Glycidyl Ester of Tridacyl Acetic acid					
Glycidyl Ester of Versatic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETIC ACID	GLT				
Glycol Diacetate, SEE ETHYLENE GLYCOL DIACETATE					
Glycols, Resins and Solvents mixtures					
Gylcol Triacetate, SEE GLYCERYL TRIACETATE					
Glyoxal solution (40% or less)					
Grease					
Heptadecane					
Heptane (all isomers) (METHYLCYCANE)	HMX	0.68	5,000	4,135	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; *7027* AND *7028*

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 TARGET MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3.000 PSIG
 (Ps/v) 1.750 PSIG
 (Pp/v) 1.500 PSIG
 (TMLTR) 5,000 BPH
 (Qv)max 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE $Q_w = (Q1) * SG1^{.5}$ (BPH)	Qw <= (Qv) max
HEPTANE (N-)					
Heptanoic acid	HPT	0.68	5,000	4,123	OK
Heptanol (all isomers)	HEP	0.92	5,000	4,796	OK
HEPTANOL	HTX	0.82	5,000	4,528	OK
Heptene (all isomers)	HTN	0.82	5,000	4,528	OK
HEPTENE (1-)	HPK	0.70	5,000	4,183	OK
Heptyl Acetate	HTE	0.70	5,000	4,183	OK
Herbicide (C15 -H22 -NO2 -CI), SEE METOLACHLOR	HPE	0.88	5,000	4,690	OK
Hexaethylene Glycol					
Hexamethylene Glycol					
Hexamethylenetetramine solutions					
Hexane (all isomers)	HTS				
HEXANE	HXS	0.66	5,000	4,062	OK
Hexanoic acid	HXA	0.66	5,000	4,062	OK
Hexanol	HXO	0.93	5,000	4,822	OK
Hexene (all isomers)	HXN	0.82	5,000	4,528	OK
HEXENE (1-)	HEX	0.67	5,000	4,093	OK
HEXENE (2-)	HXE	0.67	5,000	4,093	OK
Hexyl Acetate	HXT	0.67	5,000	4,093	OK
Hexylene Glycol	HAE				
Hog Grease, SEE LARD	HAG	0.92	5,000	4,796	OK
2-Hydroxy-4-(methylthio)butanoic acid	HBA				
HYDROCARBON 5-9 (MOVED TO SUB-0, NON TABLE 151, 6/24/95)	HPN				
Hydroxy terminated Polybutadiene, SEE POLYBUTADIENE, HYDROXYL TERMINATED/					
Isophorone	IPH	0.93	5,000	4,822	OK
JET FUELS: JP-1 (Kerosene)	JPO	0.80	5,000	4,472	OK
JET FUELS: JP-3	JPT	0.80	5,000	4,472	OK
JET FUELS: JP-4	JPP	0.81	5,000	4,500	OK
JET FUELS: JP-5 (Kerosene, heavy)	JPV	0.82	5,000	4,528	OK
JET FUELS: JP-8	JPE				
Kerosene	KRS	0.81	5,000	4,500	OK
Lactic acid					
Lard					
Latex, liquid synthetic, including: Styrene-Butadien rubber	LLS				
Latex, liquid synthetic, including: Carboxylated Styrene-Butadien Copolymer					
Magnesium Nonyl Phenol Sulfide					
Magnesium Sulfonate	MSE				
Maleic Anhydride Copolymer					
2-Mercaptobenzothiazol (in liquid mixtures)					
Methane	MTH				
3-Methoxy-1-Butanol					
3-Methoxybutyl Acetate	MOA				
1-Methoxy-2-Propyl Acetate	MPO				
Methoxy Triglycol, SEE TRIETHYLENE GLYCOL METHYL ETHER	MTG				
Methyl Acetate	MTT	0.92	5,000	4,796	OK
Methyl Acetoacetate	MAE				
Methyl alcohol (SEE METHANOL)	MAL	0.79	5,000	4,444	OK
Methyl Amyl Acetate	MAC	0.86	5,000	4,637	OK
Methyl Amyl alcohol	MAA	0.81	5,000	4,500	OK
Methyl Amyl Ketone	MAK				
Methyl Butanol, SEE THE AMYL ALCOHOLS					
Methyl Butanol	MBL				
Methyl n-Butyl, Ketone	MBK	0.81	5,000	4,500	OK
Methyl Butynol	MBY				
Methyl Butyrate	MBU	0.90	5,000	4,743	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESSURE
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 TARGET MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3.000 PSIG
 (Ps/v) 2.750 PSIG
 (Pp/v) 1.500 PSIG
 (TMLTR) 5,000 BPH
 (Qv)max 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{0.5} (BPH)	Qw <= (Qv) max
Methyl Ethyl Ketone	MEK	0.80	5,000	4,472	OK
Methyl Formal (DIMETHYL FORMAL)	MTP	0.86	5,000	4,637	OK
Methyl Neptyl Ketone	MHK	0.83	5,000	4,555	OK
Methyl Isobutyl Carbinol, SEE METHYL AMYL ALCOHOL	MIC	0.84	5,000	4,583	OK
Methyl Isobutyl Ketone	MIK	0.80	5,000	4,472	OK
3-Methyl-3-Methoxybutanol					
3-Methyl-3-Methoxybutyl Acetate					
1-Methyl Naphthalene					
Methyl Pentene	MNA	1.02	5,000	5,050	OK
2-METHYL-1-PENTENE					
5-METHYL-1-PENTENE	MPN	0.69	5,000	4,153	OK
N-Methyl-2-Pyrrolidone	MTN	0.67	5,000	4,093	OK
Methyl Tert-Butyl Ether (MTBE)	MPY				
Metolachlor	MBE	0.74	5,000	4,301	OK
Mineral spirits	MCO				
Myrcene	MNS	0.75	5,000	4,330	OK
NAPHTHA: Aromatic (Having less than 10% Benzene)	MRE	0.80	5,000	4,472	OK
NAPHTHA: Cracking fraction		.6 - .85			
NAPHTHA: Heavy		.6 - .85			
NAPHTHA: Paraffinic		.6 - .85			
NAPHTHA: Petroleum		.6 - .85			
NAPHTHA: Solvent	PTN	.6 - .85			
NAPHTHA: Stoddard solvent	NSV	0.87	5,000	4,664	OK
NAPHTHA: Varnish makers' and painters' (75%)	NSS	0.78	5,000	4,416	OK
Naphthalene Sulfonic acid-Formaldehyde Copolymer, Sodium salt solution	NVM	0.77	5,000	4,387	OK
Naphthenic acid	NPS				
Nonane (all isomers)	NTI	1.02	5,000	5,050	OK
NONANE	NAX	0.72	5,000	4,243	OK
Nonanoic acid (all isomers)	NAN	0.72	5,000	4,243	OK
Nonanoic, Tridecanoic acid mixture	NDA				
Nonene					
Nonyl alcohol (all isomers)	NON	0.73	5,000	4,272	OK
NONYL ALCOHOL	NNS	0.94	5,000	4,848	OK
NONYL ALCOHOL (iso-)	NNN	0.94	5,000	4,848	OK
Nonyl Methacrylate Monomer	NNI	0.94	5,000	4,848	OK
Nonyl Phenol					
Nonyl Phenol Poly(4-12)ethoxylates	NWP	0.95	5,000	4,873	OK
Nonyl Phenol Sulfide (90% or less)	NPE				
Noxious liquid, N.O.S. (17) ("Trade name," contains principal components), Category D (i)					
Non-Noxious liquid, N.O.S. (18) ("Trade name," contains principal components), Appendix					
Octadecene					
Octadecenoamide solution (Oleamide)	ODD				
Octane (all isomers)	OAX	0.70	5,000	4,183	OK
OCTANE	OAN	0.70	5,000	4,183	OK
Octanoic acid (all isomers)	OAA	0.91	5,000	4,770	OK
Octanol (all isomers)	OAK	0.83	5,000	4,555	OK
OCTANOL	OTA	0.83	5,000	4,555	OK
Octene (all isomers)	OTX	0.72	5,000	4,243	OK
OCTENE (1-)	OTE	0.72	5,000	4,243	OK
Octyl Acetate					
Octyl alcohol (iso-, n-) (all isomers), SEE OCTANOL (ALL ISOMERS)	OCC	0.83	5,000	4,555	OK
OCTYL ALCOHOL	IOA	0.83	5,000	4,555	OK
Octyl Aldehydes	OAL				
Octyl Decyl Adipate	OAA				
Octyl Epoxyallate	OET				

CALCULATIONS FOR CAPACITY OF SPILL VALVE
BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 "TARGET" MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3.000 PSIG
 (Ps/v) 1.750 PSIG
 (Pp/v) 1.500 PSIG
 (TMLTR) 5,000 BPH
 (Qv) max 6,750 BPH

