**DRAFT**

# DEFERRED UNIT SCREENING LEVEL RISK ASSESSMENT

Loveland Products, Inc. Facility
1525 Lockwood Road
Billings, Montana

May 5, 2022

**Submitted To:**
Ann Kron
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620

**Prepared for:**
Nutrien Ag Solutions, Inc.
5296 Harvest Lake Dr.
Loveland, Colorado 80538

**Prepared by:**
Rubik
320 Flint Street
Reno, Nevada 89501

**Prepared By:**

Todd Leonard
Principal

**Reviewed By:**

Shane P. Fitch, PG
Senior Hydrogeologist

## TABLE OF CONTENTS



## FIGURES

**TABLES**

## 1.0 INTRODUCTION

On behalf of Nutrien Ag Solutions, Inc. (Nutrien), Rubik prepared this Deferred Unit Risk Assessment for the Loveland Products, Inc. (LPI) facility located at 1525 Lockwood Road in Billings, Montana (the Facility or Site). The Deferred Units (also referred to as Deferred Areas) consist of former Solid Waste Management Units (SWMUs) 8, 13, 15, and 16 and Area of Concern (AOC) 4, which are located under concrete within or adjacent to buildings.

In 2004, the Montana Department of Environmental Quality (MDEQ) issued a Hazardous Waste Permit for the facility which identified the Deferred Units and deferred investigation of the Units until the Facility was closed construction made them accessible (MDEQ, 2004). The Permit was replaced in 2015 Corrective Action Order on Consent (CAO) No. MHWCAO-15-01 (MDEQ, 2015a), which continued to defer investigation of the Deferred Units until they were accessible.

Based on changes in the operations at the Facility after 2020, access to the Deferred Units became available, although no buildings were removed, and the areas were still located beneath concrete. In 2022, MDEQ personnel met with Nutrien representatives at the facility to identify soil sampling locations to characterize each area. Soil samples were collected from beneath the concrete in August 2022 from each Deferred Unit and the laboratory analytical results were submitted to the MDEQ in a Deferred Area Soil Investigation Report of Findings (Rubik, 2022). In response, the MDEQ requested that a screening level risk assessment be developed for the Deferred Areas (MDEQ, 2023).

A Site Vicinity Map is presented as **Figure 1,** and a Site Plan is presented as **Figure 2**. The Deferred Unit boundaries are shown on **Figure 3** and the soil boring locations are depicted on **Figure 4.**

### 1.1 Site History

LPI operated an herbicide manufacturing and formulation plant at the Site between 1975 and 2020. The herbicides manufactured consisted primarily of 2,4-D, MCPA, MCPP, dicamba, glyphosate, and fluroxypyr. The manufacturing activities were suspended in October 2020 and since that time the Facility has been operated as a storage and distribution center for prepackaged and bulk agricultural products for LPI and Nutrien. A summary of historical activities and materials used and/or stored at each Deferred Unit is presented in **Table 1.**

### 1.2 Objective

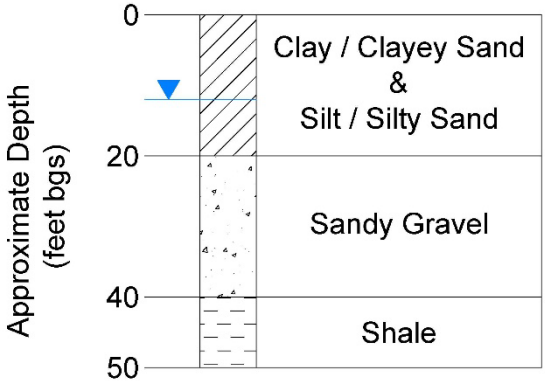
The objectives of the risk assessment were to:

- Assess the potential risk to human and ecological receptors from chemicals in the soil in the Deferred Units; and
- Determine if any further action is warranted at the Deferred Units.

## 2.0 GEOLOGY AND HYDROGEOLOGY

### 2.1 Geology

The generalized geology beneath the site is depicted below:




A map showing the paths of geologic cross sections that depict subsurface conditions in the vicinity of the 2022 Deferred Unit investigation is presented as **Figure 5**, and the cross sections are presented in **Figures 6** and **7**.

### 2.2 Hydrogeology

Groundwater beneath the facility occurs within the semi-confined sandy gravel unit between approximately 20 and 40 feet below the ground surface (bgs). This unit varies in thickness from approximately 15 to 20 feet in the southern and northern portions of the facility to approximately 5 feet thick near the center of the facility. The Site monitoring well network is screened within this sandy gravel unit. Monitoring well locations are shown on **Figure 2**.

In May 2022, prior to the Deferred Unit soil investigation, the depth to water in facility monitoring wells ranged from 10 to 19 feet bgs. Groundwater generally flows to the north at an average gradient of 0.007 ft/ft.

## 3.0 ENVIRONMENTAL BACKGROUND

Site investigations and groundwater remediation began at the site in the 1980s (Transbas, 1996). The 1993 Hazardous Waste permit issued for the Facility by the US Environmental Protection Agency (USEPA) required LPI to conduct investigations sitewide at solid waste management units (SWMUs) and areas of concern (AOCs) (MDEQ, 2010a). A 1996 Phase I RCRA Facility Investigation (RFI) Report indicated soil and groundwater was impacted at the SWMUs and AOCs. Between 1999 and 2002, Phase II RFIs were completed to further evaluate the lateral and vertical extent of the impacts in the soil and groundwater.

In 2005 a risk assessment was completed to evaluate potential risks to human health and the environment (RETEC, 2005). The chemicals of potential concern (COPCs) were chlorinated herbicides, semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs).

The risk assessment indicated that some COPC concentrations in the soil exceeded the EPA Preliminary Remediation Goals (PRGs) for industrial workers at two locations.

In 2007, a risk assessment and soil leaching evaluation were completed to further assess the areas where COPC concentrations exceeded the PRGs (AECOM, 2008; MDEQ, 2010). The COPC concentrations in the soil were compared to site-specific risk-based action levels (RBALs) and an exceedance was detected north of the former wastewater above ground storage tank (AST). Based on the leaching evaluation, the MDEQ determined that soil leaching to groundwater was not a concern for the Site and no further evaluation of this pathway was required (MDEQ, 2010).

In 2009, the wastewater AST was removed, and the impacted soil was excavated and disposed offsite in accordance with the 2010 Statement of Basis (MDEQ, 2010a). In 2011, the Soil Corrective Measures Implementation (CMI) for the Site was certified complete for all areas except the Deferred Units (MDEQ, 2015a).

In 2012, the asphalt cap and underlying soil was removed from the closed surface impoundment, SWMU-6. A risk assessment completed for the former SWMU-6 area indicated that residual COPC concentrations in the soil did not exceed site-specific RBALs for industrial or construction workers (Rubik, 2013). A building was later constructed over the area. With the closure of SWMU-6, all SWMUs and AOCs at the Facility have been closed except for the Deferred Units and SWMU-7, groundwater (DEQ 2015a).

In accordance with the 2015 Final Determination Letter for Groundwater Remedy Selection (MDEQ, 2015), groundwater corrective measures include monitored natural attenuation (MNA), institutional controls, and localized enhanced bioremediation if COPC concentrations consistently exceed DEQ-7 standards. Groundwater monitoring and sampling for select COPCs continues to be conducted semi-annually in accordance with the 2017 LPI Final Groundwater CMI Work Plan (Rubik, 2017).

The land use at the site was restricted to industrial purposes only with an Environmental Control Easement executed by the MDEQ on March 25, 2019 pursuant to the Groundwater CMI Work Plan (Rubik, 2017).

## 3.1 2022 Deferred Unit Investigation

The soil sample locations in the Deferred Units were selected based on the location of historical operations and were biased towards areas with the highest likelihood of being impacted, while still being representative of the entire Unit. Samples were collected from unsaturated soil at three depths up to 15 feet bgs to evaluate the potential risks to construction/industrial workers in direct contact with the soil if the buildings were removed.

The COPCs for the Deferred Units based on historical site investigations and facility operations included chlorinated herbicides, VOCs and SVOCs. COPCs for former SWMUs -8, -13 and -16 and AOC-4 also included total cyanide and the metals chromium, cobalt, and nickel. Total glycols were also evaluated as COPCs for SWMU-15

The concentrations of the chemicals detected in the Deferred Units are presented in **Table 2** and the laboratory analytical data were provided in the soil investigation report (Rubik, 2022).

