



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

## **Revive & Restore Remediation:**

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**CENE 476C**

**December 5, 2025**

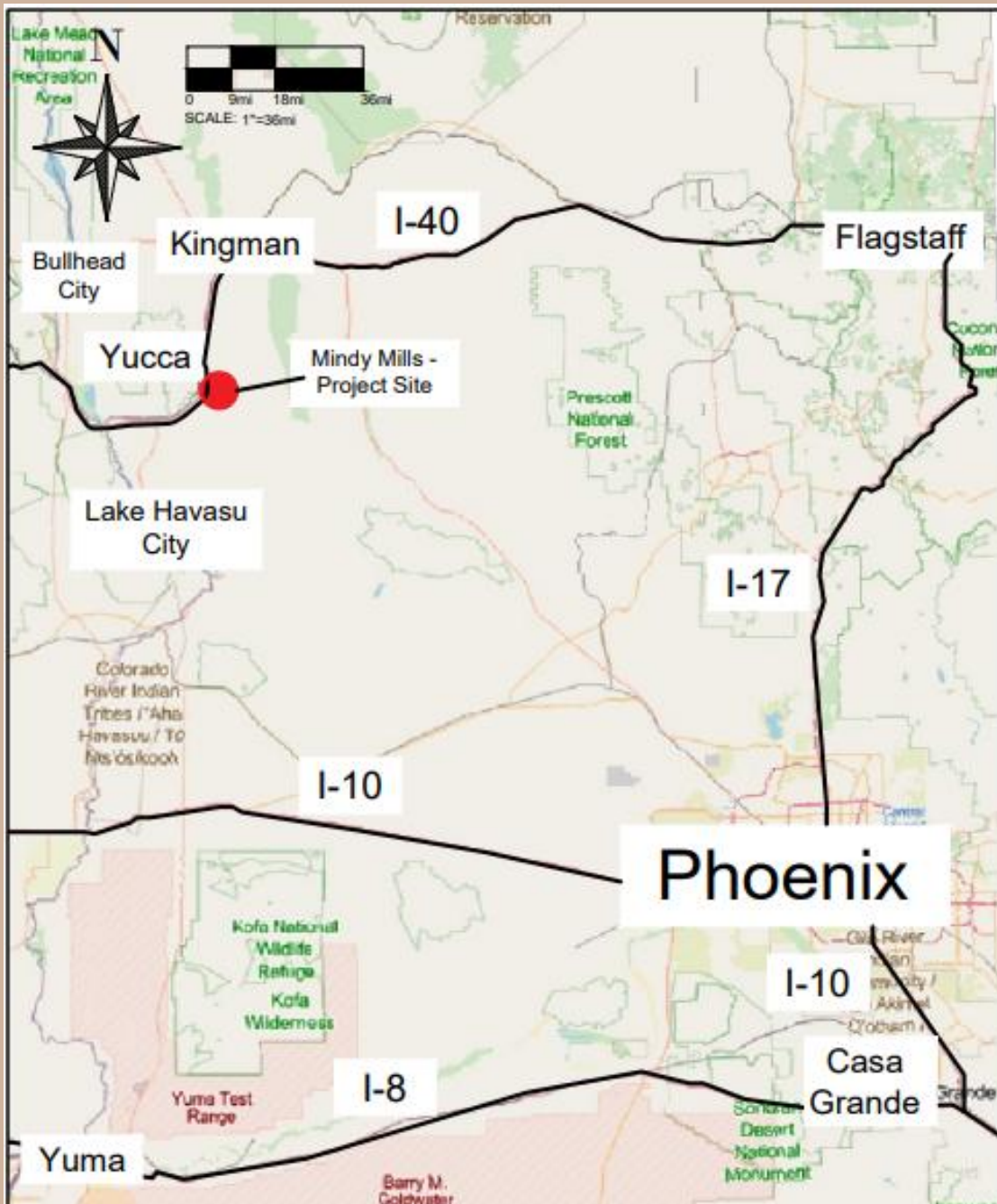


