1.0 PURPOSE

1.1 The purpose of this procedure is to establish safe work practices that minimize employee exposure to hydrocarbons containing Benzene.

2.0 SCOPE

2.1 This procedure applies to all persons, including all visitors and contractors working on Marathon Petroleum Company, LP (MPC) Michigan Refining Division (MRD) property.

2.2 Contractors are required to train their employees to meet the MIOSHA Benzene Standard Part 311 if their work involves potential exposure to benzene.

3.0 PROCEDURE

3.1 Marathon Industrial Hygiene (IH) Exposure Assessment Methodology (EXAM)

3.1.1 Based on the Marathon IH EXAM process, determine where there is regular or periodic exposure to benzene and identify where materials containing benzene are located.

3.1.2 Conduct air monitoring that is consistent with the Marathon IH EXAM, Marathon IH Measurements Procedures Manual, and federal, state, and local authorities having jurisdiction.

3.1.3 Establish control measures when benzene exposures exceed the Occupational Exposure Limit (OEL) or applicable exposure limits. In some instances, it may be appropriate to institute controls at the benzene Action Level (AL) of 0.5 ppm.

3.2 Hierarchy of Controls

3.2.1 In work areas where benzene is present, Engineering and Administrative Controls are used to reduce and maintain employee exposure to benzene at or below the action level, except where these controls are not feasible.

3.2.2 Where these controls are not feasible, Personal Protective Equipment (PPE) must be used in conjunction with Safe Work Practices to reduce and maintain employee exposure.

3.3 Engineering/Administrative Controls

3.3.1 Closed-loop sample stations and laboratory hoods are examples of engineering controls used to minimize employee exposure to benzene.

3.3.2 Safe equipment preparation including isolation, draining, steaming, purging, etc. as well as the Invasive Work Standard Practice shall be used to minimize employee exposure to benzene.

3.3.3 A joint jobsite visit (JJSV) must be conducted to determine if benzene is a potential hazard. If there is a potential for personal exposure, it shall be documented on the Safe Work Permit along with ways to mitigate the exposure.

3.3.4 Benzene monitoring is required during the initial entry for all excavations with a depth greater than 4 feet. Reference the Confined Space Entry Procedure for additional requirements.

3.3.5 All employees must complete an annual computer based training called “Benzene Awareness” that provides them will all information required to safely work with, handle and dispose of benzene.

3.3.6 Employees must use good hygiene practices to reduce the potential for benzene exposure including;

3.3.6.1 No eating, drinking or use of tobacco products in areas where benzene or hydrocarbons containing benzene are used or stored.

3.3.6.2 Employees must wash their hands and face prior to eating, drinking or using tobacco products after working with or potentially coming into contact with hydrocarbons containing benzene.

3.3.7 Contaminated PPE must be removed and disposed of prior to exiting a Regulated Area.

3.4 Personal Protective Equipment (PPE)

3.4.1 When a potential for benzene exposure exists, the appropriate Personal Protective Equipment (PPE) as described in this procedure shall be documented on the Safe Work Permit.

3.4.2 The appropriate level of respiratory protection must be worn by all personnel entering a benzene regulated area. The table below should be used to match the respirator type to the airborne benzene concentration level.

RESPIRATOR TYPE PER BENZENE CONCENTRATION	
Airborne Concentration	**Minimum Respiratory Protection (quantitative fit test required)**
0.5 to 10 ppm	Half face organic vapor air purifying (adequate O2 level required)
Greater than 10 to 50 ppm	Contractors - Full face organic vapor air purifying (adequate O2 level required) Marathon - SCBA or airline respirator with escape provisions
Greater than 50 ppm	SCBA or airline respirator with escape provisions

3.4.3 Example of job tasks that may require the use of a respirator include:

- Hand gauging storage tanks that contain hydrocarbons with benzene.
- Draining, steaming, etc. equipment that contained hydrocarbons with benzene.
- Work inside temporary regulated areas, such as certain process units during shutdown.
- Initial opening of equipment that contained hydrocarbons containing benzene.
- Entry into a vessel that contained hydrocarbons containing benzene.
- Work in and around the Centrifuge area.

3.4.4 Air purifying respirator elements must be changed at the beginning of each work shift or during the work shift if a change in breathing resistance or chemical vapor breakthrough (odor) is detected.

3.4.5 A full facepiece self-contained breathing apparatus (SCBA), shall be worn during emergency responses to fires of hydrocarbons containing benzene.

