MINDY MILL PRELIMINARY ASSESSMENT/SITE INVESTIGATION (PA/SI)

Revive & Restore Remediation:

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CENE 476C

December 5, 2025

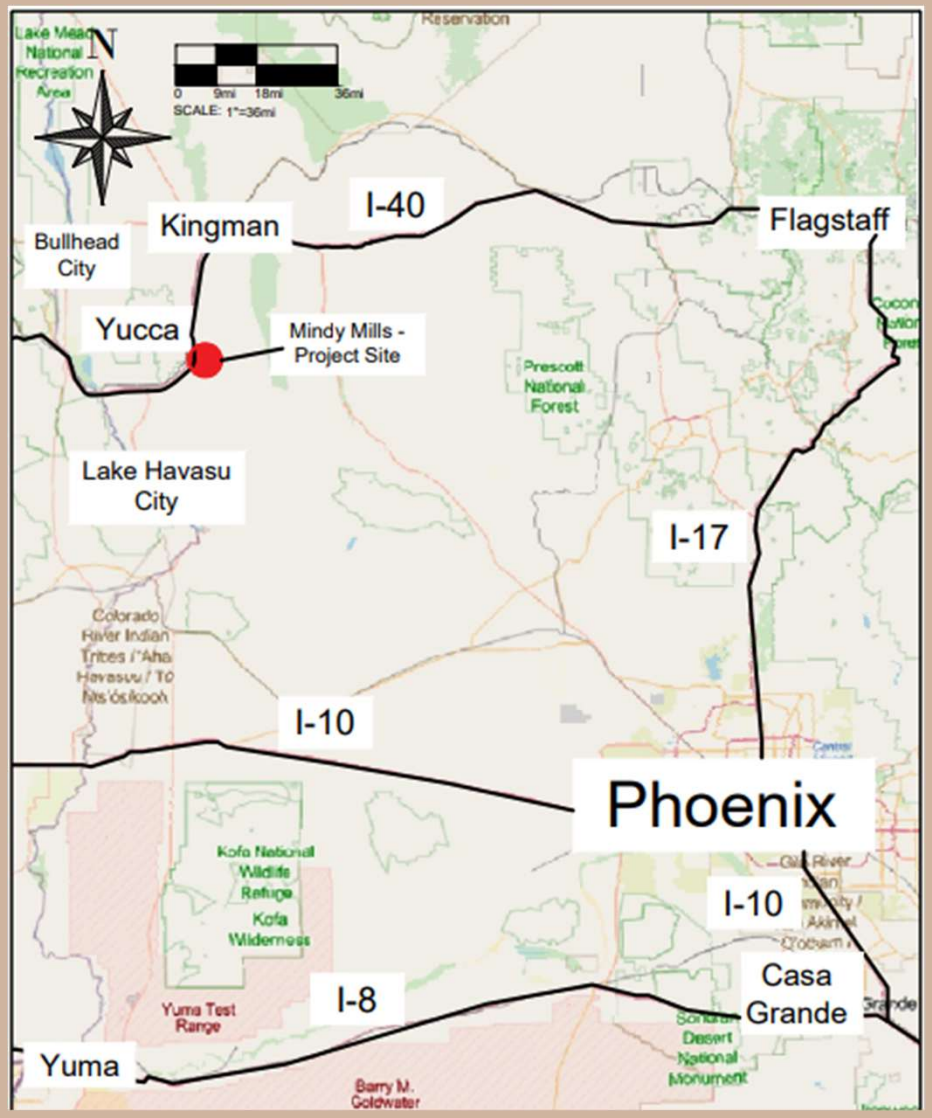


Figure 1: Location Map

MINDY MILL

Location:

- Yucca Arizona:
  - Latitude: 34°49'15" N
  - Longitude: 114°7'6" W

Background:

- Operation:
  - Began October 1st, 1984
  - Ended August 16th, 1985
- Silver Mill
- Crushing and Flotation Milling Process

PA/SI

Purpose:

