



**OXY USA WTP LP**  
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# **OXY USA WTP LP**

## **DRILL CUTTINGS MATERIALS MANAGEMENT PLAN**

**STORAGE/STAGING AND DISPOSAL AREAS  
FOR DRILL CUTTINGS GENERATED AT  
OXY'S 16A-2 AND 609-14 PADS**

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# TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page Number</u></b>
Purpose and Need	2
Cuttings Storage and Disposal Plan	2
Drill Cuttings	3
Transportation of Cuttings to Disposal and Storage Areas	3
Cuttings Disposal Areas	3
Cuttings Storage Area	4
Cuttings Sampling Procedure	4
Spill Response and Cleanup Measures	6
Attachments:	
Figure 1 Location Map	
Figure 2 616-21-32 Pad	
Analytical Data	

## **Purpose and Need**

OXY USA WTP LP's (Oxy's) 2010 oil and gas development activities in the Piceance Basin consist of drilling at Oxy's 16A-2 and 609-14 pads. Both pads were constructed in 2008 and were initially designed for drilling activities to occur first and then to be followed by completions activities. Revisions to the 2010 development plan call for drilling and completions operations to occur simultaneously at these locations. Drilling and completions operations occurring simultaneously is commonly referred to as SimOps.

In order to accommodate SimOps without increasing the pad size, Oxy is proposing to temporarily store its drill cuttings at a nearby pad, specifically the Cascade Creek 616-21-32 pad (21-32 Pad) to ensure that all activities are completed safely. Oxy will also permanently dispose of cuttings at the 21-32 pad as well as the 16A-2 and 609-14 pads.

Oxy developed this Materials Management Plan (MMP) to address storage and disposal management of drill cuttings generated at Oxy's Cascade Creek 16A-2 and Cascade Creek 609-14 well pads (see Figure 1, Location Map). The pads are located within Oxy's Cascade Creek operating area (Oxy is the surface and mineral owner), specifically:

- 16A-2 pad: NWSW, Section 16, Township 6 South, Range 97 West, Garfield County, Colorado
- 609-14 pad: SWSW, Section 9, Township 6 South, Range 97 West, Garfield County, Colorado
- 21-32 pad: NENW, Section 16, Township 6 South, Range 97 West, Garfield County, Colorado.

Temporary storage and permanent disposal management would occur at Cascade Creek 616-21-32 pad. Permanent disposal will also occur at Oxy's 16A-2 and 609-14 pads after drilling and completion activities have been completed.

## **Cuttings Storage and Disposal Plan**

Oxy's cuttings storage and disposal plan will consist of:

1. Transport cuttings from 16A-2 pad to 21-32 pad for permanent disposal
  - a. Off load in 50' by 50' receiving/mixing area located immediately adjacent to the permanent disposal area; the permanent disposal area will be approximately 100' by 150' and surrounded by an earthen berm, See figure 2.
  - b. After cuttings have been mixed they will be carried over to the permanent disposal area and stacked until approximately 3,222 cubic yards of cuttings are laid there. The cuttings will be set back so that they do not over-run the containment berm.
  - c. A final layer will be capped with 3' cover (native material) and seeded.
2. After the permanent disposal area has filled to capacity, the cuttings from the 16A-2 and 609-14 pads will be transported to a temporary storage area also located on the 21-32 pad
  - a. The temporary storage area will be approximately 200' by 250', enclosed by an earthen berm and will be used to temporarily store the cuttings until SimOps activities have been completed at the 16A-2 pad.
  - b. Approximately 1,000 cubic yards of cuttings from the 16A-2 pad and approximately 2,000 cubic yards of cuttings from the 609-14 pad will be stored at the temporary storage area.
  - c. When the 16A-2 pad SimOps activities have been completed, the cuttings temporarily stored at the 21-32 pad will then be transported to 16A-2 reserve pit and pad for permanent disposal.

- d. After all the stored cuttings on the 21-32 pad have been removed, the 21-32 pad will be contoured, seeded and placed to interim reclamation conditions.
3. Transport cuttings from the 609-14 pad to the 16A-2 reserve pit and pad for permanent disposal
  - a. Cuttings generated at the 609-14 pad (approximately 5821.6 cubic yards) will be primarily disposed of at the 16A-2 reserve pit and/or utilized to re-contour the cut slopes located on the 16A-2 pad
  - b. All permanent disposal area will be capped with a 3' cover layer (native material) and reseeded.

