

**DRAFT COMPLETION REPORT**  
**LUTTRELL LEACHATE WATER TREATMENT PLANT**  
**RIMINI, LEWIS & CLARK COUNTY, MONTANA**

Superfund Technical Assessment and Response Team (START V)

Contract No. 68HE0820D0001

Task Order 68HE0820F0071

TD# 2071-2106-08

DTN 0459

U.S. Environmental Protection Agency

Region 8

Site Assessment Branch



Revision 0

September 2021

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### INTRODUCTION

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 8 to aid with the operation and sampling for evaluation of treatment process effectiveness of the Luttrell Leachate Water Treatment Plant (WTP). The primary objectives of the emergency response remedial activity were to follow and revise water treatment operations outlined in the previous Operations and Maintenance (O&M) Manual to achieve adequate daily treatment volume and metals removal to **a)** drain the entire volume of the leachate pond during the operational season (June through October) and **b)** meet effluent discharge standards for metal contaminants of concern (COCs) established for the Land Application Disposal (LAD) system. Development of this report and monitoring activities were authorized under the EPA Region 8 START 5 Contract 68HE0820D0001, Task Order 68HE0820F0071, Technical Direction (TD) 2071-2106-08.

### PROJECT GOALS

The Luttrell Water Treatment Plant receives acid mine drainage water containing high concentrations of dissolved and suspended heavy metals from Luttrell Repository. The WTP reduces metal concentrations and adjusts pH to a neutral level before releasing the treated water to a LAD system. The goals for this remedial action are to:

1. Treat and discharge entire volume of leachate pond to LAD system,
2. Maintain effluent metal contaminant concentrations at or below established levels,
3. Recommend and/or make operational changes to improve treatment efficiency, and
4. Document operational changes in an updated O&M Manual.

### SITE DESCRIPTION / BACKGROUND

The Luttrell WTP is an interim facility designed to treat leachate from the Luttrell Repository located at the headwaters of the Tenmile and Basin Creek watersheds (**Figures 1 and 2**). The Site is located above the community of Rimini, in Lewis and Clark County near Helena, Montana. The Site is located in the 53-square-mile Upper Tenmile Creek Mining Area (UTCMA) which includes approximately 150 active and abandoned mine land (AML) sites in the historic Rimini Mining District. Mining for gold, lead, copper, and zinc began in the district in the 1870s and continued through the 1930s. Waste rock containing heavy metals was used as fill for roads, yards, and local waterways, resulting in soil and groundwater being contaminated with heavy metals.

From its headwaters, Tenmile Creek flows 28 miles before entering Lake Helena. The upper 13 miles of Tenmile Creek are in the Upper Tenmile Mining Area National Priorities List (NPL) Site. Tenmile Creek originates at the continental divide at an elevation of 7,200 feet above mean sea level (amsl) and declines to 4,380 feet amsl at the northern boundary of the Site near the confluence with Sweeney Creek. Tenmile Creek is a primary source of drinking water for the City of Helena.

From mid-October through late-May, the Site is inaccessible and therefore remains non-operational during these months. Precipitation that falls over the Luttrell repository during these winter months either directly infiltrates or accumulates, melts, and then infiltrates through the repository waste material, eventually draining from the lined catchment underlying the repository into the 750,000 gallon WTP leachate retention pond through one of two leachate pipes, the east leachate pipe (ELP) or the north leachate pipe (NLP). Leachate accumulates in the pond in this way until late-May or early-June, when adequate snowmelt in the area allows for access to the Site and the seasonal start-up routine begins. Detailed information on WTP start-up, routine WTP operation, operator intensive duties, WTP winterization, etc are included in Appendix C: Luttrell Water Treatment Plant Operating Procedures.

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Water draining into the leachate pond can range from pH 3.7 (ELP) to pH 5.3 (NLP), with average WTP Influent pH of 5.2. Contaminants of concern include aluminum, arsenic, cadmium, copper, lead, manganese, and zinc. Flows and metals concentrations from the NLP and ELP vary with the time of year, with lower flows concentrating metals in the leachate during the later, drier parts of the summer. The Luttrell WTP treatment process involves increasing the pH with the addition of caustic soda, creating floc with the addition of a polymer coagulant, promoting sedimentation of the floc by slowing the flow through two clarifiers, neutralizing the pH with the addition of muriatic acid, and finally dispersing the treated effluent using a LAD system. The LAD system uses an array of sprinklers to distribute treated effluent with COC concentrations reduced to specified limits (**Table 1**) as to minimize loading in the soils and promote the natural attenuation of any remaining metals.

