



**State Harvard/Yale Pad
Waste Management Plan**

Section 08, Township 5 South, Range 64 West
Arapahoe County, CO

Introduction

Crestone Peak Resources Operating, LLC (CPR) Waste Management Plan was developed in accordance with Colorado Energy & Carbon Management Commission (ECMC) Rule 304.c.(11).

The following Materials & Waste Management Practices were prepared by CPR to ensure compliance with applicable federal, state, and local materials management regulations by utilizing a comprehensive program of materials handling and waste minimization, segregation, transportation, and disposal. The program is administered and maintained by environmental professionals employed by the Operator with formal education in materials and waste management and years of experience in the oil and gas (O&G) industry. These personnel oversee a team of environmental professionals and consultants responsible for implementing the program and ensuring processes are consistent with current regulations.

The following provides a brief overview of the Operator's Materials and Waste Management Best Management Practices and summarizes waste streams and practices for ensuring compliance with exploration and production (E&P) waste regulations administered by the ECMC, and applicable solid, hazardous, and universal waste regulations administered by the Colorado Department of Public Health and Environment (CDPHE).

All onsite waste containers will be compatible with stored contents and labeled appropriately with a description of the waste listed on the label. All containers will be inspected regularly to ensure they are in good condition and free of excessive wear, structural issues, or other defects that may impact their effectiveness.

Drilling Waste Management

Waste generated during the drilling phase of development consists of both non-hazardous, non-E&P and E&P waste.

E&P waste can be characterized as water-based drilling fluid, synthetic drilling fluid, and drill cuttings. Water based drilling fluids are used to drill the surface hole portion of the wellbore. These fluids are reused for each well that is planned to be developed on location. After the surface hole of all wells on location have been drilled, the water-based fluid will be stored on location in tanks until they can be hauled off location via truck to an approved offsite solids disposal location. Synthetic drilling fluid is used to drill the production hole of the well; this includes the (near) vertical portion from beneath the surface casing shoe to the target formation and through the entirety of the horizontal portion of the wellbore. The fluid is continually stored and reused during drilling operations for all wells on location. After all wells have been drilled, fluid is then transported via sealed truck to the next planned pad to be developed. Drill cuttings are native materials that are produced from drilling both the surface and production holes. The drill cuttings are treated on-site via mechanical separation to remove any free liquids – e.g., drilling fluid. The resulting “dried” drill cuttings are then stored via high wall containment until such a time that they can be transported off location to an approved, offsite solids disposal location.

Non-E&P waste is characterized as general trash consisting of surface debris, trash, unusable scrap, and solid waste generated during the drilling phase. This waste is securely stored in a roll off dumpster bin until it is hauled off location to an approved, offsite solids disposal location.

Completions Waste Management

Waste generated during the completions phase of development consists of both non-hazardous, non-E&P and E&P waste.

E&P waste can be characterized as mill-out sand and water that are generated during workover operations necessary to prepare the well for production operations. Mill-out sand is separated from water and stored in a 3- sided bin until it can be loaded onto a truck and hauled to an approved, offsite solids disposal location. Mill-out water is stored in a closed loop frac tank, until it can be transported to an approved, offsite solids disposal location.

Non-E&P waste is characterized as general trash consisting of surface debris, trash, unusable scrap, and solid waste generated during the completions phase. The waste is securely stored in a roll-off dumpster bin until it is hauled off location to an approved, offsite solids disposal location.

Construction Waste Management

Waste generated during the construction phase of development consists of non-hazardous, non-E&P waste characterized as general trash. Surface debris, trash, unusable scrap, or solid waste generated during construction will be securely stored in a roll-off dumpster bin. Once a roll-off dumpster bin is full, the bin will then be transported by truck to an approved, offsite solids disposal location.

Flowback Waste Management

Waste generated during the flowback phase of development consists of non-hazardous E&P waste. The waste consists of flowback water and sand that are generated after the recently completed wells begin to produce. Sand gets filtered out from the production fluids through a mechanical separation device known as a “sand can.” As the sand can gets full, the sand is blown down to a temporary tank where it is loaded onto a truck and hauled to an approved, offsite solids disposal location. Production fluids go to the onsite production facility where they are broken down into three streams: flowback (produced) water, oil, and gas. The produced water is stored in the onsite sealed produced water tanks until it can be transported via truck to an approved, offsite commercial disposal facility.

Production Waste Management

Waste generated during the production phase of development are generated at the onsite production facility and consist of non-hazardous E&P waste. The waste consists of produced water, oily soils, engine oil, chemical fluid totes, tank bottoms, and basic sediment and water (BS&W).

Produced water, much like flowback water, is a byproduct of oil and gas production. The produced water is stored in the onsite sealed produced water tanks until it can be transported via truck to an approved, offsite commercial disposal facility.

Engine oil and chemical totes are used on location for production operations and are stored in temporary tanks or plastic totes, both of which utilize secondary containment in case of leaks. When these fluids no longer meet specifications, they are hauled to an approved, offsite commercial disposal facility.

