

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax: (303)894-2109



FOR OGCC USE ONLY

EARTHEN PIT REPORT/PERMIT

This form is to be used for both reporting and permitting pits. Rule 903 describes when a Permit with prior approval, or a Report within 30 days, is required for pits. Submit required attachments and forms.

Complete the
Attachment Checklist

FORM SUBMITTED FOR:

☒ Pit Report

☒ Pit Permit

Oper OGCC

Detailed Site Plan	✓	
Topo Map w/ Pit Location	✓	
Water Analysis (Form 25)		
Source Wells (Form 26)		
Pit Design/Plan & Cross Sec	✓	
Design Calculations	✓	
Sensitive Area Determ.		
Mud Program		
Form 2A	✓	

OGCC Operator Number: 66571
Name of Operator: OXY USA WTP LP
Address: P.O. Box 27757
City: Houston State: TX Zip: 77227-7557

Contact Name and Telephone:
Daniel Padilla
No: (970) 263-3637
Fax: (970) 243-2525

API Number (of associated well): 05-045-07522 OGCC Facility ID (of other associated facility): Loc. 335802

Pit Location (QtrQtr, Sec, Twp, Rng, Meridian): NESW, Sec 5, T6S, R97W, 6th PM

Latitude: 39.551337 Longitude: -108.245261 County: Garfield

Pit Use: ☒ Production ☐ Drilling (Attach mud program) ☐ Special Purpose (Describe Use):

Pit Type: ☒ Lined ☐ Unlined Surface Discharge Permit: ☐ Yes ☒ No

Offsite disposal of pit contents: ☐ Injection ☒ Commercial Pit/Facility Name: OXY Mesa PP Pit Pit/Facility No: 605-23

Attach Form 26 to Identify Source Wells and Form 25 to provide Produced Water Analysis results.

Existing Site Conditions

Is the location in a "Sensitive Area?" ☐ Yes ☒ No Attach data used for determination.

Distance (in feet) to nearest surface water: 1470' ground water: >500' water wells: 1591'

LAND USE (or attach copy of Form 2A if previously submitted for associated well) Select one which best describes land use:

Crop Land: ☐ Irrigated ☐ Dry Land ☐ Improved Pasture ☐ Hay Meadow ☐ CRP

Non-Crop Land: ☐ Rangeland ☐ Timber ☐ Recreational ☐ Other (describe):

Subdivided: ☐ Industrial ☐ Commercial ☐ Residential

SOILS (or attach copy of Form 2A if previously submitted for associated well)

Soil map units from USNRCS survey: Sheet No: Soil Complex/Series No:

Soils Series Name: Horizon thickness (in inches): A: ; B: ; C:

Soils Series Name: Horizon thickness (in inches): A: ; B: ; C:

Attach detailed site plan and topo map with pit location.

Pit Design and Construction

Size of pit (feet): Length: 80' Width: 50' Depth: 10'

Calculated pit volume (bbls): 2,303 Daily inflow rate (bbls/day): 1.7

Daily disposal rates (attach calculations): Evaporation: 5.5 bbls/day Percolation: none bbls/day

Type of liner material: Reinforced Polyethylene Thickness: 36 mils

Attach description of proposed design and construction (Include sketches and calculations).

Method of treatment of produced water prior to discharge into pit (separator, heater treater, other): separator

Is pit fenced? ☒ Yes ☐ No Is pit netted? ☐ Yes ☒ No

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

Print Name: Daniel Padilla

Signed: Daniel Padilla

Title: Regulatory Coordinator

Date: 9/24/08

OGCC Approved: [Signature]

Title: Env. Sup.

