



environmental sustainability

Ecological Restoration - Our Own Higher Standard

Helping to preserve our environment for people, plants, wildlife, and communities is a key focus of our work at Bayer's P4 business, which does phosphate mining and phosphorus manufacturing. When it comes to phosphate mining, our aim is simple: To leave as few traces of mining as possible and, where feasible, leave the land in better condition than it was. Bayer employees have expertise in a wide range of scientific fields, including biology, entomology, botany, and plant genetics, which is unique in the mining business and enables the company to craft innovative solutions to mine sustainability. Furthermore, Bayer hires additional engineers and geologists to ensure the phosphate ore (and the phosphorus derived from it) is obtained

In terms of sustainability, the Caldwell Canyon mine has the potential to be the most advanced and innovative mine in the nation.

We hold ourselves to our own high standards. While the traditional drivers of a mining company's reclamation program are legal standards and permit conditions imposed by government agencies, Bayer uses these required components as a foundation, and then builds on them to produce something much more than "reclamation." Our approach is **ecological restoration**, which means holistically bringing back — in full function — the key environmental systems that were present before mining. This requires baseline environmental characterization before mining to identify key ecological functions, and then working during and after mining to either (1) avoid disrupting those functions, or (2) systematically re-establish them.

An Unprecedented Environmental Standard |||

As an example, compare these differences in just a few mine reclamation activities:

Ecological Restoration

Carefully manage topsoil to preserve the original mix of healthy soil microbes: stockpile topsoil only minimally, replacing it as soon as possible, even concurrent with active mining. When replacing topsoil, be mindful of the mycorrhizal (a helpful soil fungus) content and be prepared to inject additional microbes when needed.

Design mining plans to minimize cliffs or "high walls." Replace "fill" material to, as much as possible, restore the original contour and terrain that existed pre-mining, while minimizing erosion potential.

In addition to the required grasses, add plants and shrubs that (1) will help the area rapidly reach the comparable plant succession found in surrounding vegetation, (2) bring native pollinators back into the area, and (3) reflect the key plants that local wildlife species rely upon for food and shelter. Preserve intact patches of original vegetation, including root masses, to later re-establish in the restored landscape.

Reclamation Requirements

Cap mined areas with a clean growing medium.

Avoid erosion by replacing "fill" materials without exceeding 3-to-1 slope ratios.

Plant a mix of different grass species.

A History of Raising the Bar

Mining to provide ore for phosphorus production in Soda Springs started in 1951. From those earliest years the philosophy of ecological restoration has advanced along with science.

Re-vegetation. That first mine in 1951 was also the site of some of the first US experiments in re-establishing trees and shrubs on mined land, as well as developing reclamation seed mixes and soil configurations that minimize erosion. Bayer practiced this in conjunction with the US Forest Service's Forestry Sciences Laboratory in Logan, Utah on both Bayer's land and state-controlled lands.

Backfill. The company also has pioneered the practice of backfilling pits. Bayer began backfilling in 1978. Backfilling behind mining has now become an industry-wide best practice and has matured to the point where Caldwell Canyon will have no external waste piles whatsoever. Before a "pit" exists at Caldwell Canyon, initial overburden will be hauled to the open pit end of a neighboring non-Bayer mine and used in restoration efforts there.

Selenium. When ecologists identified selenium leaching from phosphate mines in the late 1990s, it was Bayer who pioneered best mining practices to isolate and encapsulate selenium-laden overburden to inhibit leaching mechanisms, ensuring contamination doesn't reach nearby waters, above or below ground.

Valuing Biodiversity

In surveying wildlife habitat at Caldwell Canyon, federal agencies determined that some of the land could be suitable for the Greater Western Sage Grouse. Since there was no observed local sage grouse population, there were few sage grouse-specific elements required by mine plan regulations. Bayer recognized an opportunity to help a struggling species and developed an approach to sage grouse habitat that has since been highlighted as a best practice by the Western Governors' Association. Bayer's approach has also received positive reviews from several local environmental organizations.

The details of that approach can be found at CaldwellCanyon.com/grouse.

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