APPENDIX Q—REASONABLY FORESEEABLE DEVELOPMENT SCENARIOS FOR MINERALS

INTRODUCTION

This appendix describes the Reasonably Foreseeable Development scenarios for leasable, locatable, and salable mineral commodities. The purpose of this information is to provide a model that predicts the level and type of future mineral activity in the planning area, and will serve as a basis for cumulative impact analysis as called for in the Supplemental Program Guidance for Energy and Mineral Resources (BLM Manual Section 1624). The Reasonably Foreseeable Development first describes the steps involved in developing a mineral deposit, with presentation of hypothetical exploration and production operations. Future trends and assumptions affecting mineral activity are discussed here, followed by the prediction and identification of anticipated mineral exploration and development.

SCOPE

The development scenarios are limited in scope to BLM managed lands within the planning area. The Reasonably Foreseeable Development is based on the known, or inferred mineral resource capabilities of the lands involved, and applies the conditions and assumptions discussed under Future Trends and Assumptions. Changes in available geologic data and/or economic conditions could alter the Reasonably Foreseeable Development, and some change is to be expected over time.

LEASABLE MINERAL RESOURCES

Oil and Gas

Future Trends and Assumptions

Based on the history of past drilling and the foreseeable development potential in the CFO, activity over the next 15 to 20 years would continue to be low. It is anticipated that oil and gas activity could consist of the issuance of one or two geophysical surveys and perhaps the drilling of one or two exploratory holes. However, it is noted that this level of activity is highly speculative due to the fact only three exploratory oil/gas wells have ever been recorded in the planning area. These wells were drilled in 1923, 1974, and 1982, and did not encounter any hydrocarbons. Also, because there is limited information concerning possible occurrence of hydrocarbons in the planning area, and no Known Geological Structure for oil and gas occurrence has been identified within the planning area, any activity associated with oil and gas could occur anywhere in the planning area.

Because of the low potential for development of hydrocarbons we do not anticipate the discovery of a producible oil and gas field during the period covered by this plan; however, the potential surface impacts associated with the exploration and development of a small oil/gas field are given in the following sections. The development and reclamation of oil and gas sites would be subject to the regulations found in 43 CFR 3100.

Geophysical Exploration

Geophysical exploration is conducted to determine the subsurface structure of an area. Three geophysical survey techniques are generally used to define subsurface characteristics through measurements of the gravitational field, magnetic field, and seismic reflections.

Gravity and Magnetic field surveys: These two techniques involve small portable measuring units which are easily transported via light off-road vehicles, such as four-wheel drive pickups and jeeps, or aircraft. Both off-road and on-road travel may be necessary in these two types of surveys. Usually a three-man crew transported by one or two vehicles is required. Sometimes small holes (approximately one inch by two inches by two inches) are hand dug for instrument placement at the survey measurement points. These two survey methods can make measurements along defined lines, but it is more common to have a grid of discrete measurement stations.

Seismic Reflection surveys: This technique is the most common of the geophysical methods and produces the most detailed subsurface information. Seismic surveys are conducted by sending shock waves through the Earth's surface. The waves are generated by a small explosion or through mechanically beating the ground surface with a thumping or vibrating platform. The thumper and vibrator methods pound or vibrate the ground surface using four large trucks (typically), each equipped with pads about four-foot square. The pads are lowered to the ground, and the vibrators are electronically triggered from the recording truck. Once information is recorded, the trucks are moved forward a short distance and the process is repeated. Less than 50 square feet of surface area is required to operate the equipment at each recording site.

The small explosive method requires charges to be detonated on the surface or in a drill hole. In the drill hole method, holes for the charges are drilled utilizing truck-mounted or portable air drills to drill small-diameter (two to six inch) holes to depths of 100 to 200 feet. Generally four to 12 holes are drilled per mile of line and a five- to 50-pound charge of explosives is placed in the hole, covered, and detonated. The shock wave created by the detonation is recorded by geophones placed in a linear fashion on the surface. In rugged terrain, a portable drill carried by helicopter can sometimes be used. A typical drilling seismic operation may utilize 10 to 15 men operating five to seven trucks. Under normal conditions, three to five miles of line can be surveyed daily using this method. The vehicles used for a drilling program may include heavy truck-mounted drill rigs, track-mounted air rigs, water trucks, a computer recording truck, and several light pickups for the surveyors, shot hole crew, geophone crew, permit man, and party chief.

The surface charge method utilizes one- to five-pound charges attached to wooden laths three to eight feet above the ground. Placing the charges lower than six feet usually results in the destruction of vegetation, while placing the charges higher, or on the surface of deep snow, results in little visible surface disturbance.

