HB In-Situ Project

Intrepid Potash - New Mexico, LLC

Eddy County, New Mexico

Description of the Proposed Action

The proposed action consists of an in-situ, solution mining operation in Eddy County, New Mexico. The project is designed to recover and process potassium chloride ore from pillars and limited adjacent areas of the back, floor and ribs from former underground workings which are no longer economically recoverable via conventional mining techniques. The area proposed for potash extraction occurs within existing Intrepid leases. Limited surface disturbance would occur in the form of surface pipelines, well pads, utility conveyances, solar evaporation ponds, and a new processing mill. Surface disturbance would primarily occur on Intrepid owned land but also on BLM, State of New Mexico, and other deeded surface. The proposed operation has a projected duration of approximately 28 years and would provide significant contributions to the local economy.

Components of the Proposed Action

- Extraction and conditioning of groundwater from four Rustler Formation wells to form an injectate solution.
- Injection of the injectate solution via six injection wells and a surface piping system into the lower portion of four separate former underground mine workings areas.
- Extraction of the resulting pregnant brine from the underground mine workings via five extraction wells.
- Pumping the brine via a surface piping system to solar evaporation ponds where the potassium and sodium salts (KCl and NaCl, respectively) are precipitated.

- Harvest of precipitated potash and salt at the solar evaporation ponds and transport to a new flotation mill (New HB Mill).
- Refinement of ore to marketable product at the New HB Mill and the existing Intrepid North Plant. Recycling of NaCl tailings to condition the injection source groundwater.
- Reclamation of all project components upon ore depletion and process infrastructure/equipment use termination.

Extraction and Conditioning of Injectate: The primary source of groundwater to form injectate would come from four (or more) groundwater wells, located north and east of the solar evaporation ponds, along a pipeline alignment to the New HB Mill. These production wells would extract groundwater from the Rustler Formation, which is documented to historically produce large quantities of high total dissolved solids (TDS) water. The Rustler production wells would be approximately 400 to 500 feet (ft) deep.

The Rustler water would be pumped via submersible pumps through a 14" diameter high-density polyethylene (HDPE) surface pipeline to the New HB Mill area for NaCl saturation prior to being routed back to the injection well system.

Rustler groundwater would be pumped via submersible pumps through HDPE pipelines from the production wells to the New HB Mill area for conditioning, prior to being routed back to the workings via a separate pipeline system to the injection wells. During initial filling, salt to make saturated injectate will be obtained from existing West Mine Facility tailings discharge. Once the New HB Mill begins processing harvested salts (from the solar ponds) the separated NaCl tailings will be used to condition the injectate. Two of the production wells are anticipated to be in production continually, with an additional well for use during initial leach lake filling and during dry periods; one well would be reserved as back up.

Each production well would be completed with a fenced, bermed, concrete pad to support surface instrumentation, provide a maintenance surface, provide containment and provide for well casing integrity. Each of the Rustler water supply wells would include automated monitoring systems, controls, and backflow preventers to maintain flood level control and protect well integrity.

Injection and Extraction Well Networks: The project is proposed to consist of six injection wells, five extraction wells, and three monitoring/extraction wells to facilitate the injection and extraction of process brines to and from the former workings. The design of these wells includes triple casing/cementing and the use of specific construction materials to function in a saline environment and would be subject to UIC permitting and associated requirements through a Discharge Permit from the State of New Mexico. Even though they are classified as Class V injection wells, they would be constructed to comply with Class I injection well requirements (the most stringent). Well annular space and column pressure-sensing equipment would further ensure and document integrity. All wells will include an automated monitoring system to support operations and maintain maximum underground workings flood elevations.

Well locations were sited to access appropriate zones within the former underground workings. The final well sites and associated access, piping and power supply alignments were also located based on protection of resources as identified by field inspection by BLM resource specialists. Intrepid engineers and BLM staff conducted an on the ground analysis to ensure that each well site could be accessed by drilling equipment and to address any natural resource concerns, as well as confirm that well pads could be adequately constructed and reclaimed at the end of the useful life.