Table 1: LAD Discharge Standards		
Constituent	Maximum Concentration (mg/L)	
	LAD South	LAD East
Aluminum	8.42	1.42
Arsenic	1.08	1.09
Cadmium	0.34	0.25
Copper	2.25	2.26
Lead	1.45	1.47
Manganese	54.41	57.20
Zinc	47.80	44.83

Water samples were collected for total metals analysis throughout the operational season to monitor the effluent being discharged to the LAD system and to establish baseline metals concentrations for leachate and influent water. Samples were hand delivered to Energy Laboratories within 24 hours of sample collection. Samples were analyzed for total metals including Upper Tenmile Creek Mining Area contaminants of concern aluminum, arsenic, cadmium, copper, lead, and zinc. LAD effluent samples were collected and analyzed on a weekly basis for the first two months of the operational season to confirm that LAD discharge standards were being met, while leachate and influent samples were collected and analyzed once at the beginning of the operational season. All LAD effluent samples analyzed throughout the operational season (**Table 2**) show metals concentrations considerably lower than the established LAD discharge standards (**Table 1**).

## TREATMENT OVERVIEW

- 2021 Treatment Season: 6/1/2021 – 9/10/2021 (82 operational days)
- Total volume of leachate treated: 1,150,000 gallons
- Average volume of leachate treated per day: 14,000 gallons
- Approximate volume of sludge hauled to Luttrell Repository: 70,000 gallons

## TIMELINE OF WATER TREATMENT PLANT ACTIVITIES

ERRS began remedial activities on June 1<sup>st</sup>, 2021 and plan to have remedial activities completed by September 10<sup>th</sup>, 2021.

The following provides a timeline of remedial activities at the Luttrell WTP:

- June 1<sup>st</sup> – June 13<sup>th</sup>
  - Emergency and Rapid Response Services (ERRS) contractors arrived on-site and began preparing the WTP for operation, which included:
    - General WTP maintenance, including: repairing/replacing damaged piping, pumps, and hoses,

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- Contracting necessary rental and material delivery services,
  - Inspection of LAD system to identify necessary maintenance, and
  - Test overall operation of WTP.
- June 13<sup>th</sup> – June 21<sup>st</sup>
  - ERRS begins daily WTP operation, treating leachate water to optimize caustic, acid, and polymer chemical feed rates, operational run times, and clarifier flush intervals and times.
  - June 15<sup>th</sup>, START arrives on-site and is acquainted with the Site.
  - START takes preliminary samples to determine baseline metals concentrations of leachate/influent water and effectiveness of WTP metals removal.
  - START and ERRS conduct hourly monitoring of treatment processes (pH, flow rate, chemical feed rates) at multiple points throughout the treatment train.
  - START and ERRS conduct daily monitoring of field parameters (pH, temperature, specific conductivity, turbidity, dissolved oxygen, and oxidation reduction potential) of influent, effluent, north leachate pipe (NLP), and east leachate pipe (ELP).
  - ERRS continues maintenance on non-functional equipment.
  - ERRS begins installation of solar array and new pH sensors.
  - Water samples taken include:
    - LAD Effluent (6/15/2021, 6/16/2021, 6/18/2021, 6/21/2021)
    - NLP (6/18/2021)
    - ELP (6/18/2021)
    - Influent (6/18/2021)
- June 22<sup>nd</sup> – June 27<sup>th</sup>
  - START and ERRS continue daily WTP operation, monitoring, and optimization.
  - ERRS begins to design and test sludge reduction system.
  - START begins field-testing colorimetric zinc test kit.
  - Water samples taken include:
    - LAD Effluent (6/25/2021)
    - Influent (6/25/2021)
- June 28<sup>th</sup> – July 4<sup>th</sup>
  - START and ERRS continue daily WTP operation, monitoring, and optimization.
  - ERRS continues to run and optimize sludge reduction system.
  - ERRS makes safety improvements to WTP facility, including:
    - Mounting eyewash stations
    - Mounting fire extinguishers
    - Mounting a chemical spill kit
    - Installation of handrail and platform at the top of the flash mix tank
  - Water samples taken:
    - LAD Effluent (6/28/2021)
- July 5<sup>th</sup> – July 11<sup>th</sup>
  - START and ERRS continue daily WTP operation, monitoring, and optimization.
  - ERRS continues to run sludge reduction system
  - WTP shutdown July 10<sup>th</sup> and 11<sup>th</sup>
  - Water samples taken:
    - LAD Effluent (7/5/2021)
- July 12<sup>th</sup> – July 18<sup>th</sup>
  - START and ERRS continue daily WTP operation, monitoring, and optimization.
  - START and ERRS continue to run sludge reduction system
  - Water samples taken:
    - LAD Effluent (7/13/2021)

