

State of Colorado
Energy & Carbon Management Commission1120 Lincoln Street, Suite 801, Denver, Colorado 80203
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Receive Date:

Report taken by:

Site Investigation and Remediation Workplan (Supplemental Form)

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. However, this shall not preclude the Operator from taking immediate action to protect public health or safety, the environment, wildlife, or livestock.

This Form 27 describes site conditions as currently understood by the Operator; approval of this Form 27 by ECMC is based on the site conditions accurately described herein; any changes in site conditions identified during or subsequent to the performance of the approved workplan may necessitate additional investigation or remediation which shall be described on a supplemental Form 27. This Form 27 is intended to provide basic information regarding the proposed site investigation and remediation actions, but the workplan may be more fully described in attached documentation.

Closure request is not available for an Initial Site Investigation and Remediation Workplan.

OPERATOR INFORMATION

Name of Operator: PDC ENERGY INC	Operator No: 69175	Phone Numbers
Address: 1099 18TH STREET SUITE 1500		Phone: (303) 860-5800
City: DENVER	State: CO	Zip: 80202
Contact Person: Karen Olson	Email: taspillremediationcontractor@pdce.com	Mobile: ()

PROJECT, PURPOSE & SITE INFORMATION

PROJECT INFORMATION

Remediation Project #: 31424 Initial Form 27 Document #: 403480268

PURPOSE INFORMATION

- ☐ Rule 913.c.(1): Pit or Cuttings Trench closure.
- ☒ Rule 913.c.(2): Buried or partially buried vessel closure, which will be by removal.
- ☒ Rule 913.c.(3): Remediation of Spill and Releases pursuant to Rule 912.
- ☐ Rule 913.c.(4): Land treatment of Oily Waste pursuant to Rule 905.e.
- ☐ Rule 913.c.(5): Closure of Centralized E&P Waste Management Facilities pursuant to Rule 907.h.
- ☐ Rule 913.c.(6): Remediation of impacted Groundwater pursuant to Rule 915.e.(3).D, and the contaminant concentrations in Table 915-1.
- ☐ Rule 913.c.(7): Investigation and remediation of natural gas in soil or Groundwater.
- ☐ Rule 913.c.(8): When requested by the Director due to any potential risk to soil, Groundwater, or surface water.
- ☒ Rule 913.c.(9): Decommissioning of Oil and Gas Facilities.
- ☐ Rule 913.g: Changes of Operator.
- ☐ Rule 915.b: Request to leave elevated inorganics in situ.
- ☐ Other:

SITE INFORMATION

Yes Multiple Facilities

Facility Type: LOCATION	Facility ID: 311389	API #:	County Name: WELD
Facility Name: IKENOUYE-65N65W 29NWSE	Latitude: 40.367400	Longitude: -104.682790	
** correct Lat/Long if needed: Latitude: 40.367708		Longitude: -104.682225	
QtrQtr: NWSE	Sec: 29	Twp: 5N	Range: 65W Meridian: 6 Sensitive Area? Yes

Facility Type: SPILL OR RELEASE	Facility ID: 485551	API #:	County Name: WELD
Facility Name: Ikenouye F 29-22,23 Tank Battery	Latitude: 40.367910	Longitude: -104.682303	
** correct Lat/Long if needed: Latitude:		Longitude:	
QtrQtr: NWSE	Sec: 29	Twp: 5N	Range: 65W Meridian: 6 Sensitive Area? Yes

Facility Type: <u>SPILL OR RELEASE</u>		Facility ID: <u>485684</u>		API #: _____		County Name: <u>WELD</u>	
Facility Name: <u>C-AST IkenouyeF29-22,23Tank Battery</u>				Latitude: <u>40.367825</u>		Longitude: <u>-104.682188</u>	
** correct Lat/Long if needed: Latitude: _____				Longitude: _____			
QtrQtr: <u>NWSE</u>	Sec: <u>29</u>	Twp: <u>5N</u>	Range: <u>65W</u>	Meridian: <u>6</u>	Sensitive Area? <u>Yes</u>		