Access to all well locations would be constructed to minimize surface disturbance. All drilling access corridors would follow existing developed and/or undeveloped roads and trails whenever possible. Surface disturbance would range from no further roadway or well pad development, to grading and placement of approximately 6 inches of crushed caliche base in areas where modifications are needed. At the end of the project, all newly disturbed areas would be reclaimed by removing any imported materials, grading, and reseeding.

Each well would be completed with a fenced concrete pad to support continued operation and maintenance and provide casing integrity. All injection, extraction, and monitoring wells would include automated control systems to monitor and maintain production (flow rates and pressures), flood pool elevations, and well integrity.

Injection of Injectate into Former Underground Workings: Conditioned injectate, made up with NaCl saturated brine, would be injected to create four underground leach lakes in the lower portions of previously abandoned subsurface mine workings. Portions of four separate mining units (HB Eddy, HB South, HB North, and HB Crescent) would be individually flooded, using discrete injection wells specific to each flood area. The areas for the underground lakes were purposely selected to have the injected water collect in low lying areas of the mine against a solid mine face or mine floor elevation increase. The water elevation would not exceed a predetermined height (as presented below) to keep the brine from moving into non-target areas of the mine. Maintaining these maximum flood elevations will contain the brine in known low areas and prevent flooding of other mining operations down-slope of the solution mining operation.

Mining Unit	Bottom Elevation (ft mean sea level)	Maximum Flood Elevation (ft mean sea level)
HB Eddy	2,575	2,675
HB South	2,375	2,525
HB North	1,975	2,325
HB Crescent	2,050	2,200

It is anticipated that the filling process would start at the HB Crescent and HB North units, as these units have the benefit of the most complete data and analysis regarding pillar area and ore quality. Fill sequence is dependent upon several site-specific factors. Each of the four individual workings would be flooded discretely using injection wells specific to that unit. As each unit is filled, flow rates, injected volumes, and leach lake elevations and brine quality would be monitored and assessed.

Injection Wells: Six injection wells would be located to allow the injection of conditioned brine up to the maximum flood level of the former potash mine workings. Conditioned injectate would be composed of Rustler groundwater and NaCl. A flow rate of up to a maximum 2,000 gpm would be divided between the six injection wells and sequenced to facilitate strategic filling of the mine units.

The injection system would be composed of a network of valves, manifolds, and automatically monitored and controlled surface HDPE piping (12 to 16 inches in diameter) to provide variable flow to the various mine units as needed. Pumping

rates would range from 0 to 2,000 gpm per well and up to 160 pounds per square inch (PSI) and individual mine units would take from one month to 70 months to fill depending on applied pumping rates and subsequent withdrawals.

Extraction Wells: Over time, the leach lakes would dissolve potash remaining in the former workings. The pregnant brine would then be recovered through the five extraction wells positioned at the lower portions of the former workings. Extraction wells would also be used to monitor fill elevations for flood control and to collect brine for quality monitoring. Each well will be equipped with instrumentation to allow flow rates and pressures to be monitored, and the static brine level (elevation of the flood pool) to be monitored, recorded, and connected to an automated alarm/shutdown system. This monitoring and control system will provide automated safeguards to maintain the flood pool elevations at or below the maximum levels.

The extraction brine is expected to contain approximately 21.7 percent NaCl and 7.0 percent KCl. Pregnant brine pumped from the extraction well network would be conveyed to the solar pond system using HDPE pipelines of sufficient diameter and strength to handle flows up to 3,200 gpm at pressures up to 160 PSI. Extraction pipelines are proposed to be surface HDPE lines ranging from 14" to 16" diameter HDPE depending upon location. Once the brine in the workings reaches maximum flood elevations, flow will be controlled so that the injection flow rate will approximately equal the average extraction flow rate of 1,100 gpm.