3.4.6 Chemical protective clothing shall be worn on any part of the body that could be exposed to liquid containing benzene. Adequate liquid benzene protection is normally provided by:

3.4.6.1 Chemical suit
3.4.6.2 Rubber boots
3.4.6.3 Nitrile gloves
3.4.6.4 Goggles and face shield

3.4.7 All exposed skin surfaces must be protected when handling liquid hydrocarbons. Airborne (non-liquid) concentrations require only respiratory protection. Reference the Refinery PPE procedure

for a list a tasks with possible exposure to hydrocarbons containing benzene and the associated PPE.

3.5 Regulated Areas

3.5.1 Regulated Areas shall be established when the airborne concentration of benzene exceeds or can reasonably be expected to exceed either the short-term exposure limit of 5 ppm for 15 minutes or the permissible exposure limit of 1 ppm for an 8 hour time weighted average. The Safety Department should be contacted for assistance in establishing Regulated Areas.

3.5.2 The Safe Work Permit shall be used to document the establishment of a Regulated Area.

3.5.3 Draining hydrocarbons containing benzene, steaming out vessels or pipe containing benzene hydrocarbons, and entering a vessel or tank containing benzene hydrocarbons are some examples of activities that may require the establishment of a Regulated Area.

3.5.4 The possibility exists for benzene exposure during the time period required to shut down, de-inventory, drain, wash, and steam out units. Where refinery streams containing benzene are present, the Operations Department shall conduct benzene air sampling during their activities to determine if, Regulated Areas are required.

3.5.5 Appropriate respiratory protection shall be worn when regulated areas are being established. Benzene sampling is done with Drager tubes, Rae Systems UltraRae or portable gas chromatograph.

3.5.6 Portable benzene hazard warning signs shall be posted at entrances to all Regulated Areas. The warning signs shall state:

“DANGER
BENZENE
MAY CAUSE CANCER
HIGHLY FLAMMABLE LIQUID AND VAPOR
DO NOT SMOKE
WEAR RESPIRATORY PROTECTION IN THIS AREA
AUTHORIZED PERSONNEL ONLY”

3.5.7 Regulated Areas can be declassified when air sampling proves the permissible exposure limits are no longer exceeded.

3.6 First Aid Procedures

3.6.1 The Safety Data Sheet (SDS) for the specific chemical exposure should be referenced to determine appropriate first aid procedures.

3.6.2 Eye And Face Exposure - Wash immediately with large amounts of water for 15 minutes. Report to First Aid.

3.6.3 Skin Exposure - Remove clothing and wash exposed skin with soap and water. Report to First Aid.

3.6.4 Inhalation Exposure - Remove victim to fresh air immediately. Apply artificial respiration if breathing has stopped. Call for medical assistance.

3.6.5 Ingestion - Do not induce vomiting, call for medical assistance.

3.7 Spills, Leaks, and Fire Procedures

3.7.1 During spills, leaks or fires involving benzene hydrocarbons the source of the release should be isolated as soon as possible to minimize potential hazards.

3.7.2 Regulated areas shall be established and taped off with benzene hazard warning tape as well as warning signs posted as soon as possible.

3.7.2.1 Initial benzene monitoring shall be conducted by Operations using Drager tubes while wearing self-contained breathing apparatus (SCBA).

3.7.2.2 The Safety Department shall be notified, and conduct additional monitoring.

3.7.3 If a fire involving hydrocarbons containing benzene must be approached, self-contained breathing apparatus must be worn. Firefighter's protective clothing should also be worn for additional protection.

3.7.4 Eliminate all sources of ignition when responding to a hydrocarbon spill.

3.7.5 Stay upwind or crosswind of hydrocarbon spills or fires.

3.7.6 Use firefighting foam to suppress hydrocarbon vapors during a spill and to extinguish spill fires.

3.7.7 Accidental spills of hydrocarbons containing benzene should be reported to the Safety Department immediately.

3.7.8 Only persons directly involved with spill response should pass through the barrier. Non-essential personnel shall stay out of the Regulated Area to facilitate prompt response by involved parties.

3.7.9 Any person exposed to benzene during a fire or accidental spill of hydrocarbons with benzene must undergo urinary phenol testing in accordance with the MIOSHA benzene standard 1910.1028. The use of PPE such as respirators or breathing air does not eliminate the need for urinary phenol testing.

3.7.10 Persons subject to urinary phenol testing must report to the Refinery Nurse by the end of the shift to submit a urine sample. When the Nurse is not available, contact the Safety Department. All samples will be analyzed within 72 hours and the results will be sent to each employee tested. Contract employers must also submit urine samples at a facility designated by their employers.

3.0 DEFINITIONS

3.1 Action Level - an airborne concentration of benzene of 0.5 ppm calculated as an 8-hour time-weighted average

3.2 Benzene(C_6H_6) - means liquefied or gaseous benzene. It includes benzene contained in liquid mixtures and the benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene contained in solid materials.

