Corrective Action Plan 35033

CHS Big Sky Winifred

108 Main Street

Winifred, MT 59489

Facility ID# 14-01292: Release# 3040, TID 20062

Work Plan ID# 35033

Prepared for:

Shawna Conroy

CHS Inc.

5500 Cenex Drive

Inner Grove Heights, MN 55077

Prepared by:

West Central Environmental Consultants, Inc.

1030 South Ave. W.

Missoula, MT 59801

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WCEC Project No. 18-11864-70

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Appendix A

1.0 Introduction & Site History

West Central Environmental Consultants (WCEC) has prepared this Work Plan for additional corrective actions at the CHS Big Sky Winifred facility (Facility ID# 14-01292, Release# 3040) located at 108 Main Street, Winifred, Montana. The work plan was prepared as requested by the Montana Department of Environmental Quality (MTDEQ) in correspondence dated April 28, 2025. MTDEQ has required additional cleanup and monitoring actions to address the petroleum impacts at the facility that exceeds Risk-Based Screening Levels (RBSLs) in groundwater and petroleum vapor intrusion (PVI) impacting indoor air within the on-site building. Completion of the scope of work included in this work plan is expected to assess degradation rates of petroleum constituents and quantify the effectiveness of vapor intrusion mitigation efforts and document impacts to indoor air at the facility.

1.1 Site Location

The CHS Big Sky Winifred facility is located at 108 Main Street in Winifred, 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, NW/4, SE/4 of Section 26, T21N, R18E. The approximate geographic coordinates are N 47.55965°, W 109.37534°. Township, range, and section information was obtained using the United States Geological Survey (USGS) Winifred, Montana 1:24,000 Quadrangle.

1.2 Geologic / Hydrogeologic Setting

According to the *Geologic Map of the Winifred 30' x 60' Quadrangle*, the site lies on the Judith River Formation (Kjr) of the Late Cretaceous Judith River Group. The Judith River Formation is primarily composed of mudstone, siltstone, and sandstone. Interbedded coal, bentonite, and coquinas are also frequently observed. The approximate elevation at the facility is 3,240 feet and surface topography generally slopes to the east and northeast towards Dog Creek. Dog Creek is located approximately 1,000 feet east of the facility with a northerly flow direction. The surface elevation of Dog Creek is approximately 3,215 feet in the vicinity of the facility.

Montana Groundwater Information Center (GWIC) well logs from the general Winifred area indicate that the shallow subsurface is comprised of clays, shale, sand, and gravel with shallow groundwater present at depths ranging from 10 to 30 feet. Based on the relative elevations of the facility and Dog Creek, the anticipated depth to water is 20 to 30 feet with an inferred flow direction to the northeast.

1.3 Petroleum Systems & Release History

The facility was formerly the Winifred Farmers Oil Co. and is currently owned and operated by CHS Big Sky. The current petroleum distribution system consists of 7 underground storage tanks (USTs), associated underground piping, and retail dispensing equipment. All USTs currently in use are constructed of cathodically protected steel with flexible double wall plastic piping. The current UST system was installed in September 1996 replacing the previously installed UST system which consisted of 8 USTs and associated underground piping. Product storage capacity and type by tank for the current UST system is as follows:

Tank ID: 09, Tag Number 2288: 4,000 gallons, gasoline

Tank ID: 10, Tag Number 2289: 4,000 gallons, diesel

Tank ID: 11, Tag Number 2290: 4,000 gallons, diesel

Tank ID: 12, Tag Number 2291: 12,000 gallons, diesel

Tank ID: 13, Tag Number 2292: 4,000 gallons, diesel

Tank ID: 14, Tag Number 2293: 8,000 gallons, gasoline

Tank ID: 15, Tag Number 2294: 12,000 gallons, gasoline

Release 3008 was discovered during the UST system upgrade in September 1996 when weathered petroleum impacted soils were encountered in the former UST basin. Impacts were believed to be the result of small spills and overfills associated with the retail petroleum operation at the facility. Following removal of the USTs, approximately 95 cubic yards of petroleum impacted soil was excavated and delivered to a landfarm located at "Lots 1,2, and 3 of Block 8 Original Winifred". UST removal, soil excavation, soil landfarming, and soil sampling was conducted by Bill Hammer of the MTDEQ. No groundwater was encountered during the excavation. The current UST system was installed following the removal of the historic tanks and over-excavation of petroleum impacted soils.

