Attached is a copy of the 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.

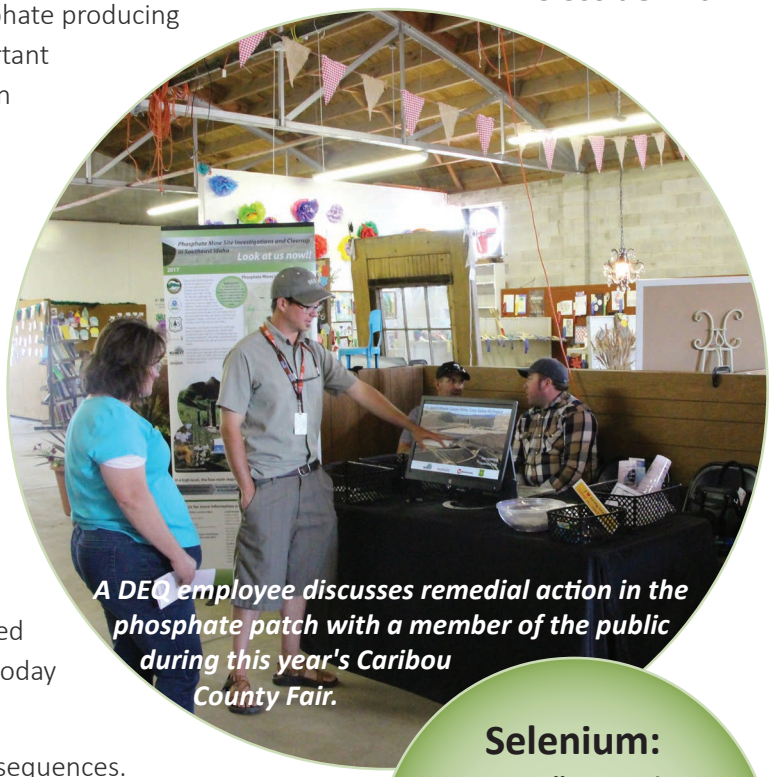
If you prefer to receive future information and updates via email, or if you would like to be removed from the mailing list, please contact Jordan Davies, 208.557.7886.

Update: Phosphate Mine Site Investigations and Cleanup in Southeast Idaho

Southeast Idaho Selenium Project

October 2017

Southeast Idaho is one of the world's major phosphate producing regions, and phosphate mining has been an important industry in the area since the early 20th century. In 2016, phosphate mining directly contributed an estimated 1,136 industry jobs and $344.9 million to the gross state product.[1] Mining royalties and taxes continues to provide millions in revenue to the State of Idaho, which funds education and other local programs.[2]



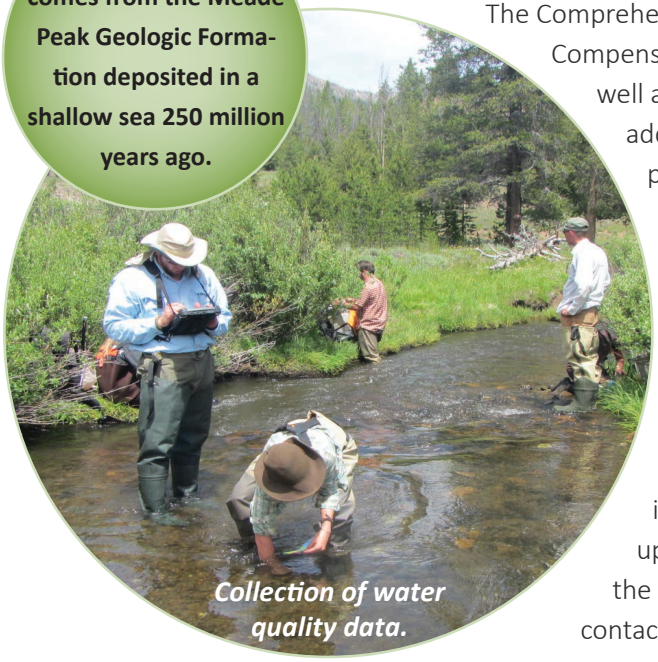
A DEQ employee discusses remedial action in the phosphate patch with a member of the public during this year's Caribou County Fair.

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

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 mining has resulted in some negative ecological consequences. Waste rock dumps and open pits act as pathways that can transport selenium and other contaminants to the environment through ground and surface water.

