

# FACT SHEET

## 2023 Phosphate Resource Area

June 2023



Southeast Idaho Phosphate Resource Area booth at the 2022 Caribou County Fair in Grace, Idaho



Many people are unaware that the area east of Soda Springs, Idaho is one of the country's major phosphate producing regions. Phosphate mining has been an important industry in this area since the early 20th century. In 2022, phosphate mining and manufacturing directly contributed an estimated 1,439 industry jobs, \$162 million in payroll and benefits, and approximately \$714 million to the gross state product. Mining royalties and taxes continue to provide millions in revenue to the State of Idaho, which funds education and other local programs.\*

Approximately 250 million years ago, this area was a shallow sea where the sudden death of tiny organisms created the presence of phosphate ore. Severe folding and thrusting of the rock layers exposed outcrops of the

Phosphoria Formation along area ridges and valleys, which have been mined mainly by open pit mining techniques for the past 80 plus years.

Phosphate mining has resulted in some adverse ecological consequences. For example, waste rock dumps and open pits can act as pathways that transport selenium and other contaminants to the environment through ground and surface water.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as well as state law, provides a framework to address these issues, which occur at various phosphate mines in the region. Investigations and planning for cleanup at mining sites are ongoing with oversight from the U.S. Environmental Protection Agency (EPA), U.S. Forest Service (USFS), Idaho

Department of Environmental Quality (DEQ), Bureau of Land Management (BLM), Shoshone Bannock Tribes, and U.S. Fish and Wildlife Service (FWS).

The agencies, Tribes, and mining companies participating in the investigations welcome public involvement throughout the process because it produces better cleanup decisions. The agencies continue to provide updates regarding the progress at each of the mine sites at a booth during the Caribou County Fair and through this fact sheet, which contains contact information and website addresses for additional information.

*\*2022 Idaho Mining Association direct estimated employment and gross state product.*