- Surveying the Contaminants of Concern (COCs)
- Evaluating the associated risks to human and ecological health
- Ensure compliance with *EPA and **CERCLA guidelines
- Recommend remedial action if needed
- Waste-Resource Recovery

Client: Eric Zielske, Bureau of Land Management (BLM)

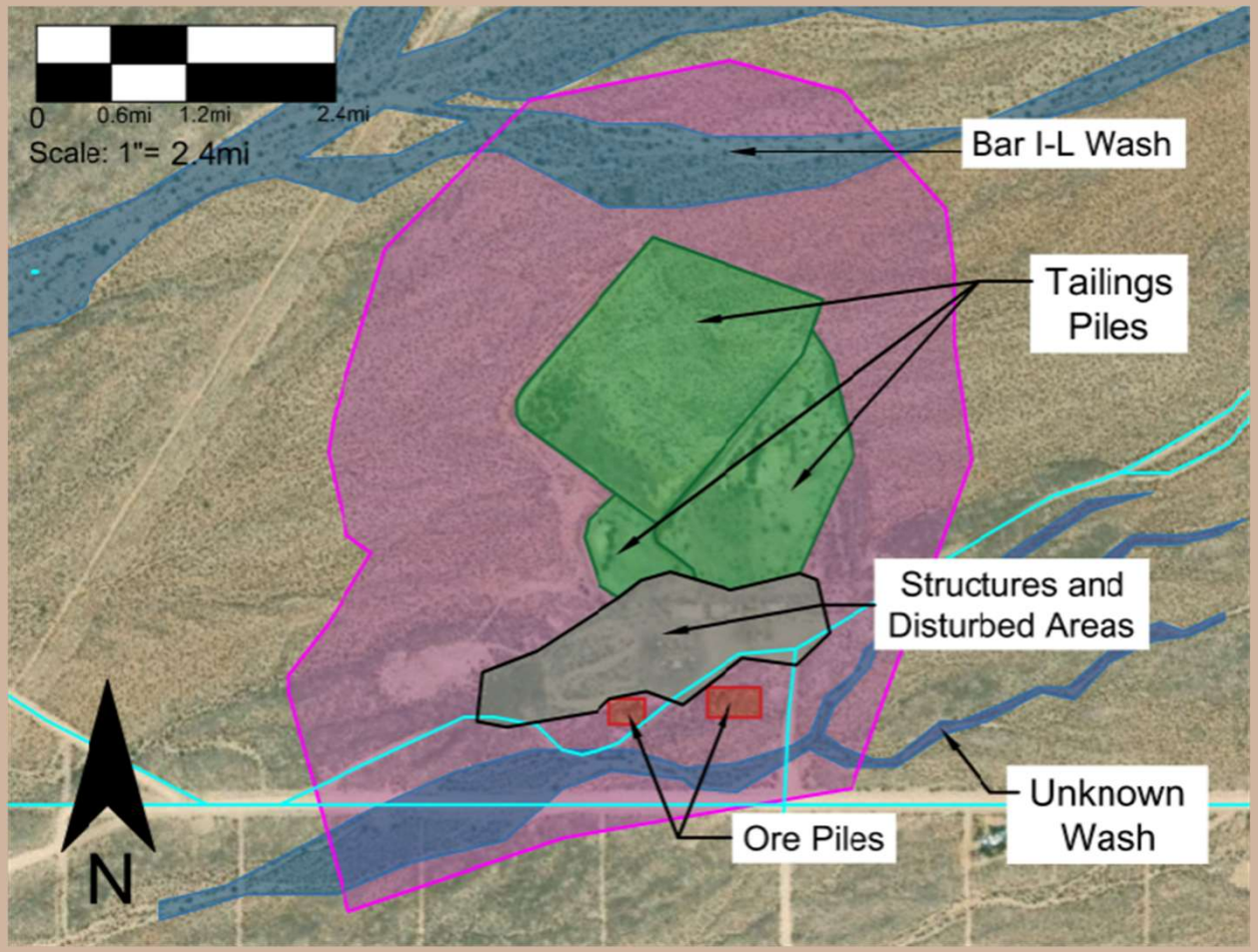


Figure 2: Site Close-up Map

*Environmental Protection Agency
**Comprehensive Environmental Response, Compensation, and Liability Act

TASK 1.0 PROJECT WORK PLAN

Preparation of an integrated plan with goals, quality assurance and quality control (QA/QC) procedures, schedule, reference to regulatory guidelines, and field procedures.

