



Engineering & Environmental Management



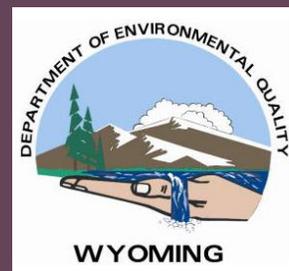
A Woodard & Curran  
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# Closure/Post Closure Cost Estimates

Grandfathered  
Commercial Oilfield  
Wastewater Disposal  
Facilities

November 2014



Wyoming  
Department of  
Environmental  
Quality

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## EXECUTIVE SUMMARY

### 1. INTRODUCTION

The State of Wyoming, Department of Environmental Quality, Water Quality Division (WDEQ/WQD) permits all Commercial Oilfield Wastewater Disposal Facilities (COWDFs) in the State of Wyoming. COWDFs accept oilfield produced wastes outside a lease, unit or communitized area and are authorized to accept exploration drilling and production wastes, exempt from RCRA hazardous waste regulations. Facilities permitted after February 24, 1989 are required to post a bond for closure (decommissioning and reclamation) and post-closure inspection, corrective action, maintenance, and environmental monitoring. Facilities permitted prior to this date are classified as a “grandfathered” facility by the WDEQ/WQD and are exempt from current COWDF financial assurance requirements.

WDEQ/WQD requested an estimate of costs needed to perform closure, post-closure, corrective action and reclamation of the twelve “grandfathered” and one partially “grandfathered” COWDFs in the State of Wyoming (Figure ES-1). Appendix A through Appendix L contain the individual report, facility layout figure, and associated closure/post closure cost estimates for each grandfathered COWDF facility. The cost estimates were completed in accordance with Chapter 14 Financial Assurance Requirements. In accordance with WDEQ/WQD Chapter 14 Financial Assurance Requirements, the closure cost estimates assume that no salvage value will be realized for any equipment, scrap metal, or residual oil encountered at the facilities.

## **2. CLOSURE**

The goal of facility decommissioning and reclamation is to remove the facility infrastructure and return the site to a condition as close to a preconstruction conditions as feasible. The plans described for decommissioning and reclamation are designed to ensure public health and safety, environmental protection, and compliance with applicable regulations. The procedures outlined include a general description of the proposed activities to be undertaken upon facility closure.

### **2.1 Residual Oil Removal and Disposal**

After closure of the facility, any residual oil remaining in the storage or separation tanks will require removal via vacuum truck prior to decommissioning and reclamation activities. In accordance with WDEQ/WQD Chapter 14 Financial Assurance Requirements, the reclamation cost estimates assume that no salvage value will be realized for the residual oil.

### **2.2 Wastewater Evaporation and Disposal**

Water remaining in the evaporation ponds will be evaporated prior to pond reclamation. When developing closure plans and comparing costs, it was deemed most effective to use natural solar evaporation with the addition of enhanced mechanical evaporation methods for most facilities. Natural solar evaporation is often limited by the surface area and depth of the ponds. Mechanical evaporation systems can more rapidly increase the evaporation process, especially during the warm summer months. Once the effectiveness of mechanical evaporation is diminished due to brine concentration, natural evaporation will continue until the ponds are sufficiently dry to permit the use of earthwork equipment to backfill the ponds. Periodic water samples will be collected and analyzed during the evaporation activities primarily for hydrocarbon constituents.

Some facilities use a separation pit in the disposal process. Any residual oil in the separation pit will be removed and disposed off-site at an approved facility via vacuum trucks.

### **2.3 Naturally Occurring Radioactive Material**

Naturally Occurring Radioactive Material (NORM) encountered in oil and gas exploration, development and production operations originates in subsurface formations, which may contain radioactive materials. NORM can be brought to the surface in the formation water that is produced in conjunction with oil and gas recovery. NORM in these produced waters typically consists of the radionuclides, radium 226 and 228 that can accumulate in tanks, pipes and pits in the form of scale and/or sludge. This can result in radiation exposure concerns to workers as well as disposal issues for contaminated pipes and equipment.

Measurements were collected using an energy-compensated pulse rate “micro-R” gamma meter that provides a scaled reading in microrentgen per hour ( $\mu\text{R/hr.}$ ) Background gamma radiation ranged from 10 to 15  $\mu\text{R/hr}$  which is typical of naturally occurring gamma levels in Wyoming.

The results of the gamma surveys of the equipment, tanks and piping at all sites showed no gamma radiation levels above background. Therefore, no NORM concerns were identified at the areas surveyed during the site inspections.

## **2.4 Solids and Sludge Removal**

Accumulated deposits of oily solids and sludge will consist of deposits from the separation pit, bottom of tanks, and the residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation ponds and/or separation pits. The sludge will be handled in one of the following ways:

1. Stabilize solids and sludge with fly ash and transport off-site to an approved disposal facility.
2. Landfarm contaminated soil, solids and sludge on-site and dispose on-site once amended. To facilitate oxygen and water transport through the soil, it will be composted with straw and manure.

Off-site disposal costs are lower than on-site treatment at some sites where small quantities of sludge/PCS are anticipated. When practicable, the second option is preferred because of its low cost, nominal transportation safety issues, and minimal environmental impact. The landfarmed material will be sampled periodically to assess the biodegradation of the hydrocarbons prior to backfilling the amended material into the evaporation ponds or adjacent areas.

## **2.5 Structure Removal**

All above-ground structures and stationary equipment will be demolished and disposed off-site or in the evaporation ponds. All tanks will be steam cleaned of oily residual materials and will be transported via heavy haul truck to one or more approved disposal or recycling facilities. The large (1,000 bbl) tanks require the use of a crane and other heavy equipment to cut up and load the tank sections for transport.

Some facilities use concrete for structure foundations, containment barriers, and/or erosion control of the evaporation pond upper interior. Any of the concrete that has substantial accumulations of oil sludge will be steam cleaned prior to demolition. All demolished concrete will be buried on-site and covered with pond backfill.

## **2.5 Pond and Pit Removal**

Once wastewater levels permit the use of earth moving equipment, the liner (clay and/or HDPE) will be abandoned in place. The evaporation ponds/pits will be backfilled with native soil and landfarmed material, to match the existing surrounding grade and restore drainage function. All groundwater/leak detection wells (if present) will be clearly marked and protected during reclamation activities. Groundwater monitor wells will be preserved for monitoring purposes whereas leak detection wells will be plugged and abandoned prior to backfill of the pond/pit.

## **2.6 Earthwork and Grading**

Recontouring of the site will be conducted using standard earth moving equipment to restore the topography to match, within reason, the previously existing surface and surrounding grade and function. Evaporation ponds will be contoured with a small mounding effect with a higher center point to facilitate water flows away the pond area as liners will remain intact. Grading activities will be limited to previously disturbed areas that require recontouring. Any visual stained or contaminated soils encountered during earthwork activities will either be removed and treated on-site via landfarming or hauled off-site for disposal as discussed in Section 1.4.

## **2.7 Revegetation**

At facilities where topsoil was salvaged and stockpiled the topsoil will be spread over the disturbed area. Facilities where topsoil was not salvaged the existing soil material will be graded to final contour. Disturbed areas will be seeded with a mixture approved by the landowner or the BLM if the facility is located on Federal lands. Revegetation tasks will be determined based upon the facility specific details regarding the depth of topsoil replacement, seed type and application rates, and fertilizer application rates.

A review of the facilities in regards to Sage Grouse core areas determined that only one of the twelve (D&B Disposal) was located within a core area. This site is located on private lands; therefore, while not subject to the Wyoming Sage Grouse Initiative, Wyoming Fish and Game should be consulted to determine the most appropriate reclamation and revegetation practices.

### **3. POST CLOSURE**

#### **3.1 Site Security**

A perimeter fence (barbwire or sheep tight) to restrict access to the public and/or livestock will be constructed or repaired as appropriate. Once closure and post closure activities have concluded fences will be removed as necessary.

#### **3.2 Monitoring and Maintenance**

Monitoring and maintenance is necessary to confirm that efforts to close and reclaim the facilities are effective, and to correct deficiencies to ensure reclamation objectives are achieved. Periodic inspections of reclamation efforts will occur for a minimum period of five years per WDEQ/WQD Chapter 14 Financial Assurance Requirements. Inspections will include an examination of vegetative cover, landfarmed materials, monitoring wells, erosion control BMPs and surrounding fences. At the end of the required monitoring period, the continued need to conduct monitoring will be re-evaluated based on inspection results and accumulated data. All monitor wells will be plugged and reclaimed at final closure.

#### **4. CORRECTIVE ACTION**

Some of the evaporation ponds and the separation pits at these sites are lined (clay or HDPE) which assists in preventing stored wastewater from infiltrating into the subsoil and reaching groundwater. These areas will be the portion of the facility that pose the greatest risk for a release to the environment. Since all storage tanks are above ground and most have containment berms (concrete, earthen), leak detection is quickly identified and PCS can be removed.

Potential monitoring well installations were evaluated based on each facility's site records and site visit. Installation of wells was deemed unnecessary based on the findings that groundwater was not present, groundwater was not contaminated to a point that required active remediation, or that groundwater was so deep that contamination from the COWDF was infeasible. Therefore, the use of monitored natural attenuation (MNA) for the remediation of groundwater is anticipated for all COWDF facilities identified in this document. As with any other remedial alternative, MNA should be selected only where it meets all relevant remedy selection criteria, and where it will meet site remediation objectives within a timeframe that is reasonable compared to that offered by other methods. Source control and long-term performance monitoring will be fundamental components of any MNA remedy.

## 5. CLOSURE/POST CLOSURE ESTIMATE

The cost estimates presented in this document were developed to assess the costs associated with closure and post closure of each disposal facility. The basis from which the costs were developed for each facility are detailed in the appendices of this document. The estimated costs for specific activities were obtained from various sources including:

- TREC's cost estimating database that uses unit costs compiled from experience with similar projects in Wyoming.
- WDEQ/LQD Guideline 12: Standardized Reclamation Performance Bond Format and Cost Calculation Methods.
- Direct quotes from Wyoming firms that conduct specialty services (i.e. tank cleaning, vacuum truck services, transportation, tank demolition, etc.)
- Methods were selected based on their likelihood to meet Environmental Quality Act requirements while being cost effective.

Table ES-1 presents the closure/post closure cost estimate summary for all COWDF facilities included in this report. The table depicts two cost estimates options representing alternative disposal methods of accumulated deposits of solids and sludge described in Section 1.4.

Salvage value or re-sale value of equipment and scrap metal is not included in the cost estimate per WDEQ/WQD Chapter 14 Financial Assurance Requirements. Additionally, no "time value of money" adjustments were used to generate the cost estimates; only present value costs are included.

Each facility closure cost estimate includes a 15 percent contingency, as necessitated by the WDEQ/WQD Chapter 14 Cost Estimate requirements. Multiple COWDF facilities are located on BLM property; therefore, BLM input could change the closure/post closure cost estimates for these facilities.

**Table ES-1: Facility Closure/Post Closure Cost Estimate Summary**

<b>Commercial Oilfield Wastewater Disposal Facility</b>	<b>Off-Site Sludge/PCS Disposal Alternative*</b>	<b>On-Site Sludge/PCS Landfarm Alternative*</b>
Cannon Land and Livestock	\$715,624	\$605,093
Church Buttes	\$186,770	\$210,510
D&B Disposal Systems Pond 1	\$664,644	\$593,707
Kinney Draw (Kinney No. 6)	\$437,678	\$455,533
Kissacks Disposal Pit	\$1,091,995	\$719,371
Linch Pit	\$389,526	\$403,888
McBeth Pit	\$1,760,297	\$1,573,574
McGinnis	\$438,472	\$471,570
Oilfield Disposal Systems	\$399,142	\$408,283
Parkman Reservoir	\$1,477,910	\$478,104
Tierney	\$323,692	\$355,544
Werner Ranch	\$1,356,839	\$891,569
<b>TOTAL</b>	<b>\$9,242,590</b>	<b>\$7,166,747</b>

Notes:

\* Closure cost estimate for each facility includes 15 percent contingency, as necessitated by the WDEQ/WQD Chapter 14 Cost Estimate requirements.



Sources: Esri, USGS, NOAA

PREPARED FOR

WYOMING

**WDEQ COWDF Locations**  
Wyoming

900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.trecorp.com

**Legend**

COWDF Site Location

1:2,500,000

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

WDEQ COWDF Site Locations				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	06/23/14	ES-1
1	Final for Submittal	EGS	07/09/14	
2				

Path: O:\WY\_P\Projects\WDEQ\_COWDF\WDEQ\_COWDF\_Locations\_state.mxd

**APPENDIX A:  
CANNON LAND AND LIVESTOCK DISPOSAL FACILITY**

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## 1. DESCRIPTION OF FACILITY

The existing Cannon Land & Livestock Disposal Facility (Cannon Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF) is located in Converse County, Wyoming, approximately 30 miles north of Douglas. The site is on leased private lands owned by Box Creek Minerals LP and currently operated by Jim's Water Service (JWS) of Gillette. The Wyoming Department of Environmental Quality (WDEQ) awarded the facility its Permit to Construct (No. 83-345) in 1983. Construction began late in 1984 and facility became operational in February 1985. Since the Cannon facility was permitted prior to 1989, it is classified as a "grandfathered" facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The Cannon Facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Other land uses are limited due to private surface ownership of the facility and adjacent lands. Bonner Brothers Inc. owns the lands to the north, south, and west of the facility and Marlene S. Hubbard et al. owns the land to the east. There are no known residences within one mile of the facility.

The Cannon Facility is located on an area of relatively even terrain near the surrounding drainage divide. The facility is located adjacent to County Road 32, which provides good access to the site. Commercial underground power is available at the facility from a transformer associated with a gas/oil pump located approximately 1,800 feet to the southeast.

The primary facilities consist of two clay lined containment cells which include one small separation pit (approximately 0.2 acres, seven foot design depth) used to separate residual hydrocarbons from the incoming wastewater. These separated hydrocarbons are pumped into one of seven, welded and bolted top type, storage tanks and disposed off-site. The remaining water is drained via an underdrain, which delivers the water to a much larger evaporation pond (approximately 4.7 acres, 7 foot design working depth). The facility also consists of a "boneyard" for the storage of ancillary equipment and 43, 400-bbl empty storage tanks. A topsoil stockpile (approximately 2,800 cubic yards) is located north of the facility outside of the fenced permit area.

There is currently a groundwater monitoring network consisting of thirteen monitor wells that range from 26 to 68 foot total depth. Previous investigations have determined the current monitor well infrastructure adequately characterizes site conditions and that a continued monitoring program will determine whether native groundwater is being impacted or the water beneath the facility is a result of leachate pooling on a confining layer. Current groundwater analytical records

establish that multiple classes of groundwater are present in the vicinity of the disposal area and that little to no hydrocarbons or organic contaminants are present.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure A-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the pits and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove accumulated deposits of solids and sludge from the small separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility, or
  - Landfarm sludge on-site and dispose on-site once amended.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high-pressure enhanced evaporation units to assist with the disposal of approximately seventy percent of the pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation, thereby permitting the use of earth moving equipment.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed and disposed of accordingly.
- Remove electrical service to the site.

Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables A-1 through A-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table A-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$102,384.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$57,460.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$139,726.60
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$137,430.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$1,778.65
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$62,120.00
<b>7.0 Reclamation</b>	\$17,066.00
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$47,745.50
<b>Subtotal</b>	<b>\$565,710.75</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$56,571.08</b>
<b>Contingency (15%)</b>	<b>\$93,342.27</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$715,624.10</b>

**Table A-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$102,384.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$57,460.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$52,350.35
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$137,430.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$1,778.65
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$62,120.00
<b>7.0 Reclamation</b>	\$17,066.00
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$47,745.50
<b>Subtotal</b>	<b>\$478,334.50</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$47,833.45</b>
<b>Contingency (15%)</b>	<b>\$78,925.19</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$605,093.15</b>

**Table A-3: Closure/Post Closure and Reclamation Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	240	day	\$300.00	\$72,000.00
Evaporation Enhancement maintenance and labor	4	month	\$4,800.00	\$19,200.00
Evaporation Enhancement utility	240	day	\$46.60	\$11,184.00
<b>Item Subtotal</b>				<b>\$102,384.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mix Removal</b>				
Pumping and disposal cost	6,800	BBL	\$5.00	\$34,000.00
Transportation costs	204	hour	\$115.00	\$23,460.00
<b>Item Subtotal</b>				<b>\$57,460.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	878	yd <sup>3</sup>	\$56.00	\$49,165.76
Sludge mixing with fly ash	878	yd <sup>3</sup>	\$22.00	\$19,315.12
Fly ash material	88	ton	\$80.00	\$7,023.68
Transportation of solidified sludge	125,548	ton-mile	\$0.15	\$18,832.24
Disposal of solidified Sludge	908	ton	\$50.00	\$45,389.80
<b>Item Subtotal</b>				<b>\$139,726.60</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS --Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	878	yd <sup>3</sup>	\$1.00	\$877.96
Land farming maintenance	10,536	yd <sup>3</sup>	\$0.30	\$3,160.66
Straw sludge amendment material	125	ton	\$43.00	\$5,393.18
Manure sludge amendment material	125	ton	\$40.00	\$5,016.91
Sludge amendment mixing and application	1,129	yd <sup>3</sup>	\$7.00	\$7,901.64
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$52,350.35</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	280	BBL	\$22.00	\$6,160.00
Steam clean 400 BBL tank	4	each	\$6,100.00	\$24,400.00
Steam clean 1,000 BBL tank	3	each	\$8,400.00	\$25,200.00
Steam clean separator (frac tank)	1	each	\$6,100.00	\$6,100.00
Steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
Demolish 1,000 BBL tank	3	each	\$24,000.00	\$72,000.00
400 BBL tank removal and transport	4	each	\$505.00	\$2,020.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$137,430.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Move Infrastructure material with D8 Dozer	200	yd <sup>3</sup>	\$2.45	\$490.00
Bury infrastructure material	30	yd <sup>3</sup>	\$0.33	\$9.90
Load Waste Material into Dumpster	15	ton	\$5.25	\$78.75
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	15	ton	\$50.00	\$750.00
<b>Item Subtotal</b>				<b>\$1,778.65</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	1	acre	\$1,000.00	\$1,000.00
Earth moving with scraper	2,800	yd <sup>3</sup>	\$4.35	\$12,180.00
Earth moving with D8 dozer	15,440	yd <sup>3</sup>	\$2.25	\$34,740.00
Recontouring (blade work)	18	acre	\$500.00	\$9,200.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
<b>Item Subtotal</b>				<b>\$62,120.00</b>

#### 7.0 Reclamation

Fertilizer material cost	18	acre	\$200.00	\$3,680.00
Fertilizer application cost	18	acre	\$187.50	\$3,450.00
Seedbed preparation cost	18	acre	\$190.00	\$3,496.00
Seeding cost	18	acre	\$350.00	\$6,440.00
<b>Item Subtotal</b>				<b>\$17,066.00</b>

#### 8.0 Miscellaneous; Including Soil and Groundwater Sampling, Well Abandonment, Fencing, Monitoring, "Boneyard" Removal

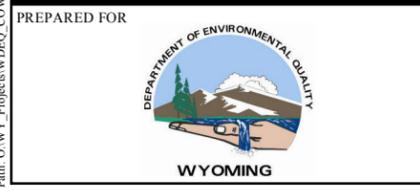
Cost to abandon monitoring well	450	ft	\$4.00	\$1,800.00
cap monitoring well	9	each	\$10.00	\$90.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	9	number	\$130.00	\$1,170.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	9	each	\$360.00	\$3,240.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	9	locations	\$270.00	\$2,430.00
Boneyard material disposal at landfill	20	ton	\$50.00	\$1,000.00
Dumptruck to landfill	2,000	ton-mile	\$0.15	\$300.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
Vegetation Assessment LRES method	40	hr	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	965	LF	\$2.50	\$2,412.50
Fencing removal and disposal cost	3,860	LF	\$0.80	\$3,088.00
Cost for 400 BBL tank removal and transport	43	each	\$505.00	\$21,715.00
<b>Item Subtotal</b>				<b>\$47,745.50</b>

Path: O:\WY\_Projects\WDEQ\_COWDF\WDEQ\_COWDF\_Cannon.mxd



Source: Esri, DigitalGlobe, GeoEye, I-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



**WDEQ-COWDF**

**TREC, Inc.**  
Engineering & Environmental Management

900 Werner Court  
Suite 130  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

A Woodard & Curran  
Company

**Legend**

- × — × Fence
- Tanks (existing)
- Electrical Line
- Tanks (removed)
- ▭ Disturbed Area
- Ponds/Pits
- ▨ Topsoil Pile

0 25 50 100 150 200 250 Feet

DRAWN BY:	EGS
CHECKED BY:	CAT
APPROVED BY:	RMD

Cannon Land and Livestock Disposal Facility (Imagery: June 2011)				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	A-1
1				
2				

**APPENDIX B:  
CHURCH BUTTES DISPOSAL FACILITY**

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Figure B-1: Church Buttes Disposal Facility

## 1. DESCRIPTION OF FACILITY

The Church Buttes facility, a commercial Oilfield Wastewater Disposal Facility (COWDF), is located in eastern Uinta County, Wyoming approximately 50 miles west of Rock Springs. There is limited background and/or historical information available for this facility. The Wyoming Department of Environmental Quality (WDEQ) issued the facility its Permit to Construct in 1985 (No. 85-123R) and is currently operated by Wexpro/Questar Corporation. Since the Church Buttes Facility was permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The Church Buttes facility is located on Federal lands managed by the Bureau of Land Management (BLM). The facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Uinta Development Company owns lands to the east, south, and west of the facility and BLM owns property to the north of the facility. There are no known residences within one mile of the facility.

The site is easily accessed from Church Buttes Road, which is accessed directly off of US Interstate 80. This facility consists of two 400-barrel tanks for offloading, followed by a separation pit to further remove oil prior to water discharge to the two evaporation ponds. The ponds are adjacent to each other and connected via a PVC pipe to maintain equal surface elevation. The current evaporation system is powered by a fuel gas driven motor pump and is located on the berm between the two ponds. Both of the ponds are covered by netting to prevent birds from landing on them. There is not currently power to the facility.

There are no true monitoring wells on site, so groundwater contamination is unknown but hydrocarbon contamination is not expected. Leak detection wells completed approximately to six foot depth have never detected leaks per the operator’s recollection. In 1985, prior to construction, a geotechnical investigation concluded the area’s near-surface bentonite strata yielded a favorable site for a disposal facility. No water was encountered in multiple test holes drilled up to 15 feet below ground surface.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure B-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the ponds and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove accumulated deposits of solids and sludge from the small separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility or;
  - Landfarm sludge on-site and dispose on-site once amended.
- Remove residual ring of petroleum-contaminated soils (PCS) around the shoreline of the evaporation pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high-pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the pond water volume. Rent and operate generator for electricity.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed.
  - Use one of the methods described above (for sludge) to mitigate PCS.

Year Three (late) or Year Four:

- Use a patrol grader to windrow approximately 2 inches of topsoil impacted by over spray. Use scraper to move this material to the evaporation pond for burial.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables B-1 through B-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table B-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$69,903.72
<b>2.0 Separation Pit Water Removal</b>	\$15,330.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$13,320.90
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$16,256.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$2,480.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$14,956.25
<b>7.0 Reclamation</b>	\$6,307.00
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$9,090.25
<b>Subtotal</b>	<b>\$147,644.37</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$14,764.44</b>
<b>Contingency (15%)</b>	<b>\$24,361.32</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$186,770.13</b>

**Table B-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$69,903.72
<b>2.0 Separation Pit Water Removal</b>	\$15,330.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$32,087.49
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$16,256.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$2,480.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$14,956.25
<b>7.0 Reclamation</b>	\$6,307.00
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$9,090.25
<b>Subtotal</b>	<b>\$166,410.96</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$16,641.10</b>
<b>Contingency (15%)</b>	<b>\$27,457.81</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$210,509.86</b>

**Table B-3: Closure/Post Closure and Reclamation Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	90	day	\$300.00	\$27,000.00
Evaporation Enhancement maintenance and labor	3	month	\$4,800.00	\$14,400.00
Evaporation Enhancement utility	90	day	\$46.60	\$4,194.00
Generator Rental	3	month	\$2,250.00	\$6,750.00
Generator Fuel Costs	1,080	\$/hr	\$16.26	\$17,559.72
<b>Item Subtotal</b>				<b>\$69,903.72</b>
<b>2.0 Separation Pit Water and Oil/Water Mix Removal</b>				
Pumping and disposal cost	2,100	BBL	\$5.00	\$10,500.00
Transportation costs	42	hour	\$115.00	\$4,830.00
<b>Item Subtotal</b>				<b>\$15,330.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	82	yd <sup>3</sup>	\$56.00	\$4,592.00
Sludge mixing with fly ash	82	yd <sup>3</sup>	\$22.00	\$1,804.00
Fly ash material	8	ton	\$80.00	\$656.00
Transportation of solidified sludge	11,726	ton-mile	\$0.15	\$1,758.90
Disposal of solidified Sludge	90	ton	\$50.00	\$4,510.00
<b>Item Subtotal</b>				<b>\$13,320.90</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS --Method B, Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	82	ft	\$1.00	\$82.00
Land farming maintenance	984	yd <sup>3</sup>	\$0.30	\$295.20
Straw sludge amendment material	12	ton	\$43.00	\$503.71
Manure sludge amendment material	12	ton	\$40.00	\$468.57
Sludge amendment mixing and application	105	yd <sup>3</sup>	\$7.00	\$738.00
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$32,087.49</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	68	BBL	\$22.00	\$1,496.00
Steam clean 400 BBL tank	2	each	\$6,100.00	\$12,200.00
steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
400 BBL tank removal and transport	2	Each	\$505.00	\$1,010.00
<b>Item Subtotal</b>				<b>\$16,256.00</b>

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>5.0 Infrastructure Demolition and Disposal</b>				
Building Demolition	800	yd <sup>3</sup>	\$0.50	\$400.00
Load Waste Material into Dumpster	1	ton	\$5.25	\$5.25
Transport waste to landfill	450	ton-mile	\$4.50	\$2,025.00
Dispose of material at landfill	1	ton	\$50.00	\$50.00
<b>Item Subtotal</b>				<b>\$2,480.25</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>				
Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with D8 dozer	2,025	yd <sup>3</sup>	\$2.25	\$4,556.25
Recontouring (blade work)	7	acre	\$500.00	\$3,400.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
<b>Item Subtotal</b>				<b>\$14,956.25</b>
<b>7.0 Reclamation</b>				
Fertilizer material cost	7	acre	\$200.00	\$1,360.00
Fertilizer application cost	7	acre	\$187.50	\$1,275.00
Seedbed preparation cost	7	acre	\$190.00	\$1,292.00
Seeding cost	7	acre	\$350.00	\$2,380.00
<b>Item Subtotal</b>				<b>\$6,307.00</b>
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>				
Soil analysis	10	each	\$140.00	\$1,400.00
Soil sample labor	10	each	\$90.00	\$900.00
Boneyard material disposal at landfill	5	ton	\$50.00	\$250.00
Dumptruck to landfill	500	ton-mile	\$0.15	\$75.00
Vegetation Assessment LRES method	40	hr	\$100.00	\$4,000.00
Fencing installation cost	433	LF	\$2.50	\$1,081.25
Fencing removal and disposal cost	1,730	LF	\$0.80	\$1,384.00
<b>Item Subtotal</b>				<b>\$9,090.25</b>



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PREPARED FOR

WYOMING

**WDEQ-COWDF**

900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

**Legend**

- × - × Fence
- ▭ Disturbed Area
- ▨ Structure
- Tanks (existing)
- Ponds/Pits
- Fuel Gas Line
- Sump

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

Church Buttes (Imagery: August 2010)				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	<b>B-1</b>
1				
2				

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**APPENDIX C:  
D&B DISPOSAL FACILITY**

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Table C-3: Closure/Post Closure and Reclamation Cost Estimate Summary

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Figure C-1: D&B Disposal Facility
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## 1. DESCRIPTION OF FACILITY

The D&B Disposal Facility (D&B Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF), was issued a Permit to Construct (No. 81-658) in 1981 to accept wastewater from nearby oil/gas wells. Initially operated by Shell Oil Company, the facility was permitted for construction of a single clay lined evaporation pond. An expansion for a second evaporation pond was requested and permitted (No. 94-511) in 1994 followed by construction in 1995. Currently the facility is comprised of two evaporation ponds, a separation pit, and storage tanks. The portion permitted prior to 1989 is classified as a “grandfathered” facility by WDEQ/WQD and therefore exempt from COWDF financial assurance requirements. Conversely, the portion of the facility constructed in 1995 is required to demonstrate financial assurance and not included in this closure cost estimate.

The D&B facility is located 14 miles south of Mountain View in Uinta County and is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Daniel E & Betty Jane Rinker own property to the east of the facility and BLM owns property to the north, west, and south of the facility. There are no known residences within one mile of the facility.

The D&B Facility is located on an area of relatively hilly terrain, near the foothills of the Uinta Mountains. The site is situated on a hillside, near the top of the hill, and best described as terraced in appearance. The facility is located adjacent to County Road 283, which provides good access to the site. Commercial overhead power is available at the facility from the north.

The primary facilities consist of a series of three tanks that where produced water is offloaded. From the offload tanks the product gravity flows to a separation pit where oil is skimmed from the surface and water is discharged to the evaporation pond. The waste oil is stored on-site in a series of storage tanks.

There are currently three monitoring wells onsite. MW-1 is located in the far southeast corner of the site, and MW-2 and MW-3 are located along the northern boundary. In 1994, deep groundwater monitoring well MW-1 was drilled to between 272 to 275 feet, with 175 feet to groundwater. Well MW-1 has not had enough water to collect a sample; thus, no impacts have been observed. Permit #96-264 was issued in 1996 and allowed for the installation of two additional monitoring wells MW-2 and MW-3. Analytical data from these wells is limited.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure C-1 of this appendix.

## 2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES

This site is unique as it contains two evaporation ponds and ancillary facilities with the east evaporation pond covered by an existing bond with the WDEQ/WQD. Therefore, the decommissioning and reclamation activities described herein only apply to the “non-bonded” area as delineated on Figure C-1. This includes the west evaporation pond, the separation pit, storage tanks and other structures.

In general, closure of the facility will consist of removing any remaining wastewater or oily sludge from the west evaporation pond, separation pit and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
  - Remove and dispose of extra non-process related tanks and ancillary equipment.
- Remove accumulated deposits of solids and sludge from the separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility or:
  - Landfarm sludge on-site and dispose on-site once amended.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high-pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed.
  - Use one of the methods described above (for sludge) to mitigate PCS

Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the truck parking/traffic area associated with the west evaporation pond (the main access road to the west pond will not be reclaimed) and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables C-1 and C-2 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table C-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$76,788.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$46,775.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	<b>\$100,719.00</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$259,782.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$1,526.25</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$15,680.00</b>
<b>7.0 Reclamation</b>	<b>\$7,420.00</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$16,720.00</b>
<b>Subtotal</b>	<b>\$525,410.25</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$52,541.03</b>
<b>Contingency (15%)</b>	<b>\$86,692.69</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$664,643.97</b>

**Table C-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$76,788.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$46,775.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$44,642.00
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$259,782.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$1,526.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$15,680.00
<b>7.0 Reclamation</b>	\$7,420.00
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$16,720.00
<b>Subtotal</b>	<b>\$469,333.25</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$46,933.33</b>
<b>Contingency (15%)</b>	<b>\$77,439.99</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$593,706.56</b>

**Table C-3: Closure/Post Closure and Reclamation Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	180	day	\$300.00	\$54,000.00
Evaporation Enhancement maintenance and labor	3	month	\$4,800.00	\$14,400.00
Evaporation Enhancement utility	180	day	\$46.60	\$8,388.00
<b>Item Subtotal</b>				<b>\$76,788.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	6,411	BBL	\$5.00	\$32,055.00
Transportation costs	128	hour	\$115.00	\$14,720.00
<b>Item Subtotal</b>				<b>\$46,775.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	620	yd <sup>3</sup>	\$56.00	\$34,720.00
Sludge mixing with fly ash	620	yd <sup>3</sup>	\$22.00	\$13,640.00
Fly ash material	62	ton	\$80.00	\$4,960.00
Transportation of solidified sludge	88,660	ton-mile	\$0.15	\$13,299.00
Disposal of solidified Sludge	682	ton	\$50.00	\$34,100.00
<b>Item Subtotal</b>				<b>\$100,719.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge-- Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	620	ft	\$1.00	\$620.00
Land farming maintenance	7,440	yd <sup>3</sup>	\$0.30	\$2,232.00
Straw sludge amendment material	89	ton	\$43.00	\$3,808.57
Manure sludge amendment material	64	ton	\$40.00	\$2,571.43
Sludge amendment mixing and application	773	yd <sup>3</sup>	\$7.00	\$5,410.00
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$44,642.00</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	546	BBL	\$22.00	\$12,012.00
Steam clean 400 BBL tank	9	each	\$6,100.00	\$54,900.00
Steam clean 1,000 BBL tank	5	each	\$8,400.00	\$42,000.00
Steam clean separator (frac tank)	0	each	\$6,100.00	\$0.00
Steam clean 100 ft of pipe	3	100 LF	\$375.00	\$1,125.00
demolish 100 ft of pipe	3	100 LF	\$400.00	\$1,200.00
Demolish 1,000 BBL tank	6	each	\$24,000.00	\$144,000.00
400 BBL tank removal and transport	9	each	\$505.00	\$4,545.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$259,782.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Building Demolition	1,600	ft <sup>3</sup>	\$0.50	\$800.00
Load Waste Material into Dumpster	5	ton	\$5.25	\$26.25
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	5	ton	\$50.00	\$250.00
<b>Item Subtotal</b>				<b>\$1,526.25</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	3	acre	\$1,000.00	\$3,000.00
Earth moving with scraper	0	yd <sup>3</sup>	\$4.35	\$0.00
Earth moving with D8 dozer	2,080	yd <sup>3</sup>	\$2.25	\$4,680.00
Recontouring (blade work)	8	acre	\$500.00	\$4,000.00
PCS disposal (bathtub ring)	80	ton	\$50.00	\$4,000.00
<b>Item Subtotal</b>				<b>\$15,680.00</b>