# REFERENCE

## Acronym List

**BLM** – Bureau of Land Management

**CERCLA** – Comprehensive Environmental Response, Compensation, and Liability Act

**CVF** – Cross Valley Fill

**DEQ** – Idaho Department of Environmental Quality

**EPA** – Environmental Protection Agency

**FS** – Feasibility Study

**FWS** – U.S. Fish and Wildlife Service

**MRP** – Mine Reclamation Plan

**ODA** – Overburden Disposal Area

**O&M** – Operations and Maintenance

**P4** – P4 Production, LLC

**PDI** – Predesign Investigation

**PRB** – Permeable Reactive Barrier

**PRG** – Preliminary Remediation Goal

**RA** – Remedial Action

**RD** – Remedial Design

**RDWP** – Remedial Design Work Plan

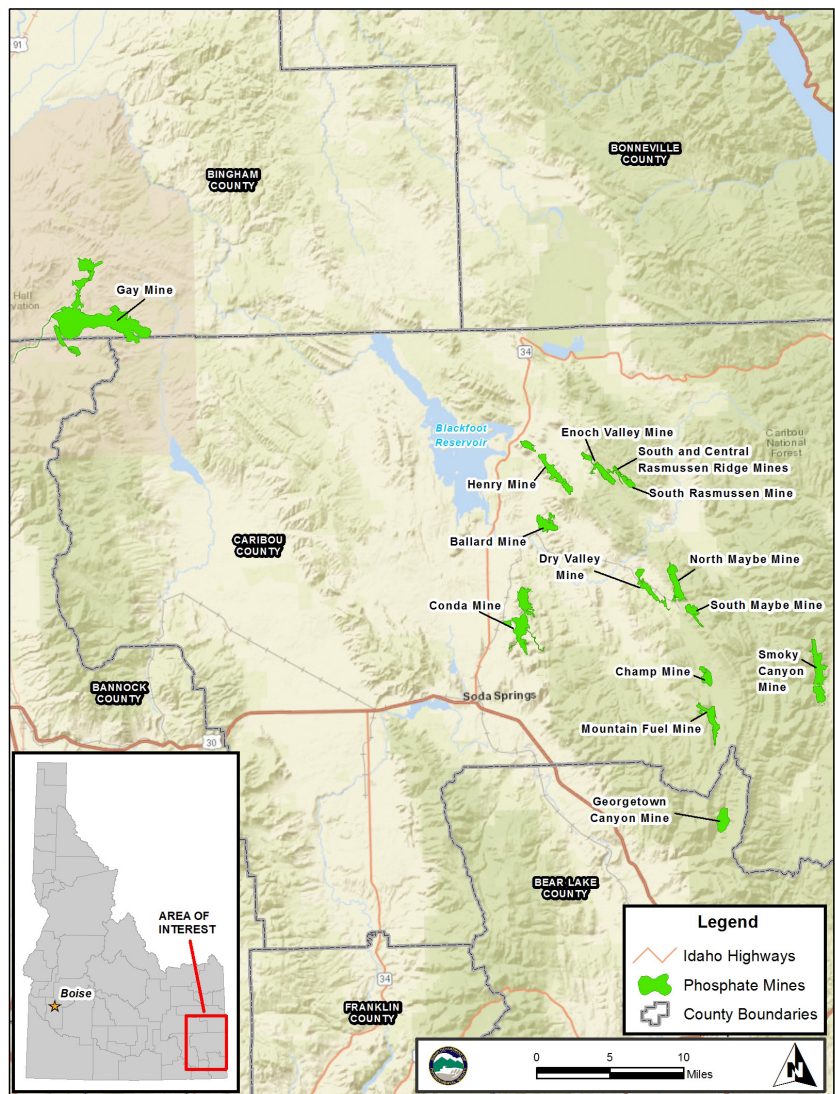
**RI** – Remedial Investigation

**ROD** – Record of Decision

**SOU** – Sub-Operable Unit

**USFS** – United States Forest Service

**XRF** – X-Ray Fluorescence



*Phosphate cleanup sites in Southeast Idaho are highlighted in green. The Blackfoot Reservoir is approximately 15 miles north of Soda Springs.*

## Key Terms

**Administrative Settlement Agreement/Order on Consent:** A negotiated agreement between the party and a regulatory agency to address potential cleanup sites.

**Removal Action:** A response to actual or threatened releases of a pollutant or contaminant that pose a threat to public health or the environment.

**Overburden:** A mining term for waste rock or soil overlying a mineral deposit.

**Remedial Investigation/Feasibility Study:** The Remedial Investigation (RI) is the mechanism for collecting data to characterize site conditions, determine the nature and extent of the waste and contamination, assess risk to human health and the environment, and conduct treatability testing, if needed. The Feasibility Study (FS) is the mechanism used for the development, screening, and detailed evaluation of alternative remedial actions.

**Proposed Plan:** A brief summary of the alternatives studied to conduct the cleanup response for a site. The Proposed Plan, as well as the RI and FS, form the basis for the lead agency's preferred alternative. It is made available for public comment.

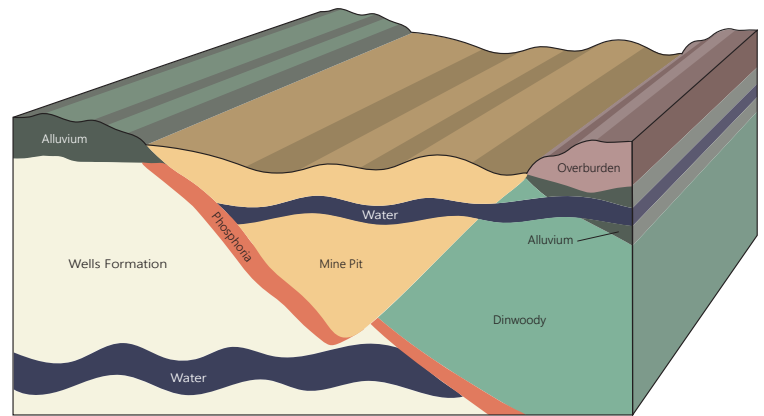
# 2023 SOUTHEAST IDAHO PHOSPHATE RESOURCE AREA FACT SHEET

The Southeast Idaho Phosphate Resource Area is located generally north and east of the city of Soda Springs, Idaho where sediment beds were deposited in a Phosphoria Sea that marked the western margin of the North American continent as it existed approximately 250 million years ago. Over time, this region has been subjected to compression (thrust) faulting followed by later extensional (normal) faulting resulting in a series of northwest-to-southeast trending ridges and valleys where the Meade Peak Member of the Phosphoria Formation is exposed. This rock layer of shale and mudstone is one of the most significant sources of phosphate found in North America, and it provides the resource that drive the mining and phosphate-based industries that exist in this corner of the state.

The rock layer generally found below, and thus that is older than, the Phosphoria Formation is the Wells Formation. It is approximately 2,000 feet thick and consists of buff-colored sandy limestone and gray to reddish-brown sandstone interbedded with gray limestone and dolomitic limestone and dolomite. The lower portion also contains silty limestone and cherty nodules. The Wells Formation is the regional water-bearing unit within the Phosphate Resource Area.

The rock layer generally found above the Phosphoria Formation is the Dinwoody Formation. This younger unit consists of thin-bedded tan siltstone, shale, and interbedded limestone. Weathering at the surface of the Dinwoody Formation forms dense, clay soils.

When mining phosphate, layers of rock found above the Phosphoria Formation (overburden) must be removed and placed somewhere. These layers of rock are usually placed along the sides of the mining pit or can be placed back in the mining pit as mining progresses. Once the material is removed and stacked, it can be exposed to the air and to water through rain and snow.

