NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations
Washington, DC 20594

July 29, 2022
Factual Report

ENVIRONMENTAL RESPONSE GROUP

PLD22FR002

A. INCIDENT

Location:	Edwardsville, IL
Date:	March 11, 2022
Time:	8:15 AM CST
Operator:	Marathon Pipe Line LLC
System Type:	Hazardous Liquid
Commodity:	Wyoming Asphaltic Sour Crude Oil

B. ENVIRONMENTAL RESPONSE GROUP

Group Chairman	Paul L. Stancil, CHMM National Transportation Safety Board Washington, DC
Group Member	Marc Dougherty National Transportation Safety Board Washington, DC
Group Member	Chris Ruhl Pipeline and Hazardous Materials Safety Administration Oklahoma City, OK
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Group Member	Kristen Schnipke Marathon Pipe Line LLC Findlay, OH

C. SUMMARY

On Friday, March 11, 2022, about 08:15 Central Standard Time, the Marathon Pipe Line LLC (Marathon) Woodpat 22-inch pipeline, Roxana to Patoka, shut-in due to low suction pressure. Marathon initially reported the pipeline released 3,000 barrels of crude oil near 6185 Old Alton Edwardsville Road, Edwardsville, Madison County, Illinois 62025.[1] On March 13, 2022, 18:06, Marathon filed a 48-hour PHMSA update revising the release amount to 3,900 barrels.[2] On April 22, 2022, Marathon reported to PHMSA a subsequently revised release amount of 3,500 barrels. Some of the released Wyoming Asphaltic Sour (WAS) crude oil entered Cahokia Creek, a tributary of the Mississippi River.

The released crude oil flowed from the breached pipeline north to the creek's south bank and entered the creek, and also flowed south to a contained wooded wetland. The EPA initial assessments found the oil impacted the full breadth of the creek in some places.

About 7.3 miles of Cahokia Creek were impacted by the oil spill. The furthest extent of the recoverable oil was a containment boom location in Cahokia Creek near Oldenburg Road, about 2.5 miles from its confluence with the Mississippi River (see Section 5.5.5 of this report). Oil sheen was observed in the creek to within one mile of the Mississippi River. Marathon and its contracted oil spill response organizations deployed multiple strings of containment boom at ten locations.

Marathon crews found a complete circumferential separation at MP 6.1, Station 2564+06 on the pipeline.

D. FACTUAL INFORMATION

D.1 Description of the Operator

Marathon Pipe Line LLC (MPL) is headquartered in Findlay, Ohio, and is a subsidiary of MPLX LP, a limited partnership formed by Marathon Petroleum Corporation (MPC). MPL transports and stores crude oil, refined products, and natural gas in the continental United States and Alaska.

D.2 Incident Site

The area where the incident occurred was identified as an Unusually Sensitive Area (USA) drinking water resource under 49 CFR 195.6, and "other populated area" as defined by 49 CFR 195.450. This area was also considered a high consequence area (HCA) according to pipeline integrity management requirements in 49 CFR 195.452. Cahokia Creek runs adjacent to the incident site and is part of the Indian-Cahokia Creek watershed. The creek flows westward and joins the Mississippi River approximately 9.8 miles downstream of the spill area.

[1] National Response Center report number 1330806.
[2] National Response Center report number 1330949.

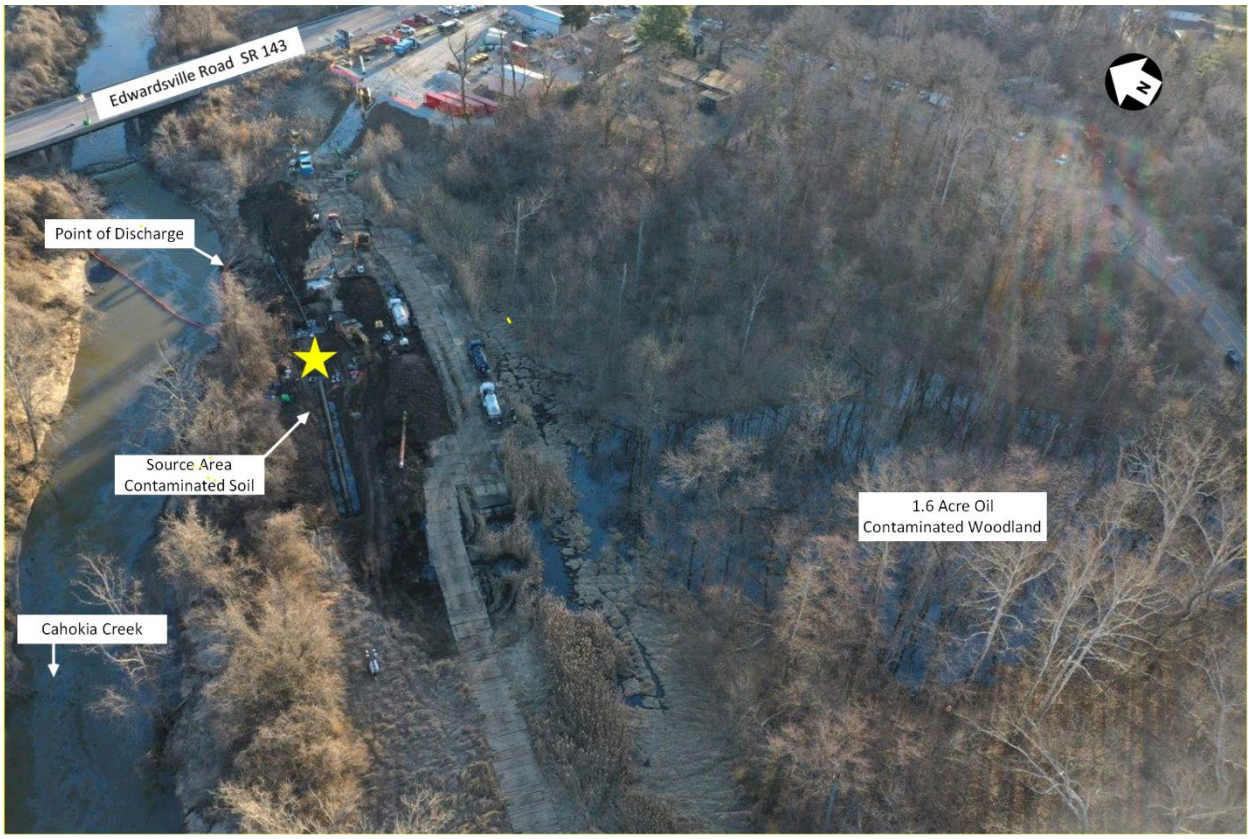

Figure 1. Incident location, Edwardsville, Illinois. Yellow star indicates approximate pipeline breach location. March 13, 2022, 08:09. Courtesy, Marathon Pipe Line LLC with NTSB annotations.

The site was bordered on the north by IL State Route 143 near its intersection with Old Alton-Edwardsville Road, with the Cahokia Creek and agricultural properties beyond; to the east and south by Old Alton-Edwardsville Road, with a Norfolk Southern railroad track and residential and commercial properties beyond; and to the west by forested land, with residential properties beyond (Figures 1 and 2).

Three parallel pipelines shared the right-of-way at the incident location. Northernmost was the Woodpat pipeline that was involved in this incident. The incident pipeline was a 22-inch diameter crude oil interstate pipeline, owned and operated by Marathon Pipe Line LLC (PHMSA Op ID 32147). At center in the right-of-way was a 12-inch diameter crude oil interstate pipeline that is part of the Roxana – Patoka pipeline system, also owned and operated by Marathon Pipe Line LLC. Southernmost was a 30-inch diameter crude oil interstate pipeline that is part of the Keystone pipeline system, owned and operated by TC Oil Pipeline Operations, Inc. (PHMSA Op ID 32334).

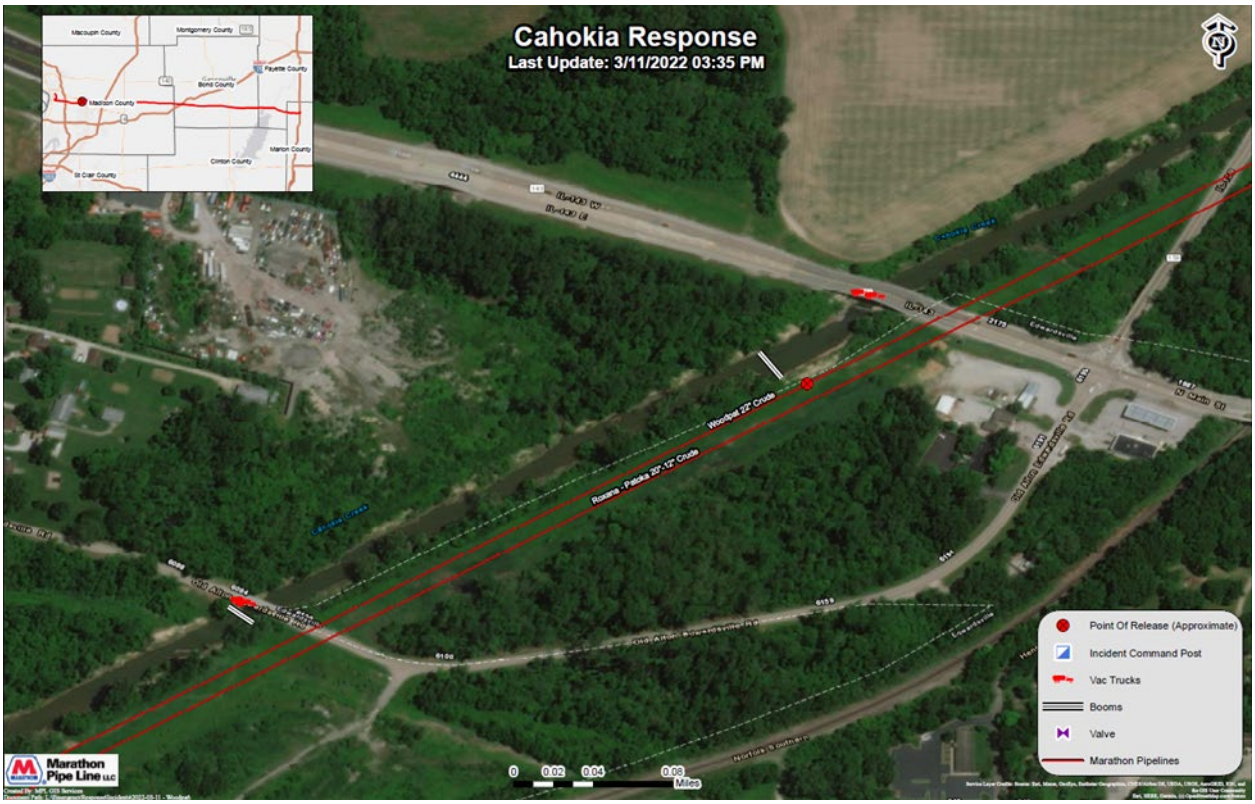

Figure 2. Incident site showing approximate pipeline locations, Edwardsville, IL (Courtesy, Marathon Pipe Line LLC).