Facility Type: <u>SPILL OR RELEASE</u>		Facility ID: <u>485685</u>		API #: _____		County Name: <u>WELD</u>	
Facility Name: <u>S-AST IkenouyeF29-22,23Tank Battery</u>				Latitude: <u>40.367777</u>		Longitude: <u>-104.682182</u>	
** correct Lat/Long if needed: Latitude: _____				Longitude: _____			
QtrQtr: <u>NWSE</u>	Sec: <u>29</u>	Twp: <u>5N</u>	Range: <u>65W</u>	Meridian: <u>6</u>	Sensitive Area? <u>Yes</u>		

SITE CONDITIONS

General soil type - USCS Classifications <u>SM</u>	Most Sensitive Adjacent Land Use <u>Agricultural</u>
Is domestic water well within 1/4 mile? <u>Yes</u>	Is surface water within 1/4 mile? <u>Yes</u>
Is groundwater less than 20 feet below ground surface? <u>Yes</u>	

Other Potential Receptors within 1/4 mile

Nearest Well: Domestic - 1,273' SSW; Surface Water: South Platte River - 272' NW; Occupied Building: 1,165' S; Livestock: 745' S; FWS Wetlands: 192' W Forest/Shrub Riparian (Rp1FO); HPH Sensitive Wildlife Habitat: Rule 1202.c: Site Within Aquatic Native Species Conservation Area; Rule 1202.c: 443' NW - Aquatic Sportfish Management Waters; Rule 1202.d: Tank Battery Within Mule Deer Severe Winter Range; Rule 1202.d: Tank Battery Within Mule Deer Winter Concentration Area; Tank Battery Within 100-Year Floodplain.

SITE INVESTIGATION PLAN

TYPE OF WASTE:

- ☒ E&P Waste ☐ Other E&P Waste ☐ Non-E&P Waste
- ☒ Produced Water ☐ Workover Fluids
- ☒ Oil ☐ Tank Bottoms
- ☒ Condensate ☐ Pigging Waste
- ☐ Drilling Fluids ☐ Rig Wash
- ☐ Drill Cuttings ☐ Spent Filters
- ☐ Pit Bottoms
- ☐ Other (as described by EPA)

DESCRIPTION OF IMPACT

Impacted?	Impacted Media	Extent of Impact	How Determined
Yes	GROUNDWATER	Refer to Table 5 & Figure 1&2	Confirmation Groundwater Sampling
Yes	SOILS	Refer to Tables 1-4 & Figure 1&2	Confirmation Soil Sampling

INITIAL ACTION SUMMARY

Description of initial action or emergency response measures take to abate, investigate, and/or remediate impacts associated with E&P Waste.

On October 30, 2023, field screening and confirmation soil sampling activities were conducted in accordance with the ECMC Rule 911 during the decommissioning of the Ikenouye F29-22, 23 tank battery (Figure 1). On October 31, 2023, it was determined that a historic release was discovered when visually impacted soils were observed in contact with groundwater at the produced water vaults (PWVs) and reported on under ECMC Spill/Release Point ID 485551. Two additional historical releases were discovered on November 10, 2023, upon receipt of final analytical results. The first release was discovered below the center above ground storage tank (AST02, Spill/Release Point ID 485684). The second release was discovered below the southern AST (AST03, Spill/Release Point ID 485685). Following the discovery of the releases, mitigation activities were initiated. Excavation activities are ongoing and total volumes of soil and groundwater removed during mitigation activities will be included in a forthcoming Supplemental Form 27.

PROPOSED SAMPLING PLAN

Proposed Soil Sampling

- ☒ Will soil samples be collected as part of this investigation? (Number, type (grab/composite), analyses, and locations of samples):

On October 31, 2023, one soil sample (WC01) was collected from the PWV source area at approximately 4 feet below ground surface (bgs). The sample was submitted for laboratory analysis of the full ECMC Table 915-1 analytical suite. Analytical results indicated that site specific COCs include: benzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene, total petroleum hydrocarbons (TPH[C6-C36]), 1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, 1-methylnaphthalene (M), & 2-M.

