AJM Incorporated
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Environmental Site Assessments
Fuel System Design and Compliance
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August 25, 2020

Ms. Latysha Pankratz
Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620-0901
Priority Ranking: 1.2

RE: Additional revisions Corrective Action Plan (CAP AC-07) to Install In-Situ Ozone Chemical Oxidation System, Conduct System Maintenance, Collect Groundwater Samples, Prepare Report.
West Gate Station, West Yellowstone, Montana 59758
Facility ID #16-03734; Release #4448; Work Plan ID 34035

Dear Ms. Pankratz

Per your February 13, 2020 letter, AJM Incorporated (AJM) is submitting the following corrective action plan to install an Ozone Chemical Oxidation Injection System to promote the degradation of high concentrations of diesel range hydrocarbons. A pilot study completed as part of this investigation has been completed by EBS out of Richmond California. The test showed significant hydrocarbon degradation and indicates that ozone would be a very good remedial option for this facility. A cost estimate and unit cost worksheet for refurbishing a trailer-mounted ozone system previously used at another site, installation of the ozone system, regular maintenance, two years of semiannual groundwater sampling, and reporting are attached. Following discussions with the DEQ, AJM has revised a work plan dated February 21, 2020 to incorporate the use of existing on-site sparge wells rather than drilling new wells, as the sparge wells were installed to anticipate for ozone injection.

Background
In 2005, a leak was detected in the diesel pipe at the facility by the mechanical line leak detector (MLLD). The release was reported as an unusual operating condition in accordance with Montana regulations. The fuel contractor discovered a small hole in the piping and repaired the pipe in the area of the release. At the same time a minor gasoline odor emanating from a nearby gas line was observed and this was also repaired even though the gas MLLD had not yet indicated an issue. As it was unknown as to how much fuel was released, the Department of Environmental Quality (DEQ) required an investigation.

In 2006, AJM installed several monitoring wells to evaluate whether the groundwater had been impacted. Both diesel and gasoline impacts were observed in the groundwater which occurs in obsidian sand at a depth of approximately 45 feet below ground surface (bgs). In 2008 the DEQ requested that a remedial system be installed to hasten the remediation of hydrocarbon impacts. An air sparge (AS) and soil vapor extraction (SVE) system was installed in 2009. The system was effective in remediating the gasoline phase of the impacts but did not significantly affect the diesel range impacts.

Recent groundwater samples have shown a significant rebound in both gasoline and diesel range impacts well above state action levels. Even if the air sparge system was re-started, it is believed that hydrocarbon concentrations would steadily rebound for years without significantly affecting the heavy-end impacts in the groundwater.

Following discussions between the DEQ and AJM, the DEQ has requested that ozone be considered as a remedial technology for groundwater cleanup. AJM recently utilized an ozone remediation system in highly permeable subsurface conditions in Big Timber, Montana with excellent results and site closure was achieved within a few years of system installation. It was proposed and accepted by DEQ that the same system be used at the Westgate facility.

Groundwater and soil samples from the Westgate facility were sent to the Clearwater Group in California for the completion of a bench test study. The results of this study would determine if ozone injection could effectively remediate the high concentrations of diesel in the groundwater while not allowing for the potential leaching of metals into the groundwater. The bench test results were promising, showing a significant decrease in hydrocarbon concentrations from a known impacted well (MW-3) and no mobilization of metals from the local soil source collected at 50 feet bgs. Based on the bench test results, an ozone injection system is recommended as the remedial technology for this site.

Site Location

The Westgate Station is located near the entrance to Yellowstone National Park at 11 Yellowstone Avenue in West Yellowstone, Gallatin County, Montana. The legal description for the site is SE¼ NE¼, Section 34, Township 13 South, Range 5 East, (see Figure 1 in Appendix A for site location map).

Site Geology/Hydrology

A review of the United States Geological Survey (USGS) topographic map of West Yellowstone shows no surface water in the immediate vicinity of the facility. The Madison River is located in Yellowstone Park approximately one mile to the east and flows to the northwest.