Figure 1: Location Map

# 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)

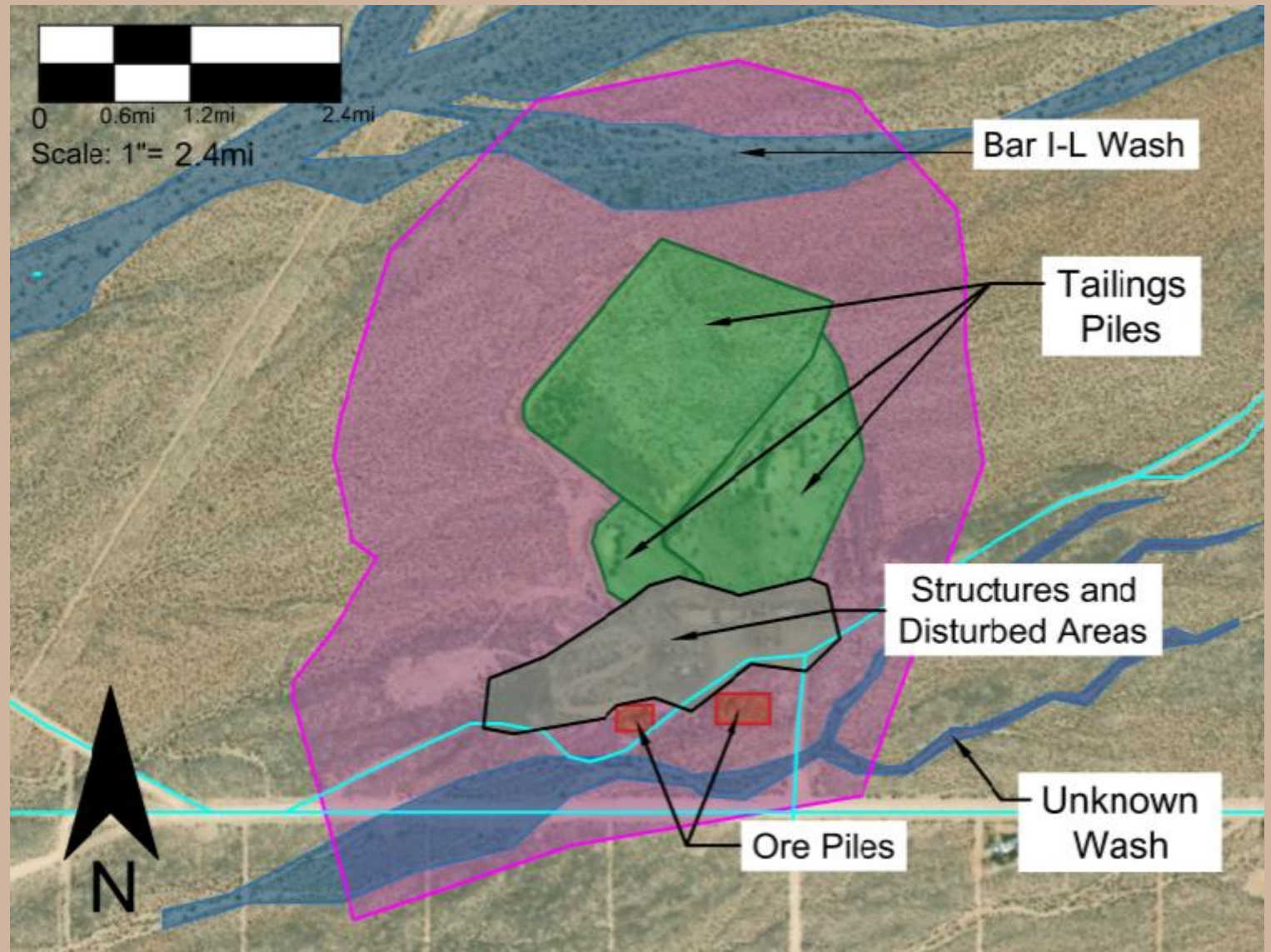


Figure 2: Site Close-up Map

\*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.

