

# the Horizon

Issue 2 | Volume 3 | 2013

## Intrepid Expands Domestic Potash Production

What would you do if about \$3 Billion was buried in your backyard? At Intrepid Potash's New Mexico facilities, located thirty miles northeast of



**Underground Potash Pillar**

Carlsbad, this question really hits home. There is a large ore body of potash under the ground that could generate five million tons of potash at its New Mexico facilities using solution mining.

So what is potash? Potash is a mined salt that contains potassium chloride and is most widely used as a fertilizer. The use of potash helps farmers get a better yield per acre for their crops. If you ate your vegetables like your mom always told you to do, potash was most likely

used to help grow them. The United States imports over 85% of its potash. Consequently, the quick development of the HB Solar Solution Mine project was critical for Intrepid in order to increase domestic production for its customers.

Potash has been conventionally mined in the Carlsbad area since the early 1930s by human labor and machines. The heart of this potash industry is a labyrinth of man-made tunnels and mine workings 700 to 2,200 feet below the surface. The tunnels are 32 feet wide on average and from 4 to 14 feet high. The underground workings lie beneath the arid rolling plains 25 miles east of Town. If the tunnels were placed end-to-end, they would extend over 12,000 miles, or almost halfway around the earth.

Large columns of material (pillars) were left behind from the early conventional mining

operation to support the roof of the mine workings and still contain good ore. Solution mining can safely recover the potash left behind from conventional mining. Without solution mining the un-mined potash would remain in place, squandering this valuable resource. Intrepid's Moab, Utah Facility has been using solution mining for over 40 years.

Solution mining is accomplished by injecting a salt-saturated

brine into the previously mined workings. The brine dissolves the remaining potash left from the conventional mining. Once the brine is saturated with the potash it is extracted as a liquid from the mine and pumped into lined ponds and allowed to evaporate. As the water in the brine evaporates, salt and potash precipitate out of solution. The salt and potash is then harvested and sent to the mill to be separated and prepared for sale to the customer.



**Scraper Harvesting Potash**



**Construction Phasing for Quick Delivery**

Intrepid recognized the value of the HB Solar Solution Mine Project as a way to increase production of potash in a low cost manner. Intrepid will use six injection wells to fill the idled mines (that had been conventionally mined) with the brine mixture to dissolve the remaining potash. The resulting potash-laden brine will then be extracted out of the mines by five wells and delivered via 37 miles of pipeline to the solar ponds. In addition to the injection and extraction wells, four wells (Rustler wells) were built that supply salty non-drinkable groundwater for use as makeup water for the injectate brine.

After a four-year environmental approval process, Intrepid elected to have this project delivered on a design-build basis to speed up the completion of the project. The solar ponds were completed by a design/build team of Sunrise Engineering and CSW Contractors. The collaboration with Intrepid, CSW and Sunrise during the design process resulted in a final design that met Intrepid's requirements for operation and maximized the total pond surface area. The design also minimized the amount of earthwork required for constructing the ponds. The project was completed in phases so that Intrepid could begin operations as quickly as possible.

The final design of the ponds resulted in a total of 18 ponds with 505 acres of pond surface area. The ponds are bisected by a

central two-way haul road used for harvesting the potash from the ponds and transporting it to the slurry pit where the potash is pumped to the mill for processing.

A total of 3.3 million cubic yards of dirt were moved to build the solar ponds. For some perspective, this volume is a little larger than the size of the Great Pyramid of Giza in Egypt (3.2 million yards). To ensure that the ponds did not leak or leach salt into the native ground the ponds and haul road were lined with a HDPE liner. As part of the design/build team, Field Lining Systems, Inc. installed over 24 million square feet (equal to about 500 football fields) of 60 mil HDPE liner. At the time of its construction it was the largest liner project in North America. To protect the liner during harvesting operations, twelve to eighteen inches of hardened salt was placed over the liner at the bottom of the ponds and the haul road.



**Completed Project**

**"The HB Project was a critical piece of growing Intrepid's potash production by 20% and producing these additional tons at low operating costs. We pushed hard to expedite the permitting and construction of the project and relied on a design-build delivery method to meet our accelerated schedule."**

**—Kevin Ryan, Director of Technical Services, Intrepid**

Construction began in May of 2012 and was completed in November 2013. The HB Solar Solution Mine Project will yield five million tons of potash over an estimated 28-year lifespan.

Intrepid is the largest producer of potash in the United States. It operates five potash production facilities; two in Utah and three in New Mexico.

By Chris Moore, and Greg Potter, P.E., Sunrise Engineering

## Environmental Assessments — Critical in Mining Development

Environmental assessment (EA) is a planning and decision-making tool to promote sustainable development. By



**Atlanta Mine EA**

predicting and evaluating the potential environmental effects of a project before it begins, there is an opportunity to mitigate the potential impacts of the undertaking on the environment. For the public, this process ensures natural resources are protected. For the proponent, this promotes better project planning, ultimately saving time and money.