Past drilling activities have shown that the soils beneath the facility consist of unconsolidated heterogeneous medium to coarse-grained obsidian sand. Red and green cobbles and small

boulders of igneous origin were encountered at various depths in the boreholes ranging from 5 to 50 feet bgs. Saturated sediments were typically encountered at a depth of 42 to 44 feet bgs. Split spoon samples obtained from 40 to 45 feet bgs indicated that this deep unconfined aquifer is composed of coarse-grained obsidian sand with gravels and cobbles.

Potentiometric estimates at the facility have shown a horizontal gradient of 0.0016 and a groundwater flow direction ranging from N25°W in the spring to N5°E in winter. A literature review indicates that coarse-grained sand and gravel aquifers can have hydraulic conductivity values ranging from 2.8 to 283 ft/day and porosity values ranging from 20 to 35% (Fetter 2001)[1].

SCOPE OF WORK

System Design

Prior to the ordering of equipment, system specifications and design work will be conducted to promote the optimal remedial system for groundwater clean-up based on facility size and space limitations. The Clearwater Group will provide specific calculations that will optimize the system specifications. It is proposed that the system from Big Timber be relocated to the Westgate Station for use as the remedial system. However, prior to using the "trailer mounted" ozone system it will have to be evaluated and some components will likely need to be rebuilt. This cost has already been estimated via the manufacturer of the system (H2O Engineering in San Luis Obispo, CA).

All appropriate materials and automated systems will be incorporated so that the proper amount of ozone is injected routinely into the in-situ system, ensuring that all points receive the correct amount of ozone (pounds/day) as per the calculations. Ozone is highly corrosive and it will be essential to implement all appropriate precautions for safety, including proper equipment and shut-down processes, in case ozone concentrations are present in the trailer.

The ozone injection will cause little mounding in the local water table, as the pressure of the injection will be less than 15 psi per well and the volume of ozone injection is significantly less than air injection at the sparge points. It is therefore not expected that any mobilization of hydrocarbons will occur. Furthermore, since the injection point will be approximately 40 feet below any subsurface utilities and ozone reacts quickly with its immediate surroundings, no impact to the local utilities is expected.

At this time, since no solid/or liquid is being injected into the formation that would change the chemical nature of the groundwater, it is anticipated that no permit for injection will be required by the Environmental Protection Agency (EPA) Region 8.

[1] Applied Hydrogeology, Fourth Edition, C.W Fetter., 2001 Prentice-Hall Inc.

Use of Existing AS Wells for Ozone System

As per discussions between the DEQ and AJM, the ozone system installation will not require drilling new wells but will utilize existing sparge points and laterals. AJM proposes using SP-1, SP-2 and SP-5 located near the source of the hydrocarbon impacts at the canopy area and directly downgradient. These wells were constructed of schedule 80 PVC and all joints were glued together, therefore Viton O-rings were not necessary. The laminar sparge point installations were designed to be used with ozone. Bentonite was used to seal the sparge points from 53 feet bgs (just above the sparge point/sand) to three feet bgs. This construction will also ensure a good seal for ozone use.

The lateral underground pipes associated with the existing air sparge system will be used as conduit to pull ½-inch HDPE Teflon-coated tubing to the proposed ozone well locations from the system shed. This technique will prevent significant concrete cutting and trenching at the facility.

Lateral Connections

In order to access the existing underground lines and sparge wells, a minimal amount of potholing will occur along the south/west side of canopy and west of the store. Potholing will be completed with a backhoe to a depth and radius of three to three feet. Concrete will need to be cut, removed and replaced as part of this process. Appropriate connections will be made for each ozone well point. A riser will be brought to the surface to allow further testing of each point. To allow for enough room to make connections from the conduit to the ozone wells, 18-inch waterproof well boxes will be used for access points. Crushed rock will be brought to a depth of twelve inches below grade and concrete will be used to finish the paved drive area in accordance with the Town of West Yellowstone and the property owner's requirements.

