KIRBY INLAND MARINE

CARGO TRANSFER PROCEDURES FOR THE BARGE

CC 134

PLEASE NOTE:

FOR PROPER VALVE ALIGNMENT AND SAFE CARGO TRANSFER GUIDANCE, PLEASE REFER TO KIRBY MARINE TRANSPORTATION'S CARGO HANDLING PROCEDURE MANUAL AND FOLLOW THE KIRBY TRANSFER PLAN.

IF YOU NEED A COPY OF THE PROCEDURE MANUAL, PLEASE CALL THE KIRBY DUTY LINE (713) 435-1618 OR (713) 435-1925 BEFORE CARGO OPERATION.

TABLE OF CONTENTS

PROPYLENE OXIDE

SECTION 1: IDENTIFICATION

Product Name: PROPYLENE OXIDE

Product Number: 000000000000499221

Chemical Name: 1,2-Propylene Oxide

CAS Number: 75-56-9

Chemical Family: Alkyl epoxides

Synonyms: 1,2-Epoxypropane; Methyl Oxirane; Propylene Oxide; PO

Manufacturer: Lyondell Chemical Company
One Houston Center, Suite 1600
1221 McKinney St.
P.O. Box 2583
Houston Texas 77252-2583

Telephone Numbers:
Emergency: CHEMTREC 800 424-9300
LYONDELL 800-245-4532

Non-Emergency: CUSTOMER SERVICE
888 777-0232
PRODUCT SAFETY
800 700-0948

SECTION 2 : Composition/Information on Ingredients

Component Name:	CAS #:	EU Inventory Number:	Concentration by Wt.-Max. Avg.	Min.	Max.
1,2-Propylene Oxide	75-56-9	EINECS 200-879-2			100.0

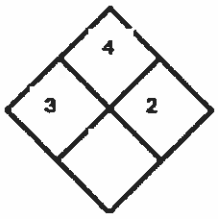
SECTION 3: HAZARD IDENTIFICATION

Emergency Overview This material is HAZARDOUS by OSHA Hazard Communication definition.

Signal Word: DANGER.

Hazards: Extremely flammable. Highly reactive. Severe eye irritant. Severe skin irritant. Potential skin sensitizer. Inhalation hazard. Possible cancer hazard.

NFPA



HMIS®

Health	*	3
Flammability		4
Reactivity		2

Physical State: Liquid.
Color: Clear, colorless.
Odor: Ether-like odor.
Odor Threshold: ~ 43 ppm / Odor is not an adequate warning of potentially hazardous ambient air concentrations.
Potential Health Effects
Routes of Exposure: Inhalation Eye Skin.
Signs and Symptoms of Acute Exposure: Propylene oxide is of slight acute toxicity.
1,2-Propylene Oxide
Severe skin irritant. Potential skin sensitizer. Skin absorption hazard. Moderate to severe eye irritant. Respiratory tract irritant. Mucous membrane irritant. Slight ingestion hazard.
Skin: Liquid may produce minimal to severe skin irritation. Potential skin sensitizer. Skin absorption hazard.
Inhalation: Signs of respiratory tract irritation (such as tearing, nasal discharge, difficulty breathing) may occur with high vapor concentrations.
Eye: Severe eye irritant.
Ingestion: Ingestion not a likely route of exposure. Ingestion may result in irritation of the mouth and digestive tract.
Chronic Health Effects:
See component summary.
1,2-Propylene Oxide
This material has been shown to induce tumors in laboratory animals. Repeated skin contact may cause irritation and allergic dermatitis. Listed by IARC as a group 2B - Possible Human Carcinogen. Listed by NTP as reasonably anticipated to be a human carcinogen based on sufficient evidence of carcinogenicity in experimental animals.
Conditions Aggravated by Exposure:
No additional information is available on whether overexposure to this material would aggravate other existing special medical conditions.

SECTION 4: FIRST AID MEASURES

General: After adequate first aid, no further treatment is required unless symptoms reappear.
Inhalation: If overcome by exposure, remove victim to fresh air immediately. Give artificial respiration if not breathing. Obtain medical attention if breathing difficulty persists. Prompt action is essential.
Eye: Immediately flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower lids. If pain or irritation persists, promptly obtain medical attention.

Skin: Immediately remove contaminated clothing. Wash skin thoroughly with mild soap and

water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first. Seek medical attention if discomfort persists.
Ingestion: If large quantity swallowed, give lukewarm water (pint/ 1/2 litre) if victim completely conscious/alert. Do not induce vomiting. Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.
Physician's Detoxification Procedures:
Treat symptomatically. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5: FIRE FIGHTING MEASURES

Flammability Classification:
OSHA/NFPA Class IA flammable liquid.
Flash Point / Method: ~ -37 °C(-35 °F)(Closed Cup)
Auto-Ignition Temperature: 449 °C (840 °F)
Flammable Limits: LOWER: 1.7 vol%
UPPER: 36.5 vol%
Hazardous Combustion Products:
Thermal decomposition may produce carbon monoxide and other toxic vapors.
Special Conditions to Avoid:
Releases flammable vapors below normal ambient temperatures. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapor source. Diluting with water may not suffice to raise flash point above ambient temperatures.
Suitable: SMALL FIRE: Use dry chemicals, CO2, water spray or alcohol-resistant foam. LARGE FIRE: Use water spray, water fog or alcohol-resistant foam. Test results indicate that alcohol resistant foam is most effective in fighting propylene oxide fires.
Extinguishing Media:
Unsuitable: Do not use solid water stream.
Fire Fighting Instructions:
Protective Equipment/Clothing: Do not enter fire area without proper protection. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters protective clothing will only provide limited protection.
INSTRUCTIONS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Heat may build enough pressure to rupture closed containers/spreading fire/increasing risk of burns/injuries. Cool containers with flooding quantities of water until well after fire is out. Blanket with alcohol-resistant foam. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Notify authorities immediately if liquid enters sewer/public waters.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Release Response: Extremely flammable liquid. Highly reactive material. Release causes immediate fire/explosion hazard. Eliminate all sources of ignition. Evacuate/limit access. All equipment used when handling this product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into

waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Clay-based absorbants may react with propylene oxide. Use clean non-sparking tools to collect absorbed material. Dike large spills and place materials in salvage containers. Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Regulation Component TPQ RQ

EPA/DOT RQ Propylene Oxide / CAS# 75-56-9. 45.4 KG / 100 lbs
SARA TPQ Propylene Oxide / CAS# 75-56-9. 4,540 KG / 10,000 lbs 45.4 KG / 100 lbs

SECTION 7: HANDLING AND STORAGE

Handling: For industrial use only. Use only non-sparking tools. Carefully vent any internal pressure before removing closure. Containers must be properly grounded before beginning transfer. Handle empty containers with care; vapor residue may be flammable/explosive. Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair. Extinguish all ignition sources. Check atmosphere for explosiveness and oxygen deficiencies. Observe precautions pertaining to confined space entry. Wear recommended personal protective equipment.