Task 1.1: Health and Safety Plan (HASP)

Task 1.2: Sampling and Analysis Plan(SAP)

Task 1.3: Lab Binder

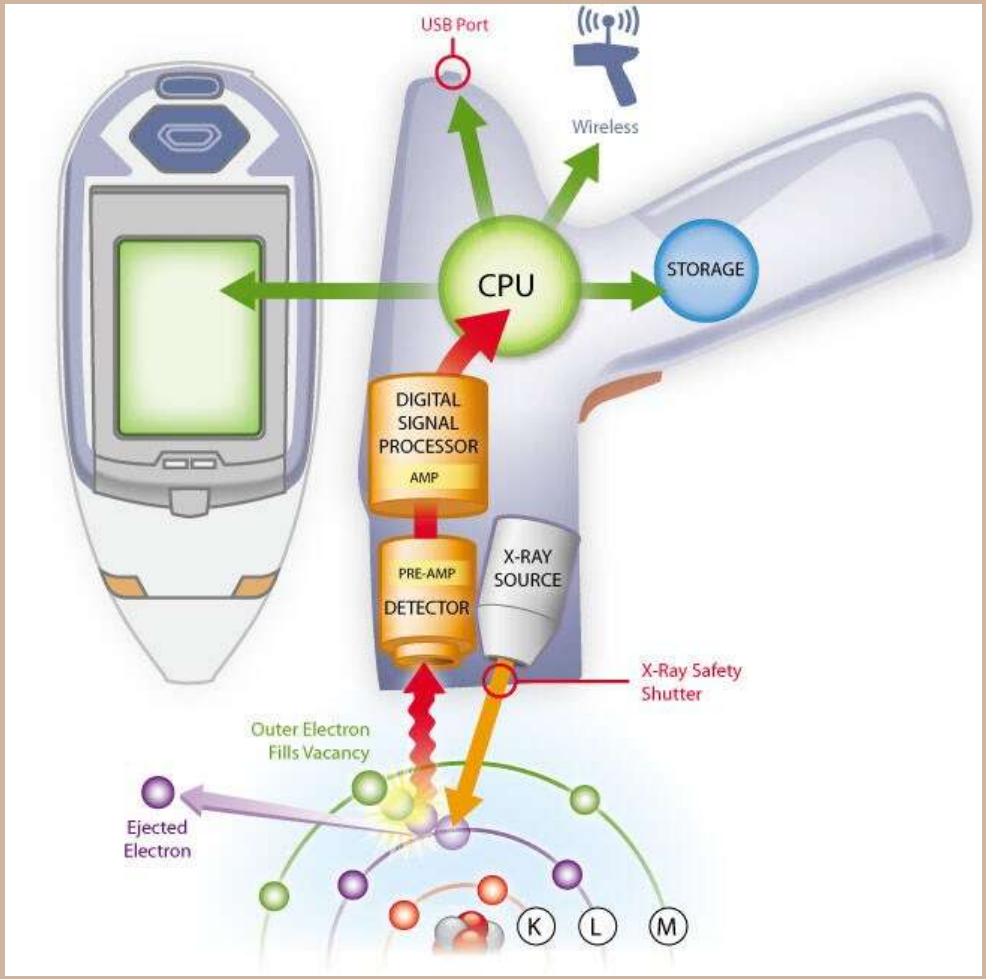


Figure 3: XRF Graphic [1], Thermo Fisher Scientific

TASK 2.0
SITE ACTIVITIES

- Conduct scheduled Site Investigation (SI)
  - Document existing conditions
  - Survey local flora and fauna
  - In-Situ X-Ray Fluorescence (XRF)
  - Collect and prepare soil samples for Ex-Situ XRF
- Prepare backup dates for any weather-related delays

TASK 3.0 LABORATORY ANALYSIS

Prepare and analyze samples to decide contaminant levels.