Date: 1/30/2012

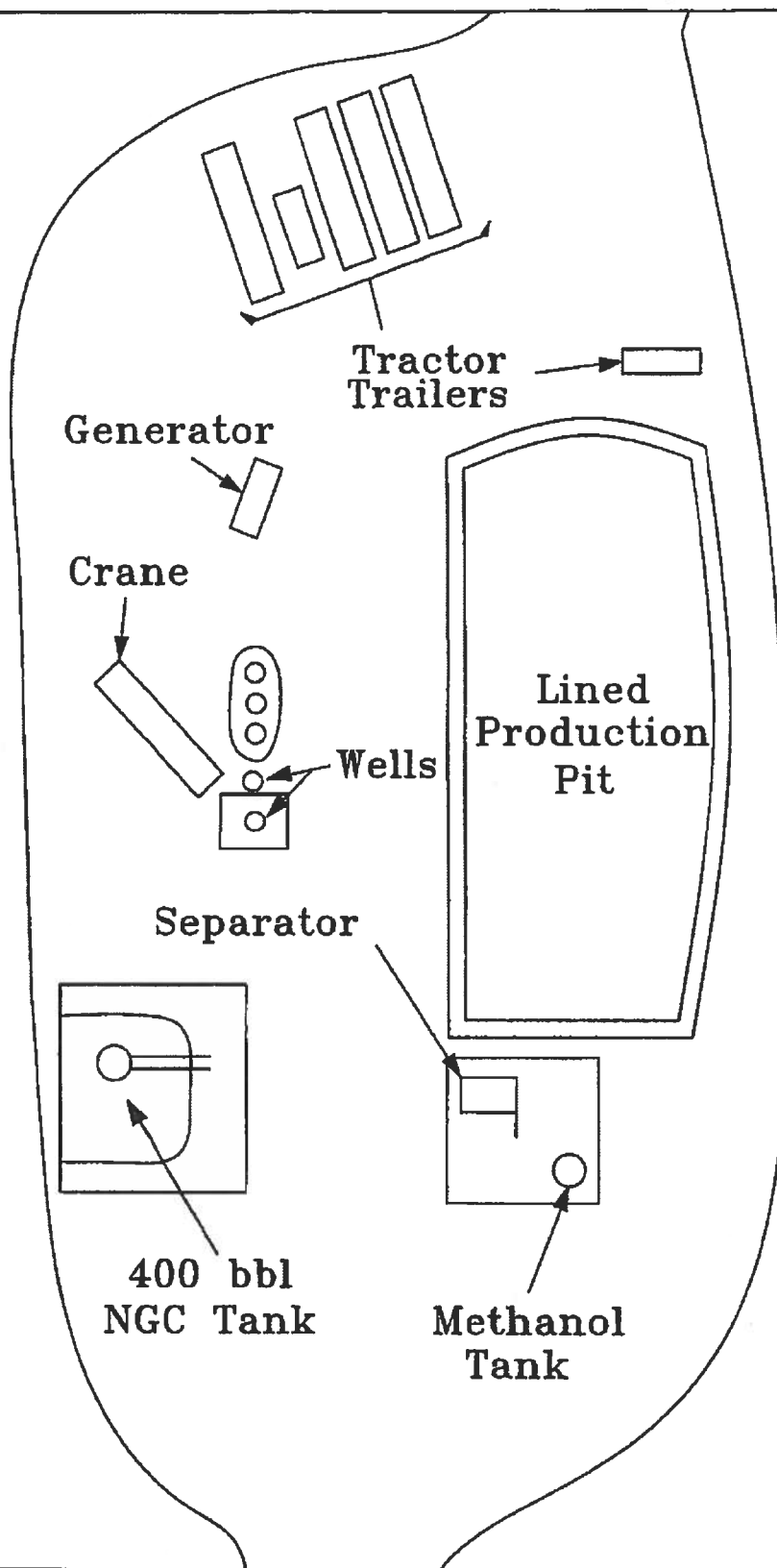
CONDITIONS OF APPROVAL, IF ANY:

FACILITY NUMBER:

427522

This pit was constructed but not used and has been closed (see Form 4 Doc # 2221331).

ASR 1/30/12



Explanation

0 50 Feet
Approximate Scale



Walsh

Environmental Scientists and Engineers, LLC

As Built For OXY's
605-23 Pad

Garfield County, Colorado

Job 7830-030

Date 9/08

Figure 1

Index Sheet: **Non Site Specific Pit Design** **Synthetic Liner Options** **Rocky Mountain Assets** **Garfield County, Colorado**

Description:

Index Sheet

General Construction Sequence

General Construction Guidelines

Geosynthetics Guidelines

Pit Plan View

Pit Section Views

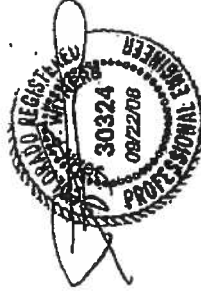
Sheet Number:

- 1
- 2
- 3
- 4
- 5
- 6



PROJECT OXY USA WTP LP 2704 Compass Drive, Suite 170 Grand Junction, CO 81508		DATE 09/22/08		REVISIONS 1 2 3 4 5 6	
DESCRIPTION Index Sheet Non Site Specific Pit Design Rocky Mountain Assets		APPROVED FOR CONSTRUCTION 09/22/2008 Ben Grubbs Geotechnical Engineering Group, Inc. 6507550000, CHS & STRUCTURAL CONSULTANTS		DATE 09/22/08	
PROJECT OXY USA WTP LP 2704 Compass Drive, Suite 170 Grand Junction, CO 81508		DATE 09/22/08		REVISIONS 1 2 3 4 5 6	

- 1) *State pit boundaries and edge of disturbed area including bank above freeboard and anchor trench for liner. All pit extents must be at least ten feet from pad boundary, and referenced from finished pad grade and elevation.*
- 2) *Excavate the pit bottom and pit slopes to specification so as to leave a layer of soil in bottom and sides as specified.*
- 3) *Excavate pit top bank and anchor trench areas as specified.*
- 4) *Compact pit bottom and slopes as specified.*
- 5) *Compact top bank and anchor trenches as specified.*
- 6) *Install geosynthetic pit liners as specified.*
- 7) *Backfill and compact anchor trenches as specified.*
- 8) *Install animal safety ramp as specified.*
- 9) *Install protective fence and sub-fence as specified.*

[illegible]

Non Site Specific Pit Design Synthetic Liner Options Rocky Mountain Assets General Construction Guidelines

1) Pit designs indicated herein are intended to give guidance for site-specific pit design requirements, and as such are not to be used as construction plans. Pit overall dimensions shown herein are based on assumed pit configurations. If actual site conditions prevent any of the following guidelines from being achieved, Geotechnical Engineering Group, Inc. is to be advised. Geotechnical Engineering Group, Inc. representative shall be called to site prior to liner procurement for validation.