Storage: Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents. Store closed drums with bung in up position. Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls:

Electrical equipment should be grounded and conform to applicable electrical code. Use only where ventilation can control exposures to within occupational exposure limit(s). Special attention should be given to low areas/pits where flammable vapors can accumulate.

Personal Protection:

Inhalation: A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use. If exposure can exceed the occupational exposure limit(s), use only approved supplied air respirator operated in a positive pressure mode.

Skin: Wear chemical resistant gloves such as: Barricade(tm). or Tychem 10 000(tm). Impervious protective suit with integral or tight-fitting gloves, boots, and full head and face protection must be worn. The equipment must be cleaned thoroughly after each use.

Eye: Eye protection, including both chemical splash goggles and face shield, must be worn when possibility exists for eye contact due to splashing/spraying liquid, airborne particles, or vapor.

Other Hygienic Practices:

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Recommended Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse.

Occupational Exposure Limits:

Component Name: Source / Date Value / Units Type Notation Carcinogenic Listing*
1,2-Propylene Oxide US (ACGIH) / 2001 2 ppm
4.8 mg/m3
8 HRS / TWA. Sen 2, 3

US (OSHA) / 2001 100 ppm
240 mg/m3
8 HRS / TWA. No 2, 3
***1 = OSHA 2 = IARC 3 = NTP 4 = Others N/L = Not Listed See Section 11 for more information**

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity: ~0.83 g/cc **Vapor:** ~2, (Air = 1.0 at 60-90°F)
Boiling Point: ~ 34 °C/94 °F, @ 760 mm Hg **pH:** Not applicable.
Vapor Pressure: ~ 440 mm Hg, @ (20 °C) **Viscosity:** ~ 4 mPa.s, @ (21 °C/70 °F), (Brookfield).
Solubility: Solubility (Water):
Appreciable (10 Percent or more).
Octanol/Water Partition Coefficient in Kow:
Log Pow: -1.52 to 0.35
Melting/ Freezing Point: -112 °C/-169 °F
Dry Point: No Data Available. **Evaporation Rate:** No Data Available.
Other Physical & Chemical Properties: Volatile Characteristics: Moderate: 1.0 to 10.0% Additional properties may be listed in Sections 3 and 5.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability: This material is stable when properly handled and stored.
Conditions to Avoid: Contact with strong acids. Contact with strong bases. Heat, sparks, open flame, other ignition sources, and oxidizing conditions.
Incompatibility with: Anhydrous metal chlorides. Reacts with anhydrous metal chlorides and peroxides. No additional information available. Bronze. Severe oxidizing conditions. Brass. Acetylide forming metals.
Decomposition Products: Incomplete combustion may produce carbon monoxide and other toxic gases.
Hazardous Polymerization: May occur.
Reactions with Air and Water:
Not expected to occur.

SECTION 11: TOXICOLOGICAL INFORMATION

Product
Summary: Propylene oxide is of slight acute toxicity, is severely irritating to the eyes, irritating to the skin and respiratory tract, and may cause skin sensitization. Target organ toxicity associated with repeated exposure to propylene oxide is limited to local tissue injury at the site of initial contact. There are no concerns for selective effects on fertility or the developing embryo or fetus associated with propylene oxide exposure. Propylene oxide can bind to and, under certain conditions, damage genetic material. In lifetime inhalation studies, propylene oxide has been shown to be a rodent nasal carcinogen at concentrations associated with obvious irritation, injury, and regenerative changes in nasal passages.
CARCINOGENICITY: See component summary.
Component Summary:
1,2-Propylene Oxide
LC50 (Inhl)
Rat 4000 PPM 4 HOURS
LC50 (Inhl)
Mouse 1740 PPM 4 HOURS
LD50 (Oral)
Rat 950 MG/KG

LD50 (Oral)
Guinea Pig 690 MG/KG
LD50 (Skin)
Rabbit 950 MG/KG
ACUTE INHALATION EFFECTS: Overexposure may cause irritation to the respiratory tract and to other mucous membranes.
SKIN EFFECTS: Liquid may produce minimal to severe skin irritation. Potential skin sensitizer. Skin absorption hazard.
EYE EFFECTS: Severe eye irritant.
Target Organ Effects At site of application: skin, eye, nasal passages, respiratory system and gastrointestinal tract.
Repeated Dose Toxicity Target organ toxicity associated with repeated exposure to propylene oxide is limited to local tissue injury at the site of initial contact. Significant toxic effects in organs distant from the site of application have not been observed.

CARCINOGENICITY: The results of cancer studies in laboratory animals indicate that propylene oxide is able to produce site of contact tumors by certain inhalation or oral exposures. The mode of action for the tumorigenic responses has not been established. Chronic irritation, cytotoxicity, and consequential cellular proliferation may play a role in tumor development. Propylene oxide is able to react directly with and, under certain conditions, damage nucleic acids (genetic material). The significance of these effects to adverse consequences in animals or humans has not been established. This chemical is an IARC 2B carcinogen that has produced tumors in experimental animals. Listed by NTP as reasonably anticipated to be a human carcinogen based on sufficient evidence of carcinogenicity in experimental animals.
Reproductive / Development Effects No evidence of developmental toxicity or adverse effects on fertility were observed at non-parentally toxic dose levels suggesting propylene oxide is not a selective developmental or reproductive toxicant.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: This material is expected to be moderately toxic to aquatic species.
Toxicity to Fish:/Amphibians
Test type Species Value / Units
LC50 / 96 HOUR rainbow trout. 52 mg/l
LC50 / 96 HOURS bluegill. 215 mg/l
LC50 / 96 HOURS mullet. 89 mg/l
Toxicity to Aquatic: Inverterbrates:
Test type Species Value / Units
EC50 / 48 HOURS Daphnia magna. 350 mg/l
Toxicity to Aquatic: Plants
Test type Species Value / Units
EC50 / 96 HOURS green algae
(selenastrum).
240 mg/l
Environmental
Fate:
This material is not expected to persist in the environment. This material is volatile and water soluble. It is expected to be poorly adsorbed onto soils or sediments. In water and soil, it will hydrolyze rapidly to non-toxic and degradable materials.
Bioaccumulation: This material is not expected to bioaccumulate.
Biodegradation: This material is expected to be biodegradable.

SECTION 13: DISPOSAL CONSIDERATIONS

Contaminated product, soil, water, container residues and spill cleanup materials may be hazardous wastes. (See applicable local, state, and international regulations, specifications or other requirements). Burn concentrated liquids in systems designed for low flash point material. Avoid flame-outs. Dilute aqueous waste may biodegrade. Concentrated/raw liquid waste may require 100 fold dilution or more to raise flash point to safe level before discharge

to treatment facility. Avoid overloading/poisoning plant biomass. Assure effluent complies with applicable regulations. Comply with applicable local, state or international regulations concerning solid or hazardous waste disposal and/or container disposal.