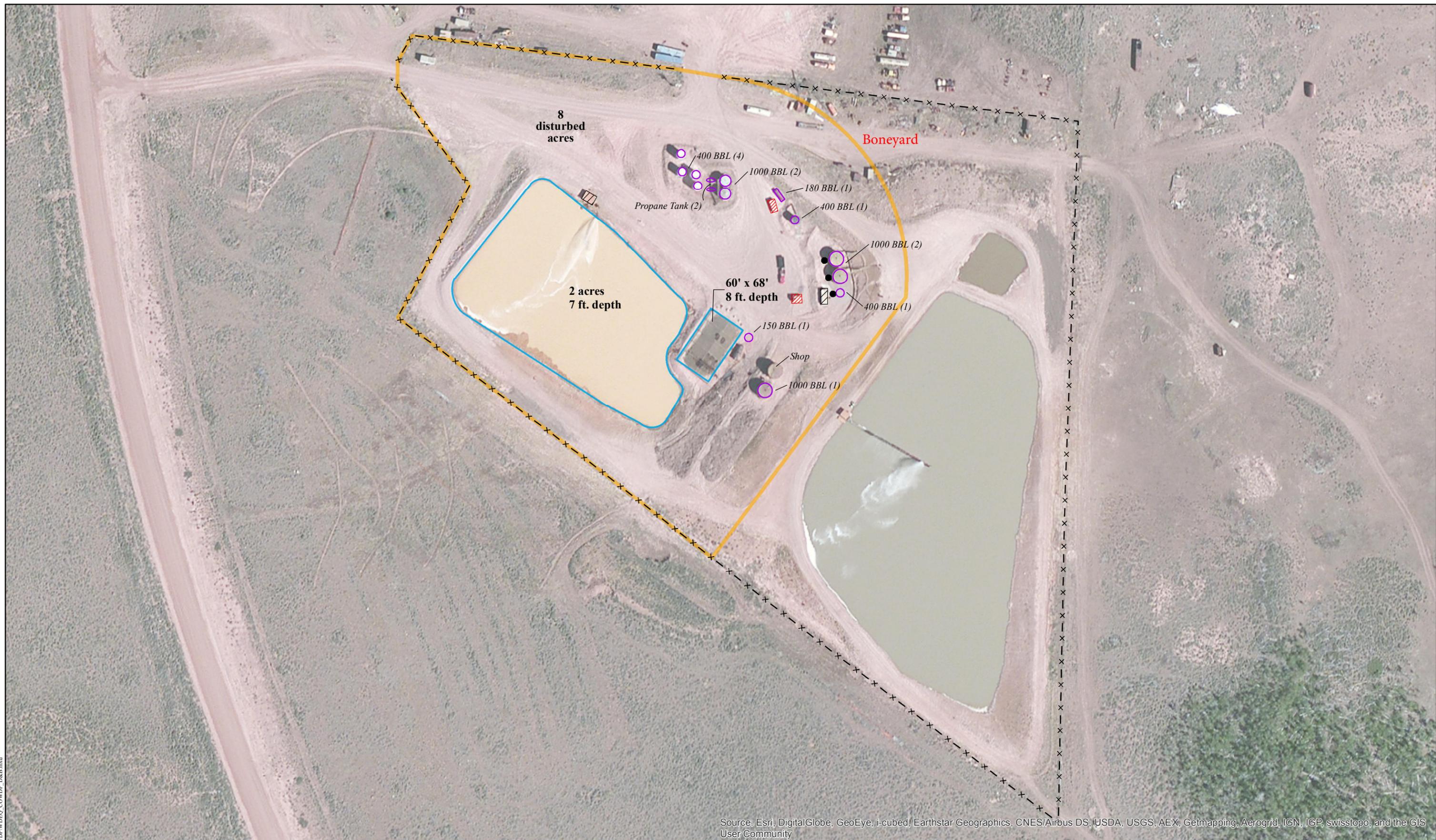
#### 7.0 Reclamation

Fertilizer material cost	8	acre	\$200.00	\$1,600.00
Fertilizer application cost	8	acre	\$187.50	\$1,500.00
Seedbed preparation cost	8	acre	\$190.00	\$1,520.00
Seeding cost	8	acre	\$350.00	\$2,800.00
<b>Item Subtotal</b>				<b>\$7,420.00</b>

#### 8.0 Miscellaneous

Cost to abandon monitoring well	150	ft	\$4.00	\$600.00
Cap monitoring well	3	each	\$10.00	\$30.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	3	number	\$130.00	\$390.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	0	each	\$360.00	\$0.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	6	locations	\$270.00	\$1,620.00
Boneyard material disposal at landfill	20	ton	\$50.00	\$1,000.00
Dumptruck to landfill	2,000	ton-mile	\$0.15	\$300.00
Vegetation Assessment LRES method	40	hr	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00

<b>Item</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Estimated Cost</b>
Fencing installation cost	400	LN	\$2.50	\$1,000.00
Fencing removal and disposal cost	1,600	LN	\$0.80	\$1,280.00
Cost for 400 BBL tank removal and transport	0	each	\$505.00	\$0.00
<b>Item Subtotal</b>				<b>\$16,720.00</b>



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PREPARED FOR

WYOMING

**WDEQ-COWDF**

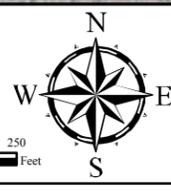
900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.trecorp.com

**Legend**

- × - × Fence
- Disturbed Area
- Tanks (existing)
- Ponds
- Structure
- Tanks (removed)
- Sump

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

D & B Disposal Facility (Imagery: August 2010)		REV #	DESCRIPTION	BY	DATE	FIGURE
		0	Draft for Review	EGS	10/08/14	<b>C-1</b>
		1				
		2				



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**APPENDIX D:  
KINNEY DISPOSAL FACILITY**

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Table D-2: Closure/Post Closure and Reclamation Cost Estimate Summary

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Figure D-1: Kinney Disposal Facility
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## **1. DESCRIPTION OF FACILITY**

The Kinney Unit #6 (Wexpro) Disposal Facility (Kinney Facility) a Commercial Oilfield Wastewater Disposal Facility (COWDF) is located approximately 45 miles southeast of Rock Springs in Sweetwater County, Wyoming. There is limited background and/or historical information available for this facility. The facility was permitted in 1982 prior to a permit being issued. A subsequent permit (#84-260RR) was issued in 1984 and the Kinney facility and is currently operated by Wexpro/Questar Corporation. Since the Kinney Facility was constructed prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The Kinney Facility is located on Federal lands managed by the Bureau of Land Management (BLM). The facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. BLM owns the property adjacent to the facility and is zoned agricultural. There are no known residences within one mile of the facility.

The facility consists of two upright tanks for offloading, followed by a horizontal tank used for oil/water separation. From the tanks, the water will flow into the first of three evaporation ponds, then downhill to the two subsequent evaporation ponds. The upper pond was recently drained and a new HDPE liner with leak detection system installed. The lower two clay lined ponds are connected via PVC pipe to create an equal surface elevation. The facility is fenced with sheep-tight fence and has a large topsoil pile located just south of the lower ponds.

Two monitor wells were observed during the site visit, their completion depths and sample analytical data were not available in the Kinney site files.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure D-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the pits and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

The facility is directly adjacent to an actively producing gas well, the tanks associated with the gas well and that portion of the road and parking area required to access the gas well are not included in this closure cost estimation. The adjacent gas well also provides power for the motor driven evaporation spray units currently used at the facility.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation ponds and transport offsite to an approved disposal facility.
- Rent and operate high-pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the water volume from the three evaporation ponds.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed.

### Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.

- Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to rough grade.
- Use a scraper to apply topsoil from the stockpile across the area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables D-1 through D-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table D-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$204,768.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$0.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$18,779.22
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$23,131.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$0.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$78,525.00
<b>7.0 Reclamation</b>	\$10,202.50
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$10,585.00
<b>Subtotal</b>	<b>\$345,990.72</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$34,599.07</b>
<b>Contingency (15%)</b>	<b>\$57,088.47</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$437,678.26</b>

**Table D-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$204,768.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$0.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$32,893.89
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$23,131.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$0.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$78,525.00
<b>7.0 Reclamation</b>	\$10,202.50
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$10,585.00
<b>Subtotal</b>	<b>\$360,105.39</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$36,010.54</b>
<b>Contingency (15%)</b>	<b>\$59,417.39</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$455,533.31</b>

**Table D-3: Closure/Post Closure and Reclamation Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	480	day	\$300.00	\$144,000.00
Evaporation Enhancement maintenance and labor	8	month	\$4,800.00	\$38,400.00
Evaporation Enhancement utility	480	day	\$46.60	\$22,368.00
<b>Item Subtotal</b>				<b>\$204,768.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	0	BBL	\$5.00	\$0.00
Transportation costs	0	hour	\$115.00	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A</b>				
Sludge collection using vac truck	116	yd <sup>3</sup>	\$56.00	\$6,473.60
Sludge mixing with fly ash	116	yd <sup>3</sup>	\$22.00	\$2,543.20
Fly ash material	12	ton	\$80.00	\$924.80
Transportation of solidified sludge	16,531	ton-mile	\$0.15	\$2,479.62
Disposal of solidified Sludge	127	ton	\$50.00	\$6,358.00
<b>Item Subtotal</b>				<b>\$18,779.22</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B</b>				
Move sludge to landfarm	116	ft	\$1.00	\$115.60
Land farming maintenance	1,224	yd <sup>3</sup>	\$0.30	\$367.20
Straw sludge amendment material	17	ton	\$43.00	\$710.11
Manure sludge amendment material	17	ton	\$40.00	\$660.57
Sludge amendment mixing and application	149	yd <sup>3</sup>	\$7.00	\$1,040.40
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$32,893.89</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	68	BBL	\$22.00	\$1,496.00
Steam clean 400 BBL tank	2	each	\$6,100.00	\$12,200.00
Steam clean separator (frac tank)	1	each	\$6,100.00	\$6,100.00
Steam clean 100 ft of pipe	3	100 LF	\$375.00	\$1,125.00
Demolish 100 ft of pipe	3	100 LF	\$400.00	\$1,200.00
400 BBL tank removal and transport	2	each	\$505.00	\$1,010.00
<b>Item Subtotal</b>				<b>\$23,131.00</b>

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>5.0 Infrastructure Demolition and Disposal</b>				
Building Demolition	0	ft <sup>3</sup>	\$0.50	\$0.00
Concrete Secondary containment removal	0	ft <sup>2</sup>	\$1.30	\$0.00
Move Infrastructure material with D8 Dozer	0	ft	\$2.45	\$0.00
Bury infrastructure material	0	yd <sup>3</sup>	\$0.33	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>				
Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	6,000	yd <sup>3</sup>	\$4.35	\$26,100.00
Earth moving with D8 dozer	16,200	yd <sup>3</sup>	\$2.25	\$36,450.00
Recontouring (blade work)	11	acre	\$500.00	\$5,500.00
PCS disposal (bathtub ring)	150	ton	\$50.00	\$7,500.00
Drainage Construction	650	ft	\$1.50	\$975.00
<b>Item Subtotal</b>				<b>\$78,525.00</b>
<b>7.0 Reclamation</b>				
Fertilizer material cost	11	acre	\$200.00	\$2,200.00
Fertilizer application cost	11	acre	\$187.50	\$2,062.50
Seedbed preparation cost	11	acre	\$190.00	\$2,090.00
Seeding cost	11	acre	\$350.00	\$3,850.00
<b>Item Subtotal</b>				<b>\$10,202.50</b>
<b>8.0 Miscellaneous</b>				
Cost to abandon monitoring well	40	ft	\$4.00	\$160.00
Cap monitoring well	2	each	\$10.00	\$20.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	2	number	\$130.00	\$260.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	0	each	\$140.00	\$0.00
Groundwater analysis	0	each	\$360.00	\$0.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	2	locations	\$270.00	\$540.00
Boneyard material disposal at landfill	0	ton	\$50.00	\$0.00
Dumptruck to landfill	0	ton-mile	\$0.15	\$0.00
Vegetation Assessment LRES method	40	hr	\$100.00	\$4,000.00
Electrical service disconnect and removal	0	each	\$3,200.00	\$0.00

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Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
Fencing installation cost	650	LF	\$2.50	\$1,625.00
Fencing removal and disposal cost	2,600	LF	\$0.80	\$2,080.00
Cost for 400 BBL tank removal and transport	0	each	\$505.00	\$0.00
<b>Item Subtotal</b>				<b>\$10,585.00</b>



PREPARED FOR  
  
 WYOMING

**WDEQ-COWDF**  
  
 900 Werner Court  
 Suite 150  
 Casper, WY 82601  
 Phone (307) 265-0696  
 Fax (307) 265-2498  
 www.trecorp.com

**Legend**

- x - x Fence
- Tanks (existing)
- Lead Detection Sump
- ⊕ Monitoring Well
- Disturbed Area
- Ponds
- Topsoil Pile
- Fuel Gas Line

0 25 50 100 150 200 250 Feet

DRAWN BY: EGS  
 CHECKED BY: CAT  
 APPROVED BY: RMD

**Kinney #6 Evaporation Pits  
(Imagery: October 2013)**

REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	<b>D-1</b>
1				
2				

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**APPENDIX E:  
KISSACK DISPOSAL FACILITY**

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Table E-2: Cost Estimate Summary of Method B
Table E-3: Closure/Post Closure Cost Estimate Summary

## LIST OF FIGURES

Figure E-1: Kissack Disposal Facility
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## **1. DESCRIPTION OF FACILITY**

The existing Kissack Disposal Facility (Kissack Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF), is located in Campbell County, Wyoming approximately 18 miles northeast of Gillette. The Wyoming Department of Environmental Quality (WDEQ) awarded the facility its Permit to Construct in May 1982 (No. 81-961RR). The original permit allowed for the construction of four cells (cells 1, 2, 4, 5). Two additional cells were built (Cells 3 and 6), but were later decommissioned and reclaimed. A subsequent permit (No. 86-117R) was issued August 1986 which allowed the construction of a fifth cell and add a storage tank. Only two cells remain operational for current operations. Since the Kissack facility was constructed prior to 1980, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The Kissack Facility is located on an area of relatively even terrain. The landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Access to the site is by a road approximately two miles off Henderson Road. Recently established subdivisions and homes are being built in the area, including some within one mile west of the facility. The Kissack family (Kissack Douglas W & Jo L Revocable Trusts and John J & Sally H revocable Trust) owns the nine-acre facility and 151 adjacent acres.

The primary facilities consist of two clay lined ponds and covered by a 30 mil Hypalon pond liner. The west pond is the receiving location for produced water while the east pond is used to for the disposal of drilling mud and associated fluids. Produced water is placed into the west pond without prior oil/water separation; water is then pumped through a filter and into a 1000-bbl tank for storage via the pumphouse located in the southwest corner of the pond. The pumphouse pumps the water through a filter and into a 1000-bbl tank for storage prior to being trucked to an off-site deep disposal/injection well.

Petroleum products from the east pond are collected in twelve 200 to 400-bbl tanks and subsequently transported offsite for appropriate recovery. Some of the soils surrounding this pond are petroleum stained. The sludge from both ponds is periodically dredged and treated at the on-site land farm and is subsequently disposed on site.