2) Pit Bottom Soils: Pit bottom is to be entirely in cut slopes from native and undisturbed material. Pit bottom shall be excavated to a depth of 12 inches below nominal bottom elevation, and shall be dished or beaded until it is free from large clasts, brought to the proper moisture content (within 1 percent below to 3 percent above optimum) and compacted to not less than 95 percent of maximum dry density as determined in accordance with ASTM D888 standard proctor. If existing subsurface conditions are encountered, stabilization may be required as determined by the Geotechnical Engineer. Use of Geosynthetic liner materials replaces the need for additional tested bedding material specified in COGCC NT-612/2008.

3) Pit Slopes and Bank Soils: Pit slopes and bank areas may be constructed from approved fill materials. These materials include but are not limited to reworked cuttings, native cut there are in compliance with COGCC specifications. Soil conditions and construction techniques outlined here allow slopes in excess of the 2:0H : 1.0V specified in the COGCC NT-612/2008. The slopes of any pit wall shall not exceed 1.5H:1.0V. Pit slopes and areas on the top bank shall be dished or rolled with a sheep's foot or similar attachment until they are free from any protruding sharp clasts larger than 6 inches in total size and with no clast protruding more than 3 inches above the plane of the slope or bank. If existing subsurface conditions are encountered, stabilization may be required as determined by the Geotechnical Engineer.

4) Anchor Trench Soils: An anchor trench shall be excavated as shown and the slopes of the trench shall be dished or beaded until it is free from large clasts and sharp clasts. Anchor trench backfill material shall be dished or beaded until it is free from clods or clasts over 6-inches diameter, and stockpiled until needed.

5) Geosynthetic Liner: The pit will be lined with one of six liner system options after the completion of earthwork. Refer to Sheet 4 of 6, Geosynthetic Guidelines, for applicable specifications. Only liner options (A), (B) and (F) are intended for pits that are located within the area specified in COGCC NT-612/2008. Pits outside that area shall use one of the liner options based on site specific excavation conditions. No vehicle traffic is allowed on the liner system other than as may be required and approved by manufacturer during installation.

6) Anchor Trench Backfill: After installation of geosynthetic pit liners per the guidelines included here and the pit liner manufacturer's specifications, the edge of the liner is to be anchored in the trench as shown and covered with anchor trench backfill material as noted. Backfill to be brought to the proper moisture content (within 2 percent above or below optimum), and compacted to not less than 95 percent of maximum dry density as determined in accordance with ASTM D888, standard proctor.

7) Animal Safety Ramp (ASR): Ramp shall be constructed of an eleven foot six inch wide by thirty two foot long mat of 60 mil textured HDPE that overlays the pit liner along the section of pit slope farthest from active rig operations, and is nearest to the native edge of the well pad. Refer to sheet 5 of 7, Geosynthetic Guidelines, for installation guidelines.

8) Protective Fence: Pits shall be surrounded on all sides by an four foot tall, six inch opening galvanized wire cloth fence with a sub-fence liner of one inch opening galvanized wire cloth attached to the bottom one foot of the six inch opening fabric. Fence to have a six foot wide opening centered about the animal safety ramp. Fence posts to be located a minimum of one foot outside of the outer limit of the pit liner anchor trench and to have a nominal spacing not larger than twenty feet.



Approved for construction, 08/29/2008 Ben Grubbs Geotechnical Engineering Group, Inc. 2744 Compass Drive, Suite 170 Golden, Colorado 80601 303-266-1471 • Fax 303-266-1472		Approved for construction, 08/29/2008 Ben Grubbs Geotechnical Engineering Group, Inc. 2744 Compass Drive, Suite 170 Golden, Colorado 80601 303-266-1471 • Fax 303-266-1472	
Date: 08/29/2008 Drawn by: JH Checked by: JH Approved by: JH	Scale: 2,004 Title: General Construction Guidelines Non Site Specific Pit Design Rocky Mountain Assets	None	None

Non Site Specific Pit Design Synthetic Liner Options

Rocky Mountain Assets

Geosynthetics Guidelines

1) **Pit liner options:** The liner systems for the pit are geosynthetic systems comprised of a Geocomposite, a Geosynthetic Clay Liner (GCL), and a Geosynthetic membrane. Typical manufacturers and product names used in these systems are as follows:

Geosynthetic Clay Liner- SKANS INDUSTRIES- SKANS TRANSNET with 12 oz outer layer.
Geosynthetic Clay Liner- CETCO LINING TECHNOLOGIES- BENTOMAT ST
Geosynthetic membrane- BTL INC.- PPL-30 (Reinforced Polyethylene).
Geosynthetic membrane- GLL INC.- 30-oz PVC (PVC).

Depending on material availability, equivalent materials may be substituted.

2) **Geocomposites:** This layer of the liner system is a permeable non-woven geosynthetic material on each side of a bi-directional Geonet. Prior to installing the geocomposite, the contractor shall remove any loose or sharp material protruding from the pit slopes, floor and top bank. The geocomposite is to be laid perpendicular to the slope of the pit with no parallel seams in the anchor trench, on the top bank, or along the pit slope higher than 4 feet above the pit floor. Seams are to be 6 inch overlaps with the bottom layer of non-woven material overlapped over the entire engagement. The Geonet is to be overlapped and attached with 80# zip ties every 24 inches. The top non-woven layers are to be overlapped and heat bonded. The geocomposite is to be laid in total contact with the anchor trench resulting in a flat horizontal and vertical surface contact. Refer to the manufacturer's complete specifications for additional installation details.