SECTION 14: TRANSPORT INFORMATION

Proper Shipping Name:
Propylene Oxide
UN/NA ID: UN 1280
NAER Guidebook: 127P **Marine Pollutant:** No
Labels: Flammable liquid.
DOT Hazard Class: 3, PG I **IMDG Hazard Class:** 3, PG I
ADR/VLG Hazard Class: 3
ICAO/IATA Hazard Class: 3, Packing Group I.
ADNR/VBG Hazard Class: 3
RID/VSG Hazard Class: 3

SECTION 15: REGULATORY INFORMATION

Regulatory Status: All components of this product are listed or are exempt from listing on the TSCA 8(b) inventory. If identified components of this product are listed under the TSCA 12(b) Export Notification rule, they will be listed below.
SARA - Section 313
Emissions Reporting: This material contains the following chemicals with known CAS numbers subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372:
Component Summary: Reporting Threshold
Propylene Oxide / CAS# 75-56-9. 0.1%
SARA - Section 311/312: Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312:
Immediate (Acute) Health Hazard.
Delayed (Chronic) Health Hazard.
Fire Hazard.
Reactive.
Sudden Release of Pressure.
State Reporting:
This material contains the following chemical(s) with CAS numbers listed by the State of California as 'known to the State to cause Cancer' or 'known to the State to cause Reproductive Toxicity' (Note that some of these chemicals may only be present in trace amounts):
Propylene Oxide, Carcinogenic Hazard

Material Safety Data Sheet
PROPYLENE OXIDE
MSDS No.:
Variant:
Version No:
Validation Date:
BE114
U.S.A.-EN
1.2
01/22/2002

Massachusetts Substances List (MSL) - Extraordinarily hazardous substances on the MSL-EHL must be identified when present in materials at levels greater than state specified criterion. The criterion is >= 0.0001%. Components with CAS numbers present in this material at levels which could require reporting under the statute are:
Propylene Oxide / CAS# 75-56-9.

Special Hazardous Substances listed by the State of Pennsylvania must be identified when present in materials at levels greater than the state specified criterion. The criterion is >= 0.01%. Components with CAS numbers in this material at a level which could require reporting under the statute are:
Propylene Oxide / CAS# 75-56-9.

Environmentally Hazardous Substances listed by the State of Pennsylvania must be identified when present in materials at levels greater than the state specified criterion. The criterion is >= 1%. Components with CAS numbers in this material at a level which could require reporting under the statute are:
Propylene Oxide / CAS# 75-56-9.

SECTION 16: OTHER INFORMATION

DISCLAIMER OF

RESPONSIBILITY: This document is generated for the purpose of distributing health, safety, and environmental data. It is not a specification sheet nor should any displayed data be construed as a specification. The information on this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct test data on the substance itself. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with handling, storage, use, or disposal of this product. If the product is used as a component in another product, this MSDS information may not be applicable.

Latest Revision(s): Revised Section(s): 11 Date of Revision: 17 January 2002

END OF DOCUMENT

PROPYLENE OXIDE

POX

CAUTIONARY RESPONSE INFORMATION

Common Synonyms	Liquid	Colorless	Sweet, alcohol odor
Methyloxirane 1, 2-Epoxypropane Propeneoxide	Mixes with water. Flammable, irritating vapor is produced.		

Evacuate.
Keep people away. AVOID CONTACT WITH LIQUID AND VAPOR.
Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Shut off ignition sources and call fire department.
Stay upwind and use water spray to "knock down" vapor.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

FLAMMABLE.
Containers may explode in fire.
Flashback along vapor trail may occur.
Vapor may explode if ignited in an enclosed area.
Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves).
Combat fires from safe distance or protected location.
Extinguish with dry chemical, alcohol foam, or carbon dioxide.
Water may be ineffective on fire.
Cool exposed containers with water.

Exposure

CALL FOR MEDICAL AID

VAPOR
Irritating to eyes, nose, and throat.
If inhaled, will cause headache, nausea, vomiting, or loss of consciousness.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Will burn skin and eyes.
Harmful if swallowed.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.

Water Pollution

Effect of low concentrations on aquatic life is unknown.
May be dangerous if it enters water intakes.
Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Do not burn

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 16; Alkylene oxide
2.2 Formula: CH_3CHCH_2O
2.3 IMO/UN Designation: 3.1/1280
2.4 DOT ID No.: 1280
2.5 CAS Registry No.: 75-56-9
2.6 NAERG Guide No.: 127P
2.7 Standard Industrial Trade Classification: 51614

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Air-supplied mask; rubber or plastic gloves; vapor-proof goggles.
3.2 Symptoms Following Exposure: Inhalation may produce headache, nausea, vomiting, and unconsciousness; mild depression of central nervous system; lung irritation. Slightly irritating to skin, but covered contact may cause burn. Very irritating to eyes.
3.3 Treatment of Exposure: INHALATION: remove person to fresh air immediately, keep quiet and warm; call a physician; if breathing stops, start artificial respiration. SKIN OR EYE CONTACT: immediately flush with plenty of water for at least 15 min.; immediately remove contaminated clothing, watch bands, rings, etc. to prevent confining product to skin; for eyes get medical attention.
3.4 TLV-TWA: 20 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: Not listed.
3.7 Toxicity by ingestion: Grade 2; LD_{50} = 0.5 to 5 g/kg (rat)
3.8 Toxicity by inhalation: Currently not available
3.9 Chronic Toxicity: Currently not available
3.10 Vapor (Gas) Irritant Characteristics: Vapor is moderately irritating such that personnel will not usually tolerate moderate or high vapor concentrations.
3.11 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure.
3.12 Odor Threshold: 200 ppm
3.13 IDLH Value: 400 ppm
3.14 OSHA PEL-TWA: 100 ppm
3.15 OSHA PEL-STEL: Not listed.
3.16 OSHA PEL-Ceiling: Not listed.
3.17 EPA AEGL: Not listed.

4. FIRE HAZARDS

4.1 Flash Point: —35°F C.C.; <—20°F O.C.
4.2 Flammable Limits in Air: 2.1%-38.5%
4.3 Fire Extinguishing Agents: Carbon dioxide or dry chemical for small fires; alcohol or polymer foam for large fires.
4.4 Fire Extinguishing Agents Not to Be Used: Water may be ineffective.
4.5 Special Hazards of Combustion Products: Not pertinent
4.6 Behavior in Fire: Containers may explode. Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.
4.7 Ignition Temperature: 869°F
4.8 Electrical Hazard: Class I, Group B (C)
4.9 Burning Rate: 3.3 mm/min.
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichiometric Air to Fuel Ratio: 18.0 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 6.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): N$_2$ diluent: 7.6%

5. CHEMICAL REACTIVITY

5.1 Reactivity With Water: No reaction
5.2 Reactivity with Common Materials: No reaction
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Not pertinent
5.5 Polymerization: May occur due to high temperatures, contamination with alkalies, aqueous acids, amines, and acidic alcohols.
5.6 Inhibitor of Polymerization: Not pertinent

