



Ohio Department of Natural Resources

MIKE DEWINE, GOVERNOR

MARY MERTZ, DIRECTOR

Eric Vendel, Chief

Division of Oil and Gas Resources Management
2045 Morse Rd, Building F-2
Columbus, Ohio 43229
Phone: (614) 265-6922; Fax: (614) 265-6910

August 7, 2020

Chief's Order 2020-214

09/22/2020

Dave Mansbery
Duck Creek Energy, Inc.
7033 Mill Road
Brecksville, OH 44141

RAD-2020-068

RE: Duck Creek Energy Inc., Radiation Protection Plan dated May 27, 2020.
Summit County; Chief's Order 2016-452 & Cuyahoga County; Chief's Order TBD

Mr. Mansbery,

The Division of Oil and Gas Resources Management (DOGRM) received your Radiation Protection Plan (RPP) amendments on July 22nd and August 5, 2020. DOGRM Radiation Safety Section (RSS) staff has completed a review of your RPP with amendments and find the plan to be acceptable.

The RPP is approved for immediate implementation at the Mogadore facility in Summit County. Accordingly, all commitments stated within the approved RPP are now conditions of your Chief's Order 2016-452.

The RPP is also approved for the Cleveland facility in Cuyahoga County and you can begin implementation of it at this time if you choose to. But at a minimum, implementation of the RPP shall begin immediately after the Division issues the Chief's order for the Cleveland facility.

If you have any questions, please contact me though the email or cell number found below.

Sincerely,

A handwritten signature in black ink that reads "Robert Leidy".

Robert Leidy, R.T.
Senior Health Physicist
Division of Oil and Gas Resources Management
C: (330) 812-9130
Robert.Leidy@dnr.state.oh.us

cf: B. Squibb, RSO, Solutient Technologies
C. McCracken, Manager, Radiation Safety Section
T. Kinsey-Lee, PE, DOGRM Engineering



DUCK CREEK ENERGY, INC.

7033 MILL ROAD
BRECKSVILLE, OHIO 44141
440.838.5135 Ph. • 440.838.5515 Fax
www.duckcreekenergy.com

July 22, 2020

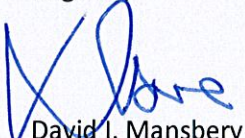
Mr. Robert Leidy
Senior Health Physicist
Ohio Department of Natural Resources
Division of Oil & Gas Resources Management
3575 Forest Lake Drive #150
Uniontown, OH 44685

Re: RPP Revisions

Dear Mr. Leidy,

Please find attached the RPP revisions per your request.

Regards,



David I. Mansbery
President

Enclosures

**RECEIVED
ODNR**

JUL 28 2020

**DIVISION OF OIL & GAS
UNIONTOWN FIELD OFFICE**



DUCK CREEK ENERGY, INC.

RECEIVED
JUN 1 8 2020
DIVISION OF OIL & GAS

Radiation Protection Plan

May 27, 2020

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DUCK CREEK ENERGY, INC.

The Duck Creek Energy RSO, Mr. Brad Squibb and JAMES HOGUE acting as the on-site health physics representative(s) have the authority to immediately stop work on any activity being performed at the Cleveland and Mogadore DCE facilities they feel is radiologically unsafe.

Owner / President

Name: DAVID MANIBERY

Signature: [Handwritten Signature] Date: 6/17/20



DUCK CREEK ENERGY, INC.

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Owner / President

Name: David Mansberg

Signature: [Handwritten Signature] Date: 6/17/20

2.0 PROGRAM SELF-ASSESSMENT

This program will be reviewed, as a minimum, on an annual basis by the Radiation Safety Officer or a third-party Health Physics consultant and the results documented in writing. The procedures and protocols used to implement this program will be used as working documents, for training, and operational guides and will, therefore, be continually reviewed.

3.0 RADIATION PROTECTION PROGRAM ADMINISTRATION

A. Management Responsibilities:

DCE management is responsible for the programmatic oversight of this facility. They will ensure the items such as personnel, funding, equipment etc. are provided to the work force.

B. Radiation Safety Officer

The Radiation Safety Officer (RSO) is Brad Squibb. He will be responsible for the implementation and compliance of the Radiation Protection Plan and will provide the technical assistance and direction for conducting the program. The RSO will have the authority to stop any work activity that is determined to be radiologically unsafe. The RSO must also have unfettered access to communicate directly with DCE executive leadership on issues of radiological safety.

The RSO shall have written authority from DCE management to immediately stop any work activity that the RSO determines to be radiologically unsafe.

Reporting Structure:

Owner – Dave Mansbery

RSO - Brad Squibb

On-Site Health Physics Representatives:

Mogadore Facility – Larry Gibler

Cleveland Facility – Jim Hogue, Clint Nageotte

4.0 PERSONNEL MONITORING PROGRAM

DCE will follow the requirements for monitoring individual external occupational dose per Chapter 3701: 1-38-12 of the Ohio Administrative Code. Monitoring for the intake of radioactive material is also required if it is likely to exceed 10% of the Annual Limit of Intake (ALI) for an occupationally exposed individual.

4.1 Occupational Dose Limits For Adults

The following dose limits apply to all employees, contractors, and visitors who will receive an occupational dose at an DCE job site. This dose limit is defined as the radiation dose received while in a radiologically restricted area or any other work-related dose received. It does not apply to dose from background radiation, medical applications, or that received while a member of the public.

- a) Whole Body - The more limiting of the total effective dose equivalent (TEDE) equal to 5 Rem or the sum of the deep dose equivalent to any individual organ or tissue other than the lens of the eye, equal to 50 Rem.
- b) Skin - A shallow dose equivalent equal to 50 Rem.
- c) Lens of the Eye - An eye dose equivalent equal to 15 Rem.
- d) Extremities- A shallow dose equivalent equal to 50 Rem.

RADIATION PROTECTION PLAN

DUCK CREEK ENERGY, INC. (DCE) has developed this Radiation Protection Plan (RPP) using Chapter 3701:1-38 of the Ohio Administrative Code as guidance. The components of this plan are designed to protect the environment and the public and minimize radiation exposure to contractors, visitors and employees of DCE during all aspects of the facilities activities.

This RPP covers two (2) facilities in the State of Ohio as shown below.

Cleveland Site:

GPS Address Only: 2850 W. 3rd Street (Clark Avenue Gate)
Cleveland, OH 44113

Mogadore Site:

246 N. Cleveland Avenue
Mogadore, OH 44260

RADIATION PROTECTION PLAN CONTENTS

DCE's Radiation Protection Plan covers the following areas in detail:

- Purpose and Scope
- Program Assessment
- Radiation Protection Program Administration
- Personnel Monitoring Program
- General Survey and Monitoring Requirements
- Packaging and Transport of TENORM Materials
- TENORM Control Program
- Instrumentation Program
- Environmental Monitoring
- Records, Reports, and Notices
- Training
- Emergency Response

POLICY

The management of DCE Enterprises recognizes the obligations of the corporation to its employees, neighbors, customers and the environment. The company's primary responsibility is to balance the business with a strong commitment towards compliance with all aspects of environmental health and safety requirements. DCE's intent is to work with the ODNR as a partner, in establishing a sound health physics program and to operate within the guidelines of Chapter 3701: 1-38 of the Ohio Administrative Code, utilizing highly qualified personnel to manage the day-to-day operations.