## **Drill Cuttings**

Oxy proposes to drill 13 directional wells from the 16A-2 pad and 24 directional wells from the 609-14 pad. Drilling will begin at the 16A-2 pad in January 2010 with SimOps commencing around April 2010. Drilling activities will begin on the 609-14 pad as early as May 2010, with SimOps commencing around August 2010. On average each well drilled will generate approximately 218 cubic yards of drill cuttings. On average, the drill cuttings will expand to approximately 325.9 cubic yards per well, using a conservative 50 percent swelling factor.

Oxy will be employing a skidable rig capable of drilling up to 24 wells from a single pad. Oxy's drilling rig employs a semi-closed loop system for mud cycling and reuse. The rig air drills the surface hole and then air injects with mud for the production hole. As drill cuttings are returned to the surface they are deposited in to a de-gasser. The de-gassing process allows the cuttings and mud to better separate in the next phase. The cuttings and mud are then sent to four shakers, which drains out fluids and mud from the cuttings. The cuttings separated in this phase consist of a larger aggregate size and constitute the bulk of the cuttings to be stored off site. The separated fluids and mud that are collected are reused in the drilling process. Finer aggregate cuttings are separated by sending the cuttings/mud mixture to a settling tank (mud trap), from which the cuttings are then sent to a centrifuge to remove low gravity solids (cuttings). These low gravity solids will also be hauled off site for storage. Any low gravity solids containing cement will be diverted to the 16A-2 reserve pit.

Cuttings generated from the 16A-2 and 609-14 pads will be initially sampled (see sampling procedure below) prior to being hauled to the 21-31 pad for storage or disposal.

## **Transportation of Cuttings to Disposal and Storage Areas**

Cuttings will be placed on to transport trucks (5 cubic yard dump trucks) and hauled to the 21-32 pad. The transport trucks will travel on Oxy owned and maintained roads, a short distance from each pad. The 16A-2 pad is approximately 2,720 feet (driving distance) to the 21-32 pad and the 609-14 pad is approximately 4,890 feet (driving distance) to the 21-32 pad. The transport trucks will off load the dry cuttings initially at the designated permanent disposal area located on the 21-32 pad and once that permanent disposal area is full, the cuttings will be transported to the designated temporary storage area also located on the 21-32 pad. Oxy will log the volume of the dry cuttings hauled for disposal and storage at the 21-32 pad.

The transport routes do not cross any water ways or drainages. In the event that a transport truck over turns along the transport route, Oxy will implement spill response and clean up procedures, (see below).

## **Cuttings Disposal Areas**

The cuttings disposal areas will be located at the 21-32 and 16A-2 pads. Cuttings generated from the 16A-2 pad will initially be disposed of at the 21-32 pad. Stored cuttings located at the 21-32 pad will be relocated to the 16A-2 reserve pit and pad after SimOps have been completed for final disposal.

All disposal areas will be managed in accordance with COGCC regulations and comply with COGCC Table 910-1 standards. The initial cuttings batch sampled show elevated SAR and pH (see attached analytical results). To address the elevated SAR and pH, the cuttings will be buried and capped with three feet of native soil. Prior to being capped, a final sample will be pulled to ensure compliance with COGCC Table 910-1 standards. The final disposal locations shall be documented and the volume of the cuttings sent to disposal shall be recorded as well.

After the disposal areas have been capped with 3 feet of native fill material; the areas will be prepped for seeding. However, reseeding will generally occur in the early spring or fall which ever comes first to ensure seed germination. The disposal area will be monitored at the next growing season.

### **Cuttings Storage Area**

The cuttings staging/storage area will be located at Oxy's 21-32 pad. The storage area will consist of a shallow depression and surrounded by a 2 foot earthen berm; a Hesco barrier system may be implemented. No new areas will be disturbed for the staging/storage area. The earthen berm will adequately sized to contain the cuttings and any precipitation received throughout the life of the staging/storage area. Oxy will install stormwater best management practices around the earthen berm as necessary to reduce potential stormwater runoff.

The dry cuttings would be hauled to the site via transport trucks. The trucks will drop the cuttings off at a designated off loading area where a loader and/or dozer would spread the cuttings throughout the staging/storage area. As the cuttings containment area fills up, the cuttings pile will be managed to adequately to minimize stormwater runoff. The cuttings will not overfill the earthen berm.

