COLORADO
Oil & Gas Conservation Commission
Department of Natural Resources

COGCC Operator Guidance

911.c. Pit Closure

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911.c.(1) Pit Evacuation. Operators will treat or dispose of E&P Waste pursuant to Rule 905 prior to backfilling and site Reclamation.

911.c.(2) Operators will collect a sufficient number of representative samples from locations beneath a Pit to demonstrate that no leakage of managed fluids has occurred. Operators will ensure that any soil left in place meets the cleanup concentrations listed in Table 915-1.

911.c.(3) Liner Disposal.

A. **Synthetic Liner Disposal.** Operators will remove and dispose of synthetic liners pursuant to all state and federal requirements for Solid Waste Disposal.

B. **Constructed Soil Liners.** Operators may remove constructed soil liner material for treatment or disposal. Alternatively, if an Operator leaves the constructed soil liner material in place, the Operator will rip the material and mix it with native soils in a manner to alleviate compaction and prevent an impermeable barrier to infiltration and Groundwater flow. Operators will demonstrate that the resulting material meets cleanup concentrations for contaminants of concern listed in Table 915-1.

Purpose of Rule

This Rule requires Operators to demonstrate through adequate site characterization that material left in place after Pit closure meets Table 915-1 Cleanup Concentrations. Soil Suitability for Reclamation parameters above Table 915-1 Cleanup Concentrations may be addressed by an approved Reclamation plan per Rule 915.b.

Additional information can be found in the following COGCC Guidance documents:

911.a.(4) - Facility Closure
912.b. - Spill/Release Reporting

913 - Site Investigation, Remediation, and Closure
913.b.(5)B i-v - Remediation Standards
915 - Concentrations and Sampling for Soil and Groundwater
915.a. - Pathway to Groundwater
915.e.(2) - Soil Sampling and Analysis

Rule 911.c. Guidance

Prior to Pit closure activity, the Pit area will be visually inspected by the Operator to document if any Spills/Releases from the Pit have impacted surrounding areas. Potential evidence of impacts to surrounding areas includes:

- If an unlined Pit is located on a hill or side-hill and has leaked, impacts such as vegetation kills or erosion can be observed on downgradient exposures below the Pit.
- In some Pits where fluid levels were maintained above surface grade and impounded by the berms, seepage at the base of the berms may have allowed impacts to adjacent areas.
- If Pits have over-topped in the past, including wind-blown spray, there may also be impacts immediately adjacent the Pit including vegetation kills and/or erosion.
- Also, many Pit berms that were not properly maintained have allowed sediment migration onto surrounding areas.

These conditions will be noted in the Initial Form 27 Site Investigation and Remediation Workplan (Form 27) required for Pit closure. Any such impacts discovered in a preliminary inspection of the Pit facility will be documented on an aerial photo or site diagram of the Pit facility and will be included with the Initial Form 27. If the Spill/Release reporting thresholds in Rule 912.b. are exceeded, Operator will submit a Form 19 Spill/Release Report (Form 19). The Form 27 will address Pit closure requirements as well as assessment and Remediation of any known impacts observed during the Pit inspection.

Some Operators may have had surface water discharge permits issued by CDPHE for COGCC permitted Pit facilities. In these cases, any erosion at the outfall or impacts from the discharged produced water will also be assessed as part of the Pit closure.

Prior to conducting assessment and Remediation, any produced water remaining in the Pit will be properly evacuated and disposed of pursuant to the appropriate methods outlined in Rule 905.c. Discharging produced water to adjacent lands to dry-out a Pit without a Colorado discharge permit issued by CDPHE is not allowed. For out-of-service

Pits or Pits with integrity issues that require closure, simply waiting for water to evaporate may not be timely enough. Operator will include a specific implementation schedule in the Initial Form 27 for closure and address appropriate disposal of remaining produced water as required. Operators are required to keep disposal documentation pursuant to Rule 905.b.(3). for all Exploration and Production Waste "E&P Waste" disposed of off-site, including any produced water removed from the Pit prior to closure.

Lined Pit Closure

Following Pit evacuation, Pit liners should be inspected for integrity and documented in a photo log. Photos of the liner condition including any holes, rips, or tears visible when the Pit is evacuated must be noted and documented in photographs. Following liner removal, a photo log documenting the soil conditions beneath the liner should be submitted confirming liner integrity or documenting the location of a Spill/Release requiring a Form 19. Operator will perform and submit appropriate field screening to aid in characterization of material under the liner. If no release is apparent based on liner condition, observations, and field screening, an adequate number of soil samples will be collected from the base of the Pit to verify compliance with Table 915-1 cleanup concentrations for soils. Operator will propose soil sample locations in the Initial Form 27 and may modify as needed upon discovery of potential impacts. Generally a minimum of four discrete grab samples will be collected from the lowest area in each quadrant of the Pit floor depending on the size of the Pit or from areas exhibiting staining, odor, or elevated field screening results. Observations of impacts in the sidewalls of the Pits may also require additional sampling. Refer to Rule 915.e.(2) Soil Sampling and Analysis Guidance for additional information on minimum sample numbers. If a Spill/Release is discovered following liner removal, a Form 19 will be submitted for approval and plans for the investigation of the Spill/Release provided on a Supplemental Form 27.