1.0 PURPOSE AND SCOPE

The Radiation Protection Program described in this plan will be implemented through the use of standard operating procedures which are tailored to the processes as outlined in Attachment 1. The SOP's will be updated prior to processes that are significantly changed or modified.

DCE will utilize administrative limits of 10% of the dose limits listed above to ensure that regulatory limits are not exceeded and to maintain an ALARA philosophy.

4.2 Dose Limits for Individual Members of the Public

DCE will follow the requirements for monitoring individual external dose limits to the public as specified in Chapter 3701: 1-38-13 of the Ohio Administrative Code.

4.3 Determination of prior occupational exposure (Accumulated Dose)

A dose history will be documented on the NRC Form 5. The record shall show each period in which the individual received occupational dose and shall be signed by the individual who received the exposure.

4.4 Visitors

Visitors do not fall under the requirements for monitoring, record keeping, and reporting. If an area has the potential to expose a visitor to more than 5 millirem of whole body exposure during a visit they will be issued a dosimeter (PCD) for verification purposes. If a group is visiting, they may be issued a single dosimeter to represent the group. All visitors entering a TENORM restricted area will be escorted by the DCE on-site health physics representative or other DCE personnel who have received radiation safety training.

5.0 GENERAL SURVEY AND MONITORING REQUIREMENTS

5.1 Surveys

This section provides an overview of the DCE radiation survey program. Radiation surveys shall be performed for the purpose of evaluating:

- a) The extent of radiation / contamination levels;
- b) Concentrations and/or quantities of radioactive materials;
- c) Potential radiological hazards that may be present.

Surveys shall be conducted at a frequency to ensure representative assessments of the area(s) are made. The type and frequency of surveys will be dictated by the number of personnel occupying the area as well the type of activity being performed and the radiological hazard present.

The types of surveys to be used by DCE shall include:

- a) Loose contamination surveys - These surveys will be performed using smears and swipes. This type of survey will aid in ensuring contamination control.
- b) Fixed contamination surveys - These surveys will be performed using the appropriate alpha/beta/gamma detector(s) to identify potential sources of exposure.
- c) Dose rate surveys - These surveys shall be used to identify the radiation levels to which an individual could be exposed.

5.2 Monitoring

Personnel and Equipment / Materials may be monitored when entering or exiting the process areas. This requires the establishment of access control points. Personnel exiting a contaminated area will be surveyed ("frisked") using a portable alpha/beta detector. Whenever materials are being taken out of a TENORM area where there is known contamination, a survey will be required to assure they meet the DCE contamination control criteria.

5.3 Contamination Control

The primary concern regarding contamination is to prevent the inhalation, ingestion, or absorption of radioactive materials into the body. The secondary concern is to prevent the spread of contamination throughout the facility by personnel tracking, movement of equipment, materials, etc. Contamination can present external exposure problems if the radiation levels are high enough and an internal exposure problem, when the radionuclide is an alpha emitter, such as radium. The contamination control measures to be utilized by DCE are:

1. Designation of controlled TENORM process areas.
2. Control of traffic and movement of materials and equipment into and out of the controlled TENORM process areas.
3. Use of personnel access points.
4. Use of personal protective clothing.
5. Prohibition of eating, drinking, smoking, and chewing in these process areas.
6. Proper housekeeping.

5.4 Contamination Control Limits

DCE's policy on contamination is to maintain ALARA levels. DCE's limits for unrestricted and conditional release are defined in the Appendix to 3701:1-43-15 of the Ohio Administrative Code:

Removable Contamination

Unrestricted Areas - $\leq 1,000$ dpm /100cm² of alpha/beta /gamma emitting radionuclides

Fixed Contamination

Unrestricted Areas - $\leq 5,000$ dpm /100cm² of alpha/beta /gamma emitting radionuclides

Note - A maximum of $\leq 15,000$ dpm /100cm² alpha/beta /gamma emitting radionuclides can be applied to an area no greater than 100 cm².

6.0 PACKAGING AND TRANSPORT OF RADIOACTIVE MATERIALS

If applicable, DCE will ensure that all individuals involved with transportation of radioactive materials (Class 7) are properly trained to ensure compliance with Chapter 3701: 1-50 of the Ohio Administrative Code and 49 CFR transportation regulations.

DCE will contract services of a person certified as a Radioactive Materials Shipper per 49 CFR 172, Subpart H when necessary to ensure compliance with Federal and State shipping regulations.

7.0 RADIOACTIVE MATERIAL CONTROL PROGRAM

A written TENORM receipt and accountability program will be put in place to ensure authorized maximum possession limits, security and control of radioactive materials and prevention of inadvertent loss of control of TENORM. These controls will be implemented throughout the process to ensure proper handling at all times. DCE will identify areas where radioactive materials/containers are being handled and/or stored and will post signs consistent with the requirements in Chapter 3701: 1-38-18 of the Ohio Administrative Code. The program elements will include the following:

1. Receipt of TENORM
2. Storage of TENORM
3. Movement of TENORM
4. Shipments of TENORM

8.0 INSTRUMENTATION PROGRAM

DCE management in consultation with the DCE Radiation Safety Officer will obtain the proper radiation survey instrumentation for the required surveys prior to the receipt of TENORM at the facility. Instrumentation may include but is not be limited to:

1. Ludlum Model 2360 with a 43-93 alpha/beta detector (or equivalent)
2. Ludlum Model 19 micro R meter (or equivalent)

An inventory of DCE radiation monitoring instruments will be maintained. DCE reserves the right to upgrade their survey instrumentation as necessary.

8.1 Calibration and Response Checks

Radiation monitoring equipment and air sampling equipment will be calibrated per the manufacturer's specifications and will be sent out for calibration to an approved vendor. The instruments must be returned with a calibration certificate. The instruments will be calibrated on an annual basis and daily response checks will be performed when the instruments are in use.

9.0 ENVIRONMENTAL MONITORING

An environmental monitoring program will be established to ensure compliance with the dose limits in Chapter 3701: 1-38 of the Ohio Administrative Code.

9.1 Environmental Effluent Levels in Unrestricted Areas

Environmental effluent levels shall not exceed those listed in Chapter 3701: 1-38-12 Appendix C, Table II of the Ohio Administrative Code. DCE shall use an ALARA limit of 10% of the Annual Limit of Intake (ALI) for an occupationally exposed individual.

DCE will initiate investigations and response if these levels are exceeded. The following actions will take place should an effluent level be exceeded:

1. Analysis of the probable cause
2. Evaluate the need for additional sampling
3. Verify the analysis with the lab
4. Evaluate the need for additional sampling

9.2 Reports of Overexposure and Excessive Levels and Concentrations

DCE will notify the Division immediately upon determination that a potential overexposure as determined by Chapter 3701: 1-38 of the Ohio Administrative Code, has occurred. A written report containing the following information about the individual will be submitted within 30 days of the determination.

