Corrective Action Plan #34960

Gilligan's Island

3201 10th Ave. South

Great Falls, MT 59405

Facility ID# 07-00387, Release# 527

WP ID# 34960

Prepared for:

Hi Noon Petroleum

1101 S. 6th W.

Missoula, MT 59801

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WCEC Project No. 2411-0084

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1.0 Introduction

West Central Environmental Consultants (WCEC) has prepared this Corrective Action Plan for the former Gilligan's Island (Facility ID# 07-00387, Release# 527, Work Plan# 34960), located at 3201 10th Ave. South, Great Falls, Montana as requested by the Montana Department of Environmental Quality (MTDEQ) on October 28, 2024.

1.1 Site Location

The Gilligan's Island facility is located at 3201 10th Ave. South, Great Falls, Montana. A site location map is included as Figure 1 and a site details map is included as Figure 2. The Public Land Survey System (PLSS) description for the site is the SW/4, SW/4, SE/4 of Section 08, T20N, R4E. The approximate geographic coordinates are N 47.49433°, W -111.25167°. Township, range, and section information was obtained using the United States Geological Survey (USGS) Southwest Great Falls, Montana 1:24,000 Quadrangle. The site is located within the Upper Missouri-Dearborn Rivers Hydrologic Unit.

1.2 Geologic/Hydrogeologic Setting

The surficial geology of Great Falls near the facility is dominated by Quaternary glacial lake deposits from the Holocene and Pleistocene. Deposits tend to consist of greyish-brown, yellowish brown and pale orange silt interbedded with very fine-grained sand and clay. Deposits tend to be horizontally interbedded. This layer is underlain by the Kootenai Formation which was deposited in the Lower Cretaceous, and consists of fine to medium grained weathered sandstone interbedded with redish brown mudstone (Vuke et al., 2001). This area of Great Falls is generally fairly dry with the water present below grade consisting of pore water resulting from surface intrusion which is suspended in the glacial lake deposits of sand, silt, and clay. These deposits have an approximate depth of 19 feet below ground surface (bgs), and are underlain by the Kootenai Formation. The area has also been developed extensively with the addition of subgrade road fill, utility bedding, and structural excavation and backfill with nonnative materials. These alterations to subgrade soils in combination with large areas of surficial asphalt and concrete capping likely have some effect on subsurface hydrology in the immediate area of the facility. No year-round surface water bodies or streams are located within a mile of the facility.

2.0 Scope of Work

2.1 Required Scope of Work

The Scope of Work requested by the MTDEQ consists of:

- Propose remedial actions in the work plan that will significantly clean up the release and help determine a pathway to closure.

Use DEQ's guidance documents to plan, conduct and generate reports documenting actions.

- Risk-Based Corrective Action (RBCA) Guidance for Petroleum Releases
- Cleanup Guidance and Cleanup Technologies Workbook
- Groundwater Sampling Guidance (continued groundwater monitoring)
- Montana Vapor Intrusion (VI) Guide; (installation of sub slab sampling point, assess VI risk)
- Data Validation Summary Form (DVSF)
- Release Closure Plan (RCP).

2.2 In-situ Injection PetroBac™/ CBN™

WCEC recommends the application of ETEC Advanced Bioremediation Solutions for in-situ remediation based on cost, site limitations, and effectiveness in addressing groundwater impacts. It is recommended that this product be injected down the existing SVE lines into the area surrounding the former excavation and near MW101. Multiple injections may be required to address the impacts below the site. The initial injection will serve the dual purpose of supplying electron acceptors to the subsurface and assessing the volume of product that the subsurface lithology will accept during an injection event.

The combination of bioremediation products includes TPH Bacterial Consortium (EZT-A2TM) and Enzyme Accelerator (EZT-EATM) which make up the PetroBac™ product bundle, CBN™ nutrients, which include macro- and micro-nutrients specially blended for in-situ bioremediation. These products work together to efficiently degrade TPH and their application performs three critical in-situ functions. They supply a large population of pre-acclimated bacteria to optimize initial growth of a healthy, in-situ, hydrocarbon-degrading microbial population. It maximizes contact between the contaminants and the bacteria allowing the petroleum food source and the electron acceptors (oxygen, nitrate, and sulfate) to biochemically oxidize the petroleum to CO2 and water. This supply of critical nutrients (nitrogen, phosphorus, and potassium) support ongoing biological growth. Nitrogen also acts as electron acceptors to ensure continuous contaminant degradation in the absences of dissolved oxygen common at petroleum sites.