Release 3040 occurred in early October 1996, shortly after the UST system upgrades had been completed. The release occurred as a result of a concrete form stake or rebar being driven through product piping that ran from the #2 clear diesel UST to the dispenser island. The leak was discovered on October 11, 1996, and the submersible pump in the #2 clear diesel was shut off. Repairs to the line were completed on October 17, 1996. Tetra Tech installed a single well / injection point (MW1) inside the UST basin and periodically pumped water into the tank basin to "float diesel" for subsequent recovery through the well. A total of approximately 3,000 gallons of water was injected into the tank basin with approximately 1,200 gallons of product recovery during October and November 1996. Tetra Tech completed various subsequent injection, recovery, and sampling events at MW1 including injection of a surfactant solution in 2003 and 2005. Water in MW1 exceeded the RBSLs for various volatile petroleum hydrocarbon (VPH) and extractible petroleum hydrocarbon (EPH) constituents throughout the site history.

Based on the information included in the respective 30-Day Release Reports regarding the timing, nature, extent, magnitude, and remedial actions conducted, the impacts remaining at the facility are primarily related to Release 3040. Release 3008 was evaluated for closure using the available soil sampling data collected by MTDEQ personnel following the 1996 excavation. Subsequently, the MTDEQ issued a No Further Corrective Action letter for Release 3008 on September 28, 2018, which designates the release as resolved. All current work at the site is being conducted under Release 3040.

1.4 Soil and Groundwater Investigation

WCEC supervised the advancement of ten soil borings (SB1 through SB10) on August 21, 2018, to determine the extent and magnitude of petroleum impacts at the facility. Samples from six of the ten soil boring locations (SB2, SB3, SB4, SB5, SB8, and SB9) exhibited exceedances of the applicable RBSLs for one or more VPH/EPH constituents. Petroleum impacted soils in the boreholes were typically encountered at a depth interval ranging from 8 to 14 feet bgs, which generally coincided with the contact between moist/wet shallow backfill material and underlying dry silts and clays. Boreholes completed on the east side of the facility (SB8, SB9, and SB10) displayed a thinner shallow backfill layer and were largely dry throughout their soil profiles.

Based on the results of the soil boring investigation, WCEC directed the installation of five additional groundwater monitoring wells (MW2 through MW6) on August 22, 2018. Groundwater monitoring of the five newly installed wells and the existing older well (MW1) was performed on August 24, 2018. Groundwater samples were collected from the monitoring wells for analysis of VPH/EPH constituents and lead scavengers. Groundwater samples from monitoring well MW1 exceeded the RBSLs for various VPH constituents and the lead scavenger DCA. Samples from monitoring wells MW2, MW3, and MW4 were below the applicable RBSLs for all groundwater constituents of concern. Monitoring wells MW5 and MW6 were both dry during the August 2018 sampling event. The results of the soil and groundwater investigations completed in August 2018 indicated that there was a shallow perched groundwater system preferentially inhabiting a localized zone of backfill near the UST basin at the facility.

The cumulative soil and groundwater data indicates that there is a shallow perched groundwater system preferentially inhabiting a localized zone of backfill near the UST basin at the Former Winifred Farmers Oil Co. facility. Low permeability silts and clays underlying the perched zone act as a confining unit to contain groundwater in the more permeable backfill material, causing what is referred to as the “bathtub effect.” Groundwater flow out of the “bathtub” is most likely minimal and primarily driven by seasonal variations in wet and dry cycles. Potentiometric surface maps created in “bathtub” situations generally appear mounded with groundwater flow possible in variable directions. Potential receptors for any high dissolved phase constituent concentration groundwater emanating from the perched zone at the Former Winifred Farmers

Oil Co. facility are virtually non-existent given that the adjacent buildings are connected to the municipal water supply and the surrounding native silts/clays exhibit relatively low permeability.