## 4.0 COPC IDENTIFICATION

### 4.1 COPCs

Chemicals that were detected or had a laboratory reporting limit that exceeded the generic November 2022 USEPA Regional Screening Levels (RSLs) were retained as COPCs for further evaluation. The COPCs are identified in **Table 3**.

### 4.2 Additional COPC Evaluation

#### 4.2.1 Metals

Chromium, cobalt, and nickel were detected in all soil samples collected. The concentrations were consistent in all samples and were also less than or equivalent to the mean background concentrations for Montana as shown in **Table 3** (Hydrometrics, 2013).

The data indicates that the metals concentrations detected are representative of background soil conditions and are unrelated to Site activities. Therefore, the metals were not retained as COPCs.

#### 4.2.2 Reporting Limits Exceeding RSLS

The following chemicals were not detected but had laboratory reporting limits (RLs) that exceeded the generic RSLs for industrial receptors:

- VOCs
  - 1,2-Dribromoethene (Ethylene dibromide or EDB), and
  - 1,2,3-Trichloropropane (1,2,3-TCP).
- SVOCs
  - Benzidine, and
  - N-nitroso-dimethylamine.

The RLs and generic RSLs based on a hazard quotient of 0.1 and an excess cancer risk (ECR) of 1 in 1,000,000 (1E-06) are presented in **Table 4**.

Benzidine is used to manufacture dyes and is unrelated to pesticides or pesticide manufacturing. Therefore, it was not retained as a COPC.

There is no indication that pesticides or other materials that would potentially contain the remaining three chemicals were ever stored or used at the facility. Additionally, none of the chemicals has been identified as a COPC in previous soil and groundwater investigations.

In accordance with EPA guidance (EPA, 2000) and the 2005 Risk Assessment for the site (RETEC, 2005), when a COPC isn't detected in 100% of the samples, the EPC should be equal to one half

of the RL. Using ½ RL, the EPC for both EDB and 1,2,3-TCP were less than the generic RSL. However, the 1,2,3-TCP generic industrial RSL was not established using an inhalation unit risk factor (IUR), which is required to evaluate the inhalation risk from a carcinogenic VOC. When an IUR was used to calculate the RSL, the EPC exceeded the screening level. Therefore 1,2,3-TCP was retained as a COPC and EDB was not.

The N-nitroso-dimethylamine EPC based on ½ of the RL exceeded the generic RSL, so the chemical was retained as a COPC.

### 4.2.3 Detected but No RSL

Concentrations of chlorinated herbicides including Clopyralid, Dichlorprop and SVOCs including butyl benzyl phthalate, 4-chloro-2-methyl phenol, and 4-chloropenol were detected in soil samples from the Deferred Units. Based on previous risk assessments for the Site that were approved by the MDEQ (RETEC, 2005), 2-chorophenol was used as a surrogate for 4-chloro-2-methyl phenol and 4-chlorophenol, and both were retained as COPCs. Similarly, 2,4-D was used as a surrogate for Dichlorprop, which was also retained as a COPC.

Due to insufficient human toxicity data, no generic RSL has been established for Clopyralid and a site-specific screening level (SSL) could not be calculated. Clopyralid was also not identified in previous Site investigations or risk assessments as a COPC and is not known to be an ingredient of chemicals stored or formerly manufactured at the site. Based on the lack of toxicity data and no knowledge of use at the site, Clopyralid was not retained as a COPC.

Phthalates are used as plasticizers that are added to plastic and other materials. They were previously determined to not be related to the site, so butyl benzyl phthalate was not retained as a COPC (RETEC, 2005).

## 5.0 EXPOSURE ASSESSMENT

An exposure assessment was conducted to identify potentially complete exposure pathways, estimate the COPC EPCs, and establish the SSLs.

### 5.1 Exposure Pathway Evaluation

For an exposure pathway to be identified as potentially complete and warrant further consideration, each of the following elements had to be present: (1) a chemical source; (2) a transport mechanism within environmental media (soil or groundwater); (3) a point of exposure where contact can occur; (4) a route of exposure (dermal contact, ingestion or inhalation), and (5) a potentially exposed population (human and/or ecological receptors) (ATSDR, 2005).

The following information was considered when evaluating the exposure pathways:

- The site is zoned for heavy industrial land use and was used for pesticide formulation and manufacturing for more than 30 years,
- Samples could not be collected from the fill material beneath the buildings overlying the Deferred Units due to presence of gravel. The concentrations of the COPCs detected in

the Deferred Units occurred at depths greater than 5 feet bgs,

- Soil leaching models, historical soil investigations and groundwater data have indicated that soil leaching to groundwater is not a concern at the site, and
- The site and surrounding properties are connected to the municipal water system and there are no water supply wells on or adjacent to the site that are used for drinking water.

## 5.2 Human Health Conceptual Site Model

Based on the depth to COPCs detected in the soil in the Deferred Units and the current and future land use of the site, excavation workers were identified as the primary receptor. Exposure to excavation workers could occur by direct contact (i.e., ingestion, dermal contact and inhalation of particulates or vapor) in excavations greater than 5 feet bgs.

If VOCs are present in the soil in the Deferred Units, current outdoor industrial workers or future indoor workers could inhale vapors emanating from the soil. No other receptors or potentially complete exposure pathways were identified.

## 5.3 Ecological Exposure

Ecological exposure pathways have been previously identified as being potentially complete; however, no unacceptable risk to ecological receptors was identified since the receptors were unlikely to be in contact with impacted soil for enough time to cause harm (RETEC, 2005).

Based on previous risk assessments and the information presented below, the ecological exposure pathways in the Deferred Units appear to be incomplete and will likely remain that way in the future.

- The facility is likely to remain industrial in the future based on zoning and historical use and the Environmental Control Easement and deferred areas are unlikely to become ecological habitat.
- Residual chemicals in the soil are located below the root zone that would be achieved seasonally by opportunistic grasses or weedy forbs that are common to the area (Weaver, 1958).
- Uptake of the residual chemicals in soil by roots is unlikely to occur based on the depth of the COPC detections. Therefore, the ingestion exposure pathway for herbivorous mammals is incomplete. Additionally, because most soil macroinvertebrates consumed by insectivorous mammals live in the root zone, the ingestion exposure pathway for these receptors is also incomplete (USEPA, 1997).
- The burrow depths of the potential mammalian receptors (mountain cottontail and deer mice) are less than 4 feet bgs (Gano, et al. 1982; Chapman, 1975; Weber, 2013).
- Soil leaching to groundwater is not a concern for the site (MDEQ, 2010) and there is no connection between the groundwater beneath the site and surface water bodies supporting aquatic life.

## 5.4 Exposure Factors and Exposure Point Concentrations

The default exposure factors in the USEPA RSL Calculator (USEPA, 2023) were used to provide a conservative assessment of the potential risk from exposure to the soil. The default values have been shown to be more conservative than realistic exposure scenarios in previous risk assessments completed for the Site (Rubik, 2013).

## 5.5 Exposure Point Concentrations

The maximum COPC concentrations detected in the soil from the samples collected during the 2022 Deferred Area Soil Investigation were established as the EPC for each of the Deferred Units to provide a conservative evaluation of risk. As noted, since 1,2,3-TCP, and N-nitroso-dimethylamine were not detected in any sample, one-half of the RL was used as the EPC (RETEC, 2005; USEPA, 2000). The EPCs are presented in **Table 3**.

## 5.6 Screening Levels

The SSLs were calculated for the direct exposure pathway for outdoor workers and for the inhalation pathway for industrial workers using the USEPA online RSL Calculator (USEPA, 2023).

The SSLs are presented in **Table 3** and were established for non-carcinogens based on a HQ of 0.1 to account for multiple chemicals and an acceptable cumulative hazard index of 1.0. A lifetime ECR of 1 in 100,000 (1E-05) was used to develop SSLs for carcinogens (MDEQ, 2013).

The SSLs were also established based on the location of Billings, Montana in Climatic Zone 4 (US EPA, 2023). Casper, Wyoming was selected in the RSL calculator to represent Climatic Zone 4.