Single-phase electrical power is already present at the system shed, so a simple 220-volt electrical connection will be installed that will allow the new ozone system trailer (to be parked on the north side of the shed) to be connected for ozone generation.

IN-SITU OZONE TREATMENT SYSTEM INSTALLATION

A trailer used at a previous ozone remediation site will be brought to the facility. It will contain all the equipment needed to operate the system in a safe and orderly fashion. Due to the nature of the ozone system, specific requirements including the following will be built into the trailer;

- Air intake system,
- Exhaust system,
- Lights,
- Ozone generators,
- All valves and controls to specific wells,
- Ozone monitoring system,
- Electrical codes will be followed as required for this type of system,

- Additional safety equipment as needed.

The current air sparge pumps and headers will need to be disassembled and moved in order to make connections to the laterals and pull the new tubing to each sparge point.

As part of the design work on this project, complete system specifications and required equipment will be finalized prior to ordering and installing the system.

ESTIMATED PROJECT SCHEDULE AND MAINTENANCE

Once approved by the DEQ, ozone unit rebuild and lateral connection can be completed in 2020. System shed and connections to wells can be completed in fall 2020, with full system activation completed shortly thereafter. Initial system maintenance will be completed weekly for the first two months until any necessary modifications are made and it is apparent that the system is operating as specified. It is imperative that ozone leaks in and around the shed be fixed as soon as possible. Due to the high corrosive properties of ozone, the allowable concentration in air for human inhalation is very low (PEL=0.1 ppm). This will be measured via ozone detection equipment prior to each trailer entry. A safety plan will be completed prior to system operation. Once system operations appear normal and no issues are apparent, a monthly system maintenance program will be followed.

SEMIANNUAL GROUNDWATER SAMPLING

Groundwater sampling will be completed in the late spring and fall of each year in 2021 and 2022. Samples will be collected from MW-2, 3, 4, and 8. AJM will sample from the least impacted well toward the most impacted well based on historical information. Prior to collecting samples, static water levels will be measured in all wells. This data will be used to determine groundwater flow direction and magnitude. Should free phase product be suspected in any of the wells (MW-3 has had product and sheen over the years), an oil/water interface probe will be used to measure product thickness. Additionally, any well heads that appear to be damaged will have replacement well head boxes installed as necessary. Currently MW-5 is broken and will need to be repaired with a new well box and PVC riser. The on-site contractor will be used to dig and remove the old well head that needs repair and a new well box will be installed.

All sampling protocols will be completed in accordance with the AJM Quality Assurance Project Plan (QAPjP) on file with the DEQ. Prior to collecting the groundwater samples, the wells will be purged with a 12-volt submirsible pump using a low-flow method as outlined in Section 3 of the Montana DEQ's Groundwater Sampling Guidance document until water quality parameters stabilized. The following stabilization parameters will be documented: temperature (°C), pH, specific conductivity, dissolved oxygen (DO), salinity, turbidity, and oxidation/reduction potential (ORP). The wells will be considered adequately purged when all parameters stabilized to within 10% of the previous reading. Typical purge volumes will not be more than 500

ml/minute. All purge water will be disposed of within site boundaries and a field sampling log kept for each well.

All non-dedicated equipment used for purging, sampling, or depth measurements will be decontaminated with an Alconox wash solution, followed by a distilled water triple rinse prior to each use. Because it will be required to thoroughly decontaminate the pump between each well, this type of low-flow sampling requires more time per well than standard sampling processes. The attached unit cost worksheet reflects the additional time and materials required to conduct low-flow sampling as required by the DEQ.

All samples will be sent under Chain of Custody to an accredited laboratory for analysis of volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) screen. Full fractionation will be completed on any EPH sample where a total petroleum hydrocarbon (TEH) concentration exceeds 1,000 µg/l. All laboratory analytical data will be validated using DEQ's Data Validation Summary Form.