3.3 Long-Term Overexposure - the average daily (eight-hour shift) exposure without personal protective equipment, during the course of a working lifetime.

3.4 Marathon Occupational Exposure Limit (OEL) - A company identified limit on the amount or concentration of a chemical to which workers may be exposed for a predefined time limit. Examples include an 8 hour Time Weighted Average (TWA), Ceiling Limit, and 15 minute Short Term Exposure Limit (STEL). These limits may be derived from the MIOSHA Permissible Exposure Limit (PEL), American Conference of Governmental Hygienists (ACGIH) Threshold Limit Value (TLV), United Kingdom Health and Safety Executive (HSE) Workplace Exposure Limits (WELs), or other sources of exposure criteria developed for the purpose of protecting the health and safety of workers. The Marathon OEL may be same or different

than a legally enforceable regulatory limit established by an agency or authority with lawful jurisdiction at a particular location or operation. When they differ, components must use the more stringent of the limits. Marathon has established a benzene exposure limit of 1 ppm for an 8 hour TWA and 5 ppm for a 15 minute STEL.

3.5 Regulated Area - An area where the airborne concentrations of benzene exceed or can reasonably be expected to exceed the permissible exposure limits, either the short-term exposure limit of 5 ppm for 15 minutes or eight hour time weighted average exposure of 1 ppm.

3.6 Short-Term Overexposure - Single, one-time exposure (without appropriate PPE), to hydrocarbons containing benzene.

3.7 Process Stream – Governed by this procedure if the process stream contains at least 0.1% benzene/volume.

4.0 REFERENCES

4.1 MIOSHA Benzene Standard Part 311

4.2 Marathon IH EXAM

4.3 Marathon IH Measurements Procedures Manual

4.4 Refinery PPE Policy

4.5 Confined Space Entry Procedure

5.0 ATTACHMENTS

5.1 ATTACHMENT A - Refinery Streams and Locations with Benzene

6.0 REVISION HISTORY

Revision number	Description of change	Written by	Approved by	Effective date
8	Update to requirements, definitions, and references.	A. Anglin / J. Tran	S. Windom	9/26/2013
9	Major format revision. Removed properties of benzene & Attachment A. Added hierarchy of controls from Tier II audit.	S. Kumpar	Safety	12/22/2014
10	Updated Attachment A based on deficiencies identified by Process Specialists & Safety	S. Kumpar	Safety/Process Specialists	8/7/2015
11	Corrected revision date errors in header. No changes to procedure	F. Ebbert	S. Kumpar	05/21/2019
12	Scheduled review no edits	A. Styes	A. Morales	12/20/19

ATTACHMENT A

REFINERY STREAMS AND LOCATIONS WITH BENZENE

Process Streams		
Stream	**Representative SDS**	**% Volume**
Lead Free Gasoline	115/116MAR003	0.5 - 3.0
Petroleum Crude Oil	110MAR003	0.0 - 2.0
Gasoline Blend Stocks	155MAR003	1.0 - 5.0
Crude Slop	160MAR003	0.1 - 0.5
Pretreated Naphtha	176MAR003	0.1 - 1.5
NHT Charge	161MAR003	0.1 - 0.5
KHT Charge (during naphtha operation only)	161MAR003	0.1 - 0.5
Gasoline/Butane Mix	115MAR003	0.5 - 3.0
Hydrogen	188MAR003	0.0 - 0.5
Transmix	263MAR003	0.5 - 3.5

Process Units	
Unit I.D.	**Description**
4	Vacuum Unit
5	Crude Unit
6	Crude Treaters
7	Distillate Hydrotreater (DHT)
8	GasOil Hydrotreater
11	Fluid Catalytic Cracker (FCCU)
12	Gas Concentration (Sats Gas)
14	Platformer (CCR)
19	Kerosene Hydrotreater (KHT)
16	Naphtha Hydrotreater (NHT)
21	Complex 3 Amine Treating System
22-1	Crude & Lab Tank Farms
22-2	Cracking Plant Tank Farm
22-3	Melvindale Tank Farm
29	API/WWTP Unit
70	Coker Unit
76	Coker Utilities

Process Vessels		
Unit	**Equipment I.D**	**Description**
Vacuum		
	4V7	Crude Flare KO Drum
Crude		