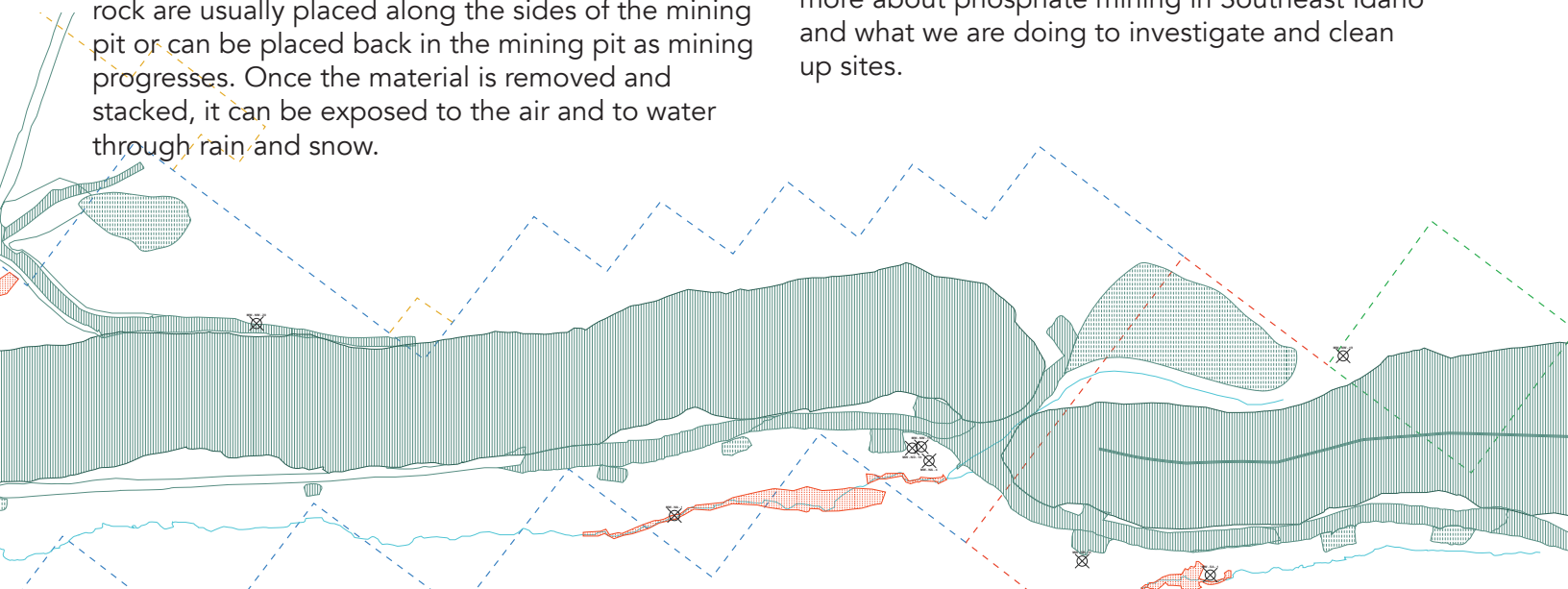


*Example of a Phosphate Mine in Southeast Idaho*

This has an effect on potentially harmful elements found in the overburden material, often making them water soluble. These elements then get transported to the soil beneath the overburden and then to groundwater, surface water, and even vegetation.

Mining practices have adapted and changed over the years in an effort to prevent the transport of harmful elements into soils, groundwater, and streams and rivers. However, several historic mining sites are quite old, and we are still working to assess and clean up contamination from these sites, where needed.

This Fact Sheet lists most of the sites undergoing study and cleanup. There are several "tools" we use to cleanup a site. Overburden can be covered or capped; it may also be removed if it isn't too uneconomical to do so. Groundwater treatment, such as pump and treat systems or Permeable Reactive Barriers (PRBs), can be installed. Visit us at our booth at the Caribou County Fair August 2, 3, and 4 to learn more about phosphate mining in Southeast Idaho and what we are doing to investigate and clean up sites.





# CERCLA REMEDIAL ACTION SITES

*These sites are led by federal agencies, such as EPA and USFS, or with state co-leads where cleanup is governed by the method established by CERCLA to characterize the nature and extent of contamination and assess risks to evaluate potential remedial options.*



*Blackfoot River Sampling*



*Groundwater Sampling*

## BALLARD, HENRY, AND ENOCH VALLEY MINES

### **Active Status:**

Ballard Mine –Remedial Design (RD); RD/Remedial Action (RA)