- 1) The name, an employee identification number, date of birth, of each individual.
- 2) Estimate of each individual's estimated dose, the level of radiation and concentration of radioactive material involved, and the cause of the elevated exposure, dose rate, or concentration; and
- 3) Corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, and ALARA constraints.

DCE will notify the Division immediately upon determination that contamination in an unrestricted area exceeds the acceptable surface contamination levels for TENORM in 3701:1-43-15 Appendix, of the Ohio Administrative Code. A written report containing the following information will be

submitted within 30 days of the determination.

- 1) The facility location where TENORM contamination was found and names of any individuals contaminated as a result,
- 2) The cause of the elevated concentration;
- 3) The corrective steps taken to ensure against a recurrence, including the schedule for achieving conformance with applicable limits.

9.3 Methods of Environmental Monitoring

There are several methods for performing environmental monitoring.

Boundary Monitoring - Environmental Thermo-Luminescent Dosimeters (TLD's) to monitor dose rate at the boundaries of the DCE property and unrestricted areas.

TENORM Area Monitoring - Environmental TLD's to monitor dose rates at the boundaries of the DCE TENORM area or the use of a hand help dose rate meter to record measurements at a prescribed frequency (See Table in Section 6.3 of RSP-005, Radiological Surveys.

10.0 RECORDS, REPORTS, AND NOTICES

DCE will develop and maintain routine and emergency procedures or protocols including but not limited to the following:

1. Radiological instrumentation type, use and maintenance;
2. TENORM receipt, control and accountability;
3. Occupational dose monitoring;
4. Public dose and environmental effluent monitoring;
5. Performance and frequency of radiological surveys;
6. Security and control measures for TENORM areas;
7. Radiological emergency response reporting protocols, and ODNR spill notification reporting to 1-844-OHCALL1.

10.1 Records

DCE's policy is to maintain the records to demonstrate regulatory compliance and also to demonstrate that good ALARA practices are maintained. Records will be maintained to show proper implementation of the radiation protection program. The following records will be kept on file and in accordance with Chapter 3701: 1-38-20 of the Ohio Administrative Code.

Records of the Radiation Protection Program

- 1) Records of surveys
- 2) Records of an individual's occupational dose
- 3) Records of individual monitoring results
- 4) Records of dose to individual members of the public
- 5) Records of waste disposal
- 6) Records of training
- 7) Transportation records
- 8) Records of free release surveys

11.0 TRAINING

DCE will establish and perform radiation safety training for their employees and tailor the training based on each employee's position. The minimum training will cover the following topics:

- Characteristics of radiation;
- Units of dose and quantity of radioactivity;
- Hazards of exposure to radiation;
- Levels of radiation from oil and gas TENORM;
- Methods of controlling radiation dose including ALARA concepts; DCE will also provide additional training whenever the following take place:
 - 1) There is a significant change in personnel duties.
 - 2) There are changes in the process.
 - 3) There are regulatory changes that may affect the operation.

Annual refresher training will be performed for employees on an annual basis.

12.0 EMERGENCY REPOSE

DCE will have a detailed emergency response procedure, including immediate actions and notifications to local emergency response personnel. Appropriate phone numbers will be posted, and training performed. Contact names and numbers for the Ohio Department of Natural Resources will be posted.

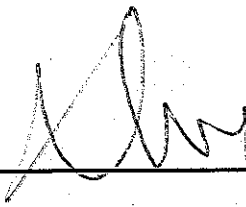
13.0 TENORM WASTE DETERMINATION

DCE will institute a TENORM sampling program for all process related wastes, including tank bottom concentrates (sludges), filter socks, filter cartridges or any other filtering, polishing or absorbent material used throughout the system. The sample results will be used to determine if the combined radium-226 and radium-228 concentrations are greater than 6.99 pCi/g. Any material exceeding this limit shall be sent to a waste processor or disposal facility authorized to accept the material.


PERSONNEL MONITORING

Approvals:

Operations:

 6/17/20
DATE

Radiation Safety:

 5/27/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at both the Cleveland and Mogadore sites.

2.0 PURPOSE AND SCOPE

This procedure provides instructions for the establishment and performance of a personnel monitoring program in compliance with the requirements in Chapter 3701: 1-38-12 C of the Ohio Administrative Code. The program will be designed such that workers will not exceed 10% of the allowable limits specified in this chapter.

3.0 RESPONSIBILITY

3.1 Radiation Safety Officer – The RSO is responsible to ensure that all employees who will be working in a designated area have personal dosimeters, as well as an occupational history form completed (NRC Form 4, or equivalent).

3.2 DCE Personnel – Each person shall be responsible for wearing their assigned monitoring devices every time they enter the designated TENORM areas and returning the devices to the approved storage area at the end of each shift.

3.2.1 Control Badges shall be placed at the designated storage area and it is essential for each person wearing a dosimeter to return it to this area daily.

4.0 DOSIMETERS

4.1 There are several different types of dosimeters that can be used. Typically for DCE employees and contractors, Thermo-luminescent Dosimeters (TLD's) will be used.

4.2 It is not expected that visitors or contractors will receive any dose greater than background. However if required, visitors or contractors that will be in a designated TENORM area for an extended amount of time may be issued a dosimeter. Upon

approval by the RSO, one person may wear the dosimeter and represent the entire group.

5.0 PROCEDURE

- 5.1 Dosimetry Assignment – Whenever a dosimeter is issued, the following information should be logged on a TLD Log sheet:
 - 5.1.1 Name, badge number, monitoring period, and the technician issuing the dosimeter.
- 5.2 Dosimetry Usage – Each employee must ensure the proper protocol is followed when using dosimeters.
 - 5.2.1 The whole body dosimeter should be worn on the front torso of the body. If there is high contamination, the badge should be placed inside a plastic bag to prevent accidental contamination.
 - 5.2.2 The dosimeters must be stored in a clean area, away from radiation fields, so no excess exposure is recorded.
 - 5.2.3 If a dosimeter is lost, it must immediately be reported to the RSO, and replaced.
- 5.3 Analysis Frequency – Dosimeters will be changed on a monthly or quarterly basis, as determined by the RSO. They will be sent out to a NAVLAP accredited vendor to be analyzed.

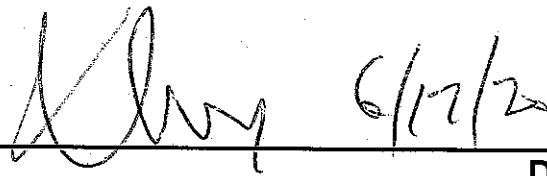
6.0 RECORDS - GENERAL

- 6.1 Records of exposure will be kept for all personnel entering a controlled area. Visitor's records will be maintained in a logbook. Employees and contractors will have their exposure records transposed to an occupational exposure history report.
- 6.2 An occupational radiation exposure history letter will be completed and sent out to all employees yearly if they are still active.
- 6.3 Former employees will receive their letter at the end of the calendar year.