Monitoring/Extraction Wells: Three monitoring / extraction wells are proposed to be installed in strategic positions within the former workings (HB 2 NE and Saunders) down-gradient of the proposed flood zone and immediately up-gradient of the former Saunders and existing Intrepid West mines. The well location and design are integral to an "early warning system" that would detect the presence of injectate brines prior to their intersecting down-gradient Saunders, Intrepid and Mosaic workings. All of the monitoring/extraction wells would be equipped with automated monitoring systems to detect and report any encountered brines. Each well would also be installed and equipped with the infrastructure and equipment (pumps, power, pipelines, etc) needed to extract encountered fluids so as to prevent a structural or safety issue from the fluid migration. This system is designed as a safe-guard against the remote possibility

that injected brines migrate to areas outside the designed flood zone. Not only would the monitoring wells detect and report potential brine excursions but would also activate planned actions to decrease injection and increase extraction to further control any unexpected brine migration.

Automated Brine Monitoring and Control: As previously prescribed, control of the flood level elevation (depth of the leach lake) is essential in maintaining correct operating parameters of the proposed system. A fully automated monitoring and control system is proposed as follows:

- Down-hole monitoring and data recording instrumentation in each of the 6 extraction wells.
- Down-hole monitoring and data recording instrumentation in the 3 monitoring/extraction wells.
- Well head monitoring facilities (pressure, flow, voltage, amperage, annular pressure, selected water quality parameters, pump controls, etc)
- A centralized data acquisition and control center to manage data, control all injection and pumping rates, effect alarms and automated contact trees, and allow manual overrides/adjustments.

All automated processes will be verified on a regular inspection schedule including: calibration, manual measurement verification, visual inspection, and field O&M procedures.

Solar Evaporation Pond System and Transport to the New HB Mill: Pregnant brine would be routed from the extraction wells directly to the proposed solar evaporation pond system located on Intrepid property in T21S, R29E Section 2. The solar evaporation pond network would be composed of an estimated 23 to 26 ponds approximately 20 - 25 acres each for an anticipated total of 520 acres of solar pond storage. The ponds will be designed to hold 2 ft of brine and incorporate 18 - 24 inches of freeboard to contain all brines plus precipitation plus wave action. The solar pond system will generally consist of a network of discrete, flat bottomed, terraced ponds to correspond to the existing topography. Existing surface materials will be graded (cut and fill), screened, and compacted to appropriate engineering standards to form the subgrade surface. A geosynthetic liner sequence will be placed over the engineered subgrade. An 18 inch permanent protective layer of salt will be placed and

allowed to set up as a hard layer over the geosynthetic liner system. The final design feature involves the installation of an automated laser or global positioning system (GPS) control system to determine and control all scraper cut depths to assure that the protective salt layer and geosynthetic sequence will not be breached.

The ponds will be continually filled via a piping manifold network and evaporation will concentrate the brine to a point where the NaCl and KCl precipitate out as solids. At a point where undesirable salts can precipitate (and sufficient KCl has precipitated), the ponds will be drained (with bitterns routed for further evaporation) and the precipitated product will then be harvested by scraper. The solid product will be hauled to a slurry mixing facility within the solar pond system, where a slurry will be created and pumped to the New HB Mill located adjacent to the existing West Mine Facility via pipeline. Each pond will be intensively managed and harvested approximately once per year.

Potash Ore Processing: The ore harvested from the solar ponds will be pumped through a pipeline in slurry form to the New HB Mill for further beneficiation. The potassium and sodium chloride are separated in the flotation mill using an amine flotation process. After flotation, standard classification, filtration and dewatering methods are utilized to further concentrate the solid potassium chloride product before it is transported from the New HB Mill to the North Mine facility for drying, grading and preparation for sale. The sodium chloride by-product generated (NaCl tailings) in the flotation process will be recycled and added to the Rustler source water to make additional injectate.