### **Cuttings Sampling Procedure**

In accordance with Colorado Oil and Gas Conservation Commission (COGCC) regulations for storage and permanent disposal, samples shall be pulled through out the drilling process to document that the cuttings meet the standards which have been established by COGCC. To accomplish this, Oxy will:

- Initially, collect three (3) background samples and collect one (1) composite cuttings sample (taken from the drilling location). All initial samples will be analyzed for the full COGCC Table 910-1 constituents excluding Hot Water Soluble Boron. Barium will be analyzed via method SW-846.
- Monthly thereafter, collect one (1) cuttings composite sample from the cuttings storage bin (mixed with sawdust which is used to absorb any *de minimus* water in the cuttings) and analyzed for any analytes that initially exceeded Table 910-1 Maximum Contaminant Levels (so long as those results are greater than all background concentrations).

Cuttings samples shall be collected directly from the cuttings bin. At a minimum, one composite sample should be collected. The individual collecting the sample should wear a new pair of disposable "exam type" gloves for each sample collected to prevent cross-contamination of the samples. The samples should be collected using a stainless steel spoon, trowel or other appropriate equipment. The sampling equipment used will need to be thoroughly cleaned and rinsed with distilled water between each discrete sample. Appropriate sampling containers should be used for each sample. Each discrete sample should be placed into the specified container, and a log kept identifying the date, time, and identification of the person pulling the samples. The containers must be stored in a temperature controlled area which will maintain at or near 40 degrees F. (i.e. a refrigerator).

Once the last composite has been pulled all of the samples from the cuttings should be thoroughly mixed together in a stainless steel bucket/bowl. A single sample should be pulled from this composite mixture, and placed into glass jars (provided by the laboratory). After filling the jars a sample label will be prepared and placed over the lid to provide a permanent seal to take the sample through chain of custody to the specified laboratory.

Each composite samples will be sent to a laboratory for analysis, samples should be given a distinct identification number (for example: 01 cuttings), labeled with the date and time of the sample collection, and the initials of the sampler, placed in a cooler with ice or back into the refrigerator under chain of custody protocol. The samples must be kept on ice and cool, during transportation from the field to the laboratory.

Background samples shall be collected immediately adjacent to the existing pad, in an undisturbed area.

#### Chain-of-Custody Procedures

Written procedures for sample handling should be available and followed whenever samples are collected, transferred, stored, analyzed or destroyed. For the purposes of litigation (and quality control), it is necessary to have an accurate written record to trace the possession and handling of samples from collection through reporting. The procedures defined here represent a means to satisfy this requirement.

##### A. Sample is in someone's "custody" if:

1. It is in one's actual physical possession;
2. It is in one's view, after being in one's physical possession;
3. It is one's physical possession and then locked up so that no one can tamper with it;
4. It is kept in a secured area, restricted to authorized personnel only.

##### B. Sample Collection, Handling and Identification

1. It is important that a minimum number of persons be involved in sample collection and handling. Field records should be completed at the time the sample is collected and should be signed or initialed, including the date and time, by the sample collector(s). Field records should contain the following information:
  - a. Unique sample or log number;
  - b. Date and time;
  - c. Source of sample (including name, location and sample type);
  - d. Name of collector(s);
  - e. Comments.
2. Each sample is identified by affixing a pressure sensitive gummed label or standardized tag on the container(s). This label should contain the sample number, source of sample, preservative used, and the collector(s') initials. The analysis required should be identified. Where a label is not available, the sample information should be written on the sample container with an indelible marking pen.
3. The closed sample container should then be placed in a transportation case or appropriate container along with the chain-of-custody record form, pertinent field records, and analysis request forms (these forms will be supplied with the appropriate sample containers). A transportation case if used should then be sealed and labeled. All records should be filled out legibly in waterproof pen. The use of locked or sealed chests will eliminate the need for close control of individual sample containers. However, there will undoubtedly be occasions when the use of a chest will be inconvenient. On these occasions, the sampler should place a seal around the cap of the individual sample container which would indicate tampering if removed.

##### C. Transfer of Custody and Shipment

1. When transferring the possession of the samples, the transferee must sign and record the date and time on the chain-of-custody record. Custody transfers, if made to a sample custodian in the field, should account for each individual sample, although samples may be transferred as a group. Every person who takes custody must fill in the appropriate section of the chain-of-custody record.
2. The field custodian (or field sampler if a custodian has not been assigned) is responsible for properly packaging and dispatching samples to the appropriate laboratory for analysis. This responsibility includes filling out, dating, and signing the appropriate portion of the chain-of-custody record.
3. All packages sent to the laboratory should be accompanied by the chain-of-custody record and other pertinent forms. A copy of these forms should be retained by the field custodian (either carbon or photocopy).
4. Mailed packages can be registered with return receipt requested. If packages are sent by common carrier, receipts should be retained as part of the permanent chain-of-custody documentation.
5. Samples to be transported must be packed to prevent breakage. If samples are shipped by mail or by other common carrier, the shipper must comply with any applicable Department of Transportation regulations. (Most water samples are exempt unless quantities of preservatives used are greater than certain levels.) The package must be sealed or locked to prevent tampering. Any evidence of tampering should be readily detected if adequate sealing devices are used.