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- July 19<sup>th</sup> – July 30<sup>th</sup>
  - ERRS continues daily WTP operation, monitoring, and optimization.
  - ERRS continues to run sludge reduction system
- August 1<sup>st</sup> – August 10<sup>th</sup>
  - WTP Shutdown
- August 10<sup>th</sup> – August 29<sup>th</sup>
  - ERRS continues daily WTP operation, monitoring, and optimization.
  - ERRS continues to run sludge reduction system
  - ERRS continues general upgrades and plant maintenance, including:
    - LAD system pipe network and sprinklers
    - Sludge reduction system
  - ERRS contracts vacuum truck to remove remaining sludge from leachate pond.
  - Pond fully emptied, WTP winterized.
- Work to be completed in September 2021
  - START will install a pressure transducer and data logger in the leachate collection to enable for real-time monitoring of pond water levels.

## SUMMARY

Work began at the Luttrell Leachate WTP on June 1<sup>st</sup>, 2021 and will end on September 10, 2021, totaling 101 days (82 operational days) to treat approximately 1,150,000 gallons at an average of 14,000 gallons per operational day. In total, approximately 70,000 gallons of sludge was removed from the leachate pond through the sludge reduction system and subsequently hauled to the Luttrell Repository. In addition to the treating the entire volume of leachate, the following major activities were completed over the course of the 2021 operational season:

- Restoration of basic WTP plant functionality, including repair/replacement of pipes, valves, hoses, transfer pumps, and chemical feed pumps within the WTP building.
- Restoration of LAD system functionality, including repair/replacement of pipes, valves, and sprinklers throughout entirety of LAD distribution network.
- Confirmed WTP component redundancy by ensuring back-ups are working and available for all major failure points in the WTP system.
- Designed and built a sludge reduction system to reduce sediment loading on the treatment system and reintroduction of sediment to the leachate pond.
- Optimized WTP operation and generated an up-to-date O&M Manual reflecting necessary changes that were made.
- Inventory of all major WTP components, supplemental equipment, rentals, and required services.
- Ensured that all safety equipment is accessible, up-to-date, and redundant throughout the WTP facility.
- Winterization of all equipment, tanks, pumps, and pipes/lines for seasonal WTP shutdown.