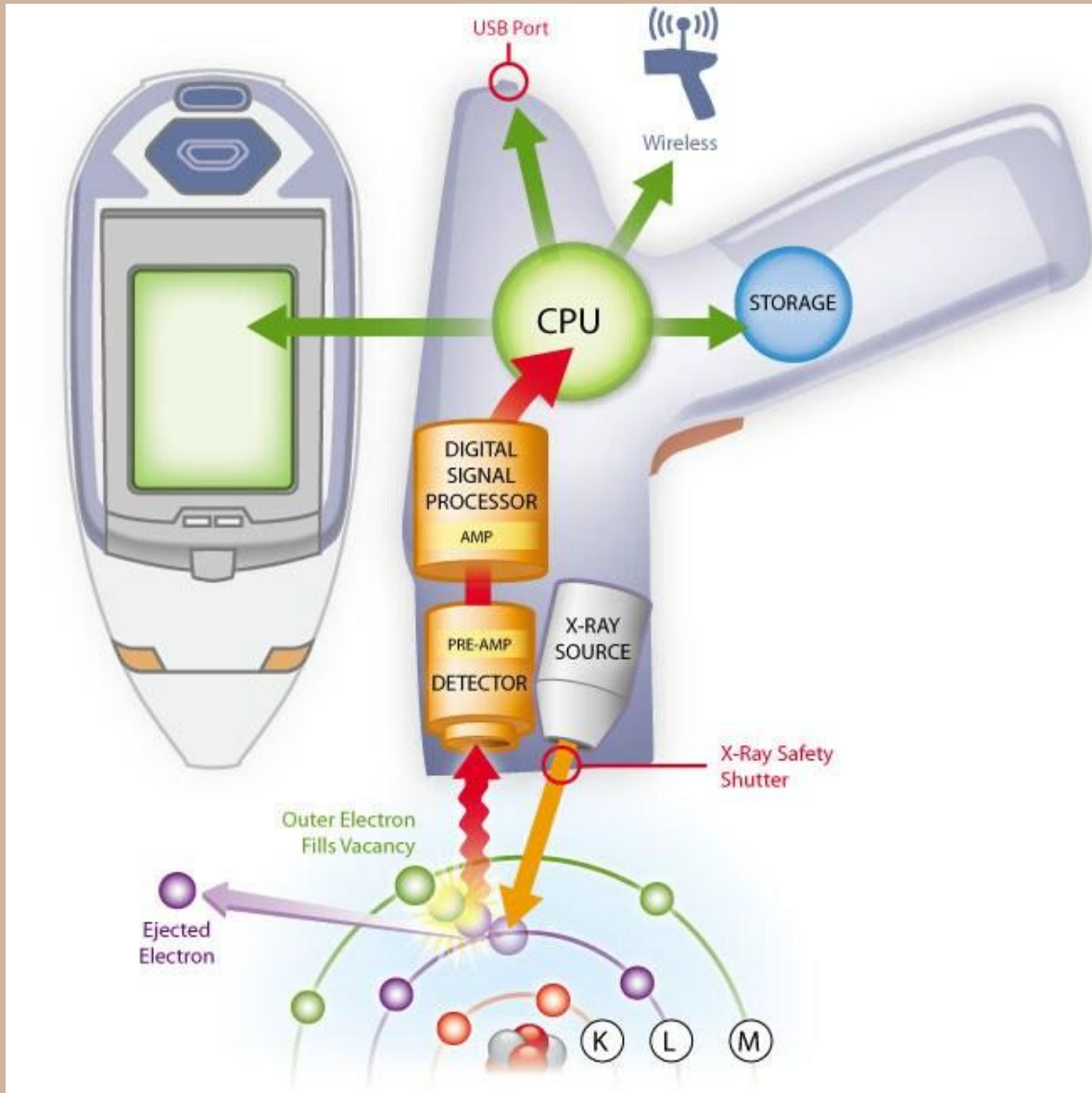
**Task 1.1: Health and Safety Plan (HASP)**