REPORT WRITING

As per the DEQ's February 13, 2020 request letter and subsequent discussions the following reports will be completed:

1. 'Status reports' for ongoing system maintenance and the groundwater analytical data from each sampling event. These reports will describe any issues or modifications to the remedial system that may need to be made.
2. One Standardized Generic Applications Report (AR-07) to include the details of the ozone chemical oxidation system installation and maintenance, and two years of semiannual groundwater sampling. The AR-07 will also include recommendations for future work to resolve the release and an updated release closure plan (RCP) as per the DEQ's requirement.

A cost estimate for the ozone unit installation and a unit cost work sheet for sampling and report writing have been completed for the scope of work contained in this work plan. These can be found in Appendix B. Work at this site can begin upon written approval by the DEQ. Please do not hesitate to call if there are any questions or if we can provide any additional information.

Sincerely,

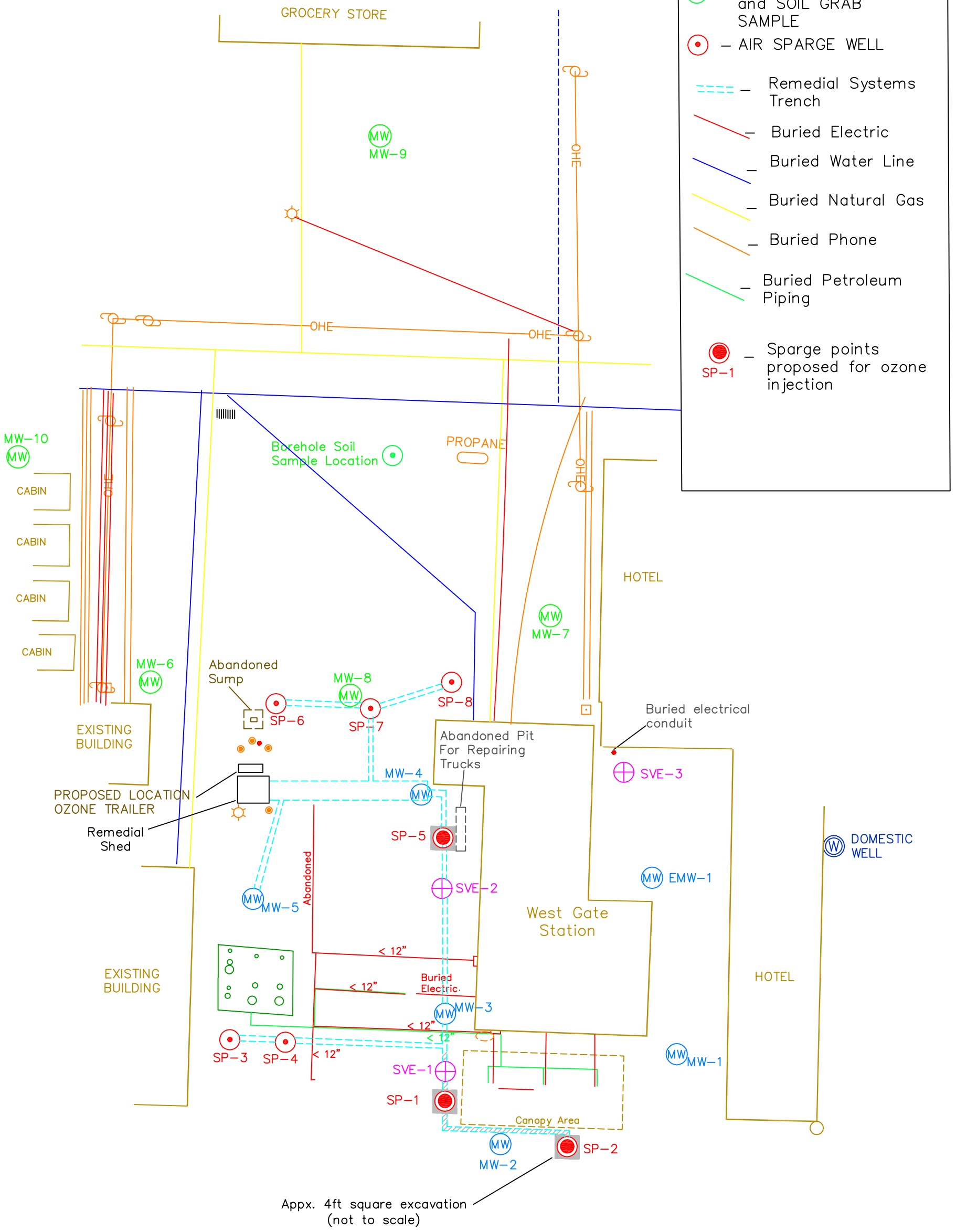
Dennis Franks

AJM Incorporated
By: Dennis Franks, President

ecc: Cole & Kerry Parker, Westgate Station
JoAnne Adydan PTRCB

APPENDIX A

Figures



BASE MAP

Prepared by:

Rocky Mountain Engineers, P.L.L.C.
1700 West Kock Street, Suite 7
Bozeman, MT 59715
(406) 586–4859

Modified by:

AJM Incorporated

WORK PLAN FOR
OZONE SYSTEM INSTALLATION

FIGURE 1

WESTGATE STATION
WEST YELLOWSTONE
GALLATIN COUNTY, MONTANA

AJM INCORPORATED

APPENDIX B

Excavation/Ozone Design & Equipment Cost Estimate/ AR-07 Report
and