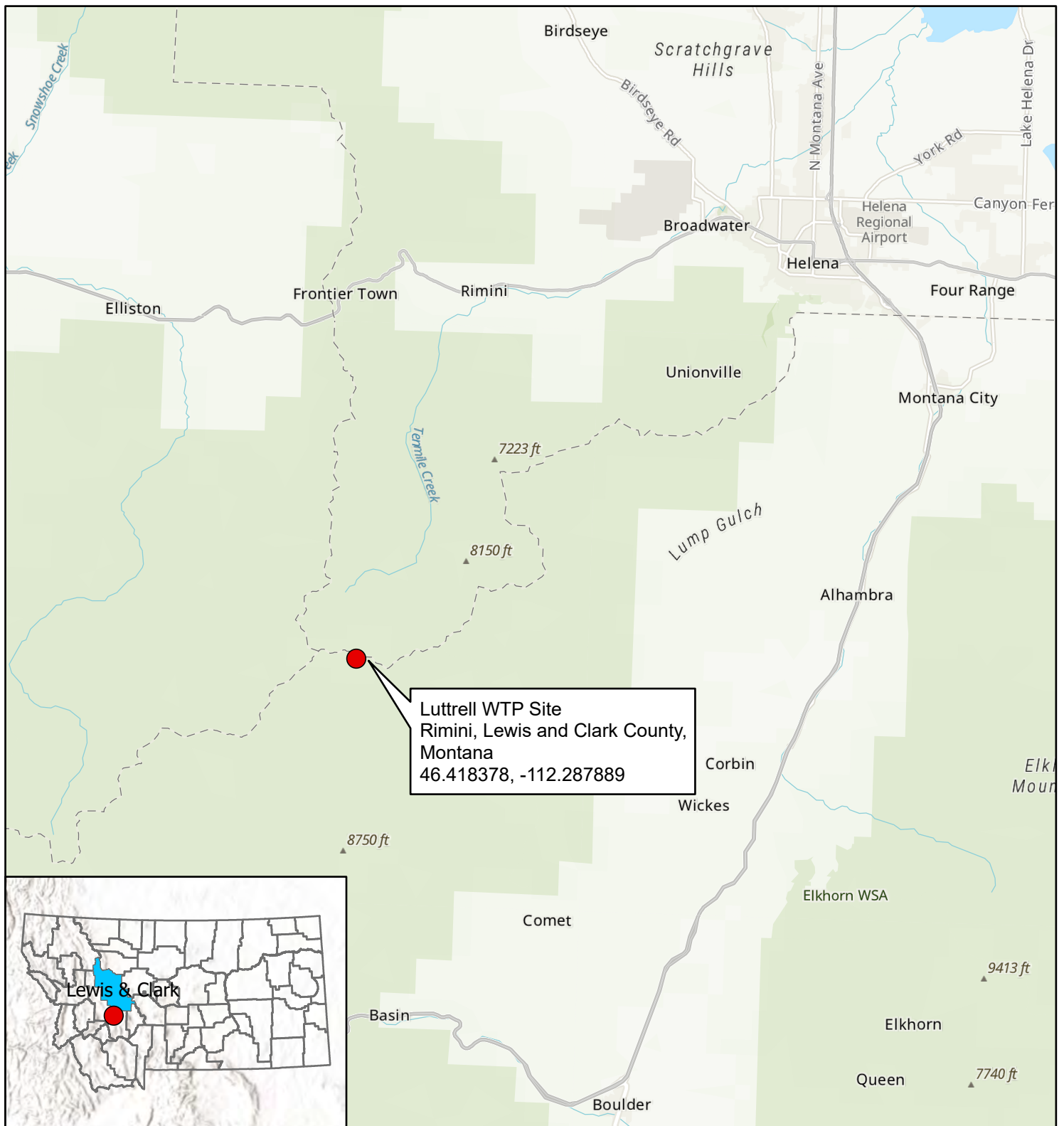
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## **REFERENCES**

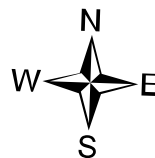
CDM Smith (CDM). Luttrell Water Treatment Plant Operating Procedures.

U.S. Environmental Protection Agency. 2002. Record of Decision: Upper Tenmile Creek Mining Area. June 28<sup>th</sup>, 2002.

**FIGURES**



 Luttrell Water Treatment Plant Site



0 1.3 2.5 5 7.5 Miles

Spatial Reference  
Name: NAD 1983 CORS96 StatePlane Montana FIPS  
2500 Ft Intl  
Datum: NAD 1983 CORS96  
Projection: Lambert Conformal Conic