Henry Mine – FS

Enoch Valley Mine – On hold

The EPA issued a Record of Decision (ROD) for P4 Production, LLC's (P4's) Ballard Mine on October 1, 2019; thus, completing the RI/FS process. As identified in the ROD, a final cleanup plan was selected for this historic mine site that includes partial backfilling and grading of mine pits and mine dumps, constructing a cover system, and treating contaminated groundwater. The ROD also accommodates recovery of phosphate ore from the site during implementation of the remedy. P4 obtained the phosphate lease from the BLM in November 2020 to re-mine material that contains valuable minerals. Re-mining of ore is under the jurisdiction of the BLM and is not considered part of the CERCLA response action. The EPA worked with the BLM to ensure that the design for the CERCLA remedy is consistent with the BLM-approved Mine Reclamation Plan (MRP). On May 21, 2021, the Consent Decree for the RD/RA was signed by P4 and the EPA, Shoshone Bannock Tribes, and DEQ. This legal agreement details the work to be performed by P4 during the RD/RA. The Shoshone Bannock Tribes, DEQ, and FWS have a legal obligation to the project because of either land administration/hunting and fishing rights or because they are landowners. The EPA also works with the BLM and Idaho Department of Lands on the re-mining aspect of the project. In August 2021, the EPA, in coordination with the BLM and Idaho Department of Lands, approved a Remedial Design Work Plan (RDWP) that details the approach for designing the remedy to ensure the design addresses ROD requirements. The RDWP includes a schedule for the remedial cleanup. The 30% design was submitted to the EPA, Shoshone Bannock Tribes, DEQ, and FWS; all agencies provided review comments to P4 on this document. P4 responded to these comments and is developing a schedule for submitting a 60% design. In late 2021, P4 installed a Permeable Reactive Barrier (PRB) to study the feasibility of using this technology at the site.

P4 monitored the performance of the PRB for the past year and will submit a report detailing the monthly monitoring of the PRB. P4 was approved to begin some of the early work to support the RD/RA in July 2021. Some of the early work completed in 2021 included construction of the contractor ready line/laydown area, development of topsoil stockpile areas, and several haul and access roads.



Under an approved 2021 Predesign Investigation (PDI) Work Plan, additional characterization work was completed at Ballard Mine in January 2022. Seventeen monitoring wells and nine soil borings were drilled and sampled. This information will be used to better understand borrow material properties and groundwater conditions at the site. The remaining field activities outlined in the 2021 PDI Work Plan occurred in the Spring of 2022, including additional characterization of proposed PRB locations, groundwater sampling, and aquifer testing for several of the PDI characterization wells. A Draft PDI Report will be prepared to summarize the 2021 and 2022 PDI geophysical surveys, borrow source investigations, and PRB characterization. It is anticipated that a draft report will be submitted to the EPA in the Spring of 2023.

In October 2021, P4 installed a pilot study PRB (PRB-4) along the east side of Ballard Mine.

PRBs have been successfully used as an in-situ remedial component at other phosphorus mine sites to treat shallow groundwater. The PRB includes an excavated trench filled with a mixture of permeable

sand and organic matter (i.e., alfalfa and wood chips) that provide a food source for natural microbes in the soil. As the groundwater passes through the PRB, biochemical reactions cause the water chemistry to change, which in turn helps in removing the selenium. Under the approved PRB Treatability Study Work Plan, drilling and installation of eight performance monitoring wells (PRB4-4 thru PRB4-11) in the vicinity of PRB-4 followed construction in December 2021. The data collected from the treatability study will be used to design additional PRBs that are a component of the CERCLA remedy. The draft field report summarizing this effort was submitted to the EPA in mid-March 2023. In addition to this work, groundwater and surface water data have been collected monthly starting in May 2022. Results from this pilot study will be provided in a summary report in 2023.

P4 is currently working on the FS at Henry Mine and a draft FS is anticipated in 2023.

An RI is anticipated to begin at Enoch Valley Mine in 2023.

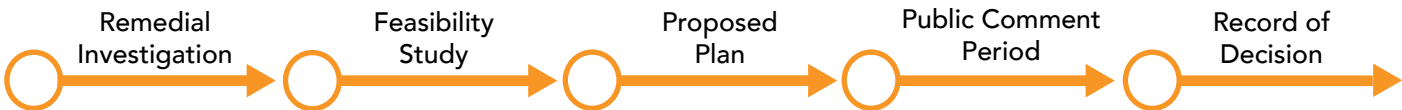
Next Steps for Ballard Mine



Next Steps for Henry Mine



Next Steps for Enoch Valley Mine



CHAMP MINE

Active Status: RI

Field work conducted by Nu-West to support the RI continued, including groundwater and surface water sampling. The Baseline Human Health Risk Assessment was completed in 2022. The RI Report is under review by the agencies.