Tank bottoms, basic sediment, and water are byproducts of production operations and consists of dirt, oil emulsified with water, and free water. This facility is equipped with recycle pumps which eliminates this waste stream. Instead of draining VRTs and tank bottoms, the recycle pumps re-route these wastes streams back into the bulk separator to be reprocessed.

Spill Response/Remediation Waste Management

In the event there is a release of hydrocarbons from primary containment, contaminated oily soils and other media are excavated and loaded onto trucks where it is transported to an approved, offsite commercial disposal facility. All soil and other media are removed, until field and/or laboratory testing shows there is no longer contamination.

Facility Decommissioning/ Plugging and Abandonment Waste Management

When a location has reached the end of its life, facility decommissioning along with associated plugging and abandonment will commence. During this process, there is associated waste and opportunities for reuse. All remaining liquids that are generated during production operations are hauled off location to an approved offsite liquids disposal facility. Equipment that was utilized during production operations is thoroughly tested and, if it still meets acceptable specifications, it will be transported to another location and reused. Equipment that no longer meets specifications including facility equipment, flowlines, casing, and wellheads will be transported via truck to an approved, offsite solids disposal location or sold for scrap.

Reuse/Recycle

Where applicable, current reuse/recycling procedures have been discussed in the various phases of waste management. The operator continues to investigate options to reuse/recycle waste streams generated through pre-production and/or production operations. As other technologies and recycling practices become technically and economically feasible, they will be implemented into our operations as appropriate.

Human Waste

Self-contained portable toilets will be provided for human waste disposal during most operational activities. As necessary, the holding tanks on these toilets will be emptied and the contents will be disposed of at an approved sewage disposal facility.



Offsite Waste Transport Procedures and Tracking

CPR will comply with ECMC Rule 905.b. Waste containers will be labeled appropriately with a description of the chemical waste listed on the label. The Operator will retain records of any test results, waste analysis, waste profiles, manifests, shipping papers and any waste determinations made for at least five (5) years from the date the waste was removed from location.

CPR will comply with ECMC Rule 206. Records of waste that is transported off-site will be kept for a period of 5 years and shall include copies of each invoice, bill, or ticket and such other records as necessary to document waste disposal. Records will include:

- Date of transport
- Name of the generator
- Name of the transporter
- Location of the waste site
- Type and volume of waste
- Name, and location of the disposal facility

Approved Waste Disposal Facilities

Operational considerations, the type of waste in question, and approved disposal profiles, will determine where waste is disposed of on an individual project. The Operator has active waste disposal profiles with the following facilities:

SOLIDS DISPOSAL LOCATIONS

- Waste Management-Buffalo Ridge Landfill: COD-00227827
- Waste Management-Denver Arapahoe Disposal Site (DADS): COD-149366106
- Waste Management-North Weld Landfill: COD-983790684
- Waste Management-Conservation Services, Inc. (CSI): COD-983767674
- Waste Connections: COD-910629
- Pawnee Waste, LLC: EPL03443

LIQUIDS DISPOSAL LOCATIONS

- NGL Energy Partners, LP (*dba NGL Water Solutions DJ LLC*) – See *Appendix A* for full list.



<u>Waste Stream</u>	<u>Est. Volume (daily)</u>	<u>Method of Storage</u>	<u>Method of Treatment (if applicable)</u>	<u>Frequency of Disposal</u>	<u>Method of Disposal (*Approved Waste Disposal Locations)</u>	<u>Duration of Waste Stream (days)</u>	<u>Phase</u>
Surface (Water based bentonitic)Cuttings	240 Tons	High Wall Containment		16 Loads/Day	Commercial Solids Disposal	18	Drilling
Drilling (Water based bentonitic) Fluid	140 BBL	Storage Tanks		1 Load/pad	Commercial Solids Disposal	18	Drilling
Production(Oil Based) Cuttings	320 Tons	High Wall Containment		15 Loads / Day	Commercial Solids Disposal	69	Drilling
Drilling (Oil Based) Fluids	140 BBL	Storage Tanks		Never/Recycled	N/A	69	Drilling
General Trash	40 Yards	Roll off dumpster		1 dumpster/week	Landfill	184	Drilling/ Completions
Millout Sand	20,000 lbs	3 sided bin	NA	Daily	Side Dump Trailer	18	Completions
Millout Water	1200 bbls	Closed loop frac tanks	Biocide	3 days	Tanker Truck/Trailer	18	Completions
Flowback Sand	4 bbls	Frac Tank		1 time	Commercial Solids Diposal	60	Flowback
Flowback Water	4400 bbls	Sealed Tank		Daily	Commercial Fluid Disposal	60	Flowback
Produced Water	40 bbls	Sealed Tank		Daily	Commercial Fluid Disposal	Life of Wells	Production
Tank Bottoms	4 bbls	Concrete pit		Bi-weekly	Commercial Fluid Disposal	Life of wells	Production
Basic sediment and water	As needed	Concrete pit		As needed	Commercial Fluid Disposal	Life of wells	Production
Oily Soils	Varies	Trucked to approved waste site	Media will be characterized/ screened, removed, and disposed of in compliance with remediation practices required by 900-series rules.	As needed	Commercial Solids Disposal	Life of wells	Production
Engine Oil	1 gallon monthly	Concrete pit		As needed	Commercial Fluid Disposal	Life of wells	Production
Chemical Fluid Totes	5 gallons	Plastic Tote		As needed	Commercial Fluid Disposal	Life of wells	Production
Biohazardous Waste	34 Gallons	Portable Toilet		2 times/week	Commercial Disposal	184	Drilling/ Completions