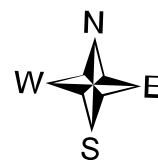
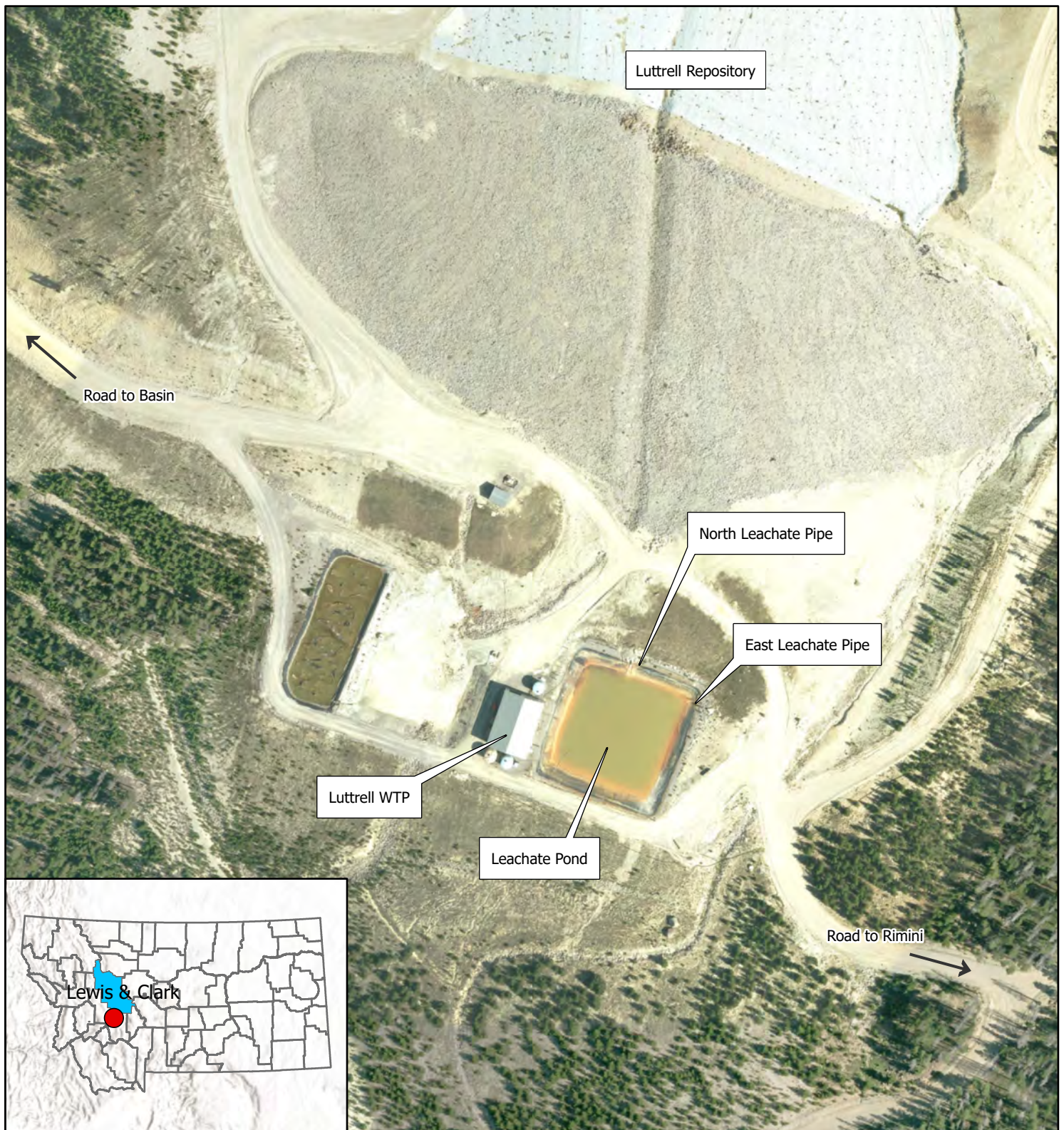
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**TETRA TECH** Date: 9/3/2021  
Analyst: KWP