Next Steps for Champ Mine





# CONDA/WOODALL MOUNTAIN MINE

**Active Status:** FS; Operations and Maintenance (O&M)

During 2022, work continued on the FS to support future cleanup decisions. One of the tasks completed last year was determining a preliminary remediation goal (PRG) for birds that are exposed to selenium in site soils. The PRG for birds is an average concentration that has the potential to result in an unacceptable risk to a local population of birds living at the site. The PRG for birds, along with other PRGs for humans and aquatic receptors, will be used in the FS to determine which Conda sites may require cleanup. Additionally, as part of the FS, Simplot and the Agencies also began work on the detailed analysis of remedial alternatives. The detailed analysis of alternatives will evaluate which remedial alternatives, or combination thereof, are best suited for various parts of the site depending on site-specific conditions and risks. In August 2022, a final report was issued for the PRB Treatability Pilot Study. The final PRB report provides lessons learned involving design/construction and makes recommendations for future use of PRBs to address shallow contaminated groundwater. Long-term monitoring continued across the Conda Mine in 2022. A report including recently-collected information regarding the release of contaminants to the bedrock aquifers and contaminant migration from extensive overburden disposal areas (ODAs) on North Woodall Mountain is anticipated in early 2023. O&M activities continued on the Pedro Creek ODA Removal Action cover and associated water management features that were constructed during 2013-2015.

## Did you know?

The company town of Conda was built in 1920 by the Anaconda Copper Mining Company to house its miners and their families. At one time, the town had 82 homes, a school, a meeting hall, and a company store. Company housing rented for \$12/month. The town closed and most buildings were removed in 1984.

## Next Steps for Conda/Woodall Mountain Mine







*Georgetown Creek below the Georgetown Canyon Mine*

## GEORGETOWN CANYON MINE

**Active Status:** Ecological and Human Health Risk Assessments

A Screening Level Human Health and Ecological Risk Assessment and a Preliminary Baseline Problem Formulation were completed and approved in 2022. Baseline Human Health and Ecological Risk Assessments are being developed and will be submitted in 2023. Surface water and groundwater sampling continues to be conducted annually during high-flow (May) and low-flow (September) periods.

### ***Did you know?***

Georgetown Creek flows within Georgetown Canyon. During spring and early summer, Georgetown Creek flows continuously towards the Bear River. In the summer and fall when flows are lower, a segment of Georgetown Creek stops flowing at the ground surface; much of the flow is lost to the underlying geologic formations. Groundwater flows back into the Georgetown Creek-bed from two springs located down-valley within the canyon. These two springs flow year-round.

### Next Steps for Georgetown Canyon Mine





## GAY MINE

**Active Status:** RI; Ecological, Human Health, and Livestock Risk Assessments

An ambitious effort was completed to sample soil from all disturbed areas of Gay Mine that have not already been sampled. This effort will determine contaminant concentrations across more than 2,600 acres. The sampling targeted four soil types: 1) overburden materials; 2) mill shale piles containing low-grade phosphate ore; 3) haul roads; and 4) other areas, including the bottom and side walls of open pits, where accessible. The sampling program used an incremental sampling methodology approach, collecting 60 incremental samples from a grid covering each sampling area, and then combining the increments into one composite sample. Sampling began in 2020 and has now concluded. The data from this sampling effort, along with data from ongoing groundwater and surface water sampling, will be used in development of a Risk Assessment for the site. The Draft Baseline Human Health and Ecological Risk Assessment Work Plan completed by Golder Associates on behalf of FMC Corporation and J.R. Simplot Company in November 2022 is currently under review. Additionally, the EPA, FMC, Simplot, and the Shoshone-Bannock Tribes are working to identify areas where early actions can be taken to better protect people's health and the environment.

### Did you know?

The EPA Office of Research and Development (ORD) is conducting research at the site to determine if selenium concentrations can be approximated from the air over large areas using Hyperspectral Imaging (HI). Analytical and X-Ray Fluorescence (XRF) data was collected in 2022 to develop correlations between HI and XRF and ORD is planning to conduct an overflight of the site in the summer of 2023 with a plane mounted Hyperspectral instrument to determine selenium concentrations across the site.

#### Next Steps for Gay Mine



## MOUNTAIN FUEL MINE

**Active Status:** RI

Nu-West continued groundwater and surface water sampling work to support the RI. The Baseline Human Health Risk Assessment and Ecological Risk Assessment were approved in 2022. The RI Report is currently under review by the Agencies.