Table 1: State Harvard/Yale Waste Stream (Volumes and frequencies are estimated)

Best Management Practices

1. All onsite waste containers will be compatible with stored contents and labeled appropriately with a description of the waste listed on the label. All containers will be inspected regularly to ensure they are in good condition and free of excessive wear, structural issues, or other defects that may impact their effectiveness.
2. Consistent with good materials and waste management practices, the Operator maintains records of material/waste source, transporter, and final disposition or disposal. These records are maintained under usual and customary practice and are made available upon request. See attached list of waste disposal facilities that the Operator has active waste disposal profiles with. Depending on operational considerations, the type of waste in question, and approved disposal profiles, the Operator may send waste to one or more approved facilities on a single, individual project.
3. The Operator minimizes the generation of waste by ensuring that material products are fully used for their intended purpose. If unused materials remain following an activity, contractors are required to take unused product with them for reuse at the next applicable project. Contractors are contractually required to comply with applicable material and waste management practices.
4. In the event of an unintended release of material by a contractor, the Operator requires the contractor to report the release, and to remediate impacts in accordance with applicable cleanup standards. The Operator tracks all contractor releases to closure by requiring formal documentation, supported by laboratory analysis demonstrating cleanup of site impacts, any required waste characterization, waste disposal approval, and manifests or load tickets tracking waste from source, through transport, to final disposal.
5. If there are unanticipated hazardous waste streams not listed in the attached Waste Streams Spreadsheet, the hazardous waste will be stored and disposed of in compliance with all rules and regulations applicable to that specific waste.
6. Produced water with no commercial value or reuse potential is typically disposed of via underground injection. In all instances, produced water is disposed of at an offsite location(s) via properly permitted disposal facilities including but not limited to UIC wells intended specifically for produced water disposal.
7. Soils impacted with produced fluids will be transported offsite for disposal at a disposal facility permitted to receive E&P waste. All incidents are reported in accordance with ECOM 900-Series Rules.
8. All drill cuttings generated during drilling operations are transported offsite with proper manifesting for disposal at facilities properly permitted to receive E&P waste. Drilling fluids will be stored on-site and recycled for use in future drilling operations.
9. All surface trash, debris, and material not intrinsic to the operation of the oil and gas facility shall be removed, stored in a roll off container or other trash bin and disposed of at a commercial solid waste disposal location.



Appendix A

Facility Name	ECMC Location ID	Latitude	Longitude
CENTRAL WELD SWD #1	443002	40.481780	-104.774310
CONQUEST SWD-64N64W #8SESE	329055	40.321092	-104.565822
NGL #C10B	450612	40.532560	-104.638910
NGL #C12A	440939	40.384110	-104.415940
NGL #C1C	305484	40.320297	-104.566164
NGL #C2 C & D	444710	40.016169	-104.896529
NGL #C3B	444922	40.287762	-104.678962
NGL #C5	440017	40.102970	-104.582800
NGL #C5A & C5B	159607	40.107446	-104.575499
NGL #C6A	159601	40.191650	-104.705460
NGL #C9B	440284	40.826500	-104.145170
NGL #C9C & C9F	440281	40.820610	-104.162360
NGL #C9Dm	456584	40.821780	-104.163080
NGL Apollo #11	443273	40.489735	-104.472850
NGL Apollo Facility	309984	40.490070	-104.473580
NGL MAJOR FACILITY	464900	40.320216	-104.566955
NGL MAJOR FACILITY #C1	302647	40.320830	-104.566400
NGL MAJOR FACILITY #C10	440290	40.525250	-104.628130
NGL MAJOR FACILITY #C11	435249	40.366055	-104.189802
NGL MAJOR FACILITY #C12	440941	40.369520	-104.415910
NGL MAJOR FACILITY #C2	330267	40.016564	-104.887081
NGL MAJOR FACILITY #C2	443339	40.022538	-104.886924
NGL MAJOR FACILITY #C3	311419	40.273861	-104.694278
NGL MAJOR FACILITY #C4	311343	40.451472	-104.627806
NGL MAJOR FACILITY #C5	440092	40.105521	-104.581750
NGL MAJOR FACILITY #C6	310159	40.192040	-104.698970
NGL MAJOR FACILITY #C7	419255	40.524140	-104.414560
NGL MAJOR FACILITY #C8	421249	40.893930	-104.335530
NGL MAJOR FACILITY #C9	438816	40.835970	-104.160350
ROY SWD #3	460668	40.026910	-104.780480
ROY SWD FACILITY	460656	40.028580	-104.780150
SOUTH WELD SWD FACILITY	456888	40.025060	-104.816560

Table A1: Liquids Disposal Facilities