On March 12, 2022, NTSB investigators monitored excavations at the breach location, where Marathon crews uncovered a circumferential pipe separation on the Woodpat pipeline at joint number MAPLID # 29782. The gap between the two separated pipeline segments measured between 6 ¾-inches to 8-inches (Figure 3). The release location was within the pipeline right-of-way.

As crews uncovered the breached pipe, investigators observed released oil from underneath the pipe accumulate in the excavation.

Figure 3. Excavated pipeline at the breach location and circumferential pipe separation, March 12, 2022, 17:27.

D.3 Description of the Pipeline System

The Woodpat Pipeline is a 55-mile, 22-inch crude oil pipeline originating in Wood River, Illinois, and terminating in Patoka, Illinois. It is capable of transporting approximately 360,000 barrels-per-day (bpd) of crude oil. Pump stations were located at Wood River and at Roxana.

The failure occurred at about station 2564+06 (MP 6.1) on the Roxana to Patoka segment of the Woodpat Pipeline. The pipeline alignment sheet indicated the depth-of-cover was about 48 inches at the incident location. The pipeline was installed on January 1, 1949.

The maximum operating pressure was 881 psig at the affected segment. The operating pressure at the time of the incident was about 479 psig.

D.4 Incident Command Structure

Marathon assumed the role of incident commander (IC) and formed an oil spill response organization for this incident. To formalize Marathon's incident management role, on March 12, 2022, the EPA issued a Notice of Federal Interest to Marathon, indicating that an oil removal action was needed and that as the owner and operator of the pipeline facility, Marathon may be financially responsible for removal and mitigation actions.

Marathon established a unified command to manage the emergency response to the crude oil release. The unified command organizations consisted of Marathon, U.S. Environmental Protection Agency (EPA), Illinois Environmental Protection Agency (I-EPA), and Edwardsville Fire Department. Cooperating agencies included the U.S. Coast Guard, PHMSA, U.S. Fish and

Wildlife Service, Illinois Department of Natural Resources, Illinois Emergency Management Agency, and Madison County Emergency Management.

The unified command defined four geographic divisions between the release site and the Mississippi River to help manage activities and resources being deployed to the scene (Figure 4).

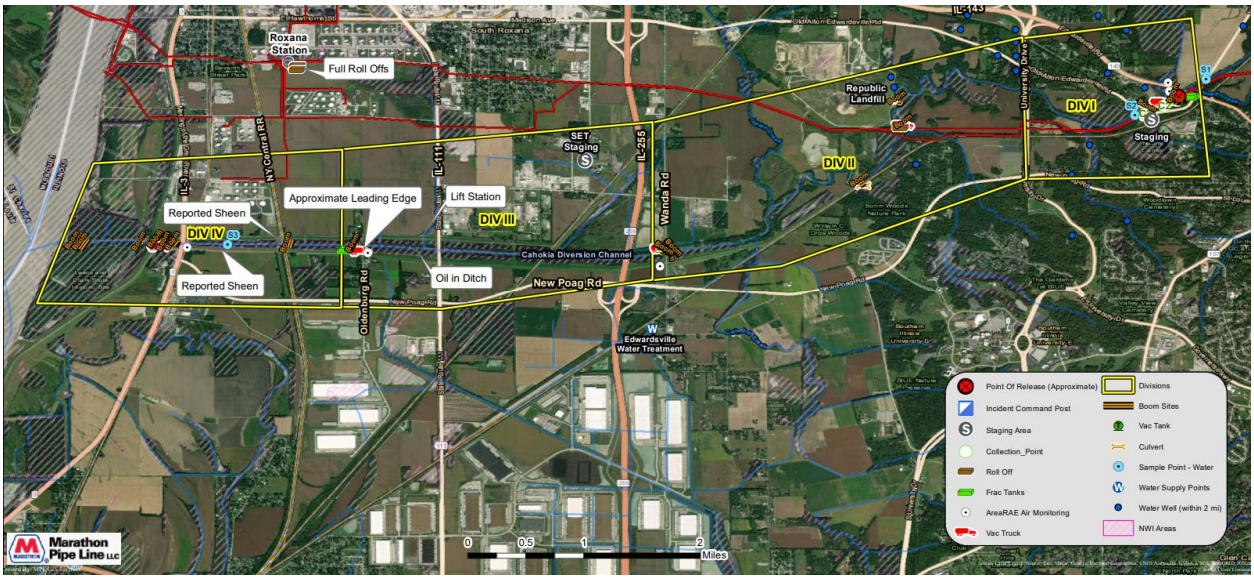

Figure 4. Four designated oil spill response divisions for Cahokia Creek, Excerpt from Incident Action Plan no. 1. The source area was in Division 1 (right) and the confluence of Cahokia Creek, and the Mississippi River was in Division 4 (left), (Courtesy, Marathon Pipe Line LLC).

D.5 Oil Spill Response Operations

Marathon deployed internal and contracted Oil Spill Removal Organizations (OSROs) to respond to the release. According to EPA records, oil containment and recovery equipment began to arrive on scene and was deployed within one hour to control the release source and intercept the leading edge of the spill in an effort to prevent it from traveling further downstream.[3] Marathon's vice president of operations, the qualified individual identified in the company's facility response plan, arrived on scene, the evening of March 11, 2022.[4]

During the first 24 hours, following the release, Marathon had established ten oil spill containment locations along Cahokia Creek, extending to its confluence with the Mississippi River. Marathon deployed oil containment boom at these locations, which were equipped with collection points tended by vacuum truck crews. Low ambient temperatures during the initial operations period increased product viscosity and slowed pumping progress. Recovery crews ordered heaters for use on pooled product to reduce the viscosity and expedite pumping.

[3] U.S. EPA Polrep #1, March 12, 2022.

[4] The qualified individual is an English-speaking representative of the operator, located in the United States, available on a 24-hour basis, with full authority to activate and contract with required oil spill removal organizations, activate personnel and equipment maintained by the operator, act as liaison with the on-scene coordinator, and obligate any funds required to carry out all required or directed oil response activities.

By March 12, 2022, crews had constructed an access road for heavy equipment to enter the source area. Vacuum trucks and excavators worked in the source area to excavate an interception trench and pothole, stockpile oil contaminated soil, and remove pooled oil. Some oil continued to seep into Cahokia Creek from the bank adjacent to the breached pipeline.

In accordance with Marathon's solid waste plan, approved disposal locations for oily liquids, contaminated soils, absorbent materials, and associated solid wastes were:

- Republic Services Roxana Landfill, 4601 Cahokia Creek Road, Edwardsville, IL for non-hazardous waste and debris,
- Covanta Indianapolis, Inc., 2320 Harding Street, Indianapolis, IN for oil-saturated absorbent materials,
- Wood River Station, Wood River, IL for recovered liquids and petroleum contaminated water.

Recovered oil and petroleum contaminated water was temporarily stored in vacuum trucks or portable frac tanks stationed near some oil boom deployment sites.[5] Marathon's contractors took recovered liquids to its Wood River Station to undergo oil/water separation for quantifying the recovery amounts (for mass balance information see section D.5.6 of this report).

On March 15, 2022, the EPA and I-EPA approved Marathon's Shoreline Cleanup and Assessment Techniques (SCAT) plan.[6] The plan provided for:

- Collecting real-time survey data and information on stream bank oiling conditions, bank, and backshore character,
- Identifying environmental, cultural, or operational constraints to shoreline treatment,
- Recommending shoreline treatment priorities,
- Developing appropriate endpoint criteria and treatment options in consultation with agency personnel,
- Monitoring the treatment progress, and
- Ensuring that sufficient treatment has been completed.

According to the plan, a minimum of two-person SCAT assessment teams, accompanied by other stakeholders as necessary, collected data using ArcGIS Online (AGOL)for real-time integration with maps for twelve identified stream segments within the four response divisions. This allowed the locations of actionable accumulations of oil or impacted animals to be disseminated to command staff using online map sharing.

On March 19, 2022, the formal unified command demobilized, while site operations transitioned from an emergency response to longer-term remediation. The unified command determined that while several of its response objectives had been met, including identifying, containing, and

[5] A frac tank is a large portable container used for temporary storage and separation of liquids such as oil/water mixtures.

[6] The National Oceanic and Atmospheric Administration defines Shoreline Cleanup and Assessment Techniques (SCAT) as a systematic method for surveying an affected shoreline after an oil spill. The method originated during the response to the 1989 Exxon Valdez oil spill and is currently a regular part of an oil spill response.

controlling the source of the oil spill, remediation would continue to focus on monitoring and maintaining established oil containment sites. In addition, Marathon agreed, under state and federal oversight, to continue water sampling, to conduct sediment poling and surveillance activities, and to manage disposal of wastes generated from the remediation under Illinois rules and regulations.[7]

Marathon's soil sampling plan indicated, that as of April 1, 2022, grossly contaminated soil removal had been completed along the pipeline corridor excavation area that measured about 500 feet long and 12 feet wide. Marathon contractors conducted further soil sampling to determine the horizontal and vertical extents of soil impacts. In coordination with the I-EPA, soil sample screening by photoionization detector was used to determine the need for further soil removal.[8] Following screening and contaminated soil removal, the pipeline was backfilled with clean soil sourced from offsite.

Marathon OSROs transported recovered liquids (oil and oil/water emulsions) to floating-roof storage tank 1297 located at the company's Wood River breakout tank facility in Wood River, Il. (See Section D.5.6, table 6 for a summary of oil spill recovery metrics).

D5.1 Marathon Pipe Line Initial Oil Spill Response Actions

On March 11, 2022, about 08:40 – 08:45, the Marathon pipeline operations center notified the area manager/IC that the Woodpat pipeline was shut down due to a possible leak indication on a two-mile segment between Wood River, Illinois, and Roxana, Illinois. Marathon had dispatched crews to investigate and locate any point of release. The area manager/IC contacted the operations center supervisor, who advised that modeling indicated that a release had occurred.

The area manager/IC, who lived within a few miles of the incident scene, joined the search for the release site. The area manager/IC could smell crude oil odor as he drove on Highway 159 toward Highway 143.

At about 09:50, the area manager/IC located the point of release and observed puddled oil and an earth blowout. He notified other Marathon management and response personnel that oil was discharging into Cahokia Creek and was flowing west toward the Mississippi River but noted there was no oil actively flowing from the blowout. Using his 4-gas monitor, he found no evidence of a hazardous atmosphere near the blowout.