6. WATER POLLUTION

6.1 Aquatic Toxicity: Currently not available
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): Currently not available
6.4 Food Chain Concentration Potential: None
6.5 GESAMP Hazard Profile:
Bioaccumulation: 0
Damage to living resources: 2
Human oral hazard: 1
Human contact hazard: II
Reduction of amenities: X

7. SHIPPING INFORMATION

7.1 Grades of Purity: 99.99% (must contain no acetylene)
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: Inerted
7.4 Venting: Safety relief
7.5 IMO Pollution Category: C
7.6 Ship Type: 2
7.7 Barge Hull Type: 2

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Flammable liquid
8.2 49 CFR Class: 3
8.3 49 CFR Package Group: I
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	3
Flammability (Red)	4
Reactivity (Yellow)	2

8.6 EPA Reportable Quantity: Not listed.
8.7 EPA Pollution Category: Not listed.
8.8 RCRA Waste Number: Not listed
8.9 EPA FWPCA List: Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15°C and 1 atm: Liquid
9.2 Molecular Weight: 58.08
9.3 Boiling Point at 1 atm: 93.7°F = 34.3°C = 307.5°K
9.4 Freezing Point: —169.4°F = —111.9°C = 161.3°K
9.5 Critical Temperature: 406.4°F = 208.1°C = 482.3°K
9.6 Critical Pressure: 714 psia = 48.6 atm = 4.92 MN/m^2
9.7 Specific Gravity: 0.830 at 20°C (liquid)
9.8 Liquid Surface Tension: 24.5 dynes/cm = 0.0245 N/m at 15°C
9.9 Liquid Water Interfacial Tension: Not pertinent
9.10 Vapor (Gas) Specific Gravity: 2.0
9.11 Ratio of Specific Heats of Vapor (Gas): 1.133
9.12 Latent Heat of Vaporization: 205 Btu/lb = 114 cal/g = 4.77 X 10^5 J/kg
9.13 Heat of Combustion: —13,000 Btu/lb = —7,221 cal/g = —302.3 X 10^5 J/kg
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: (est.) —19 Btu/lb = —11 cal/g = —0.45 X 10^5 J/kg
9.16 Heat of Polymerization: Not pertinent
9.17 Heat of Fusion: Currently not available
9.18 Limiting Value: Currently not available
9.19 Reid Vapor Pressure: 18.0 psia

NOTES

POX

PROPYLENE OXIDE

9.20 SATURATED LIQUID DENSITY	
Temperature (degrees F)	Pounds per cubic foot
—35	56.390
—30	56.170
—25	55.940
—20	55.720
—15	55.490
—10	55.270
—5	55.040
0	54.810
5	54.591
10	54.360
15	54.140
20	53.910
25	53.690
30	53.460
35	53.240
40	53.010
45	52.791
50	52.560
55	52.330
60	52.110
65	51.880
70	51.660
75	51.430
80	51.210
85	50.980
90	50.760

9.21 LIQUID HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.433
10	0.445
20	0.457
30	0.469
40	0.482
50	0.494
60	0.506
70	0.518
80	0.531
90	0.543

9.22 LIQUID THERMAL CONDUCTIVITY	
Temperature (degrees F)	British thermal unit-inch per hour-square foot-F
NOT PERTINENT	

9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Centipoise
NOT PERTINENT	

9.24 SOLUBILITY IN WATER	
Temperature (degrees F)	Pounds per 100 pounds of water
68	40.500

9.25 SATURATED VAPOR PRESSURE	
Temperature (degrees F)	Pounds per square inch
—50	0.207
—40	0.318
—30	0.474
—20	0.691
—10	0.983
0	1.371
10	1.875
20	2.521
30	3.337
40	4.353
50	5.601
60	7.118
70	8.941
80	11.110
90	13.670
100	16.660
110	20.130
120	24.120
130	28.680
140	33.860
150	39.710

9.26 SATURATED VAPOR DENSITY	
Temperature (degrees F)	Pounds per cubic foot
—50	0.00274
—40	0.00410
—30	0.00598
—20	0.00850
—10	0.01183
0	0.01613
10	0.02160
20	0.02844
30	0.03687
40	0.04713
50	0.05946
60	0.07411
70	0.09133
80	0.11140
90	0.13450
100	0.16100
110	0.19110
120	0.22510
130	0.26320
140	0.30550
150	0.35240

9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.257
25	0.270
50	0.283
75	0.296
100	0.308
125	0.320
150	0.332
175	0.344
200	0.355
225	0.366
250	0.377
275	0.388
300	0.398
325	0.409
350	0.419
375	0.429
400	0.438
425	0.448
450	0.457
475	0.466
500	0.475
525	0.484
550	0.492
575	0.501
600	0.509

PROPYLENE OXIDE

Synonyms—1,2-Epoxypropane; Methyloxirane; Propene oxide

Formula—CH_3OCHCH_2

Appearance-Odor—Colorless liquid; ether-like odor

Specific Gravity—0.86

Chemical Family—Alkalene oxide

Pollution Category—USEPA-B IMO-D

Applicable Bulk Reg. 46 CFR Subchapter O

United Nations Number 1280

CHRIS Code ..... POX

Boiling Point	34°C	94°F
	°C	°F
Freezing Point	−112°C	−170°F
	°C	°F
Vapor Pressure 20°C (68°F) (mmHg)	449	
Reid Vapor Pressure (psia)	18.0	
Vapor Pressure 46°C (115°F) (psia)	22.0	
Vapor Density (Air = 1.0)	2.00	
Solubility in Water	58%	

FIRE & EXPLOSION HAZARD DATA

Grade—A: Flammable liquid
Electrical Group—B

General—An extremely reactive, flammable liquid with a wide explosive range. Ignited by heat, sparks or open flame. Flashback along vapor trail may occur. Fire or contamination may cause violent rupture of tank.

Flash Point (°F)	−35
Flammable Limits	1.8 to 36.5%
Autoignition Temp. (°F)	869
Extinguishing Agents	Stop flow of gas; large volumes of water, CO_2, alcohol foam.
Special Fire Procedures	If a fire breaks out near a propylene oxide tank, keep tank cool with a water spray. Explosion hazard requires approaching a burning tank with caution.

HEALTH HAZARD DATA

Health Hazard Ratings	Odor Threshold (ppm)	PEL/TWA (ppm)	TLV/TWA (ppm)
3, 2, 2	200*	20	20

General—Suspected carcinogen. Vapor harmful. Liquid causes eye burns. Liquid or water solutions absorbed into clothing, particularly shoes, cause delayed skin burns.

Symptoms—Nausea, vomiting and irritation to eyes and respiratory passages.

Short Exposure Tolerance—2000 ppm for 4 hours.

Exposure Procedures—Vapor—remove victim to fresh air; if breathing stops, apply artificial respiration. Skin or eye contact—remove contaminated clothing and gently flush affected areas with water for 15 minutes. Get medical advice or attention.