#### Next Steps for Mountain Fuel Mine







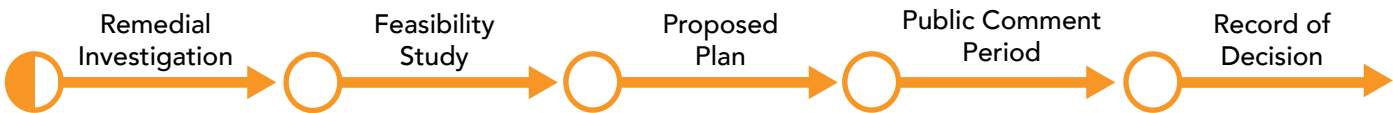
A former mining pit for South Maybe Canyon Mine

## SOUTH MAYBE CANYON MINE

**Active Status:** RI, ROD, O&M, 5-Year Review

Nu-West performed field activities at the site and continued O&M activities on the Cross Valley Fill (CVF). Agencies conducted a 5-year review of the removal action at the CVF in 2022. Conditions in Maybe Creek continued to improve after capping was completed at the CVF in 2017. Surface water concentrations of selenium measured near the containment area have declined by greater than 95% since cleanup work began. RI field work began in Maybe Creek in 2022 (including soil, surface water, groundwater, surveys, and sediment sampling). The Baseline Human Health Risk Assessment for the Open Pits Operable Unit was approved in 2022 and the RI was approved in early 2023.

### Next Steps for Maybe Creek Sub Operable Unit at South Maybe Canyon Mine



## NORTH MAYBE MINE

**Active Status:** RI/FS, ROD

In 2022, Nu-West conducted field activities associated with the North Maybe Mine RI/FS, including surface water and groundwater monitoring. The Baseline Human Health Risk Assessment for the Open Pit Sub-Operable Unit (SOU) was approved in 2022 and the RI was approved in early 2023. The Interim ROD for the East Mill Dump SOU was signed in 2022. Agencies began negotiation of a Consent Decree for the East Mill Dump SOU Remedial Action selected in the Interim ROD in late 2022. Agencies continued reviewing the FS for the West Ridge Operable Unit in 2022.

### Next Steps for North Maybe Mine



## NORTH DRY VALLEY MINE

**Active Status:** Administrative Settlement Agreement/Order on Consent

The DEQ, BLM, and the Tribes are close to completing a proposed settlement agreement and statement of work for conducting an RI/FS for the site. The next step is for this agreement to go to the FMC Corporation for review.

### Next Steps for North Dry Valley Mine



### Did you know?

The North Dry Valley Mine is mostly located on private land owned or leased by the FMC Corporation. A small section of BLM land is also located at the site. Pit areas were backfilled at this site as mining was ongoing; therefore, the mining impacts are hard to see today.

## SMOKY CANYON MINE

**Active Status:** FS

In 2022, the Simplot Smoky Canyon Mine continued optimized operation of its Pilot Water Treatment Plant, which uses advanced technologies (including ultra filtration, reverse osmosis, and fluidized bed reactors) to treat mining-impacted spring or stream water. Water is pumped through the system at approximately 1,800 gallons per minute. Iron co-precipitation is added to the treatment process to further enhance the removal of selenium from the impacted water. The FS, which discusses potential remedial options, will be finalized in early 2023.

### Next Steps for Henry Mine



### Did you know?

Mining began at Smoky Canyon in 1983 and is still ongoing today. Ore from Smoky Canyon travels through a 92-mile pipeline as a slurry to the Simplot fertilizer production plant in Pocatello, Idaho.



# STATE REMEDIAL ACTION SITES

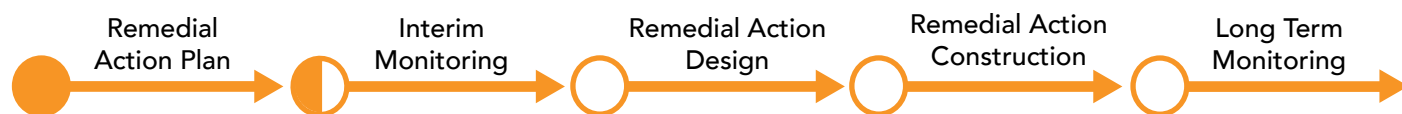
*These sites differ from CERCLA remedial action sites in that measures taken in response to degradation are in accordance with the Idaho Environmental Protection and Health Act (Idaho Code § 39101 et. Seq.).*

## SOUTH CENTRAL RASMUSSEN RIDGE MINE AREA

**Active Status:** RA Plan; Operation, Maintenance, and Monitoring Plan; RD; RA

Nu-West completed, and DEQ and BLM approved, an RA Plan for the site in October 2022. Remedial activities outlined in the RA Plan include re-establishing diverted surface water drainage back to the No Name Creek area, reclaiming no-longer-needed haul roads and stormwater retention ponds, placement of a geosynthetic cover on select external dump areas, and specifying site-specific groundwater points of compliance in the No Name Creek and South Fork Sheep Creek Drainages.