RADIATION SURVEY INSTRUMENTATION QA


Approvals:

Operations:



DATE

Radiation Safety:



5/27/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at both the Cleveland and Mogadore sites.

2.0 PURPOSE

To provide the general guidelines for performing routine quality assurance of radiation survey instrumentation.

3.0 RESPONSIBILITY

- 3.1 The Radiation Safety Officer (RSO) will ensure that all health physics personnel are familiar with the requirements of this procedure.
- 3.2 The RSO or his designee will ensure that all instrumentation used in the field has been calibrated and is in working condition.

4.0 EQUIPMENT

- 4.1 Ludlum Model 19 or equivalent
- 4.2 Ludlum Model 2360 with 43-93 alpha/beta probe or equivalent
- 4.3 Check source (beta/gamma)

5.0 PROCEDURE

- 5.1 Each instrument to be used will be checked for the following:
 - 5.1.1 Charged battery.
 - 5.1.2 Audible alarm is functioning, if applicable.
 - 5.1.3 The meter is responding properly in fast and slow mode.
- 5.2 Background measurements shall be performed each day the instrument is used.
- 5.3 Source check measurements shall be performed each day the instrument is used.

5.3.1 Check with the instrument manufacturer for the most appropriate source activity for daily source checks.

5.3.1.1 Use a Cesium -137 gamma source for the Ludlum Model 19.

5.3.1.2 Use a Cesium -137 beta source for the instrument used for contamination surveys listed in Section 4.2.

5.3.2 Always place the probe directly on top of the check source for consistency and to ensure the detector is responding to the maximum disintegration's of the source.

6.0 INSTRUMENT PARAMETERS

- 6.1 Establish the instrument parameters for background and source check measurements on the instrument when received from the manufacturer and on a monthly basis.
- 6.2 The calibration lab established efficiency for the instrument may be used or an efficiency can be established using the applicable check source as discussed in Section 6.0 below.

7.0 INSTRUMENT EFFICIENCY

The efficiency to be used for each survey instrument will be determined by the calibration lab and should be listed on the side of the instrument or on the calibration certificate. This value should be put on all electronic survey forms.

8.0 RECORDS

- 8.1 Record the following data:
 - 8.1.1 Date
 - 8.1.2 Instrument serial number
 - 8.1.3 Check source used
 - 8.1.4 Background count time
 - 8.1.5 Instrument counts

8.1.6 Instrument efficiency

8.1.7 Disposition of failed instruments

9.0 QUALITY CONTROL

9.1 Maintain records on the calibration of instruments and keep a copy of the calibration certificate at the job site.

9.2 A visual check is performed on the instrumentation weekly to ensure the calibration is current.

9.2.1 All survey instrumentation should have a label indicating the date on which the instrument was last calibrated and the date of the next required calibration.

9.3 Any instrument that is within one week of the "calibration due date" must be taken out of service and sent for calibration.

9.4 Instruments requiring calibration may be shipped to the following company for service:

Griffin Instruments
131 Gallaher Road
Kingston, TN 37763

NOTE: Other qualified companies may be used, if approved by the RSO.

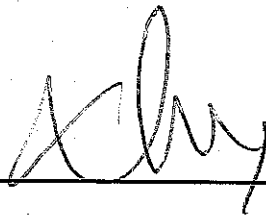
10.0 CALIBRATION REQUIREMENTS

Radiation instruments shall be calibrated annually.

ENVIRONMENTAL MONITORING


Approvals:

Operations:

 5/17/20

DATE

Radiation Safety:

 5/27/20

DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at both the Cleveland and Mogadore sites.

2.0 PURPOSE AND SCOPE

This procedure provides instructions for the establishment and performance of an environmental monitoring program in compliance with the requirements in Chapter 3701: 1-38-12 Appendix C Table II and 1-38-13 of the Ohio Administrative Code.

3.0 RESPONSIBILITY

- 3.1 Radiation Safety Officer – The RSO is responsible to ensure that all aspects of the environmental monitoring program are implemented and performed properly.
- 3.2 Health Physics Personnel – The HP Technicians shall be responsible for the daily activities of the monitoring program.

4.0 GENERAL

- 4.1 Environmental Conditions may be monitored through the collection of soil samples, ambient radiation levels, and air samples, if required. The results of these measurements will be used to calculate potential dose to individual members of the public and to DCE employees / contractors.
- 4.2 The environmental levels shall not exceed those listed in Chapter 3701: 1-38-12 Appendix C Table II of the Ohio Administrative Code.

5.0 PROCEDURE

5.1 Radiation / Contamination Levels in Unrestricted Areas

- 5.1.1 Monitoring shall be performed, where applicable, at the boundaries of the DCE facility to ensure that no member of the public would receive a dose greater than 100 mrem per year.

5.1.2 TLD (s) may be placed at the boundaries (fence line), to monitor radiation levels and radioactive effluents.

5.1.2.1 These dosimeters will be collected quarterly, as designated by the RSO and sent to a NVLAP accredited lab for analysis. Based on an annual review of the results collection times may be extended.

5.1.3 Dose rate surveys may be performed periodically at the boundary of the site to check radiation levels and ensure compliance with the regulations.

5.1.2 Contamination surveys will initially be performed weekly to ensure contamination control procedures and house-keeping activities are being followed. These surveys will consist of collecting smears to assess removable contamination and direct measurements to assess fixed contamination. The RSO will establish standard locations and may change the frequency based on survey data results.

5.2 Action Levels

5.2.1 DCE has established action levels at 50 % of the limits as outlined in Chapter 3701: 1-38-13 of the Ohio Administrative Code and will initiate the following actions:

5.2.1.1 Analysis of the probable Cause,

5.2.1.2 Evaluate the need for additional sampling,

5.2.1.3 Verify the analysis of the lab,

5.2.1.4 Evaluate the need for additional sampling.

6.0 QUALITY CONTROL

6.1 Instrumentation shall be checked as specified in RSP-002

" Radiation Survey Instrumentation QA".

- 6.2 Records documenting the activities of the environmental monitoring program shall be maintained for use as an audit function of the Radiation Protection Plan.

Magdalena Francy

TENORM Receipt, Control, and Accountability

Approvals:

Operations:

KS 7/22/20
DATE

Radiation Safety:

Brad Squibb 7/22/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Mogadore facility.

2.0 PURPOSE AND SCOPE

This purpose of this procedure is to provide guidance on the receipt, control, and accountability of TENORM materials received at the DCE processing facility. The facility must institute protocols to quantify the amount of TENORM material received at the facility and the amounts leaving the facility as product and waste and cover as a minimum:

- 2.1 Receipt of TENORM Materials
- 2.2 Storage of TENORM Material
- 2.3 Movement of TENORM Materials
- 2.4 Shipments of TENORM Materials

3.0 RESPONSIBILITY

- 3.1 Radiation Safety Officer – The RSO is responsible to ensure that all employees are aware of the requirements and standards for receipt, handling and packaging of TENORM materials.