CARGO	C E R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE $Q_w = (Q1) \cdot SG1^{.5}$ (BPH)	Qw < (Qv) max
Octyl Phthalate. SEE DI-(2-ETHYLHEXYL) PHTHALATE					
OIL, EDIBLE: Babassu	OB				
OIL, EDIBLE: Beechnut					
OIL, EDIBLE: Castor					
OIL, EDIBLE: Cocoa butter	OCA				
OIL, EDIBLE: Coconut					
OIL, EDIBLE: Cod liver	OCC	0.95	5,000	4,884	OK
OIL, EDIBLE: Corn					
OIL, EDIBLE: Cottonseed	OCO	0.96	5,000	4,886	OK
OIL, EDIBLE: Fish, N.O.S.	OCS				
OIL, EDIBLE: Grapeseed	OPS	0.96	5,000	4,899	OK
OIL, EDIBLE: Groundnut					
OIL, EDIBLE: Hazelnut					
OIL, EDIBLE: Lard					
OIL, EDIBLE: Maize					
OIL, EDIBLE: Mustard seed	OLD				
OIL, EDIBLE: Nutmeg Butter					
OIL, EDIBLE: Olive					
OIL, EDIBLE: Palm	OOL				
OIL, EDIBLE: Palm kernel	OPM				
OIL, EDIBLE: Peanut	OPO				
OIL, EDIBLE: Poppy	OPW				
OIL, EDIBLE: Raisin seed					
OIL, EDIBLE: Rice bran					
OIL, EDIBLE: Safflower	ORP				
OIL, EDIBLE: Salad	OSP				
OIL, EDIBLE: Sesame					
OIL, EDIBLE: Soya bean					
OIL, EDIBLE: Sunflower, SEE SUNFLOWER SEED	OSB	0.96	5,000	4,899	OK
OIL, EDIBLE: Sunflower seed		0.95	5,000	4,873	OK
OIL, EDIBLE: Tucum	OSN				
OIL, EDIBLE: Vegetable, N.O.S.	OTC				
OIL, EDIBLE: Walnut	OVG	0.96	5,000	4,899	OK
OIL, FUEL: No. 1 (Kerosene)					
OIL, FUEL: No. 1-D	OCN				
OIL, FUEL: No. 2	OOD				
OIL, FUEL: No. 2-D	OTW	0.88	5,000	4,690	OK
OIL, FUEL: No. 4	OTD				
OIL, FUEL: No. 5	OFR	0.90	5,000	4,743	OK
OIL, FUEL: No. 6	OFV	0.94	5,000	4,848	OK
OIL, MISC: Absorption	OSX	0.95	5,000	4,873	OK
OIL, MISC: Aliphatic	OAS				
OIL, MISC: Animal, N.O.S.					
OIL, MISC: Aromatic					
OIL, MISC: Aviation P2300					
OIL, MISC: Clarified					
OIL, MISC: Coal	OCP				
OIL, MISC: Coconut oil, esterified, SEE COCONUT OIL, FATTY ACID METHYL ESTER					
OIL, MISC: Coconut oil, fatty acid					
OIL, MISC: Coconut oil, fatty acid Methyl Ester					
OIL, MISC: Coconut oil, Methyl Ester, SEE COCONUT OIL FATTY ACID METHYL ESTER	OCM				
OIL, MISC: Cottonseed, fatty acid, SEE COTTONSEED OIL, FATTY ACID	CFY	0.95	5,000	4,873	OK
OIL, MISC: Croton					
OIL, MISC: Crude	OIL	0.95	5,000	4,873	OK
OIL, MISC: Diesel	ODS	0.90	5,000	4,743	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS

SPILL VALVE SET PRESSURE

CARGO TANK P/V SETTING

"TARGET" MAX LIQUID TRANSFER RATE

SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (Ps/v) 1,750 PSIG
 (Pp/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Qv) max 6,750 BPH

CARGO	C H R I S	LIQUID SPECIFIC GRAVITY (1)	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE $Q_w = (Q1) \cdot SG1^{.5}$ (BPH)	OK	$Q_w \leq (Q_v)_{max}$
OIL, MISC: Gas, low pour						
OIL, MISC: Gas, low sulfur						
OIL, MISC: Heartcut distillate						
OIL, MISC: Lanolin						
OIL, MISC: Linseed						
OIL, MISC: Lubricating						
OIL, MISC: Mineral						
OIL, MISC: Mineral seal	OLB	0.90	5,000	4,743	OK	
OIL, MISC: Motor						
OIL, MISC: Neefsfoot	OMS					
OIL, MISC: Oiticica	OMT					
OIL, MISC: Palm oil, fatty acid Methyl Ester	OMF					
OIL, MISC: Palm oil, Methyl Ester, SEE SEE PALM OIL, FATTY ACID METHYL ESTER	OOI					
OIL, MISC: Penetrating	OPE	0.95	5,000	4,873	OK	
OIL, MISC: Perilla	OPT					
OIL, MISC: Pilchard						
OIL, MISC: Pine						
OIL, MISC: Range	OPI					
OIL, MISC: Residual	ORG					
OIL, MISC: Resin						
OIL, MISC: Resinous petroleum	ORS	1.02	5,000	5,050	OK	
OIL, MISC: Road						
OIL, MISC: Rosin	ORD					
OIL, MISC: Seal	ORN					
OIL, MISC: Soapstock						
OIL, MISC: Soya bean (epoxidized)	OIS					
OIL, MISC: Sperm						
OIL, MISC: Spindle	OSP					
OIL, MISC: Spray	OSD					
OIL, MISC: Tall	OSY					
OIL, MISC: Tall, fatty acid	OTL					
OIL, MISC: Tanner's	TOP					
OIL, MISC: Transformer	OTN					
OIL, MISC: Tung	OTF					
OIL, MISC: Turbine	OTG					
OIL, MISC: Whale	OTB	0.87	5,000	4,664	OK	
OIL, MISC: White (mineral)						
OIL, MISC: Wood						
alpha-Olefins (C13 - C18)						
Olefins (C13 and above, all isomers)	OAM					
Oleic acid	OLA	0.72	5,000	4,243	OK	
Oleyl alcohol (OCTADECENOL), SEE ALCOHOLS (C13 AND ABOVE)						
Organic Amine 70, SEE AMINOETHYLDIETHANOLAMINE, AMINOETHYL-ETHANOLAMINE SOLUTION						
Palm Stearin						
n-Paraffins (C10 - C20)	PMS					
Pentadecanol, SEE SEE ALCOHOLS (C13 AND ABOVE)	PPN					
Pentaethylene Glycol	PDC	0.83	5,000	4,555	OK	
Pentaethylenhexamine						
Pentane (all isomers)	PEP					
PENTANE (iso-)	PTY	0.63	5,000	3,957	OK	
PENTANE (n-)	IPT	0.62	5,000	3,937	OK	
Pentanoic acid	PTA	0.63	5,000	3,969	OK	
Pentane (all isomers)						
PENTENE (1-)	PTX	0.64	5,000	4,000	OK	
Petrolatum	PTE	0.64	5,000	4,000	OK	
	PTL					

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809: CONOCO, INC.; '7027' AND '7028'

MAX DESIGN WORKING PRESS	(MDWP)	3.000 PSIG
SPILL VALVE SET PRESSURE	(Ps/v)	1.750 PSIG
CARGO TANK P/V SETTING	(Pp/v)	1.500 PSIG
"TARGET" MAX LIQUID TRANSFER RATE	(TMLTR)	5.000 BPH
SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE	(Qv) max	6.750 BPH

CARGO	C R I S	LIQUID SPECIFIC GRAVITY	CARGO MAX LIQUID TRANSFER RATE (Q1)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{0.5}	Qw <= (Qv) max
1-Phenyl-1-Xylyl Ethane					
Phosphosulfurized Bicyclic Terpene	PXB				
Phthalate plasticizers, SEE INDIVIDUAL PHTHALATES					
Pinene					
Polyalkenyl Succinic Anhydride Amine	PIN	0.86	5,000	4,637	OK
Polyalkylene Glycols, Polyalkylene Glycol Monoalkyl Ethers mixtures	PFK				
Polyalkylene Oxide Polyol	PAO	1.04	5,000	5,099	OK
Polamine, Amide mixture					
Polybutadiene, Hydroxyl terminated					
Polybutene					
Polydimethylsiloxane	PLB	0.91	5,000	4,770	OK
Polyethylene Glycol		1.04	5,000	5,099	OK
Polyethylene Glycol Dimethyl Ether		1.04	5,000	5,099	OK
Polyglycerol					
Polyisobutylene, SEE POLYBUTENE					
Polymerized Esters					
Poly(20)oxyethylene Sorbitan Monooleate	PSM				
Polypropylene	PLP				
Polypropylene Glycol	PGC	1.01	5,000	5,025	OK
Polypropylene Glycol Methyl Ether	PGM	0.92	5,000	4,796	OK
Polysiloxane					
Polystyrene Diakyl Maleate					
Potassium Oleate					
Propane	POE				
n-Propoxypropanol	PRP	1.04	5,000	5,099	OK
Propyl Acetate (iso-)	PKP				
Propyl Acetate (n-)	IAC	0.89	5,000	4,717	OK
Propyl alcohol (iso-)	PAT	0.80	5,000	4,444	OK
Propyl alcohol (n-)	IPA	0.79	5,000	4,472	OK
Propylbenzene (n-)	PAL	0.80	5,000	4,637	OK
iso-Propylcyclohexane	PBZ	0.86	5,000	4,472	OK
Propylene	IPX	0.80	5,000	4,472	OK
Propylene-Butylene Copolymer	PPL	1.04	5,000	5,099	OK
Propylene Dimer	PBP				
Propylene Glycol (1,2-PROPANDIOL)	PDR				
Propylene Glycol Monoalkyl Ether	PPG	1.04	5,000	5,099	OK
Propylene Glycol Ethyl Ether	PGE				
Propylene Glycol Methyl Ether	PGY				
Propylene Polymer (in liquid mixtures)	PME	0.92	5,000	4,796	OK
Propylene Tetramer	PTT	0.29	5,000	2,693	OK
Propylene Trimer	PTR				
Pseudocumene, SEE TRIMETHYLBENZENES					
Rum					
Sodium Acetate, Glycol, water solutions					
Sodium Acetate solution					
Sodium Benzoate solution	SAN				
Sodium Sulfonate	SEN				
Stearic acid					
Stearyl alcohol (Octadecanol)	SRA				
Sulfolane					
Tallow	SFL	1.26	5,000	5,612	OK
Tallow alcohol, SEE ALCOHOLS (C13 AND ABOVE)	TLO				
Tallow fatty acid					
Tallow Alkyl Nitrile	TFD				
Tetradecanol	TTM	0.82	5,000	4,528	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS	(MDWP)	3,000 PSIG
SPILL VALVE SET PRESSURE	(Ps/v)	1,750 PSIG
CARGO TANK P/V SETTING	(Pp/v)	1,500 PSIG
"TARGET" MAX LIQUID TRANSFER RATE	(TMLTR)	5,000 BPH
SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE	(Qw)max	6,750 BPH