Proposed Groundwater Sampling

- ☒ Will groundwater samples be collected as part of this investigation? (Number, analyses, and locations of samples):

On October 31, 2023, groundwater was encountered at approximately 6.5 feet bgs in the PWV excavation. Consequently, one groundwater sample (GW01) was collected from the excavation and submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-TMB, and 1,3,5-TMB. Analytical results indicated that benzene, ethylbenzene, xylene, 1,2,4-TMB, & 1,3,5-TMB were in exceedance of the applicable ECMC Table 915-1 standards. The groundwater sample location is illustrated on Figure 1 and the analytical results are summarized on Table 5.

Proposed Surface Water Sampling

- ☐ Will surface water samples be collected as part of this investigation? (Number, analyses, and locations of samples):

Additional Investigative Actions

- ☐ Additional alternative investigative actions described in attached Site Investigation Plan (summary):

During initial closure activities conducted on October 30, 2023, soil encountered on-site and below production equipment was visually inspected and field screened for volatile organic compound (VOC) concentrations using a photoionization detector (PID). Per the approved proposed sampling plan, samples were collected below and/or adjacent to the above ground storage tanks (ASTs), separator flowlines, & separator dump lines (SEP01-FL, SEP02-FL, SEP01-DL, & SEP02-DL), and submitted for analysis of Table 915-1 Organic Compounds in Soil and TPH (C6-C36). Soil samples SEP01-FL, SEP02-FL, SEP01-DL, & SEP02-DL were submitted for additional laboratory analysis of pH, EC, SAR, & boron. Additionally, field screened grab soil samples were collected below the emission control devices (ECDs) and meter-house (MH). Analytical results indicated that soil samples were in compliance with the applicable standards, except for the previously mentioned reportable releases in soil samples AST02 & AST03.

SITE INVESTIGATION REPORT

SAMPLE SUMMARY

Soil

Number of soil samples collected 89

Number of soil samples exceeding 915-1 12

Was the areal and vertical extent of soil contamination delineated? Yes

Approximate areal extent (square feet) 5400

NA / ND

-- Highest concentration of TPH (mg/kg) 2160

-- Highest concentration of SAR 0.765

BTEX > 915-1 Yes

Vertical Extent > 915-1 (in feet) 6

Groundwater

Number of groundwater samples collected 1

Was extent of groundwater contaminated delineated? No

Depth to groundwater (below ground surface, in feet) 7

Number of groundwater monitoring wells installed 0

Number of groundwater samples exceeding 915-1 1

-- Highest concentration of Benzene (µg/l) 670

-- Highest concentration of Toluene (µg/l) 11

-- Highest concentration of Ethylbenzene (µg/l) 6300

-- Highest concentration of Xylene (µg/l) 54000

NA Highest concentration of Methane (mg/l)

Surface Water

0 Number of surface water samples collected

Number of surface water samples exceeding 915-1

If surface water is impacted, other agency notification may be required.

OTHER INVESTIGATION INFORMATION

☐ Were impacts to adjacent property or offsite impacts identified?

☒ Were background samples collected as part of this site investigation?

On October 30, 2023, two background soil samples (BKG01 @ 2.5' and BKG01 @ 4') were collected from native material topographically up-gradient of the tank battery location and submitted for laboratory analysis of ECMC Table 915-1 Metals and SAR. Analytical results indicated that arsenic, barium, cadmium, copper, lead, selenium, & silver were observed in exceedance of the applicable regulatory standards in native material.

In addition, on January 11, 2024, two background soil boring (BKG01 & BKG02) were advanced within native material topographically up-gradient of the tank battery location with soil samples being collected from each soil boring at approximately 2.5 feet, 4 feet, 6 feet, and 7 feet bgs. Background soil samples were submitted for laboratory analysis of pH. Analytical results indicated that pH was observed in exceedance of the applicable regulatory standards in native material.

☒ Was investigation derived waste (IDW) generated as part of this investigation?

Volume of solid waste (cubic yards) 2727

Volume of liquid waste (barrels) 4930

☒ Is further site investigation required?