Elevated dissolved phase constituent concentrations are present in the UST basin as represented by groundwater samples obtained from MW1. Samples obtained from all other groundwater monitoring wells were below the applicable RBSLs. The groundwater analytical results indicate that the dissolved phase plume is isolated in the perched groundwater zone in the immediate vicinity of the UST basin. There is most likely very little groundwater flow through the perched zone as evidenced by the continual presence of residual surfactant in monitoring wells MW1 and MW3 even though the last injection event occurred approximately 15 years ago.

1.5 PVI Investigation

As requested by the MTDEQ, WCEC conducted a PVI investigation at the Former Winifred Farmers Oil Co. facility to evaluate the potential vapor intrusion pathway. Two sub-slab vapor points were installed on the south side of the basement of the occupied building in December 2019. Contemporaneous samples were collected from the sub-slab vapor points (VP SE and VP SW), two indoor air locations (Basement and Mainfloor), and one ambient background location (Background) in accordance with the Montana Vapor Intrusion Guide. Based on the results from the December 2019 air sampling event, two additional sub-slab vapor points were installed on the north side of the building in December 2020. Another air sampling event was conducted in December 2020 which included sample collection from all four sub-slab vapor points (VP SE, VP SW, VP NE, and VP NW), three indoor air locations (Basement SE, Basement NW, and Mainfloor), and one ambient background location (Background) [Figure 2]. All air samples collected during the PVI investigation were analyzed for VOCs using EPA method TO-15 and APH.

The results from the PVI investigation conducted in December 2019 and 2020 indicate that the vapor intrusion pathway is complete and that petroleum vapors are impacting the occupied building at the facility. The sub-slab vapor point samples contained several petroleum constituents at concentrations exceeding ambient background conditions, providing evidence that there is a source for petroleum vapors underneath the occupied building. The indoor air samples confirmed that petroleum vapors have successfully migrated from the subsurface into the building. Occupied Building Questionnaires completed during the PVI investigation indicate that there are likely contributing sources for VOCs from products handled and stored inside the building. Additional air sampling events conducted in 2023 and 2024 have shown improved indoor air quality and show some indication that both the storage of gasoline operated equipment in the structure and vapor intrusion are contributing to indoor air detection. A radon style vapor abatement system is in operation currently. This should create a negative pressure under the slab and limit vapor intrusion as long as it is operated.

1.6 Aquifer Pump Test

An aquifer pump test was performed in February 2023. This test found that materials in the tank basin have an average hydraulic conductivity of 0.008857 cm/sec, and that hydraulic conductivity outside of the UST basin in native materials had a hydraulic conductivity of 3.155E-8 cm/sec.

1.7 Multi-Phase Extraction Pilot Study

Multi-Phase Extraction (MPE) is the combination of two commonly used technologies, pump and treat and soil vapor extraction. The removal of water and free product via high volume pumping depresses the water table to below levels that would occur naturally, while recovering and treating water and collecting free LNAPL if present. The depression of the water table also exposes soils with adsorbed LNAPL to be addressed via soil vapor extraction. MPE is accomplished at a given well location by installation of a smaller diameter suction tube within a larger diameter extraction well using a dual completion wellhead manifold. Fluids are recovered from the suction tube (high volume pumping) with simultaneous application of pneumatic vacuum to the extraction well (soil vapor extraction). A pilot test of this technology was completed in June 2023. The operation of multi-phase extraction proved that it is a viable technology at the facility, but that continued disposal of effluent water would present a difficulty for the use of this technology.