## 5.7 Toxicity Values

The default toxicity values from the USEPA's online RSL calculator were used to develop the SSLs (USEPA, 2023). The calculator did not have an inhalation unit risk factor for 1,2,3-TCP, so a value assigned by the California EPA was used in the calculations (CalEPA, 2005b). All toxicity values were reviewed to ensure the most current information available was used.

# 6.0 RISK CHARACTERIZATION

## 6.1 Human Health Screening Level Evaluation Results

The COPCs in the soil were less than the SSLs for the protection of human health in all of the Deferred Units. The COPC EPCs and SSLs are presented in **Table 3** and the risk characterization results are presented in **Table 5**.

## 6.2 Ecological Risk

The ecological exposure pathways for the Deferred Units appear to be incomplete. Additionally, previous risk assessments for the site indicated COPCs in the soil did not present an unacceptable risk to ecological receptors because they were unlikely to remain at a point of contact (RETEC,

2005). Therefore, the COPCs in the soil with the Deferred Units to do present and unacceptable ecological risk.

## 7.0 UNCERTAINTY ANALYSIS

### 7.1 Uncertainty with Selection of COPCs

The factors that contribute to the uncertainties associated with the evaluation of COPCs are inherent in the data collection and data evaluation processes, including appropriate sample locations, adequate sample quantities, laboratory analyses, data validation, and treatment of environmental samples. There is particular uncertainty regarding the potential presence of absence of chemicals that weren't detected and are only being retained as potential COPCs because the RL exceed the RSL. Historical data and knowledge of the facility can be used to further evaluate whether of these chemicals should be included as COPCs.

### 7.2 Uncertainties Related to Exposure Assessment

Inclusion of VOCs with RLs exceeding RSLs as COPCs resulted in identifying and evaluating potentially complete exposure pathways (i.e. vapor exposure to current outdoor workers and future indoor workers) that wouldn't otherwise warrant consideration based on the chemicals associated with the site. Inclusion of the VOCs that weren't detected increases the uncertainty in the receptors and complete exposure pathways.

Other uncertainties in exposure assessment include the degree of accuracy in the the EPC estimation and exposure factors used to evaluate each potentially complete exposure pathway. Variability or heterogeneity in exposure routes and exposure dynamics, such as age, gender, behavior, genetic constitution, state of health, and random movement of the potentially exposed populations, also results in uncertainty over the exposure estimates.

For exposure pathways besides direct contact, there is also inherent uncertainty and error by establishing the risk based on measurement in the soil rather than at the point of contact (USEPA, 1989). Additionally, for the vapor migration and inhalation pathway, the use of soil data rather than soil gas data results in a high degree of uncertainty due to the estimated partitioning from the solid to vapor phase (CalEPA, 2005b).

### 7.3 Uncertainties Related to Toxicity Assessment

Uncertainties associated with toxicity values used in the risk assessment include: 1) using dose response information from animal studies to predict effects in humans; 2) using dose response information from effects observed at high doses to predict the adverse effects that may occur following human exposure to the low levels; 3) using dose response information from short term exposure studies to predict the effects of long term exposures and vice versa; 4) using dose response information from homogeneous animal populations or healthy human populations to predict the effects likely to be observed in the general population consisting of individuals with a wide range of sensitivities, and using surrogates to represent COPCs.

## 7.4 Uncertainties Related to Risk Characterization

Uncertainties in risk characterization are the product of many factors affecting each component of the risk assessment process, namely data collection/evaluation and selection of COPCs, exposure assessment, and toxicity assessment. These factors generally include, at a minimum, measurement errors, conservative exposure and modeling assumptions, and uncertainty and variability of the values used in the assessment.

Another uncertainty may include the conservative assumption that COPC concentrations do not decrease over time in the environment due to source depletion and biodegradation but remain at the concentrations measured during sample collection. This assumption has a low to moderate effect on the health risk results for soils where risk drivers include biodegradable chemicals.

# 8.0 CONCLUSIONS

The residual impacts detected within soils of the Deferred Units do not present an unacceptable risk to potential human or the ecological current or future receptors. The screening level risk assessment indicated that hazard levels and ECR estimates for direct exposure by outdoor workers and vapor inhalation by industrial workers were less than the MDEQ acceptable endpoints of 1.0 and 1E-05. The assessment also indicated that there is no ecological risk and the ecological exposure pathways are unlikely to be complete.

Based on the results of the risk assessment, no further action is necessary at the Deferred Units.

## 9.0 REFERENCES


AECOM, 2008. Soil Corrective Measures Study Report and Groundwater Treatability Work Plan, Transbas Inc. 1525 Lockwood Road Billings, Montana. February.

AECOM. 2010. Groundwater (CMS) Report. LPI. May.

California Environmental Protection Agency (Cal-EPA). 2005a. HERD_Soil_Gas_Screening_Model_2005.xls" (last modified on 1/21/05)

CALEPA. Department of Toxic Substances Control (DTSC). 2005b. Guidance for the Evaluation and Mitigation of Suburface Vapor Intrusion into Indoor Air. Interim Final. Revised February 7.

Chapman, J.A. 1975. Sylvilagusnuttali. Mammalian Species. Vol 21.No. 56. November.

Gano, K.A. and J.B. States. 1982. Habitat Requirements and Burrowing Depths of Rodents in Relation to Shallow Waste Burial Sites. Prepare for U.S. Department of Energy. Pacific Northwest Laboratory, Richland, WA. May

Hydrometrics, Inc. 2013. Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils. September.

Montana Department of Environmental Quality (MDEQ). 2004. Hazardous Waste Permit No. MTHWP-04-01. June 1

MDEQ, 2005a. Conditional Approval of the August 6, 2005 Transbas Risk Assessment, Revision 2. December 5.

MDEQ, 2010. Fact Sheet/Statement of Basis, LPI, Lockwood, Montana. April.

MDEQ, 2015a. Corrective Action Order on Consent HHWCAO-15-01. 2015.

DEQ, 2015b. Statement of Basis - Proposed Groundwater Remedy Selection for Groundwater. May.

Rubik, 2013. SWMU-6 Risk Assessment, Loveland Products, Inc. Billings, Montana. August 8.

Rubik, 2017. Final Groundwater Corrective Measures Implementation Work Plan, Loveland Products, Inc. Billings, Montana. January 12.

Rubik, 2022. Deferred Area Soil Investigation Report of Findings, Loveland Products, Inc. Facility Billings, Montana. December 9.

The RETEC Group (RETEC), 2005. Risk Assessment Addendum, Transbas, Inc. Billings, Montana, Revision 2. August 26.

Transbas, Inc. 1996.

UniField, 1994. RFI Work Plan, Transbas Inc. 1525 Lockwood Road Billings, Montana. April 29. Revised September 1994.

USEPA. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final. June

USEPA, 2000. Guidance for Data Quality Assessment. Practical Methods for Data Analysis. EPA QA/G-9. EPA/600/R-96/084. July.

USEPA, 2023. RSL Online Calculator. https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search

Weaver, J.E., 1958. Classification of Root Systems of Forbs or Grassland and a Consideration of Their Insignificance. Ecological Society of America (Ecology).Vol. 39, No. 3. July.

Weber, J.N., B.K. Peterson, and H.E. Hoekstra, 2013. Discrete genetic modules are responsible for complex burrow evolution in Peromyscus mice. Nature. 493. 402-405. January 17.