Unit Cost Work Sheet for System Maintenance & GW Sampling/Status Reports

AJM
Incorporated

AJM Project Code: 866

DRAFT Cost Estimate
Ozone System Installation Work Plan
Westgate Station, West Yellowstone, MT
Facility ID#16-03734; Release #4448 WPID 34035

TASK	UNITS	QUANTITY/RATE	COST
WP 34035 Preparation	1 **unit**	**3500.00 unit**	$3,500.00

Task I - Ozone Specs & Well Installation

Engineering Services(based on installing 11 wells)

Ozone design with Clearwater to determine specifications on system requirements and outline of full Ozone generation needs and winter/summer issues/safety	40	hours @	120.00	per hour	$4,800.00
Clearwater Professional design evaluations	10	hours @	150.00	per hour	$1,500.00
Project Management Eng III, Ozone system mangement to CA for Rebuild, discuss issues with H2O Engineering, get system to West Y	20	hours @	130.00	per hour	$2,600.00
write and send contracts to excavation contractor Sci II, review insurance info	10	hours @	120.00	per hour	$1,200.00
COST ESTIMATE FOR TASK I					***$10,100.00***

Task II -Connect Laterals to wells

Eng III Prj mangmnt	4.0	hours @	120.00	per hour	$480.00
Sci I	30.0	hours @	115.00	per hour	$3,450.00
2-Tech III	30.0	hours @	216.00	per hour	$6,480.00
Site Prep/Mob/Demob Sci I	5	hours @	83.00	per hour	$415.00
Mileage (tech II separate rig)	120	miles @	0.63	per mile	$75.60
Site Prep/Mob/Demob, tech IIIx2	8	hours @	216.00	per hour	$1,728.00
Mileage (tech II separate rig)	120	miles @	0.63	per mile	$75.60
Per Diem	7	B,LD @	30.50	per day	$213.50
motel	7	day @	200.00	per day	$1,400.00

DRAFT Cost Estimate
Ozone System Installation Work Plan
Westgate Station, West Yellowstone, MT
Facility ID#16-03734; Release #4448 WPID 34035