2.2.1 PetroBac™ /CBN™ Injection Protocol

PetroBac™ & CBN ™ are water soluble compounds that will be blended with a minimum of 1,000 gallons of water to create a bioremediation solution for the injection into the subsurface. As described in Section 2.2, CBN™ (custom nutrient blend) is a nutrient amendment designed specifically for enhanced attenuation and bioremediation of petroleum hydrocarbon constituents (gas, BTEX, diesel, oil) in soil and groundwater. It contains a balanced blend of nutrients (nitrogen and phosphorus) and electron acceptors (nitrate) that enhance biodegradation. This product in combination with PetroBac™, which includes a TPH bacterial consortium (ETZ-A2™ and Enzyme Accelerator (EZT-EA™), stimulates the breakdown of constituents of concern.

The fully soluble, non-viscous remediation solution will be prepared on site and injected down each SVE line using a Geoprobe GP800 pump. The pump will be manifolded to the SVE lines to allow the product to be pump out of the vapor extraction lines and dispersed in the primary area of hydrocarbon impacts without creating any surface disturbance to the paved area.

ETEC technical documents and application proposal are included in Appendix C. The volume of water blended into the CBN™/PetroBac™ solution will be maximized based on field observation of injection potential without surfacing of remediation solution. A filter system will be plumbed between the pump and the manifold to the SVE lines to ensure that any precipitated materials in the mixing totes do not plug the screens on the vapor extraction lines.

2.2.2 PetroBac™ /CBN™ Groundwater Monitoring Parameters

WCEC will collect field parameters (specific conductivity, salinity, pH, dissolved oxygen, temperature, ORP, and turbidity) and inorganic parameters (soluble iron, soluble manganese, sulfate, nitrate, ammonia, and TDS) to evaluate oxidative/reductive groundwater conditions and in situ microbial growth. These parameters will be collected from monitoring wells MW101, MW4, MW9, and MW10.

2.3 Soil Vapor Point Installation and Vapor Intrusion Assessment

WCEC will install one soil vapor point in the southwest corner of the Gold's Casino Building. The exact location of the vapor point will be determined with the current property owner at a location that is acceptable to them. This point will be installed by drilling a 1" diameter hole through the concrete slab and underlying sub-grade material. A second, 2" diameter hole will also be drilled to allow for installation of a 2" diameter, flush mount, stainless steel cap. This cap provides protection and security for the VI sampling port. Each sampling point will be constructed in the sub-grade material using a 3" long, semipermeable, vapor sampling implant connected to a ¼" diameter stainless steel tube which brings the port to grade. The

annular space surrounding the vapor implant will be filled with 10/20 silica sand to approximately 2" above the top of the implant screen. A hydrated bentonite seal will be placed from the top of the sand pack to the bottom of the concrete slab. Rapid curing concrete grout will be used to fill each hole to approximately 1" below grade, allowing for installation of the tamper-proof, stainless-steel cap.

To verify the integrity of the seal on the soil vapor points, helium gas will be used as a gaseous tracer in accordance with the Montana Vapor Intrusion Guide (MVIG). Helium gas will be pumped into a shroud placed around the sub-slab VI sampling point to achieve a minimum concentration of 20% helium gas measured with field instruments. The vapor point will then be purged by removing a minimum of three times the calculated volume of the tubing and vapor sampling point. Following the purging of air from the sample point, a helium gas measurement will be collected by directly attaching the field instrument to the tubing, to ensure that the tubing shows less than 10% of the helium concentration recorded in the shroud. Sub-slab soil gas concentration measurements of oxygen, carbon dioxide, methane, and nitrogen will also be collected during vapor point purging. Following adequate purging and verification of the sub-slab vapor sampling point integrity, a grab sample will be collected from each point using a SUMMA canister.