Based on the final analytical results, eleven (11) groundwater monitoring wells will be installed via direct-push drilling methods to confirm the absence of dissolved-phase hydrocarbon impacts within and surrounding the former Ikenouye F29-22, 23 Tank Battery excavation extent.

Volatile organic compound (VOC) concentrations using a photoionization detector (PID) and lithologic descriptions will be recorded for each borehole. If elevated VOC concentrations are encountered during the investigation, a sample will be collected from the interval exhibiting the highest VOC concentration from the borehole and submitted for laboratory analysis of the full Table 915-1 suite. Proposed monitoring well locations are illustrated on Figure 3.

REMEDIAL ACTION PLAN

Does this Supplemental Form 27A include changes to a previously approved Remedial Action Plan? No

SOURCE REMOVAL SUMMARY

Describe how source is to be removed.

Between October 31, 2023 & March 11, 2024, approximately 2,727 cubic yards (CY) of impacted material were removed from the Ikenouye F29-22, 23 Tank Battery and transported to the North Weld Waste Management landfill for disposal under PDC waste manifests. Additionally, groundwater vacuum recovery was conducted concurrent with excavation activities and approximately 4,930 barrels (BBLs) of groundwater were removed from the Ikenouye F29-22, 23 Tank Battery excavation and transported to NGL C3 for disposal under PDC waste manifests.

REMEDIATION SUMMARY

Describe how remediation of existing impacts to soil and groundwater is to be accomplished (i.e. summarize remedial action plan). Provide a brief narrative description including: technical justification, schedule for implementation, estimated time to attain NFA status, plus plans and specifications for the selected remedial action technology.

Between October 30 & November 10, 2023, three historic releases were discovered following discovery of impacts in contact with groundwater and receipt of final analytical results from soil samples collected during decommissioning activities at the Ikenouye F29-22,23 tank battery, respectively. Soil sample (WC01) was collected at approximately 4 feet bgs and was submitted for laboratory analysis of the full Table 915-1 analytical suite. Soil samples AST02 & AST03 were collected at approximately 0-6 inches bgs below the central and southern above ground storage tanks, respectively, and submitted for Table 915-1 Organic Compounds in Soil and TPH (C6-C36). Analytical results indicated that organic compound concentrations were in exceedance of the applicable standards in the following:

WC01 @ 4': benzene, ethylbenzene, xylene, 1,2,4-TMB, 1,3,5-TMB, naphthalene, TPH (C6-C36), 1-M, & 2-M.
AST02 @ 0-6": 1-M
AST03 @ 0-6": 1,3,5-TMB

Between October 31, 2023 & March 11, 2024, excavation activities were conducted and seventy-seven (77) soil samples (SS01-SS20, SS22, SS23, SS25-SS43, SS45, SS46, & SS48-SS81) were collected from the base and sidewalls of the final excavation extent at depths ranging between 6 inches and 7 feet bgs and were submitted for laboratory analysis of the previously mentioned COCs. Based off of potential comingling of spills, soil samples SS31-SS43, SS45, SS46, & SS48-SS81 were submitted for additional analysis of the Table 915-1 PAH suite, to mitigate hydrocarbon impacts. Analytical results indicated benzantracene exceedances were observed in soil samples SS31, SS34, SS41, SS45, SS53, SS63, SS66, SS70, & SS74. Soil samples SS21, SS24, SS44, & SS47 were collected at 2.5 feet bgs and submitted for laboratory analysis of pH, EC, SAR, & boron. Analytical results indicated that constituent concentrations were below the ECOM Table 915-1 standards or applicable background concentrations in all samples collected from the final excavation extent.

Soil Remediation Summary

☐ In Situ

Bioremediation (or enhanced bioremediation)

Chemical oxidation

Air sparge / Soil vapor extraction

Natural Attenuation

Other

☒ Ex Situ

Yes

Excavate and offsite disposal

If Yes: Estimated Volume (Cubic Yards) 2727

Name of Licensed Disposal Facility or COGCC Facility ID #

Excavate and onsite remediation

Land Treatment

Bioremediation (or enhanced bioremediation)

Chemical oxidation

Other

Groundwater Remediation Summary

Bioremediation (or enhanced bioremediation)

Chemical oxidation

Air sparge / Soil vapor extraction

Natural Attenuation

Other

GROUNDWATER MONITORING

If groundwater has been impacted, describe proposed monitoring plan, including # of wells or sample points, monitoring schedule, analytical methods, points of compliance. Attach a groundwater monitoring location diagram.