1.8 Vapor Abatement System Installation & Operation

The vapor abatement system consists of a single vertical sub-slab recovery point and an in-line fan similar to a typical radon mitigation system. The vertical vapor recovery point is located in the basement at the point closest to the UST basin. Due to a lack of any gravel fill under the concrete slab, the radius of influence that is generated with this system appears to be limited in area. To effectively cover the southern edge of the basement near the known area of the release, additional sub-slab vapor points would need to be added along the southern basement wall.

2.0 Scope of Work

2.1 Required Scope of Work

Remedial action under this corrective action plan consists of:

- Conduct semiannual groundwater monitoring for two years from monitoring well MW1 and collect groundwater elevation data from all wells on site during each event. Groundwater monitoring will be conducted during periods of high and low groundwater at the facility (May, and December). Groundwater samples will be analyzed for VPH constituents only.
- Conduct PVI sampling at the CHS Big Sky building located at 108 Main Street following the "Montana Vapor Intrusion Guidance Document." Per guidance sampling will be conducted in the winter (worst case period). Sub slab VPSE, indoor air samples point Basement SE and Mainfloor, and a Background sample will be collected during the PVI sampling event.
- Submit PVI samples for analysis using method TO-15 and aromatic petroleum hydrocarbons (APH), and Helium.
- Validate all laboratory analytical data using DEQ's Data Validation Summary Form (DVSF) found online.
- Discuss ongoing WP tasks and results with DEQ's project manager; submit written agreed- upon WP modifications as required to complete the WP objectives.
- Prepare an updated Release Closure Plan (RCP); discuss results with DEQ's project manager. DEQ expects the RCP to cover the Release investigation, cleanup, and monitoring information. Use the RCP format found online.
- Complete operation and maintenance of the vapor mitigation system in conjunction with all site events.
- Prepare an IDS report following the initial PVI sampling event and the initial year of semiannual groundwater monitoring.
- Prepare and submit the Remedial Activities Report following completion of all remedial actions covered in this work plan. The Report is expected to include all the content outlined in the Cleanup Report Guidance:
    - Append laboratory analytical data, field data, the DVSF, and RCP.

(1) Use standardized DEQ WP and report formats found online.

2.2 Vapor Mitigation System Operation

The VMS will be operated continuously throughout the work plan. Operation and maintenance (O&M) events will be conducted in conjunction with all sampling events. VMS O&M will consist of collection of system vacuum and flow data, and assessment of the effluent stream for CH_4, O_2, CO_2, and VOCs with a PID. WCEC will include recommendations regarding system operation and necessary modifications to achieve cleanup goals based on O&M inspections and PVI results from the annual event described in Section 2.3.

2.3 Petroleum Vapor Intrusion (PVI) Sampling

PVI sampling will be conducted in December of each winter. As stated in the Montana Vapor Intrusion Guidance (MVIG) "Sub-slab/indoor air measurements should be collected during "worst case" conditions. The worst case conditions in Montana will generally occur during the winter months when the ground is frozen for most sites. Not only are vapors limited in their ability to travel through frozen soil and out into the atmosphere during this time of year, but structures are heated, creating a stack or chimney effect that can draw vapors into the structures. In addition, because of the extreme winter weather conditions that may occur in Montana, structures are typically well insulated and kept closed during the winter, thereby allowing vapors to accumulate indoors. Indoor air and sub-slab samples should be collected during the winter for appropriate VI decision-making in Montana."

A MTDEQ Occupied Building Questionnaire will be completed during each PVI event. 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 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 of 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 sample will be collected from each point using a SUMMA canister equipped with a flow controller calibrated to a flow rate of 100 milliliters per minute (ml/min).