2.4 Monitoring Well Abandonment

WCEC will abandon monitoring well GP8 at the time of the injection event. This well has filled with sediment and is in a state of disrepair that makes it unviable for use in future monitoring events. The monitoring well will be abandoned in accordance with ARM 36.21.810 and the Montana Board of Water Well Contractors requirements. The well casing will be removed from the ground and the void space will be completely filled with bentonite sealing material to within 1 foot of the ground surface, with any remain void space filled with concrete to match the grade of the paved parking lot surface. If this cannot be accomplished the casing will be cut off at least 3 feet below the ground surface. The surface at the location of the well will be filled back to normal grade with naturally occurring materials. Details regarding monitoring well abandonment will be recorded for each well for preparation and submittal of monitoring well abandonment logs. Monitoring well abandonment will be overseen by WCEC's DNRC licensed well driller.

2.4 Groundwater Monitoring

Groundwater monitoring wells will be sampled on an annual basis for two years following the remedial injection to quantify the effectiveness of this injection event. The initial sampling event will be scheduled approximately 3 months after the injection is completed. Monitoring wells MW101, MW4, MW9, and MW10 will be sampled for VPH during each event. Monitoring wells MW101 and MW9 will be sampled for EPH screen during each event. Additionally, monitoring wells MW101, MW9, and MW10 will be analyzed during the initial sampling event for lead scavengers (EDB & DCA). Lead scavengers have not been historically analyzed at this facility and it will be required in the future for closure review. Planned analytical analysis is tabulated below.

Anaytical Analysis Chart					
Sample Location	VPH	EPH	Lead Scavangers	IBI - Injection parameters	Depth to Water only
MW101	x	x	x	x	
MW2					x
MW3					x
MW4	x		x	x	
MW5					x
MW6					x
MW7					x
MW9	x	x	x	x	
MW10	x		x	x	
GP3					x
Anaysis per event	4	2	4	4	6
Total all events	8	4	8	8	12

Well sampling will be conducted using low flow sampling methodologies in accordance with MTDEQ requirements and WCEC SOPs. WCEC will use a peristaltic pump to purge and sample each monitoring well. Groundwater quality parameter data (conductivity, pH, salinity, dissolved oxygen, temperature, ORP, and turbidity) will be acquired from all site wells sampled during each event using a flow through cell. Groundwater sample collection from each well will be completed following stabilization of groundwater quality parameters. Groundwater quality parameter, purge, and stabilization data for each well will be recorded in the field using WCEC's Well Sampling Form. Depth to water measurements will be recorded from all the site wells during each groundwater monitoring event to provide an accurate potentiometric surface plot, flow direction, and gradient.

Groundwater samples will be preserved in accordance with required laboratory methods, packed on ice, and shipped to Energy in Helena, Montana under chain of custody. Groundwater samples collected will be

submitted for analytical analysis as detailed above for each event. If the EPH screening limit of 1000 µg/L is exceeded TEH fraction analysis will be requested.

All the purge water generated during the semiannual sampling events will be disposed of according the Montana DEQ Disposal of Untreated Purge Water from Monitoring Well's flowchart. If purge water cannot be disposed of on-site it will be transported by WCEC to an office location and disposed of through a waste recycler or through application to a drying bed where it can be solidified and disposed of as solid waste at a Class II landfill.