The area manager/IC directed Wood River operations supervisor to assist with contacting OSROs for oil spill response. Based on the scale of this incident, the area manager/IC initially deployed both company and OSRO response resources to the release point and to previously identified downstream spill recovery access points at Wanda Road and near the Republic Landfill. The first

[7] Poling involves the measurement of sediment and water characteristics, including a qualitative determination of oil sheen and globule coverage over a specified surface area.

[8] According to Marathon's Pipeline Corridor Soil Sampling Plan, this process would be repeated until visual and olfactory impacts are not observed, and photoionization detector readings were less than 50 ppm. Confirmation samples were analyzed in a laboratory for BTEX (benzene, toluene, ethylbenzene, and xylenes) using EPA method 8270, *Gas Chromatography Analysis of PAHs*.

two OSROS the area manager contacted, were Jarrett Industries and Environmental Restoration as he was aware their response resources were staged closest to the incident site.

About 10:00, the area manager/IC met on scene with the Edwardsville fire chief and assistant fire chief and confirmed that Marathon's pipeline was the release source and that oil spill response resources were enroute. The fire chiefs informed him that the fire department had received odor complaints from nearby residents that morning.

Before 10:50, responding to local police and fire incident communications, the Wood River Phillips 66 refinery placed oil boom across Cahokia Creek at the Wanda Road bridge access point.[9] Also at this time, Marathon crews equipped with an oil spill response trailer arrived at Wanda Road. Between 10:50 and 12:00, Marathon crews also installed oil boom near the Republic Landfill and Highway 3 near the Lewis and Clark Tower. Marathon crews installing oil boom near the Republic Landfill, about 2.5 miles downstream of the pipeline breach location, reported to the area manager/IC that they had secured oil boom in advance of the oil discharge leading edge.

The area manager/IC coordinated the deployment of OSRO Jarrett Industries crews, who arrived about 10:50 at the Old Alton Edwardsville Road bridge, about 400 yards downstream of the pipeline breach location. The Jarrett crews installed oil boom and had a vacuum truck to begin recovering oil at that location by 12:00.

Between 11:00 and 12:00, Marathon's safety officer arrived on site to deploy air monitoring equipment for worker safety and perimeter monitoring. The area manager/IC was not informed of any exceedances of air monitoring action levels for benzene or other parameters of concern such as hydrogen sulfide and lower explosive limit in air (LEL).

About 12:00 the Marathon hydraulics group informed the area manager/IC that the initial crude oil release estimate was 3,000 barrels. Spill response resources continued to arrive throughout the day and assignments were provided by the area manager/IC. Contractor efforts also included constructing a stone and mat stabilized road for heavy equipment to access the breach location that was situated within a marshy floodplain.

About 16:30, the alternate incident commander from the Marathon headquarters in Findlay OH, arrived on the site and was briefed by the area manager/IC. The area manager/IC estimated there were about 40 response personnel on-site by 17:30. The first unified command briefing occurred about 18:00.

One initial challenge Marathon experienced at the Wanda Road booming site, was getting vacuum trucks low and close enough to the water to lift recovered oil from skimmers. Marathon remedied the issue by directing placement of a stone and gravel roadway leading to the lower-elevation creek bank (see Figure 14).

[9] Marathon, the Phillips 66 refinery, and other local facilities have a mutual aid agreement for industrial firefighting support.

D5.2 U.S. EPA Initial Actions

In the inland zone, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) designates the EPA as the federal on-scene coordinator (OSC).[10] The federal OSC directs federal response efforts and coordinates all other federal efforts at the scene of a discharge or release. The OSC may also monitor local, Tribal, State, or private actions to remove a discharge, and may provide technical assistance to responsible party response personnel. The OSC ensures oversight of responsible party efforts, and if the responsible party cannot or will not initiate action to eliminate the environmental and public health threat, or if the removal is not being conducted properly, the OSC may intervene to take appropriate action to mitigate or remove the threat or discharge.[11] While the OSC maintained an oversight role during the course of the emergency response, no federal action was required to take control of oil spill removal efforts.

The EPA OSC told investigators that about 11:15 on March 11, 2022, he departed from his office in Collinsville, Illinois after the Region 5 duty officer dispatched him in response to the National Response Center report for this incident. On arrival at the incident scene about noon, the Marathon area manager/IC briefed the OSC, the Edwardsville fire chief, and two I-EPA officials, who had arrived prior to the OSC. Marathon informed the EPA OSC that the company shut down and blocked the affected pipeline. The OSC observed oil discharging from the bank into Cahokia Creek at the source area, "at a fairly good rate." He noted the swift water current adjacent to the source area where conditions were too challenging for oil boom deployment.[12]

Following the briefing, the OSC, Illinois EPA, and a Marathon field environmental technician observed that OSROs had installed oil boom south of the Old Alton Edwardsville Road bridge. They observed a "large amount" of oil accumulating behind the boom and migrating further downstream. The OSC said the oil covered about half the creek channel at that location and some material was escaping underneath the oil boom.

They traveled further downstream to the Republic Landfill facility where they assessed the feasibility of deploying boom for establishing an oil spill collection point. There, they observed heavy oil flowing in the creek. The OSC and Illinois EPA assessed another downstream location for collection point oil boom deployment but determined vehicular access to the location would be poor.

Finally, between 14:30 and 15:00, the OSC, Illinois EPA, and the Marathon field environmental technician traveled about 5.0 miles downstream from the release site to the Wanda Road bridge, near New Poag Road, and observed crews with vacuum trucks deploying oil boom and other equipment at that location. At that time, no oil had thus far migrated downstream to that location.

[10] The NCP, codified at 40 CFR Part 300, is the federal government's blueprint for responding to both oil spills and hazardous substance releases. Among its provisions, the NCP establishes general responsibilities of federal On-Scene Coordinators and provides funding for federal responses to oil releases under the Oil Spill Liability Trust Fund. The inland zone delineates an area of federal responsibility inland of the coastal zone, although precise boundaries of federal agency jurisdiction are determined by EPA/U.S. Coast Guard agreements and regional contingency plans.

[11] *Region 5 Regional Contingency Plan / Inland Zone Area Contingency Plan*, (U.S. Environmental Protection Agency, May 2021).

[12] NTSB interview of first arriving EPA on-scene coordinator, March 13, 2022.

The OSC and Illinois EPA officials discussed implementing further downstream containment measures as well.

On return to the mobile command post, the OSC discussed public safety concerns with the Edwardsville fire chief and informed him that the EPA Superfund Technical Assessment and Response Team (START) would supplement EPA and local air monitoring efforts.[13] The OSC noted no evacuations or impacts to private property. However, the Edwardsville Fire Department investigated some residential odor complaints earlier in the day.

Prior to the first incident command meeting that took place at 18:00, the OSC returned to the Wanda Road bridge oil containment location and observed that oil was beginning to collect in the oil boom.

By about 20:30, other EPA OSCs and START personnel arrived on scene. The START contractor set up and calibrated air monitoring equipment and then deployed the equipment that evening. Also, during the evening of March 11, 2022, the EPA, I-EPA, and Marathon further coordinated plans for oil boom deployment and air monitoring.

About 22:00, the OSC returned to both the Old Alton Edwardsville Road bridge and the Wanda Road bridge oil containment locations and observed heavy oiling in the creek.

The EPA first pollution/situation report (Polrep #1) documented the following response actions from 3/11/22 to 3/13/2022:

- EPA mobilized five on-scene coordinators and seven START personnel to support the incident,
- EPA deployed air sampling equipment (SUMMA canisters) in two locations near the release point. One location was east of the release point near a residential neighborhood and the other sample location was to the west of the release point, near the bridge on Old Alton Edwardsville Road,
- EPA and Marathon initiated surface water sampling in the Cahokia Creek and the Cahokia Diversion Channel. Samples were collected and analyzed for gasoline range organics (GRO), diesel range organics (DRO), oil range organics (ORO), volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), see Section D.5.4.2 for further information,
- EPA reviewed Marathon's draft Air and Water Monitoring/Sampling Plans,
- Shoreline Cleanup and Assessment Techniques (SCAT) operations were underway in Divisions I, II, III, IV,

[13] U.S. EPA Superfund Technical Assessment & Response Team (START) contractors consist of a variety of technical experts (engineers, geologists, toxicologists, biologists, chemists, and technical support staff). The team provides technical support services for EPA site assessment activities. The EPA START contractor for the Edwardsville, Illinois oil spill response was Tetra Tech, Inc.

- Marathon submitted a private well water sampling plan to EPA for comment. EPA deferred to the State of Illinois EPA for plan approval.

EPA tasked its START contractor to conduct air monitoring, surface water sampling, and to provide technical support during the emergency response. The purpose of the monitoring and sampling activities was to investigate the migration of crude oil and the associated fugitive emissions and evaluate immediate threats to human health or the environment.

D5.3 State of Illinois Actions

On March 11, 2022, the Illinois Environmental Protection Agency (IEPA) referred an enforcement action to the Illinois Attorney General's Office against Marathon, for the release of crude oil. The referral cited violations of the Illinois Environmental Protection Act and the Illinois Pollution Control Board's regulations.[14]

The referral asked the state attorney general's office to represent the IEPA to ensure that Marathon completely remediates the release. IEPA sought legal action for Marathon to implement appropriate measures to remove all product in the affected waterway, assess the integrity of the pipeline, and effect necessary repairs. The referral also asks for compliance measures that include fully delineating the extent of the oil spill to both soil and groundwater, and implementation of a corrective action plan.

On March 18, 2022, the state attorney general's office filed a lawsuit in Madison County, Illinois, against Marathon, alleging that the company created a substantial danger to public health and the environment when crude oil released from its pipeline. The lawsuit sought to require that Marathon immediately cease and desist the release of heavy crude oil from the pipeline, and to immediately undertake corrective action to abate the discharge. Additionally, the lawsuit sought civil penalties for violations of the Illinois Environmental Protection Act and the Illinois Pollution Control Board regulations.[15]

D5.4 Impacts to Sensitive Environmental Resources and the Community

D5.4.1 Drinking Water Sources

Drinking water intakes were located on the Mississippi River, downstream of the incident site. The release did not have any documented effect on these drinking water sources beyond the confluence of Cahokia Creek and the Mississippi River.

About 34 water wells were identified within two miles of the release site (see Figure 4). Eight private property locations were evaluated for water well sampling, however seven of the locations

[14] See: https://www2.illinois.gov/IISNews/24616-IEPA_Refers_Marathon_Pipe_Line_LLC_to_Attorney_General_for_Enforcement.pdf, accessed May 16, 2022.

[15] *People of the State of Illinois vs. Marathon Pipe Line LLC*, case number 2022CH000020, Circuit Court of Madison County, Illinois. See also: https://illinoisattorneygeneral.gov/pressroom/2022_03/20220318d.html, accessed June 6, 2022.

had either inactive wells or wells that could not be located. Six of these locations nearest the source area were among the wells that technicians could not sample.