Task 3.1: Moisture Content and Sieving

Task 3.2: XRF Screening

- **Task 3.2.1: Sample Preparation for XRF**
- **Task 3.2.2: Sample Analysis by XRF**

Task 3.3: Inductively Conductive Plasma (ICP) Verification

- **Task 3.3.1: Sample Preparation and Shipment**
- **Task 3.3.2: XRF & ICP Correlation**

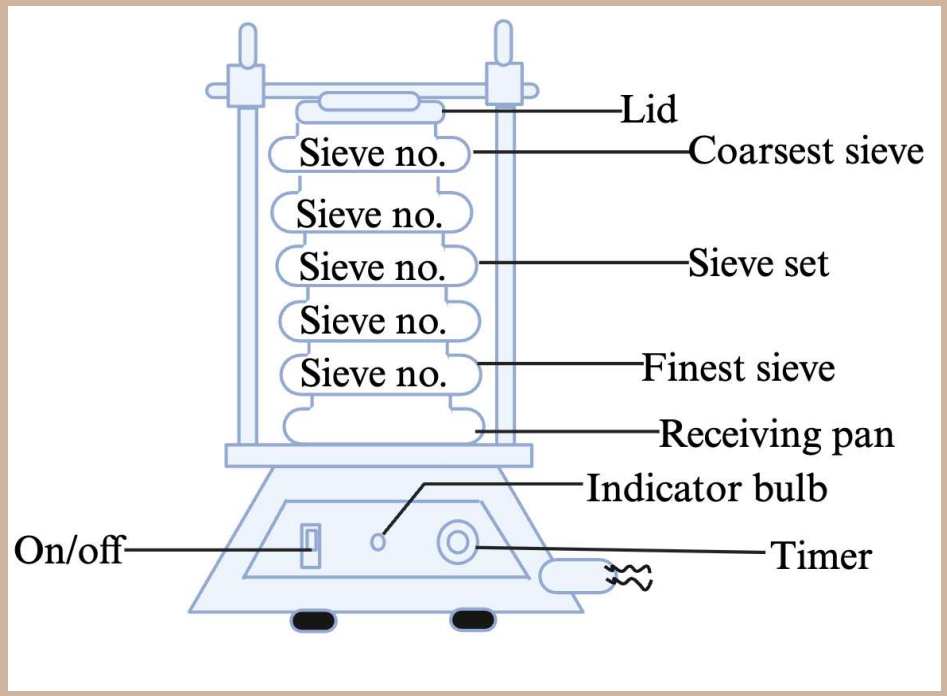


Figure 4: Sieving Graphic [2], BioRender

TASK 4.0
DATA ANALYSIS

Process and interpret analytical data.

Task 4.1: Identification of Human Health (HH) CoCs

Task 4.2: Identification of Ecological (ECO) CoCs

Task 4.3: QA/QC Data Analysis

Task 4.4: Contaminant of Concern (CoC) Mapping

TASK 5.0
CONTAMINATION MIGRATION PATHWAYS

- Map contaminant distributions
- Show migration routes
- Build a Site Conceptual Model (SCM)

TASK 6.0
RISK ASSESSMENT - HUMAN HEALTH

Use EPA IRIS data to assess carcinogenic and non-carcinogenic risks and apply *ALM and **IEUBK models for lead exposure.

Task 6.1: HH COCs Exposure Point Concentrations (EPCS)

Task 6.2: Toxicology Assessment

Task 6.3: Exposure Assessment

Task 6.4: Risk Characterization

TASK 7.0
RISK ASSESSMENT - ECOLOGICAL

Identify which species are at risk, describe habitats, and qualitatively assess ecological impacts and any uncertainties.