3.0 Report Preparation

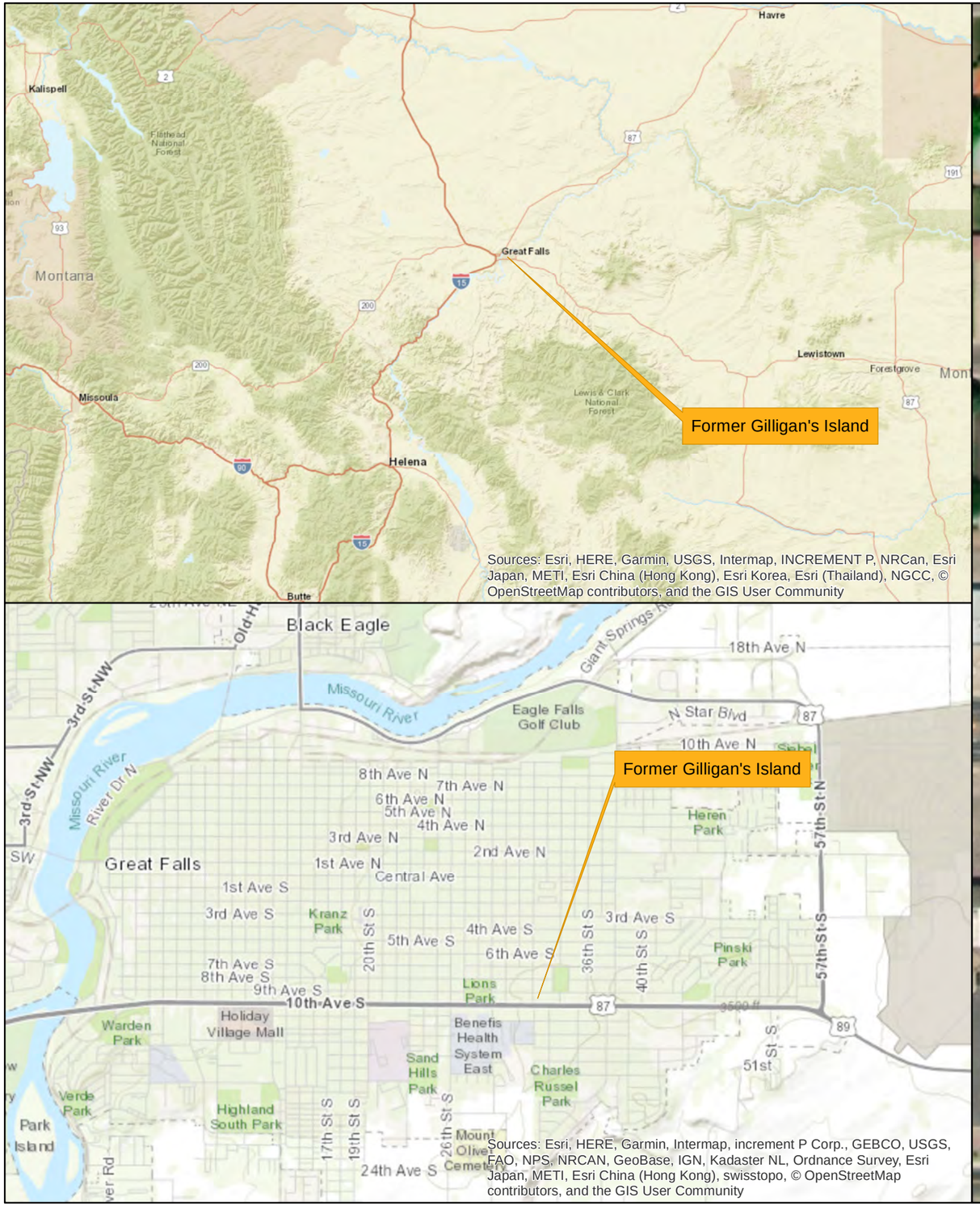
WCEC will complete a report following the injection event and initial groundwater sampling and sub-slab vapor intrusion assessment events. This report will included a description of the application of CBN™/PetroBac™, details regarding the sub-slab vapor point installation and sampling, and the analysis of groundwater analytical results. This report will include sampling locations, methods, cumulative field and analytical data, site maps, and groundwater potentiometric surface maps. Well sampling field sheets, Montana DEQ DVSF, and analytical laboratory reports will be appended to the interim data report.

An additional groundwater monitoring report will be submitted following receipt of analytical from the second annual groundwater monitoring event. Groundwater trend lines for constituents of concern will be analyzed to assess the timeline for closure and effects of the remedial injection event. The report will include an RCP identifying potential paths to closure for the release. Maps will be provided detailing site structures, sampling locations, groundwater flow direction, and potentiometric groundwater surfaces for the event. This data will be used to make additional recommendations for future remedial activities to advance the facility towards closure.

4.0 Time Line

The scope of work outlined in this corrective action plan will be conducted following approval by the MTDEQ of CAP 34960. It is tentatively scheduled to begin in the spring 2025.