There are two monitoring wells located southeast of the west pond and one monitoring well located northeast of the east pond, though there have been no shallow water bearing strata identified in the area. Other items of note at the facility include: three tanks that are not part of the facility’s process, a large treated mud/sludge landfarm area, a propane tank, a solid mixer, and a pug mill. An aerial

photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure A-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the two ponds and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping. The land farm area will be leveled and the land farm and ponds area will be graded to restore original contours. The entire disturbed area will be and revegetated. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and oily sludge from the bottom of all tanks.
  - Steam clean tanks removal from the site for disposal.
  - Steam clean, remove and dispose of associated piping
- Tank sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility.
  - Landfarm sludge on site and dispose on site once amended.
- Remove residual petroleum contaminated soil (PCS) from area surrounding the west pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high-pressure enhanced evaporation units to assist in the removal of approximately seventy percent of the pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- Dredge sludge from the west pond and land farm it on site.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Remove electrical service from the site.

### Year Three (late) or Year Four:

- Land farm the sludge dredged from the west pond on site.
- Plug and abandon all groundwater monitoring wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade

- Use a patrol grader to smooth fill material to final grade
- Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary with the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables E-1 and E-2 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table E-1: Cost Estimate Summary of Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$0.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$285,000.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$376,785.23
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$124,017.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$1,126.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$45,140.00
<b>7.0 Reclamation</b>	\$8,811.25
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$22,357.50
<b>Subtotal</b>	<b>\$863,237.23</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$86,323.72</b>
<b>Contingency (15%)</b>	<b>\$142,434.14</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$1,091,995.10</b>

**Table E-2: Cost Estimate Summary of Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$0.00
<b>2.0 Separation Pit Water Removal</b>	\$285,000.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$89,045.09
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$124,017.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$1,126.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$45,140.00
<b>7.0 Reclamation</b>	\$8,811.25
<b>8.0 Miscellaneous: Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$22,357.50
<b>Subtotal</b>	<b>\$575,497.09</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$57,549.71</b>
<b>Contingency (15%)</b>	<b>\$86,324.56</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$719,371.37</b>

**Table E-3: Closure/Post Closure and Reclamation Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	0	day	\$300.00	\$0.00
Evaporation Enhancement maintenance and labor	0	month	\$4,800.00	\$0.00
Evaporation Enhancement utility	0	day	\$46.60	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	57,000	BBL	\$5.00	\$285,000.00
Transportation costs	0	hour	\$115.00	\$0.00
<b>Item Subtotal</b>				<b>\$285,000.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	2,319	yd <sup>3</sup>	\$56.00	\$129,885.95
Sludge mixing with fly ash	2,319	yd <sup>3</sup>	\$22.00	\$51,026.62
Fly ash material	232	ton	\$80.00	\$18,555.14
Transportation of solidified sludge	331,673	ton-mile	\$0.15	\$49,750.96
Disposal of solidified Sludge	2,551	ton	\$50.00	\$127,566.56
<b>Item Subtotal</b>				<b>\$376,785.23</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	2,319	ft	\$1.00	\$2,319.39
Land farming maintenance	27,833	yd <sup>3</sup>	\$0.30	\$8,349.81
Straw sludge amendment material	331	ton	\$43.00	\$14,247.69
Manure sludge amendment material	331	ton	\$40.00	\$13,253.67
Sludge amendment mixing and application	2,982	yd <sup>3</sup>	\$7.00	\$20,874.53
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$89,045.09</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	456	BBL	\$22.00	\$10,032.00
Steam clean 400 BBL tank	12	each	\$6,100.00	\$73,200.00
Steam clean 1,000 BBL tank	1	each	\$8,400.00	\$8,400.00
Steam clean separator (frac tank)	0	each	\$6,100.00	\$0.00
steam clean 100 ft of pipe	3	100 Inft	\$375.00	\$1,125.00
demolish 100 ft of pipe	3	100 Inft	\$400.00	\$1,200.00
Demolish 1,000 BBL tank	1	each	\$24,000.00	\$24,000.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
400 BBL tank removal and transport	12	Each	\$505.00	\$6,060.00
<b>Item Subtotal</b>				<b>\$124,017.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Building Demolition	800	ft <sup>3</sup>	\$0.50	\$400.00
Load Waste Material into Dumpster	5	ton	\$5.25	\$26.25
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	5	ton	\$50.00	\$250.00
<b>Item Subtotal</b>				<b>\$1,126.25</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	4	acre	\$1,000.00	\$4,000.00
Earth moving with scraper	4,400	yd <sup>3</sup>	\$4.35	\$19,140.00
Earth moving with D8 dozer	6,000	yd <sup>3</sup>	\$2.25	\$13,500.00
Recontouring (blade work)	10	acre	\$500.00	\$4,750.00
PCS disposal (bathtub ring)	75	ton	\$50.00	\$3,750.00
<b>Item Subtotal</b>				<b>\$45,140.00</b>

#### 7.0 Reclamation

Fertilizer material cost	10	acre	\$200.00	\$1,900.00
Fertilizer application cost	10	acre	\$187.50	\$1,781.25
Seedbed preparation cost	10	acre	\$190.00	\$1,805.00
Seeding cost	10	acre	\$350.00	\$3,325.00
<b>Item Subtotal</b>				<b>\$8,811.25</b>

#### 8.0 Miscellaneous

Cost to abandon monitoring well	120	ft	\$4.00	\$480.00
Cap monitoring well	3	each	\$10.00	\$30.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	3	number	\$130.00	\$390.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	13	each	\$360.00	\$4,680.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	3	locations	\$270.00	\$810.00
Boneyard material disposal at landfill	5	ton	\$50.00	\$250.00
Dumptruck to landfill	500	ton-mile	\$0.15	\$75.00
Vegetation Assessment LRES method	40	hr	\$100.00	\$4,000.00

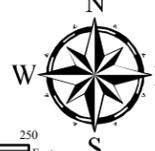
Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	875	LF	\$2.50	\$2,187.50
Fencing removal and disposal cost	1,800	LF	\$0.80	\$1,440.00
Cost for 400 BBL tank removal and transport	3	each	\$505.00	\$1,515.00
<b>Item Subtotal</b>				<b>\$22,357.50</b>



**Legend**

- × — × Fence
- Disturbed Area
- Tanks (existing)
- Ponds/Pits
- Electrical Line
- ⊕ Monitoring Well

0 25 50 100 150 200 250 Feet



DRAWN BY: EGS  
 CHECKED BY: CAT  
 APPROVED BY: RMD

REV #		DESCRIPTION	BY	DATE	FIGURE
0		Draft for Review	EGS	10/08/14	<b>E-1</b>
1					
2					

**Kissack Disposal Pits**  
(Imagery: October 2013)

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**APPENDIX F:  
LINCH PIT DISPOSAL FACILITY**

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Table F-2: Cost Estimate Summary of Method B
Table F-3: Closure/Post Closure, and Reclamation Cost Estimate Summary

## LIST OF FIGURES

Figure F-1: Linch Pit Disposal Facility
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## 1. DESCRIPTION OF FACILITY

The existing Linch Pit Disposal Facility (Linch Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF) is in Johnson County, Wyoming outside the town of Linch. The Linch facility was first permitted by the WDEW/WQD in August 1983 (No. 83-382) as a drilling mud disposal facility. This classification was later modified in 1993 to permit the Linch Facility to accept produced water as the primary disposal effluent.

The Linch Facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Other land uses are limited due to private surface ownership of the facility and adjacent lands. Adjacent properties to the north and west are owned by Reeves Family LLC, and the nearest residence is approximately 0.3 miles to the southwest.

The Linch Facility, is located on the top of a hill and drainage from the reclaimed facility will occur in nearly all compass directions. The facility is located on the southwest corner of an unzoned 1,950 acre parcel owned by a Ronald B. Linch, and is adjacent to Wyoming Highway 192 which provides good access to the site. The sites gravel access road currently serves other operations beyond the facility. Commercial overhead power is available at the site.

The primary Linch facility consist of a separation pit and a larger evaporation pond. A permit issued in 1998 (No. 98-235), allowed the Linch Facility to add a 50 foot tank skimmer. One evaporation pond has been removed from the Linch Facility as a result of a Consent Decree (Docket No. 167-76) resulting from unauthorized disposal into the pond.

Upon WDEQ recommendation, three monitoring wells (MW 1, MW 2, MW 3) were installed in 1988 (No. 88-121) after it was proposed that the original geologic assessment of the site area was misinterpreted. These monitoring wells located to the south and east of the pond and drilled to a depth of approximately 200 feet, below the aquitard.

In 1992, as a result of the stipulations stemming from a notice of violation (Docket #1972-88) as well as the suggestion that the existing monitoring wells were inadequate, a leak detection system was installed at the site. Under a new permit (No. 91-126), two shallow leak detection monitoring wells (LD-1 and LD-2) were installed, to depths of 48 feet and 27 feet respectively.

Questioning their effectiveness, MW-1 and LD-1 were plugged and abandoned, leaving only MW-2, MW-3 and LD-2 to provide monitoring capabilities.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure F-1 of this appendix.

## 2. FACILITY DECOMMISSIONING AND RECLAMATION PLAN

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the pits and tanks; removing and disposing of any contaminated infrastructure; removing /the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network.

The Linch Facility will likely require high sodium soils to be scraped and disposed of in the pond as significant overspray has been observed. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove accumulated deposits of solids and sludge from the small separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility.
  - Landfarm sludge on-site and dispose on-site once amended.
  - Utilize a thermal destruction unit on site and dispose on site.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high pressure enhanced evaporation units to assist with the disposal of approximately seventy percent of the pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Remove electrical service to the site.

Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables F-1 through F-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table F-1: Cost Estimate Summary of Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$30,396.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$6,965.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$22,111.39
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$166,842.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$726.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$39,259.80
<b>7.0 Reclamation</b>	\$10,388.00
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$31,237.30
<b>Subtotal Method A</b>	<b>\$307,925.74</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$30,792.57</b>
<b>Contingency (15%)</b>	<b>\$50,807.75</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$389,526.07</b>

**Table F-2: Cost Estimate Summary of Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$30,396.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$6,965.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$33,465.02
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$166,842.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$726.25
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$39,259.80
<b>7.0 Reclamation</b>	\$10,388.00
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$31,237.30
<b>Subtotal</b>	<b>\$319,279.37</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$31,927.94</b>
<b>Contingency (15%)</b>	<b>\$52,681.10</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$403,888.41</b>

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**Table F-3: Closure/Post Closure Cost Estimate Summary**

Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	60	day	\$300.00	\$18,000.00
Evaporation Enhancement maintenance and labor	2	month	\$4,800.00	\$9,600.00
Evaporation Enhancement utility	60	day	\$46.60	\$2,796.00
<b>Item Subtotal</b>				<b>\$30,396.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	933	BBL	\$5.00	\$4,665.00
Transportation costs	20	hour	\$115.00	\$2,300.00
<b>Item Subtotal</b>				<b>\$6,965.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	136	yd <sup>3</sup>	\$56.00	\$7,622.27
Sludge mixing with fly ash	136	yd <sup>3</sup>	\$22.00	\$2,994.46
Fly ash material	14	ton	\$80.00	\$1,088.90
Transportation of solidified sludge	19,464	ton-mile	\$0.15	\$2,919.60
Disposal of solidified Sludge	150	ton	\$50.00	\$7,486.16
<b>Item Subtotal</b>				<b>\$22,111.39</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	136	yd <sup>3</sup>	\$1.00	\$136.11
Land farming maintenance	1,633	yd <sup>3</sup>	\$0.30	\$490.00
Straw sludge amendment material	19	ton	\$43.00	\$836.12
Manure sludge amendment material	19	ton	\$40.00	\$777.78
Sludge amendment mixing and application	175	yd <sup>3</sup>	\$7.00	\$1,225.01
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$33,465.02</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	416	BBL	\$22.00	\$9,152.00
Steam clean 400 BBL tank	8	each	\$6,100.00	\$48,800.00
Steam clean 1000 BBL tank	3	each	\$8,400.00	\$25,200.00
Steam clean separator (frac tank)	1	each	\$6,100.00	\$6,100.00
Steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
Demolish 1000 BBL tank	3	each	\$24,000.00	\$72,000.00
400 BBL tank removal and transport	8	each	\$505.00	\$4,040.00

Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$166,842.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Load Waste Material into Dumpster	5	ton	\$5.25	\$26.25
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	5	ton	\$50.00	\$250.00
<b>Item Subtotal</b>				<b>\$726.25</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	1,008	yd <sup>3</sup>	\$4.35	\$4,384.80
Earth moving with D8 dozer	9,900	yd <sup>3</sup>	\$2.25	\$22,275.00
Recontouring (blade work)	11	acre	\$500.00	\$5,600.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
<b>Item Subtotal</b>				<b>\$39,259.80</b>

#### 7.0 Reclamation

Fertilizer material cost	11	acre	\$200.00	\$2,240.00
Fertilizer application cost	11	acre	\$187.50	\$2,100.00
Seedbed preparation cost	11	acre	\$190.00	\$2,128.00
Seeding cost	11	acre	\$350.00	\$3,920.00
<b>Item Subtotal</b>				<b>\$10,388.00</b>

#### 8.0 Miscellaneous

Cost to abandon monitoring well	870	ft	\$4.00	\$3,480.00
Cap monitoring well	6	each	\$10.00	\$60.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	6	number	\$130.00	\$780.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	13	each	\$360.00	\$4,680.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	6	locations	\$270.00	\$1,620.00
Boneyard material disposal at landfill	10	ton	\$50.00	\$500.00
Dumptruck to landfill	1,000	ton-mile	\$0.15	\$150.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	945	LF	\$2.50	\$2,362.50
Fencing removal and disposal cost	1,306	LF	\$0.80	\$1,044.80

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Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
Cost for 400 BBL tank removal and transport	12	each	\$505.00	\$6,060.00
<b>Item Subtotal</b>				<b>\$31,237.30</b>

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PREPARED FOR

WYOMING

**WDEQ-COWDF**

**TREC, Inc.**  
Engineering & Environmental Management  
900 Werner Court  
Suite 130  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

**Legend**

- × — × Fence
- Disturbed Area
- Tanks (existing)
- Ponds/Pits

0 25 50 100 150 200 250 Feet

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

Linch Pit (Imagery: August 2013)				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	F-1
1				
2				

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**APPENDIX G:  
McBETH DISPOSAL FACILITY**

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Table G-2: Cost Estimate Summary for Method B
Table G-3: Closure/Post Closure, and Reclamation Cost Estimate Summary

## LIST OF FIGURES

Figure G-1: McBeth Disposal Facility
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## **1. DESCRIPTION OF FACILITY**

The McBeth Disposal Facility (McBeth Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF), is located in Campbell County, Wyoming 20 miles northeast of Wright and 26 miles southwest of Gillette. The McBeth facility was first permitted in October 1981 (No. 81-470), and since the McBeth facility was permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The site is located on an unzoned 26 acre parcel, leased by Jim’s Water Service of Gillette. The facility is constructed in a small playa lake area with no drainage away from the site, and evidence of some small ponding areas of water from seasonal rains and runoff to both the east and west of the evaporation ponds. Access to the site is from the Black and Yellow Road approximately 4.5 miles west of State Highway 50 and overhead power is available to the site.

The McBeth Facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, wildlife habitat. James A. Hall owns the facility property as well as the property to southwest. Rafter X Resources LLC owns and operates the Pumpkin Butte COWDF on a 170 acre parcel that borders the facility on the northeast, southeast, and northwest sides. The nearest residence is 0.9 miles to the northeast.

The McBeth Facility currently has two separation pits (Cell A and Cell B, approximately 0.5 acres total ), two clay lined evaporation ponds (Cell C and Cell D, approximately 6.1 acres each), storage tanks, and additional ancillary tanks and equipment. The treatment systems consist of thirteen 1,000-bbl tanks, eight 400-bbl tanks, two 500-bbl tanks and a 500-bbl separator tank/vault contained in a concrete sump that is partially below grade. Recently the operator constructed two covered buildings with open sides over the separation ponds to protect against rainfall and waterfowl. The buildings are approximately 150 feet x 65 feet and 120 feet x 120 feet and contain substantial concrete footings for support. The second building is a wood frame pole-barn style structure. At present, the McBeth facility has a monitoring network of 11 monitoring wells. Monitor well data indicates pond exfiltration has created a perched groundwater zone and that exfiltrated water exists in this zone rather than in the uppermost groundwater below the site.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure G-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

The decommissioning and reclamation activities includes removing the water from the two evaporation ponds with enhanced and natural evaporation, and backfilling the ponds with existing material from the dikes. The tanks, separation pits and buildings will be removed. The separation pits will be emptied and then backfilled with the use of a dozer and a scraper. The land farm area will be flattened. These areas will be graded with existing non-topsoil material and fertilizer will be added to assist with revegetation. The dirt work will primarily be done with a dozer, scraper and patrol blade.