If the field sampler delivers samples to the laboratory, custody may be relinquished to laboratory personnel. If appropriate personnel are not present to receive the samples, they should be locked in a designated area of the laboratory to prevent tampering. The person delivering the samples should make a log entry stating where and how the samples were delivered and secured. Laboratory personnel may then receive custody by noting in a logbook, the absence of evidence of tampering, unlocking the secured area, and signing the custody sheet.

After the lab has run the samples, the lab will provide Oxy with the results in a written report per the specified turn-around time.

### **Spill Response and Cleanup Measures**

In the event that a transport truck overturns and discharges cuttings materials, the site will be secured. Oxy emergency response personnel will ensure that the area is safe and that no fuel or hydraulic fluid has been released. If fuel, hydraulic fluid or other refined chemical has released, then the release will be contained, cleaned up, and if applicable reported to the necessary agencies.

Any cuttings that have discharged from the truck will be contained and collected and taken to either the disposal or storage area. The cuttings shall be transported in a dry state and therefore not run-off or generate an impact beyond the release area.







**Figure 2: 616-21-32 PAD**



Drill Cuttings - 697-16A2

Pad #:697-16A2

		Sample Identifications (mg/kg)						
	MCL (mg/kg)	02 Background-NW 01/15/10	03 Background-N 01/15/10	04 Background-E 01/15/10	01 Cuttings 11/15/10	01 Cuttings (February 2010)	01 Cuttings (March 2010)	01 Cuttings (April 2010)
Organics in Soil								
TPH (GRO and DRO)	500	ND	5.7	5.4	321			
Benzene	0.17	<0.00090	<0.00090	<0.00090	0.0050			
Toluene	85	0.0036	<0.0015	<0.0015	0.0140			
Ethylbenzene	100	0.0024	<0.0013	<0.0013	0.0088			
Xylenes	175	0.0034	85.00	<0.0028	0.0330			
Organics in Soil (PAH's)								
Acenaphthene	1000	<0.011	<0.011	<0.011	<0.011			
Anthracene	1000	<0.0093	<0.0093	<0.0093	0.012			
Benzo(A)anthracene	0.22	<0.0077	<0.0077	<0.0077	<0.0077			
Benzo(B)fluoranthene	0.22	<0.0078	<0.0078	<0.0078	<0.0078			
Benzo(K)fluoranthene	2.2	<0.012	<0.012	<0.012	<0.012			
Benzo(A)pyrene	0.022	<0.0074	<0.0074	<0.0074	<0.0074			
Chrysene	22	<0.0091	<0.0091	<0.0091	<0.0091			
Dibenzo(A,H)anthracene	0.022	<0.011	<0.011	<0.011	<0.011			
Fluoranthene	1000	<0.0079	<0.0079	<0.0079	<0.0079			
Flourene	1000	<0.0095	<0.0095	<0.0095	<0.0095			
Indeno(1,2,3,C,D)pyrene	0.22	<0.011	<0.011	<0.011	<0.011			
Napthalene	23	<0.016	<0.016	<0.016	0.062			
Pyrene	1000	<0.0089	<0.0089	<0.0089	<0.0089			
Inorganics in Soil								
EC	<4 mmhos/cm or 2X background	0.290	0.096	0.140	1.5			
SAR	<12	0.55	0.37	0.22	32			
pH	6-9	7.9	6.9	7.2	9.5			
Metals in Soils								
Arsenic	0.39	1.6	5.1	1.8	4.6			
Barium	15000	230	260	180	220			
Boron (Hot Water Soluble)	2 (mg/L)	NA	NA	NA	NA			
Cadmium	70	0.70	0.44	0.38	0.86			
Chromium	12000	43	42	22	12			
Chromium VI	23	19	<5.2	14	<1.0			
Copper	3100	20	16	14	19			
Lead	400	14	12	11	9.2			
Mercury	23	0.023	0.015	0.025	0.028			
Nickel	1600	32	26	15	15			
Selenium	390	<0.32	<0.32	<0.32	<0.32			
Silver	390	<0.16	<0.16	<0.16	<0.16			
Zinc	23000	56	52	44	56			