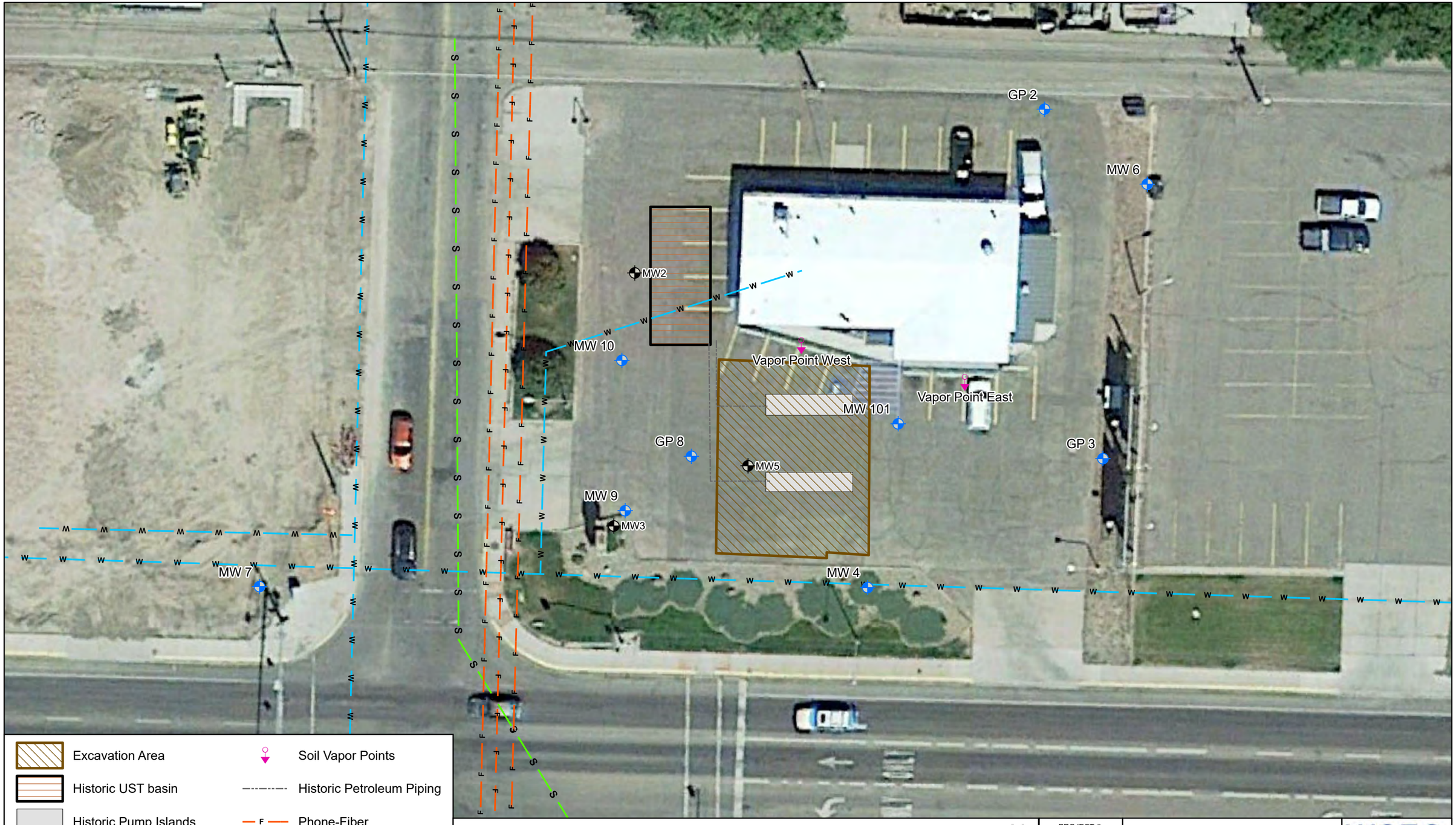
List of Figures



PROJECT #: 10-7545-70	**Site Location Maps**
DATE: 07/27/16	**Gilligan's Island** **3201 10th Ave. South** **Great Falls, MT**
DRAWN BY: NGO	
ORTHOPHOTO DATE: 06/13/2010	