	5V1	Crude Column
	5V4	Crude Column Overhead Receiver
	5V5	Debutanizer
	5V6	Debutanizer Overhead Receiver
	5V31	Desalter First Stage
	5V32	Desalter First Stage
	5V35	Desalter First Stage
	5V34	Preflash Overhead
	5V37	BFC Overhead
	5V51	Desalter Second Stage
Distillate Hydrotreater (DHT)		
	7V9	Fractionator Overhead Receiver
	7V58	Foul Water Naphtha Skimmer
GasOil Hydrotreater (GOHT)		
	8V21	Flare KO Drum
Fluid Catalytic Cracker (FCCU)		
	11V4	Low Pressure Receiver
	11V5	Heating Oil Stripper
	11V21	Fractionator
	11V29	Slurry Stripper
	11V43	Cat Naphtha Sand Filter
Gas Concentration (Sats Gas)		
	12V2	High Pressure Receiver
	12V6	Cat Gasoline Stripper
	12V7	Cat Debutanizer Column
	12V41	Primary Absorber
Platformer (CCR)		
	14R1	Products Separator/#1 Reactor
	14R2	#2 Reactor
	14R3	#3 Reactor
	14R4	#4 Reactor
	14V6	Debutanizer Tower
	14V7	Debutanizer Receiver
	14V9	Interstage Knockout Drum
	14V34	Surge Drum
	14V37	First Stage Recontact Drum
	14V38	Second Stage Recontact Drum
	14V10	Fuel Gas Knockout Drum
Naphtha Hydrotreater		

	16V1	LPP Reactor
	16V2	Reactor Products Separator
	16V3	Stripper Column
	16V4	Stripper Receiver
	16V5	LPP Clay Filter
	16V6	Reactor
	16V9	NHT Dependanizer
	16V10	NHT Dependanizer Receiver
	16V13	Splitter Column
	16V15	Splitter OVHD Receiver
	16V7	Feed Filter
Kerosene Hydrotreater (NHT)		
	19V100	Reactor
	19V3	Reactor Products Separator
	19V5	Stripper Column
	19V6	Stripper Receiver
	19V9	Feed Surge Drum
Cracking Plant Flare System		
	25V1	CP Flare Primary KO Drum
	25V2	CP Flare Secondary KO Drum
	25V7	CX 4 Primary KO Drum
Coker		
	70V2	Coker Fractionator
	70V5	Coker Fractionator Ovhd. Receiver
	70V6	First Stage Suction Drum
	70V7	Interstage Drum
	70V8	Recontact Drum
	70V9	Absorber/Stripper
	70V10	Sponge oil Absorber
	70V11	Stripper H2O Draw off pot
	70V12	Presaturator H2O Draw off pot
	70V14	Debutanizer
	70V15	Debutanizer Reflux Drum
Coker Utilities		
	76V801	Coker Flare K.O.

Heaters		
Unit	**Heater I.D.**	**Description**
Crude Unit		
	5H1	Crude Heater
CCR		

	14H1	Charge Heater
	14H2	Interheater
	14H3	Interheater
	14H4	Interheater
	14H8	Charge Heater
	14H9	Interheater
Naphtha Hydrotreater		
	16H3	Stripper Reboiler Heater
	16H4	LPP Charge Heat
Kerosene Hydrotreater		
	19H2	Charge Heater

Tanks		
Unit	**Tank I.D.**	**Description**
Vacuum		
	4T23	Slop
	4T508	Slop
API/WWTP		
	29T12	Oily Water Storage Tank
	29T40	API Slop Oil
	29T41	API Slop Oil
	29T44	DEPT API Separator
	29	API Forebay
	29	East Cell
	29	West Cell
Naphtha Hydrotreater		
	16T3	Nalco Tank
	16T4	Nalco Tank
Crude and Lab Tank Farms		
	22T40	Gasoline Stocks/RLF, SLF
	22T45	Premium Gasoline
	22T46	Premium Gasoline
	22T47	Premium Gasoline/Toluene
	22T51	Sour Water
	22T52	Sour Water
	22T53	Gasoline Stocks / RLF, SLF

	22T72	Gasoline
	22T80	Mixed LPG Slop
	22T81	Mixed LPG Slop
	22T82	Mixed LPG Slop
	22T83	Mixed LPG Slop
	22T190	Mixed LPG Slop
	22T191	Mixed LPG Slop
	22T507	H2O/Benzene
Cracking Plant Tank Farm		
	22T19	CCR Charge
	22T55	Gasoline Stocks/Plat/Cat Naphtha
	22T57	CCR Charge
	22T58	Gasoline Stocks/Cat Naphtha/Plat
	22T216	Sour Water
Melvindale Tank Farm		
	22T101	Crude Naphtha
	22T108	Gasoline
	22T109	Gasoline
	22T110	Gasoline
	22T112	Crude
	22T113	Crude
	22T114	Crude
	22T115	Crude
	22T116	Gasoline
	22T118	Gasoline Stocks/Cat Naphtha/Plat
	22T120	Gasoline
	22T129	Crude
	22T130	Crude
	22T176	Pentane