Indoor air sampling will be conducted in conjunction with sub-slab vapor sampling. SUMMA air samples will be collected from vapor point (VP SE), indoor area locations (Basement SE & Mainfloor), and the background sample locations during each PVI event. The background air sample location is located outdoors immediately to the north of the CHS Big Sky building for evaluation of background conditions. Indoor and background air samples will be collected using SUMMA canisters equipped with 24-hour flow controllers. Sub slab vapor point (VP SE) will be collected without a flow controller as a grab sample. All samples collected during the

PVI events will be submitted for analysis of VOCs using EPA method TO-15 SIM, APH, and helium using EPA Method 3C Modified.

2.4 Groundwater Monitoring

Semiannual groundwater sampling events will be conducted to evaluate seasonal fluctuations in groundwater elevation, flow direction, and constituent concentrations if present. Well sampling will be conducted according to MTDEQ Groundwater Sampling Guidance for low-flow sampling using a peristaltic pump for purging and sample collection. Groundwater quality parameter data (conductivity, pH, salinity, dissolved oxygen, temperature, ORP, and turbidity) monitoring wells that are sampled during each event using a flow through cell attached to a peristaltic pump.

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 are recorded in the field using WCEC's Well Sampling Form. Depth to water measurements will be recorded from all the site wells during each event to provide an accurate potentiometric surface plot, flow direction, and gradient.

Groundwater samples will be preserved with hydrochloric acid, packed on ice, and delivered to Energy Laboratories (Energy) in either Helena or Billings, Montana under chain of custody. All groundwater samples collected will be submitted for VPH

2.5 Data Validation

WCEC will complete the MTDEQ – Waste Management and Remediation Division Data Validation Summary Form for each individual laboratory analytical report associated with this work plan. The completed data validation forms will be included in an appendix of each respective report.

2.6 Reporting

One interim data submittal will be completed following completion of the first year of remedial actions. This will include high and low groundwater monitoring events and a wintertime PVI sampling event. The IDS will include information, location and contact personnel. A brief executive summary of action will include dates that groundwater monitoring and PVI event were completed, maps identifying sampling points, sampling methodologies, cumulative data tables, potentiometric surface plots, the complete laboratory analytical reports and attached DVSFs for each event.

The final remedial activities report will include an executive summary detailing all of the groundwater and PVI events conducted under the work plan. The report will include detailed site history, maps identifying sample location, structures, utilities and UST fueling infrastructure. Potentiometric surface plots will be created for each groundwater monitoring event. Sample analytical will be presented in cumulative data tables. DVSFs will be included with each analytical report and appended to the final report. A release closure plan will be included in the report and the findings of this document will be discussed with recommendations based on analytical data and the finding of the RCP. The Cleanup Report will include all components and format sections outlined in the DEQ Cleanup Report Guidance.

3.0 Timeline & Costs

The attached *Cleanup Work Plan 35033 Estimated Costs* spreadsheet [Appendix A] details anticipated project costs to complete the MTDEQ required scope of work. A PTRCB Groundwater Monitoring and Sampling Unit Cost Worksheet is also included. The scope of work outlined in this work plan is tentatively scheduled to begin in Fall 2025, pending approval from the MTDEQ and to allow cost review by the Montana Petroleum Tank Release Compensation Board (PTRCB).

3.1 Planned Workflow & Cost Explanations

The estimated costs in Appendix A include completion of the initial phase of cleanup and sampling tasks included in this work plan. WCEC will complete these tasks during 2025, 2026 and 2027 during a total of four individual events as follows:

Event 1: Low groundwater semiannual monitoring & PVI sampling event (1 staff, 1 vehicles) December 2025

Event 2: High groundwater Semiannual monitoring event (1 staff, 1 vehicles) late April- mid June 2026

Report: IDS submittal documenting first 2 events.