Phosphate ore comes from the Meade Peak Geologic Formation deposited in a shallow sea 250 million years ago.



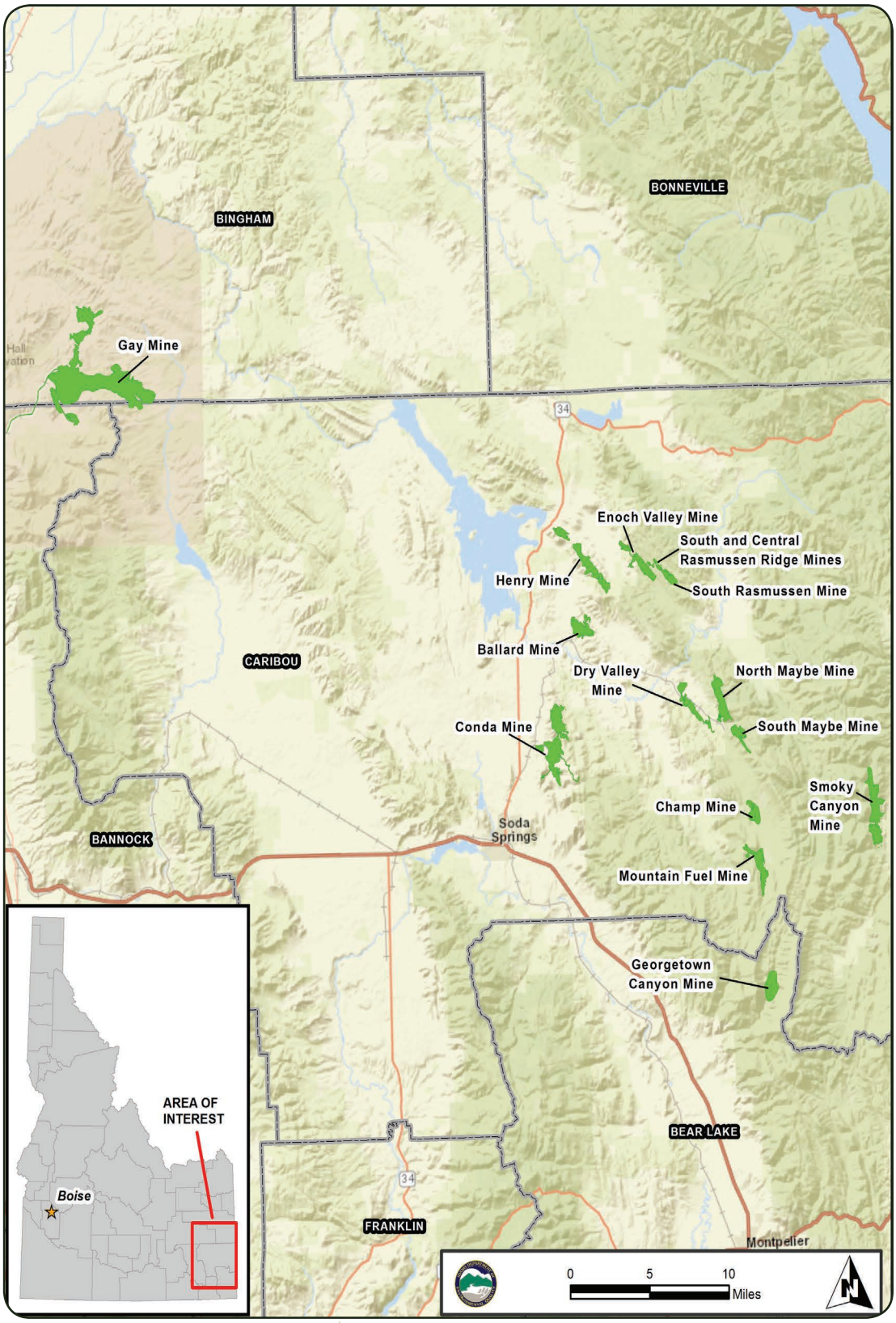
Collection of water quality data.

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. Furthermore, additional investigations and planning for cleanup at mining sites are also ongoing with the 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) agencies.