Public and private roads and trails are used where possible. However, off-road cross-country travel is also necessary in some cases. Graders and dozers may be required to provide access to remote areas. Several trips a day are made along a seismograph line, usually resulting in a well defined two-track trail. Drilling water, when needed, is usually obtained from private landowners.

During the life of this plan, it is speculated that one or two notices of intent involving seismic reflection and gravity/magnetic field surveys could be filed.

Drilling Phase

An operator would determine if they wished to pursue an oil and gas lease based on information collected during geophysical exploration. If a lease is issued, then the lessee would be required to submit an application for a permit to drill. Once the application for a permit to drill has been approved, the operator may begin construction activities in accordance with any stipulations and conditions. When a site is chosen that necessitates the construction of an access road, the length of road may vary, but usually the shortest feasible route is selected to reduce the haul distance and construction costs. Environmental factors or a landowner's wishes may dictate a longer route in some cases. Drilling activity in the planning area is predicted to be done using existing roads and constructing short (approximately 0.25-mile) roads to access drill site locations.

During the first phase of drilling, the operator would move construction equipment over existing roads to the point where the access road begins. No more than 0.25-mile of moderate duty access road with a cinder or gravel surface 18 to 20 feet wide is anticipated to be constructed. The total surface disturbance width would average 40 feet with ditches, cuts, and fill. The second part of the drilling phase is the construction of the drilling pad or platform. The likely duration of well development, testing, and abandonment is predicted to be less than 12 months per drill site. The total disturbance for each exploratory well and any new road constructed to that drill site is expected to be no more than six acres.

Based on past oil and gas drilling in North Idaho, it is speculated that one or two exploratory "wildcat" well(s) could be drilled on BLM land in the planning area. The estimated success rate of finding hydrocarbons is predicted to be less than ten percent, based on the average US wildcat well success rate and the lack of any indications of hydrocarbons in the planning area. The potential for oil and gas occurrence is low throughout BLM lands therefore target areas are unknown. The total surface disturbance caused by exploratory drilling over the life of the plan is projected to be no more than 15 acres.

Field Development and Production

No field development is expected to occur during the life of the plan. However, the following scenario describes operations and impacts associated with field development and production.

Small deposits of oil or gas discovered in the planning area would not be economic to develop. The minimum size that would be economic would be a field containing reserves of 50 to 60 billion cubic feet of gas over a productive lifespan of ten years. The total area of such a field would be 200 acres with a likely well spacing of 160 acres. The field would require four development wells in addition to the discovery well. Each development well would require 0.25-mile of road, likely cinder or gravel surfaced, and would have a width of about 20 feet. The width of the surface disturbance associated with roads would average 40 feet. Produced gas would be carried by pipelines estimated to average 30 to 60 miles in length, not all of which would necessarily be on BLM lands. The width of surface disturbance for pipelines would average 30 feet. Any produced oil would likely be trucked to transmission lines in Washington for delivery to the west coast. Well servicing requirements would be provided by established service companies.

The total anticipated surface disturbance would be; 8 acres for well pads, five acres for roads, 13 acres for field development, and 600 acres for pipelines. In the unlikely event that an economic field is discovered, the total surface disturbance caused by exploration and development over the life of the plan is expected to be between 620 to 630 acres.

Plugging and Abandonment

Wells that are completed as dry holes are plugged according to a plan designed specifically for the down-hole conditions of each well. Plugging is accomplished by the placing of cement plugs at strategic locations down-hole and up to the surface. Drilling mud is used as a spacer between plugs to prevent communication between fluid bearing zones. The casing is cut off at least 3 feet below ground level and capped by welding a steel plate on the casing stub. After plugging, all equipment and debris would be removed and the site would be restored as near as reasonably possible to its original condition.

It is predicted that the one or two exploratory wells drilled would be plugged and abandoned.

Geothermal Resources

Future Trends and Assumptions

With environmental protection and enhancement being a major consideration, clean, low-impacting energy sources are becoming more important. Although abundant geothermal resources are thought to be present in the Northwest (Washington, Oregon, Idaho, and western Montana), none have been identified in the planning area. As the demand for environmentally-friendly energy sources increases, the planning area could attract renewed interest.

There are no areas classified as a Known Geothermal Resource Area by the Idaho Department of Water Resources, which is responsible for geothermal evaluation in Idaho. The potential for developing geothermal resources is considered to be low, based on the data collected by the Idaho Bureau of Water Resources, which indicates the temperatures are not high enough to be ranked for future evaluation. The development and reclamation of geothermal sites would be subject to the regulations found in 43 CFR 3200.