*Note: Detectable odor is greater than the TLV. Exposure to potentially dangerous vapor concentration can occur before product can be detected by smell.

REACTIVITY DATA

Stability—Polymerizes violently with catalysts such as acids, bases, and certain salts. Reacts violently with chlorine and with ammonia.

Compatibility—Material: Avoid copper and other acetylide-forming metals.

Cargo: Group 16 of compatibility chart.

SPILL OR LEAK PROCEDURE

Wear rubber gloves, large heavy face shield, (if in doubt, use body shield also), self-contained breathing apparatus. Avoid contact with liquid. Secure ignition sources. Do not flush spill into confined spaces where flammable vapors can accumulate.

If a spill occurs, call the National Response Center, 800-424-8802.

Remarks: Must be shipped with inert pad.

SECTION 155.750(a)(2):

BARGE TRANSFER SYSTEM

Enclosed are the piping diagrams for the load, unload, and monitoring system

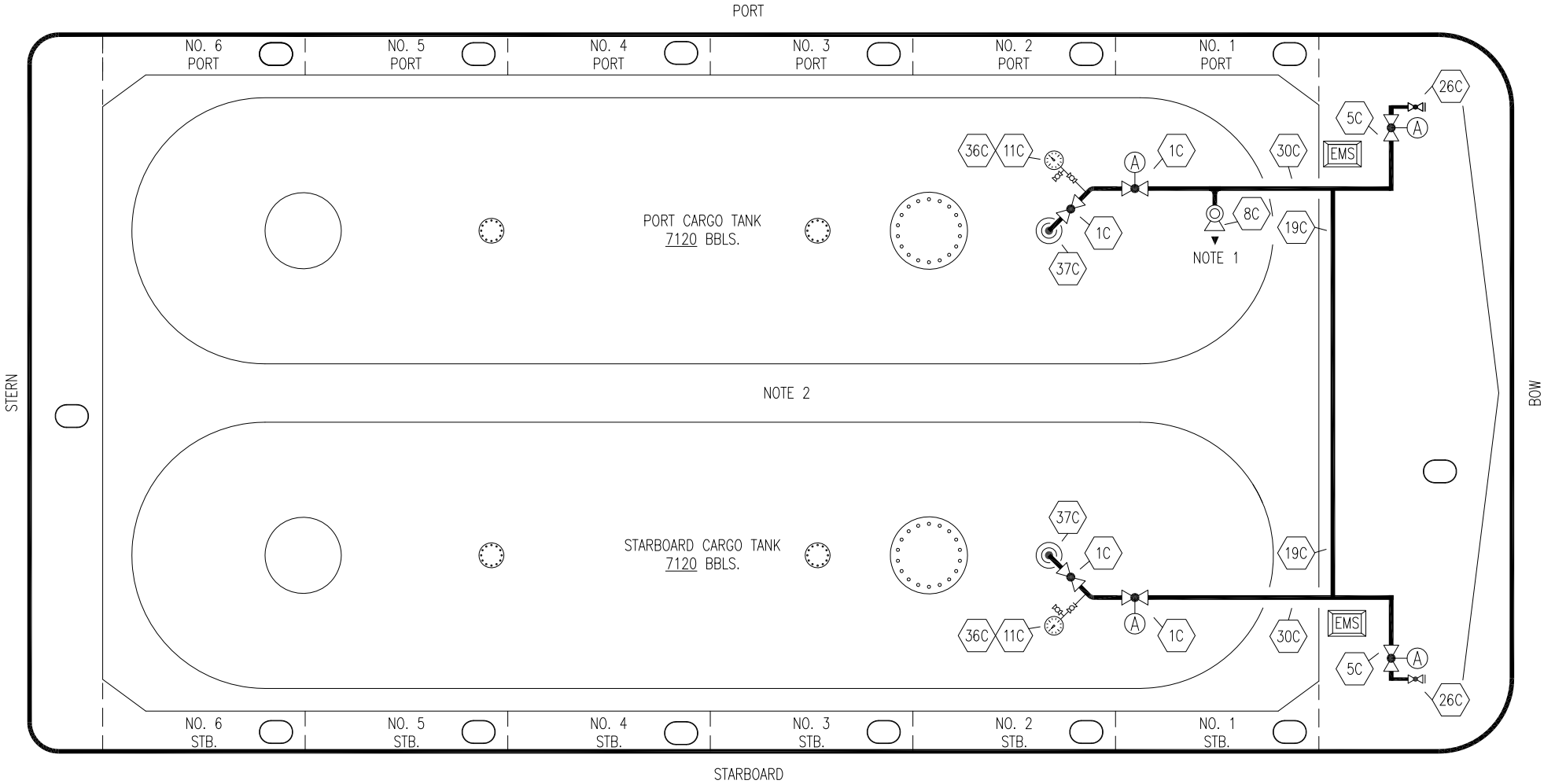
ASSUMING THAT ALL VALVES ARE CLOSED FROM THE START:

TO LOAD

1. Open cargo (liquid) valves (2c) load valves , (1c) tank valves, (5C) header valve
2. Open vapor valve (41V) to the cargo tanks and header Valve (7v) and (27V)

TO DISCHARGE

1. Open master suction valve (3C) ,(4c) and (5C) header valve
2. Open vapor valve (41V) to the cargo tanks and header Valve (7v) and (27V)



NO	DESCRIPTION
1C	CARGO TANK VALVE
5C	HEADER VALVE
8C	RELIEF VALVE/STACK
11C	BLEED OFF VALVE
19C	CARGO HEADER
26C	DRAIN (BLEED) VALVE
30C	CARGO PIPELINE
36C	PRESSURE GAUGE
37C	CARGO DROP
A	AIR ACTUATED AUTOMATIC VALVE
	ABOVE DECK PIPING

NOTE 1: P/V VALVES VENTED TO ATMOSPHERE

NOTE 2: CONDUIT BELOW GRATE FOR EMS.