Task 7.1: Species and Habitat Evaluation

Task 7.2: Comparison of ECO COCs to ECO Risk Levels

Task 7.3: Qualitative Assessment of ECO Risk

*Adult Lead Model
**Integrated Exposure Uptake Biokinetic

TASK 8.0 REMEDIAL ACTION

Develop and Evaluate Cleanup Options.

Task 8.1: Development of Remedial Action Objectives (RAOs)

Task 8.2: Remedial Alternatives

Task 8.3: Selection of Preferred Alternative

TASK 9.0 ECONOMIC AND RESOURCE RECOVERY ASSESSMENT

- Waste Evaluation for recovery
- Estimate quantities of potentially recoverable minerals

TASK 10.0
PROJECT IMPACTS

- Positive and negative impacts of project findings and remedial options.

TASK 11.0
PROJECT DELIVERABLES

Task 11.1: 30%: Task 1-3, Site Investigation

Task 11.2: 60%: Task *4-7, Interpretation and COCs Mapping

Task 11.3: 90% & Website: Task **7-10; Data Analysis, Alternatives, Waste Resource Recovery, Project Impacts

Task 11.4: Final Report, Presentation & Website

*Exclusion of Task 6.3 & 6.4
**Including Task 6.3 and 6.4

TASK 12.0 PROJECT MANAGEMENT

Task 12.1: Meetings and Communication

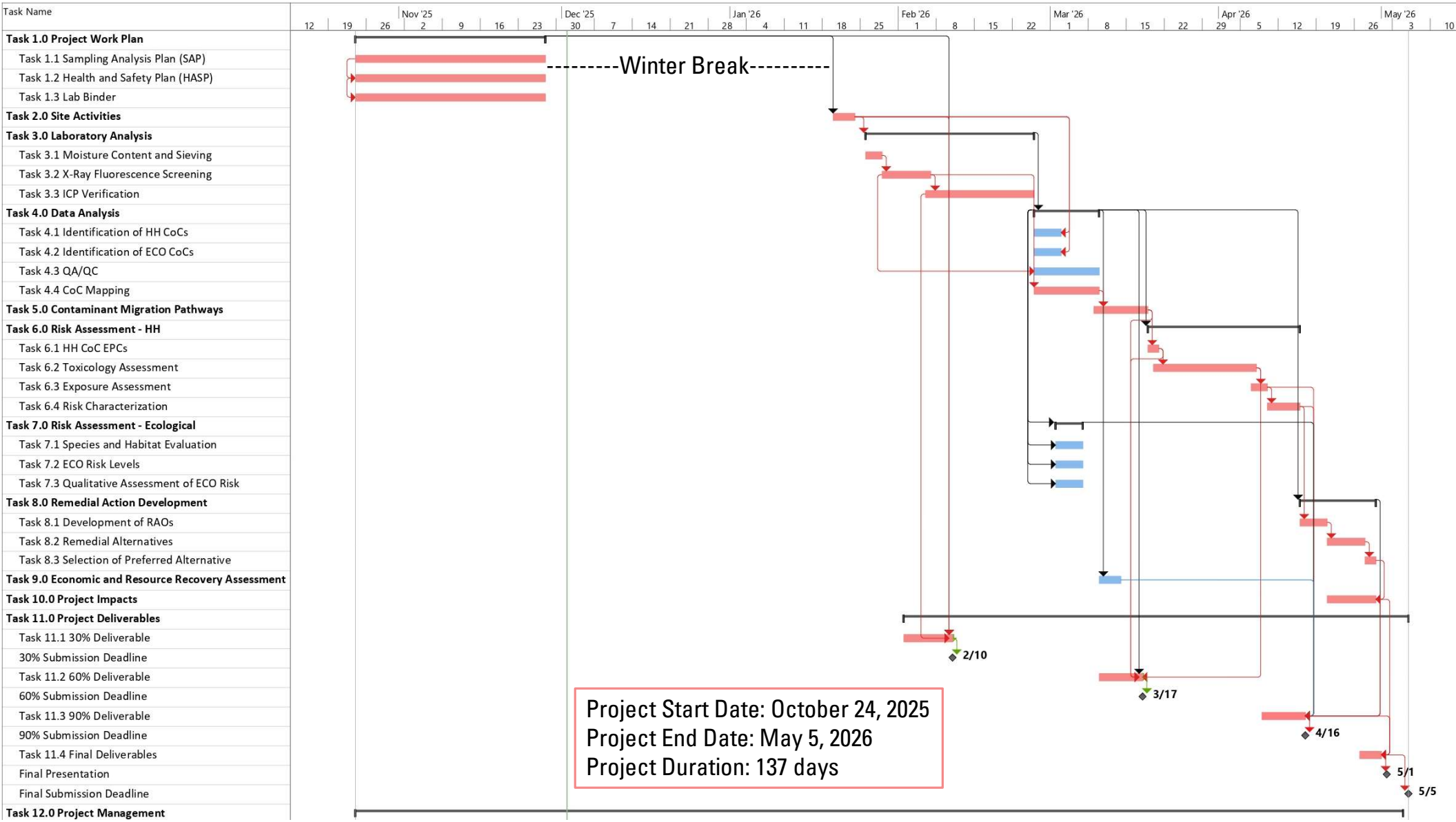
Task 12.2: Schedule Management

Task 12.3: Resource Management

EXCLUSIONS

Air and water sampling will not be conducted.

No full-scale remediation design or construction will be implemented.


Task Name
Nov '25
Dec '25
Jan '26
Feb '26
Mar '26
Apr '26
May '26
Task 1.0 Project Work Plan
Task 1.1 Sampling Analysis Plan (SAP)
Task 1.2 Health and Safety Plan (HASP)
Task 1.3 Lab Binder
Task 2.0 Site Activities
Task 3.0 Laboratory Analysis