Thus, on March 19, 2022, a Marathon analytical services contractor sampled one private drinking water well located at a residential property on Oldenburg Road near the location where the furthest downstream oil recovery site was situated. Marathon's contractor tested the sample for volatile organic compounds that included constituents of crude oil, finding no analytes that exceeded the method reporting limit.[16]

D5.4.2 Surface Water Quality Sampling

Marathon's surface water sampling plan, dated March 15, 2022, described surface water sampling efforts to assess the extent of the crude oil release impact to Cahokia Creek. In summary, Marathon's environmental site investigation contractor and EPA collected split surface water grab samples from seven upstream and downstream locations on Cahokia Creek between March 11 – 14, 2022. The samples were tested for benzene, toluene, ethylbenzene, xylenes, volatile organic compounds, and polyaromatic hydrocarbons.[17] The test results were compared with EPA maximum contaminant levels and applicable Illinois EPA water quality standards for aquatic life and human health.[18] No exceedances of applicable state and federal standards were reported.

D5.4.3 Air Monitoring

D5.4.3.1 Marathon Air Monitoring

On March 11, 2022, Marathon developed a site safety and air monitoring work plan that was approved by the EPA OSC. The plan addressed air monitoring at the perimeters of the release site and oil boom containment sites for the protection of the community and site workers. Marathon also monitored air to assess the presence of any airborne contaminants within nearby potentially impacted communities and designated an odor response strike team to respond to odor complaints. In addition to collecting air monitoring data, Marathon provided for toxicology support, data collection quality assurance/quality control, data evaluation, and reporting.

Target air monitoring analytes and action levels included the following, by real-time direct reading instruments:

- lower explosive limit (LEL) of 1 percent,
- volatile organic compounds (VOCs) sustained at 1 ppm over a 60 second draw,
- benzene at > 200 ppb, or 60 ppb with VOC > 1 ppm,

[16] The method reporting limit (MRL) means the amount of contaminant present is less than the laboratory instrument used to measure it could detect; in this case 0.50 micrograms per liter for each volatile organic compound covered by the technique. The analytical method used was EPA Method 542.2, Rev. 4.1, *Measurement of Purgeable Organic Compounds by Capillary Column Gas Chromatography/Mass Spectrometry*.

[17] Analyses completed in accordance with EPA Method 8260, *Volatile Organic Compounds by Gas Chromatography – Mass Spectrometry*, and EPA Method 8270.

[18] The EPA-established maximum contaminant level is the legal threshold limit on the amount of a substance allowed in public water systems under the Safe Drinking Water Act. Also see Illinois Administrative Code, Title 35, Subtitle C.

- hydrogen sulfide > 0.1 ppm, evacuation at > 1 ppm.

In addition to direct reading instruments, Marathon collected air samples for laboratory analysis for OSHA time-weighted average (TWA) concentrations of contaminants. Analytes of concern were ethylbenzene, hydrogen sulfide, benzene, toluene, xylene, and total VOCs. The level of personal protective equipment required for site workers was established based on real-time air monitoring and this sampling.

The unified command used EPA priority list acute exposure guideline levels (AEGLs) for benzene and hydrogen sulfide as guidance for community exposures to assess airborne concentrations of crude oil toxic constituents.[19] Table 1 provides the AEGLs for benzene, and Table 2 provides the AEGLs for hydrogen sulfide.[20]

Table 1. Environmental Protection Agency benzene (CAS # 71-43-2) acute exposure guidelines (parts-per-million), interim.

	10 min	30 min	60 min	4 hr	8 hr
ppm (12/12/06)					
AEGL 1	130	73	52	18	9.0
AEGL 2	2,000*	1,100	800	400	200
AEGL 3	**	5,600*	4,000*	2,000*	990

Lower Explosive Limit (LEL) = 14,000 ppm
* = >10% LEL; ** = >50% LEL
AEGL 3 - 10 mins = ** 9,700 ppm
For values denoted as * safety considerations against the hazard(s) of explosion(s) must be taken into account.
For values denoted as ** extreme safety considerations against the hazard(s) of explosion(s) must be taken into account.

Table 2. Environmental Protection Agency hydrogen sulfide (CAS # 7783-06-4) acute exposure guidelines (parts-per-million), final.

	10 min	30 min	60 min	4 hr	8 hr
ppm					
AEGL 1	0.75	0.60	0.51	0.36	0.33
AEGL 2	41	32	27	20	17
AEGL 3	76	59	50	37	31

* Level of Odor Awareness = 0.01 ppm

[19] The EPA acute exposure guideline levels (AEGLs) are specific concentrations of airborne chemicals at which health effects may occur. They are designed to protect the elderly and children, and other susceptible individuals. AEGL "levels" are dictated by the severity of the toxic effects caused by the exposure, with Level 1 being the least severe and Level 3 being the most severe. Benzene and hydrogen sulfide are included on the AEGL chemical priority list that is generated from nominations of stakeholder organizations.

[20] AEGL level 1 predicts no noticeable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversable upon cessation of exposure. Level 2 predicts irreversible long-lasting effects. Level 3 predicts life-threatening health effects.

No air monitoring data collected during the response to this incident exceeded AEGLs for these compounds.

D5.4.3.2 U.S. EPA Air Monitoring

EPA established an air sampling circuit consisting of fourteen locations near the release point area and downstream of the release. These monitoring locations focused on ambient air near the release location, oil containment sites, and residential areas near the oil discharge. The EPA tasked its START contractor with conducting real-time ambient air monitoring for volatile organic compounds (VOC), percent lower explosive limit (LEL), percent oxygen, carbon monoxide, hydrogen sulfide, and benzene. EPA air monitoring thresholds are shown in Table 3.

Table 3. U.S. EPA Air Monitoring Action Levels[21]

Parameter	Action Level
Hydrogen Sulfide	1 ppm
Carbon Monoxide	25 ppm
Oxygen	19.5 to 23.5 %
Lower Explosive Limit (LEL)	5%
Volatile Organic Compounds	1 ppm
Benzene	1 ppm

In addition, EPA installed fixed air monitoring stations at six locations: three near the point of release in Division 1, and one each at oil boom containment sites in Divisions 2, 3 and 4.

Between March 12, and March 15, 2022, EPA air monitoring identified one transient exceedance of the action level for benzene, where the concentration was 4.43 ppm on March 15, 04:31, at SR 143 & Old Alton-Edwardsville Road (near the point of release). This action level exceedance prompted EPA to initiate stationary perimeter air monitoring in the vicinity of heavily impacted wetland near the source area, which was connected to EPA's wireless telemetry system.[22] In addition, the EPA START contractor deployed air sampling canisters near a residential neighborhood east of the release point, and another west of the release point.[23] The canister samples were examined by a laboratory with no exceedances of AEGLs or actions levels reported.

D5.4.4 Sediment Monitoring

On March 20 and June 16, 2022, Marathon contractor, the Antea Group, visually assessed portions of Cahokia Creek downstream of the release location for the presence of depositional areas and backwater shoughs where oil could accumulate. According to Marathon's sediment assessment

[21] A contaminant action level means its concentration has exceeded permissible exposure limits and removal of personnel from the area or the use of personal protective equipment, exposure monitoring, and medical surveillance may be required. Action Levels were based on 8-hour time-weighted averages described in the EPA-approved Edwardsville Oil Spill Emergency Response Site Air Monitoring and Sampling Plan (Tetra Tech 2022).

[22] Stationary perimeter air monitoring consisted of AreaRAE Pro wireless area monitor that can simultaneously detect toxic and combustible gases and volatile organic compounds.

[23] An air sampling canister (Summa Canister) is a chemically inert container used to collect a whole air sample over a period of time.

and poling plan, limited depositional areas in Divisions 3 and 4 were anticipated since the flow of water in these areas of Cahokia Creek is channelized.

Aetna Group visually identified 21 shallow depositional areas in Cahokia Creek within Divisions 1 and 2, which were selected for poling assessment for qualitative determination of the degree of oiling and potential sediment impacts. Poling involved determining the thickness of soft sediment and the use of a hand auger to agitate sediment to observe for the presence of oil sheen and globules in accordance with plan protocols. The results of the sediment assessment found no evidence of oil sheen or oil globules at any of the poling stations.[24]

D5.4.5 Wildlife Impacts

The unified command established a wildlife branch within its operations section that remained active through March 27, 2022. Among the wildlife branch tasks, were capture and care for injured wildlife and documentation of the adverse effects of the oil spill and cleanup operations. The branch activities also included wildlife hazing to keep animals away from oil spillage and cleanup operations in the impacted wetland near the point of release.

As of May 13, 2022, the crude oil release affected a total 41 wildlife of various species, of which 26 animals died (Table 4).

Table 4. Wildlife impacts as of May 13, 2022 (source: EPA POLREP #9).

Description	Impacted (total)	Released	Dead on Arrival	Euthanized/Died in Facility
Ducks	20	5	12	3
Hawk	1			1
Frog	2	1	1	
Muskrat	1		1	
Blue Heron	3		3	
Beaver	5	2	1	2
Racoon	1		1	
Turtle	4	3		1
Owl	1	1		
Snake	3	3		
Fish			(14)[25]	
Total	**41**	**15**	**19**	**7**

[24] In accordance with the sediment poling protocol, the submerged oil category of "none" was determined when there was 0% sheen coverage, and no oil globules were observed within a one square yard area after agitation.

[25] Marathon agreed to collect 14 dead fish found at the furthest downstream oil boom site, however the Wildlife Division determined they did not exhibit any indication of oiling and were therefore not considered impacted by the oil spill.

5.5 Oil Spill Response Resources Deployed

The incident action plan for the operational period beginning 18:00, March 12, 2022, reported that Marathon and its 15 OSRO and support contractors had the resources deployed and available on-site, as shown in Figure 5. Within the first 24 hours following the release, these resources included 130 Marathon personnel, 110 contractor personnel, 40 vacuum trucks, 12 frac tanks, 1,100 feet of deployed oil boom, 3,200 feet of staged oil boom, and 7 oil skimmers. Available equipment resources, such as the number of available frac tanks, skimmers, and boats, continued to increase throughout the course of the emergency response.

8. Equipment Resources [RESL]

Description	Ordered	Available/ Staged	Assigned	Out of Service
Light Plants			21	
Tanker Trucks			3	
Frac Tank			12	
Roll-off (soft top)			4	
VAC Trucks			40	
Roll-off (hard top)		4	6	
Skimmers		7		
Mats			69	
Copressors			8	
Boom 6" (ft)			1100	
Boom 18" (ft)		3200		
Sbnt/Snr Bm. (ft.)				
Steam genies			9	
Trackhoes			6	
Drones			1	
Dozer			1	
Helicopters	1			
Telehandler			2	
Skid Steer			4	

9. Personnel Resources [RESL]

Organization	People in Cmd. Post	People in Field	Total People On-Scene
Federal	4		
State			
Local			
RP			
Contract Personnel			
Marathon			130
Contractor			110

Figure 5. Deployed equipment and personnel resources, excerpt from incident action plan, form ICS-209, operational periods 1 and 2, March 12-13, 2022.