INGALLS IRON – EX: N/A

REV.	DATE	BY	CHK	APP	REVISION DESCRIPTION
1	01/05/22	MRV	DDA	DR	REVISED PER CLIENT COMMENTS
0	10/11/11	JN	DDA		ISSUED FOR APPROVAL

KIRBY INLAND MARINE

CARGO
PIPING FLOW DIAGRAM

SCALE: NONE

PAGE: 1 OF 3

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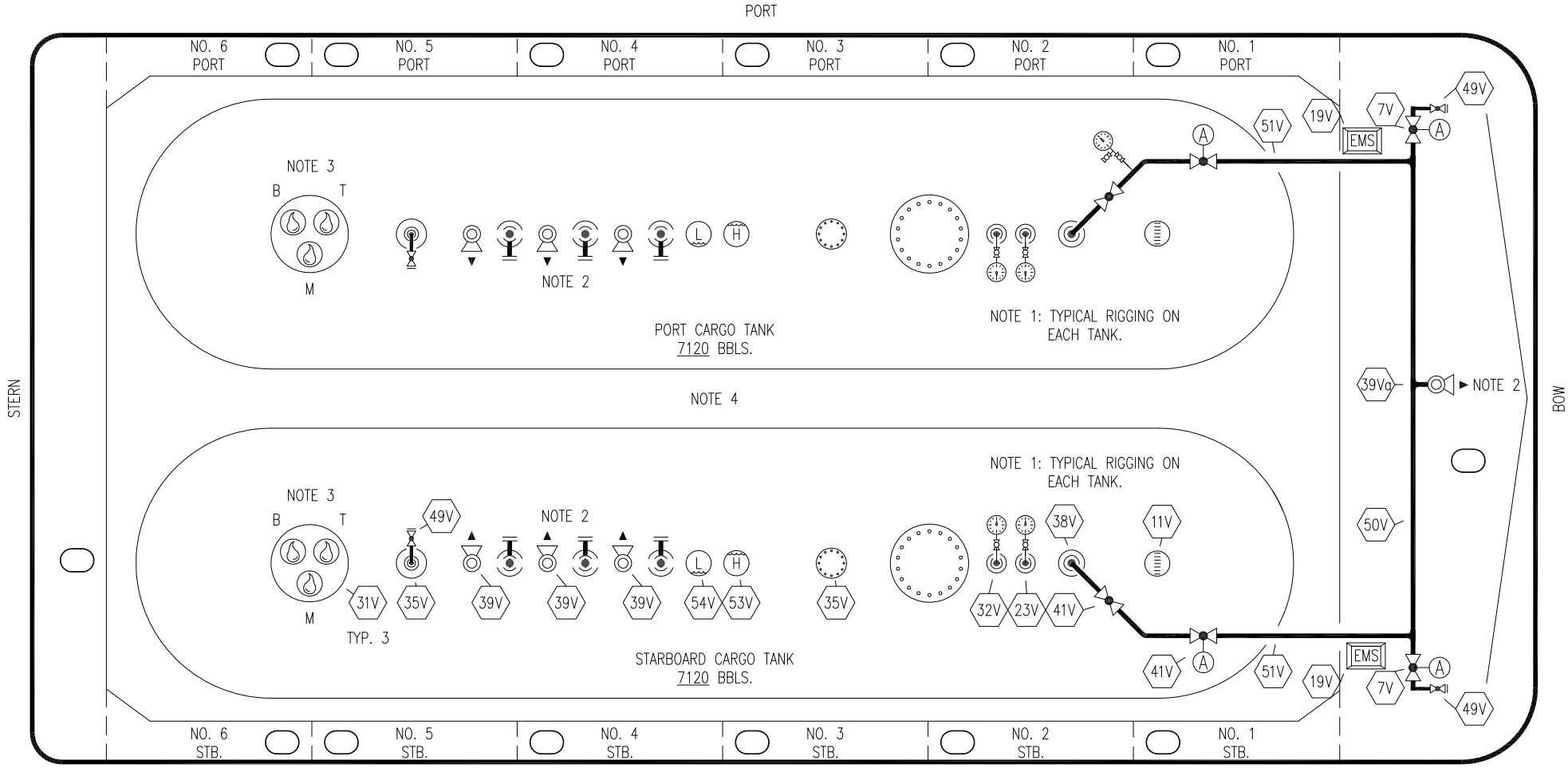
REV. **1**



NO	DESCRIPTION
7V	HEADER VALVE
11V	GAUGE STICK (MIDDLE)
19V	EMERGENCY SHUT DOWN STATIONS
23V	PRESSURE GAUGE
31V	SAMPLE STATIONS
32V	TEMPERATURE GAUGE
35V	NOZZLE W/BLIND
38V	VAPOR DROP OR PENETRATION
39V	PRESSURE/VACUUM VALVE
39Va	STACK-PRESSURE/VACUUM VALVE
41V	VAPOR TANK VALVE

NO	DESCRIPTION
49V	BLEED VALVE
50V	VAPOR HEADER
51V	VAPOR PIPELINE
53V	HIGH LEVEL GAUGE
54V	LOW LEVEL GAUGE
—	ABOVE DECK PIPING
A	AIR ACTUATED AUTOMATIC VALVE

NOTE 1: TYPICAL RIGGING ON EACH TANK

NOTE 2: P/V VALVES VENTED TO ATMOSPHERE

NOTE 3: SAMPLES–T=TOP, M=MIDDLE, B=BOTTOM

NOTE 4: CONDUIT BELOW GRATE FOR EMS.

INGALLS IRON – EX: N/A

REV.	DATE	BY	CHK	APP	REVISION DESCRIPTION
1	01/05/22	MRV	DDA	DR	REVISED PER CLIENT COMMENTS
0	10/11/11	JN	DDA		ISSUED FOR APPROVAL