PVC/tubing for Ozone connections	50	feet @	2.25	per ft	$112.50
well boxes for connections	3	18-inch round 18-inch skirt, ship to site	350.00	per unit	$1,050.00
LDPE 3/8"-ID teflon lined tubing	2	500 foot rolls	700.00	per unit	$1,400.00
Contractor Services					
Dirt Detail	Cut concrete, expose PVC, excavate as needed, backfill, compact, pour new concrete with tie ins				
	1	mob @	1000.00	per mob	$1,000.00
	100	feet @	33.00	per foot	$3,300.00
	5	yards @ (labor for concrete install)	550.00	per yard	$2,750.00
	8	yards @ (delivered to site)	275.00	per yard	$2,200.00
		includes all labor, materials, equipment, mob, decon			
	1	per diem and hotel est	1500.00		$1,500.00
		Contractor markup	7%		$752.50
COST ESTIMATE FOR TASK II					***$28,382.70***

DRAFT Cost Estimate
Ozone System Installation Work Plan
Westgate Station, West Yellowstone, MT
Facility ID#16-03734; Release #4448 WPID 34035

Task III -Ozone Shed and Generator $ and System Connections & Start Up

Eng III Prj mangmnt	20.0	hours @	120.00	per hour	$2,400.00
Sci I (pull LDPE tubing)	20.0	hours @	115.00	per hour	$2,300.00
Tech III x 2	20.0	hours @	216.00	per hour	$4,320.00
Site Prep/Mob/Demob Sci I	5	hours @	83.00	per hour	$415.00
Mileage (2- tech II separate rig)	200	miles @	4.93	per mile	$986.00
Site Prep/Mob/Demob, tech III	10	hours @	78.00	per hour	$780.00
Mileage Sci I separate rig)	200	miles @	3.44	per mile	$688.00
Per Diem	15	B,LD @	30.50	per day	$457.50
motel	5	day @	200.00	per day	$1,000.00
Ozone TreatmentTrailer with Ozone Generator, valves, timers, AC/Heater, Safety Equipment (est.)	1	unit @ estimate with owner purchase of trailer from Oie motor	30000.00	unit	$30,000.00
transportation of system RT CA	1	unit	5000.00	unit	$5,000.00
Electrical Connection 1-phase 220 volt	1	prep current electric system and contact idaho energy	1500.00	unit	$1,500.00
Electrician (est)	5	hrs	85.00	hrs	$425.00
Full System Testing 3 man crew	20	hours @	325.00	hrs	$6,500.00
COST ESTIMATE FOR TASK III					***$56,771.50***

Task IV - Report Writing

AR-07/MR-01	1	report to include system install, GW samples	5000.00	per Rpt	$5,000.00
COST ESTIMATE FOR TASK IV					***$5,000.00***

TOTAL ESTIMATED COSTS FOR WP, TASK I, II, III,IV ***$103,754.20***

System Maintenece and groundwater sampling Cost on Separate Attached Unit Cost Sheet

GROUNDWATER MONITORING AND OZONE SYSTEM MAINT
UNIT COST WORKSHEET
Montana Department of Environmental Quality
Petroleum Release Section/Petroleum Fund Services Section
(estimated dates 2020, 2021)

Contractor Information

Company Name: AJM Inc

Address: 1805 Kenyon Dr

City, State, Zip: Bozeman, Montana 59715

Phone: (406) 600-2045;

Cost Estimator: Dennis Franks

Project Information

Site Name: West Gate Station_____ Facility ID #16-03734

Address:11 Yellowstone Ave _____ Release #4448

City: West Yellowstone, MT 59758 _____ WPID 34035

Monitoring Well Details

Total Number of Wells at Site:___**13**
Number of Wells to be monitored: __**4**
Number of Wells to be monitored/sampled: **4**
Well Casing Diameter (inches) **2 ”**
Average Depth to Groundwater (ft) **40-45’**
Average Depth of Wells (ft) **50-55’**

Well Purging Method

ρ Hand bailing
ρ Peristaltic Pump
x Submersible Pump
ρ Micropurge
ρ No Purge
ρ Other (please specify) Low Flow_____