Based on the analytical data collected during decommissioning and source mass removal activities, PDC will conduct quarterly groundwater monitoring at the 11 proposed monitoring wells until closure criteria are met. Groundwater samples will be submitted for laboratory analysis of BTEX, naphthalene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene by EPA Method 8260, chloride and sulfate anions by EPA Method 300.0, and total dissolved solids (TDS) by Method SM 2540C in accordance with Table 915-1.

REMEDIATION PROGRESS UPDATE

PERIODIC REPORTING

Approved Reporting Schedule:

☒ Quarterly☐ Semi-Annually☐ Annually☒ Other

Confirmation Sampling Summary, Analyte Reduction Request, Supplemental Site Investigation Proposal

☐ Request Alternative Reporting Schedule:

☐ Semi-Annually☐ Annually☐ Other

Rule 913.e:

After initial approval of a Form 27, the Operator will provide quarterly update reports in a Supplemental Form 27 to document progress of site investigation and remediation, unless an alternative reporting schedule has been requested by the Operator and approved by the Director. The Director may request a more frequent reporting schedule based on site-specific conditions.

Report Type:

☐ Groundwater Monitoring☐ Land Treatment Progress Report☐ O&M Report

☒ Other Confirmation Sampling Summary, Analyte Reduction Request, Supplemental Site Investigation Proposal

Adequacy of Operator's General Liability Insurance and Financial Assurance

Describe the adequacy of the Operator's general liability insurance and Financial Assurance to fully address the anticipated costs of Remediation, including the estimated remaining cost for this project (below).

If this information has been provided on a Form 27 within the last 12 months, provide the Document Number of that form.

Operator does not have site-specific financial assurance for this project; however, Operator has inactive well, blanket, and surface bonding including Surety IDs 106077122, 106473808, and 106473820, as well as commercial general liability and/or umbrella/excess insurance meeting the requirements of Rule 705.b. Operator does not anticipate making an insurance claim for this project.

-Facility and infrastructure were decommissioned and the location will be reclaimed in accordance with the ECMC 1000 Series.
-Source mass removal has been completed.
-Investigation and delineation for organics and inorganics has been completed in soil.
-Groundwater monitoring wells will be installed and monitored for natural attenuation.

Costs included herein are estimates only and may change over time based on numerous factors. Accordingly, Operator makes no guarantees as to the accuracy of such cost estimates, thus providing an estimate for the next year below.

Operator anticipates the remaining cost for this project to be: \$ 50000

WASTE DISPOSAL INFORMATION

Was E&P waste generated as part of this remediation? Yes

Describe beneficial use, if any, of E&P Waste derived from this remediation project:

No beneficial use.

Volume of E&P Waste (solid) in cubic yards 2727

E&P waste (solid) description Hydrocarbon Impacted Soils

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: North Weld Waste Management Facility

Volume of E&P Waste (liquid) in barrels 4930

E&P waste (liquid) description Hydrocarbon Impacted Groundwater

ECMC Disposal Facility ID #, if applicable:

Non-ECMC Disposal Facility: NGL C3

REMEDIATION COMPLETION REPORT

REMEDIATION COMPLETION SUMMARY

Is this a Final Closure Request for this Remediation Project? No

If YES:

☐ Compliant with Rule 913.h.(1).

☐

Compliant with Rule 913.h.(2).

☐ Compliant with Rule 913.h.(3).

Do all soils meet Table 915-1 standards? _____

Does the previous reply indicate consideration of background concentrations? _____

Does Groundwater meet Table 915-1 standards? _____

Is additional groundwater monitoring to be conducted? _____

Operator shall comply with the ECMC 1000-Series Reclamation Requirements for all impacted and disturbed areas.