# FIGURES

**DRAFT DEFERRED UNIT SCREENING LEVEL RISK ASSESSMENT**

LPI Billings Facility
Billings, Montana

May 5, 2023



320 Flint Street
Reno, Nevada 89501
(775) 622-0857


# VICINITY MAP

**LPI Billings**
**1525 Lockwood Road**
**Billings, Yellowstone County, Montana**

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |
| DATE: 5/5/2023 | ACAD FILE: 20230505 RBK Billings MT Fig 1 VICMAP.dwg | |
| PROJECT NO.: 03005-2023 | PLOT SCALE: Approx. 1" = 1,200' | |

FIGURE 1

L:\Rubrik Environmental\Projects\Active\Billings, MT\2023 Risk Assessment\Figures\2023\0505 RBK Billings MT Fig 1 VICMAP.dwg



320 Flint Street
Reno, Nevada 89501
(775) 622-0857

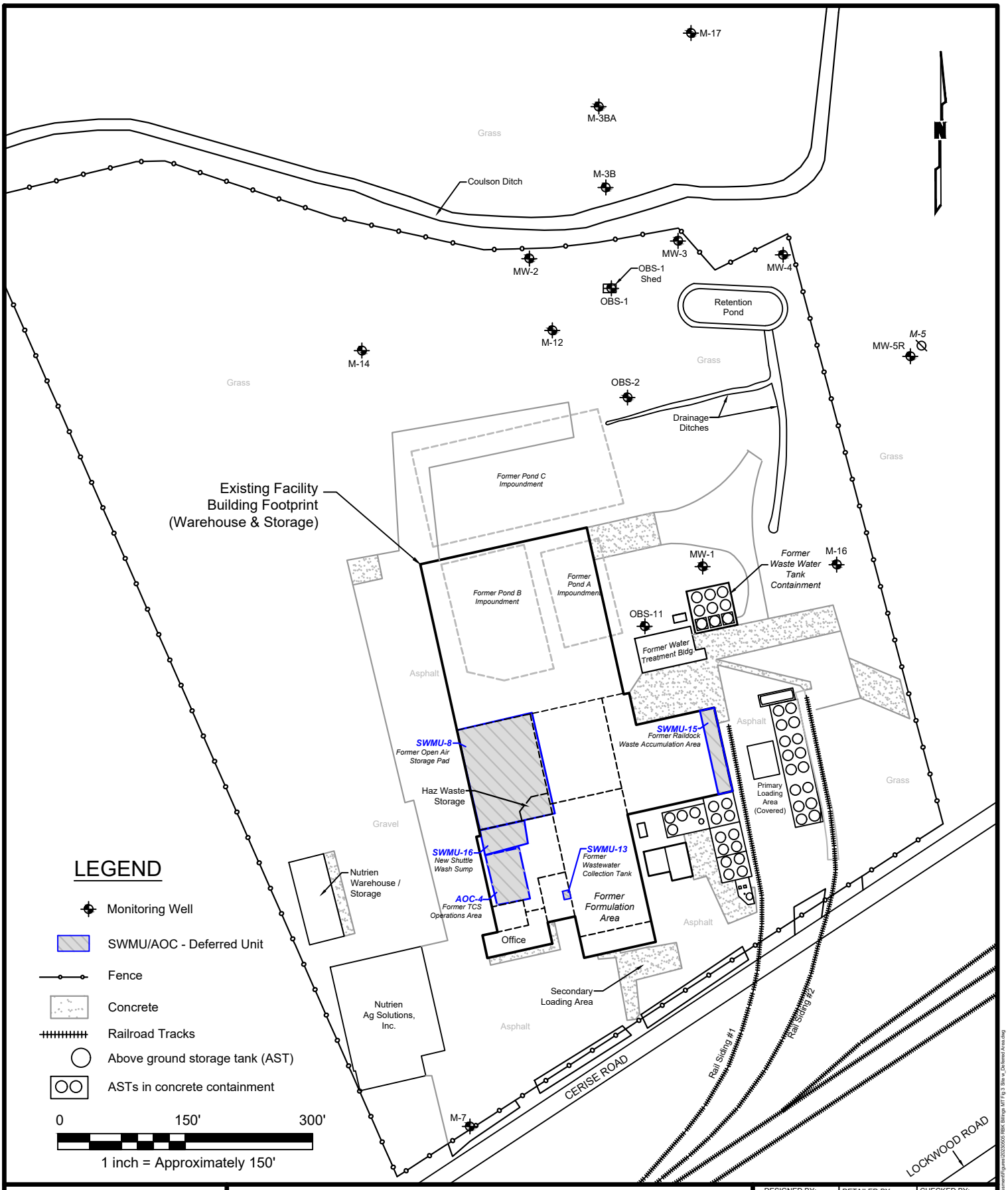

# SITE PLAN

**LPI Billings**
**1525 Lockwood Road**
**Billings, Montana**

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |

| DATE: | ACAD FILE: |
|---|---|
| 5/5/2023 | 20230505 RBK Billings MT Fig 2 Site Aerial.dwg |
| PROJECT NO.: | PLOT SCALE: |
| 03005-2023 | APPROX. 1" = 150' |

FIGURE 2





320 Flint Street
Reno, Nevada 89501
(775) 622-0857


# DEFERRED UNIT LOCATIONS

**LPI Billings**
**1525 Lockwood Road**
**Billings, Montana**

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |

| DATE: | ACAD FILE: |
|---|---|
| 5/5/2023 | 20230505 RBK Billings MT Fig 3 Site w_Deferred Area.dwg |

| PROJECT NO.: | PLOT SCALE: |
|---|---|
| 03005-2023 | APPROX. 1" = 150' |

FIGURE 3

Former Pond B Impoundment

OBS-11

Former Water Treatment Bldg.

**SWMU-8**
Former Open Air Storage Pad

SR-5
SR-6
SR-10
SR-7
SR-9
SR-8
SR-15
SR-16
SR-17

**SWMU-16**
New Shuttle Wash Sump

SR-1
SR-2
SR-4
SR-3

**AOC-4**
Former TCS Operations Area

Office

**SWMU-13**
Former Wastewater Collection Tank

SR-11

Former Formulation Area

SR-12

**SWMU-15**
Former Raildock Waste Accumulation Area

SR-13
SR-14

Asphalt

Asphalt

Asphalt

Secondary Loading Area

CERISE ROAD

Rail Siding #1

LEGEND

- Monitoring Well
- 2022 Boring Location
- SWMU/AOC - Deferred Area
- Fence
- Concrete
- Railroad Tracks
- Above ground storage tank (AST)
- ASTs in concrete containment

0 40' 100'

1 inch = Approximately 40'

