Attached is a copy of the 2022 updated overview factsheet for phosphate mine site investigations and cleanup in southeast Idaho. The Idaho Department of Environmental Quality (DEQ), along with the U.S. Environmental Protection Agency (EPA) and the U.S. Forest Service (USFS) prepared this factsheet to outline the latest progress at each of the mine sites.

If you prefer to receive future information and updates via email, or if you would like to be removed from the mailing list, please contact Kelly Green, kgreen@northwindgrp.com.
Southeast Idaho is one of the world’s major phosphate producing regions. Phosphate mining has been an important industry in the area since the early 20th century. In 2020, phosphate mining and manufacturing directly contributed an estimated 1,367 industry jobs, $138.1 million in payroll and benefits, and $567.6 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.*

The rapid death of tiny organisms such as algae and diatoms living in what was once a shallow sea approximately 250 million years ago created the presence of phosphate ore. The concentrated phosphorous in their bodies did not have time to dissolve back into the sea water. Consequently, the phosphate and other materials (e.g., selenium) were trapped in the seabed shales, siltstones, and other sedimentary rocks that are mined today in this area.

Phosphate mining has resulted in some adverse ecological consequences. For example, waste rock dumps and open pits act as pathways that can 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 some 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 on the progress of each of the mine sites at the annual Caribou County Fair and through this fact sheet, which contains contact information and website addresses for additional information.

* 2020 Idaho Mining Association direct estimated employment and gross state product.

Selenium: A naturally occurring element that is an essential nutrient in small doses but which in high levels can cause adverse effects in humans and animals.
Phosphate Cleanup Sites in Southeast Idaho

Reference

Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>DEQ</td>
<td>Idaho Department of Environmental Quality</td>
</tr>
<tr>
<td>DFRAP</td>
<td>Draft Final Remedial Action Plan</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>FS</td>
<td>Feasibility Study</td>
</tr>
<tr>
<td>FWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>HOA</td>
<td>Horseshoe Overburden Area</td>
</tr>
<tr>
<td>MRP</td>
<td>Mine Reclamation Plan</td>
</tr>
<tr>
<td>ODA</td>
<td>Overburden Disposal Area</td>
</tr>
<tr>
<td>OPOU</td>
<td>Open Pits Operable Unit</td>
</tr>
<tr>
<td>OPSOU</td>
<td>Open Pit Sub-Operable Unit</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>P4</td>
<td>P4 Production, LLC</td>
</tr>
<tr>
<td>PDI</td>
<td>Predesign Investigation</td>
</tr>
<tr>
<td>PDIWP</td>
<td>Predesign Investigation Work Plan</td>
</tr>
<tr>
<td>RDWP</td>
<td>Remedial Design Work Plan</td>
</tr>
<tr>
<td>PRB</td>
<td>Permeable Reactive Barrier</td>
</tr>
<tr>
<td>RI</td>
<td>Remedial Investigation</td>
</tr>
<tr>
<td>ROD</td>
<td>Record of Decision</td>
</tr>
<tr>
<td>SEIPRA</td>
<td>SE Idaho Phosphate Resource Area</td>
</tr>
<tr>
<td>USFS</td>
<td>United States Forest Service</td>
</tr>
</tbody>
</table>

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 remedial 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.
Use of Permeable Reactive Barriers in the Southeast Idaho Phosphate Resource Area

What are Permeable Reactive Barriers (PRBs)?
Permeable Reactive Barriers, or PRBs, are one of the remediation “tools” used in the SE Idaho Phosphate Resource Area (SEIPRA). A PRB is created by constructing a permeable wall below ground for groundwater to flow through. As groundwater flows through the PRB, materials used to construct the wall either trap harmful contaminants or make them less harmful by reacting with them in some way. As groundwater flows through the PRB wall, it is passively treated by the contents in the wall and the treated groundwater flows through and out the other side.

How do they work?
In the SEIPRA, PRBs are usually constructed by digging a long, narrow trench in the path of contaminated groundwater flow. The trench is filled with organic mulch, usually comprised of plant-based materials, such as a combination of compost, wood chips, and ground-up alfalfa. This organic mulch makes up the reactive material of the PRB and naturally contains many different types of microbes, which “feed” on the organic material in the PRB, releasing carbon and gases such as carbon dioxide. These microbes can make some contaminants, like selenium, arsenic, and uranium, less soluble in groundwater by changing their chemical form and thus “trapping” them in the mulch and removing them from the groundwater as they pass through the PRB wall.