WCEC ENVIRONMENTAL CONSULTANTS

FIGURE 1



PROJECT #: 10-7545-70	
DATE: 06/15/22	
DRAWN BY: NGO	
ORTHOPHOTO DATE: 06/13/2010	

Site Details Map

Gilligan's Island
3201 10th Ave. South
Great Falls, MT

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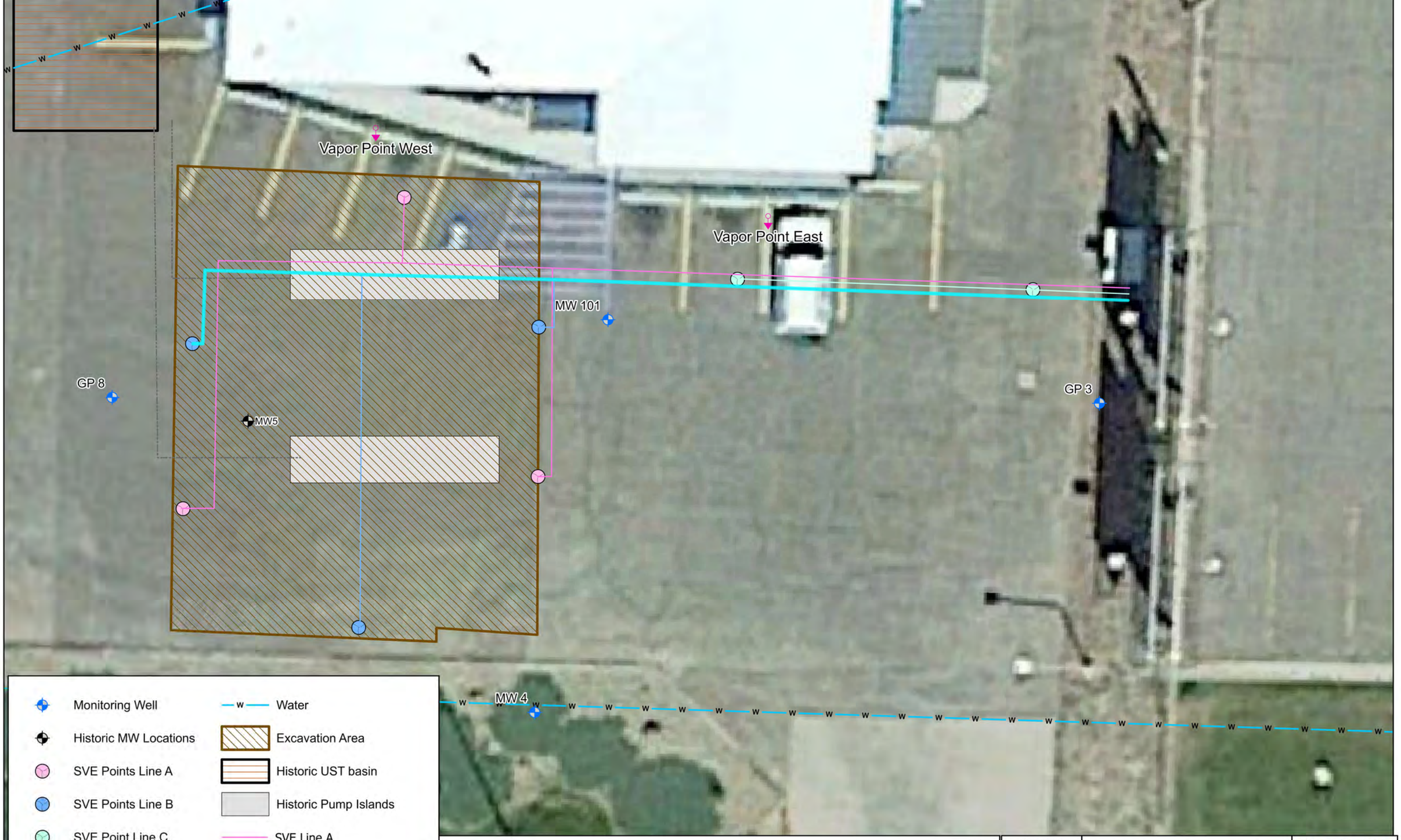
FIGURE 2



PROJECT #: 10-7545-70	System Vapor Point Locations
DATE: 06/15/22	Gilligan's Island 3201 10th Ave. South Great Falls, MT
DRAWN BY: NGO	
ORTHOPHOTO DATE: 06/13/2010	

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FIGURE 3

Appendix A

Estimated Cost sheet for Corrective Action Plan #34960

Advanced Bioremediation Solutions

PMB 133, 3307 Evergreen Way, Ste 707
Washougal, WA 98671
(971) 222-3616 • (971) 222-3903 Fax
www.etec.bio

November 6, 2024

Mr. Nathan Olson
WCEC
1030 South Ave W.
Missoula, MT 59801

RE: PILOT-SCALE REMEDIATION PRODUCT APPLICATION PROPOSAL, GILLIGAN'S ISLAND, GREAT FALLS, MONTANA

Mr. Olson:

As requested, this proposal provides recommendations for implementing an in-situ remediation approach at the Gilligan's Island site in Great Falls, Montana. ETEC recommends conducting an injection of remediation products into the available SVE wells to enhance biological degradation of remaining contaminants at the site.