3) **Geosynthetic Clay Liner (GCL):** This layer of the system is a layer of sodium bentonite between a permeable woven and non-woven geosynthetic. The GCL is to be laid perpendicular to the slope of the pit with the non-woven layer in full contact with either the pit excavated surfaces or any underlain geosynthetic liner, and with no parallel seams in the anchor trench, on the top bank, or along the pit slope. Seams are to be staggered a minimum 1 foot off of the seams for any underlain geosynthetic, and be 6 inch overlaps. End of roll seams shall be overlapped 2 feet and located on the floor of the pit. The GCL is not to be stapled. Refer to the manufacturer's complete specifications for additional installation details. In applications where the GCL is sandwiched between other geosynthetic layers, additional sodium bentonite is not required at GCL seams due to confinement by other layers.

4) **Geosynthetic membrane:** The top layer of the system is a Geosynthetic membrane comprised of a 38 mil RPE (Reinforced Polyethylene), material. The Geosynthetic is to be laid perpendicular to the slope of the pit in contact with either the pit excavated surfaces or any underlain geosynthetic liner. If liner is not pre-manufactured, seams are to be staggered 1 foot off of the seams for any underlain geosynthetic liner, and are to be field heat bonded per manufacturer's specifications. Care is to be taken to ensure that no tears or burn through occurs in the GCL during installation of the Geosynthetic membrane. Refer to the manufacturer's complete specifications for additional installation details. Field welding procedures shall be observed and sampled by a representative of the Geotechnical Engineer for pool and shear testing.

5) **Animal Safety Ramp (ASR):** Ramp shall be constructed of an eleven foot six inch wide by thirty two foot long mat of 60 mil textured HDPE. ASR overlays the pit liner along the section of pit slopes farthest from active rig operations, and is nearest to the native edge of the wall pad. ASR to be supplied in pre fabricated rolls from COLORADO LINING INTERNATIONAL or other approved vendor. ASR to be anchored at the top of the pit bank with appropriate bedding material in a secondary anchor trench that is outside the extent of the liner system anchor trench. This trench shall be a minimum of one foot deep and one foot wide. The ASR shall extend at least 5 feet onto the floor of the pit. The ASR may not be sealed to the pit liner top bank, slope or floor in any fashion that might result in puncturing the liner system. The ASR may be spot welded to the Geosynthetic membrane as required to anchor edges from wind lift.

6) Pit lining options:

A) 2-layer Geosynthetic System: The bottom layer of the system is an 12 oz. Geosynthetic liner, the effects of minor debris protruding through the surface of the pit excavation. The top layer, used for confinement is a Geosynthetic membrane, (PPL-30). Installation of each component is to adhere to the specifications in this document and with the manufacturer's complete specifications.

B) 3-layer System: The bottom layer is a Geocomposite, TRANSNET, the middle layer is a GCL, BENTOMAT ST-1, and the top layer is a Geosynthetic membrane, PPL-30. Installation of each of the liner components is to adhere to the specifications in this document and with the manufacturer's complete specifications.

C) 2-layer GCL System: The bottom layer of the system is a layer of GCL, BENTOMAT ST. The top layer, used for primary confinement is a Geosynthetic membrane, (PPL-30). Installation of each component is to adhere to the specifications in this document and with the manufacturer's complete specifications.

D) 2-layer Geocomposite System: The bottom layer is a Geocomposite, TRANSNET. The top layer, used for primary confinement is a Geosynthetic membrane, (PPL-30). Installation of each component is to adhere to the specifications in this document and with the manufacturer's complete specifications.

E) Solitary Geosynthetic Membrane System: The liner consists of a single layer of Geosynthetic membrane, (PPL-30). Installation of the Geosynthetic membrane is to adhere to the specifications in this document and with the manufacturer's complete specifications.

F) Double Composite 4 layer system: The bottom layer is a Geocomposite, TRANSNET, the next layer is a 30 mil PVC Geosynthetic Membrane. The second composite layer is a GCL, BENTOMAT ST. The top, primary confinement layer, is a Geosynthetic Membrane, (PPL-30). Installation of each component is to adhere to the specifications in this document and with the manufacturer's complete specifications.