CARGO	C H R I S	LIQUID	CARGO	EQUIVALENT	Qw <= (Qw) max
		SPECIFIC GRAVITY (1)	MAX LIQUID TRANSFER RATE (Q1) (BPH)	WATER LIQUID TRANSFER RATE (BPH)	
1-Tetradecene, SEE THE OLEFIN OR ALPHA-OLEFIN ENTRIES	TTD	0.77	5,000	4,387	OK
Tetradecylbenzene	TRD				
Tetraethylene Glycol	TTG	1.12	5,000	5,292	OK
Tetrahydronaphthalene	TTHN	0.97	5,000	4,924	OK
Tetrapropylbenzene, SEE ALKYL(C9-C17) BENZENES					
Toluene	TOL	0.87	5,000	4,664	OK
Triaryphosphate	TBP				
Tributyl Phosphate	TCP	1.16	5,000	5,385	OK
Tricresyl Phosphate (less than 1% of the ortho isomer)	TRD	0.76	5,000	4,359	OK
Tridecane					
Tridecanoic acid	TDW	0.85	5,000	4,610	OK
Tridecanol, SEE ALCOHOLS (C13 AND ABOVE)	TDC	0.77	5,000	4,387	OK
1-Tridecene	TRB				
Tridecylbenzene	TEB	0.86	5,000	4,637	OK
Triethylbenzene	TEG	1.12	5,000	5,292	OK
Triethylene Glycol					
Triethylene Glycol Butyl Ether	TGD	1.04	5,000	5,099	OK
Triethylene Glycol Butyl Ether mixture					
Triethylene Glycol di-(2-ethylbutyrate)	TGE				
Triethylene Glycol Ether mixture					
Triethylene Glycol Ethyl Ether					
Triethylene Glycol Methyl Ether					
Triethyl Phosphate	TPS	1.07	5,000	5,172	OK
Triisooctyl Trimellitate					
Triisopropanolamine	TIP	1.02	5,000	5,050	OK
Trimethylbenzenes (all isomers)	TRB	0.89	5,000	4,717	OK
TRIMETHYL BENZENE (1,2,5-)	TMB	0.89	5,000	4,717	OK
TRIMETHYL BENZENE (1,2,3-)	TMD	0.89	5,000	4,717	OK
TRIMETHYL BENZENE (1,2,4-) (PSEUDOCUMENE)	TME	0.89	5,000	4,717	OK
Trimethylol Propane Polyethoxylate	TPR				
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate					
2,2,4-Trimethyl-3-pentanol-1-isobutyrate	TMP				
Tripropylene, SEE PROPYLENE TRIMER					
Tripropylene Glycol	TGC				
Tripropylene Glycol Methyl Ether	TGM				
Trixylenyl Phosphate	TRP	1.16	5,000	5,385	OK
Turpentine	TPT				
Turpentine substitute (White spirit), SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)					
Undecanol					
Undecene (1-)	UDC	0.75	5,000	4,330	OK
Undecyl alcohol	UND	0.84	5,000	4,583	OK
Undecylbenzene	UDB				
Vinyl Acetate-fumerate Copolymer					
Waxes:					
WAXES: Candelilla	MAX				
WAXES: Carnauba					
WAXES: Paraffin	MAX, WCA				
WAXES: Petroleum	MAX, WPP				
White spirit, SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)					
White spirit (low (15 - 20%) aromatic)					
Wine, SEE ALCOHOLIC BEVERAGES, N.O.S.	WSL				
Wool grease					
Xylenes (ortho-, meta-, para-)					
XYLENE (M-)	XLX	0.89	5,000	4,717	OK
XYLENE (O-)	XLN	0.87	5,000	4,664	OK
	XLO	0.89	5,000	4,717	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
BARGE: C9809: CONOCO, INC.; *7027* AND *7028*

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 TARGET MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (Ps/v) 1,750 PSIG
 (Pp/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Qv) max 6,750 BPH

CARGO

C	LIQUID	CARGO	EQUIVALENT	
H	SPECIFIC	MAX	WATER	
R	GRAVITY	LIQUID	LIQUID	Qv <= (Qv) max
I		TRANSFER	TRANSFER	
S	(1)	RATE	RATE	
		(Q1)	Qv = (Q1) * SG1 ^{0.5}	
		(BPH)	(BPH)	

XYLENE (P-)
 XYLENOL
 Zinc Dialkyldithiophosphate

XLP	0.86	5,000	4,637	OK
XYL	1.01	5,000	5,025	OK

CALCULATIONS FOR CAPACITY OF SPILL VALVE
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

MAX DESIGN WORKING PRESS
 SPILL VALVE SET PRESSURE
 CARGO TANK P/V SETTING
 "TARGET" MAX LIQUID TRANSFER RATE
 SPILL VALVE CAPACITY (WATER) @ MAX DESIGN WORKING PRESSURE

(MDWP) 3,000 PSIG
 (Ps/v) 1,750 PSIG
 (Pp/v) 1,500 PSIG
 (TMLTR) 5,000 BPH
 (Qw)max 6,750 BPH

CARGO

C H R I S	LIQUID SPECIFIC GRAVITY	CARGO MAX LIQUID TRANSFER RATE (Q1) (BPH)	EQUIVALENT WATER LIQUID TRANSFER RATE Qw = (Q1) * SG1 ^{1.5} (BPH)	Qw <= (Qw) max
-----------------------	-------------------------------	---	--	----------------

46 CFR SUBCHAPTER D, BUT NOT TABLE 30.25-1

AROMATIC RESIN OIL 60
 AROMATIC RESIN OIL 80
 AROMATIC RESIN OILS

ARS	1.02	5,000	5,050	OK
ARS	1.02	5,000	5,050	OK

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809; CONOCO, INC.; '7027' AND '7028'

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
ACETIC ACID	AAC	5,000	5,000
ACETIC ANHYDRIDE	ACA	5,000	5,000
ACETONITRILE	ATN	5,000	5,000
ACRYLIC ACID	ACR	5,000	5,000
ACRYLONITRILE	ACN	5,000	5,000
ADIPONITRILE	ADN	5,000	5,000
ALUMINUM SULFATE SOLUTION	ASX	5,000	
AMINOETHYLETHANOLAMINE	AEE	5,000	5,000
AMMONIUM BISULFITE SOLN (70% OR LESS)	ABX	5,000	
AMMONIUM HYDROXIDE (28% OR LESS NH3)	AMH		
ANTHRACENE OIL (COAL TAR FRACTION)	AHO		
BENZENE	BNZ	5,000	5,000
BENZENE HYDROCARBON MIXTURES (W/ACETYLENES) (W/10% BENZENE OR MORE)	BHA	5,000	5,000
BENZENE HYDROCARBON MIXTURES (W/10% BENZENE OR MORE)	BHB	5,000	5,000
BENZENE, TOLUENE, XYLENE MIXTURES (HAVING 10% BENZENE OR MORE)	BTX	5,000	5,000
iso-BUTYL ACRYLATE	BAI	5,000	5,000
n-BUTYL ACRYLATE	BTC	5,000	5,000
BUTYL ACRYLATE (SEE ISO- & N- BUTYL ACRYLATE)	BAR	5,000	5,000
BUTYL METHACRYLATE	BMH	5,000	5,000
iso-BUTYRALDEHYDE	BAD	5,000	5,000
n-BUTYRALDEHYDE	BTR	5,000	5,000
BUTYRALDEHYDES (CRUDE)	BFA	5,000	5,000
BUTYRALDEHYDE (ISO-, N-)	BAE	5,000	5,000
CAMPHOR OIL (LIGHT)	CPO	5,000	
CARBON TETRACHLORIDE	CBT	5,000	
CAUSTIC POTASH SOLUTION	CPS	5,000	
CAUSTIC SODA SOLUTION	CSS	5,000	
CHLOROBENZENE	CRB	5,000	5,000
CHLOROPFORM	CRP	5,000	
CHLOROSULFONIC ACID	CSA	5,000	
COAL TAR NAPHTHA SOLVENT	NCT	5,000	5,000
CREOSOTE (COAL TAR)	CCT	5,000	5,000
CREOSOTE (WOOD)	CWD	5,000	5,000
CRESOLS (ALL ISOMERS)	CRS	5,000	5,000
CRESOLS WITH LESS THAN 5% PHENOL (SEE CRESOLS (ALL ISOMERS))	CRS	5,000	
CRESOLS WITH 5% OR MORE PHENOL (SEE PHENOL)	CRS	5,000	
CRESYLATE SPENT CAUSTIC	CFP	5,000	5,000
CRESYLIC ACID, SODIUM SALT SOLUTION, SEE CRESYLATE SPENT CAUSTIC	CSC	5,000	
CROTONALDEHYDE	CAK		
CYCLOHEXANONE	CTA	5,000	5,000
CYCLOHEXYLAMINE	CCH	5,000	5,000
DECYL ACRYLATE (iso-, n-)	CHA	5,000	5,000
DICHLOROBENZENE (ALL ISOMERS)	DAT	5,000	5,000
1,1-DICHLOROETHANE	DBX	5,000	5,000
2,2-DICHLOROETHYL ETHER	DCH	5,000	5,000
DICHLOROMETHANE (ALSO KNOWN AS METHYLENE CHLORIDE)	DEE	5,000	5,000
2,4-DICHLOROPHENOXYACETIC ACID DIETHANOLAMINE SALT SOLUTION	DCM	5,000	
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION	DDE		
2,4-DICHLOROPHENOXYACETIC ACID, TRIISOPROPANOLAMINE SALT SOLUTION	DAD		
1,1-,1,2- OR 1,3- DICHLOROPROPANE	DTI		
1,3-DICHLOROPROPENE	DPX	5,000	5,000
DICHLOROPROPENE, DICHLOROPROPANE MIXTURES	DFU	5,000	5,000
2,2-DICHLOROPROPIONIC ACID	DMK	5,000	5,000
DIETHANOLAMINE	DCN		
DIETHYLAMINE	DEA	5,000	5,000
DIETHYLENEDIAMINE	DEN	5,000	5,000
DIETHYL ETHER, SEE ETHYL ETHER	DET	5,000	5,000
	DEE		