Many different types of reactive materials can be placed in a PRB trench. Iron, limestone, and carbon (or mulch) are some common ones. PRBs are typically no deeper than 50 feet due to the limitations of excavation equipment but there are some construction techniques, such as drilling or fracturing, that can be used to make them deeper.

The reactive material selected for the PRB depends on the types of contaminants present in the groundwater. The material can be mixed with sand to make it more permeable and easier for groundwater to pass through. In some cases, side walls may be constructed of clay or less permeable materials at an angle to the PRB to help funnel the contaminated groundwater through. The trench used to make the PRB wall is covered over with soil, completing concealing the underground system.
How long will it take?
PRBs may take many years to clean up contaminated groundwater. The cleanup time will depend on factors that vary from site to site. For example, cleanup may take longer where:

- The source of dissolved contaminants (e.g., a leaking drum of solvent) has not been removed.
- The contaminants remain in place because they are not easily dissolved by groundwater.
- Groundwater flow is slow.

How might it affect me?
During construction of the PRB, nearby residents may see increased truck traffic when materials are hauled to the site or hear earth-moving equipment. However, no noisy equipment is required once construction of the PRB is complete. Cleanup workers will occasionally visit the site to collect groundwater and soil samples to ensure that the PRB is working. When the reactive materials need to be replaced, the old materials will have to be excavated and hauled to a landfill.

Are PRBs safe?
The reactive materials placed in PRBs are not harmful to groundwater or people. Contaminated groundwater is cleaned up underground so treatment does not expose workers or others onsite to contamination. Due to the possibility of encountering contaminated soil while digging the trench, workers wear protective clothing. Workers also cover loose contaminated soil to keep dust and vapors out of the air before disposing of it. Groundwater is tested regularly to make sure the PRB is working.

Why use PRBs?
PRBs are a relatively inexpensive way to clean up groundwater. No energy is needed because PRBs rely on the natural flow of groundwater. The use of some materials (i.e., limestone, shell fragments, and mulch) can be very inexpensive. Once the PRB is installed, no equipment is needed aboveground so the property may continue its normal use.

PRBs have been selected or are being used at more than 30 Superfund sites across the country.

CERCLA Remedial Action Sites

Sites 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.

Ballard, Enoch Valley, and Henry Mines

Active Status: Record of Decision (ROD) for Ballard Mine issued; draft FS submitted for Henry Mine; Enoch Valley Mine on hold.

EPA issued a ROD for P4 Production, LLC’s (P4’s) Ballard Mine on October 1, 2019, 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 BLM in November 2020 to re-mine material that contains valuable minerals. Re-mining of ore is under the jurisdiction of BLM and is not considered part of the CERCLA response action. A Mine Reclamation Plan (MRP) will need to be approved by BLM prior to starting the re-mining work. EPA is working with BLM to ensure that the design for the CERCLA remedy is consistent with the MRP.

On May 21, 2021, the Consent Decree for Remedial Design and Remedial Action was signed by EPA, P4, the Shoshone-Bannock Tribes, and DEQ. This legal agreement details the work to be performed by P4. The Shoshone-Bannock Tribes, DEQ, and FWS are interested and have a legal obligation to the project because of either land administration/hunting and fishing rights or because they are landowners. EPA also works with BLM and the Idaho Department of Lands on the re-mining aspect of the project. In August 2021, EPA, in coordination with BLM and the 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 EPA, the Shoshone Bannock Tribes, DEQ, and FWS; all agencies provided review comments to P4 on this document. P4 is working to address those comments. A 60% design is expected to be submitted in 2022.
P4 is seeking approval to begin additional early work for 2022, which is necessary to implement the cleanup remedy, once it is approved, and to support re-mining of ore. P4 was approved to begin some of the early work in July 2021. Between July and mid-December 2021, P4 constructed the contractor ready line/laydown area, topsoil stockpile areas, and several haul and access roads.