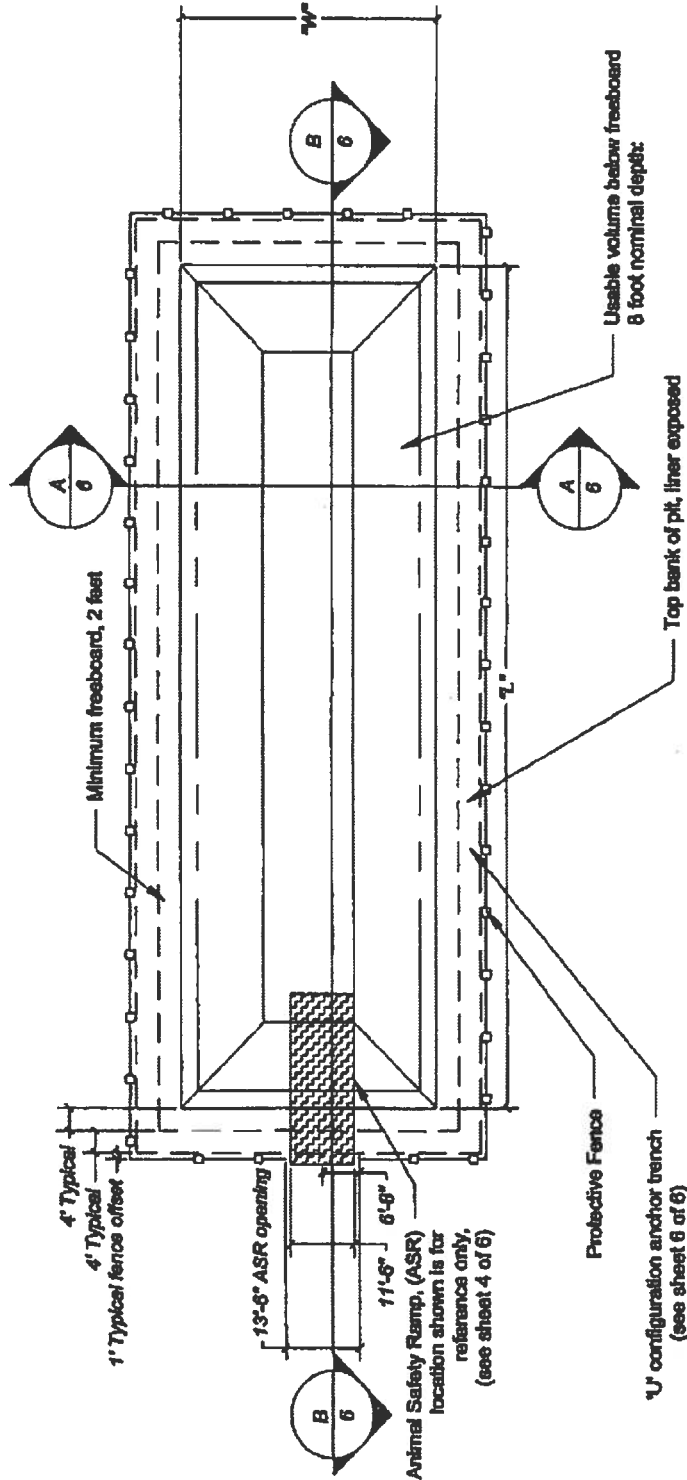
<div> OXY USA WTP LP 3754 Caspary Drive, Suite 170 Grand Junction, CO 81506 </div>	Approved for Construction, 09/20/2008 Ron Gelske	APPROVED FOR CONSTRUCTION DATE BY CHECKED DATE BY
Geotechnical Engineering Group, Inc. 1000 14th Street, Suite 100 Grand Junction, CO 81506	Approved for Construction, 09/20/2008 Ron Gelske	APPROVED FOR CONSTRUCTION DATE BY CHECKED DATE BY
Geotechnical Engineering Group, Inc. 1000 14th Street, Suite 100 Grand Junction, CO 81506	Approved for Construction, 09/20/2008 Ron Gelske	APPROVED FOR CONSTRUCTION DATE BY CHECKED DATE BY



Non Site Specific Pit Design Synthetic Liner Options Rocky Mountain Assets Plan View