### Next Steps for South Central Rasmussen Ridge Mine Area



South Rasmussen Mine facing Southeast



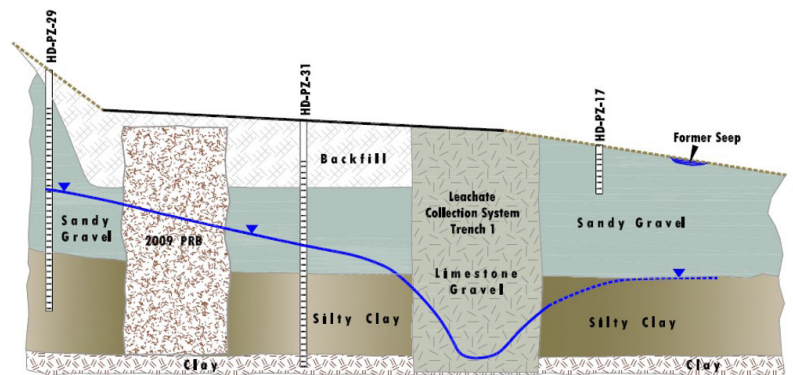


South Rasmussen Valley – Angus Creek looking North

## SOUTH RASMUSSEN MINE

**Active Status:** RA and Remedial Monitoring

P4 continued groundwater and surface water monitoring in 2022 (including the PRB and point of compliance monitoring wells) and continued operation of the leachate collection system in Watershed B. P4 continues to investigate sources of selenium found in Watershed B shallow groundwater and surface water. P4 submitted an application for an Idaho Pollutant Discharge Elimination System permit in May 2022 to conduct a Horseshoe Overburden Area leachate collection system closure pilot study. The closure pilot study will investigate Watershed B impacts as a result of shutting down the leachate collection system and allowing groundwater treated by the PRB to flow downgradient to Watershed B. The closure pilot study will also help to establish a new water resource baseline for the Horseshoe Overburden Area under static conditions. This new baseline will allow for consideration of possible remedial closure scenario.



Conceptual diagram of passive permeable reactive barrier and active leachate collection system located within Watershed B at the South Rasmussen Mine.