N

Rubik
320 Flint Street
Reno, Nevada 89501
(775) 622-0857

**2022 BORING LOCATIONS**

**LPI Billings**
**1525 Lockwood Road**
**Billings, Montana**

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |

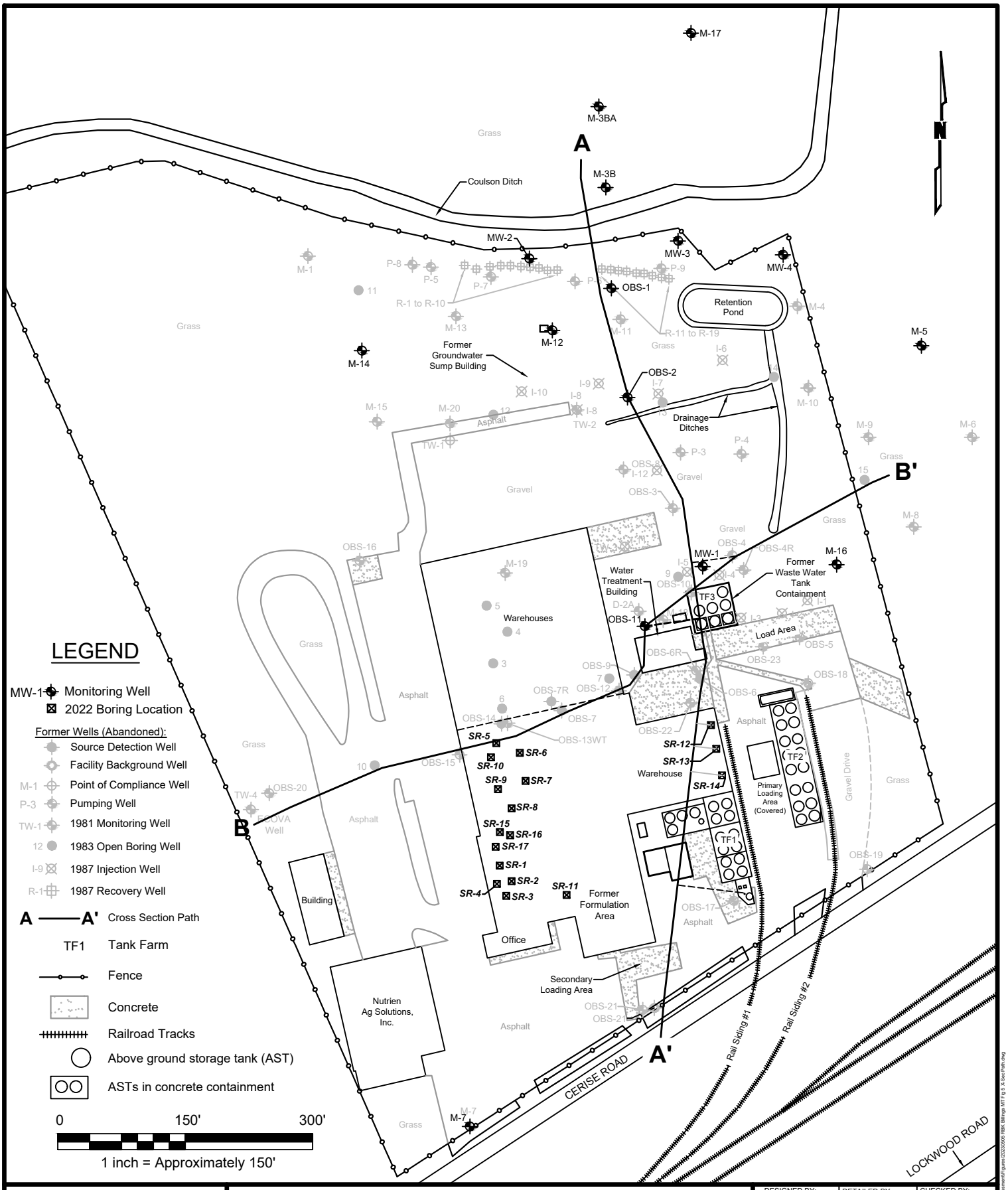
DATE: 5/5/2023

PROJECT NO.: 03005-2023

PLOT SCALE: APPROX. 1" = 40'

FIGURE 4

L:\Rubik Environmental\Projects\Nuvera\Billings, MT\2023 Risk Assessment\Figures\20230505 RBK Billings MT Fig 4 Boring Locs.dwg





320 Flint Street
Reno, Nevada 89501
(775) 622-0857


# CROSS SECTION PATHS

**LPI Billings**
**1525 Lockwood Road**
**Billings, Montana**

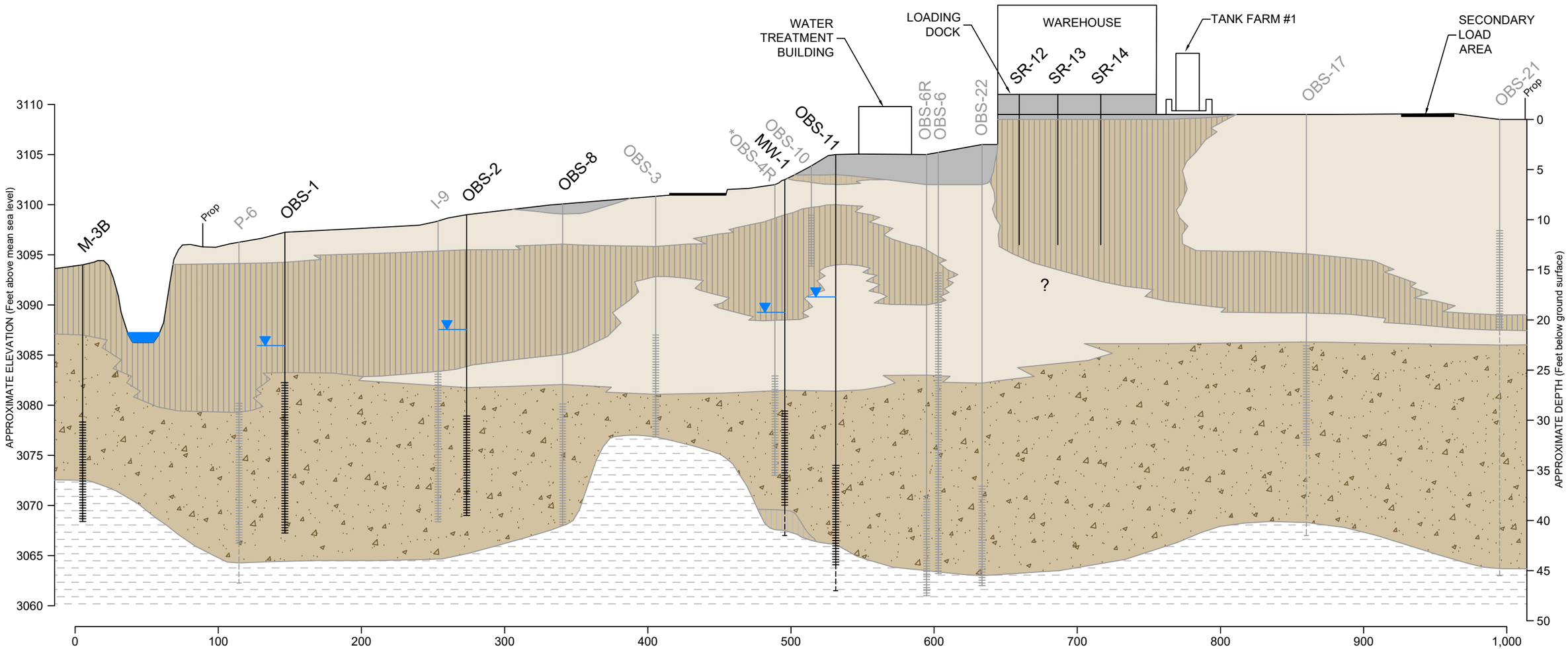
| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |
| DATE: 5/5/2023 | ACAD FILE: 20230505 RBK Billings MT Fig 5 X-Sec Path.dwg | |
| PROJECT NO.: 03005-2023 | PLOT SCALE: APPROX. 1" = 150' | |

FIGURE 5

L:\Rubik Environmental\Projects\Active\Billings, MT\2023 Risk Assessment\Figures\20230505 RBK Billings MT Fig 5 X-Sec Path.dwg

A
NORTH

A'
SOUTH




10'
0
0
70'
Vertical Exaggeration = 7x

Approximate Static Groundwater Elevation (May 2022)

Prop.
Approximate Site Property Boundary

ABANDONED WELL
WELL
SOIL BORING
CASING
SCREEN
BOTTOM OF WELL BORING

FILL
CLAY / CLAYEY SAND
SILT / SILTY SAND
SANDY GRAVEL
SHALE BEDROCK

? = Unknown or assumed extent
*Lithology from this well not used in interpretation.


Rubik
320 Flint Street
Reno, Nevada 89501
(775) 622-0857


**GEOLOGIC CROSS SECTION A-A'**

LPI Billings
1525 Lockwood Road
Billings, Montana

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |

| DATE: | ACAD FILE: |
|---|---|
| 5/5/2023 | 20230505-RBK Billings MT Fig 6_7 X-Sec AA'_BB'.dwg |