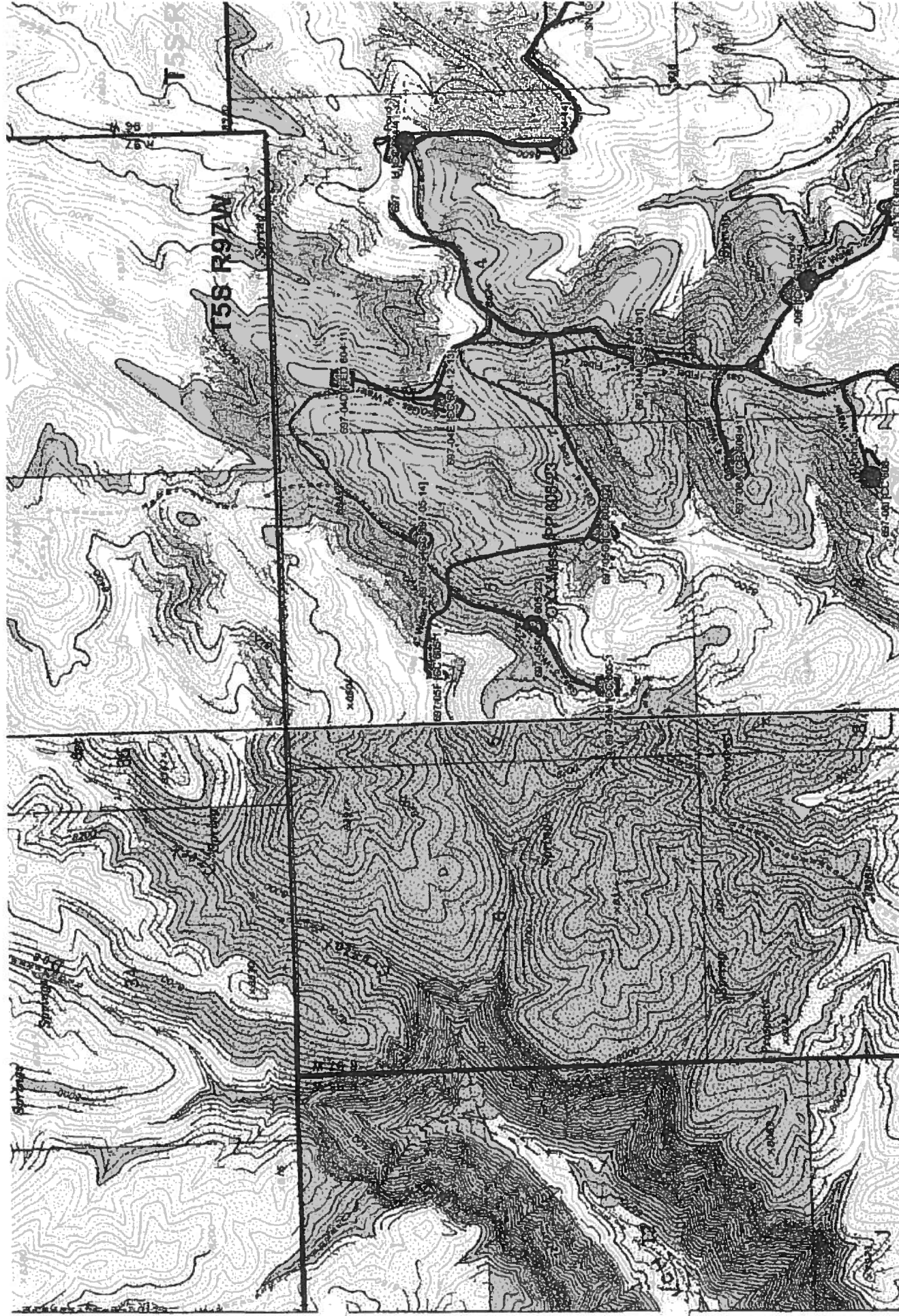
Notes:
Pit dimensions are nominal with the following tabulated pit calculations:

L-200Z			
Pit Dimensions:	Total Volume (cu ft)	Usable Volume (cu ft)	Fence length (ft)
W=82	3850	1882	684.5
L=107	4200	2120	678.5
W=82	2875	1437.5	684.5
L=107	3115	1557.5	678.5



<div> </div> <div> OXY USA WTP LP 2704 Compass Drive, Suite 170 Grand Junction, CO 81508 </div>	Approved for Construction: 09/20/2008 Ben Grebbs Civil Engineer 30324 09/22/08	Project No.: Revision: Date: Drawn by: Checked by: Approved by:
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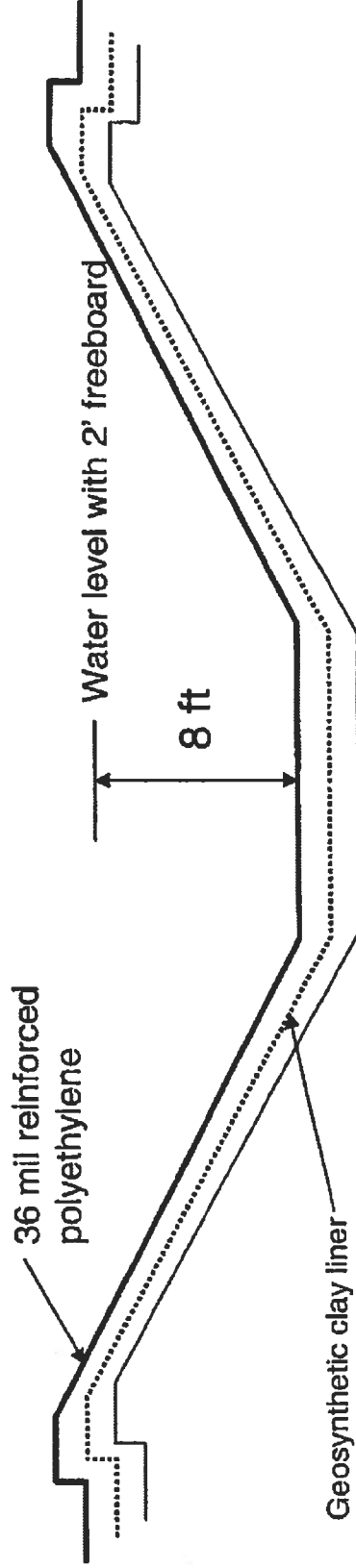
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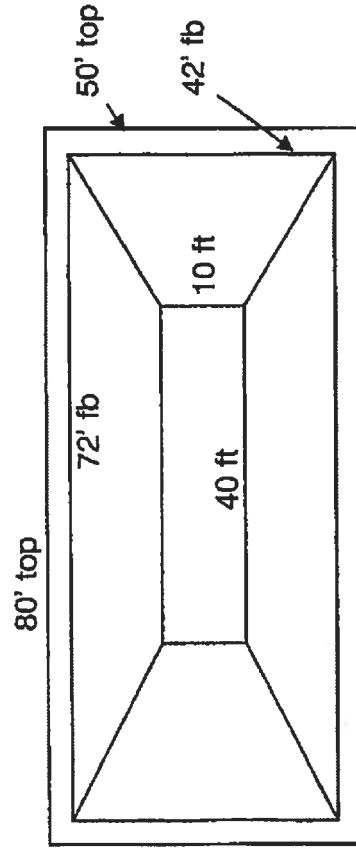
OXY Mesa PP 605-23 Pit, NESW Sec 5, 6S, 97W 6th