### Next Steps for South Rasmussen Mine

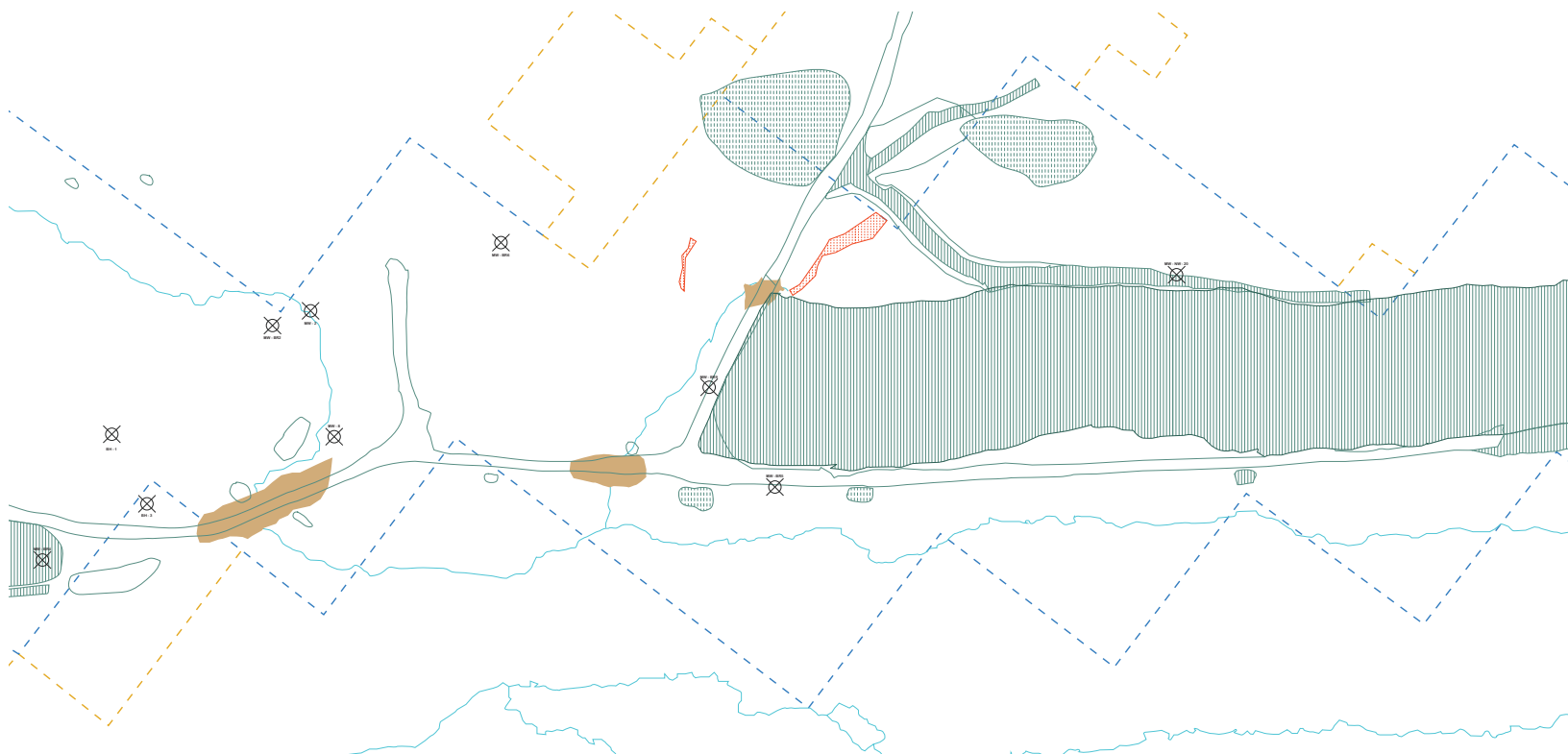


### Did you know?

Previous remediation efforts (i.e., the passive PRB and active leachate collection system) at the South Rasmussen Mine have been successful in treating and capturing localized groundwater impacts. P4 looks forward to the leachate collection system closure pilot study to inform the long-term closure remedies in Watershed B.



# CONTACT INFORMATION



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<https://www.epa.gov/superfund/henry-mine>

## Conda/Woodall Mountain Mine

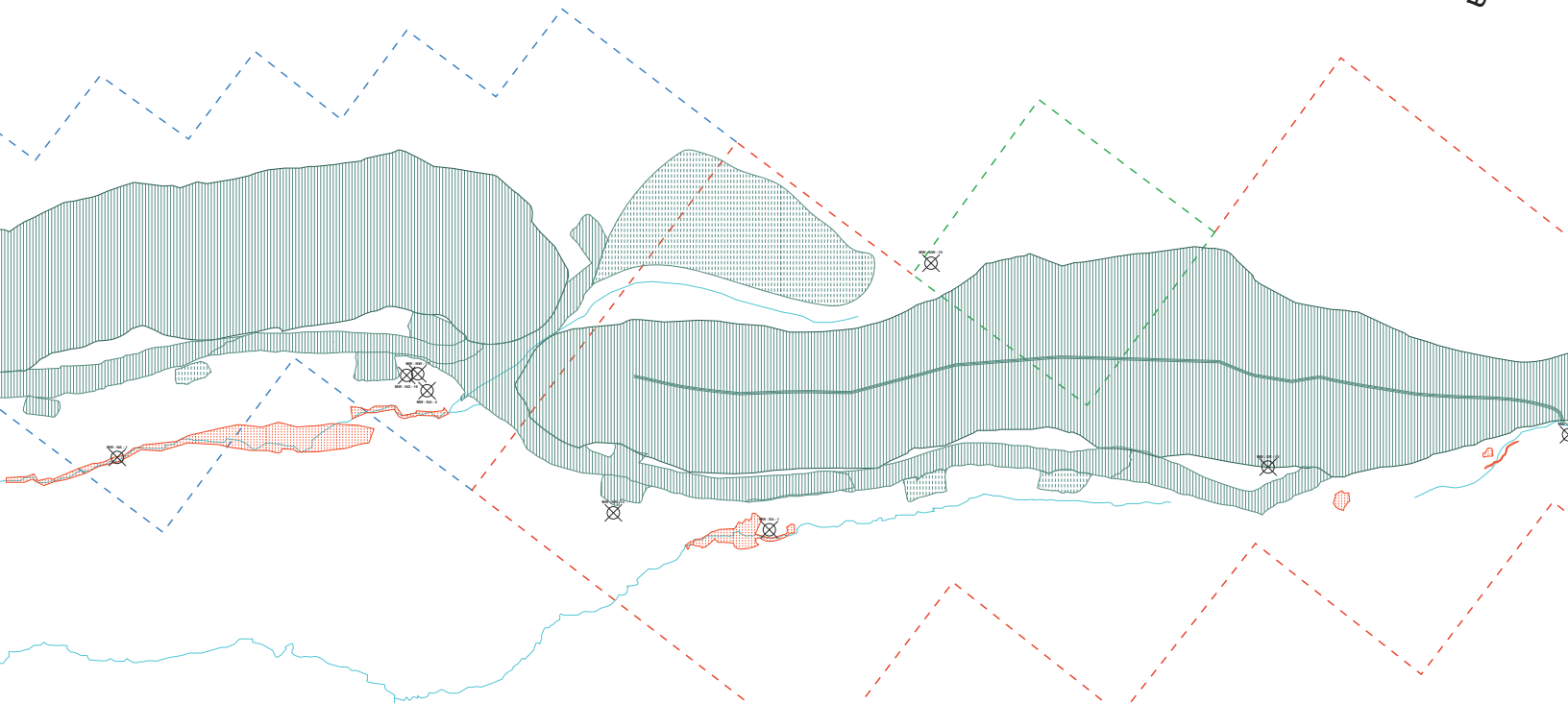
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