Event 3: Low groundwater semiannual monitoring & PVI sampling event (1 staff, 1 vehicles) December 2026

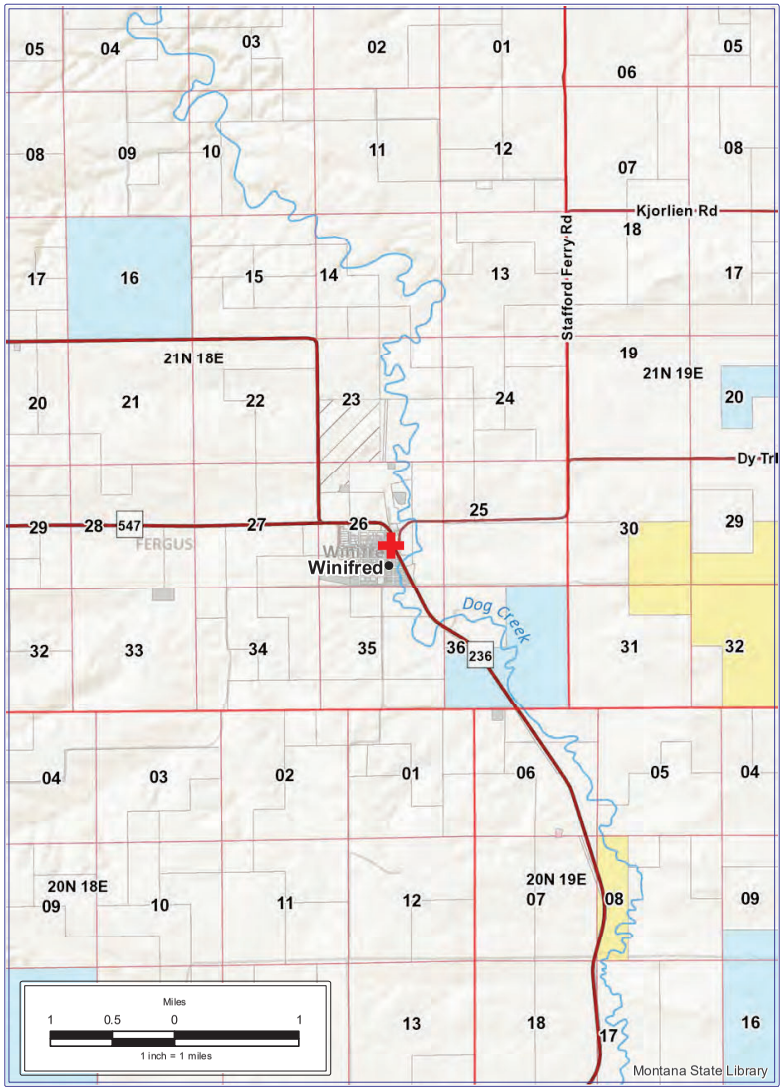
Event 4: High groundwater Semiannual monitoring event (1 staff, 1 vehicles) late April- mid June 2027

Report: Cumulative remedial activities report for all 4 events.

This workflow approach is designed to provide groundwater monitoring and PVI sampling data that will be used to evaluate petroleum attenuation at the facility and assess the timeline to bring the facility to closure through natural attenuation.

One IDS and one cumulative remedial actions report will be prepared covering all four events as described above.