Side View

PRODUCTION PIT



Top View



Volume of Pit = 2,303 bbls (with 2' freeboard)

Volume Calculation:

$$= \frac{8 * [(72 * 42) + (57 * 25) + (40 * 10)]}{3}$$

$$= 12,931 \text{ cu ft} = 2,303 \text{ bbls}$$

Volume of 1" = 44.9 bbls @ freeboard line

OXY USA WTP LP	Production Pit	
	OXY Mesa PP 605-23 Pit/ 605-23 Pad (Garfield County)	
Sep 10, 2008	Not to scale	Page 1 of 1

FORM
2A
Rev. 12/98



00869724



State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver Colorado 80203: (303) 894-2100 Fax 894-2109

DRILL SITE/ACCESS ROAD RECLAMATION FORM

This form shall be submitted in duplicate with the application for permit-to-drill (OGCC Form 2) unless a Federal 13 point surface plan is included. Also required are a minimum of two photographs (site and access road). Soil and plant community information from United States Natural Resources Conservation Services (USNRCS).

FOR OGCC USE ONLY

RECEIVED

APR -4 00

COGCC

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Complete the Application
Attachment Checklist

1. OGCC Operator Number: 66561	4. Contact Name & Phone Joe Flemming	Oper	OGCC
2. Name of Operator: Oxy USA, Inc.	No: 915-685-5858		
3. Address: PO Box 50250	Fax: 915-685-5888	Drill site and access photographs	X
City: Midland State: TX Zip: 79710		COE Section 404 documentation	
5. Well Name & Number: Cascade Creek #605-23	6. County: Garfield		
7. Location (Qtr, Sec, Twp, Rng, Meridian): NE SW 5 6S R97W 6th PM			

Pre-Drilling Information

Current Land Use

8. Crop Land: ☐ Irrigated ☐ Dry Land ☐ Improved Pasture ☐ Hay Meadow ☐ CRP
 9. Non-crop land: ☒ Rangeland ☐ Timber ☐ Recreational ☐ Other (describe):
 10. Subdivided: ☐ Industrial ☐ Commercial ☐ Residential

* Attach color photographs of drill site and access road; identify each photo by date, well name and location.

Soils

11. Soil map units from USNRCS survey: Sheet No: 12 Soil Complex/Series No: 55
 Soils Series name: Parachute Horizon thickness (in inches): A: 10 B: 15 C: Bedrock
 Soils Series name: Ingal Horizon thickness (in inches): A: 6 B: 7 C: Bedrock

Plant Community

* Complete only if operations to be conducted upon non-crop land

12. Plant species from: ☐ USNRCS or ☒ Field Observation Date of Observation: 11/09/99
 List individual species:

13. Check one predominant plant community for the drill site:

- ☐ Disturbed Grassland (Cactus, Yucca, Cheatgrass, Rye, Thistle)
☐ Grassland (Bluestem, Grama, Wheatgrass, Buffalograss, Fescue, Oatgrass, Brome)
☒ Shrub and Brush Land (Mahogany, Oak, Sage, Serviceberry, Chokecherry)
☐ Plains Deciduous Riparian (Cottonwood, Willow, Aspen, Maple, Poplar, Russian Olive, Tamarisk)
☐ Mountain Conifer Riparian (Spruce, Fir, Ponderosa Pine)
☐ Evergreen Forest Land (Spruce, Fir, Ponderosa Pine, Lodgepole Pine, Juniper, Pinyon)
☐ Aquatic (Bullrush, Sedges, Cattail, Arrowhead)
☐ Tundra (Alpine, Willow, Currant, Raspberry)
☐ Other (describe):

14. Was an Army Corps of Engineers Section 404 Permit filed? ☐ Yes ☒ No If yes, attach appropriate documentation.

Comments, if any

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access road; that I am familiar with the conditions which presently exist, that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: David R. Stewart 915/685-5717

Signed: David R. Stewart by David Smith Title: Regulatory Analyst Date: 03/31/00

Calculations for Earthen Pit Permit Applications

Calculation of Pit Capacities:

Pit capacities were estimated from length and width measured at ground level and at the bottom of the pit. Figure 1 shows the top view with the measured dimensions shown. For non-rectangular shapes, equivalent dimensions were used for volume calculations. For capacity calculations, the depth was reduced by two feet from the total pit depth to allow for a minimum of the required two feet of freeboard.

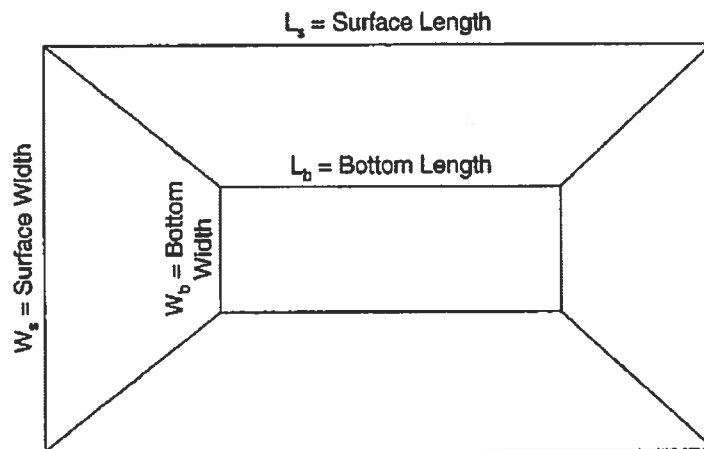


Figure 1. Top View of an earthen pit.