4.0 DOCUMENTATION

- 4.1 The following is a list of documentation DCE will utilize to account for the amount of TENORM if received, processed, and/or treated, and at the facility.
 - 1. Incoming work order for each load
 - 2. DCE personnel fill out an internal inventory spreadsheet.

5.0 TYPES OF INCOMING STREAMS

- 5.1 The following waste streams are received at the DCE facility.
 - 1. Brine

6.0 PROCESS

The DCE process is shown in Figure 1 on page 4.

- 6.1 Loaded trucks enter through a daily locked gate.
- 6.2 Driver checks in at the foreman's house/office.
- 6.3 After check in the driver is to unload in the unloading area, which is at the 20,000 gallons raw storage tanks.
- 6.4 From the 20,000 gallons raw storage tanks the material is transferred through the shed (10'x10') where samples are taken.
- 6.5 After the samples are taken the material is then pumped into the 20,000 gallons in-process tanks.
- 6.6 From the in-process tanks the material is then pumped into the foreman's house/office into storage crates and blended.
- 6.7 After leaving the foreman's house/office it's then pumped into 8,400 gallons steel or 6,100 gallons poly storage tanks.
- 6.8 From the storage tanks the material is then loaded into out-going trucks.

7.0 WASTE PROCESSING

- 7.1 Any TENORM waste equal to or exceeding the criteria of 6.99 pCi/g total Ra-226 plus Ra-228 will be sent to a processor or disposal facility capable of handling this material.
- 7.2 TENORM waste below the criteria of 7.0 pCi/g Ra-226 plus Ra-228 will be sent to an approved landfill.
- 7.3 Waste to be sent for disposal will be manifested to the disposal facility. Waste material for reuse will be also manifested to site/facility for reuse.

Figure-1
DCE Process

Figure-1 Mogadore Facility

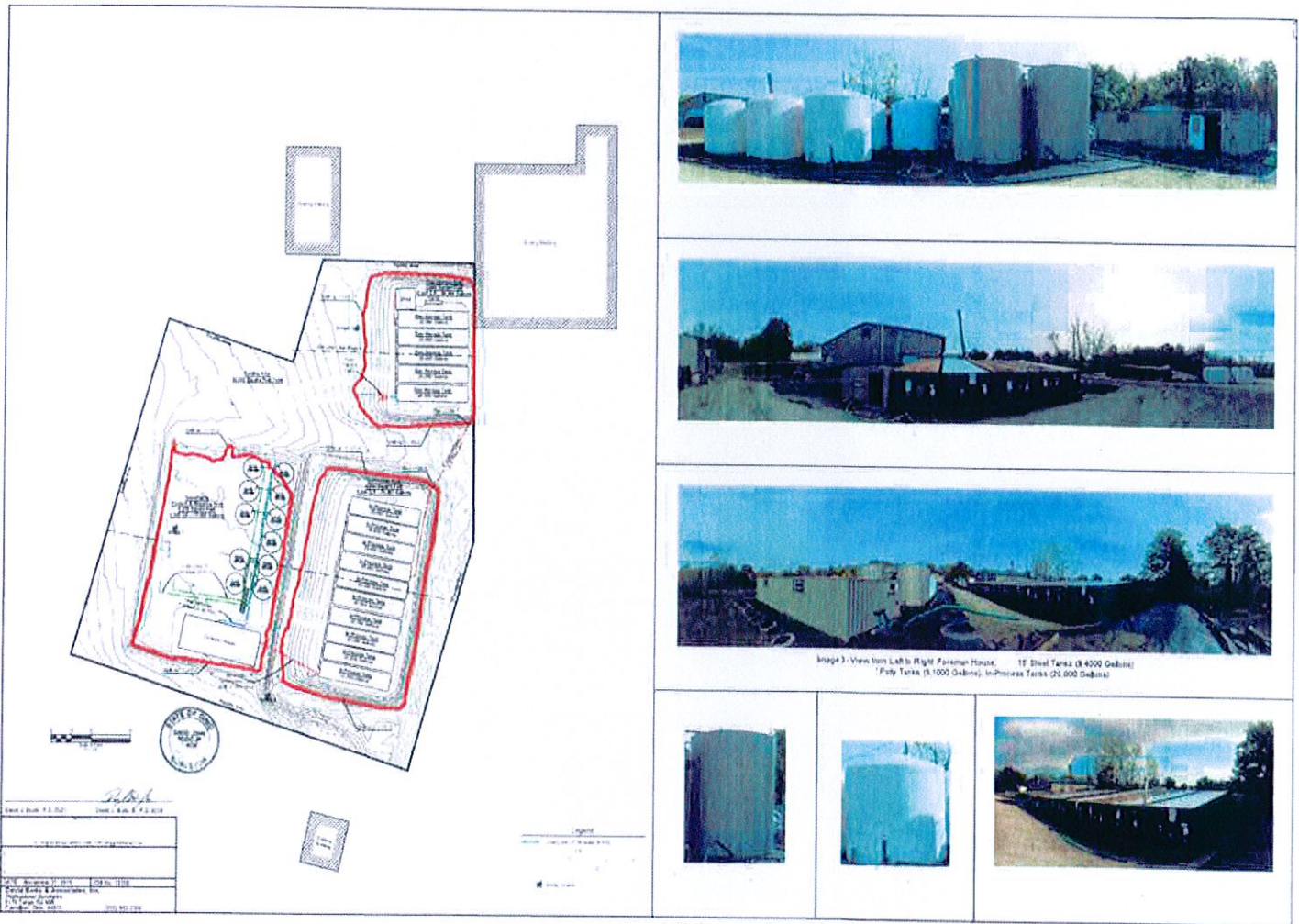


Figure 2.2 AquaSolino production facility - Mogadore, Ohio

Duck Creek Energy, Inc.
TENORM Receipt, Control, and Accountability
Cleveland Facility

Radiation Safety Procedure
RSP- 004
May 15, 2020 Rev 0
Page 1 of 4

TENORM Receipt, Control, and Accountability

Approvals:

Operations:

 7/22/20
DATE

Radiation Safety:

Brad Squibb 7/22/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Cleveland facility.

2.0 PURPOSE AND SCOPE

This purpose of this procedure is to provide guidance on the receipt, control, and accountability of TENORM materials received at the DCE processing facility. The facility must institute protocols to quantify the amount of TENORM material received at the facility and the amounts leaving the facility as product and waste and cover as a minimum:

- 2.1 Receipt of TENORM Materials
- 2.2 Storage of TENORM Material
- 2.3 Movement of TENORM Materials
- 2.4 Shipments of TENORM Materials

3.0 RESPONSIBILITY

- 3.1 Radiation Safety Officer – The RSO is responsible to ensure that all employees are aware of the requirements and standards for receipt, handling and packaging of TENORM materials.

4.0 DOCUMENTATION

- 4.1 The following is a list of documentation DCE will utilize to account for the amount of TENORM if received, processed, and/or treated, and at the facility.
 - 1. Incoming work order for each load
 - 2. DCE personnel fill out an internal inventory spreadsheet.