The agencies, Tribes, and mining companies participating in the investigations welcome public involvement throughout the process because it produces better cleanup decisions. The agencies provide the latest updates about the progress at each of the mine sites at their booth during the annual Caribou County Fair or through this factsheet, which contains contact information and website addresses for more information.

[1] *2016 Idaho Mining Association Direct Estimated Employment and GSP. Mining = 456 jobs, $87.3 million GSP; Processing = 680 jobs, $257.6 million GSP*
[2] *Idaho Department of Commerce, via Economic Modeling Specialists Intl, March 2017*

Phosphate Cleanup Sites in Southeast Idaho



Phosphate mines in Southeast Idaho are highlighted in green. The Blackfoot Reservoir lies near the center of the image, approximately 15 miles north of Soda Springs.

Key Terms:

Administrative Agreement/ Consent Order

A negotiated agreement of the parties involved to address potential cleanup sites.

Removal Action

A removal action is a response to actual or threatened releases of a pollutant or contaminant that poses 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 methodology established by CERCLA to characterize the nature and extent of contamination, and assess risks to evaluate potential remedial options. The Remedial Investigation (RI) is the mechanism for collecting data to characterize site conditions, determine the nature and extent of the waste/contamination, assess risk to human health and the environment, and conduct treatability testing if needed. The Feasibility Study (FS) is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions.

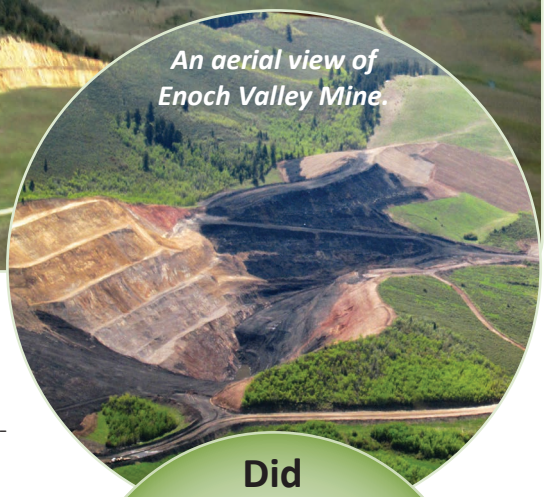
Proposed Plan

A brief summary of the alternatives studied to complete the remedial response for a site. The Proposed Plan, as well as the Remedial Investigation and Feasibility Study form the basis for the lead agency's preferred alternative and is made available for public comment.

Ballard, Enoch Valley, and Henry Mines

Active Status: Proposed Plan for Ballard Mine nearing completion.

An aerial view of Henry Mine.



An aerial view of Enoch Valley Mine.

The Proposed Plan for Ballard is nearly complete and remedial action is imminent. Henry and Enoch Valley will follow suit using the methods and approaches developed for Ballard as a guide:

- Perform extensive investigation work to evaluate the nature and extent of contamination in groundwater, surface water, soils, plants, and other media
- Complete the RI report, including a Site Characterization and Risk Assessment
- Enhance the Site Characterization with collection of supplemental background data and report the results
- Complete the Feasibility Study and prepare the Proposed Plan

Did you know?

Ballard was an active mine from 1951-1969, Henry 1969-1989, and Enoch Valley from 1989-2004. All three mines are now owned by P4 (a subsidiary of Monsanto).

In 2016 and 2017:

Completed the FS for Ballard

Ballard Path Forward:

Proposed Plan	Public Comment	Record of Decision	Begin Remedial Work
Identifies the preferred cleanup alternative; anticipated in Fall 2017	*Stay tuned for more information on how to provide public comment*	*Sometimes referred to as a ROD, documents selected cleanup actions*	*Design and implementation of selected cleanup actions*

Pit Lake.