Task 3.1 Moisture Content and Sieving
Task 3.2 X-Ray Fluorescence Screening
Task 3.3 ICP Verification
Task 4.0 Data Analysis
Task 4.1 Identification of HH CoCs
Task 4.2 Identification of ECO CoCs
Task 4.3 QA/QC
Task 4.4 CoC Mapping
Task 5.0 Contaminant Migration Pathways
Task 6.0 Risk Assessment - HH
Task 6.1 HH CoC EPCs
Task 6.2 Toxicology Assessment
Task 6.3 Exposure Assessment
Task 6.4 Risk Characterization
Task 7.0 Risk Assessment - Ecological
Task 7.1 Species and Habitat Evaluation
Task 7.2 ECO Risk Levels
Task 7.3 Qualitative Assessment of ECO Risk
Task 8.0 Remedial Action Development
Task 8.1 Development of RAOs
Task 8.2 Remedial Alternatives
Task 8.3 Selection of Preferred Alternative
Task 9.0 Economic and Resource Recovery Assessment
Task 10.0 Project Impacts
Task 11.0 Project Deliverables
Task 11.1 30% Deliverable
30% Submission Deadline
Task 11.2 60% Deliverable
60% Submission Deadline
Task 11.3 90% Deliverable
90% Submission Deadline
Task 11.4 Final Deliverables
Final Presentation
Final Submission Deadline
Task 12.0 Project Management
---------Winter Break----------
2/10
3/17
4/16
5/1
5/5
Project Start Date: October 24, 2025
Project End Date: May 5, 2026
Project Duration: 137 days

STAFFING

Senior Engineer (SENG):

- Master's Degree in Environmental Engineering (EnvE)
- Registered Professional Engineer (PE)
- 10 years of experience

Engineer (ENG):

- Bachelor's Degree in EnvE
- Passed Fundamentals Engineering exam for EnvE
- Field Experience with related projects

Lab Technician (TECH):