| PROJECT NO.: | HORIZONTAL PLOT SCALE: |
|---|---|
| 03005-2023 | APPROX. 1" = 70' |

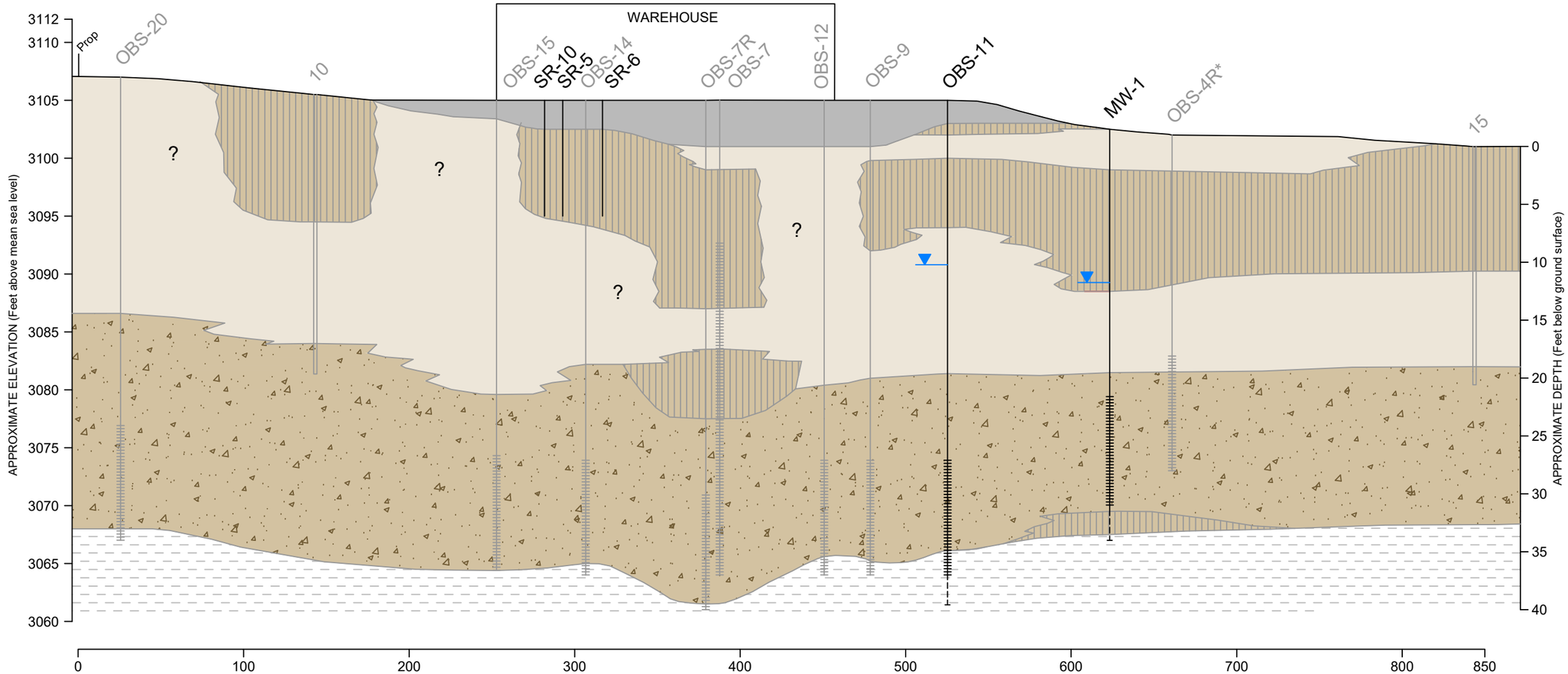
FIGURE 6

B

WEST

B'

EAST




Approximate Static Groundwater Elevation (May 2022)

Prop.

Approximate Site Property Boundary

ABANDONED OPEN HOLE WELL

ABANDONED WELL

WELL

CASING

SCREEN

SOIL BORING

FILL

CLAY / CLAYEY SAND

SILT / SILTY SAND

SANDY GRAVEL

SHALE BEDROCK

? = Unknown or assumed extent

*Lithology from this well not used in interpretation.

10'

0

0

70'

Vertical Exaggeration = 7x


320 Flint Street
Reno, Nevada 89501
(775) 622-0857


**GEOLOGIC CROSS SECTION B-B'**

LPI Billings
1525 Lockwood Road
Billings, Montana

| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| SPF | SPF | TLL |

| DATE: | ACAD FILE: |
|---|---|
| 5/5/2023 | 20230005-RBK Billings MT Fig 6_7 X-Sec A-A'_BB'.dwg |

| PROJECT NO.: | HORIZONTAL PLOT SCALE: |
|---|---|
| 03005-2023 | APPROX. 1" = 70' |

FIGURE 7

# TABLES

**DRAFT DEFERRED UNIT SCREENING LEVEL RISK ASSESSMENT**

LPI Billings Facility
Billings, Montana

May 5, 2023

**TABLE 1**
**SUMMARY OF DEFERRED UNIT USE**
Loveland Products, Inc. Billings Facility
Billings, Montana

| UNIT | AREA NAME | HISTORICAL ACTIVITIES AND MATERIALS[1] |
|---|---|---|
| AOC 4 | Special Process Area | Transbas Chemical Specialties (TCS) operated from late 1988 to mid 1991 in an area in the west-central portion of the process facility, south of the acid pad. TCS was involved in development of several proprietary chemical products, including potassium ferrate, pheromones, and 2,2-Dibromoheptane nitrile. Chemicals used by TCS included: liquid bromine, xylene, ethylbenzene, n-butyl alcohol, methanol, cyclohexane, sodium cyanide, Raney catalyst (nickel, aluminum, chromium, manganese), nitrobenzene, chlorine, hydroquinone (in very small quantities, if at all), carbon tetrachloride, and hydrochloric acid. |
| SWMU 8 | Open Air Storage | A centered-sloped concrete pad (93 ft x 124 ft) with a capacity of 2,500 gallons was installed in 1983. The pad was enclosed with a roof and north and west side walls in 1992. Prior to pad construction, the area was used for product and waste storage. The pad has been used to store raw material and a temporary waste accumulation and handling area. Raw materials were 2,4-D based and stored in solid or semi-solid form. Rain water collected on the pad was in direct contact with 2,4-D based material with pad runoff and soil erosion observed in 1991. Water samples from the pad water contained 2,4-D and phenol compounds. The pad water results were reflective of the chemicals detected in groundwater in down gradient wells OBS-7 (installed June 1990) and M-19. A shuttle wash (SWMU-16) constructed in August 1992 upgradient of SWMU-8 had reported sump leakage in November 1992 and identified as a potential upgradient source. The shuttle wash was repaired in late 1992 and subsequent groundwater results in well OBS-7 improved. |
| SWMU 13 | Warehouse 2 Wastewater Collection Tank | The waste water collection tank located in the Warehouse 2 was constructed in 1990 and originally did not contain secondary containment. A tank sample collected in 1992 contained concentrations of 2,4-D, Dicamba, Dichloroprop, MCPA and MCPP. In 1992, tank (3 ft wide, 6 ft long, and 4 ft deep totaling 466 gallons) was relocated in its present location and secondary containment was constructed (area was the former shuttle wash area). The tank is used to collect process area wastewaters pending shipment to a TSDF underground injection disposal area. The area immediately adjacent to the north is operated as a pump parts washer facility and generates low volumes of wastewater that enter the tank. Releases from this area are not known to have occurred, but undetected releases from the old shuttle wash sump, similar to those experienced in 1992 at the new shuttle wash area, are possible. Therefore, some investigation of this area is justified. |
| SWMU 15 | Rail-dock Accumulation Area | A previous management practice included the solidification and repackaging of 2,4-D impacted material into fiber packs. Some materials were generated by cleanup of spills of raw materials or products within the formulation process facility. The fiber packs were transferred to the rail-dock along the east side of warehouse #4, prior to shipment to an off-site TSDF. Activities and potential impacts, if any, may be indistinguishable from those of Rail Siding #1 (SWMU-10).<br><br>SWMU-10a & 10b (rail sidings) - No risk based SL exceedances - NFA |
| SWMU 16 | New Shuttle Wash Sump | Relocation area for the shuttle wash sump (previously in warehouse #2) constructed in 1992 south of the acid pad was identified as a potential source of upgradient releases in late November, 1992. Shuttle wash sump leakage was confirmed in early December 1992. Wastewater leakage from the sump was estimated to be 20 to 40 gallons per day. The sump was removed from service and reconstructed with secondary containment and placed in operation on December 18, 1992. There are no documented reports of liquid or solid material releases within or around the Transbas Chemical Specialties (TCS) area; however, TCS drums were among the drums listed in MDHES and EPA citations of storage/handling violations in 1990. |