5.0 TYPES OF INCOMING STREAMS

- 5.1 The following waste streams are received at the DCE facility.
 - 1. Brine

6.0 PROCESS

The DCE process is shown in Figure 1 on page 4.

- 6.1 Loaded trucks enter facility through the Cleveland steel mill, which has a security guard with locked gate.
- 6.2 Driver proceeds ¼ mile through mill and checks in at the foreman's house/office.
- 6.3 After check in the driver is to unload in the unloading area, which is at the 20,000 gallons raw storage tanks.
- 6.4 From the 20,000 gallons raw storage tanks the material is transferred through the shed (10'x10') where samples are taken.
- 6.5 After the samples are taken the material is then pumped into the 20,000 gallons in-process tanks.
- 6.6 From the in-process tanks the material is then pumped into the foreman's house/office into storage crates and blended.
- 6.7 After leaving the foreman's house/office it's then pumped into 8,400 gallons steel or 6,100 gallons poly storage tanks.
- 6.8 From the storage tanks the material is then loaded into out-going trucks.

7.0 WASTE PROCESSING

- 7.1 Any TENORM waste equal to or exceeding the criteria of 6.99 pCi/g total Ra-226 plus Ra-228 will be sent to a processor or disposal facility capable of handling this material.
- 7.2 TENORM waste below the criteria of 7.0 pCi/g Ra-226 plus Ra-228 will be sent to an approved landfill.
- 7.3 TENORM waste to be sent for disposal will be manifested to the disposal facility. Waste material for reuse will be also manifested to site/facility for reuse.

Figure-1
DCE Process

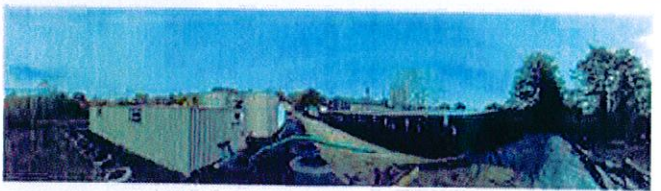
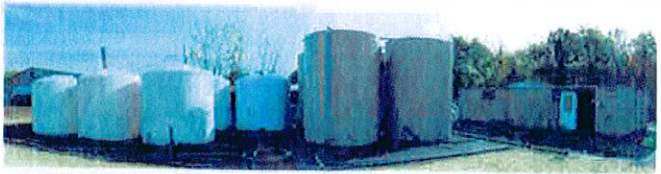


Image 3 - View from Left to Right Foreman Hopok 15' Dished Tanks (8 4500 Gallons)
7' Poly Tanks (8 1000 Gallons) In-Process Tanks (23,000 Gallons)

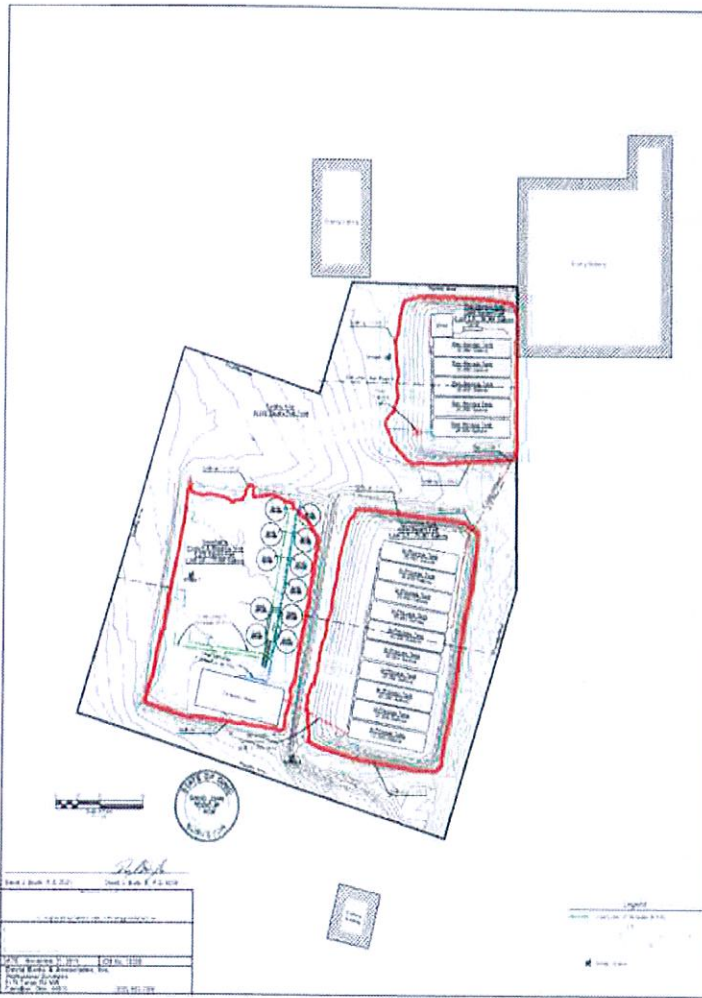
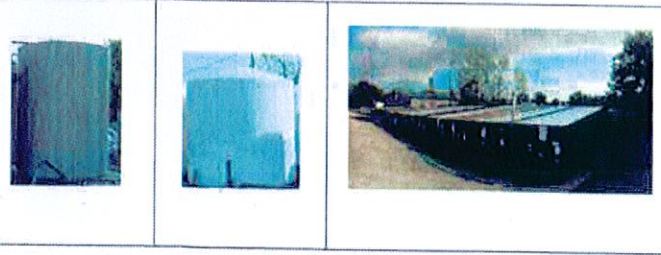


Figure 2.2 Aquasaline production facility - Megadere, Ohio

RADIOLOGICAL SURVEYS

Approvals:

Operations:



DATE

Radiation Safety:

Brad Squibb 7/22/20

DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Mogadore facility.

2.0 PURPOSE AND SCOPE

This procedure describes in detail the survey program and expected locations where radiological surveys may be required and the type and frequency of these surveys.

3.0 REFERENCES

- 3.1 Ohio Administrative Code 3701:1-43-15 Appendix, Acceptable surface contamination levels for TENORM.
- 3.2 NUREG Guide 1.86

4.0 RESPONSIBILITY

- 4.1 Radiation Safety Officer – The RSO is responsible to implement this survey program, review the initial findings and develop a final survey plan. The final survey plan will be signed, dated and attached to this RSP as a supplement.
- 4.2 A copy of the final survey plan will be submitted to ODNR.

5.0 TYPES OF SURVEYS

- 5.1 Dose Rate Surveys - A survey designed to assess potential external dose to individuals
- 5.2 Contamination Surveys - A survey designed to identify areas where contamination may be present. Contamination surveys will initially be performed weekly to ensure contamination control procedures and house-keeping activities are being followed. The RSO will establish standard locations and may change the frequency based on survey data results. The survey technique is described below.