The facility decommissioning and reclamation activities developed for this site is as follows:

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove accumulated deposits of solids and sludge from the small separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility or:
  - Landfarm sludge on-site and dispose on-site once amended.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation pond.
  - Use one of the methods described above (for sludge) to mitigate PCS.
- Rent and operate high-pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the evaporation pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed and disposed of accordingly.

Year Three (late) or Year Four:

- Dismantle building over the separation pits ~~skim ponds~~ and ancillary buildings.
  - Remove concrete building supports and any additional concrete. Dispose these materials in the evaporation ponds.
- Utilize a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade. Utilize a patrol grader to smooth material to the final grade.
- Utilize a dozer and scraper to backfill the land farm area located to the northwest of the evaporation ponds
  - Use a dozer or patrol grader to rip the truck parking/traffic area.
  - Utilize a patrol grader to smooth material to the final grade.
- Plug and abandon any monitor wells.
- Complete seeding, fertilizing and any erosion control for the entire disturbed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables G-1 through G-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table G-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$371,136.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$97,380.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$210,611.88
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$518,252.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$61,109.35
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$81,477.50
<b>7.0 Reclamation</b>	\$23,187.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$28,385.00
<b>Subtotal</b>	<b>\$1,391,539.23</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$139,153.92</b>
<b>Contingency (15%)</b>	<b>\$229,603.97</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$1,760,297.12</b>

**Table G-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$371,136.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$97,380.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$63,004.47
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$518,252.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$61,109.35
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$81,477.50
<b>7.0 Reclamation</b>	\$23,187.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$28,385.00
<b>Subtotal</b>	<b>\$1,243,931.82</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$124,393.18</b>
<b>Contingency (15%)</b>	<b>\$205,248.75</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$1,573,573.76</b>

**Table G-3: Closure/Post Closure Cost Estimate Summary**

Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	960	day	\$300.00	\$288,000.00
Evaporation Enhancement maintenance and labor	8	month	\$4,800.00	\$38,400.00
Evaporation Enhancement utility	960	day	\$46.60	\$44,736.00
<b>Item Subtotal</b>				<b>\$371,136.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mix Removal</b>				
Pumping and disposal cost	13,358	BBL	\$5.00	\$66,790.00
Transportation costs	266	hour	\$115.00	\$30,590.00
<b>Item Subtotal</b>				<b>\$97,380.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	1,296	yd <sup>3</sup>	\$56.00	\$72,602.43
Sludge mixing with fly ash	1,296	yd <sup>3</sup>	\$22.00	\$28,522.38
Fly ash material	130	ton	\$80.00	\$10,371.78
Transportation of solidified sludge	185,395	ton-mile	\$0.15	\$27,809.32
Disposal of solidified Sludge	1,426	ton	\$50.00	\$71,305.96
<b>Item Subtotal</b>				<b>\$210,611.88</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and --Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	1,296	yd <sup>3</sup>	\$1.00	\$1,296.47
Land farming maintenance	15,558	yd <sup>3</sup>	\$0.30	\$4,667.30
Straw sludge amendment material	185	ton	\$43.00	\$7,964.04
Manure sludge amendment material	185	ton	\$40.00	\$7,408.41
Sludge amendment mixing and application	1,667	yd <sup>3</sup>	\$7.00	\$11,668.25
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$63,004.47</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	896	BBL	\$22.00	\$19,712.00
Steam clean 400 BBL tank	8	each	\$6,100.00	\$48,800.00
Steam clean 1000 BBL tank	13	each	\$8,400.00	\$109,200.00
Steam clean separator (frac tank)	3	each	\$6,100.00	\$18,300.00
Steam clean 100 ft of pipe	8	100 LF	\$375.00	\$3,000.00
Demolish 100 ft of pipe	8	100 LF	\$400.00	\$3,200.00
Demolish 1000 BBL tank	13	each	\$24,000.00	\$312,000.00
400 BBL tank removal and transport	8	each	\$505.00	\$4,040.00

Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$518,252.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Building Demolition	195,648	ft <sup>3</sup>	\$0.20	\$39,129.60
Concrete Secondary containment removal	9,750	ft <sup>2</sup>	\$1.30	\$12,675.00
Remove Railroad Tie Retaining Wall	40	ft	\$100.00	\$4,000.00
Move Infrastructure material with D8 Dozer	250	yd <sup>3</sup>	\$2.45	\$612.50
Bury infrastructure material	200	yd <sup>3</sup>	\$0.33	\$66.00
Load Waste Material into Dumpster	5	ton	\$5.25	\$26.25
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	5	ton	\$50.00	\$250.00
Concrete Pad Steam Cleaning	9,750	sq ft	\$0.40	\$3,900.00
<b>Item Subtotal</b>				<b>\$61,109.35</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	5	acre	\$1,000.00	\$5,000.00
Earth moving with scraper	3,900	yd <sup>3</sup>	\$4.35	\$16,965.00
Earth moving with D8 dozer	16,450	yd <sup>3</sup>	\$2.25	\$37,012.50
Recontouring (blade work)	25	acre	\$500.00	\$12,500.00
PCS disposal (bathtub ring)	200	ton	\$50.00	\$10,000.00
<b>Item Subtotal</b>				<b>\$81,477.50</b>

#### 7.0 Reclamation

Fertilizer material cost	25	acre	\$200.00	\$5,000.00
Fertilizer application cost	25	acre	\$187.50	\$4,687.50
Seedbed preparation cost	25	acre	\$190.00	\$4,750.00
Seeding cost	25	acre	\$350.00	\$8,750.00
<b>Item Subtotal</b>				<b>\$23,187.50</b>

#### 8.0 Miscellaneous; Including Soil and Groundwater Sampling, Well Abandonment, Fencing, Monitoring Activities

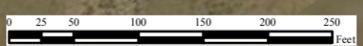
Cost to abandon monitoring well	550	ft	\$4.00	\$2,200.00
Cap monitoring well	11	each	\$10.00	\$110.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	11	number	\$130.00	\$1,430.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	11	each	\$360.00	\$3,960.00
Soil sample labor	10	each	\$90.00	\$900.00

Items	Estimated Quantity	Unit	Unit Price	Estimated Cost
Groundwater sample labor cost	11	locations	\$270.00	\$2,970.00
Boneyard material disposal at landfill	0	ton	\$50.00	\$0.00
Dumptruck to landfill	0	ton-mile	\$0.15	\$0.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	1,000	LF	\$2.50	\$2,500.00
Fencing removal and disposal cost	4,000	LF	\$0.80	\$3,200.00
Cost for 400 BBL tank removal and transport	3	each	\$505.00	\$1,515.00
<b>Item Subtotal</b>				<b>\$28,385.00</b>



**Legend**

- x - Fence
- Disturbed Area
- Tanks (existing)
- Ponds/Pits
- Land Farm
- Structures
- Topsoil Pile



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<p>PREPARED FOR</p> <p><b>WYOMING</b></p>	<p><b>WDEQ-COWDF</b></p> <p><b>TREC, Inc.</b> Engineering &amp; Environmental Management</p> <p>900 Werner Court Suite 150 Casper, WY 82601 Phone (307) 265-0696 Fax (307) 265-2498 www.treccorp.com</p>		<p>DRAWN BY: EGS</p> <p>CHECKED BY: CAT</p> <p>APPROVED BY: RMD</p>	<p><b>McBeth Disposal Facility</b> (Imagery: August 2013)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV #</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> <th>FIGURE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Draft for Review</td> <td>EGS</td> <td>10/8/14</td> <td rowspan="3" style="text-align: center; vertical-align: middle;"><b>G-1</b></td> </tr> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	REV #	DESCRIPTION	BY	DATE	FIGURE	0	Draft for Review	EGS	10/8/14	<b>G-1</b>	1				2			
REV #	DESCRIPTION	BY	DATE	FIGURE																			
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**APPENDIX H:  
McGINNIS DISPOSAL FACILITY**

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## 1. DESCRIPTION OF FACILITY

McGinnis Pit Disposal Facility (McGinnis Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF), is located in Sublette County, Wyoming approximately 42 miles southwest of Pinedale. ExxonMobil, received permit No. 84-387RR for construction of a single, five surface acre disposal pond and monitoring well network from the Wyoming Department of Environmental Quality (WDEQ) in October 1984, and still operates the facility. A permit to add an aeration system to the facility was issued in August 1985 (No. 85-449). Further modifications occurred with the addition of a separation facility consisting of a containment cell, two produced water tanks and two condensate tanks in 2005 (No. 05-605R). Since the McGinnis facility was permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements

The McGinnis Facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, livestock grazing, and wildlife habitat. The facility is located on a 324 acre parcel zoned agricultural, owned by JF Ranch, Inc. and is leased to the site operator. Wyoming Peak Land Company, LLC owns property to the south of the facility and BLM owns the property to the west of the facility. There are no residences within one mile of the facility.

As the site is near the Wyoming Range mountain foothills, the area around the site is high rolling hills, with the site itself built on the side of a hill. However, the site does not lie directly in a drainage and should not experience significant run-on.

The primary facility components consist of a series of four tanks and an evaporation pond. Arriving trucks unload into two 400-bbl tanks where oil is separated and transferred to two 300-bbl storage tanks for removal from site. The water is discharged directly into the evaporation pond from the separation tanks after the oil has been removed. The pond is a large, deep pond that is currently covered nearly in its entirety with “bird balls” intended to keep waterfowl from landing in the pond; With the bird balls in place, enhanced evaporation becomes a necessity. The pond also has three operational enhanced evaporation sprayers.; although, the motors are damaged and no longer in operation. There is a large topsoil pile located to the south of the evaporation pond available for reclamation purposes. Overhead electric service and good road access is available on site.

Historically, there had been a landfill associated with this site directly east of the pond. This landfill has since been reclaimed. As such, this closure cost estimate assumes proper closure of the landfill and does not address further costs for that portion of the site.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure H-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the pond and tanks; removing and disposing the “bird balls”; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours, applying topsoil from the stockpile and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Remove residual ring of petroleum contaminated soils (PCS) around the shoreline of the evaporation pond.
- Rent and operate high pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the evaporation ponds water volume.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.
- If additional PCS is encountered during evaporation pond drawdown/evaporation, the soils will be removed and disposed of accordingly.
- Remove and dispose of plastic bird balls.

### Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance area and truck parking/traffic area and smooth to final grade.
  - Use a scraper to reapply topsoil from stockpile located to south of pond. Smooth to final grade with patrol grader.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables H-1 through H-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table H-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$204,768.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	<b>\$4,548.60</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$30,962.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$1,587.50</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$53,899.95</b>
<b>7.0 Reclamation</b>	<b>\$9,275.00</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$41,577.50</b>
<b>Subtotal</b>	<b>\$346,618.55</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$34,661.86</b>
<b>Contingency (15%)</b>	<b>\$57,192.06</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$438,472.47</b>

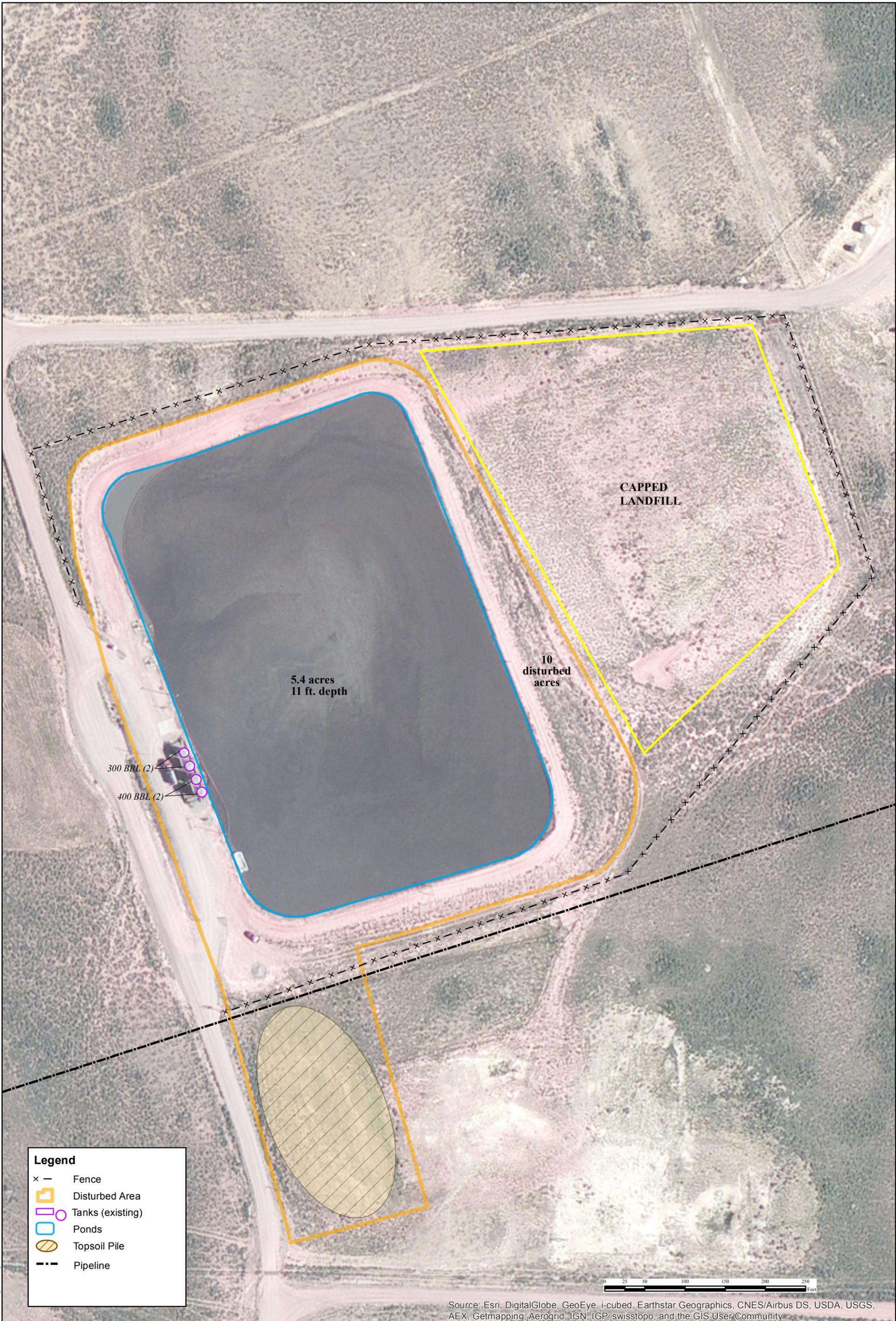
**Table H-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$204,768.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	<b>\$30,712.80</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$30,962.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$1,587.50</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$53,899.95</b>
<b>7.0 Reclamation</b>	<b>\$9,275.00</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$41,577.50</b>
<b>Subtotal</b>	<b>\$372,782.75</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$37,278.28</b>
<b>Contingency (15%)</b>	<b>\$61,509.15</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$471,570.18</b>

**Table H-3: Closure/Post Closure Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	480	day	\$300.00	\$144,000.00
Evaporation Enhancement maintenance and labor	8	month	\$4,800.00	\$38,400.00
Evaporation Enhancement utility	480	day	\$46.60	\$22,368.00
<b>Item Subtotal</b>				<b>\$204,768.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	0	BBL	\$5.00	\$0.00
Transportation costs	0	hour	\$115.00	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	28	yd <sup>3</sup>	\$56.00	\$1,568.00
Sludge mixing with fly ash	28	yd <sup>3</sup>	\$22.00	\$616.00
Fly ash material	3	ton	\$80.00	\$224.00
Transportation of solidified sludge	4,004	ton-mile	\$0.15	\$600.60
Disposal of solidified Sludge	31	ton	\$50.00	\$1,540.00
<b>Item Subtotal</b>				<b>\$4,548.60</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	28	yd <sup>3</sup>	\$1.00	\$28.00
Land farming maintenance	336	yd <sup>3</sup>	\$0.30	\$100.80
Straw sludge amendment material	4	ton	\$43.00	\$172.00
Manure sludge amendment material	4	ton	\$40.00	\$160.00
Sludge amendment mixing and application	36	yd <sup>3</sup>	\$7.00	\$252.00
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$30,712.80</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	136	BBL	\$22.00	\$2,992.00
Steam clean 400 BBL tank	4	Each	\$6,100.00	\$24,400.00
Steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
400 BBL tank removal and transport	4	each	\$505.00	\$2,020.00
<b>Item Subtotal</b>				<b>\$30,962.00</b>