Unlined Pit Closure

Due to the introduction of produced water to unlined Pits, impacts to underlying material are anticipated. Even unlined Production Pits receiving produced water that is considered "*fresh*" or low total dissolved solids "TDS" can cause impacts resulting in elevated soil suitability parameters, organic compounds, and metals. As a result, unlined Pits require a detailed subsurface investigation to characterize impacts for appropriate Remediation. As discussed for lined Pits, Operators will perform a pre-closure inspection and document any impacts to surrounding areas related to the Pit. The Initial Form 27 will include proposed soil sample locations with methods of

sampling, such as soil borings, test pits, or trenches. Any known surrounding area impacts such as vegetation kill or erosion should also be addressed in the Initial Form 27 workplan. Sensitive Areas within a half mile should be identified on the Initial Form 27 workplan.

Operator will remove all junk, trash, debris, vegetation, and Pit covers, if present, prior to creating a photo log that documents Pit conditions. All Oily Waste identified through surficial staining, odor characteristics, or field screening should be removed and the area of impact documented on a scaled site diagram or aerial photograph of the Pit facility. Oily Waste will be treated or disposed in accordance with Rule 905.e. A Form 19 will not be required if the quantity of Oily Waste removed is less than 10 cubic yards. If more than 10 cubic yards of Oily Waste is removed, or other Spill/Release reporting thresholds in Rule 912.b. are exceeded, Operator will submit a Form 19 to document the Spill/Release and provide soil confirmation sample locations and analytical results on a Supplemental Form 27. Operator will collect a sufficient number of discrete confirmation soil samples from the areas of Oily Waste removal adequate to demonstrate that the soil to be left in place meets the cleanup concentrations listed in Table 915-1.

If no surficial hydrocarbon impacts are discovered within the Pit after all debris has been removed, the Operator will demonstrate through adequate subsurface sampling that the soil to be left in place meets the cleanup concentrations listed in Table 915-1. In the likely event that impacts are discovered to material at the base of and below the Pit, the complete lateral and vertical extent of impacts, including Soil Suitability parameters must be determined. The Operator must also characterize the material in the sidewalls and berms of Pits.

A standard practice historically used to improve percolation in unlined production Pits was to muck the Pit bottom material out and place that material on the berms. This material is considered E&P Waste, as it is generally impacted with high Electrical conductivity “EC” and Sodium adsorption ratio “SAR” values in addition to organic compounds and metals. In these cases, Operator will properly characterize and treat or dispose of the Pit berm material as part of the environmental investigation.

Multiple methods of subsurface investigation such as hand auger borings, geoprobe or drill rig borings, pot-holing, or trench excavations may be utilized to investigate subsurface conditions to either demonstrate compliance with Table 915-1 or delineate residual impacts. Due to infiltration of produced water into the subsurface, it is necessary to characterize several feet below the bottom of the Pit. The actual depth

will be site specific based on field observations, screening, and soil types. Only collecting confirmation samples of dry material from the top few inches of the bottom of a Pit is not adequate characterization and will not be accepted for closure purposes.

Special consideration should be given to the assessment of the Soil Suitability for Reclamation agronomic properties of pH, EC, SAR, and boron within the subgrade portion of the Pit as well as the berm material and the surface grade area beneath the berms (berm footprint) in order to ensure successful final Reclamation. Background sampling to determine the non-impacted values of these parameters should be adequate to capture the lateral and vertical variability in the native soils at the location. For example, if an Operator intends to demonstrate background to compare to Pit bottom samples that were collected at 8-feet below grade, background samples should also be collected from a relevant depth below grade. The site specific background determination for soil suitability and/or metals may require several soil samples collected at different depths. Proposed background soil sample locations should be included on the Initial Form 27 or Supplemental Form 27s as applicable.

The Soil Suitability for Reclamation properties should meet the Table 915-1 cleanup concentrations or be used to develop a detailed Reclamation plan per Rule 915.b. Consultation with the area Reclamation Specialist may be helpful in developing the Reclamation plan. At a minimum the extent of soil suitability parameters that exceed Table 915-1 standards must be delineated. If an Operator proposes leaving such material in place, the Reclamation plan should indicate the depth of the material, the thickness of cover that will be placed over it as well as the background concentrations, revegetation techniques, site stabilization, and details of seeded species if applicable. Additional information that will be helpful may include source and description of fill, topsoil characteristics comparable to existing if topsoil is imported to site, as well as final site contours for locations undergoing final Reclamation. Site-specific depth to Groundwater and a description of surrounding Sensitive Areas may also be required to receive approval to leave material with elevated inorganics in place. Please note that organic compounds that exceed Table 915-1 standards cannot be left in place and require treatment or disposal pursuant to Rule 905.e. Reclamation plans requesting to leave elevated inorganics in place will be submitted via Supplemental Form 27 using the Reclamation tab and attachments as appropriate. Operators are encouraged to attach stand-alone Reclamation plans.

Coal Bed Methane Produced Water Pit Closure

Impacts from organic compounds are not as likely from coal bed methane "CBM" produced water. As such, analysis of some Table 915-1 Organic Compounds in Soils or other contaminants of concern may not be necessary to analyze for closure of CBM produced water Pits. An Operator who can demonstrate the absence of Organic Compounds in produced water or worst case soil samples may use Rule 915.e.(2)C. to request a reduction to the list of contaminants of concern sampled during Pit closure. Per rule, the request must be made on an individual site basis. Operator will submit a proposed modified list of contaminants of concern on a Form 19 or Form 27, as applicable including analytical summary tables and the laboratory reports. Requests will include analytical results from the most recent CBM produced water sampling event, worst case soil samples, or be based upon other process knowledge.