Recycling NaCl Tailings to Condition Injection Source Groundwater: The NaCl tailings from the HB milling process would be dissolved and returned to the solution mining operation as a conditioning agent for the Rustler source water. During initial filling, and periods when salt is not available from the New HB Mill, tailings from the existing Intrepid West facility will be used to condition the injectate solution.

Support activities related to the Proposed Action

- Pipeline system
- Lift and booster stations
- Utilities and access roads

Initial configuration of all infrastructure components is complete and final designs may vary from the specifications presented herein as final design and construction activities commence.

Pipeline System: A series of surface HDPE pipelines would be used to convey all fluids associated with the HB In-situ Project as follows:

- Rustler Source Line – from the Rustler water supply wells to the New HB Mill area (including tailings facilities from the existing West Mine Facility) – 14 inch diameter.
- Injectate Line – from the New HB Mill area to the injection wells – 12 to 16 inch diameter.
- Pregnant Brine Line – from the extraction wells to the solar ponds – 14 to 16 inch diameter.
- Dilution Line – from the existing Cap Rock fresh water line to the extraction wells – 4 to 6 inch diameter
- Harvested Slurry Line (and return) – 14 to 18 inch slurry line from the solar pond slurry pit to the New HB Mill
- Other lines may be added and sizes modified as needed

The pipelines are proposed to be surface installations throughout the piping network, except where natural resource mitigation or access requirements dictate localized burial or ramps. The pipelines will also incorporate regularly spaced ramps and/or localized burial to facilitate access and surface water drainage. Wherever possible, the pipeline alignment will take advantage of developed and undeveloped roads and ROWs. The alignments have also been designed to avoid steep topographic areas that would adversely affect pumping requirements and create undue surface disturbance.

Pipelines would be laid on the undisturbed ground surface or on a minimally prepared bedding surface (fine sand or other designed material) as needed. Where burial is required, shallow trenching, ramping, or bored conduit would be utilized. Where multiple pipelines are present, the various pipes would be laid next to each other in a piping bundle. All piping is proposed to be composed of black, UV resistant, HDPE that is extrusion welded or joined with bolted flanges. All pipelines would be pressure tested and all construction and testing procedures would follow standard engineering and industry protocols. Soil

ramps and/or localized buried sections will be constructed over the pipeline(s) at appropriated locations or pre-established intervals to enable wildlife and livestock as well as other required access (vehicles, etc) to cross the obstructions. In the Hackberry Recreation area, the pipelines will be buried at locations which may have an impact on off-highway vehicle (OHV) use and recreation. Pipeline bundling where proposed shall be spaced adequately to allow crossing of livestock and wildlife. Specific design characteristics regarding piping size, flow rates and pressures are subject to final design modifications.

The pipelines would be monitored and controlled through regular field inspection and automated sensing and shutdown equipment to minimize the potential of discharges or leaks of the transported brines. Pipeline monitoring, spill response, and remedial actions are presented in the Mine Operations and Closure Plan.

Lift and Booster Stations: Because of distance, friction loss, and topographically induced pressures, a series of booster stations would be used in conjunction with the submersible pumps located at extraction wells and pumping stations at the New HB Mill and solar pond slurry pit. Booster pump design includes in-line submersible pumps or equivalent pumping systems that can vary flow rates over substantial ranges. Alternate designs could include centrifugal pumps supplied by underground or aboveground surge tanks constructed of fiberglass, lined steel, or lined reinforced concrete at each booster station. All designs would include check valves to account for anti-backflow or siphon conditions and instrumentation to monitor pipeline performance and adjust interdependent flow rates and pressures.

The booster stations are currently proposed to be situated near well heads and would incorporate a pump house and power pole within a fenced area. Surge tanks may be included at each booster station. Installation of low profile tanks and painting aboveground structures a natural color would mitigate impacts associated with visual resource values. Based on final design requirements, booster stations may be required at other locations.