**Task 1.2: Sampling and Analysis Plan(SAP)**

**Task 1.3: Lab Binder**

# 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

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

# 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

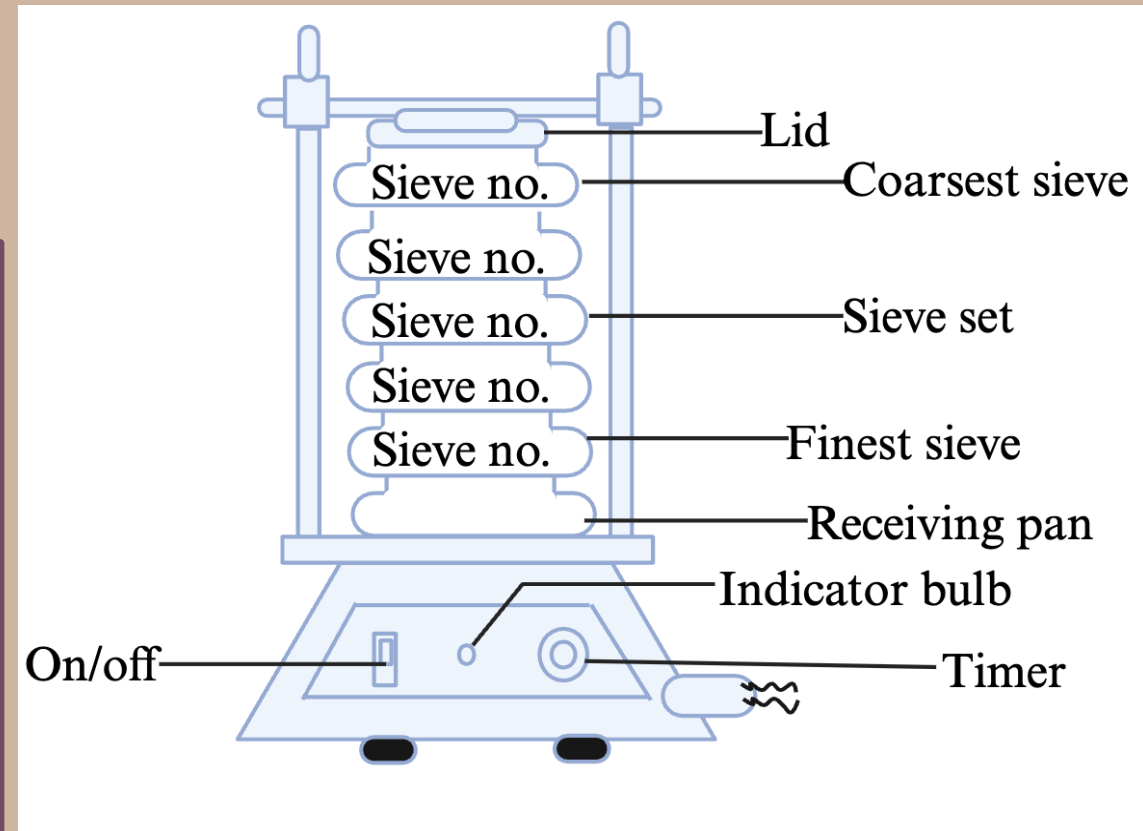


Figure 4: Sieving Graphic [2], BioRender

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## 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)

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## 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**

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\*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

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## 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

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\*Exclusion of Task 6.3 & 6.4

\*\*Including Task 6.3 and 6.4



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## TASK 12.0 PROJECT MANAGEMENT