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>5.0 Infrastructure Demolition and Disposal</b>				
Concrete Pad Demolition	450	ft <sup>2</sup>	\$1.30	\$585.00
Load Waste Material into Dumpster	10	ton	\$5.25	\$52.50
Transport waste to landfill	100	ton-mile	\$4.50	\$450.00
Dispose of material at landfill	10	ton	\$50.00	\$500.00
<b>Item Subtotal</b>				<b>\$1,587.50</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>				
Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	4,977	yd <sup>3</sup>	\$4.35	\$21,649.95
Earth moving with D8 dozer	9,000	yd <sup>3</sup>	\$2.25	\$20,250.00
Recontouring (blade work)	10	acre	\$500.00	\$5,000.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
<b>Item Subtotal</b>				<b>\$53,899.95</b>
<b>7.0 Reclamation</b>				
Fertilizer material cost	10	acre	\$200.00	\$2,000.00
Fertilizer application cost	10	acre	\$187.50	\$1,875.00
Seedbed preparation cost	10	acre	\$190.00	\$1,900.00
Seeding cost	10	acre	\$350.00	\$3,500.00
<b>Item Subtotal</b>				<b>\$9,275.00</b>
<b>8.0 Miscellaneous</b>				
Cost to abandon monitoring well	210	ft	\$4.00	\$840.00
Cap monitoring well	7	each	\$10.00	\$70.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	7	number	\$130.00	\$910.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	11	each	\$360.00	\$3,960.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	7	locations	\$270.00	\$1,890.00
Boneyard material disposal at landfill	2	ton	\$50.00	\$100.00
Dumptruck to landfill	200	ton-mile	\$0.15	\$30.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	575	LF	\$2.50	\$1,437.50
Fencing removal and disposal cost	2,300	LF	\$0.80	\$1,840.00
Bird Ball Collection and Disposal	1	number	\$20,000.00	\$20,000.00
<b>Item Subtotal</b>				<b>\$41,577.50</b>



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PREPARED FOR

**WYOMING**

**WDEQ-COWDF**

**TREC, Inc.**  
Engineering & Environmental Management

900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

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CHECKED BY: CAT  
APPROVED BY: RMD

McGinnis Evaporation Pond (Imagery: July 2010)		BY	DATE	FIGURE
REV #	DESCRIPTION			
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1				
2				

**APPENDIX I:  
OILFIELD DISPOSAL SERVICE  
DISPOSAL FACILITY**

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## **1. DESCRIPTION OF FACILITY**

Oilfield Disposal Services Pit (ODS Facility), a Commercial Oilfield Wastewater Disposal Facility (COWDF), is located in Washakie County, Wyoming approximately 18 miles east of Worland. Utilizing a mined out bentonite pit, ODS Pit was first permitted in 1985 (No. 84-568) to receive produced oilfield waters. The permit allowed for construction of a single evaporative containment pond, with a bentonite liner. It was anticipated that the bentonite layer would eventually allow seepage, so original designs called for a collection trench to detect leaks. However, due to underlying shale, the trench design was replaced with the installation of two monitoring wells in the southeast corner of the pit (No. 84-568R). Additional permitted modifications to the site occurred in 1993 (No. 91-318R) to enhance the evaporation process, this permit covered the addition of a spray system, which was composed of two separator tanks and a skirted boom. This permit also allowed for the construction of truck unloading area and a discharge line. Since the ODS facility was permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The ODS Facility is located on Basin Bentonite Trust lands, owned and operated by Vista Trucking and Water Services. The site location sits at the base of two hills and partially within the channel of a small tributary. Access is obtained through lands owned by a Basin Bentonite Trust, as such access is poor in wet conditions. The site is approximately three-quarters of a mile off State Highway 16. There is not power service available on-site.

The landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Basin Bentonite Trust owns property to the north, east, south and west and BLM owns property adjacent to the northwest corner. There are no residences within one mile of this facility.

The pit, as per the application permit, measures approximately 200 feet wide, 600 feet long, is 10 feet deep, and was designed to hold a volume of 113,271 barrels. The pond was originally designed with two dikes, one on the north (Dike A) and west (Dike B) sides of the pond. It was later determined that the permeability of the Mowry Shale Formation was not suitable for containment and a bentonite liner would need to be used. The pond liner is comprised of a 1-foot layer of bentonite at the bottom and 3-feet of bentonite on the sides. There are six monitor wells on site with an average depth of about 40 feet. Four of these wells were gauged during a recent site visit with all being found dry.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure I-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater and oily sludge from the pond and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water via a vacuum truck.
- Water will be decanted to the evaporation pond and oil will be hauled offsite.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Rent and operate high pressure enhanced evaporation units to assist with the disposal of approximately seventy percent of the evaporation pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.

### Year Three (late) or Year Four:

- Plug and abandon all groundwater monitor wells.
- Assume 100 cubic yards of sludge and PCS needs to be removed from the east portion of the pond.
- Remove residual ring of PCS around an estimated 25 % of the shoreline of the evaporation pond.
- The sludge/PCS will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility or:
  - Landfarm sludge on-site and dispose on-site once amended.
- Use a dozer and scraper to complete filling of the pond with fill material from the dikes to rough grade and use a dozer to reduce the “high wall” area along the east side of the pond to a reduced slope.
  - Use a patrol grader to smooth fill material to final grade.

- Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables I-1 through I-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table I-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$102,384.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	<b>\$27,005.69</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$106,030.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$2,005.00</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$42,950.00</b>
<b>7.0 Reclamation</b>	<b>\$12,985.00</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$22,167.75</b>
<b>Subtotal</b>	<b>\$315,527.44</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$31,552.74</b>
<b>Contingency (15%)</b>	<b>\$52,062.03</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$399,142.21</b>

**Table I-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$102,384.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	<b>\$34,232.00</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$106,030.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$2,005.00</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$42,950.00</b>
<b>7.0 Reclamation</b>	<b>\$12,985.00</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$22,167.75</b>
<b>Subtotal</b>	<b>\$322,753.75</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$32,275.37</b>
<b>Contingency (15%)</b>	<b>\$53,254.37</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$408,283.49</b>

**Table I-3: Closure/Post Closure Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	240	day	\$300.00	\$72,000.00
Evaporation Enhancement maintenance and labor	4	month	\$4,800.00	\$19,200.00
Evaporation Enhancement utility	240	day	\$46.60	\$11,184.00
<b>Item Subtotal</b>				<b>\$102,384.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	0	BBL	\$5.00	\$0.00
Transportation costs	0	hour	\$115.00	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	166	yd <sup>3</sup>	\$56.00	\$9,309.44
Sludge mixing with fly ash	166	yd <sup>3</sup>	\$22.00	\$3,657.28
Fly ash material	17	ton	\$80.00	\$1,329.92
Transportation of solidified sludge	23,772	ton-mile	\$0.15	\$3,565.85
Disposal of solidified Sludge	183	ton	\$50.00	\$9,143.20
<b>Item Subtotal</b>				<b>\$27,005.69</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	166	yd <sup>3</sup>	\$1.00	\$166.24
Land farming maintenance	1,995	yd <sup>3</sup>	\$0.30	\$598.46
Straw sludge amendment material	24	ton	\$43.00	\$1,021.19
Manure sludge amendment material	24	ton	\$40.00	\$949.94
Sludge amendment mixing and application	214	yd <sup>3</sup>	\$7.00	\$1,496.16
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$34,232.00</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	320	BBL	\$22.00	\$7,040.00
Steam clean 400 BBL tank	8	each	\$6,100.00	\$48,800.00
Steam clean 1000 BBL tank	1	each	\$8,400.00	\$8,400.00
Steam clean separator (frac tank)	2	each	\$6,100.00	\$12,200.00
steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
Demolish 1000 BBL tank	1	each	\$24,000.00	\$24,000.00
400 BBL tank removal and transport	8	each	\$505.00	\$4,040.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$106,030.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Load Waste Material into Dumpster	20	ton	\$5.25	\$105.00
Transport waste to landfill	200	ton-mile	\$4.50	\$900.00
Dispose of material at landfill	20	ton	\$50.00	\$1,000.00
<b>Item Subtotal</b>				<b>\$2,005.00</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	2,000	yd <sup>3</sup>	\$4.35	\$8,700.00
Earth moving with D8 dozer	8,000	yd <sup>3</sup>	\$2.25	\$18,000.00
Recontouring (blade work)	14	acre	\$500.00	\$7,000.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
Drainage Construction	1,500	ft	\$1.50	\$2,250.00
<b>Item Subtotal</b>				<b>\$42,950.00</b>

#### 7.0 Reclamation

Fertilizer material cost	14	acre	\$200.00	\$2,800.00
Fertilizer application cost	14	acre	\$187.50	\$2,625.00
Seedbed preparation cost	14	acre	\$190.00	\$2,660.00
Seeding cost	14	acre	\$350.00	\$4,900.00
<b>Item Subtotal</b>				<b>\$12,985.00</b>

#### 8.0 Miscellaneous

Cost to abandon monitoring well	200	ft	\$4.00	\$800.00
Cap monitoring well	5	each	\$10.00	\$50.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	5	number	\$130.00	\$650.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	13	each	\$360.00	\$4,680.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	5	locations	\$270.00	\$1,350.00
Boneyard material disposal at landfill	10	ton	\$50.00	\$500.00
Dumptruck to landfill	1,000	ton-mile	\$0.15	\$150.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	0	each	\$3,200.00	\$0.00

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<b>Item</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Estimated Cost</b>
Fencing installation cost	908	LF	\$2.50	\$2,268.75
Fencing removal and disposal cost	3,630	LF	\$0.80	\$2,904.00
Cost for 400 BBL tank removal and transport	3	each	\$505.00	\$1,515.00
<b>Item Subtotal</b>				<b>\$22,167.75</b>

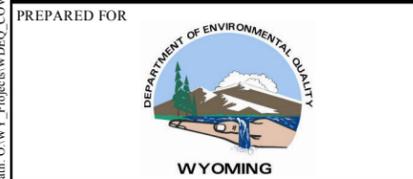
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Path: O:\WY\_Projects\WDEQ\_COWDF\WDEQ\_COWDF\_ODS.mxd

3.4  
acres

Boneyard

Source: Esri, DigitalGlobe, GeoEye, I-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



**WDEQ-COWDF**

**TREC, Inc.**  
Engineering & Environmental Management

900 Werner Court  
Suite 130  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

A Woodard & Curran  
Company

**Legend**

- × — × Fence
- Tanks (existing)
- Ponds
- ▨ Tanks (removed)
- ⊕ Monitoring Well

DRAWN BY: EGS

CHECKED BY: CAT

APPROVED BY: RMD

Oilfield Disposal Services (Imagery: August 2011)				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	I-1
1				
2				

**APPENDIX J:  
PARKMAN DISPOSAL FACILITY**

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Table J-3: Closure/Post Closure, and Reclamation Cost Estimate Summary

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Figure J-1: Parkman Disposal Facility

## **1. DESCRIPTION OF FACILITY**

The Parkman Facility, a Commercial Oilfield Wastewater Disposal Facility (COWDF) is located in Johnson County, Wyoming, approximately 30 miles northeast of Kaycee. High Plains Resources, Inc., (HPR) was issued its Permit to Construct (No. 83-601) the facility in 1983 in accordance with the requirements of the Department of Environmental Quality of the State of Wyoming. While the facility has been maintained in working order, there has been no commercial activity at the site since March of 2014. However, it is the intention of the HPR to operate the facility in light of increased demand, due in part to increased oil and gas development in the area. The site operator confirmed the separation pits were effectively filled with drilling mud and would need to be removed prior to future commercial activity. Since the Parkman facility was permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The site is on a 928 acre parcel owned by Larry Brubaker and is currently operated by High Plains Resources (HPR) of Buffalo. The facility is located on a hillside and an ephemeral drainage near the surrounding area drainage divide. The facility is not readily accessed from public roads and is located in a remote area of Johnson County that is accessed by private roads through operating conventional oil and gas operations.

The Parkman Facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Other land uses are limited due to private surface ownership of the facility and adjacent lands. Larry Brubaker owns the parcel to the south of the facility and the state owns the property to the west of the facility. There are no residences within one mile of the facility, and commercial overhead power is available at the site.

The Parkman facility consists of two separation pits and an evaporation pond. The evaporation pond was constructed by placing a large fill (dam) in an ephemeral drainage. There are 9 tanks at the facility that were used to store and treat oily wastewater (seven 400-bbl and two 500-bbl tanks). This facility does not currently have monitoring wells. A geotechnical investigation was conducted in the immediate vicinity to depths up to 41 feet below ground surface; although, none of those bores encountered groundwater. The report did note that a groundwater table in the area was unlikely unless an unknown artesian aquifer was penetrated. It is recommended monitor wells be installed to attempt to acquire groundwater samples to test for potential contamination.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure J-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater and oily sludge from the separation pit and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; and monitoring of groundwater via existing monitor well network. The large dam will be reduced in height and used as part of the final contours and reclamation of the site. The height of the dam will be reduced approximately 6 feet to provide approximately four feet of fill material to cover the drilling mud contained in the evaporation pond. An overflow emergency spillway type excavation will be included in native soils on the south side of the dam. This design may be more protective of the existing environment compared to completely removing the dam, which has been in place for over 30 years. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water via a vacuum truck.
- Water will be decanted to the evaporation pond and oil will be hauled off-site.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Rent and operate high-pressure enhanced evaporation units to assist with the disposal of approximately seventy percent of the evaporation pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.

### Year Three (late) or Year Four:

- Remove the protective netting from the two separation pit, torch off supporting steel H-beams and demo concrete.
- Remove residual ring of PCS around an estimated 25 % of the shoreline of the evaporation pond
- Remove 2 feet of sludge from the two separation pit. The sludge/PCS will potentially be handled in one of the following ways:
  - Stabilize sludge and transport offsite to a disposal site (landfill).
- Landfarm it on the site and dispose on site.

- Use a dozer and scraper to complete filling of the pond with fill material from the dikes to rough grade and use a dozer to reduce the “high wall” area along the east side of the pond to a reduced slope.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Plug and abandon all groundwater monitor wells
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables J-1 through J-2 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table J-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$0.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$51,725.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$972,806.16
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$67,727.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$0.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$39,285.00
<b>7.0 Reclamation</b>	\$12,057.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$24,707.50
<b>Subtotal</b>	<b>\$1,168,308.16</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$116,830.82</b>
<b>Contingency (15%)</b>	<b>\$192,770.85</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$1,477,909.82</b>

**Table J-2: Cost Estimate Summary for Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$0.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$51,725.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$182,446.08
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$67,727.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$0.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$39,285.00
<b>7.0 Reclamation</b>	\$12,057.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$24,707.50
<b>Subtotal</b>	<b>\$377,948.08</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$37,794.81</b>
<b>Contingency (15%)</b>	<b>\$62,361.43</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$478,104.32</b>

**Table J-3: Closure/Post Closure Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	0	day	\$300.00	\$0.00
Evaporation Enhancement maintenance and labor	0	month	\$4,800.00	\$0.00
Evaporation Enhancement utility	0	day	\$46.60	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	7,125	BBL	\$5.00	\$35,625.00
Transportation costs	140	hour	\$115.00	\$16,100.00
<b>Item Subtotal</b>				<b>\$51,725.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	5,988	yd <sup>3</sup>	\$56.00	\$335,347.15
Sludge mixing with fly ash	5,988	yd <sup>3</sup>	\$22.00	\$131,743.52
Fly ash material	599	ton	\$80.00	\$47,906.74
Transportation of solidified sludge	856,333	ton-mile	\$0.15	\$128,449.94
Disposal of solidified Sludge	6,587	ton	\$50.00	\$329,358.81
<b>Item Subtotal</b>				<b>\$972,806.16</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	5,988	yd <sup>3</sup>	\$1.00	\$5,988.34
Land farming maintenance	71,860	yd <sup>3</sup>	\$0.30	\$21,558.03
Straw sludge amendment material	855	ton	\$43.00	\$36,785.53
Manure sludge amendment material	855	ton	\$40.00	\$34,219.10
Sludge amendment mixing and application	7,699	yd <sup>3</sup>	\$7.00	\$53,895.08
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$182,446.08</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	306	BBL	\$22.00	\$6,732.00
Steam clean 400 BBL tank	9	each	\$6,100.00	\$54,900.00
Steam clean 1,000 BBL tank	0	each	\$8,400.00	\$0.00
Steam clean separator (frac tank)	0	each	\$6,100.00	\$0.00
Steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
Demolish 1,000 BBL tank	0	each	\$1,500.00	\$0.00
400 BBL tank removal and transport	9	each	\$505.00	\$4,545.00
<b>Item Subtotal</b>				<b>\$67,727.00</b>