Notes
[1]From 1994 RFI Current Conditions Report
NFA - No further action

**TABLE 2**
**CHEMICALS DETECTED IN DEFERRED UNIT SOIL**
Loveland Products, Inc. Billings Facility
Billings, Montana

| Sample Location | Sample Date | Sample Depth[1] (feet) | Chlorinated Herbicides | | | | | | Cyanide (total) (mg/kg) | Ethylene Glycol (mg/kg) | Metals | | | VOCs | | SVOCs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2,4,5-T (mg/kg) | 2,4-D (mg/kg) | Clopyralid (mg/kg) | Dicamba (mg/kg) | Dichlorprop (mg/kg) | Picloram (mg/kg) | | | Chromium (total) (mg/kg) | Cobalt (mg/kg) | Nickel (total) (mg/kg) | 1,2,4-T (mg/kg) | 1,3,5-T (mg/kg) | Butyl-benzylphthalate[3] (mg/kg) | Triallate (mg/kg) | o-Cresol (mg/kg) | 4-chloro-2-methylphenol (mg/kg) | 4-Chlorophenol (mg/kg) | Phenol (mg/kg) |
| **RSL[2]** | **Generic Industrial Direct Contact** | | **820** | **960** | NE | **2,500** | NE | **5,700** | **15 - 12,000** | **66,000** | NE | **35** | **810 - 2,200** | **180** | **150** | NE | **46** | **4,100** | NE | NE | **25,000** |
| **Montana Mean Background Concentrations[4]** | | | | | | | | | | | **20** | **7** | **17** | | | | | | | | |
| ***AOC - 4*** | | | | | | | | | | | | | | | | | | | | | |
| SR-1 | 8/12/2022 | 5 | <0.0043 | **3.4** | **0.079** | **1.2** | <0.022 | <0.011 | **0.6** | -- | **22** | **6** | **15** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0045 | **0.30** | **0.20** | **0.056** | <0.023 | <0.011 | <0.3 | -- | **11** | **5** | **10** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-2 | 8/12/2022 | 5 | <0.0043 | <0.022 | <0.0054 | <0.0054 | <0.022 | <0.011 | <0.3 | -- | 15 | **5** | **13** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0045 | 0.15 | <0.0056 | <0.0056 | <0.022 | <0.011 | <0.3 | -- | **15** | 5 | **12** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-3 | 8/12/2022 | 5 | <0.0042 | **11** | **0.043** | **0.50** | <0.021 | <0.011 | **0.6** | -- | **15** | **5** | **10** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0045 | **1.3** | **0.018** | **0.050** | <0.022 | <0.011 | <0.3 | -- | **12** | **5** | **11** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-4 | 8/12/2022 | 5 | <0.0041 | **1.3** | **0.022** | **0.055** | <0.021 | <0.010 | <0.2 | -- | **13** | **5** | **11** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0046 | **0.40** | <0.0057 | **0.0092** | <0.023 | <0.011 | <0.3 | -- | **13** | **6** | **12** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| ***SWMU - 8*** | | | | | | | | | | | | | | | | | | | | | |
| SR-5 | 8/11/2022 | 5 | <0.0047 | **0.42** | **1.4** | **0.013** | <0.024 | <0.012 | **0.8** | -- | **17** | **6** | **16** | <0.20 | <0.24 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | <0.0049 | <0.024 | **0.13** | **0.0082** | <0.024 | <0.012 | <0.3 | -- | **20** | **6** | **20** | <0.20 | <0.24 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| | | 10 | <0.0044 | <0.022 | **0.0068** | **0.014** | <0.022 | <0.011 | **2.1** | -- | **15** | **5** | **13** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-6 | 8/11/2022 | 5 | <0.0042 | **2.5** | **0.037** | **0.084** | **0.16** | <0.010 | **0.4** | -- | **17** | **5** | **13** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | <0.0046 | <0.023 | <0.0058 | <0.0058 | <0.023 | <0.012 | **4.9** | -- | **19** | **7** | **20** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 10 | <0.0045 | <0.022 | <0.0056 | <0.0056 | <0.022 | <0.011 | **2.0** | -- | **18** | **6** | **15** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-7 | 8/11/2022 | 5 | <0.0043 | **12** | <0.0054 | **2.0** | <0.022 | <0.011 | <0.3 | -- | **17** | **3** | **9** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | <0.0043 | <0.021 | <0.0054 | **0.0077** | <0.021 | <0.011 | **1.5** | -- | **19** | **6** | **16** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 10 | <0.0045 | <0.022 | <0.0056 | <0.0056 | <0.022 | <0.011 | **1.0** | -- | **16** | **5** | **14** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-8 | 8/11/2022 | 5 | <0.0045 | <0.023 | <0.0057 | <0.0057 | <0.023 | <0.011 | **1.3** | -- | **19** | **6** | **17** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | <0.0046 | **3.5** | **0.012** | **0.16** | <0.023 | <0.012 | **0.7** | -- | **19** | **6** | **16** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 10 | <0.0049 | <0.024 | <0.0061 | <0.0061 | <0.024 | <0.012 | **1.1** | -- | **18** | **6** | **15** | <0.20 | <0.24 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-9 | 8/11/2022 | 5 | <0.0052 | **0.38** | <0.0065 | **0.022** | <0.026 | <0.013 | **0.4** | -- | **12** | **3** | **8** | <0.20 | <0.26 | <0.64 | <0.64 | <0.64 | <0.64 | <0.64 | <0.64 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SR-10 | 8/11/2022 | 5 | <0.0042 | **0.77** | **0.016** | **0.026** | **0.031** | <0.011 | **0.6** | -- | **17** | **6** | **12** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0052 | <0.026 | <0.0065 | **0.010** | <0.026 | <0.013 | **5.0** | -- | **19** | **7** | **15** | <0.20 | <0.26 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| ***SWMU - 13*** | | | | | | | | | | | | | | | | | | | | | |
| SR-11 | 8/12/2022 | 5 | <0.0044 | **0.78** | <0.0055 | <0.0055 | <0.022 | <0.011 | <0.3 | -- | **12** | **6** | **12** | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | **0.0092** | **4.2** | <0.0053 | **0.026** | <0.021 | <0.011 | <0.3 | -- | **11** | **5** | **10** | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| ***SWMU - 15*** | | | | | | | | | | | | | | | | | | | | | |
| SR-12 | 8/12/2022 | 5 | **0.012** | **4.9** | <0.0054 | **0.027** | <0.022 | <0.011 | -- | <5.4 | -- | -- | -- | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | <5.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0046 | <0.023 | <0.0058 | <0.0058 | <0.023 | <0.012 | -- | <5.6 | -- | -- | -- | <0.20 | <0.23 | <0.98 | <0.98 | <0.98 | <0.98 | <0.98 | <0.98 |
| | | 15 | <0.0045 | **0.64** | **0.017** | **0.17** | <0.022 | <0.011 | -- | -- | -- | -- | -- | **0.30** | **0.26** | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-13 | 8/12/2022 | 5 | **0.029** | **19** | **0.084** | **2.3** | **2.8** | **0.016** | -- | **12** | -- | -- | -- | <0.20 | <0.22 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | **0.079** | **154** | **0.17** | **8.6** | **8.1** | **0.037** | -- | **49** | -- | -- | -- | <0.20 | <0.21 | <0.33 | **0.70** | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 15 | **0.17** | **327** | **0.37** | **8.3** | **9.4** | **0.060** | -- | **36** | -- | -- | -- | <0.20 | <0.21 | <0.33 | **0.40** | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-14 | 8/12/2022 | 5 | **0.022** | **11** | **0.040** | **0.82** | **1.5** | **0.014** | -- | **6.1** | -- | -- | -- | <0.20 | <0.21 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0045 | **0.085** | **0.025** | <0.0057 | <0.023 | <0.011 | -- | <5.6 | -- | -- | -- | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 15 | <0.0046 | **1.0** | **0.16** | **0.28** | **0.071** | <0.011 | -- | <5.7 | -- | -- | -- | **1.1** | **0.40** | <0.58 | <0.58 | **0.44** | **3.1** | **5.0** | **1.3** |