List of Maps



LEGEND

SITE LOCATION

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Site Location Maps

Former Winifred Farmers Oil Co.
108 Main Street
Winifred, MT 59489

DRAWN BY: MM
DATE: 09/07/18
SCALE: 1:12,000
PROJECT NUMBER: 18-11864-70
IMAGE SOURCE: ESRI BASEMAPS

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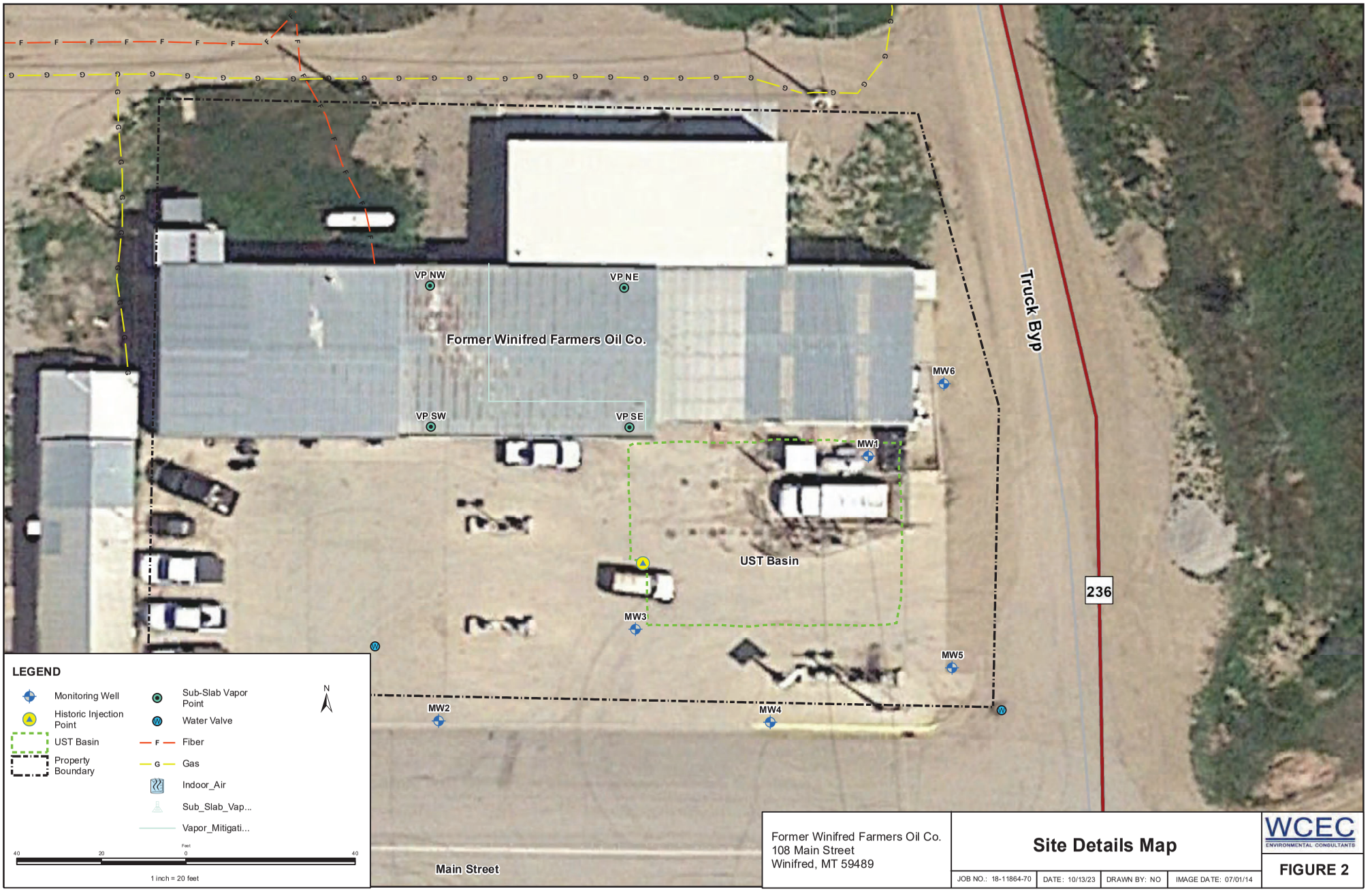
FIGURE 1