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>5.0 Infrastructure Demolition and Disposal</b>				
Building Demolition	0	ft <sup>3</sup>	\$0.50	\$0.00
Concrete Secondary containment removal	0	ft <sup>2</sup>	\$1.30	\$0.00
Move Infrastructure material with D8 Dozer	0	yd <sup>3</sup>	\$2.45	\$0.00
Bury infrastructure material	0	yd <sup>3</sup>	\$0.33	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>				
Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	3,350	yd <sup>3</sup>	\$4.35	\$14,572.50
Earth moving with D8 dozer	4,250	yd <sup>3</sup>	\$2.25	\$9,562.50
Recontouring (blade work)	13	acre	\$500.00	\$6,500.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
Drainage Construction	1,100	ft	\$1.50	\$1,650.00
<b>Item Subtotal</b>				<b>\$39,285.00</b>
<b>7.0 Reclamation</b>				
Fertilizer material cost	13	acre	\$200.00	\$2,600.00
Fertilizer application cost	13	acre	\$187.50	\$2,437.50
Seedbed preparation cost	13	acre	\$190.00	\$2,470.00
Seeding cost	13	acre	\$350.00	\$4,550.00
<b>Item Subtotal</b>				<b>\$12,057.50</b>
<b>8.0 Miscellaneous</b>				
Cost to abandon monitoring well	150	ft	\$4.00	\$600.00
Cap monitoring well	3	each	\$10.00	\$30.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	3	number	\$130.00	\$390.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Drill Monitor Well	3	each	\$1,800.00	\$5,400.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	0	each	\$360.00	\$0.00
Soil sample labor	20	each	\$90.00	\$1,800.00
Groundwater sample labor cost	9	locations	\$270.00	\$2,430.00
Boneyard material disposal at landfill	5	ton	\$50.00	\$250.00
Dumptruck to landfill	500	ton-mile	\$0.15	\$75.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00

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<b>Item</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Estimated Cost</b>
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	725	LF	\$2.50	\$1,812.50
Fencing removal and disposal cost	2,900	LF	\$0.80	\$2,320.00
Cost for 400 BBL tank removal and transport	0	each	\$505.00	\$0.00
<b>Item Subtotal</b>				<b>\$24,707.50</b>

---



**Legend**

- × - Fence
- ▭ Disturbed Area
- Tanks (existing)
- ▭ Ponds/Pits
- ▨ Topsoil Pile

PREPARED FOR



**WYOMING**

**WDEQ-COWDF**



**TREC, Inc.**  
Engineering & Environmental Management

900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com



DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

**Parkman Reservoir Disposal Facility  
(Imagery: October 2013)**

REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/8/14	<b>J-1</b>
1				
2				

**APPENDIX K:  
TIERNEY DISPOSAL FACILITY**

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Table K-3: Closure/Post Closure, and Reclamation Cost Estimate Summary

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## **1. DESCRIPTION OF FACILITY**

The Tierney Disposal Facility, a Commercial Oilfield Wastewater Disposal Facility (COWDF) is located in Sweetwater County, Wyoming, approximately five miles southeast of Wamsutter. In 1985 Marathon Oil Company, was issued its Permit to Construct (#85-130RR) for the Tierney Evaporation Pit. Since the Tierney facility was initially permitted prior to 1989, it is classified as a “grandfathered” facility by the WDEQ/WQD. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements. However, Encore Energy Partners Operating, LLC (Encore) purchased the facility from Marathon in fall 2014 and is now responsible for demonstrating compliance with the Chapter 14 financial assurance portion of the guidelines.

The Tierney facility, which is located on and surrounded by Bureau of Land Management (BLM) property, occupies approximately 7.5 acres. The facility is very flat, even terrain and easily accessible from County Road 23. The facility landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area. Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. The Wamsutter landfill is located one mile to the north of the facility, but there are no residences within one mile of the facility.

The primary facilities consist of the 9 acre HDPE lined evaporation pond; several tanks including two 500-bbl water receiving/water separation tanks, one 500-bbl ethylene glycol/water solution tank, one 300-bbl water/oil waste sludge tank, and one 300-bbl oil storage tank; two buildings including one 10’x16’ electrical/utility building and one 12’x12’ water receiving/separation building; an advanced aeration system; and leak detection wells. There is overhead power to the site, which currently operates two rented mechanical evaporation units.

Due to WDEQ’s authorization to discontinue groundwater monitoring in 1987 based on extremely poor groundwater quality underlying the evaporation pit and the likely abandonment of the monitor well(s) thereafter, post-closure groundwater monitoring will not be possible. The leak detection wells are not suitable for groundwater monitoring wells and will be abandoned during reclamation.

An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure K-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

Closure of the facility will generally consist of removing any remaining wastewater or oily sludge from the pond and tanks; removing and disposing of any contaminated infrastructure; removing the steel storage tanks; removing and disposing of underground piping; grading and earthwork to restore original contours, spreading topsoil from the stockpile and revegetation of the reclaimed area; and monitoring of groundwater via existing monitor well network. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Vacate the storage tanks of all oil and water for off-site disposal via a vacuum truck.
  - Remove accumulated deposits of solids and of oily sludge from the bottom of all tanks.
  - Steam clean tanks and removal from the site for disposal.
  - Remove and dispose of associated piping.
- Rent and operate high-pressure enhanced evaporation units for to assist with the disposal of approximately seventy percent of the evaporation pond water volume.
- Remove and dispose of ancillary tanks/equipment located in facility storage areas.

### Years Two and Three:

- All remaining water will be removed from the evaporation pond via natural evaporation until wastewater levels permit the use of earth moving equipment to backfill the pond.

### Year Three (late) or Year Four:

- Plug and abandon evaporation pond leak detection wells
- Use a patrol grader to windrow approximately 2 inches of topsoil impacted by over spray.
  - Use scraper to move this material to the evaporation pond for burial.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Use a patrol grader to smooth fill material to final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
  - Use a scraper to apply topsoil from the stockpile to the disturbed area.
- Complete seeding and apply erosion control best management practices (BMP) installed where necessary within the reclaimed area.

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables K-1 through K-3 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the executive summary.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table K-1: Cost Estimate Summary for Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$153,576.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	<b>\$5,716.62</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$38,315.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$2,880.25</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$30,092.00</b>
<b>7.0 Reclamation</b>	<b>\$8,347.50</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$16,955.50</b>
<b>Subtotal</b>	<b>\$255,882.87</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$25,588.29</b>
<b>Contingency (15%)</b>	<b>\$42,220.67</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$323,691.82</b>

**Table K-2: Cost Estimate Summary for Method B**

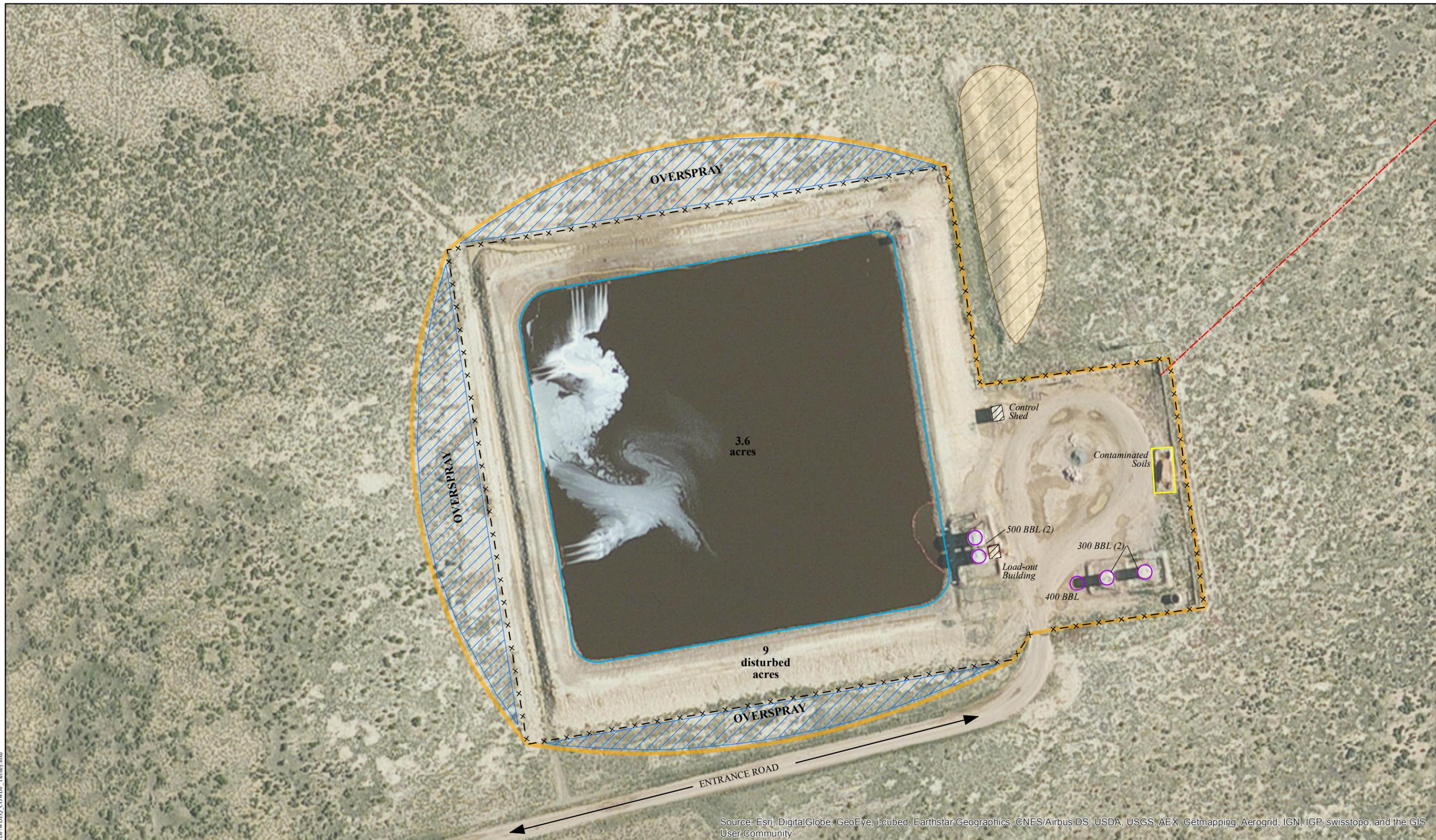
<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	<b>\$153,576.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	<b>\$30,895.84</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	<b>\$38,315.00</b>
<b>5.0 Infrastructure Demolition and Disposal</b>	<b>\$2,880.25</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	<b>\$30,092.00</b>
<b>7.0 Reclamation</b>	<b>\$8,347.50</b>
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	<b>\$16,955.50</b>
<b>Subtotal</b>	<b>\$281,062.09</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$28,106.21</b>
<b>Contingency (15%)</b>	<b>\$46,375.24</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$355,543.54</b>

**Table K-3: Closure/Post Closure Cost Estimate Summary**

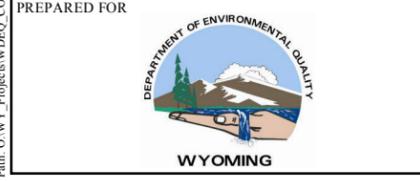
Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	360	day	\$300.00	\$108,000.00
Evaporation Enhancement maintenance and labor	6	month	\$4,800.00	\$28,800.00
Evaporation Enhancement utility	360	day	\$46.60	\$16,776.00
Generator Rental	0	month	\$2,250.00	\$0.00
Generator Fuel Costs	0	\$/hr	\$16.26	\$0.00
<b>Item Subtotal</b>				<b>\$153,576.00</b>
<b>2.0 Separation Pit Water and Oil/Water Mix Removal</b>				
Pumping and disposal cost	0	BBL	\$5.00	\$0.00
Transportation costs	0	hour	\$115.00	\$0.00
<b>Item Subtotal</b>				<b>\$0.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	35	yd <sup>3</sup>	\$56.00	\$1,970.64
Sludge mixing with fly ash	35	yd <sup>3</sup>	\$22.00	\$774.18
Fly ash material	4	ton	\$80.00	\$281.52
Transportation of solidified sludge	5,032	ton-mile	\$0.15	\$754.83
Disposal of solidified Sludge	39	ton	\$50.00	\$1,935.45
<b>Item Subtotal</b>				<b>\$5,716.62</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS --Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	35	yd <sup>3</sup>	\$1.00	\$35.19
Land farming maintenance	422	yd <sup>3</sup>	\$0.30	\$126.68
Straw sludge amendment material	5	ton	\$43.00	\$216.17
Manure sludge amendment material	5	ton	\$40.00	\$201.09
Sludge amendment mixing and application	45	yd <sup>3</sup>	\$7.00	\$316.71
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$30,895.84</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	170	BBL	\$22.00	\$3,740.00
Steam clean 400 BBL tank	5	each	\$6,100.00	\$30,500.00
Steam clean 100 ft of pipe	2	100 LF	\$375.00	\$750.00
Demolish 100 ft of pipe	2	100 LF	\$400.00	\$800.00
400 BBL tank removal and transport	5	Each	\$505.00	\$2,525.00
<b>Item Subtotal</b>				<b>\$38,315.00</b>

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>5.0 Infrastructure Demolition and Disposal</b>				
Building Demolition	1,600	ft <sup>3</sup>	\$0.50	\$800.00
Load Waste Material into Dumpster	1	ton	\$5.25	\$5.25
Transport waste to landfill	450	ton-mile	\$4.50	\$2,025.00
Dispose of material at landfill	1	ton	\$50.00	\$50.00
<b>Item Subtotal</b>				<b>\$2,880.25</b>
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>				
Rip access road and pad with dozer or grader	2	acre	\$1,000.00	\$2,000.00
Earth moving with scraper	2,320	yd <sup>3</sup>	\$4.35	\$10,092.00
Earth moving with D8 dozer	6,000	yd <sup>3</sup>	\$2.25	\$13,500.00
Recontouring (blade work)	9	acre	\$500.00	\$4,500.00
PCS disposal (bathtub ring)	0	ton	\$50.00	\$0.00
<b>Item Subtotal</b>				<b>\$30,092.00</b>
<b>7.0 Reclamation</b>				
Fertilizer material cost	9	acre	\$200.00	\$1,800.00
Fertilizer application cost	9	acre	\$187.50	\$1,687.50
Seedbed preparation cost	9	acre	\$190.00	\$1,710.00
Seeding cost	9	acre	\$350.00	\$3,150.00
<b>Item Subtotal</b>				<b>\$8,347.50</b>
<b>8.0 Miscellaneous; Including Soil and Groundwater Sampling, Well Abandonment, Fencing, Monitoring, "Boneyard" Removal</b>				
Cost to abandon monitoring well	3	ft	\$150.00	\$600.00
Cap monitoring well	3	each	\$10.00	\$30.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	3	number	\$130.00	\$390.00
Groundwater sample labor	3	each	\$270.00	\$810.00
Groundwater sample analysis	3	each	\$360.00	\$1,080.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Soil sample labor	10	each	\$90.00	\$900.00
Boneyard material disposal at landfill	5	ton	\$50.00	\$250.00
Dumptruck to landfill	500	ton-mile	\$0.15	\$75.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00
Fencing installation cost	565	LF	\$2.50	\$1,412.50

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
Fencing removal and disposal cost	2,260	LF	\$0.80	\$1,808.00
<b>Item Subtotal</b>				<b>\$16,955.50</b>



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



**WDEQ-COWDF**

900 Werner Court  
Suite 130  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

**Legend**

- x - x Fence
- Tanks (existing)
- Overhead Electrical Line
- Structure
- Disturbed Area
- Ponds
- Topsoil Pile

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

Tierney Pit (Imagery: June 2010)				
REV #	DESCRIPTION	BY	DATE	FIGURE
0	Draft for Review	EGS	10/08/14	<b>K-1</b>
1				
2				

Path: O:\WY\_Projects\WDEQ\_COWDF\WDEQ\_COWDF\_Tierney.mxd

**APPENDIX L:  
WERNER RANCH DISPOSAL FACILITY**

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Table L-3: Closure/Post Closure, and Reclamation Cost Estimate Summary

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Figure L-1: Werner Ranch Disposal Facility
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## **1. DESCRIPTION OF FACILITY**

The existing Werner Ranch Disposal Facility (Werner Facility), a commercial Oilfield Wastewater Disposal Facility (COWDF) is situated 24 miles north of Douglas, Wyoming in Section 28, T 36N, R 70W, Converse County, WY. The Werner Ranch Facility was constructed under permit number 83-68RR, issued in June 1983 by the Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD). This permit allowed for the construction of a disposal facility for wastewater produced during oil and gas production operations. As a grandfathered facility, it is exempt from current COWDF financial assurance requirements.

The Werner Facility is currently operated by Jim's Water Service (JWS) of Gillette. The landscape is rural in character with a number of ranch access roads and industrial development from oil and gas activities in the area, and is easily accessible from Highway 59.