- 5.2.1 Removable Contamination – This survey is performed by using a cloth smear and wiping a surface area of 100 cm² (4" x 4") and analyzing the loose material on the smear with a radiation detector.
- 5.2.2 Fixed Contamination - This survey is performed by placing the radiation detector on the surface and collecting a static one-minute count
- 5.2.3 The removable and fixed survey will be collected at the same locations unless otherwise changed by the RSO..
- 5.2.4 The results will be recorded in counts per minute (cpm) on the survey spreadsheet and the RSO will convert the measurements to disintegrations per minute (dpm) for comparison with the established limits.
- 5.3 Personnel Surveys - Scan and direct frisk surveys of individuals to assess potential contamination on the clothing and body. This survey will be performed when employees are exiting a TENORM restricted area.
- 5.4 Unconditional Release Surveys - Scanning, direct frisk, and smears to assess equipment and tools to assess contamination.

6.0 PROCEDURE

- 6.1 A survey program shall be developed which uses the types of surveys identified in Section 5.0 to identify and prevent the spread of contamination, limit the dose to personnel, and ensure the concept of ALARA is continually applied.
- 6.2 An initial assessment of the facility will be performed by the RSO to determine those areas and activities where contamination and dose potential exists. This includes break rooms, offices, storage areas, material transfer areas, and other places where TENORM is not contained.
- 6.3 The following table example describes how the survey plan will be established with area descriptions, survey type, and frequency.

Facility Survey Program

Description	Contamination	Frequency	Dose Rate	Frequency
Office Areas / Break Rooms	X	Monthly	X	Quarterly
Raw Storage Areas	X	Monthly	X	Quarterly
In-Process Storage	X	Monthly	NA	Quarterly
Final Product Storage	X	Monthly	NA	Quarterly
Shipping Area	X	Monthly	X	Quarterly
Waste Handling	X	Monthly	X	Quarterly

7.0 UNCONDITIONAL RELEASE SURVEYS

- 7.1 Vehicles, materials, and equipment, which enter or are used in the process area, have the potential to be contaminated. Therefore, procedures must be put in place to ensure surveys are implemented to eliminate potential contamination spread.
- 7.2 Following the rationale discussed in Section 6.2 above the RSO will determine those areas in the facility which may require unconditional release surveys of vehicles, materials, and equipment entering those areas.

8.0 RECORDS:

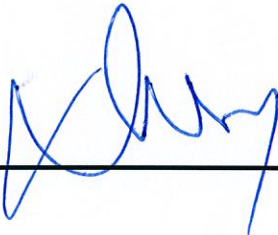
- 8.1 Records of all surveys shall be kept on file for a minimum of three years.

Cleveland Facility

RADIOLOGICAL SURVEYS

Approvals:

Operations:

 7/22/20
DATE

Radiation Safety:

Brad Squibb 7/22/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Cleveland facility.

2.0 PURPOSE AND SCOPE

This procedure describes in detail the survey program and expected locations where radiological surveys may be required and the type and frequency of these surveys.

3.0 REFERENCES

- 3.1 Ohio Administrative Code 3701:1-43-15 Appendix, Acceptable surface contamination levels for TENORM.
- 3.2 NUREG Guide 1.86

4.0 RESPONSIBILITY

- 4.1 Radiation Safety Officer – The RSO is responsible to implement this survey program, review the initial findings and develop a final survey plan. The final survey plan will be signed, dated and attached to this RSP as a supplement.
- 4.2 A copy of the final survey plan will be submitted to ODNR.

5.0 TYPES OF SURVEYS

- 5.1 Dose Rate Surveys - A survey designed to assess potential external dose to individuals
- 5.2 Contamination Surveys - A survey designed to identify areas where contamination may be present. Contamination surveys will initially be performed weekly to ensure contamination control procedures and house-keeping activities are being followed. The RSO will establish standard locations and may change the frequency based on survey data results. The survey technique is described below.

- 5.2.1 Removable Contamination – This survey is performed by using a cloth smear and wiping a surface area of 100 cm² (4" x 4") and analyzing the loose material on the smear with a radiation detector.
- 5.2.2 Fixed Contamination - This survey is performed by placing the radiation detector on the surface and collecting a static one-minute count
- 5.2.3 The removable and fixed survey will be collected at the same locations unless otherwise changed by the RSO..
- 5.2.4 The results will be recorded in counts per minute (cpm) on the survey spreadsheet and the RSO will convert the measurements to disintegrations per minute (dpm) for comparison with the established limits.
- 5.3 Personnel Surveys - Scan and direct frisk surveys of individuals to assess potential contamination on the clothing and body. This survey will be performed when employees are exiting a TENORM restricted area.
- 5.4 Unconditional Release Surveys - Scanning, direct frisk, and smears to assess equipment and tools to assess contamination.

6.0 PROCEDURE

- 6.1 A survey program shall be developed which uses the types of surveys identified in Section 5.0 to identify and prevent the spread of contamination, limit the dose to personnel, and ensure the concept of ALARA is continually applied.
- 6.2 An initial assessment of the facility will be performed by the RSO to determine those areas and activities where contamination and dose potential exists. This includes break rooms, offices, storage areas, material transfer areas, and other places where TENORM is not contained.
- 6.3 The following table example describes how the survey plan will be established with area descriptions, survey type, and frequency.

Facility Survey Program

Description	Contamination	Frequency	Dose Rate	Frequency
Office Areas / Break Rooms	X	Monthly	X	Quarterly
Raw Storage Areas	X	Monthly	X	Quarterly
In-Process Storage	X	Monthly	NA	Quarterly
Final Product Storage	X	Monthly	NA	Quarterly
Shipping Area	X	Monthly	X	Quarterly
Waste Handling	X	Monthly	X	Quarterly

7.0 UNCONDITIONAL RELEASE SURVEYS

- 7.1 Vehicles, materials, and equipment, which enter or are used in the process area, have the potential to be contaminated. Therefore, if required, procedures must be put in place to ensure surveys are implemented to eliminate potential contamination spread.
- 7.2 Following the rationale discussed in Section 6.2 above the RSO will determine those areas in the facility which may require unconditional release surveys of vehicles, materials, and equipment entering those areas.

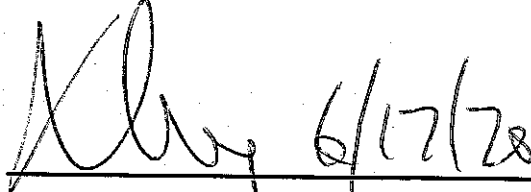
8.0 RECORDS:

- 8.1 Records of all surveys shall be kept on file for a minimum of three years.

EMERGENCY ACTION PLAN


Approvals:

Operations:



DATE

Radiation Safety:



5/27/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at both the Cleveland and Mogadore sites.

2.0 PURPOSE AND SCOPE

This procedure provides instructions to all employees concerning the Emergency Action Plan at the facility and for off-site situations which may arise.