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 RANGE: C9809; CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
DIISOBUTYLAMINE	DBU	5,000	5,000
DIISOPROPANOLAMINE	DIP	5,000	5,000
DIISOPROPYLAMINE	DIA	5,000	5,000
N,N-DIMETHYLACETAMIDE	DAC	5,000	5,000
DIMETHYLETHANOLAMINE	DMB	5,000	5,000
DIMETHYLFORMAMIDE	DMP	5,000	5,000
1,4-DIOXANE	DOX	5,000	5,000
DI-N-PROPYLAMINE	DNA	5,000	5,000
ETHANOLAMINE	MEA	5,000	5,000
ETHYL ACRYLATE	EAC	5,000	5,000
ETHYLAMINE SOLUTION (72% OR LESS)	EAN	5,000	5,000
N-ETHYLBUTYLAMINE	EBA	5,000	5,000
N-ETHYLCYCLOHEXYLAMINE	ECC	5,000	5,000
ETHYLENE CYANOHYDRIN	ETC	5,000	5,000
ETHYLENEDIAMINE	EDA	5,000	5,000
ETHYLENE DIIBROMIDE	EDB	4,582	
ETHYLENE DICHLORIDE	EDC	5,000	5,000
ETHYLENE GLYCOL PROPYL ETHER	EGP	5,000	5,000
2-ETHYLBUTYL ACRYLATE	EAI	5,000	5,000
ETHYLIDENE NORBORNENE	ENB	5,000	5,000
ETHYL METHACRYLATE	ETM	5,000	5,000
2-ETHYL-3-PROPYLACROLEIN	EPA	5,000	5,000
FERRIC CHLORIDE SOLUTIONS	FCS		
FORMALDEHYDE SOLUTION (37% TO 50%)	FMS	5,000	5,000
FORMIC ACID	FMA	5,000	5,000
FORMFURAL	FFA	5,000	5,000
GLUTARALDEHYDE SOLUTION (50% OR LESS)	GTA		
HEXAMETHYLENEDIAMINE SOLUTION	HMC	5,000	5,000
HEXAMETHYLENEMINE	HMI	5,000	5,000
HYDROCHLORIC ACID SPENT (15% OR LESS)	HCS	5,000	
ISOPENTALDEHYDE (MIXED ISOMERS) (SEE VALERALDEHYDE (ISO-, N-))			
ISOPRENE	IPR	5,000	5,000
KRAFT PULPING LIQUORS (FREE ALKALI CONTENT 3% OR MORE) (INCLUDING: BLACK)	KPL		
MESITYL OXIDE	MSO	5,000	5,000
METHYL ACRYLATE	MAM	5,000	5,000
METHYLCYCLOPENTADIENE DIMER	MCK	5,000	5,000
METHYL DIETHANOLAMINE	MDE	5,000	5,000
2-METHYL-5-ETHYLPYRIDINE	MEP	5,000	5,000
METHYLENE CHLORIDE (SEE DICHLOROMETHANE)			
METHYL METHACRYLATE	MMH	5,000	5,000
2-METHYLPYRIDINE	MPR	5,000	5,000
alpha-METHYLSTYRENE	MSR	5,000	5,000
MORPHOLINE	MPL	5,000	5,000
NITRIC ACID (70% OR LESS)	NCD		
NITROPROPANE (-1, OR -2)	NPM	5,000	5,000
OCTYL NITRATES (ALL ISOMERS)	ONE	5,000	5,000
OLEUM	OLM	4,797	5,000
PENTACHLOROETHANE	PCE	5,000	
1, 3-PENTADIENE	PDE	5,000	5,000
PERCHLOROETHYLENE (SAME AS TETRACHLOROETHYLENE)	PER	5,000	
PHOSPHORIC ACID	PAC	4,990	
POLYETHYLENE POLYAMINES	PEB	5,000	5,000
POLYMETHYLENE POLYPHENYL ISOCYANATE	PPI	5,000	
POTASSIUM HYDROXIDE SOLUTION (SEE CAUSTIC POTASH SOLUTION)			
iso-PROPANOLAMINE	MPA	5,000	5,000
PROPANOLAMINE (iso-, n-)	PAX	5,000	5,000
PROPIONIC ACID	PMA	5,000	5,000
iso-PROPYLAMINE	IPP	5,000	5,000
iso-PROPYL ETHER	IPB	5,000	5,000
PYRIDINE	PRD	5,000	5,000
SODIUM ALUMINATE SOLUTION	SAD		

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C E R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)

SODIUM CHLORATE SOLUTION (50% OR LESS)	SDO	5,000	
SODIUM DICHROMATE SOL'N (70% OR LESS)	SDL		
SODIUM HYDROXIDE SOLUTION (SEE CAUSTIC SODA SOLUTION)			
SODIUM HYPOCHLORITE SOL'N (15% OR LESS)	SEP	5,000	
SODIUM SULFIDE, HYDROSULFIDE SOLUTIONS (H2S 15 PPM OR LESS)	SSH	5,000	
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (15 PPM<H2S<200 PPM)	SSI	5,000	
SODIUM SULFIDE HYDROSULFIDE SOLUTIONS (H2S GREATER THAN 200 PPM)	SSJ	5,000	
SODIUM THIOCYANATE SOLUTION (56% OR LESS)	STS		
STYRENE MONOMER	STY	5,000	5,000
SULFURIC ACID	SFA	4,976	5,000
SULFURIC ACID, SPENT	SAC	5,000	5,000
1,1,2,2-TETRACHLOROETHANE (ACETYLENE TETRACHLORIDE)	TEC	5,000	
TETRAETHYLENEPENTAMINE	TTP	5,000	5,000
TETRAHYDROFURAN	THF	5,000	5,000
1,1,2-TRICHLOROETHANE (VINYL TRICHLORIDE)	TCM	5,000	5,000
TRICHLOROETHANE (SEE 1,1,2-TRICHLOROETHANE)			
TRICHLOROETHYLENE	TCL	5,000	5,000
1,2,3-TRICHLOROPROPANE	TCN	5,000	5,000
TRISTANOLAMINE	TEA	5,000	5,000
TRIETHYLAMINE	TEN	5,000	5,000
TRIETHYLENETETRAMINE	TET	5,000	5,000
UREA, AMMONIUM NITRATE SOL'N (CONTAINING MORE THAN 2% NH3)	UAS		
VALERALDEHYDE (iso-, n-)		5,000	5,000
VALERALDEHYDE (iso-)	IVA	5,000	5,000
VALERALDEHYDE (n-)	VAL	5,000	5,000
VANILLAN BLACK LIQUOR (FREE ALKALI CONTENT 3% OR MORE)	VBL		
VINYL ACETATE	VAM	5,000	5,000
VINYLTOLUENE	VMT	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)