KIRBY INLAND MARINE

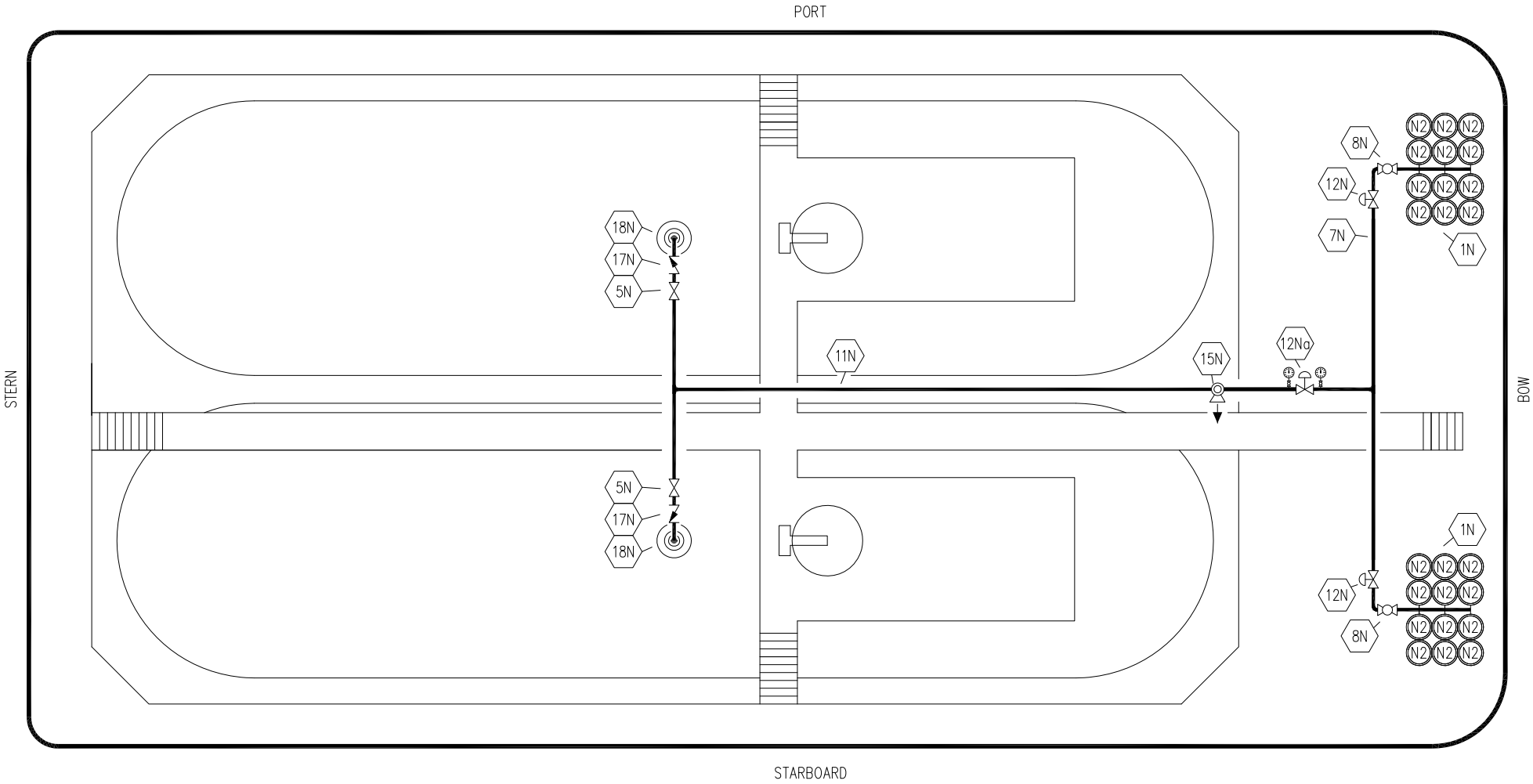
VAPOR
PIPING FLOW DIAGRAM

SCALE: NONE

PAGE: 2 OF 3

CC 134

REV. **1**



NO	DESCRIPTION
1N	NITROGEN BOTTLE RACK (12 PK.)
5N	N2 SUPPLY VALVE
7N	NITROGEN HEADER
8N	N2 REGULATOR CONTROL VALVE
11N	NITROGEN PIPELINE
12N	HARRIS NITROGEN REGULATOR
12Na	FISHER NITROGEN REGULATOR
15N	N2 RELIEF VALVE
17N	N2 CHECK VALVE
18N	N2 TANK PENETRATION
	ABOVE DECK PIPING

REV.	DATE	BY	CHK	APP	REVISION DESCRIPTION
1	01/05/22	MRV	DDA	DR	REVISED PER CLIENT COMMENTS
0	10/11/11	JN	DDA		ISSUED FOR APPROVAL

KIRBY INLAND MARINE

NITROGEN
PIPING FLOW DIAGRAM

SCALE: NONE

PAGE: 3 OF 3

CC 134

REV. **1**

SECTION 155.750(a)(3):

PERSONS ON DUTY DURING TRANSFER OPERATIONS

No person shall act as the person in charge of transfer operations on more than one vessel at a time during transfers between vessels or between two or more vessels and a facility unless authorized by the Captain of the Port. This authorization will be in writing and made part of the transfer procedure. The person in charge shall be a certified tankerman who must hold an LFG or DL endorsement. The person in charge shall be aboard the barge at all times unless he is properly relieved or transfer have stopped.

SECTION 155.750(a)(4):

DUTIES OF TANKERMAN (PERSON IN CHARGE)

The tankerman (person in charge) is responsible for transferring barge and carrying out related operations on board in an efficient, safe, and pollution free manner.

The tankerman (person in charge) shall:

1. Have on board a valid merchant mariners document endorsed as tankerman, certified to handle LFG or DL.

2. Make a thorough inspection of the barge prior to the start of the transfer and check the following:

    a. Hull condition

    b. Pressure and Temperature Gauge accuracy

    c. Any valve or safety valve leakage

    d. Fire extinguisher condition and number

    e. Piping Diagram and Strappings for correctness and completeness

    f. Warning signs, flag, night warning light, shut down sign

    g. Condition of shutdowns and air control system valves and regulators

    h. Operability of closed stick gauges

3. In addition the tankerman shall ensure that:

    a. The vessel's moorings are strong enough to hold during all expected conditions of surge, current, and are long enough to allow for changes in draft, drift, and tide.

    b. The hoses are long enough to allow the vessels to move within the limits of its moorings without placing a strain on the hose loading arm or piping systems.

SECTION 155.750(a)(4) continued:

c. Each hose is supported to prevent chaffing kinking, or other damages to the hose or hose couplings.

d. Each transfer system is aligned to allow the flow of cargo.

e. Each part of the transfer system not in use is securely blanked or shut off.

f. Each end of hose or loading arm that is not in use is securely blanked by using a bolt in every hole.

g. Each hose has no loose covers, kinks, bulges, soft spots, gouges, cuts, or slashes that penetrate the first layer of hose reinforcement.

h. All connections in the transfer system are leak free.

i. The communications required for the transfer system are leak free.

j. Tankerman is at the site of the transfer and immediately available.

k. Transfer is conducted in accordance with the vessel transfer procedure.

l. Thankerman has a copy of transfer procedure in possession.

m. Tankerman and dock person in charge both speak English.

n. A pre-transfer conference is held with the person in charge of the dock facility and the person understands the following details of the transfer:

   1) The identity of the product being transferred

   2) The sequence of transfer operations

   3) The transfer rate

   4) The name, or title, and location of each person involved in the transfer operations

5) Details of the transferring and receiving system

SECTION 155.750(a)(4) continued:

6) Critical stages of the transfer operations

7) Federal, state, and local rules that apply to the transfer

8) Emergency procedure

9) Discharge mitigation and containment procedures

10) Discharge reporting procedures

11) Watch or shift change arrangements

12) Transfer shutdown procedures

o. The Persons in charge of transfer operations for the vessel and facility must agree on the transfer operations prior to transfer.

p. The transfer operation is lighted between sunset and sunrise.

SECTION 155.750(a)(5):

TENDING VESSEL MOORINGS DURING TRANSFER OPERATIONS

Proper mooring of the barge is essential for both safety and pollution prevention. You may not transfer cargo to or from a barge unless its moorings are strong enough to hold in all expected conditions of surge, current, and weather. The mooring lines must be long enough to allow for changes in draft, trim, surge, and tide during transfer operations.

All conditions at the dock must be considered to determine the adequate size, proper lead and the number of lines necessary. Surge of the barge, both at parallel to and at right angles to the dock, will be influenced by the proximity of traffic in the channel, the dock design, the state of the tide and the barge's draft. Be sure that all lines have the proper lead and are secure.

Be particularly mindful of docks with high and low mooring dolphins, etc. It may be necessary to shift from lower mooring supports to higher or visa versa, as the barge goes down or comes up from the water.