3.0 RESPONSIBILITY

- 3.1 Radiation Safety Officer – The RSO is responsible to ensure that all employees are aware of the actions to take in the event of an emergency.
- 3.2 DCE Personnel – Each person shall be responsible for properly following the emergency action plans in the event a situation arises. This includes knowing how to initiate the emergency notifications and appropriate alarms, if applicable.
- 3.3 DCE will have a detailed emergency response procedure, including immediate actions and notifications to local emergency response personnel. Appropriate phone numbers will be posted, and training performed. Contact names and numbers for the Ohio Department of Natural Resources will be posted.

4.0 PROCEDURE

- 4.1 DCE will have a detailed emergency response procedure, including immediate actions and notifications to local emergency response personnel. Appropriate phone numbers will be posted, and training performed. Contact names and numbers for the Ohio Department of Natural Resources will be posted.
- 4.2 This plan is designed to ensure emergency contacts, phone numbers, and emergency response agencies are listed and posted in a conspicuous area.

- 4.3 Directions to local emergency facilities and hospitals should be made available.
- 4.4 Identification of water supplies, first aid kits, fire extinguishers shall be performed.

5.0 TRAINING

- 5.1 Emergencies involving radioactive contamination are outside the norm for most people and the responsibility to ensure proper emergency planning belongs to DCE personnel.
- 5.2 DCE personnel will provide training for events deemed most likely to occur for this facility.

6.0 NOTIFICATIONS

6.1 DCE will comply with all emergency notifications reporting requirements under Ohio Administrative Code 1501:9-8-01, including:

- (1) The name and phone number of a person who can provide further information regarding the occurrence;
- (2) The location of the occurrence, including the county, township, section or lot number, directions from the nearest intersection, and global positioning system coordinates.
- (3) The identification information pertaining to the authorized activity pursuant to Chapter 1509. of the Revised Code or division 1501:9 of the Administrative Code, such as an authorized owner's or person's name and the permit number, order number, or registration certificate number;
- (4) The type of occurrence or occurrences as specified in paragraphs (A)(1) to (A)(10) of this rule;
- (5) The potential health effects and safety concerns associated with the occurrence;
- (6) The mitigation measures initiated or performed, including any evacuation;

(7) Whether an emergency responder was contacted to respond to the incident;

(8) The identity of other federal, state, or local agencies that were notified;

(9) If the occurrence involves a release of any reportable substance

6.1.1 The One-Call Incident number is 1-844-642-2511.

6.2 DCE will comply with all emergency notifications reporting requirements Ohio under required by Ohio EPA under Administrative Code ORC 3750.

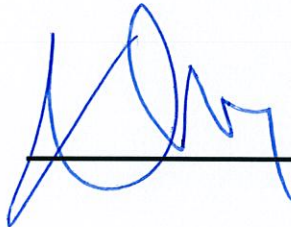
6.2.1 The emergency phone number is 800-282-9378

6.3 DCE shall have an Ohio Department of Health 03219 Licensed Service provider's contact information available in case of an emergency requiring immediate response.

SECURITY AND ACCESS CONTROL

Approvals:

Operations:

 7/22/20
DATE

Radiation Safety:

Brad Squibb 7/22/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Mogadore facility.

2.0 PURPOSE AND SCOPE

This procedure provides the methods DCE uses to control access to the site and post areas containing TENORM materials within the facility. Adherence to this procedure will provide reasonable assurance that personnel will remain free of contamination, the spread of contamination will not occur, and personnel exposures will remain ALARA.

3.0 RESPONSIBILITY

- 3.1 DCE shall establish a system which limits the unencumbered access to unauthorized personnel.
- 3.2 The Radiation Safety Officer is responsible for ensuring that all personnel are familiar with this procedure.

4.0 GENERAL

- 4.1 Types of control methods.
 - 4.1.1 Control of trucks bringing TENORM materials to the site.
 - 4.1.2 Vehicle and personnel check-in protocols.
 - 4.1.3 Establishing and posting TENORM contamination areas.
 - 4.1.4 Establishing and posting areas with elevated dose measurements.
 - 4.1.5 Posting TENORM storage areas.

5.0 FACILITY PHYSICAL SECURITY

- 5.1 The Mogadore facility is secured by fully gated chain link fence, which is locked during off hours.

5.2 The facility is only operational from October through April. Maintenance activities are performed from May through September.

5.3 Hours are Monday-Friday 0600 to 1800.

6.0 REQUIREMENTS

6.1 Site training will be performed as required.

6.2 If and when applicable "Ohio Administrative Code 3701:1-38-18 posting, labeling, and receipt of packages" shall be implemented.

6.3 All areas containing TENORM material shall be posted with appropriate signage.

6.4 All personnel, contractors, and visitors shall sign in at the foreman's office.

6.5 Drivers hauling TENORM materials to the facility shall check in at the office.

7.0 QUALITY CONTROL

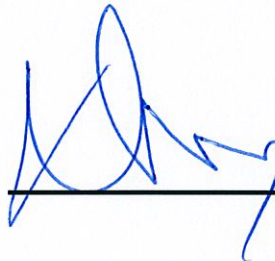
7.1 The RSO shall perform audits of the ensure the security and site access program.

Cleveland Facility

SECURITY AND ACCESS CONTROL

Approvals:

Operations:

 7/22/20
DATE

Radiation Safety:

Brad Squibb 7/22/20
DATE

1.0 APPLICABILITY

This procedure applies to Duck Creek Energy, Inc. (DCE) personnel, contractors, and any other personnel working under the DCE Radiation Protection Plan at the Cleveland facility.

2.0 PURPOSE AND SCOPE

This procedure provides the methods DCE uses to control access to the site and post areas containing TENORM materials within the facility. Adherence to this procedure will provide reasonable assurance that personnel will remain free of contamination, the spread of contamination will not occur, and personnel exposures will remain ALARA.

3.0 RESPONSIBILITY

- 3.1 DCE shall establish a system which limits the unencumbered access to unauthorized personnel.
- 3.2 The Radiation Safety Officer is responsible for ensuring that all personnel are familiar with this procedure.

4.0 GENERAL

- 4.1 Types of control methods.
 - 4.1.1 Control of trucks bringing TENORM materials to the site.
 - 4.1.2 Vehicle and personnel check-in protocols.
 - 4.1.3 Establishing and posting TENORM contamination areas.
 - 4.1.4 Establishing and posting areas with elevated dose measurements.
 - 4.1.5 Posting TENORM storage areas.

5.0 FACILITY PHYSICAL SECURITY

- 5.1 The Cleveland facility is secured by fully gated chain link fence, which is maned by guard house 24 hours daily.

5.2 The facility is only operational from October through April. Maintenance activities are performed from May through September.

5.3 Hours are Monday-Friday 0600 to 1800.

6.0 REQUIREMENTS

6.1 Site training will be performed as required.

6.2 If and when applicable "Ohio Administrative Code 3701:1-38-18 posting, labeling, and receipt of packages" shall be implemented.

6.3 All areas containing TENORM material shall be posted with appropriate signage.

6.4 All personnel, contractors, and visitors shall sign in at the foreman's office.

6.5 Drivers hauling TENORM materials to the facility shall check in at the office.

7.0 QUALITY CONTROL

7.1 The RSO shall perform audits of the ensure the security and site access program.