Champ Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

In 2016:

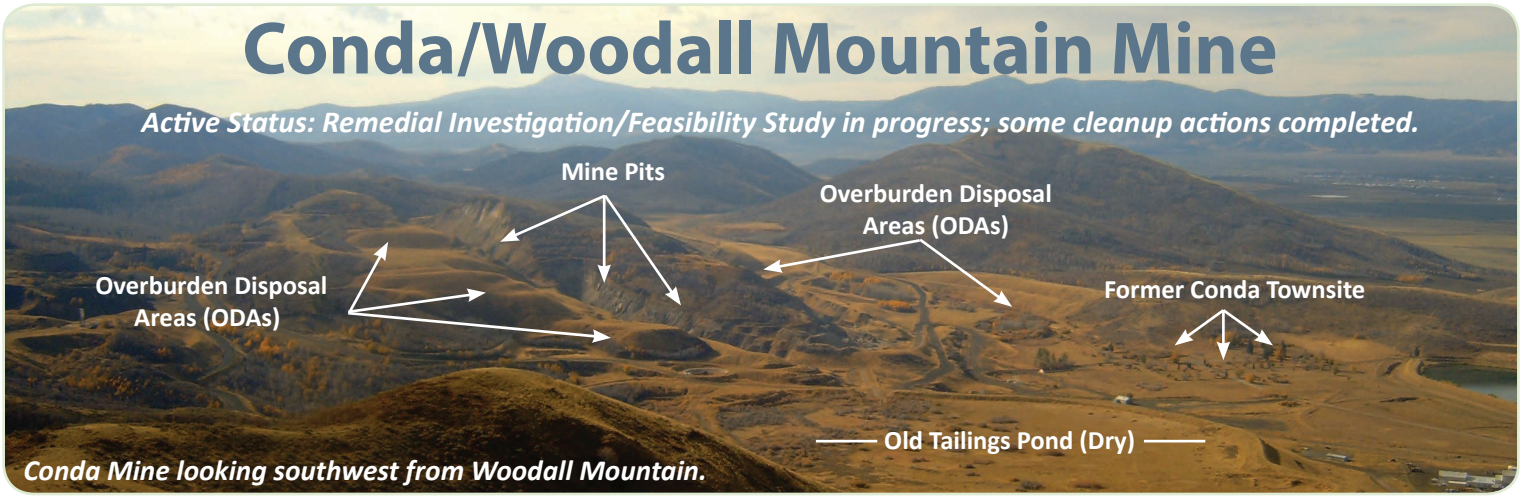
- Continued field work associated with the RI
- Sampled groundwater in the spring and fall
- Conducted terrestrial and aquatic habitat surveys, including small mammal trapping, avian point count surveys, visual encounter surveys, and aquatic community surveys
- Sampled sediment, surface water, and aquatic invertebrates, as well as soil and vegetation

Path Forward:

Remedial Investigation	Baseline Ecological & Human Health Risk Assessments	Feasibility Study	Proposed Plan
Continuing		*Development, screening & evaluation of potential cleanup alternatives*	*Identifies the preferred cleanup alternative*

Conda/Woodall Mountain Mine

Active Status: Remedial Investigation/Feasibility Study in progress; some cleanup actions completed.



Conda Mine looking southwest from Woodall Mountain.

In 2016:

1
Completed the Remedial Investigation and finalized the Site-Specific Human Health, Ecological, and Livestock Risk Assessment reports

The Remedial Investigation evaluated the nature and extent of contamination in formerly mined areas both within and beyond the Conda Mine property.

Mine features investigated as potential source areas included overburden disposal areas, tailing ponds, and mine panels. Many of these features are located in or above the headwaters of streams draining the Conda Mine Property. Contaminant uptake by plants growing on contaminated soils was also evaluated.

Site-Specific Risk Assessments determined the likelihood of adverse impacts to humans, wildlife, and livestock from exposure to site contaminants identified in the Remedial Investigation.

2
Monitored and maintained the Pedro Creek cover, which was completed in 2015

3
Continued data collection in the Plant Uptake Field Scale Pilot Study for the fourth year

The Plant Pilot Study evaluates selenium uptake by vegetation planted on waste rock and in various soil cover types. This information will determine proper cover thickness to reduce selenium uptake by plants, thereby minimizing risk to the animals that consume them.

Path Forward:

Feasibility Study
Development, screening and evaluation of potential cleanup alternatives

Proposed Plan
Identifies the preferred cleanup alternative

Public Comment Period
Stay tuned for more information on how to provide public comment

Record of Decision
Selected cleanup actions are documented in the ROD

Gay Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

The A12 Pit at Gay Mine.

Did you know?

The Gay Mine is located on the Fort Hall Reservation. Within an area approximately 6 miles by 6 miles, the mine encompases three work areas and over 150 open pits, 57 waste shale piles, and multiple overburden disposal areas.