46 CFR SUBCHAPT O BUT NOT TABLE 151 -----			
1,1-DICHLOROPROPANE			
1,1,1-TRICHLOROETHANE	DPB	5,000	5,000
1,2-DICHLOROPROPANE		5,000	
1,3-CYCLOPENTADIENE	DPP	5,000	5,000
1,3-DICHLOROPROPANE			
2-METHYL-2-HYDROXY-3-BUTYNE	DPC	5,000	5,000
2,4-DICHLOROPHENOXYACETIC ACID, DIMETHYLAMINE SALT SOLUTION (70% OR LESS)	MHB	5,000	5,000
3-PENTENITRILE	SSDDA		
AEROTRENE TT (1,1,1-TRICHLOROETHANE)	PNT		
ALKYLBENZENE			
AMINOETHYLPIPERAZINE			
BENZENE RAFFINATE (ASSUME VAPOR PROPERTIES SIMILAR TO BENZENE)	AEP		
BENZENE SULFONYL CHLORIDE		5,000	5,000
BENZYL ACETATE	BSC	5,000	5,000
BENZYL CHLORIDE (STABILIZED)	BZE	5,000	5,000
BUTANOL	BCL	5,000	5,000
BUTYL ETHER (n-)			
BUTYLENE OXIDE (i,2-)	BTE	5,000	5,000
BUTYRIC ACID	BTO	5,000	5,000
CARBOLIC ACID	BRA	5,000	5,000
CHLOROACETIC ACID (80% OR LESS)	CBO	5,000	5,000
CHLOROPROPIONIC ACID (2- OR 3-)	CPM	5,000	5,000
CHLOROTOLUENE (m-)	CPM	5,000	5,000
CHLOROTOLUENE (o-)	CTM	5,000	5,000
CHLOROTOLUENE (p)	CTO	5,000	5,000
CHLOROTOLUENES (MIXED ISOMERS)	CRN	5,000	5,000
CREOSOTE (ALL ISOMERS)	CHI	5,000	5,000
CRESYLIC ACID TAR	CCW	5,000	5,000
CYCLOHEPTANE	CRK	5,000	5,000
CYCLOHEXANONE, CYCLOHEXANOL MIXTURE	CYE	5,000	5,000
CYCLOHEXYL ACETATE	CYC	5,000	5,000
CYCLOPENTADIENE, STYRENE, BENZENE MIXTURE	CYC	5,000	5,000
CYCLOPENTANE	CSB	5,000	5,000
DECAHOIC ACID	CYP	5,000	5,000
DI 2 ETHYLHEXYL PHTHALATE (SEE ALSO ETHYLHEXYL PHTHALATE)	DCO	2,770	
DICHLOROISOPROPYL ETHER (2,2'-)		5,000	
DICHLOROPROPANE	DCI	5,000	5,000
DICHLOROPROPENE		5,000	
DIETHYL SULFATE		5,000	
DIETHYLETHANOLAMINE	DSU	5,000	5,000
DODECYL BENZENE	DAB	5,000	5,000
DODECYLDIMETHYLAMINE TETRADECYLDIMETHYLAMINE MIXTURE			
DRIPOLENE	DOT		
ETHANOL (see ethyl alcohol)			
ETHYL BROMIDE			
ETHYL TERT-BUTYL ETHER			
ETHYLAMINE	EBE	5,000	5,000
ETHYLENE DICHLORIDE 1,1,2-TRICHLOROETHANE MIXTURE	EMM	5,000	5,000
ETHYL MERCAPTAN (SAME AS ETHANETHIOL)	ETX	5,000	5,000
ETHYLPHENOL			
FORMALDEHYDE SOLUTION (50% OR MORE), METHANOL MIXTURES	EPL	5,000	5,000
HYDROSULFIDE	MTM	5,000	5,000
INDICES			
ISOBUTYL ACETATE			
ISOPRENE, PENTADIENE MIXTURE	IRA		5,000
ISO-PROPYL ALCOHOL	IPW		
LAURIC ACID		5,000	5,000
METHACRYLONITRILE	LRA	5,000	
	MET	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
METHANOL			
METHYL STYRENE		5,000	
METHYL STYRENE, INDENES, ALKYL BENZENE MIXTURES			
METHYLCYCLOHEXANE	MIA		
METHYLHEXANE (SAME AS HEPTANE)	MCY	5,000	5,000
MONOETHANOLAMINE			
MONOISOPROPANOLAMINE	MEA	5,000	5,000
NAPHTHALENE (MOLTEN)		5,000	5,000
NEODECANOIC ACID	NIM	5,000	5,000
NITRILOTRIACETIC ACID	NEA	5,000	5,000
NITROPHENOL (MOLTEN)	NAA		
NITROPROPANE (60%), NITROETHANE (40%) MIXTURE	NTP	5,000	
NITROTOLUENE (o-,p-)	NMM	5,000	5,000
PARALDEHYDE	NIT	5,000	5,000
POLYGLYCERINE, SODIUM SALT SOLN (CONTAINING 3% OR MORE SODIUM HYDROXIDE)	PDB	5,000	5,000
PROPIONALDEHYDE	PGS		
PROPIONIC ANHYDRIDE	PAD	5,000	5,000
PROPIONITRILE	PAH	5,000	5,000
PROPYLAMINE (n-)	PCW	5,000	5,000
PROPYLBENZENE	PRA	5,000	5,000
PYROLYSIS GASOLINE (GREATER THAN 5% BENZENE)			5,000
PYROLYSIS RESIDUAL FUELS	GPY	5,000	5,000
SEWAGE, RAW		5,000	
SODIUM SULFIDE (SOLID IN WATER)	SWR		
STYRENE	SDS	5,000	
STYRENE CRUDE	STY	5,000	5,000
STYRENE TAR	STX	5,000	5,000
TETRAMETHYLBENZENE (1,2,3,5-)	STT		
TOLUIDINE (o-)	TTB	5,000	5,000
TRICHLOROBENZENE (1,2,4-)	TLI	5,000	5,000
TRIIISOPROPANOLAMINE SALT OF 2,4-DICHLOROPHENOXY ACETIC ACID SOL'N	TCB	5,000	5,000
TRIPHENYLBORANE			
UNDECANOIC ACID	TPE		
HYDROCARBON 5-9	UDA	5,000	
	HPW	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)