Under an approved 2021 Predesign Investigation Work Plan (PDIWP), 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 PDIWP will occur in spring 2022, including additional characterization of proposed PRB locations, groundwater sampling, and aquifer testing for several of the Predesign Investigation (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 EPA in May 2022.

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 EPA in mid-March. In addition to this work, groundwater and surface water data will be collected monthly this year starting in May/June through November. These results will be provided in an annual report in March 2023 per the PRB Treatability Study Work Plan.

Next Steps for Ballard Mine:
1. Feasibility Study
2. Proposed Plan
3. Public Comment Period
4. Record of Decision
5. Remedial Design

Next Steps for Henry Mine:
1. Feasibility Study
2. Proposed Plan
3. Public Comment Period
4. Record of Decision
5. Remedial Design
Champ Mine


Next Steps:

1. Remedial Investigation
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision

Field work conducted by Nu-West to support the RI, which included groundwater and surface water sampling, continued. The Human Health Risk Assessment and RI report are currently under review by the Agencies. The Baseline Ecological Risk Assessment was completed in 2021.
Active Status: FS, Operations and Maintenance (O&M)

During 2021, J.R. Simplot finalized the first part of the FS in a technical memorandum documenting the development and initial screening of remedial alternatives for the site. The next step of the FS process is continuing in 2022 with a detailed analysis of those remedial alternatives that passed the initial screening. The detailed analysis of alternatives will be used to help determine which remedial alternatives, or combination thereof, are best suited for various parts of the site.

In addition to ongoing monitoring, monitoring wells were drilled and installed at three locations near the northern edge of Conda Mine to provide information regarding release of contaminants to the bedrock aquifers and contaminant migration from extensive overburden disposal areas (ODAs) on North Woodall Mountain. Modifications were made to the Seep Treatment Cell component of the PRB Pilot Study to improve treatment efficiency. A final report will to be issued for the PRB Pilot Study in 2022, making recommendations for future use of PRBs at Conda Mine.

O&M activities continued on the Pedro Creek ODA Removal Action cover and associated water management features that were constructed during 2013-2015.

Next Steps:

1. Feasibility Study
2. Proposed Plan
3. Public Comment Period
4. Record of Decision
5. Remedial Design

**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 per month. The town closed and most buildings were removed in 1984.
**Gay Mine**

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

EPA, Shoshone-Bannock Tribes, FMC Corporation, and J.R. Simplot Company agreed on a plan to sample soil from all disturbed areas of Gay Mine that have not already been sampled. This ambitious effort will determine contaminant concentrations across more than 2,600 acres. Sampling will target 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 uses 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 concluded in 2021. The program will measure the concentrations of 21 metals in soil (including arsenic, lead, mercury, and selenium) and 10 radionuclides (including uranium, thorium, and radium). Soil will be sampled at two depth intervals: 0 to 3 inches and 3 to 12 inches below ground surface. The ongoing site characterization effort also includes groundwater and surface water sampling.

**Next Steps:**
1. Remedial Investigation
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision

**Georgetown Canyon Mine**

Active Status: Ecological, Human Health, and Livestock Risk Assessments

Work continued for the risk assessment phase of the project during 2021. Arcadis (consultants for Nutrien and CF Industries on the project) submitted a Screening Level Human Health and Ecological Risk Assessment and a Preliminary Baseline Problem Formulation. Both documents are slated for approval in 2022. Surface water and groundwater sampling continues to be conducted annually during high-flow (May) and low-flow (September) periods.

**Did you know??**

Georgetown Canyon Mine is an inactive phosphate mine that operated intermittently from 1908 to 1964. Exploration and trenching occurred from 1909 through 1912, limited underground mining occurred from 1955 through 1959, and open pit mining occurred from 1958 through 1963.

**Next Steps:**
1. Screening Level Risk Assessment
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision
Mountain Fuel Mine

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

Nu-West continued groundwater and surface water sampling work to support the RI. Ecological and Human Health Risk Assessments, in addition to the RI Report, are currently under review by the Agencies.

Next Steps:

1. Remedial Investigation
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision

Did you know??
North Dry Valley Mine supplied ore to an elemental phosphorous plant located just outside Pocatello, Idaho. Mining was conducted at the site from 1992 until 2000.