Project Understanding

Using available site data, our recommendations and estimates are based on the following information:

- Soil-bound and dissolved-phase petroleum impacts the site from a historical release. WCEC wishes to address the impacts in the 5,000 square foot contaminated pump island area:
  - The 2nd Quarter 2023 groundwater sampling event yielded the following results:
    - MW-101 contained 1,110 µg/L benzene and 8,500 µg/L TPH
    - MW-4 contained 2.2 µg/L benzene and 537 µg/L TPH
    - MW-9 contained 168 µg/L benzene and 12,100 µg/L TPH
- Soil is silty sand.

The above information was used to determine the appropriate bioremediation products and overall costs.

Product Recommendations

For the remediation products at this site, we recommend our 100% soluble TPH Bacterial Consortium (EZT-A2™) and Enzyme Accelerator (EZT-EA™) which make up our PetroBac™ product bundle, as well as our CBN™ nutrients, which include macro- and micro-nutrients specially blended for in-situ bioremediation. These products work together to efficiently degrade petroleum constituents, including BTEX, naphthalene and TPH. Their application will perform three critical in-situ functions, including:

1. Supply of a large population of pre-acclimated bacteria to optimize initial growth of a healthy, in situ, hydrocarbon-degrading microbial population.
2. Maximize contact between the contaminants and the bacteria. Bioremediation is a contact technology – the bacteria must physically contact the petroleum food source and the electron acceptors (oxygen, nitrate, and sulfate) to biochemically oxidize the petroleum to CO_2 and water.
3. Supply of critical nutrients like nitrogen, phosphorus, and potassium to support ongoing biological growth. The nitrogen compounds also act as secondary electron acceptors to ensure continuous contaminant degradation during absences of dissolved oxygen.

Sampling Recommendations

To maximize the effectiveness of the proposed remedial approach, scheduled collection of several specific parameters is recommended. These parameters include field readings, inorganic parameters (nitrate, sulfate, dissolved iron, ammonia-nitrogen), and GW contaminant data. These analyses should be collected from MW-101 before (baseline) and following the application. The samples should be collected to evaluate the effectiveness of this remedial approach and to make modifications if necessary.

Bioremediation Product Application

WCEC plans on applying the bioremediation solution into the pump island area. ETEC recommends applying 1,000 pounds of CBN™ and 30 gallons of Petrobac™ (15 gallons EZT-A2™ and 15 gallons EZT-EA™) to this area. To mix the products, a minimum of 1,000 gallons of water should be used. If more volume can be used for mixing and injection, it would be preferred for increasing the distribution of the injectate.

Following the first application, sampling will guide the scope and scale of future applications. Multiple applications will be necessary to support the bioremediation activity needed to break down the existing TPH in all areas. Subsequent applications may become more focused as peripheral areas achieve cleanup goals. At least two, possibly three applications should be made annually between May 1 and October 31.

Product Cost Estimate

The following table outlines bioremediation products and shipping costs for the remediation product injection event.

Item	Cost
Quarterly Bioremediation Products	
CBN™ Nutrients & PetroBac™ Product Bundle (30/1000)	$9,200.00
ETEC Filter System	$1,500.00
Shipping	$1,780.00
TOTAL	**$12,480.00**

ETEC believes that a one-time treatment will show significant reductions in the remaining dissolved-phase constituents, but additional applications may be necessary to reach regulatory goals due to the mass of contaminants in the area. Following the treatment, ETEC recommends groundwater monitoring on a quarterly basis. ETEC will be available to assist with post-injection groundwater data interpretation and analysis at no additional cost.

Please review the summarized costs and call the undersigned at 971-222-3616 x104 with any questions or comments. Thank you for this opportunity, and we look forward to further discussion regarding this project.

Sincerely,

ETEC, INC

Eric Bueltel, P.E.
Technical Director