**TABLE 2**
**CHEMICALS DETECTED IN DEFERRED UNIT SOIL**
Loveland Products, Inc. Billings Facility
Billings, Montana

| Sample Location | Sample Date | Sample Depth[1] (feet) | Chlorinated Herbicides | | | | | | Cyanide (total) (mg/kg) | Ethylene Glycol (mg/kg) | Metals | | | VOCs | | SVOCs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2,4,5-T (mg/kg) | 2,4-D (mg/kg) | Clopyralid (mg/kg) | Dicamba (mg/kg) | Dichlorprop (mg/kg) | Picloram (mg/kg) | | | Chromium (total) (mg/kg) | Cobalt (mg/kg) | Nickel (total) (mg/kg) | 1,2,4-T (mg/kg) | 1,3,5-T (mg/kg) | Butyl-benzylphthalate[3] (mg/kg) | Triallate (mg/kg) | o-Cresol (mg/kg) | 4-chloro-2-methylphenol (mg/kg) | 4-Chlorophenol (mg/kg) | Phenol (mg/kg) |
| **RSL[2]** | **Generic Industrial Direct Contact** | | **820** | **960** | NE | **2,500** | NE | **5,700** | **15 - 12,000** | **66,000** | NE | **35** | **810 - 2,200** | **180** | **150** | NE | **46** | **4,100** | NE | NE | **25,000** |
| ***SWMU - 16*** | | | | | | | | | | | | | | | | | | | | | |
| SR-15 | 8/11/2022 | 5 | <0.0046 | **0.92** H | **0.12** | **0.045** | <0.023 | **0.042** | **0.4** | -- | **15** | **6** | **14** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | **--** | **--** | **--** | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0050 | **0.12** | <0.0063 | **0.012** | <0.025 | <0.013 | <0.3 | -- | **19** | **7** | **21** | <0.20 | <0.25 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-16 | 8/11/2022 | 5 | <0.0046 | **0.54** | **0.020** | **0.0067** | <0.023 | **0.058** | <0.3 | -- | **16** | **6** | **15** | <0.20 | <0.23 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | **--** | **--** | **--** | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0048 | **1.7** | <0.0060 | **0.012** | <0.024 | <0.012 | <0.3 | -- | **12** | **5** | **11** | <0.20 | <0.24 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |
| SR-17 | 8/11/2022 | 5 | <0.0047 | **3.4** | **0.46** | **0.39** | <0.023 | **0.13** | <0.3 | -- | **16** | **6** | **15** | <0.20 | <0.23 | **11** | <0.33 | **0.27** | <0.33 | <0.33 | <0.33 |
| | | 7.5 | -- | -- | -- | -- | -- | -- | -- | -- | **--** | **--** | **--** | -- | -- | -- | -- | -- | -- | -- | -- |
| | | 10 | <0.0048 | **1.9** | **0.28** | **0.31** | <0.024 | **0.014** | <0.3 | -- | **13** | **5** | **12** | <0.20 | <0.20 | **35** | <0.33 | <0.33 | <0.33 | <0.33 | <0.33 |

Notes:

Data qualifiers are noted in the Table of Qualified Results within the Data Validation Report (Appx. B)
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
NE - Not established
-- - Sample not collected due to no recovery
<0.3 - Less than the indicated laboratory method reporting limit
2,4,5-T - Trichlorophenoxyacetic acid
2,4-D - 2,4-Dichlorophenoxyacetic acid
1,2,4-T - 1,2,4-Trimethylbenzene
1,3,5-T - 1,3,5-Trimethylbenzene
RSL - US EPA Regional Screening Levels

Analytical Methods:

Chlorinated Herbicides - EPA SW8151A
VOCs - EPA SW8260B
SVOCs - EPA SW8270C
metals - EPA SW846
cyanide - EPA SW9012B
Ethylene glycol - EPA 8015C

**Bold** - Detected concentration
[1]- Below the bottom of overlying concrete. Borings for sample collection at SWMU-15 were advanced from the top of the rail loading dock, approximately 5 feet above the surrounding ground surface.
[2]- Hazard Quotient =1, Excess Cancer Risk = $1E10^{-6}$
[3]- Not a site-related chemical (RETEC, 2005)
[4]- Hydrometrics, Inc. 2013. Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils. September.

**TABLE 3**
**DEFERRED UNIT COPCS, EXPOSURE POINT CONCENTRATIONS AND SITE SPECIFIC SCREENING LEVELS**
Loveland Products, Inc. Billings Facility
Billings, Montana

| | | Chemicals of Potential Concern | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Chlorinated Herbicides (mg/kg) | | | | | Total Cyanide (mg/kg) | Ethylene Glycol (mg/kg) | VOCs (mg/kg) | | | | SVOCs (mg/kg) | | | | | |
| | Site-Specific Screening Levels* | 2,4,5-T | 2,4-D | Dicamba | Dichlorprop** | Picloram | | | EDB | 1,2,3-TCP | 1,2,4-T | 1,3,5-T | N-Nitroso-dimethylamine | o-Cresol | 4-chloro-2-methylphenol*** | 4-Chloro Phenol*** | Phenol | Triallate |
| | **Outdoor Worker** | **912** | **1,070** | **2,740** | **1,070** | **6,380** | **22.2** | **72,800** | **2.53** | **0.69** | **273** | **236** | **0.45** | **4,560** | **649** | **649** | **27,300** | **507** |
| **Deferred Area** | **Indoor Worker** | **2,340** | **2,340** | **7,010** | **2,340** | **16,400** | **23.3** | **186,000** | **2.44** | **0.87** | **274** | **234** | **0.59** | **11,700** | **1,170** | **1,170** | **69,900** | **912** |
| AOC - 4 | **Exposure Point Concentrations** | 0.002 | 11.000 | 1.200 | 0.023 | 0.055 | 0.600 | -- | 0.100 | 0.100 | 0.100 | 0.115 | 0.165 | 0.165 | 0.330 | 0.330 | 0.165 | 0.500 |
| SWMU - 8 | | 0.003 | 12.000 | 2.000 | 0.160 | 0.007 | 0.800 | -- | 0.100 | 0.100 | 0.100 | 0.130 | 0.165 | 0.500 | 1.000 | 1.000 | 0.500 | 0.500 |
| SWMU - 13 | | 0.009 | 4.200 | 0.026 | 0.022 | 0.006 | 0.150 | -- | 0.100 | 0.100 | 0.100 | 0.110 | 0.165 | 0.165 | 0.100 | 0.330 | 0.165 | 0.165 |
| SWMU-15 | | 0.017 | 327.000 | 8.600 | 9.400 | 0.130 | 0.800 | 2.850 | 0.100 | 0.100 | 0.3000 | 0.260 | 0.165 | 0.500 | 3.100 | 3.100 | 0.500 | 0.500 |
| SWMU - 16 | | 0.003 | 3.400 | 0.390 | 0.025 | 0.130 | 0.400 | -- | 0.100 | 0.100 | 0.100 | 0.125 | 0.165 | 0.165 | 0.330 | 0.330 | 0.165 | 0.165 |

Notes
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
-- - Sample not collected due to no recovery
2,4,5-T - Trichlorophenoxyacetic acid
2,4-D - 2,4-Dichlorophenoxyacetic acid
1,2,4-T - 1,2,4-Trimethylbenzene
1,3,5-T - 1,3,5-Trimethylbenzene
COPCs- Chemicals of Potential Concern
* Hazard Quotient = 0.1; Excess Cancer Risk = 1E-05
**- Not toxicity data available. Using 2,4-D as a surrogate based on previous risk assemssment for the Site (RETEC, 2005)
***- Not toxicity data available. Using 2-Chlorophenol as a surrogate based on previous risk assemssment for the Site (RETEC, 2005)

**TABLE 4**
**CHEMICALS WITH REPORTING LIMIT THAT EXCEEDED RSL**
Loveland Products, Inc. Billings Facility
Billings, Montana

| COMPOUND | RL[1] | RSL[2] | Synonyms |
|---|---|---|---|
| | mg/kg | | |
| **VOCs** | | | |
| 1,2-Dibromoethane | 0.20 | 0.16 | Ethylene dibromide EDB |
| 1,2,3-Trichloropropane | 0.20 | 0.11 | |
| Benzidine | 0.39 | 0.01 | |
| N-Nitroso-dimethylamine | 0.33 | 0.034 | |

NOTES:

[1]-Laboratory reporting limit

[2]-EPA Regional Screening Level - Direct Contact (Industrial) - HQ=0.1, Excess Cancer Risk = 1E-06

**TABLE 5**
**DEFERRED UNIT RISK CHARACTERIZATION**
Loveland Products, Inc. Billings Facility
Billings, Montana

| Sample Location | Risk Characterization[1] | | | |
|---|---|---|---|---|
| | Future Outdoor Worker[1] | | Future Indoor Worker[1] | |
| | Hazard Index[2] (HI) | Excess Cancer Risk[3] (ECR) | HI[2] | ECR[3] |
| AOC - 4 | 2.98E-02 | 5.55E-06 | 2.31E-02 | 4.39E-06 |
| SWMU - 8 | 3.08E-02 | 5.55E-06 | 2.40E-02 | 4.39E-06 |
| SWMU - 13 | 2.71E-02 | 5.50E-06 | 2.09E-02 | 2.60E-02 |
| SWMU - 15 | 5.70E-02 | 5.55E-06 | 3.43E-02 | 4.39E-06 |
| SWMU - 16 | 2.80E-02 | 5.54E-06 | 2.19E-02 | 4.38E-06 |

Notes
[1]MDEQ Acceptable HI = 1; ECR = 1E-05
[2]Established basedon Hazard Quotient = 0.1 with EPA RSL Calculator (EPA, 2023)
[3]ECR calculated with EPA RSL Calculator (EPA, 2023)