46 CFR SUBCHAPTER D, TABLE 30.25-1 *****			
Acetone	ACT	5,000	5,000
Acetophenone	ACP	5,000	5,000
Acetyl Tributyl Citrate		5,000	
Acrylonitrile-Styrene Copolymer dispersion in Polyether Polyol	ALE		
Alcohols (C13 and above)	ALY		
Alcoholic beverages, N.O.S.			
Alcohol (C6 - C17) (secondary) Poly(3-6)ethoxylates			
Alcohol (C12 - C15) Poly(1-3)ethoxylates			
Alcohol (C12 - C15) Poly(3-11)ethoxylates			
Alkenylsuccinic acid			
Alkenylsuccinic Anhydride			
Alkyl (C9 - C17) Benzenes			
Alkylbenzenesulfonic acid (4t or less)	AKB		
Alkyl Phthalates (n-)	ABS		
Alkyl Succinate Formaldehyde Hydr- oxyamino condensate (3.2t or less)			
Aminoethyldiethanolamine, Aminoethylethanolamine solution			
Amyl Acetate-(commercial, iso-, n-, sec-)	AEC	5,000	5,000
AMYL ACETATE (n-)	AML	5,000	5,000
AMYL ACETATE (iso-)	IAT	5,000	5,000
Amyl alcohol (iso-, n-, sec-, primary) (SEE ALSO IAA)	AAI	5,000	5,000
Amyl alcohol (n-)	AAN	5,000	5,000
Amyl alcohol (tert-)	AAI		
AMYL ALCOHOL, PRIMARY	APM	5,000	5,000
AMYL ALCOHOL, (sec-)	ASE	5,000	5,000
Amylene	AME		
AMYL ALCOHOL, (iso-)	IAA	5,000	5,000
Amyl Methyl Ketone	AMK		
Amyl Tallate			
Asphalt	ASP	5,000	
ASPHALT BLENDING STOCKS: Roofers flux	ARF		
ASPHALT BLENDING STOCKS: Straight run residue	ASR		
Behenyl alcohol			
Benzene Tricarboxylic acid Trioctyl Ester			
Benzyl alcohol	BAL	5,000	5,000
Bicyclic Terpenel Polyamide salt			
Brake fluid base mixtures (containing Poly(2-8)alkylene (C2-C3) glycols, BFX	BMX	5,000	
Butane			
Butene, SEE BUTYLENE			
Butene Oligomer	BOL		
Butyl Acetate (iso-, n-)	BAX	5,000	5,000
BUTYL ACETATE (N-)	BCN	5,000	5,000
Butyl Acetate (sec-)	BTA	5,000	5,000
Butyl alcohol (iso-, n-, sec-, tert-)			
BUTYL ALCOHOL (ISO-)	IAL	5,000	5,000
BUTYL ALCOHOL (N-)	BAW	5,000	5,000
BUTYL ALCOHOL (SEC-)	BAS	5,000	5,000
BUTYL ALCOHOL (TERT-)	BAT	5,000	5,000
Butyl Benzyl Phthalate	BPH	5,000	5,000
Butylene	BTW		
Butylene Glycol	BUG		
1,3-Butylene Glycol, SEE BUTYLENE GLYCOL			
Butylene Polyglycol, SEE BUTYLENE GLYCOL			
iso-Butyl Formate			
n-Butyl Formate			
Butyl Heptyl Ketone			
Butyl Methyl Ketone, SEE METHYL BUTYL KETONE	BHK		
Butyl Stearate			
Butyl Toluene	BUE	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: COMOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Butyrolactone (gamma)			
Calcium Alkylphenate	BLA		
Calcium Alkyl Salicylate			
Calcium Amino Nonyl Phenolate			
Calcium Carboxylate			
Caprolactam solutions			
Carbon black base	CLS	5,000	5,000
Cetyl alcohol (HEXADECANOL) SEE ALCOHOLS (C13 AND ABOVE)		5,000	
Cetyl-Stearal alcohol			
Cleaning spirit (unleaded)			
Coal tar			
Cumene	COR	5,000	
Cycloaliphatic resins	CUM	5,000	5,000
Cyclohexane			
Cyclohexanol	CHK	5,000	5,000
1,3-Cyclopentadiene dimer (molten)	CHN	5,000	5,000
Cyclopentadiene polymers, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	CPD	5,000	5,000
Cymene (para-)			
Decahydronaphthalene	CHP	5,000	5,000
Decaldehyde (iso-)	DEI	5,000	5,000
Decaldehyde (n-)	IDA	5,000	5,000
Decane	DAL	5,000	
Decene	DDC		
Decyl alcohol (all isomers) (DECANOL)	DCE	5,000	5,000
DECYL ALCOHOL (iso-)	DAI	5,000	5,000
DECYL ALCOHOL (n-)	ISA	5,000	5,000
Decylbenzene (n-)	DAN	5,000	5,000
Detergent Alkylate	DBZ	5,000	5,000
Diacetone alcohol			
Dialkyl (C10-C14) Benzenes	DAA	5,000	5,000
Dialkyl (C7-C13) Phthalates	DAB		
Dibutyl Carbinol	DAH		
Dibutyl Phthalate (ortho-)			
Dicyclopentadiene, SEE 1,3-CYCLOPENTADIENE DIMER (MOLTEN)	DPA	5,000	
Diethylbenzene	DPT	5,000	5,000
Diethylene Glycol	DEB	5,000	5,000
Diethylene Glycol Butyl Ether	DEG	5,000	5,000
Diethylene Glycol Butyl Ether Acetate	DNE	5,000	5,000
Diethylene Glycol Dibutyl Ether	DEM		
Diethylene Glycol Diethyl Ether	DIG		
Diethylene Glycol Ethyl Ether			
Diethylene Glycol Ethyl Ether Acetate	DGE		
Diethylene Glycol Methyl Ether	DGA	5,000	5,000
Diethylene Glycol Methyl Ether Acetate	DGM	5,000	5,000
Diethylene Glycol Phenyl Ether	DGR		
Diethylene Glycol Phthalate	DGP		
Di-(2-ethylhexyl)adipate	DGL		
Di-(2-ethylhexyl)phthalate	DEH		
Diethyl Phthalate	DIE		
Diglycidyl Ether of Bisphenol A	DPH		
Diheptyl Phthalate	BDE		
Dihexyl Phthalate	DHP		
Diisobutylcarbinol	DHA		
Diisobutylene	DBC	5,000	5,000
Diisobutyl Ketone	DBL	5,000	5,000
Diisobutyl Phthalate	DIK	5,000	5,000
Diisodecyl Phthalate	DIT		
Diisononyl Adipate	DID		
Diisononyl Phthalate	DNY		
Diisocetyl Phthalate	DIN		
Diisopropylbenzene (all isomers)	DIO		
	DIX	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809; CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Diisopropyl Naphthalene	DII		
Dimethyl Adipate	DLA		
Dimethylbenzene			
Dimethyl Glutarate	DOT		
Dimethyl Phthalate	DTL	5,000	
Dimethyl Polysiloxane	DMP		
2,2-Dimethylpropane-1,3-diol	DDI		
Dimethyl Succinate	DSE		
Dinonyl Phthalate	DIF	5,000	5,000
Di(octylphenyl)amine			
Dioctyl Phthalate	DOP	5,000	
Dipentene	DPN	5,000	5,000
Diphenyl	DIL	5,000	5,000
Diphenyl, Diphenyl Ether mixture	DDO	5,000	5,000
Diphenyl Ether	DPE	5,000	5,000
Diphenyl Ether, Biphenyl Ether mixture	DOB		
Dipropylene Glycol	DPG	5,000	5,000
Dipropylene Glycol Dibenzate	DGY		
Dipropylene Glycol Methyl Ether	DPY		
DISTILLATES: Flashed feed stocks	DFP	5,000	5,000
DISTILLATES: Straight run	DSR	5,000	5,000
Ditridecyl Phthalate	DTP		
Diundecyl Phthalate	DUP		
Dodecane (all isomers)	DOC		
Dodecanol	DDN		
Dodecene (all isomers)	DOZ	5,000	5,000
DODECENE	DOD	5,000	5,000
Dodecylbenzene	DOB	5,000	5,000
Dodecyl Phenol	DOL		
Drilling mud (low toxicity) (if flammable or combustible)/ Epoxyated linear alcohols, C11-C15			
Ethane	ETH	5,000	
2-Ethoxyethanol	EEO	5,000	
2-Ethoxyethyl Acetate	EEA	5,000	
Ethoxyated alcohols, C11-C15, SEE THE ALCOHOL POLYETHOXYLATES			
Ethoxy Triglycol (crude)	ETG	5,000	
Ethyl Acetate	ETA	5,000	5,000
Ethyl Acetoacetate	EAA	5,000	5,000
Ethyl alcohol (ETHANOL)	EAL	5,000	5,000
Ethyl Amyl Ketone	EAK		
Ethyl Benzene	ETB	5,000	5,000
Ethyl Butanol	EBT	5,000	5,000
Ethyl Butyrate	EBR	5,000	5,000
Ethyl Cyclohexane	ECY	5,000	5,000
Ethylene	ETL		
Ethylene Carbonate			
Ethylene Glycol	EGL	5,000	5,000
Ethylene Glycol Acetate	EGB		
Ethylene Glycol Butyl Ether	EGB		
ETHYLENE GLYCOL BUTYL ETHER ACETATE	EGB		
Ethylene Glycol Ether Acetate	EGB	5,000	5,000
Ethylene Glycol Tert-Butyl Ether	EGB		
Ethylene Glycol Diacetate	EGB		
Ethylene Glycol Dibutyl Ether	EGB	5,000	5,000
Ethylene Glycol Ethyl Ether, SEE 2-ETHOXYETHANOL	EGB		
Ethylene Glycol Ethyl Ether Acetate, SEE 2-ETHOXYETHYL ACETATE	EGB		
Ethylene Glycol Isopropyl Ether	EGB		
Ethylene Glycol Methyl Butyl Ether	EGB		
Ethylene Glycol Methyl Ether	EME	5,000	5,000
Ethylene Glycol Methyl Ether Acetate	EMT		
Ethylene Glycol Phenyl Ether	EPE	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; '7027' AND '7028'

CARGO	C H R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Ethylene Glycol Phenyl Ether, Diethylene Glycol Phenyl Ether mixture	KDX		
Ethylene-Propylene Copolymer (in liquid mixtures)			
Ethyl-3-Ethoxypropionate	EEP		
2-Ethylhexaldehyde, SEE OCTYL ALDEHYDES	EEA	5,000	5,000
2-Ethylhexanoic acid	EEO		
2-Ethylhexanol, SEE OCTANOL (ALL ISOMERS)	EEK	5,000	5,000
Ethylhexoic acid, SEE 2-ETHYLHEXANOIC ACID			
Ethyl Hexyl Phthalate (SEE ALSO DI 2-ETHYLHEXYL PHTHALATE)	EEH		
Ethyl Hexyl Tallate	EET		
Ethyl Propionate	EPR	5,000	5,000
Ethyl Toluene	ETE	5,000	5,000
Fatty acid (saturated, C13 and above)			
Fatty acid Amides			
Formamide	FAM	5,000	5,000
Furfuryl Alcohol	FAL	5,000	5,000
Gas oil, cracked	GOC		
GASOLINE BLENDING STOCKS: Alkylates	GAK	5,000	5,000
GASOLINE BLENDING STOCKS: Reformates	GRF	5,000	5,000
GASOLINES: Automotive (containing not over 4.23 grams lead per gallon)	GAT	5,000	5,000
GASOLINES: Aviation (containing not over 4.86 grams lead per gallon) Avia	GAV	5,000	5,000
GASOLINES: Casinghead (natural)	GCS	5,000	5,000
GASOLINES: Polymer	GPL	5,000	5,000
GASOLINES: Straight run	GSR	5,000	5,000
Glycerine	GCR	5,000	
Glycerol, SEE GLYCERINE			
Glycerol Polyalkoxylate			
Glycerol Triacetate			
Glycidyl Ester of Tertiary Carboxylic acid, SEE GLYCIDYL ESTER OF TRIDECYL A			
Glycidyl Ester of Tridecyl Acetic acid	GLT		
Glycidyl Ester of Versatic acid, SEE GLYCIDYL ESTER OF TRIDECYL ACETIC ACID			
Glycol Diacetate, SEE ETHYLENE GLYCOL DIACETATE			
Glycols, Resins and Solvents mixtures			
Gylcol Triacetate, SEE GLYCERYL TRIACETATE			
Glyoxal solution (40% or less)			
Grease			
Heptadecane			
Heptane (all isomers) (METHYLHEPTANE)	HPK	5,000	5,000
HEPTANE (N-)	HPT	5,000	5,000
Heptanoic acid	HPP	5,000	5,000
Heptanol (all isomers)	HTX	5,000	5,000
HEPTANOL	HTN	5,000	5,000
Heptene (all isomers)	HPY	5,000	5,000
HEPTENE (1-)	HTE	5,000	5,000
Heptyl Acetate	HPE	5,000	5,000
Herbicide (C15 -H22 -NO2 -Cl), SEE METOLACHLOR			
Hexaethylene Glycol			
Hexamethylene Glycol			
Hexamethylenetetramine solutions	HTS		
Hexane (all isomers)	HXS	5,000	5,000
HEXANE	HXA	5,000	5,000
Hexanoic acid	HKO	5,000	5,000
Hexanol	HON	5,000	5,000
Hexene (all isomers)	HXY	5,000	5,000
HEXENE (1-)	HXE	5,000	5,000
HEXENE (2-)	HXT	5,000	5,000
Hexyl Acetate	HAR		
Hexylene Glycol	HIG	5,000	5,000
Hog Grease, SEE LARD			
2-Hydroxy-4-(methylthio)butanoic acid	HBA		
HYDROCARBON 5-9 (MOVED TO SUB-O, NOW TABLE 151, 6/24/95)	HFN		
Hydroxy terminated Polybutadiene, SEE POLYBUTADIENE, HYDROXYL TERMINATED/			