Figure 2 shows the dimensions and calculated terms in a cross-sectional view of a pit. The angle β is calculated from the length and width at the surface and the freeboard depth. Pits are designed to have a 2 (horizontal) to 1 (vertical) slope on the sides. With a 2 to 1 slope the angle β is 63.435° from vertical as shown by the yellow shaded area.

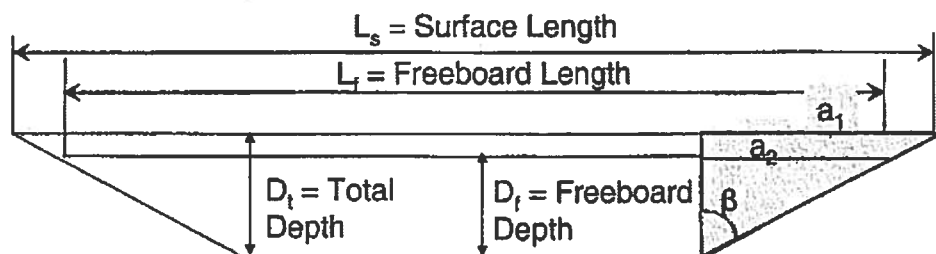


Figure 2. Cross-section of an earthen pit.

A sample calculation is shown based on the construction design for a 2500 barrel pit with a 10-ft depth. The following terms are defined:

L_s = surface length = 80'

W_s = surface width = 50'

L_b = length along bottom = 40'

W_b = width along bottom = 10'

D_t = total depth = 10'

D_f = depth with 2' freeboard ($D_t - 2'$)

The distance a_1 can be calculated from the measured surface lengths:

$$a_1 = (L_s - L_b)/2 = (80' - 40')/2 = 20'$$

The angle β can be calculated using the two sides of the yellow-shaded triangle.

$$\tan\beta = \text{opposite side/adjacent side} = 20'/10' = 2.0 \text{ and taking the arctangent, } \beta = 63.435^\circ.$$

Side a_2 on the smaller yellow triangle can then be calculated using the angle β with the freeboard depth as:

$$a_2 = D_f * \text{Tangent } \beta = 8' * 2.0 = 16'$$

$$L_f = L_s - 2 * (a_1 - a_2) = 80' - 2*(20' - 16') = 72'$$

The widths were calculated in the same manner using the same angle β :

$$a_1 = (W_s - W_b)/2 = (50' - 10')/2 = 20'$$

$$a_2 = D_f * \text{Tangent } \beta = 8' * 2.0 = 16'$$

$$W_f = W_s - 2 * (a_1 - a_2) = 50' - 2*(20' - 16') = 42'$$

Capacities were calculated using the standard formula for a truncated rectangular pyramid as follows where V is the pit capacity in cubic feet:

$$V = \frac{D_f * \left[L_f * W_f + \left(\frac{L_f + W_f}{2} \right) \left(\frac{L_b + W_b}{2} \right) + L_b * W_b \right]}{3}$$

Substituting example values (all dimensions are in feet) into the volume equation:

$$V = \frac{8 * \left[72 * 42 + \left(\frac{72 + 42}{2} \right) \left(\frac{40 + 10}{2} \right) + 40 * 10 \right]}{3}$$

The resulting volume is 12,930.7 ft³.

Converting to barrels the capacity is:

$$\text{Capacity} = 12930.7 \text{ ft}^3 / 5.61458 \text{ ft}^3/\text{bbl} = 2303 \text{ bbls}$$

Freeboard Surface Calculations

Surface Volume at Freeboard Line

The volume at the freeboard line is calculated for a depth of 1 inch using the freeboard length and width and converting to barrels as:

$$\text{Surface Volume} = \frac{L_f (\text{ft}) * W_f (\text{ft}) * (1" \text{ depth})}{5.61458 \text{ cu ft/bbl}}$$

For the example calculation:

$$\text{Surface volume of 1" @ freeboard line} = (72') * (42') * (1/12') / 5.61458 \text{ ft}^3/\text{bbl} = 45 \text{ bbls}$$

Evaporation Rate

The evaporation rate is calculated from the surface area at the freeboard based on the average evaporation rate for Garfield County of 45 in/yr/sq ft surface area. The evaporation rate in barrels per day is calculated by the equation:

$$\text{Evaporation Rate} = \frac{L_f (\text{ft}) * W_f (\text{ft}) * (\text{evap rate (in)} / 12)}{(365 \text{ days/yr}) * (5.61458 \text{ cu ft/bbl})}$$

Using the sample calculation numbers the evaporation in bbl/day is:

$$\text{Evaporation rate} = (72') * (42') * (45 / 12) / (365 \text{ days/yr}) * (5.61458 \text{ ft}^3/\text{bbl}) = 5.5 \text{ bbl/day}$$