RECLAMATION PLAN

RECLAMATION PLANNING

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing.

Following tank battery decommissioning & source mass removal activities, the location was backfilled, compacted, and re-contoured to match pre-existing conditions. The location will be reclaimed in accordance with the ECMC 1000 series.

Is the described reclamation complete? Yes _____

Does the reclamation described herein constitute interim or final reclamation of the Oil and Gas Location?

☒ Interim ☐ Final

Did the Surface Owner provide the seed mix? _____

If YES, does the seed mix comply with local soil conservation district recommendations? _____

Did the local soil conservation district provide the seed mix? _____

SITE RECLAMATION DATES

Proposed date of commencement of Reclamation. 10/30/2023

Proposed date of completion of Reclamation. 10/30/2028

IMPLEMENTATION SCHEDULE

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

PRIOR DATES

Date of Surface Owner notification/consultation, if required. 07/05/2023

Actual Spill or Release date, or date of discovery. 10/31/2023

SITE INVESTIGATION DATES

Date of Initial Actions described in Site Investigation Plan (start date). 08/18/2023

Proposed site investigation commencement. 04/01/2024

Proposed completion of site investigation. 12/31/2024

REMEDIAL ACTION DATES

Proposed start date of Remediation. 10/30/2023

Proposed date of completion of Remediation. 10/30/2028

Per Rule 913.d.(2): Any change from the approved implementation schedule will be requested at least 14 days in advance, and the Operator may not make the change without the Director's approval.

☒ Change from approved implementation schedule per Rule 913.d.(2).

Basis for change in implementation schedule:

Based on soil analytical results received for samples collected during decommissioning and source mass removal activities, supplemental site investigation activities are needed to install monitoring wells and establish a groundwater monitoring network. Supplemental site investigation activities are proposed to be completed by the end of the fourth quarter 2024.

OPERATOR COMMENT

Based on analytical results for the waste characterization sample WC01 collected from the produced water vessel source area, indicate that the COCs for the historic release discovered at the Ikenouye F29-22, 23 tank battery location be reduced to the following: BTEX, naphthalene,1,2,4-TMB, 1,3,5-TMB, TPH (C6-C36), 1-M, & 2-M. In addition to the waste characterization sample, benzantrhacene was observed in exceedance of the ECMC Table 915-1 standards in nine soil sample locations that were subsequently excavated with the impacted soil being removed. As such, PDC requests that benzantrhacene be added to the list of COC even though it was not present in the waste characterization sample. As such, PDC is requesting that the COCs for the historic release discovered at the Ikenouye F29-22, 23 tank battery location be reduced to the following: BTEX, naphthalene,1,2,4-TMB, 1,3,5-TMB, TPH (C6-C36), benzantrhacene, 1-M, & 2-M.

Following the approval of this form and landowner approval, PDC will install and conduct quarterly groundwater monitoring at the 11 proposed monitoring wells at the Ikenouye F29-22, 23 tank battery until closure criteria are met.

Supplemental Form 27s will be prepared and submitted on a quarterly schedule to provide updates and progress of the remediation until closure criteria has been achieved.

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: Karen Olson

Title: Remediation Advisor

Submit Date: _____

Email: taspillremediationcontractor@pdce.com

Based on the information provided herein, this Application for Site Investigation and Remediation Workplan complies with ECMC Rules and applicable orders and is hereby approved.

ECMC Approved: _____

Date: _____

Remediation Project Number: 31424

COA Type

Description

0 COA	

Attachment Check List

Upon approval, the approved Form 27 and all listed attachments will be indexed to the Remediation Project file. Only the approved Form 27 will also be indexed to the related Facilities.

Att Doc Num

Name

403731988	SOIL SAMPLE LOCATION MAP
403731995	SITE INVESTIGATION PLAN
403732001	PHOTO DOCUMENTATION
403735293	SOIL SAMPLE LOCATION MAP
403735296	ANALYTICAL RESULTS

Total Attach: 5 Files

General Comments

User Group

Comment

Comment Date

		Stamp Upon Approval
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Total: 0 comment(s)