The following NTSB investigator observations describe the status of oil spill recovery operations within the four response divisions between 22-28 hours following the pipeline breach.

D5.5.1 Division 1 – Source Area

Within the pipeline breach source area, the surface oil-saturated soil footprint was about ½ acre. The pipeline breach location was identified by a pool of oil in the center of this saturated zone (Figures 6 and 7).

Figure 6. Point of pipeline failure, March 12, 2022, 07:43.

Figure 7. Puddled oil, saturated soil and vegetation near source area, March 12, 2022, 08:20.

Oil containment in the source area was accomplished with a diversion ditch and interceptor sump/pothole installed about 20 feet of the pipeline breach. OSRO crews tended the sump with two vacuum trucks (Figure 8).

Figure 8. Diversion ditch and pothole at source area, March 12, 2022, 11:36.

Although on the morning of March 12, 2022, no active point-source discharges of oil to Cahokia Creek were found on the ground surface, investigators observed some oil emerging from the bank downgradient of the interceptor sump that led to sheen in the creek (Figure 9).[26] A roughly 75-foot long circular patch of black oil was stationary, held in place by swirling current on the opposite side of the creek from the point of discharge.

Figure 9. Point of discharge to Cahokia Creek adjacent to pipeline breach, March 12, 2022, 07:48.

D5.5.2 Division 1 – Old Alton Edwardsville Road Wooded Wetland

On March 14, 2022, 13:05, investigators observed approximately 1.6 acres of oil contaminated soil and vegetation in a wooded/wetland area south of the release location (Figures 10 and 11). A

[26] Point source pollution originates at a particular place, such as an outfall, ditch, or discharge pipe.

large fraction of the released crude oil had accumulated in this area. Investigators observed Marathon crews working to vacuum the oil puddles in advance of expected precipitation, March 17-18, 2022. Crews were also engaged in constructing berms and a timber mat access road into the area, which added to physical oil containment, along with the existing topography. There were no storm drain outlets, ditches, or other release pathways found from this impounded wetland area.

Figure 10. Oil saturated soil, wooded area Old Alton Edwardsville Road, March 14, 2022, 13:05.

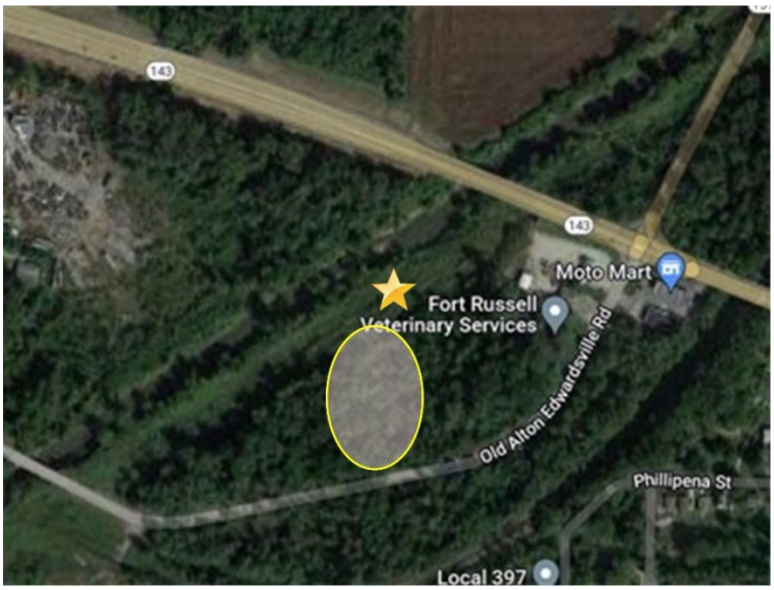

Figure 11. Old Alton Edwardsville Road Division 1 wooded area location showing the approximate area of puddled oil accumulation.

EPA reported that as of March 18, 2022, Marathon had completed pooled oil recovery from the Division 1 wetland.

D5.5.3 Division 1 – Old Alton Edwardsville Road Bridge

On March 12, 2022, 11:52, investigators observed 2 vacuum trucks and 1 oil boom trailer staged next to a spill containment site, adjacent to the Old Alton Edwardsville Road bridge over Cahokia Creek, which was about 400 yards downstream of the breached pipeline source area. This location

had visibly less water flow velocity than the upstream shallower portion of the creek, adjacent to the release site. Three strands of floating skirted hard oil boom were in place downstream of the bridge.[27] At this time, oil sheen with intermittent globlules of floating oil was flowing from upstream into this containment location. The boom had been deployed at an angle across the creek channel to deflect the oil to collection points on the bank where OSRO contractors skimmed and removed the oil with vacuum trucks (Figures 12 and 13).

Figure 12. First containment boom in Cahokia Creek downstream of source area, March 12, 2022, 11:52.

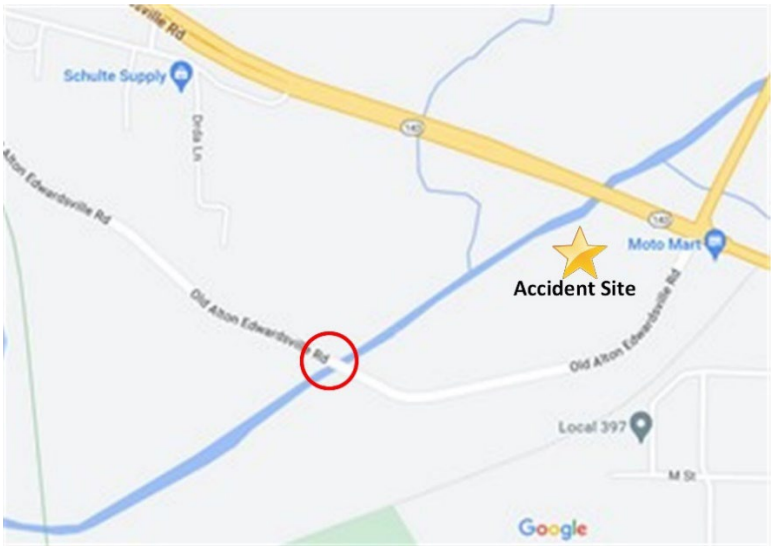

Figure 13. First oil booming site location in Division 1, down stream of source location.

[27] Oil containment boom may be deployed in various configurations to divert oil spills to collection locations. Boom allows oil to concentrate into a thicker mass to facilitate removal by skimming and vacuum methods. Hard oil boom refers to boom that is constructed of a cylindrical plastic float on top and a weighted below water skirt that helps reduce the amount of oil lost under the boom.

On March 14, 2022, 13:25, investigators revisited the Old Alton Edwardsville Road bridge oil boom deployment site and observed no pockets of black oil at the collection point. A contractor manager employed by SET Environmental told investigators that other than sheen, no additional free oil had arrived at this containment point during the previous 24 hours.

D5.5.4 Division 2 – Wanda Road at New Poag Road

On March 12, 2022, 12:12, investigators visited the Wanda Road oil containment site in Division 2, about 5.0 miles downstream of the relase site. At that time, equipment onsite included 6 vacuum trucks, a single staged boom trailer, and 5 frac tanks. Crews were actively vacuuming a relatively small area of pooled black oil, which had been diverted to the shoreline with oil boom (Figure 14). Three strands of oil boom and sections of sorbent boom were installed on the upstream side of the Wanda Road bridge.[28] A light oil sheen was seen flowing into the containment area from upstream.

Figure 14. Oil recovery operations in Cahokia Creek upstream side of Wanda Road bridge, March 12, 2022, 12:12.

The oil containment measures included two additional oil boom strands on downstream side of the Wanda Road bridge (Figure 15 and 16). Contractor crews were tending and repositioning the downstream oil boom to address a streamer of entrained oil that was escaping the final boom section. Other crews employed a vacuum truck and skimmer to remove the pocket of oil. The alternate EPA OSC advised that at the direction of the unified command, Marathon crews were working to add additional containment measures at this location.

[28] Sorbent boom has the appearance of a long sausage made from material that absorbs oil. Unlike hard boom, sorbent boom does not have a skirt that extends below water and is intended for use in slow moving current. Hard boom can be used in combination with sorbent boom, such as seen in Figure 14.

Figure 15. Oil recovery operations downstream of Wanda Road bridge, March 12, 2022, 12:12.

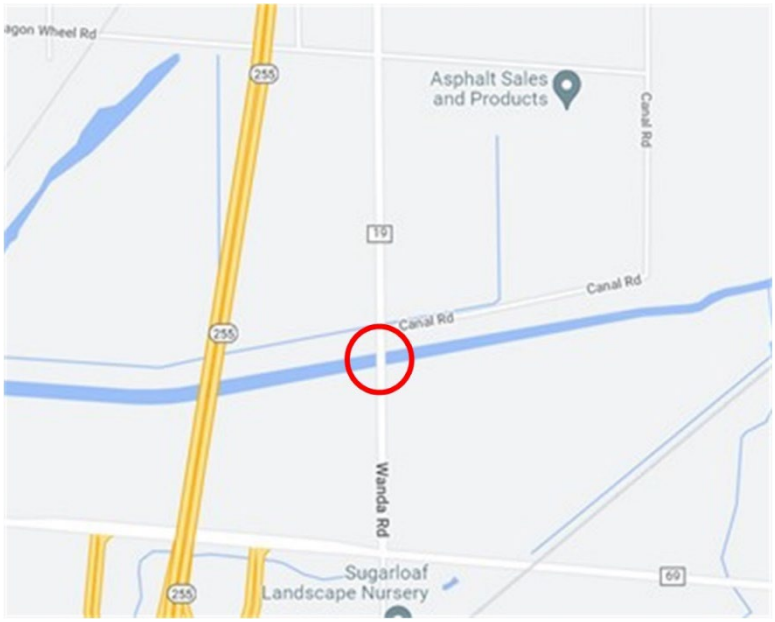

Figure 16. Wanda Road booming location in Division 2.

D5.5.5 Division 3 – Between Oldenburg Road and Canal Road

On March 12, 2022, 12:30, investigators observed oil containment measures in Cahokia Creek between Oldenburg Road and Canal Road. This location was the leading edge of recoverable quantities of the oil spill, which was about 7.3 miles dowstream of the pipeline breach and 2.5 miles upstream of the Mississippi River.