For a mining project, an EA is required when federal actions are necessary. For example, a mining company proposes to perform exploratory drilling operations to define the extent and nature of the quality and quantity of minerals on public lands administered by the Bureau of Land Management (BLM). The total proposed surface disturbance is greater than five acres, so an EA will need to be prepared.

An EA is a site-specific analysis of potential impacts that could result from the implementation of a proposed action or its alternatives. The EA assists the federal agency involved in project planning, ensuring compliance with the National Environmental Policy Act (NEPA), and determining whether any "significant" impacts could result from the analyzed actions. An EA provides evidence for determining whether to prepare an Environmental

Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). A FONSI is a document that briefly presents the reasons why implementation of the selected alternative would not result in "significant" environmental impacts. If the decision maker determines that this project would have "significant" impacts, then an EIS would be prepared. If not, a Record of Decision (ROD) may replace the EA that approves the alternative selected.

Generally, preparation of an EA is the responsibility of the lead federal agency. However, an agency can allow a consultant to prepare an EA at the request of a mining company (proponent of a proposed action) and then the lead federal agency will review the EA. The benefit of using a consultant to prepare an EA is that the NEPA process can be accelerated by the higher efficiency of consultants. It takes years for a federal agency to complete an EA. If a consultant is used, it generally takes half the time required by a federal agency. If time is of the essence, consultants should be used.

Recently, Sunrise prepared an EA for Meadow Bay Gold Corporation's proposed exploratory drilling program to further define the extent and nature of the quality and quantity of minerals within the claim boundaries at Atlanta Mine. The proposed drilling activities would be performed on 11,365 acres of public lands administered by the BLM. The BLM's goal was to complete the EA within two years. With Sunrise's involvement, the EA was completed in less than one year.

By Dao Yang, P.E., Sunrise Engineering



## Mining Permitting

Requirements for mining permitting in the West, vary from state to state.

In Wyoming, mining permitting is handled by the Wyoming Department of Environmental Quality. Specific permitting requirements exist under the Land, Air and Water Quality Divisions. Mining requirements in Wyoming may be investigated at <http://deq.state.wy.us>.

The Land Division is the lead agency in mine permitting. Under the Land Quality Division, mining is divided into two categories; Coal and Non-coal.

The requirements for establishment of a coal mine are generally more involved than for non-coal mines and all coal mines are considered Large Mines.

Under non-coal mines, three categories of mining exist: 1) Limited Mining Operation (LMO) which involves a total disturbance of 15 acres or less. LMO's require the least amount of permitting. 2) Small Mine Permit applications cover mines that will disturb 10 acres or less per year and disturb less than 35,000 cubic yards of overburden. 3) Large Mine permitting covers mines which will disturb more than 10 acres per year or disturb more than 35,000 cubic yards of overburden.

In Utah, The Department of Natural Resources, Division of Oil, Gas and Mining oversees the permitting of mining operations. Permitting is divided into coal and non-coal mining. Regulatory requirements for coal mining permitting are contained in the document, "State of Utah, Coal Regulatory Program, Technical Analysis and Findings Review Guide" found at the Division of Oil, Gas and Mining website - <http://linux1.ogm.utah.gov/WebStuff/wwwroot/division/tabs.html>. Permitting requirements for non-coal mining are also located at the above website. (Continued next page)



## SUNRISE ENGINEERING, INC.

25 East 500 North  
Fillmore, UT 84631

## Mining Permitting

*(Continued)* In both Wyoming and Utah, permitting requirements will involve similar components. These components may include:

1. Air Quality
2. Water Quality (surface and ground water)
3. Access to Federal, State, County or City roadways
4. Federal, State, County or City use permits
5. Mapping and survey
6. Soil, vegetation, wildlife, cultural resources, historical, climatological, and wetlands investigations
7. Mine Plan
8. Reclamation Plan

Pre-application conferences are generally requested by the agency overseeing the permitting so they may communicate the steps required in their particular permitting process. The applicant is asked to provide as much detail as possible concerning the proposed mine at the pre-conference meeting, including target dates and milestones for completion.

By Clyde Rainey, Sunrise Engineering

## Fourth Consecutive PSMJ Award Confirms Sunrise's Commitment

**November 13, 2013, Newton, Massachusetts—**

PSMJ Resources, Inc. (PSMJ), the premier management consulting firm for the architecture/engineering/construction (AEC) Industry, recently announced the winners of the 4th annual Premier Award for Client Satisfaction.

Sunrise Engineering was one of twelve firms to receive the Award, making it one of only two firms that have received this prestigious honor for four consecutive years. The Premier Award, presented in partnership with Client Feedback Tool, honors Architecture, Engineering and Construction firms that provide their clients with top quality communications, impressive performance and cost effective solutions.

Winners were selected based on both the quality of feedback received and the quantity of replies. Feedback quality is measured by score, but also by consistency and the ability to avoid abnormally low scores. The average evaluation of the winning firms centered in the range of "Exceeded expectations" – thus clients rated them as significantly more client-focused than the other firms.

Sunrise Engineering appreciates its loyal clients that have made this fourth consecutive Award possible.