**FIGURE 1**  
**Site Location Map**  
**Luttrell WTP Site**  
**TD No: 2071-2106-08**

City: Rimini County: Lewis & Clark State: Montana



0 0 0 0 0 Miles

**FIGURE 2**  
**Site Features Map**  
**Luttrell WTP Site**  
**TD No: 2071-2106-08**

City: Rimini County: Lewis & Clark State: Montana

Spatial Reference  
 Name: NAD 1983 CORS96 StatePlane Montana FIPS  
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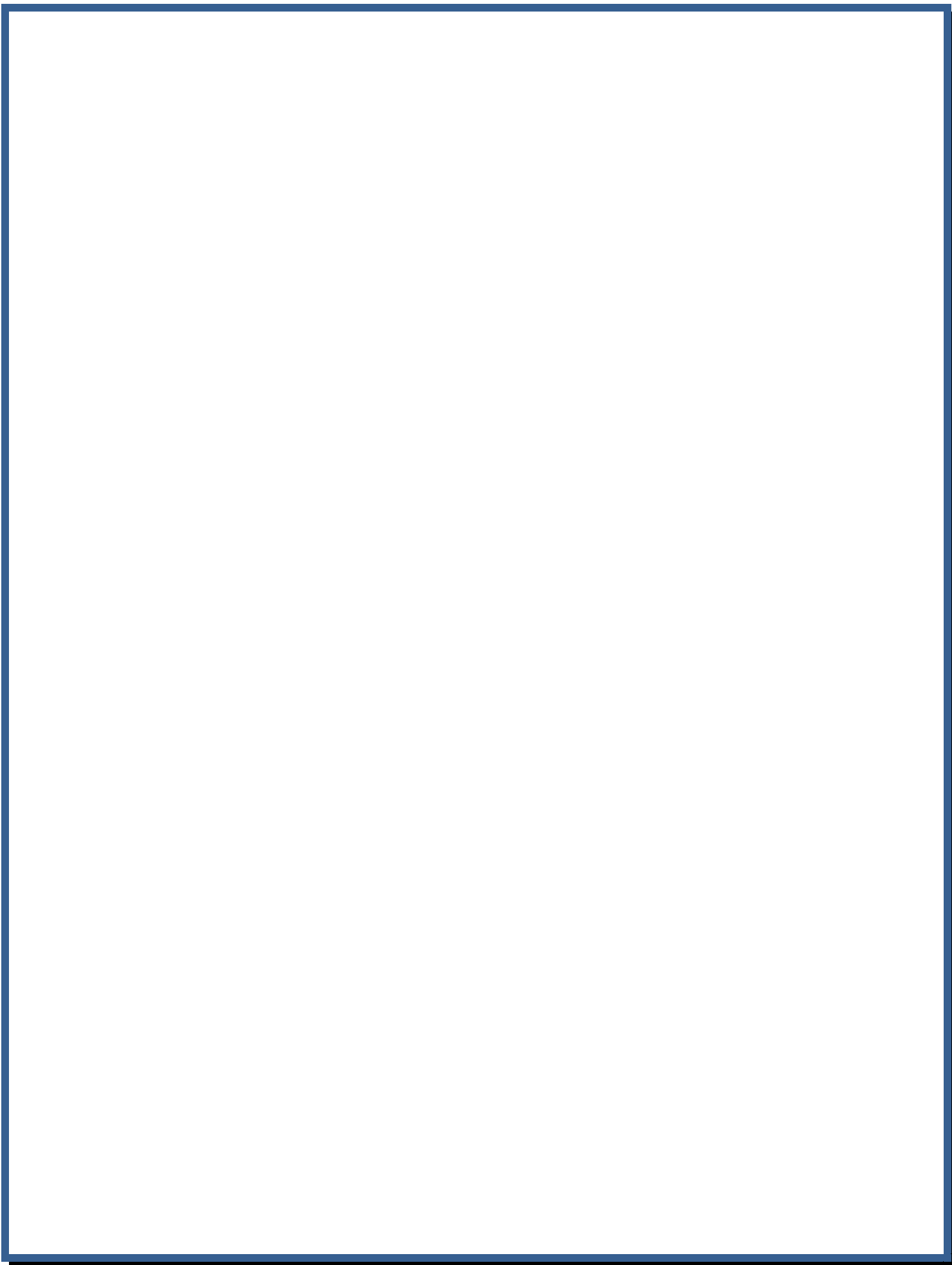
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 Analyst: KWP

## **APPENDIX A**

### **HEALTH AND SAFETY PLAN**



## **APPENDIX B**

### **LUTTRELL WATER TREATMENT PLANT OPERATING PROCEDURES**

**APPENDIX C**  
**INVENTORY OF WTP EQUIPMENT AND SERVICES**