**Task 12.1: Meetings and Communication**

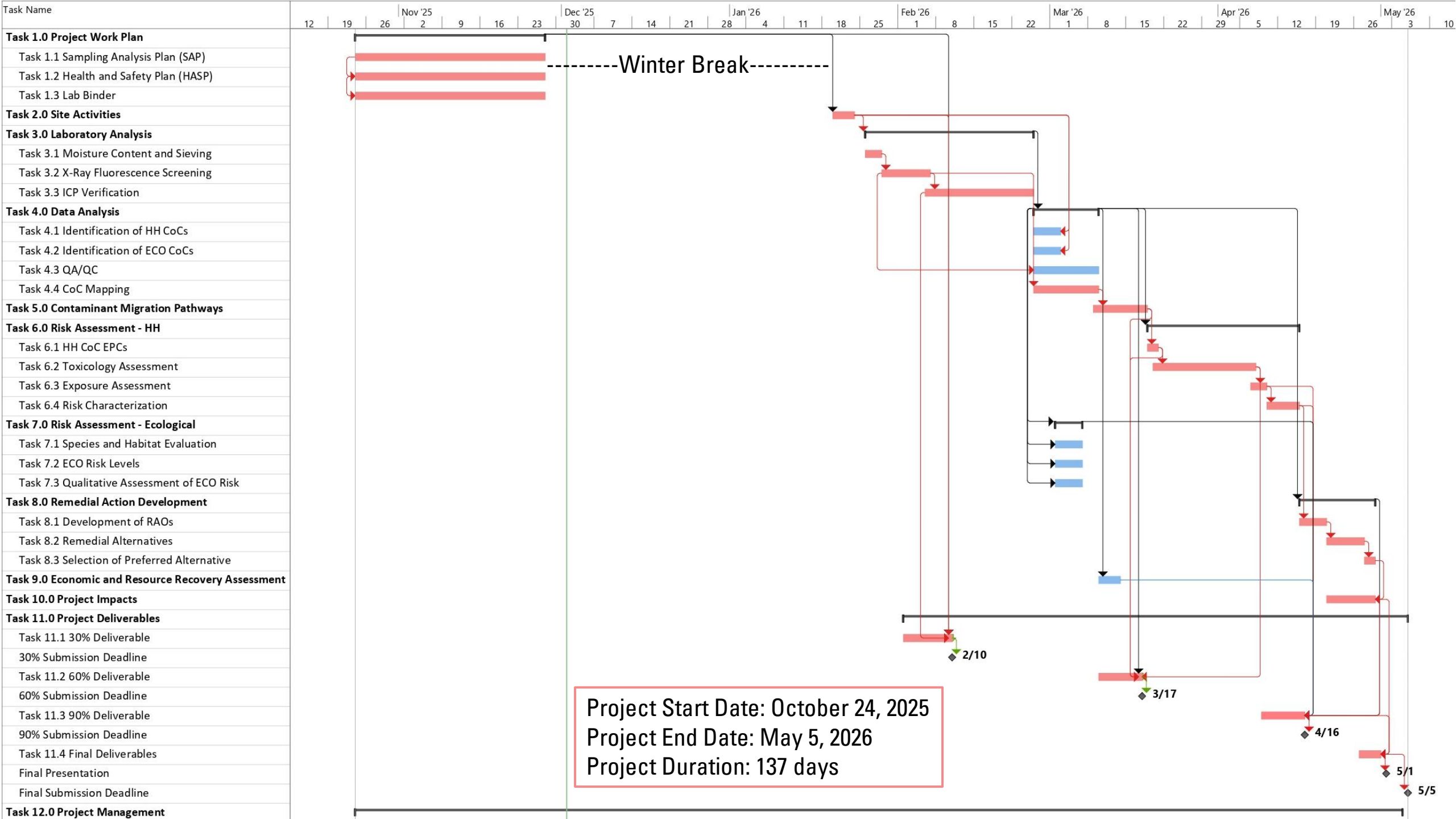
**Task 12.2: Schedule Management**

**Task 12.3: Resource Management**

## EXCLUSIONS

Air and water sampling will not be conducted.

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



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# 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	<b>64</b>
Task 2.0: Site Activities	20	20	20	20	<b>80</b>
Task 3.0: Laboratory Analysis	2	10	85	67	<b>164</b>
Task 4.0: Data Analysis	10	25	5	13	<b>53</b>
Task 5.0: Contaminant Migration Pathways	0	20	0	10	<b>30</b>
Task 6.0: Risk Assessment - Human Health	7	37	0	19	<b>63</b>
Task 7.0: Risk Assessment - Ecological	5	36	0	18	<b>59</b>
Task 8.0: Remedial Action Development	6	15	0	8	<b>29</b>
Task 9.0: Economic and Resource Recovery Assessment	2	5	0	3	<b>10</b>
Task 10.0: Project Impacts	1	3	0	1	<b>5</b>
Task 11.0: Project Deliverables	18	32	0	16	<b>66</b>
Task 12.0: Project Management	14	9	5	7	<b>35</b>
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					
Supplies (Magnified)	Classification	Quantity	Rate	Unit	Cost (\$)
	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



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THANK YOU

Any Questions?