Former Winifred Farmers Oil Co.
108 Main Street
Winifred, MT 59489

Site Details Map

JOB NO.: 18-11864-70 | DATE: 10/13/23 | DRAWN BY: NO | IMAGE DATE: 07/01/14

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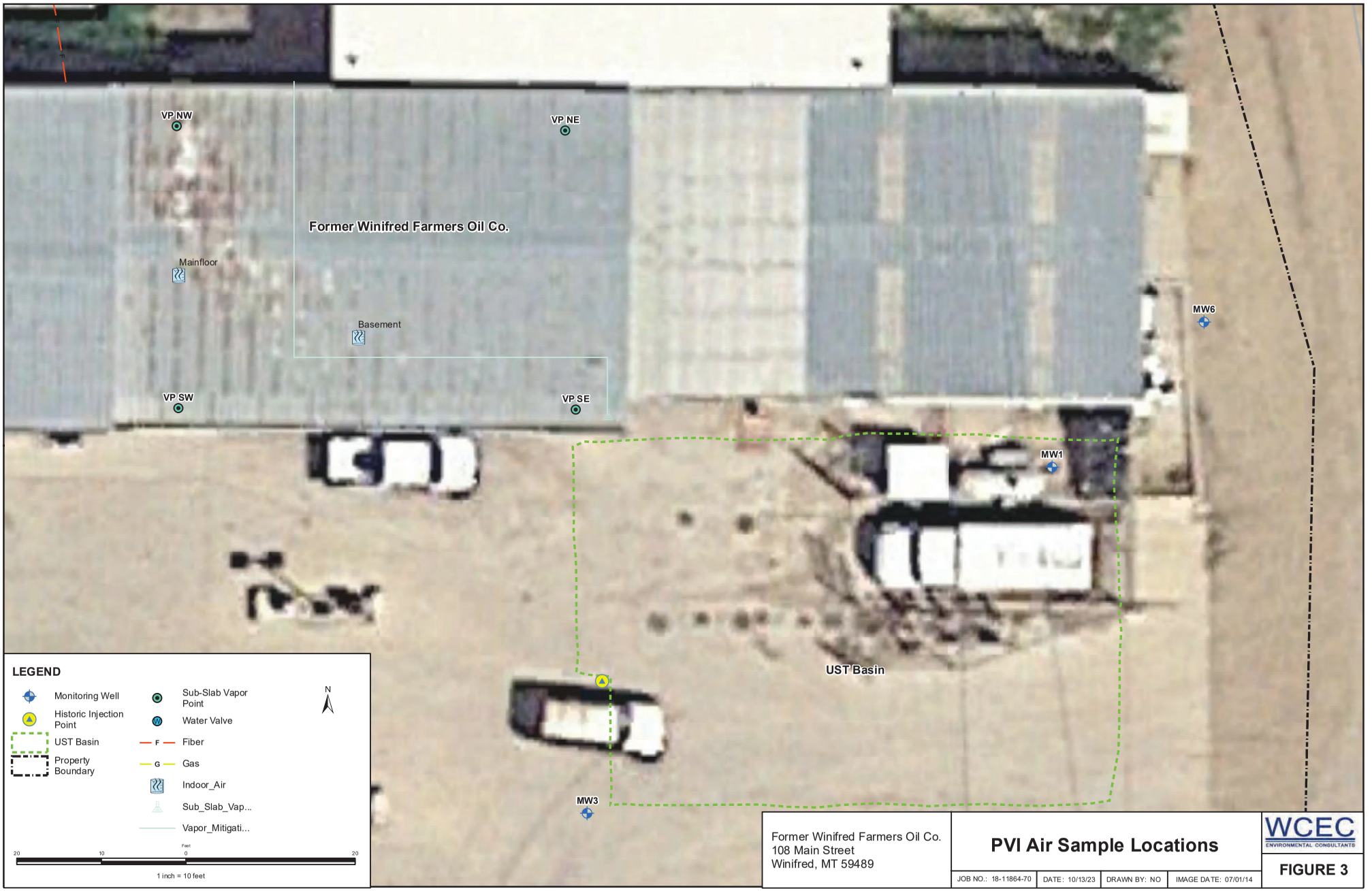
FIGURE 2



Former Winifred Farmers Oil Co.
108 Main Street
Winifred, MT 59489

PVI Air Sample Locations

JOB NO.: 18-11864-70	DATE: 10/13/23	DRAWN BY: NO	IMAGE DATE: 07/01/14

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FIGURE 3