In 2016:

Continued media sampling over the 4,736 acres of disturbed land surface at the Gay Mine, including soils, overburden, mill shales, groundwater, surface water, dominant plant species, culturally significant plants, and selenium hyper-accumulating plant species.

Path Forward:

Continue Field Work
Due to the size of the site, more sampling is planned

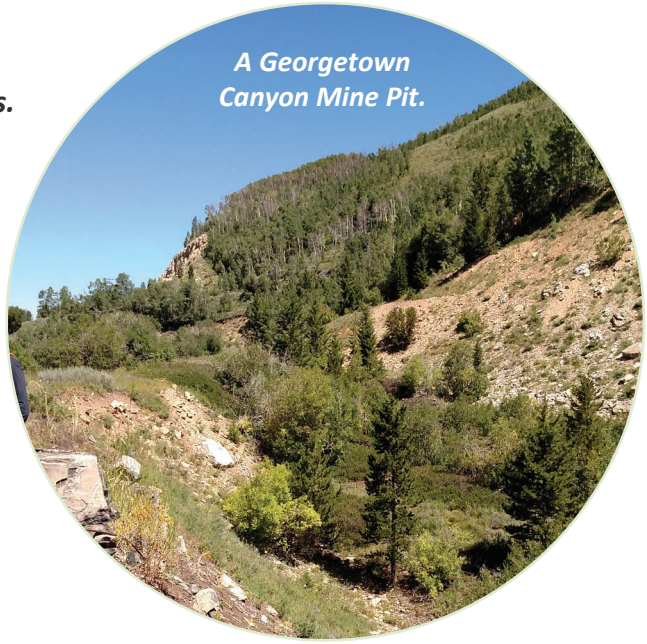
Remedial Investigation
2019 target; will determine contaminant distribution

Feasibility Study
2020 target; will emphasize cultural use of resources

Proposed Plan
Identifies the preferred cleanup alternative

Georgetown Canyon Mine

Active Status: Remedial Investigation/Feasibility Study in progress.



A Georgetown Canyon Mine Pit.

In 2015 and 2016:

- Performed field work, including groundwater, surface water, sediment, soil, vegetation, and aquatic biota sampling
- Conducted a cultural resources survey, avian nest clearance survey, and a waters/wetlands delineation
- Installed four new shallow alluvial wells along with two bedrock (Dinwoody and Wells Formation) wells in 2015 and two additional bedrock wells in 2016

Path Forward:

Remedial Investigation *Continuing* → **Feasibility Study** *Development, screening & evaluation of potential cleanup alternatives* → **Proposed Plan** *Identifies the preferred cleanup alternative* → **Public Comment Period** *Stay tuned for more information on how to participate*

Mountain Fuel Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

Panorama of Mountain Fuel.

In 2016:

- Continued field work associated with the Remedial Investigation at Mountain Fuel Mine
- Sampled groundwater in the spring and fall
- Conducted terrestrial and aquatic habitat surveys, including small mammal trapping, avian point count, visual encounter, and aquatic community surveys
- Performed sediment, surface water, and aquatic invertebrate sampling, as well as sampling of soil and vegetation

Path Forward:

Remedial Investigation *Continuing* → **Baseline Ecological Risk Assessment -** *Analyzes the risks from contamination to wildlife* → **Feasibility Study** *Development, screening & evaluation of potential cleanup alternatives* → **Proposed Plan** *identifies the preferred cleanup alternative*

North Maybe Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

Looking north to North Maybe Mine.

In 2016:

- Performed field activities associated with the North Maybe Mine Remedial Investigation that included surface water, groundwater, soil, and vegetation sampling; and habitat, plant, and wildlife surveys
- Completed the Remedial investigation report for the West Ridge portion of North Maybe Mine
- Finished the Screening Level Ecological Risk Assessment to analyze risks from contamination to wildlife in the North Maybe Mine Open Pit

Path Forward:

Continue Field Work — *Anticipated to include surface water and groundwater sampling*

RI/FS for East Mill Dump — *Summarizes investigation results & evaluates remedial alternatives*

Baseline Ecological & Human Health Risk Assessments

Feasibility Study — *For the remainder of the North Maybe Mine Site*

South Maybe Canyon Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

Installation of the Cross Valley Fill cap liner.

Did you know?