- Proper certifications
- Trained in lab safety
- Trained in lab equipment and lab procedures

Engineering Intern (INT):

- Current EnvE Sophomore
- ABET accredited university
- GPA of 3.0

STAFFING PLAN

Table 1: Staffing Plan Hours (h)

Task	SENG (h)	ENG (h)	TECH (h)	INT (h)	Task Total (h)
Task 1.0: Project Work Plan	10	35	9	10	**64**
Task 2.0: Site Activities	20	20	20	20	**80**
Task 3.0: Laboratory Analysis	2	10	85	67	**164**
Task 4.0: Data Analysis	10	25	5	13	**53**
Task 5.0: Contaminant Migration Pathways	0	20	0	10	**30**
Task 6.0: Risk Assessment - Human Health	7	37	0	19	**63**
Task 7.0: Risk Assessment - Ecological	5	36	0	18	**59**
Task 8.0: Remedial Action Development	6	15	0	8	**29**
Task 9.0: Economic and Resource Recovery Assessment	2	5	0	3	**10**
Task 10.0: Project Impacts	1	3	0	1	**5**
Task 11.0: Project Deliverables	18	32	0	16	**66**
Task 12.0: Project Management	14	9	5	7	**35**
Subtotal Hours	95	247	124	192	
Total Hours	658				

*Staffing Plan Hours do not include sub or sub-sub-task for conformity with presentation formatting

COST OF ENGINEERING SERVICES

Table 2: Cost of Project Services, Supplies Magnified

Summary Cost of Project					
	Classification	Quantity	Rate	Unit	Cost ($)
Supplies (Magnified)	Ziploc Gallon Freezer Bags, 200ct	1	17	$/pack	17
	Trowel	12	5	$/trowel	60
	Dish Soap	1	5	$/Dish Soap	5
	Marking Flags, 50ct	2	8	$/pack	16
	5-Gallon Buckets with Lids	4	8	$/bucket	32
	Large Bins	4	12	$/bin	48
	Water, Gallon	10	2	$/gallon	20
	Paper Towels, 2 pack	1	5	$/pack	5
	Sharpie Pens, 5 pack	2	5	$/pack	10
	Field Logbooks	4	8	$/notebook	32
	Gloves, 1000ct	1	45	$/pack	45
	Trash Bags, 30 Gallon, 50ct	1	11	$/pack	11
	Clip Board, 2ct	2	8	$/pack	16
	Scrub Brushes, 4ct	1	17	$/pack	17
	Total Supplies				334

COST OF ENGINEERING SERVICES

Table 3.A: Cost of Project, Supplies Collapsed

Summary Cost of Project					
Subsection	Classification	Hours	Rate	Unit	Cost ($)
Personnel	Senior Engineer	95	325	$/hour	30,875
	Engineer	247	182	$/hour	44,954
	Lab Technician	124	65	$/hour	8,060
	Intern	192	33	$/hour	6,336
	Total Personnel				90,225
Travel	Classification	Quantity	Rate	Unit	Cost ($)
	NAU Mileage Rate (1 round trip)	391	0.67	$/mile	262
	Rental: NAU Large 4WD SUV	2	56	$/day	112
	Hotel 1 Night; 4 rooms	4	100	$/night	400
	PerDiem; 5 Persons, 2 days	10	30	$/day-person	300
	Total Travel				1,074

Table 3.B: Cost of Project, Supplies Collapsed; Continued

Summary Cost of Project					
Subsection	Classification				Cost ($)
Supplies (Collapsed)	Total Supplies				334
Analysis	Classification	Quantity	Rate	Unit	Cost ($)
	Rental: NAU XRF Device	10	300	$/day	3,000
	Rental: NAU Soils Lab	20	100	$/day	2,000
	Rental: NAU Survey GPS	2	100	$/day	200
	Total Analysis				5,000
Subcontract	Western Technologies Inc.	10	140	$/sample	1,400
Total Cost					98,033

THANK YOU

Any Questions?