Resources engaged at the time of this inspection included 4 vacuum trucks, 2 frac tanks, 4 strands of hard boom, and 5 strands of sorbent boom. There was no visible amount of oil downstream of these containment structures (Figures 17 and 18) .

Figure 17. Oil recovery operations in Cahokia Creek at Oldenburg Road in Division 3, 7.3 miles downstream of the release site, March 12, 2022, 12:30.

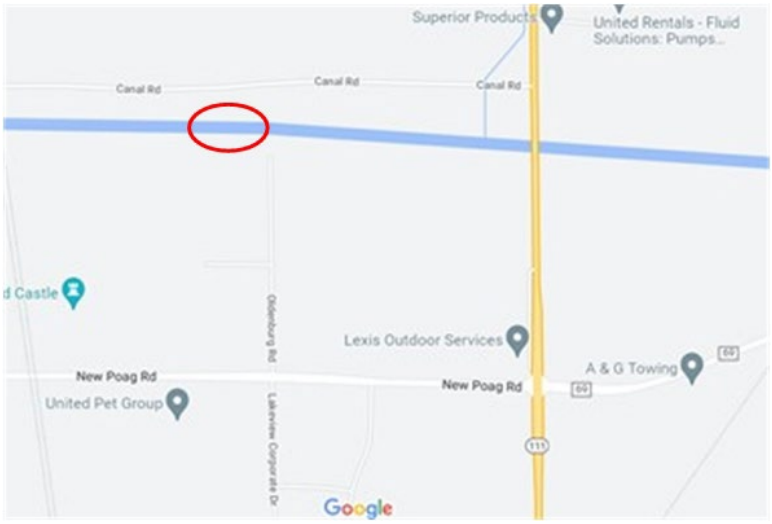

Figure 18. Oldenburg Road booming location in Division 3.

D5.6 Release Quantification

On March 13, 2022, Marathon filed a 48-hour update incident report to the National Response Center (Incident number 1330949) to update the release quantity reported on March 11, 2022, from 3,000 barrels to 3,900 barrels of crude oil.

After these initial reports, on April 22, 2022, Marathon's Hydraulics Department revised the release quantification to 3,500 barrels using two methods: mass balance from batch tickets, and release volume from line refill.

Marathon provided the following calculations to support its revised release quantification:

Method 1 – From Tickets = 3,490 bbl.

- Patoka Batches
  - WAS – Ticketed – 26,954
  - WAS/CLK tanked – 19,334
  - CLK – Ticketed – 5,527
  - Total – 51,815
- Wood River Receipt
  - WAS – Ticketed – 34,565
  - CLK – Ticketed – 20,740
  - Total – 55,305

Difference: 55,305 – 51,815 = 3,490 bbl.

Method 2 – From Refill = 3,544 bbl.

To refill the Woodpat Pipeline and repressure the system to the pressure the line was operating at when the rupture occurred required 4,062 bbl. (Delivered – Receipt = Refill Volume)

The 4,062-bbl. Consisted of the following:

- 3,856 refill bbl.
- 206 repressure bbl.

Drain-up from Field

- 518 bbl. Project related drain-up

The volume of crude oil released to the environment was calculated as:

Refill Barrels + Repressure Barrels – Project Related Drain-up Barrels = Barrels Released

3,856 Refill Barrels + **206** Repressure Barrels – **518** Project Related Drain-up Barrels = **3,544 bbl. Released to environment**

Because each method has a margin of error, Marathon used a standard rounding procedure in which it reported a release estimate for both methods as **3,500 bbl**.

D5.7 Oil Spill Recovery Summary

The initial incident status summaries and unified command briefings covering the first week of the spill recovery efforts reported the following progress metrics (Table 5):

Table 5. Oil recovery progress, recovery totals and observed impacts.

Date/Time	Recovered Oil/Water, bbl.	Recovered Solids, yd^3	Shoreline Impacts
3/12/2022, 06:00	933		
3/12/2022, 17:35	2,218		Light, 7.3
3/13/2022, 15:15	2,890	150	Light, 7.3
3/14/2022, 17:00	7,117	390	Medium, 9.5
3/16/2022, 06:00	14,270	2,440	Medium, 9.5
3/17/2022, 06:00	15,659	3,000	Light, 9.5
3/18/2022, 06:00	17,665	5,320	Medium, 9.5

As indicated in Table 5, the unified command identified the degree of oiling from SCAT assessments as light, medium, or heavy, and with the miles of affected waterway.[29]

On May 13, 2022, the EPA final pollution/situation report (Polrep) indicated that cleanup had been completed for all 9.5 miles of affected Cahokia Creek.[30] The affected area included about 25 acres of floodplain and riverbank.

Marathon OSROs transported recovered liquids (oil and oil/water emulsions) to floating-roof storage tank 1297 located at the company's Wood River breakout tank facility in Wood River, Il. The water fraction was separated to facilitate a mass balance of recovered oil.

On July 29, 2022, Marathon reported that all recovered wastes have been removed from the spill site. Marathon reported the following final oil spill removal metrics (Table 6):

Table 6. Marathon Final oil spill removal metrics as of July 29, 2022

Total Release (bbl.)	3,500
Recovered free oil, vacuum truck ops. (bbl.)	3,245
Recovered oil contained in solid wastes (bbl.)	117
Percent recovery	96
Oil-contaminated reclaim Soil (tons)	60
Non-hazardous soil (tons)	17,464
Debris (tons)	1,188
Absorbents (tons)	80

Marathon reported that the total amount recovered from oil spill response operations was 3,362 barrels (free oil plus oil recovered from solid wastes), or 96 percent recovery efficiency for the released oil.

D.6 Petroleum Crude Oil Description

Wyoming Asphaltic Sour (WAS) crude oil is a flammable liquid petroleum crude oil that exhibits an amber to black viscous liquid with a mild hydrocarbon or rotten egg odor. The API gravity was 21.6 (specific gravity of 0.92), thus, the material was buoyant upon water.[31]

A pre-incident crude oil assay found the viscosity was 305.14 cSt @ 100˚ F. The benzene concentration was 0.05 LV%, the hydrogen sulfide concentration was 1.99 ppm, and the Reid vapor pressure was 2.35 psi.[32] According to the Marathon safety data sheet for petroleum crude oil, the specific gravity may range from 0.73 to 0.96, and its flash point was -30 ˚F.

[29] The terms light, moderate, and heavy oiling are defined in the *NOAA Shoreline Assessment Manual, 4th Edition* (Seattle Washington, National Oceanic and Atmospheric Administration, 2013). NOAA defines an average crude oil thickness of 0.01 to 0.1 cm as moderate oiling.

[30] EPA Polrep #9, Marathon Pipeline Release – Wood River to Patoka System, Edwardsville, Illinois, May 13, 2022.

[31] The crude oil assay was determined from a February 18, 2022, sample collected from a storage tank at the Marathon Wood River facility.

[32] Reid vapor pressure (RVP) is a measure of the volatility of petroleum products and is determined at test conditions of 100 ˚F.

The released crude oil did not contain diluent.[33] Marathon's post-accident testing suggested there would be little probability that evaporation of light ends would result in sinking oil becoming commingled with river bottom sediments.

Petroleum crude oil is an extremely flammable liquid. Its vapor may cause flash fire or explosion. The material also contains hydrogen sulfide gas and may be fatal if inhaled. Gas may evolve and accumulate in confined spaces. Fumes may cause eye and respiratory irritation. The material may be harmful or fatal if swallowed, may cause lung damage overexposure, and may cause central nervous system depression. Benzene is a cancer hazard that can cause leukemia and other blood disorders. Petroleum crude oil is toxic to aquatic organisms, with the potential to cause long lasting adverse effects in the aquatic environment.

Recommended and regulatory worker exposure limits for constituents of petroleum crude oil are provided in the Marathon safety data sheet. Marathon provided the safety data sheet to emergency responders on the day of the release.

D.7 Oil Spill Preparedness

D7.1 Marathon Facility Response Plan

The Marathon Pipeline facility response plan (FRP), last revised on July 30, 2021, for the Martinsville Response Zone, includes the incident location that was within the geographic scope of the plan. Marathon identified the Roxana to Patoka segment of the Woodpat 22-inch pipeline as a Significant and Substantial Harm pipeline.[34] As such, the pipeline is required to be covered by the pipeline facility response plan because it is located near water intakes and environmentally sensitive areas and crosses waterways. The plan is intended to satisfy the requirements of 49 CFR Part 194 and the Oil Pollution Act of 1990 (OPA 90). PHMSA approved the revised pipeline facility response plan on September 8, 2021.

The plan describes Marathon's approach to respond to oil spills within the geographic zone. The plan provides a description of anticipated initial response actions including spill detection and mitigation procedures, spill surveillance, spill volume estimating, estimating spill trajectories, air monitoring, initial containment actions, safety considerations, and specific response considerations.

According to the plan, the first company official on-scene functions as the incident commander (IC) until relieved by an authorized supervisor, who then assumes the IC position.

Among general guidelines provided for initial response priorities, the plan identified the following actions:

[33] Diluent is a light hydrocarbon mixture used for blending with heavy crude oil to reduce viscosity to make it more fluid and efficient to transport by pipeline.

[34] According to PHMSA regulations at 49 CFR 194.103, a line section can be expected to cause significant harm to the environment in the event of a discharge of oil if it is greater than 6 5/8 inches in outside nominal diameter, is greater than 10 miles in length, and, among other things, is located within a 1-mile radius of potentially affected environmentally sensitive areas. Operators must submit a statement with its response plan identifying which line sections within a response zone can be expected to cause significant and substantial harm.

- Personnel and public safety are priority,
- Eliminating sources of ignition in the vicinity of the spill,
- Isolating the source of the discharge to minimize further flow,
- Making internal and external notifications,
- Maintaining communication with fire, police, and other public officials,
- Activating local company personnel as necessary,
- Activating response contractors and other external resources as necessary,
- Initiating spill mitigation and response activities,
- Protecting environmentally sensitive areas,
- Monitoring and controlling the containment and clean-up effort, and
- Restricting access to the spill area to protect the public health and safety.

According to 49 CFR Part 194.105, the operator must identify and ensure, by contract or other approved means, the resources necessary to remove, to the maximum extent possible, a worst-case discharge and to mitigate or prevent a substantial threat of a worst-case discharge.[35] Marathon determined the line segment in the Martinsville Response Zone with the highest throughput and largest drainage volume between block valves on pump stations was the pipeline segment at "Capline 40," mile post 0.4, Marion County, Illinois. Thus, the pipeline facility response plan is expected to provide for the resources necessary to address the worst-case discharge for this response zone of 41,057 barrels.