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: COMOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Isophorone			
JET FUELS: JP-1 (Kerosene)	IPH	5,000	5,000
JET FUELS: JP-3	JPO	5,000	5,000
JET FUELS: JP-4	JPT	5,000	5,000
JET FUELS: JP-5 (Kerosene, heavy)	JPF	5,000	5,000
JET FUELS: JP-8	JPV	5,000	5,000
Kerosene	JPE		
Lactic acid	KLS	5,000	5,000
Lard			
Latex, liquid synthetic, including: Styrene-Butadien rubber	LLS		
Latex, liquid synthetic, including: Carboxylated Styrene-Butadien Copolymer			
Magnesium Nonyl Phenol Sulfide			
Magnesium Sulfonate	MSE		
Maleic Anhydride Copolymer			
2-Mercaptobenzothiazol (in liquid mixtures)			
Methane	MTH		
3-Methoxy-1-Butanol			
3-Methoxybutyl Acetate	MOA		
1-Methoxy-2-Propyl Acetate	MPO		
Methoxy Triglycol, SEE TRIETHYLENE GLYCOL METHYL ETHER	MTG		
Methyl Acetate	MTT	5,000	5,000
Methyl Acetoacetate	MAE		
Methyl alcohol (SEE METHANOL)	MAL	5,000	5,000
Methyl Amyl Acetate	MAC	5,000	5,000
Methyl Amyl alcohol	MAA	5,000	5,000
Methyl Amyl Ketone	MAK		
Methyl Butanol, SEE THE AMYL ALCOHOLS			
Methyl Butenol	MBL		
Methyl n-Butyl Ketone	MBK	5,000	5,000
Methyl Butynol	MBY		
Methyl Butyrate	MBU	5,000	5,000
Methyl Ethyl Ketone	MEK	5,000	5,000
Methyl Formal (DIMETHYL FORMAL)	MTF	5,000	5,000
Methyl Heptyl Ketone	MEH	5,000	5,000
Methyl Isobutyl Carbinol, SEE METHYL AMYL ALCOHOL	MIC	5,000	
Methyl Isobutyl Ketone	MIX	5,000	5,000
3-Methyl-3-Methoxybutanol			
3-Methyl-3-Methoxybutyl Acetate			
1-Methyl Naphthalene	MNA	5,000	5,000
Methyl Pentene			
2-METHYL-1-PENTENE	MPN	5,000	5,000
5-METHYL-1-PENTENE	MTH	5,000	5,000
N-Methyl-2-Pyrrolidone	MPY		
Methyl Tert-Butyl Ether (MTBE)	MBE	5,000	5,000
Metolachlor	MCO		
Mineral spirits	MMS	5,000	5,000
Myrcene	MRE	5,000	5,000
NAPHTHA: Aromatic (Having less than 10% Benzene)			
NAPHTHA: Cracking fraction			
NAPHTHA: Heavy			
NAPHTHA: Paraffinic			
NAPHTHA: Petroleum			
NAPHTHA: Solvent	PTW		
NAPHTHA: Stoddard solvent	NSV	5,000	5,000
NAPHTHA: Varnish makers' and painters' (75%)	NSS	5,000	5,000
Naphthalene Sulfonic acid-Formaldehyde Copolymer, Sodium salt solution	NVM	5,000	5,000
Naphthenic acid	NFS		
Nonane (all isomers)	NTI	5,000	
NONANE	NAX	5,000	5,000
Nonanoic acid (all isomers)	NAN	5,000	5,000
Nonanoic, Tridecanoic acid mixture	NDA		

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
None			
Monyl alcohol (all isomers)	MON	5,000	5,000
MONYL ALCOHOL	MNS	5,000	5,000
MONYL ALCOHOL (iso-)	MNI	5,000	5,000
Monyl Methacrylate Monomer	MNI	5,000	5,000
Monyl Phenol			
Monyl Phenol Poly(4-12)ethoxylates	MNP	5,000	5,000
Monyl Phenol Sulfide (90% or less)	MPE		
Moxious liquid, N.O.S. (17) ("Trade name," contains "principal components"), Non-Moxious liquid, N.O.S. (18) ("Trade name," contains principal components)			
Octadecene			
Octadecenoamide solution (Oleamide)	ODD		
Octane (all isomers)	OAX	5,000	5,000
OCTANE	OAN	5,000	5,000
Octanoic acid (all isomers)	OAA	5,000	5,000
Octanol (all isomers)	OCC	5,000	5,000
OCTANOL	OTA	5,000	5,000
Octene (all isomers)	OTX	5,000	5,000
OCTENE (1-)	OTE	5,000	5,000
Octyl Acetate			
Octyl alcohol (iso-, n-) (all isomers), SEE OCTANOL (ALL ISOMERS)	OCC	5,000	5,000
OCTYL ALCOHOL	ICA	5,000	5,000
Octyl Aldehydes	OAL		
Octyl Decyl Adipate	ODA		
Octyl Epoxytallate	OET		
Octyl Phthalate. SEE DI-(2-ETHYLHEXYL) PHTHALATE			
OIL, EDIBLE: Babassu	OBB		
OIL, EDIBLE: Beechnut			
OIL, EDIBLE: Castor	OCA		
OIL, EDIBLE: Cocoa butter			
OIL, EDIBLE: Coconut	OCC	5,000	
OIL, EDIBLE: Cod liver			
OIL, EDIBLE: Corn	OCO	5,000	
OIL, EDIBLE: Cottonseed	OCS		
OIL, EDIBLE: Fish, N.O.S.	OFS	5,000	
OIL, EDIBLE: Grapeseed			
OIL, EDIBLE: Groundnut			
OIL, EDIBLE: Hazelnut			
OIL, EDIBLE: Lard			
OIL, EDIBLE: Maize	OLD		
OIL, EDIBLE: Mustard seed			
OIL, EDIBLE: Nutmeg Butter			
OIL, EDIBLE: Olive	OOL		
OIL, EDIBLE: Palm	OPM		
OIL, EDIBLE: Palm kernel	OPO		
OIL, EDIBLE: Peanut	OPW		
OIL, EDIBLE: Poppy			
OIL, EDIBLE: Raisin seed			
OIL, EDIBLE: Rice bran	ORP		
OIL, EDIBLE: Safflower	OSF		
OIL, EDIBLE: Salad			
OIL, EDIBLE: Sesame			
OIL, EDIBLE: Soya bean	OSB	5,000	
OIL, EDIBLE: Sunflower, SEE SUNFLOWER SEED		5,000	
OIL, EDIBLE: Sunflower seed	OSW		
OIL, EDIBLE: Tucum	OTC		
OIL, EDIBLE: Vegetable, N.O.S.	OVG	5,000	
OIL, EDIBLE: Walnut			
OIL, FUEL: No. 1 (Kerosene)	OWW		
OIL, FUEL: No. 1-D	OOD		
OIL, FUEL: No. 2	OTW	5,000	5,000