When mooring the barge, as a MINIMUM standard, the PIC should ensure that the number of mooring lines used is in accordance with the governing Standard Operating Procedures for the service of this barge. The lines are used in combination to fulfill the following functions:

(1) Towing lines
(2) Backing lines
(3) Spring lines

SECTION 155.750(a)(6):

EMERGENCY SHUTDOWN AND COMMUNICATIONS

The valving system contains air diaphragm control valves throughout, with the exception of a manual valve closest to the tank entrance for the liquid and vapor lines.

NOTE: These manual valves are adjacent to the air operated valves, thus each vapor and liquid line has two valves as close to the tank penetration as possible. The air diaphragm valves are opened by application of air pressure against their diaphragms.

The control valves throughout the barge can be opened by controlling a four way valve at each control station. Suitable block valves are located in the air control system in order to keep some valves closed if desired.

The air control system for this barge is designed with special dump valves at each control valve to ensure total closure time is within 10 seconds. By pulling the cable at the four way valve at any station, all control valves will close within 10 seconds.

The control system is also designed to allow local closure at a particular control valve without having to dump the entire system. This valving arrangement is located at the particular control valve.

Each vessel must have a means that enables continuous two way voice communications between the facility and vessel persons in charge. This means must be usable and effective in all phases of the transfer operation and in all conditions of weather.

The means of communication may be a two way radio or a loud hailer and must be intrinsically safe as defined in 46 CFR 110 and meet Class 1, Division 1, Group D.

SECTION 155.750(a)(7):

PROCEDURES FOR TOPPING OFF TANKS AND PROCEDURES FOR DISCHARGE OPERATIONS

TOPPING OFF

The load limits for LG barges are based on authorized Type II draft limitations, or volumetric capacities based on filling densities, whichever comes first. It is anticipated that at all loading temperatures, the percentage based on filling density will be reached before the authorized barge draft is obtained.

The COI for this barge has a draft restriction listed for **PROPYLENE OXIDE** (Type II @ 7.12 lbs/gal) which is approved as a maximum draft for stability and structural reasons, and that is the one you can never exceed. **Therefore, the load limit is either this MEAN maximum draft or the loading of 80% maximum.**

Remember, mean draft means the mean draft at midship, or the average of the forward and aft drafts, NOT the point where one end of the barge first reached the authorized draft limit.

Kirby would like to know if the listed draft is met before the load limit of 80% is reached. First, check your barge to look for water in the voids or hopper and report accordingly. Second, check to ensure that your draft reading is mean midship draft.

UNLOADING WITHOUT PUMPS

Also, with regard to unloading operations using gas (either product, nitrogen, natural gas) as the only pressurizing medium, line up appropriately with vapor valves open to allow gas from the dock. HOWEVER, do not run the discharge pressure beyond 90% of the **CARGO TANK SAFETY RELIEF VALVE SETTING. The cargo tank safeties are set at 50psig so do not introduce pressure into the tanks greater than 45psig.**

SECTION 155.750(a)(8):

PROCEDURES FOR ENSURING ALL VALVES ARE CLOSED

To Open Control Valves:

1. Connect shore air supply to control station.
2. Open manual air supply valve to air operated control valves.
3. Open the air valve in the system to each control valve desired for the operation.
4. In case of emergency pull the emergency shutdown cable at any control station.

To Close Control Valves:

1. Shut off and bleed the air pressure from the system.
2. Close all manual air supply valves in the system.
3. Close all cargo and vapor manual valves.

Cargo Hose Connections:

1. All flanges must be made up with bolts in every hole.
2. After discharge or loading, blinds are made up with bolts in every hole.

SECTION 155.750(a)(10):

PROCEDURES FOR CLOSING AND OPENING THE VESSEL OPENINGS

This is an LG barge with pressure vessel tanks at MAWP of 50 psig. The cargo tanks are not designed to allow any open or PV venting to the atmosphere during transfer operations in while transit. In fact, they are outfitted only with safety relief valves set at 50 psig as the venting device. Any such venting needs to be reported to the appropriate Kirby Inland Marine authorities. Check for leaks in this area and report them.

Sometimes after a load residual product will be trapped in the pipelines. The safety relief valves on these pipelines have been set much higher than the cargo tank safety relief valve in order to minimize the transit venting of product. This is USCG approved. Nevertheless, be wary of these pipelines and their potential to vent. If they do vent, report this to the appropriate Kirby Inland Marine authorities.

The hull and hopper have voids, which could provide a great deal of space for the influx of rainwater, etc. which could compromise load limits and barge stability. Hatches over these void spaces should only be opened for inspection purposes. During the transfer, they need not be totally dogged down since the PIC will be conducting frequent inspections of the voids. After the transfer, and while in transit, they must be totally secured. If opened periodically for inspection during transit, they must be totally secured.

SECTION 155.750(a)(11):

CARGO HOSES CARRIED ON BARGES

Cargo hoses for LG service whether provided by the barge/boat or terminal must be made of flexible metal and fabricated of seamless steel pipe and flexible joints of steel or bronze, or of other suitable material resistant to the action of the cargo.

The Maximum Allowable Working Pressure (MAWP) shall be marked on the hose. For transfers involving **propylene oxide** a #150 hose is OK.

In addition to the MAWP, the date of the manufacture and date of the annually required pressure test should be marked on the hose. If not, however, this information can be contained within the barge or facility paperwork records, and the hose must be marked to indicate this.

Further, the hose must marked for Liquefied Gas service, or for the specific liquefied gas, or reference a chart of approved LG products in the barge or facility paperwork, where appropriate.

Inspection procedures in Section 155.750 (a)(4) must be met.

SECTION 151.50-73:

CHEMICAL PROTECTIVE CLOTHING

When table 151.05 refers to this section, the following apply:

(a) The person in charge of cargo handling operations shall ensure that the following chemical protective clothing constructed of materials resistant to permeation by the cargo being handled is worn by all personnel engaged in an operation listed in paragraph

(b) of this section:

(1) Splash protective eyewear.

(2) Long-sleeved gloves.

(3) Boots or shoe covers.

(4) Coveralls or lab aprons.

(b) The section applies during the following operations:

(1) Sampling cargo.

(2) Transferring cargo.

(3) Making or breaking cargo hose connections.

(4) Gauging a cargo tank, unless gauging is by closed system.

(5) Opening cargo tanks.

(c) Coveralls or lab aprons may be replaced by splash suits or aprons constructed of light weight or disposable materials if, in the judgment of the person in charge of cargo handling operations,

(1) Contact with the cargo is likely to occur only infrequently and accidentally; and

(2) The splash suit or apron is disposed of immediately after contamination.

(d) Splash protective eyewear must be tight-fitting chemical-splash goggles, face shields, or similar items intended specifically for eye protection from chemical splashing or spraying.

(e) The person in charge of cargo handling operations shall ensure that each person in the vicinity of an operation listed in the paragraph of this section or in the vicinity of tanks, piping, or pumps being used to transfer the cargo wear splash protective eyewear under paragraph (d) of this section.