North Dry Valley Mine

Active Status: Administrative Settlement Agreement/Order on Consent

DEQ, BLM, and the Tribes have been working on a proposed settlement agreement and statement of work for conducting an RI and FS for the site. The next step is for this agreement to go to the FMC Corporation for review.

Next Steps:

1. Site Investigation
2. Remedial Investigation
3. Feasibility Study
4. Proposed Plan
5. Public Comment Period

Former mining pit at Mountain Fuel Mine.
North Maybe Mine

Active Status: RI/FS, Ecological, Human Health, and Livestock Risk Assessments, Proposed Plan, Public Comment Period

In 2021, Nu-West conducted field activities associated with the North Maybe Mine RI/FS, including surface water and groundwater sampling. The Baseline Ecological Risk Assessment and the Livestock Risk Assessments were approved for the Open Pit Sub-Operable Unit (OPSOU). The Focused FS for the East Mill Dump was also approved. A public meeting was held in July 2021 for the East Mill Dump Proposed Plan. Nu-West is continuing work on the Human Health Risk Assessment for the OPSOU.

Next Steps:

1. Remedial Investigation
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision

South Maybe Canyon Mine

Active Status: RI, Ecological, Human Health, and Livestock Risk Assessments, O&M

Nu-West performed field activities at the site (including surface water and groundwater sampling), and continued O&M activities on the Cross Valley Fill. The Baseline Ecological Risk Assessment and the Livestock Risk Assessments were approved for the Open Pits Operable Unit (OPOU). Work on the OPOU Human Health Risk Assessment for the site continues. Conditions in Maybe Creek continued to improve after capping was completed at the Cross Valley Fill in 2018. Surface water concentrations measured near the containment area have declined 97% since cleanup work began. RI work also began in the Maybe Creek Operable Unit in 2022.

Next Steps:

1. Remedial Investigation
2. Feasibility Study
3. Proposed Plan
4. Public Comment Period
5. Record of Decision
Smoky Canyon Mine

Active Status: FS

In 2021, 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, is currently under review by the Agencies.

Next Steps:

1. Feasibility Study
2. Proposed Plan
3. Public Comment Period
4. Selection of Remedy
5. Record of Decision

Fish monitoring at Smoky Canyon Mine.
State Remedial Action 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: Remedial Action Plan, Remedial Design, and Remedial Action

DEQ, BLM, and Nu-West have nearly completed a Draft Final Remedial Action Plan (DFRAP) for the site, which will go out for public comment in 2022. Once any changes have been incorporated, this plan will be approved. Remedial activities proposed in the DFRAP 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 selected external dump areas, and identifying groundwater site-specific points of compliance in the No Name Creek and South Fork Sheep Creek Drainages. Notice of the public comment period and instructions to provide comments to DEQ will be provided in 2022.

Next Steps:

1. DFRAP
2. RAP Approval
3. Remedial Action Design
4. Remedial Action Construction
5. Long-term Monitoring

Did you know??

The site is located on the east limb of the Snowdrift Anticline, with the axis of the Anticline located approximately 1,000 feet to the west of the site. The Snowdrift Anticline trends northwest to southeast and is bounded to the west by the Enoch Valley Fault and to the southeast by the Lanes Creek Fault.

South Rasmussen Mine

Active Status: Remedial Action and Remedial Monitoring

P4 continued monitoring the PRB and point of compliance wells. P4 continues with its investigation into sources of selenium found in Watershed B groundwater. The pilot test, which was conducted to intercept clean surface flow and interflow water prior to its infiltration into the Horseshoe Overburden Area (HOA) core, was unsuccessful and further work has been canceled. P4 has convened discussions with the EPA and DEQ, and has begun the process of obtaining an Idaho Pollutant Discharge Elimination System permit to conduct an HOA leachate collection system closure pilot study.

Next Steps:

1. Site Characterization
2. Remedial Action Plan
3. Remedial Design
4. Remedial Action
5. Remedial Monitoring

Did you know??

PRBs at the HOA have been the “model” for PRBs at the historic Conda Mine and Ballard Mine sites.
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Mountain Fuel Mine looking southeast.