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
OIL, FUEL: No. 2-D			
OIL, FUEL: No. 4			
OIL, FUEL: No. 5	OTD		
OIL, FUEL: No. 6	OPR	5,000	5,000
OIL, MISC: Absorption	OPV	5,000	5,000
OIL, MISC: Aliphatic	OSX	5,000	5,000
OIL, MISC: Animal, N.O.S.	OAS		
OIL, MISC: Aromatic			
OIL, MISC: Aviation F2300			
OIL, MISC: Clarified			
OIL, MISC: Coal	OCF		
OIL, MISC: Coconut oil, esterified, SEE COCONUT OIL, FATTY ACID METHYL ESTER			
OIL, MISC: Coconut oil, fatty acid			
OIL, MISC: Coconut oil, fatty acid Methyl Ester			
OIL, MISC: Coconut oil, Methyl Ester, SEE COCONUT OIL FATTY ACID METHYL ESTER	OCM		
OIL, MISC: Cottonseed, fatty acid, SEE COTTONSEED OIL, FATTY ACID	OCY	5,000	
OIL, MISC: Croton			
OIL, MISC: Crude			
OIL, MISC: Diesel	OIL	5,000	5,000
OIL, MISC: Gas, low pour	ODS	5,000	5,000
OIL, MISC: Gas, low sulfur			
OIL, MISC: Heartcut distillate			
OIL, MISC: Lanolin			
OIL, MISC: Linseed			
OIL, MISC: Lubricating			
OIL, MISC: Mineral			
OIL, MISC: Mineral seal	OLB	5,000	5,000
OIL, MISC: Motor			
OIL, MISC: Neatsfoot	OMS		
OIL, MISC: Oiticica	OMT		
OIL, MISC: Palm oil, fatty acid Methyl Ester	OMF		
OIL, MISC: Palm oil, Methyl Ester, SEE SEE PALM OIL, FATTY ACID METHYL ESTER	OOI		
OIL, MISC: Penetrating	OPE	5,000	
OIL, MISC: Perilla	EOPE		
OIL, MISC: Pilchard	OPT		
OIL, MISC: Pine			
OIL, MISC: Range	OPI		
OIL, MISC: Residual	ORG		
OIL, MISC: Resin			
OIL, MISC: Resinous petroleum	ORS	5,000	5,000
OIL, MISC: Road			
OIL, MISC: Rosin	ORD		
OIL, MISC: Seal	ORN		
OIL, MISC: Soapstock			
OIL, MISC: Soya bean (epoxidized)	OIS		
OIL, MISC: Sperm			
OIL, MISC: Spindle	OSP		
OIL, MISC: Spray	OSD		
OIL, MISC: Tall	OSY		
OIL, MISC: Tall, fatty acid	OTL		
OIL, MISC: Tanner's	TOP		
OIL, MISC: Transformer	OTN		
OIL, MISC: Tung	OTF		
OIL, MISC: Turbine	OTG		
OIL, MISC: Whale	OTB	5,000	5,000
OIL, MISC: White (mineral)			
OIL, MISC: Wood			
alpha-Olefing (C13 - C18)			
Olefins (C13 and above, all isomers)	OAM		
Oleic acid		5,000	
Oleyl alcohol (OCTADECENOL), SEE ALCOHOLS (C13 AND ABOVE)	OLA		

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Organic Amine 70, SEE AMINOETHYLDIETHANOLAMINE, AMINOETHYL-ETHANOLAMINE SOLU			
Palm Stearin	PMS		
n-Paraffins (C10 - C20)	PFN		
Pentadecanol, SEE SEE ALCOHOLS (C13 AND ABOVE)	PDC	5,000	5,000
Pentaethylene Glycol			
Pentaethylenhexamine	PEP		
Pentane (all isomers)	PTY	5,000	5,000
PENTANE (iso-)	IPT	5,000	5,000
PENTANE (n-)	PTA	5,000	5,000
Pentanoic acid			
Pentene (all isomers)	PTX	5,000	5,000
PENTENE (1-)	PTE	5,000	5,000
Petrolatum	PTL		
1-Phenyl-1-Xylyl Ethane	PXE		
Phosphosulfurized Bicyclic Terpene			
Phthalate plasticizers, SEE INDIVIDUAL PHTHALATES			
Pinene			
Polyalkenyl Succinic Anhydride Amine	PIN	5,000	5,000
Polyalkylene Glycols, Polyalkylene Glycol Monoalkyl Ethers mixtures	PFX		
Polyalkylene Oxide Polyol	PAO	5,000	
Polamine, Amide mixture			
Polybutadiene, Hydroxyl terminated			
Polybutene	PLB	5,000	5,000
Polydimethylsiloxane		5,000	
Polyethylene Glycol		5,000	
Polyethylene Glycol Dimethyl Ether		5,000	
Polyglycerol			
Polyisobutylene, SEE POLYBUTENE			
Polymerized Esters			
Poly(20)oxyethylene Sorbitan Monooleate	PSM		
Polypropylene	PLP		
Polypropylene Glycol	PGC	5,000	5,000
Polypropylene Glycol Methyl Ether	PGM	5,000	5,000
Polysiloxane			
Polystyrene Diakyl Maleate			
Potassium Oleate			
Propane	POE		
n-Propoxypropanol	PRP	5,000	
Propyl Acetate (iso-)	PKP		
Propyl Acetate (n-)	LAC	5,000	5,000
Propyl alcohol (iso-)	PAT		5,000
Propyl alcohol (n-)	IPA	5,000	5,000
Propylbenzene (n-)	PAL	5,000	5,000
iso-Propylcyclohexane	PBZ	5,000	5,000
Propylene	IPX	5,000	5,000
Propylene-Butylene Copolymer	PPL	5,000	
Propylene Dimer	PBP		
Propylene Glycol (1,2-PROPANDIOL)	PDR		
Propylene Glycol Monoalkyl Ether	PPG	5,000	5,000
Propylene Glycol Ethyl Ether	PGE		
Propylene Glycol Methyl Ether	PGY		
Propylene Polymer (in liquid mixtures)	PWE	5,000	5,000
Propylene Tetramer	PTT	5,000	5,000
Propylene Trimer	PTR		
Pseudocumene, SEE TRIMETHYLBENZENE			
Rum			
Sodium Acetate, Glycol, water solutions			
Sodium Acetate solution	SAN		
Sodium Benzoate solution	SBN		
Sodium Sulfonate			
Stearic acid	SRA		

SUMMARY COMPARISON OF "SPILL VALVE" VS "P/V" MAX LIQUID TRANSFER RATES
 RANGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
Stearyl alcohol (Octadecanol)			
Sulfolane			
Tallow	SFL	5,000	5,000
Tallow alcohol, SEE ALCOHOLS (C13 AND ABOVE)	TLO		
Tallow fatty acid			
Tallow Alkyl Nitrile	TFD		
Tetradecanol			
1-Tetradecene, SEE THE OLEFIN OR ALPHA-OLEFIN ENTRIES	TIN	5,000	
Tetradecylbenzene	TTD	5,000	5,000
Tetraethylene Glycol	TED		
Tetrahydronaphthalene	TTG	5,000	5,000
Tetrapropylbenzene, SEE ALKYL (C9-C17) BENZENES	TEN	5,000	5,000
Toluene			
Triarylphosphate	TOL	5,000	5,000
Tributyl Phosphate			
Tricresyl Phosphate (less than 1% of the ortho isomer)	TBP		
Tridecane	TCP	5,000	5,000
Tridecanoic acid	TRD	5,000	5,000
Tridecanol, SEE ALCOHOLS (C13 AND ABOVE)			
1-Tridecane	TDN	5,000	5,000
Tridecylbenzene	TDC	5,000	5,000
Triethylbenzene	TEB		
Triethylene Glycol	TEG	5,000	5,000
Triethylene Glycol Butyl Ether			
Triethylene Glycol Butyl Ether mixture			
Triethylene Glycol di-(2-ethylbutyrate)		5,000	
Triethylene Glycol Ether mixture	TGD		
Triethylene Glycol Ethyl Ether			
Triethylene Glycol Methyl Ether	TGE		
Triethyl Phosphate			
Triisooctyl Trimellitate	TPS	5,000	5,000
Triisopropanolamine			
Trimethylbenzenes (all isomers)	TIP	5,000	
TRIMETHYL BENZENE (1,2,5-)	TRB	5,000	5,000
TRIMETHYL BENZENE (1,2,3-)	TMB	5,000	5,000
TRIMETHYL BENZENE (1,2,4-) (PSEUDOCUMENE)	TMD	5,000	5,000
Trimethylol Propane Polyethoxylate	TME	5,000	5,000
2,2,4-Trimethyl pentanediol-1,3-diisobutyrate	TFR		
2,2,4-Trimethyl-3-pentanol-1-isobutyrate			
Tripropylene, SEE PROPYLENE TRIMER	TMP		
Tripropylene Glycol			
Tripropylene Glycol Methyl Ether	TOC		
Trixylenyl Phosphate	TGM		
Turpentine	TRP	5,000	
Turpentine substitute (White spirit), SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)	TPT		
Undecanol			
Undecene (1-)			
Undecyl alcohol	UDC	5,000	5,000
Undecylbenzene	UND	5,000	5,000
Vinyl Acetate-fumarate Copolymer	UDB		
Waxes:			
WAXES: Candelilla	WAX		
WAXES: Carnauba			
WAXES: Paraffin	WAX,		
WAXES: Petroleum	WAX,		
White spirit, SEE WHITE SPIRIT (LOW (15-20%) AROMATIC)			
White spirit (low (15 - 20%) aromatic)			
Wine, SEE ALCOHOLIC BEVERAGES, N.O.S.	WSL		
Wool grease			
Xylenes (ortho-, meta-, para-)	XLM	5,000	5,000
XYLENE (M-)	XLM	5,000	5,000

MLTRSUM

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO	C H R I S	MAX	MAX
		LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	LIQUID TRANSFER RATE PER P/V VALVE (BBL/ HR)
KYLENE (O-)	KLO	5,000	5,000
KYLENE (P-)	KLP	5,000	5,000
KYLENOL	KYL	5,000	5,000
Zinc Dialkyldithiophosphate			

SUMMARY COMPARISON OF "SPILL VALVE" vs "P/V" MAX LIQUID TRANSFER RATES
 BARGE: C9809: CONOCO, INC.; "7027" AND "7028"

CARGO

	MAX LIQUID TRANSFER RATE PER SPILL VALVE (BBL/ HR)	MAX LIQUID- TRANSFER RATE PER P/V VALVE (BBL/ HR)
--	--	---

46 CFR SUBCHAPTER D, BUT NOT TABLE 30.25-1

AROMATIC RESIN OIL 60	ARS 5,000	5,000
AROMATIC RESIN OIL 80	ARS 5,000	5,000
AROMATIC RESIN OILS		