Federal regulations further require the operator to identify in the pipeline facility response plan the response resources that are available to respond within the time specified, after discovery of a worst-case discharge, or to mitigate the substantial threat of such a discharge. The spill response planning timeframes provide for a three-tier system for high-volume areas and for all other areas (Table 7).[36] The Mississippi River at Wood River, Illinois, is defined as a high-volume area. However, the location of the oil spill on Cahokia Creek does not qualify as a high-volume area and the oil spill did not impact the Mississippi River.

Table 7. High volume and other area oil spill resource response times, 49 CFR 194.115.

	Tier 1	Tier 2	Tier 3
High volume area	6 hrs	30 hrs	54 hrs.
All other areas	12 hrs	36 hrs	60 hrs.

[35] PHMSA regulations define worst-case discharge as the largest foreseeable discharge of oil, including a discharge from fire or explosion, in adverse weather conditions. Pipeline operators must determine this volume for each response zone using the methodology described in 49 CFR 194.105.

[36] PHMSA regulations in Part 194 define a high-volume area as an area in which an oil pipeline having a nominal outside diameter of 20 inches or more crosses a major river or other navigable waters, which, because of the velocity of the river flow and vessel traffic on the river, would require a more rapid response to a worse-case discharge or substantial threat of such a discharge.

According to the plan, Marathon's local operations area emergency response team would provide Tier 1 response resources. For oil spill response operations that exceed the capabilities of the local emergency response team, personnel, and resources from throughout the operations region would provide Marathon's Tier 2 response. Tier 3 describes Marathon's corporate emergency response team (CERT) that it established to assure total corporate resources are available to manage major emergencies at any company location.

D7.2 Available Spill Response Resources

According to the facility response plan, Marathon company-owned response equipment was staged in trailers at Bridgeport, Il; Clairmont, IN; Griffith, IN; Patoka, Il; Martinsville, Il; and Wood River, Il. The response trailers contained 60 feet of sorbent boom, 600 feet of 6-inch skirted oil boom in 50-foot sections, and miscellaneous tools and personal protective equipment.

The area manager/IC told NTSB investigators he was aware Marathon had numerous pieces of response equipment staged in strategic locations within the operational area, which included boats and enclosed trailers loaded with tools and hundreds of feet of various oil boom. Among these were three response trailers staged at Marathon's Wood River station. According to the area manager/IC, Marathon inspects oil spill response equipment quarterly to verify it is consistent with resources listed in the facility response plan. He was also familiar with the equipment resources available through Marathon's primary OSROs and listed in the facility response plan for the local region, which included spill response trailers, vacuum trucks, tank trucks, and frac tanks. The area manager/IC stated that although company employees review the facility response plan content during training and exercises, he and other Marathon officials were familiar enough with the plan that it was not needed for reference during this actual response.

The plan also provided lists of regional company and expected OSRO response times. In the incident location operational area, the plan provided information for 9 OSROs (Table 8). The plan also provided evidence of contracted availability of these OSROs to deliver emergency response resources for oil discharges.

Table 8. Marathon facility response plan-identified operational area oil spill removal organizations and response times.

Martinsville Operational Area		
CLASSIFIED OSRO's		
Environmental Restoration LLC **Office Address:** 1666 Fabick Dr. St. Louis, MO 63026	Full Response Capabilities per U.S. Coast Guard Classification	2 hour(s)
***Clean Harbors Environmental Services, Inc. **Office Address:** 633 East 138th St. Dolton, IL 60419	Full Response Capability per U.S. Coast Guard Classification	3 hour(s)
E3 (Enhanced Environmental & Emergency) **Office Address:** 2525 Wayne Sullivan Drive Paducah, KY 42003	Full Response Capability per U.S. Coast Guard Classification	3 hour(s)
HEPACO (Evansville Area) **Office Address:** 5700 Prospect Dr. New burgh, IN 47630	Full Response Capabilities per U.S. Coast Guard Classification	3 hour(s)
NON-CLASSIFIED OSRO's		
Bolin Enterprises, Inc. **Office Address:** 506 NE 15th St. Casey, IL 62420	Small Spill - Boom, Skimmers, Vacuum Trucks, product storage.	1 hour(s)

COMPANY/CONTRACTOR	EQUIPMENT	RESPONSE TIME
SENCO **Office Address:** 1408 S Eaton St Robinson, IL 62454	Pumps, miscellaneous heavy equipment	2 hour(s)

Wood River Operational Area		
CLASSIFIED OSRO's		
Jarrett Industries **Office Address:** 1600 Madison Ave. South Roxanna, IL 62087	Full Response Capabilities per U.S. Coast Guard Classification	1 hour(s)
Environmental Restoration LLC **Office Address:** 1666 Fabick Dr. St. Louis, MO 63026	Full Response Capabilities per U.S. Coast Guard Classification	2 hour(s)
HEPACO **Office Address:** 2125 Glenview Dr. Evansville, IN 47720	Full Response Capability per U.S. Coast Guard Classification	3 hour(s)
***Clean Harbors Environmental Services, Inc. **Office Address:** 633 East 138th St. Dolton, IL 60419	Full Response Capability per U.S. Coast Guard Classification	5 hour(s)
E3 (Enhanced Environmental & Emergency) **Office Address:** 2525 Wayne Sullivan Drive Paducah, KY 42003	Full Response Capability per U.S. Coast Guard Classification	5 hour(s)

COMPANY/CONTRACTOR	EQUIPMENT	RESPONSE TIME
****Marine Pollution Control Corporation **Office Address:** 11320 E. Lakewood Blvd., #11 Holland, MI 49424	Full response capabilities per U.S. Coast Guard Classification	8 hour(s)
NON-CLASSIFIED OSRO's		
EnviroServe (Bodine) **Office Address:** 5350 E. Firehouse Rd. Decatur, IL 62521	Boom, pumps, skimmer, boat, storage, trucks	1 hour(s)
Bolin Enterprises, Inc. **Office Address:** 506 NE 15th St. Casey, IL 62420	Small Spill - Boom, Skimmers, Vacuum Trucks, product storage.	4 hour(s)

The area manager/IC stated that OSRO availability was prearranged by contract, such that Marathon incident commanders could contact them as needed. In response to this incident, it was not necessary for Marathon to negotiate terms with contractors while requesting emergency deployment of their resources.

D7.3 Training and Exercises

Prior to the incident, on August 17, 2021, Marathon conducted its most recent oil spill response equipment deployment exercise in the Marathon Wood River Area, in accordance with the National Preparedness for Response Exercise Program (PREP).[37] The exercise was intended to demonstrate the ability of the spill response organization to contain the discharge at the source or in various locations for recovery operations. This exercise involved 11 local area personnel. The Marathon team deployed 100 feet of hard oil boom, 75 feet of sorbent boom, and reviewed access locations for vacuum trucks and the use of drum skimmers.

Marathon also participated in triennial full-scale PREP drills. During each cycle, all components of the facility response plan were exercised. The exercises tested the notification procedures identified in the Area Contingency Plan and the pipeline facility response plan.[38] The exercises also demonstrated staff mobilization and the ability to assemble a spill response organization.

Among the general training topics provided to 34 Marathon area staff are the following:

- Hazwoper Technician,
- Benzene Awareness,
- Hydrogen Sulfide Awareness,
- HVL Awareness,
- Hazard Identification,
- Hazard Communications,
- Incident Command System and Response Management,

[37] The PREP Guidelines were developed to provide minimum requirements for ensuring adequate response preparedness and to provide an opportunity for response plan holders to continually identify deficiencies and improve their response plans.

[38] *Region 5 Regional Contingency Plan / Inland Zone Area Contingency Plan*.

- Personal Protective Equipment Awareness,
- Monitoring Equipment and Methods,
- Marathon Pipe Line Response Plan,
- DOT Emergency Response Drills,
- DOT Annual Emergency Response Review Summary,
- Emergency Action Plan,
- Hazardous Material Training.

In October 2019, Marathon (including the area manager/IC) participated in and successfully passed a government-initiated unannounced exercise (GIUE).[39] In connection with the GIUE, Marathon reviewed its contracted OSRO resources to ensure they were readily available on-call as needed.

The area manager/IC told NTSB investigators that the March 11 incident was the largest oil release that he has managed. However, annual PREP exercises that included several oil boom deployments in Cahokia Creek, familiarized local Marathon staff with accessible booming sites along the creek. The area manager/IC added that these exercises have also familiarized Marathon staff with local water bodies that could be impacted by a release.

D.8 Cahokia Creek Hydrologic Conditions

According to U.S. Geological Survey (USGS) data, Cahokia Creek has a drainage basin of 212 square miles at the incident location.[40] The USGS maintains a stream gage on Cahokia Creek, identified as monitoring location 05587900, on the upstream side of the bridge at State Highway 143 in Edwardsville, Illinois (Stream mile 9.4), 38°49'28"N, 89°58'29"W. The gage datum is 425.62 feet above NGVD 29.[41]

Figures 19 and 20 show that on March 7, 2022, at 08:00, Cahokia Creek experienced an elevated stage event of 13.97 ft. (439.59 ft. above NGVD 29), and an elevated streamflow event of 4,110 ft^3/s.[42] The mean creek stage for the date of the incident was about 4.1 ft. and mean streamflow was about 75 ft^3/s.

[39] A Government Initiated Unannounced Exercise (GIUE) is a preparedness verification function that EPA, USCG, BSEE, and PHMSA employs to witness and evaluate, on a no-notice basis, a plan holder's capabilities to use public and private equipment, resources, and staff to respond to a hypothetical oil spill. An interagency exercise team is formed, and a plan holder is selected for GIUEs according to many factors, such as participation in previous exercises, previous performance, facility incident history, and current industry trends. At the conclusion of the exercise, the GIUE team determines whether the plan holder's performance was satisfactory or unsatisfactory. Any facility that satisfactorily completes a GIUE is not required to participate in another for at least 36 months.

[40] *Surface Water Daily Data for the Nation,* U.S. Department of the Interior, U.S. Geological Survey. See https://waterdata.usgs.gov/nwis/uv?05587900, accessed on May 17, 2022.

[41] Vertical datums are a surface of zero elevation to which heights of various points are referenced as defined by the National Geodetic Survey. The National Geodetic Vertical Datum of 1929 (NGVD 29) is a vertical control datum in the United States by the general adjustment of 1929. In 1992, it was superseded by the North American Vertical Datum of 1988 (NAVD 88).

[42] At the time of this report, the Cahokia Creek stage and streamflow data provided for March 2022 is provisional and subject to change.

Near the time of the pipeline breach incident on March 11, 2022, 08:15, the creek stage was 4.46 ft. and trending downward, reaching mean water level on March 12, 12:30. The stream flow at the time of the incident was 242 ft^3/s and trending downward.