Two types of covers are commonly used to cover mine waste and prevent infiltration of water:

1. Caps comprised of earthen material

2. Synthetic liners

In 2016:

- Performed field work for the South Maybe Canyon Mine Open Pits Remedial Investigation, including surface water, soil, and vegetation sampling, and habitat, plant, and wildlife surveys
- Completed the Screening Level Ecological Risk Assessment to analyze risks from contamination to wildlife in the South Maybe Canyon Mine Open Pits
- Continued construction activities on the Cross Valley Fill Cap; construction activities in 2015 and 2016 resulted in the completion of all regrading, channel construction, and liner installation

Path Forward:

Remedial Investigation — *Continuing*

Baseline Ecological & Human Health Risk Assessments

Feasibility Study — *Development and evaluation of potential cleanup alternatives*

Continue Maybe Creek Groundwater & Surface Water Sampling

South Central Rasmussen Ridge Area

Active Status: Remedial Action Plan in progress.

In 2015 and 2016:

- A Final Preliminary Source Characterization Report was completed in June identifying potential sources of contamination to the groundwater, South Fork Sheep Creek, and No Name Creek
- An Interim Remedial Action Plan was approved for the South Fork of Sheep Creek

Did you know?

Because of its shape and size, the Luxor waste rock dump at the Central Rasmussen Ridge Mine was named after the Luxor Casino in Las Vegas

Path Forward:

Preliminary Site Characterization — *Identify problems*

Remedial Action Plan (RAP) — *A RAP is used to evaluate short and long term cleanup alternatives*

Remedial Action Plan — *Comprehensive RAP to be submitted in 2017 for long-term issues*

RAP Monitoring — *To continually monitor the effectiveness of the RAP*

Smoky Canyon Mine

Active Status: Remedial Investigation/Feasibility Study in progress.

Aerial photo of Treatability Study for selenium-contaminated surface water.

In 2016:

Completed final inspection of the cover for the Pole Canyon Overburden Disposal Area.

A Treatability Study to evaluate the Fluidized Bed Reactor (FBR) as a method for reducing selenium in surface water began in 2015 and will continue into 2017. There are two phases:

Phase I

- Began in 2015
- Treated 250 gallons per minute (gpm) of selenium contaminated water

Phase II

- To begin in fall 2017
- Adds an additional FBR, as well as ultrafine filtration and osmosis systems, to increase the volume of surface water treated to 2,000 gpm.

Path Forward:

Treatability Study - Phase II
Continued from 2015; evaluates fluidized bed reactor (FBR)

Feasibility Study
Development, screening & evaluation of potential cleanup alternatives

Proposed Plan
Identifies the preferred cleanup alternative

Public Comment Period
Stay tuned for more information on how to participate

South Rasmussen Mine

Active Status: Remedial Action Plan in progress.

In 2016:

Investigation and monitoring activities at South Rasmussen Mine:

- Performed groundwater quality fate and transport modeling as well as additional groundwater sampling
- Continued surface water and groundwater sampling
- Installed three temporary alluvial (shallow) wells in Watershed A to evaluate potential source of increasing selenium concentrations
- Evaluated Horseshoe Overburden Area (HOA) groundwater because of higher selenium concentrations

Activities at the Horseshoe Overburden Area (HOA):

- Expanded Permeable Reactive Barrier (PRB) system around toe of the HOA
- Constructed a pond to temporarily hold excess water that might not infiltrate during spring runoff
- Installed a return flow system to move water from holding ponds back to the PRBs for treatment
- Placed rock-filled drains along drainage channel to direct water into subsurface for treatment by the PRBs

Installation of a permeable reactive barrier.

The Horseshoe Overburden Area at South Rasmussen Mine.

Path Forward (Ongoing Work):

Remedial Action Evaluation (REA)
To evaluate potential remedial actions

REA (Cont.)
Watershed A Groundwater Investigation

REA (Cont.)
Haul Road Pond & Stormwater Pond Areas Groundwater Investigation

REA (Cont.)
Improvement of Water Management at the Site

DEQ employee monitoring habitat/water quality near a mine.

Send a note to Jordan Davies (Jdavies@northwindgrp.com) to be added to our mailing list, or to receive future updates electronically.

For more information:

Ballard, Enoch Valley, and Henry Mines

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Conda/Woodall Mountain Mine

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South and Central Rasmussen Ridge Area

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