Monitoring/Sampling Interval

Estimated Start Date: **October 2020**
ρ Quarterly (# of events_____)
Semi-annual (3 of events =**)**
ρ Other (please specify) _Weekly/Monthly Systm Maint__
ρ Annual (# of events_____)

Other Services

ρ Free Product Recovery
ρ Groundwater Well Survey
ρ Wellhead retrofit/reconstruction
x Other _Ozone System Main_

Cost Estimate Explanation:

(1) Mobilization/Demobilization: Includes all costs and mileage to transport equipment, materials, and personnel to and from the site location. More than one mobilization event will require justification and pre-approval by the DEQ-PRS and DEQ-PFSS staffs. This item should be estimated on a per mile unit rate.

(2) Water Level Measurements: Includes all costs (labor, equipment, materials, and well consumables) to monitor groundwater depth, collect other groundwater information from well, and decontaminate equipment. The well monitoring costs should be estimated on a per well basis and does not include purging and sampling of the well.

(3) Well Monitoring/Purging/Sampling: Includes all costs (labor, equipment, materials, and well consumables) to monitor (see above), purge, sample groundwater, decontaminate equipment, and handle disposal of contaminated purge water. The cost should be estimated on a per well basis.

(4) Report Preparation: Includes all costs (labor and materials) project management, report preparation, and report submittal, including all office related costs, per groundwater sampling event.

(5) Laboratory Analysis: Includes all laboratory costs for all wells, for duration of project. It is realized that some laboratory analyses will not be conducted for every event and that the well sampling frequency may change.

(5) PTRCB Sampling Fee: Includes all costs related to management of the sample including: sample container, cooler, ice, packing, and office related handling charges. The sample is defined as the laboratory ID number on the laboratory invoice.

UNIT COST WORKSHEET WPID 34035

West Gate Station 2020, 2021 System Maint, & GW sampling/Reporting

Task	Unit Cost	Number of Units	Total Cost
Project Management Engineer III	$120/hr	40	$4800
Mobilization/Demobilization(1)			
Mobilization/Demobilization/pre & post Decon, equip load, calibration GW Sampling	$3.37/mile	600	$2022.00
Mobilization/Demobilization/pre & post Decon, equip load, System Maint 2 man crew, weekly first month, then monthly for one year	$5.03 /mile	3200	$16096.00
Field Work		3 sampling events	
Water/product Level Measurements	50/well	6	300
Well Monitoring/Purging/Sampling(3) **(MW-2, MW-3, MW-4, MW-8)**	$220/well	12	$2640
Air Sampling of the SVE System (labor)			
misc. equipment/supplies	$		
Monthly System maintenance 15 events,	$600/event	16	$9600
Other Service (Ozone Detector)	$100/day	16	1600
Report Preparation(4)			
Status Reports (system maint, GW samples)	$1000/report	3	$3,000
Other (please specify)			
	Subtotal Project Expense		$40058

The costs below are estimates, not bids. Lodging and laboratory analysis will be paid at actual cost when documented by receipts/invoices.

Per Diem(specify number of individuals **1**)			
Per Diem: Motel	$200.00/ person/night	10	$2000
Per Diem: Food (Breakfast, lunch, Dinner)	$30.50/person/day	27	$824
Laboratory Analysis(5)			
Volatile Petroleum Hydrocarbons (VPH) Water	$175/sample	12	$2100
Extractable Petroleum Hydrocarbons (EPH) EPH "screen"- **4 wells**	$100/sample	12	$1200
EPH "fractions" (as needed) est	$180/sample	10	$1800
PTRCB sampling fee(6)	**$10/***sample*	12	$120
	TOTAL PROJECT EXPENSE		**48102**
Project Expense per event (total project cost / # of events) 16 events			**$3006**

Additional Comments/Costs: Backup documentation will be provided for lab & hotel. All additional invoice modifications requested by the DEQ and/or the PFSS will be charged at $100/hr.