Existing land use for the facility and adjacent lands include oil and gas production, transportation, livestock grazing, and wildlife habitat. Other land uses are limited due to private surface ownership of the facility and adjacent lands. J.P. Werner & Sons Inc. owns the facility property and lands east of the facility. Jake Johnson Inc. owns the property to the north and west of the facility, and Irene Ranch LLC owns property to the south of the facility. There are no residences within one mile of the facility.

Following completion of construction, operations began in October 1984. The facility is currently comprised of one separation pit (approximately 0.7 acres) and one evaporation pond (approximately 6 acres). The facility operations consists of four-1,000 barrel tanks, two-500 barrel tanks and a 500 barrel separator tank/vault contained in a concrete sump that is partially below grade. In the past year, the current operator constructed a covered building with partially open sides over the separation pond to protect against rainfall and waterfowl. The building is approximately 200 feet long by 80 feet wide and contains substantial concrete footings for support. The roof of the building is supported with structural steel girders supported by approximate 12 x 12 inches wood support columns. Two additional permits to modify the site were approved by the WDEQ in March 1991 and January 1999, both granting installation of monitoring wells. Presently, the Werner Ranch facility has a monitoring network of 13 monitoring wells.

An area north of the evaporation pond has recently been altered to augment land farming and other on-site activities. The area has been stripped of topsoil and an earthen berm approximately 1,200 feet long and 6 feet high has been constructed. An aerial photograph presenting the existing infrastructure and relevant information (tank size, acreages, disturbed areas, etc.) is included as Figure L-1 of this appendix.

## **2. FACILITY DECOMMISSIONING AND RECLAMATION ACTIVITIES**

The Werner Facility is located on a relatively flat area near the surrounding area drainage divide. The facility is located adjacent to Wyoming Highway 59, which affords good access to the site. Commercial overhead power is available at the site.

The decommissioning and reclamation activities developed for this facility includes evaporation of production water, handling of sludge, removal of infrastructure, backfilling, grading, applying topsoil from the existing pile and revegetation. Below are the anticipated decommissioning and reclamation activities and schedule.

### Year One:

- Process Tanks: Empty the six (6) process tanks and the separator tank/vault of all oil and water, transferring contents into the separation pit with a vacuum truck.
  - Remove an estimated two (2) feet of oily sludge from the bottom of each tank.
  - Steam clean the tanks and transport the tanks off site for disposal.
  - Remove and dispose of associated conveyance piping.
- Remove one (1) foot of sludge from the separation pit. The sludge will potentially be handled in one of the following ways:
  - Stabilize sludge with fly ash and transport offsite to an approved disposal facility or:
  - Landfarm sludge on-site and dispose on-site once amended.
- Assume a two (2) wide foot, two (2) inch thick “bathtub ring” of PCS around 25 percent of the shoreline of the evaporation pond.
  - Use one of the methods above (for sludge) to mitigate the PCS.
- Remove/dispose of ancillary tanks (currently five (5) 400 barrel tanks) and other “bone yard type” materials.
- Rent and operate two (2) Land Shark high pressure enhanced evaporation units for four (4) months to assist with the disposal of approximately 25 percent of the evaporation pond water volume.

### Year Two:

- Rent and operate two (2) Land Shark high pressure spray units for four (4) months to assist with the disposal of an additional approximately 25 percent of the evaporation pond water volume.

### Years Three and Four:

- Use natural evaporation for two (2) years to finish drying out the evaporation pond to permit the use of earth moving equipment.

Year Four (late) or Year Five:

- Dismantle building over the separation pit.
  - Remove concrete building supports and any additional concrete. Dispose these materials in the evaporation ponds.
- Use a dozer and scraper to complete filling of the ponds with fill material from the dikes to rough grade.
  - Utilize a patrol grader to smooth material to the final grade.
  - Use a dozer or patrol grader to rip the entrance road and truck parking/traffic area and smooth to final grade.
- Use a dozer and scraper to backfill the land farm area located to the north of the evaporation pond (approximately 3 acres).
  - Use a patrol grader to smooth material to the final grade.
  - Apply topsoil from the stockpile to the landfarm area with a scraper and final grade with a patrol grader.
- Complete seeding and any erosion control for the entire disturbed area (approximately 21.5 acres).

Years Five through Nine:

- Conduct periodic site inspections to assess surrounding fences, revegetation progress, and condition of erosion control BMPs.
- Complete final cleanup of the site and remove fencing.

### **3. CLOSURE/POST-CLOSURE COST ESTIMATE**

The closure/post closure costs are estimated in Tables L-1 through L-2 provided below. The costs presented in each table are based on the closure/post-closure plan details presented in the previous section. The basis from which the costs were developed is detailed in the general closure/ post closure report.

The cost tables below present two alternative methods for disposal of sludge and/or PCS. Method A presents estimated costs associated with excavation, stabilization, and transportation of the sludge and/or PCS off site for disposal. Method B presents estimated costs for excavation, amending, and treating the sludge and/or PCS on location.

**Table L-1: Cost Estimate Summary of Method A**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method A: Off Site Disposal of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$204,768.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$109,500.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge</b>	\$471,725.56
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$156,955.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$26,546.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$52,866.00
<b>7.0 Reclamation</b>	\$19,477.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$30,761.88
<b>Subtotal</b>	<b>\$1,072,599.93</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$107,259.99</b>
<b>Contingency (15%)</b>	<b>\$176,978.99</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$1,356,838.92</b>

**Table L-2: Cost Estimate Summary of Method B**

<b>Closure, Post-Closure, and Reclamation Activity Cost Estimate Method B: On Site Treatment of Sludge</b>	
	<b>Estimated Cost</b>
<b>1.0 Evaporation Pond Water Removal</b>	\$204,768.00
<b>2.0 Separation Pit Water and Oil/Water Mixture Removal</b>	\$109,500.00
<b>3.0 Treatment / Disposal of Pond and Pit Sludge and PCS</b>	\$103,922.96
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>	\$156,955.00
<b>5.0 Infrastructure Demolition and Disposal</b>	\$26,546.00
<b>6.0 Rough Grading, Backfilling, and Recontouring</b>	\$52,866.00
<b>7.0 Reclamation</b>	\$19,477.50
<b>8.0 Miscellaneous; Including Sampling and Monitoring, Well Abandonment, Fencing, etc.</b>	\$30,761.88
<b>Subtotal</b>	<b>\$704,797.34</b>
<b>Administration and Project Oversight (10%)</b>	<b>\$70,479.73</b>
<b>Contingency (15%)</b>	<b>\$116,291.56</b>
<b>Total Cost Estimate for All Activities</b>	<b>\$891,568.63</b>

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**Table L-3: Closure/Post Closure Cost Estimate Summary Cost Estimate Summary**

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>1.0 Evaporation Pond Water Removal</b>				
Enhanced Evaporation equipment (rental)	480	day	\$300.00	\$144,000.00
Evaporation Enhancement maintenance and labor	8	month	\$4,800.00	\$38,400.00
Evaporation Enhancement utility	480	day	\$46.60	\$22,368.00
<b>Item Subtotal</b>				<b>\$204,768.00</b>
<b>2.0 Separation Pit Water Removal</b>				
Pumping and disposal cost	15,000	BBL	\$5.00	\$75,000.00
Transportation costs	300	hour	\$115.00	\$34,500.00
<b>Item Subtotal</b>				<b>\$109,500.00</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method A: Off Site Disposal of Sludge</b>				
Sludge collection using vac truck	2,904	yd <sup>3</sup>	\$56.00	\$162,613.92
Sludge mixing with fly ash	2,904	yd <sup>3</sup>	\$22.00	\$63,884.04
Fly ash material	290	ton	\$80.00	\$23,230.56
Transportation of solidified sludge	415,246	ton-mile	\$0.15	\$62,286.94
Disposal of solidified Sludge	3,194	ton	\$50.00	\$159,710.10
<b>Item Subtotal</b>				<b>\$471,725.56</b>
<b>3.0 Treatment / Disposal of Pond and Pit Sludge--Method B: Treat Sludge and PCS On Site (Landfarm)</b>				
Move sludge to landfarm	2,904	yd <sup>3</sup>	\$1.00	\$2,903.82
Land farming maintenance	34,846	yd <sup>3</sup>	\$0.30	\$10,453.75
Straw sludge amendment material	415	ton	\$43.00	\$17,837.75
Manure sludge amendment material	415	ton	\$40.00	\$16,593.26
Sludge amendment mixing and application	3,733	yd <sup>3</sup>	\$7.00	\$26,134.38
Miscellaneous Labor	3	year	\$10,000.00	\$30,000.00
<b>Item Subtotal</b>				<b>\$103,922.96</b>
<b>4.0 Tank, Separator, and Pipe Cleaning, Dismantling, and Disposal</b>				
Tank sludge cleaning / vac	260	BBL	\$22.00	\$5,720.00
Steam clean 400 BBL tank	2	each	\$6,100.00	\$12,200.00
Steam clean 1,000 BBL tank	4	each	\$8,400.00	\$33,600.00
Steam clean separator (frac tank)	1	each	\$6,100.00	\$6,100.00
Steam clean 100 ft of pipe	3	100 LF	\$375.00	\$1,125.00
Demolish 100 ft of pipe	3	100 LF	\$400.00	\$1,200.00
Demolish 1,000 BBL tank	4	each	\$24,000.00	\$96,000.00
400 BBL tank removal and transport	2	each	\$505.00	\$1,010.00

Item	Estimated Quantity	Unit	Unit Price	Estimated Cost
<b>Item Subtotal</b>				<b>\$156,955.00</b>

#### 5.0 Infrastructure Demolition and Disposal

Building Demolition	120,800	ft <sup>3</sup>	\$0.20	\$24,160.00
Concrete Secondary containment removal	980	ft <sup>2</sup>	\$1.30	\$1,274.00
Move Infrastructure material with D8 Dozer	400	yd <sup>3</sup>	\$2.45	\$980.00
Bury infrastructure material	400	yd <sup>3</sup>	\$0.33	\$132.00
<b>Item Subtotal</b>				<b>\$26,546.00</b>

#### 6.0 Rough Grading, Backfilling, and Recontouring

Rip access road and pad with dozer or grader	4	acre	\$1,000.00	\$4,000.00
Earth moving with scraper	1,300	yd <sup>3</sup>	\$4.35	\$5,655.00
Earth moving with D8 dozer	12,316	yd <sup>3</sup>	\$2.25	\$27,711.00
Recontouring (blade work)	21	acre	\$500.00	\$10,500.00
PCS disposal (bathtub ring)	100	ton	\$50.00	\$5,000.00
<b>Item Subtotal</b>				<b>\$52,866.00</b>

#### 7.0 Reclamation

Fertilizer material cost	21	acre	\$200.00	\$4,200.00
Fertilizer application cost	21	acre	\$187.50	\$3,937.50
Seedbed preparation cost	21	acre	\$190.00	\$3,990.00
Seeding cost	21	acre	\$350.00	\$7,350.00
<b>Item Subtotal</b>				<b>\$19,477.50</b>

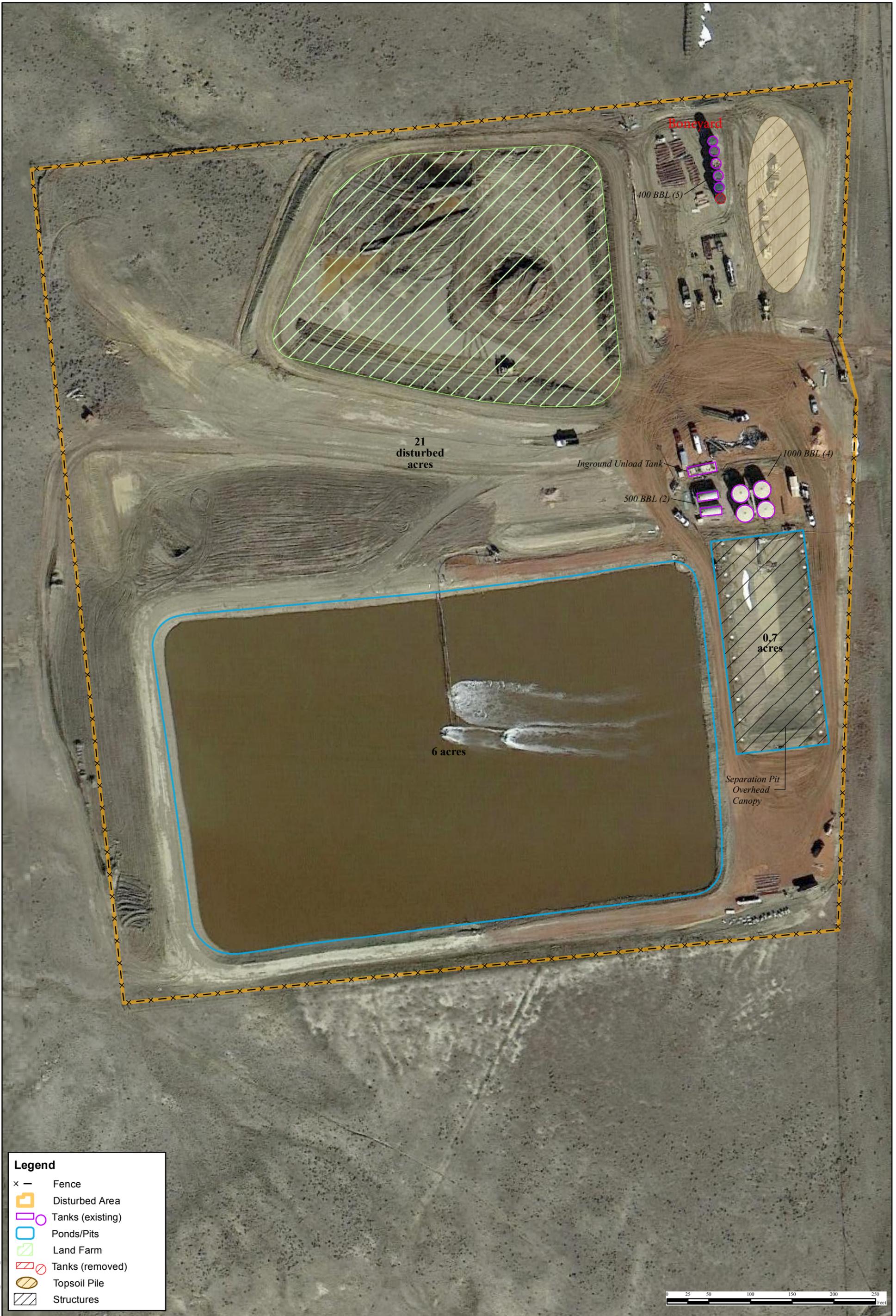
#### 8.0 Miscellaneous

Cost to abandon monitoring well	650	ft	\$4.00	\$2,600.00
Cap monitoring well	13	each	\$10.00	\$130.00
Removal and disposal of top three feet of casing (below grade) and disposal of concrete pedestal	13	number	\$130.00	\$1,690.00
Mobilization	1	project	\$1,000.00	\$1,000.00
Soil analysis	10	each	\$140.00	\$1,400.00
Groundwater analysis	13	each	\$360.00	\$4,680.00
Soil sample labor	10	each	\$90.00	\$900.00
Groundwater sample labor cost	13	locations	\$270.00	\$3,510.00
Boneyard material disposal at landfill	5	ton	\$50.00	\$250.00
Dumptruck to landfill	500	ton-mile	\$0.15	\$75.00
Vegetation Assessment LRES method	40	hour	\$100.00	\$4,000.00
Electrical service disconnect and removal	1	each	\$3,200.00	\$3,200.00

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<b>Item</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Estimated Cost</b>
Fencing installation cost	969	LF	\$2.50	\$2,421.88
Fencing removal and disposal cost	2,975	LF	\$0.80	\$2,380.00
Cost for 400 BBL tank removal and transport	5	each	\$505.00	\$2,525.00
<b>Item Subtotal</b>				<b>\$30,761.88</b>

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**Legend**

- × — Fence
- Disturbed Area
- Tanks (existing)
- Ponds/Pits
- Land Farm
- Tanks (removed)
- Topsoil Pile
- Structures

PREPARED FOR

WYOMING

**WDEQ-COWDF**

TREC, Inc.  
Engineering & Environmental Management

900 Werner Court  
Suite 150  
Casper, WY 82601  
Phone (307) 265-0696  
Fax (307) 265-2498  
www.treccorp.com

DRAWN BY: EGS  
CHECKED BY: CAT  
APPROVED BY: RMD

Werner Ranch Disposal Facility (Imagery: October 2013)		BY	DATE	FIGURE
REV #	DESCRIPTION			
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