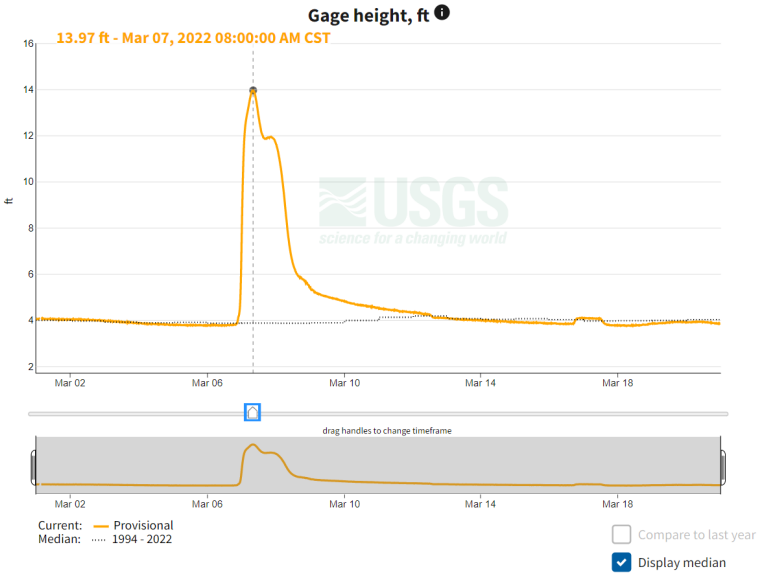

Figure 19. Cahokia Creek at Edwardsville, IL gage height data, March 1 – 20, 2022, near incident location. Source: USGS station 05587900.

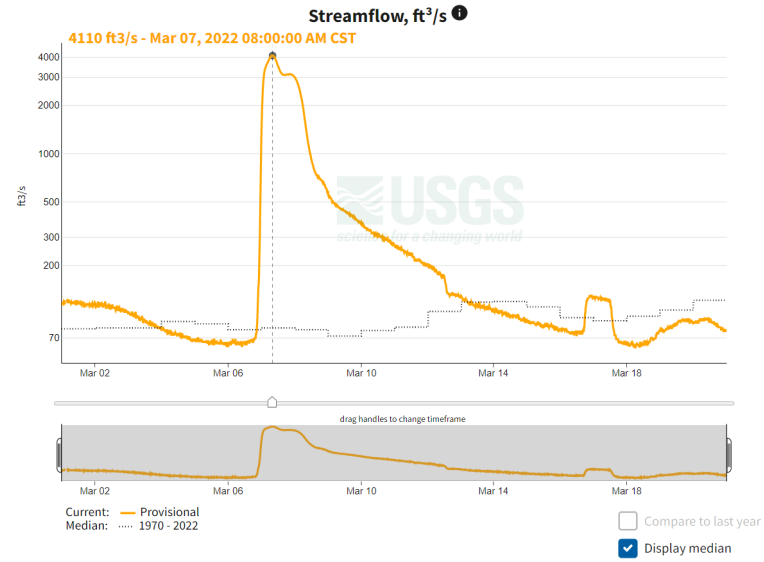

Figure 20. Cahokia Creek at Edwardsville, IL streamflow data, March 1-20, 2022, near incident location. Source: USGS station 05587900.

Submitted by:

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Appendix A
Chronology of Oil Spill Response Events, March 11, 2022

Time (CST)	Event	Source
08:15:21	Roxana – discharge pressure value – rate of change – Low	Marathon timeline of events
08:15:21	Roxana Unit 3 – change to state Off -low suction shut down	Marathon timeline of events
08:19:27	Roxana Unit 2 – change state to Off	Marathon timeline of events
08:19:27	Wood River Unit 9 – change state to Off	Marathon timeline of events
08:20:11	Wood River Booster 8 – change state to Off	Marathon timeline of events
08:22:00	Roxana Valve IN1 Closed	Marathon timeline of events
08:22:15	Meter counts stop	Marathon timeline of events
08:23:18	Patoka Valve HG1 Closed	Marathon timeline of events
08:40 – 08:45	Marathon area manager/incident commander (IC) notified of Woodpat pipeline shut down and possible leak indication. Marathon personnel were investigating. Release point suspected in a 2-mile section between Wood River IL and Roxana IL. Area manager/IC contacted operations center supervisor who advised that modeling suggested a release had occurred.	Marathon area manager/IC interview, p.8-9
Aft. 08:45	Marathon area manager/IC dispatched from home and joined other Marathon personnel engaged in search for incident location.	Marathon area manager/IC interview, p.9
09:35	Marathon dispatches field personnel to close Equilon BV and Grant Fork BV valves.	Marathon timeline of events
09:50 – 10:00	Marathon area manager I/C discovered crude oil release site, observed puddle of oil, earth blowout, and oil discharge to Cahokia Creek. Confirmed no hazardous atmosphere in the vicinity and no oil actively flowing from the surface blowout. Notified other Marathon officials and response personnel there was crude oil on Cahokia Creek that was flowing west toward Mississippi River. Additional Marathon crews dispatched. Area manager/IC directed Wood River operations supervisor to contact OSROs for oil spill response. Dispatched initial resources to release point and to known access points at Wanda Road the Republic Landfill. Booming operations and ramp-up of resources occurred throughout the day.	NRC#1330806, Marathon area manager/IC interview, p. 10-12, 15, 43.
Abt. 10:00	Marathon area manager/IC met Edwardsville FD chief and assistant chief on site, confirmed release source and that Marathon is the responsible party. Learned that resident had made an odor complaint.	Marathon area manager/IC interview, p. 12-13.
10:07	Grant Fork BV (MP 28.80 closed by field.	Marathon timeline of events
10:15	National Response Center report, release of 3,000 barrels of crude oil from underground transmission pipeline due to equipment failure discovered at 9:50 AM local time. Impacted Cahokia Creek. Boom has been placed. No injuries.	NRC#1330806
10:15 – 10:30	Marathon construction and maintenance crews arrived on site.	Marathon area manager/IC interview, p.15.

Bef. 10:50	Responding to local fire and police department communications, Phillips 66 Refinery placed oil boom across Cahokia Creek at Wanda Road. Marathon response trailer also arrived at that time.	Marathon area manager/IC interview, p.46.
10:50 – 12:00	OSRO Jarrett Industries installed oil boom at Old Alton Edwardsville Road bridge, vacuum truck on site bef. 12:00. Marathon placed oil boom at Wanda Road, Oldenburg Road, Republic Landfill, and Highway 3 near the Lewis and Clark Tower.	Marathon area manager/IC interview, p.44-45.
11:00 – 12:00	Marathon safety officers arrived on site with air monitoring equipment. Air monitoring was conducted for worker safety, as well as perimeter monitoring. No actionable levels of benzene were detected.	Marathon area manager/IC interview, p.37.
Abt. 12:00	Marathon teams installing oil boom at Republic Landfill reported having placed oil boom just as leading edge of the spill arrived.	Marathon area manager/IC interview, p. 14.
Abt. 12:00	Incident command post established at release site. Area manager/IC briefed Marathon headquarters.	Marathon area manager/IC interview, p. 13-14.
Abt. 12:00	EPA OSC arrived on scene, met with Marathon I/C, IEPA, and Edwardsville fire chief. Marathon advised pipeline was shut down and line was blocked. Observed oil discharging from source area to Cahokia Creek. Observed oil boom site at Old Alton Edwardsville Road bridge.	EPA OSC interview
14:30-15:00	EPA OSC, IEPA, Marathon observed Wanda Road bridge containment site, 5.0 miles downstream. No oil in creek at that time.	EPA OSC interview
16:30	The alternate Marathon incident commander arrived on scene. Marathon crews engaged in building access road to source area.	Marathon area manager/IC interview, p. 13-
17:30	Estimated 40 persons on site responding to the oil spill.	Marathon area manager/IC interview, p.44.
bef. 18:00	Oil was entering Wanda Road booming site.	EPA OSC interview
18:00	First incident command meeting.	Marathon area manager interview, p. 13, 65.
20:30	EPA START contractor on scene to begin air monitoring.	EPA OSC interview
22:00	Heavy oiling observed in creek at Old Alton Edwardsville Road and Wanda Road booming sites.	EPA OSC interview

Appendix B
List of Attachments

ATTACHMENT 1 – ENVIRONMENTAL PROTECTION AGENCY NOTICE OF FEDERAL INTEREST, MARCH 12, 2022
ATTACHMENT 2 – ENVIRONMENTAL PROTECTION AGENCY POLLUTION REPORT (POLEP) #1, MARCH 12, 2022
ATTACHMENT 3 – ENVIRONMENTAL PROTECTION AGENCY POLLUTION REPORT (POLEP) #9, MAY 13, 2022
ATTACHMENT 4 – SOLID WASTE MANAGEMENT PLAN, EDWARDSVILLE RESPONSE, MARCH 2022
ATTACHMENT 5 – SHORELINE CLEANUP AND ASSESSMENT TECHNIQUES (SCAT) PLAN, MARCH 2022
ATTACHMENT 6– PIPELINE CORRIDOR SOIL SAMPLING PLAN, ANTEA GROUP, EDWARDSVILLE RESPONSE
ATTACHMENT 7 – EPA AIR MONITORING AND SAMPLING PLAN, TETRA TECH, MARCH 14, 2022
ATTACHMENT 8 – PRIVATE WELL WATER SAMPLING PLAN, EDWARDSVILLE RESPONSE, MARCH 2022
ATTACHMENT 9 – PRIVATE DRINKING WATER SAMPLE RESULTS, PACE ANALYTICAL, MARCH 23, 2022
ATTACHMENT 10 – WATER SAMPLING PLAN, ANTEA GROUP, MARCH 15, 2022
ATTACHMENT 11– ANALYTICAL RESULTS SUMMARY FOR SURFACE WATER SAMPLES, MARCH 15, 2022
ATTACHMENT 12 – SITE SAFETY AND AIR MONITORING WORK PLAN, EDWARDSVILLE RESPONSE, MARCH 11, 2022
ATTACHMENT 13 – EPA AIR MONITORING SUMMARY TABLES, MARCH 12 – 15, 2022
ATTACHMENT 14 – WILDLIFE MANAGEMENT PLAN, GEOSYNTEC CONSULTANTS, EDWARDSVILLE RESPONSE, MARCH 12, 2022
ATTACHMENT 15 – MARATHON PETROLEUM CRUDE OIL SAFETY DATA SHEET, DECEMBER 28, 2021
ATTACHMENT 16 – SEDIMENT ASSESSMENT POLING PLAN AND RESULTS, ANTEA GROUP, MARCH 20, 2022, AND JUNE 16, 2022
ATTACHMENT 17 – TRANSITION PLAN, EDWARDSVILLE RESPONSE, MARCH 19, 2022
ATTACHMENT 18 – IMPACTED WILDLIFE DISPOSITION, MARCH 2022
ATTACHMENT 19 – UPDATED OIL SPILL REMOVAL METRICS