Utilities and Access: The proposed development would require electric power to be supplied to extraction wells and booster stations. Access to wells, pipelines, and power lines would be required in order to operate and maintain the production systems.

Electric service would be provided to the extraction wells and booster stations via overhead lines. Existing lines would be used wherever possible to minimize disturbance. New lines would utilize existing ROWs to the greatest extent possible. Access roads would be required along each pipeline and power corridor and to each injection or extraction well to facilitate access and O&M. Existing roads and trails have been incorporated into the project design wherever possible. The access road system would be used on a regular basis for inspection and maintenance for the life of the project.

Right-of-Ways: The piping runs, access roads, and utility corridors are located on Federal, State of New Mexico, and fee surface lands. Fifty foot wide ROWs will be required for the construction and operation of pipelines, utilities, and access roads.

Relocation of Existing Utilities: Within Section 2, T21S, R30E (the solar pond area), three Xcel overhead power lines, two New Mexico Gas underground gas lines, and one ATT fiber optic line will require relocation. These lines will be relocated within Section 2 (Intrepid fee surface) in consultation with Xcel, PNM, and ATT prior to construction of the solar ponds.

Reclamation Plan

The expected operating lifespan of the proposed HB In-situ Project, considering the ore reserve estimates and extent of flooding, is approximately 28 years.

Following removal of pregnant brine from the underground workings for final processing and completion of mining operations, all wells would be plugged and abandoned in accordance with applicable rules and regulations. All ancillary equipment associated with the HB In-situ Project would be abandoned, demolished, razed, and recycled or transported to an appropriately permitted local landfill for proper disposal. No structures associated with the HB In-situ Project would remain on site following final reclamation and restoration activities. Following the removal of all structures and infrastructure components, disturbed areas will be regraded, seed beds will be prepared, and native seed mixtures will be applied. The demolition and revegetation effort is intended to return the property to an appropriate and beneficial post-mining land use similar to pre-project conditions.

Reclamation of Infrastructure Located on BLM, State, and Private Lands: The network of injection, extraction, Rustler production wells, and the monitoring well network located on state and federally managed lands would be abandoned as per State and Federal requirements, generally as follows:

- Removing pumps, injection/discharge columns, and surface appurtenances
- Demolishing and removing concrete pads, berms and fencing
- Cutting off aboveground well casing at the ground surface
- Installing a bridge plug near the bottom of the injection and extraction wells
- Circulating a cement/grout mixture from the bottom of the hole to surface return
- Setting a location monument at the well site

The pipeline runs and booster stations to be located within the project boundary for conveying production water, injection/extraction brine, or product delivery would be drained (product contained and disposed of), removed, cut up, and properly disposed if they could not be recycled as scrap or other alternative reuse material.

The remaining disturbed areas (piping runs, drill pads, power ROWs, roadways, and miscellaneous support areas) are largely impacted only by compaction. Generally, reclamation would involve the following:

- Removing piping runs, power poles, and lines
- Removing any imported materials
- Grading as necessary to approximate surrounding contours and drainage
- Ripping, seed bed preparation, and reseeding

Reclamation of Intrepid Facilities: Upon the end of useful life, all infrastructure and facilities associated with the HB In-Situ Project on private surface lands will also be demolished and reclaimed.

The New HB Mill would consist of a new building, flotation plant, and clarifiers. Surface impacts are limited to compacted surfaces. Reclamation would consist of structure demolition/removal, site grading, and site ripping, and reseeding.

The solar pond system includes approximately 23 to 26 individual ponds within the 520-acre complex. Reclamation of the solar pond facilities would consist of:

- Mechanical removal of stored salts/brines and hauling/deposition in the existing Intrepid West tailings area
- Shredding of the liner and burial or removal and off-site disposal
- Grading and recontouring the berms to facilitate drainage and revegetation
- Grade and rip sub-liner engineered fill material
- Ripping and reseeding