Geophysical/Geochemical Exploration

In addition to the geophysical methods discussed in the Oil and Gas section, the following exploration techniques are often employed in geothermal prospecting:

Microseismic: Small seismometers are buried at a shallow depth (hand-dug holes) and transmit signals from naturally-occurring, extremely minor seismic activity (micro-earthquakes) to an amplifier on the surface. Stations are located away from roads to avoid traffic "noise." These units are often backpacked into areas inaccessible to vehicles.

Resistivity: Induced polarization techniques are used to measure the resistance of subsurface rocks to the passage of an electric current. A vehicle-mounted transmitter sends pulses of electrical current into the ground through two widely-spaced electrodes (usually about two miles apart). The behavior of these electrical pulses as they travel through underlying rocks is recorded by “pots” (potential electrodes), small ceramic devices that receive the current at different locations. The electrodes are either short (two to three feet) rods driven into the ground, or aluminum foil shallowly buried over an area of several square feet. Two or three small trucks transport the crew of three to five people to transmitting and receiving sites.

Telluric: A string of “pots” record the variations in the natural electrical currents in the earth. No transmitter is required. Small trucks are used to transport the crew and equipment.

Radiometric: Radioactive emissions (generally radon gas) associated with geothermal resources are usually measured using a hand-held scintillometer, often at hot spring locations. Another method used involves placing plastic cups containing small detector strips sensitive to alpha radiation either on the surface or in shallow hand-dug holes. If holes are dug, they are covered, and the cups left in place for three to four weeks. At the end of the sampling period, the cups are retrieved and all holes are backfilled. These surveys can be conducted on foot or with the aid of light vehicles.

Geochemical Surveys: Geochemical surveys are usually conducted at hot springs by taking water samples directly from the spring. Sampling for mercury associated with geothermal resources is often done by taking soil samples using hand tools. These surveys can be conducted on foot or with the aid of light vehicles.

Temperature Gradient Drill Hole Surveys: Temperature gradient holes are used to determine the rate of change of temperature with respect to depth. Temperature gradient holes usually vary in diameter from about 3.5 to 4.5 inches, and from a few hundred feet to about 5,000 feet in depth. They are drilled using rotary or coring methods. Approximately 0.10- to 0.25-acre per drill hole would be disturbed. A typical drill site could contain the drill rig, most likely truck-mounted, water tank(s), fuel tank, supply trailer, and a small trailer for the workers. Drilling mud and fluids would be contained in earthen pits or steel tanks. Water for drilling would be hauled in water trucks, or if suitable water sources are close, could be piped directly to the site. Water consumption could range from about 4,000 to 20,000 gallons per day under extreme conditions.

Other equipment that would be utilized includes large flatbed trucks to haul drill rod, casing, and other drilling supplies, and in some cases, special cementing and bulk cement trucks. Two or three small vehicles would be used for transporting workers. In most cases, existing roads would be used. It is estimated that short spur trails (usually less than a few hundred yards long) would be bladed for less than ten percent of these holes. All holes would be plugged and abandoned to protect both surface and subsurface resources, including aquifers, and reclamation of disturbed areas would be required, unless some benefit to the public could be gained; for example, a water well or camping area.

Depending upon the location and proposed depth of the drill hole, detailed plans of operation covering drilling methods, casing and cementing programs, well control, plugging and abandonment may be required.

Based upon past geothermal exploration in the planning area and the lack of an identified geothermal resource, it is anticipated that less than five notices of intent to conduct geothermal exploration would be filed during the life of this plan.

Drilling and Testing

Drilling to determine the presence of, test, develop, produce, or inject geothermal resources can be done only on planning area lands covered by a geothermal resources lease issued to an operator by the Bureau of Land Management. A typical geothermal well drilling operation would require two to four acres for a well pad, including reserve pit, and 0.5-mile of moderate duty access road with a surface 18 to 20 feet wide, totaling up to 40 feet wide with ditches, cuts, and fills. Existing roads would be used whenever possible. Total surface disturbance for each well, and any new road is expected to be no more than six acres. In some cases, more than one production well could be drilled from one pad. Well spacing would be determined by the authorized officer after considering topography, reservoir characteristics, optimum number of wells for proposed use, protection of correlative rights, potential for well interference, interference with multiple use of lands, and protection of the surface and subsurface environment. Close coordination with the State would take place. It is anticipated that the duration of well development, testing, and if dry, abandonment, would be four months.

Plugging and Abandonment

Prior to abandonment, the operator would be required to plug the hole to prevent contamination of aquifers and any impacts on subsurface and surface resources. Plugging is accomplished by the placing of cement plugs at strategic locations down-hole and up to the surface. Depending upon the formations encountered, drilling mud could be used as a spacer between plugs to prevent communication between fluid bearing zones. The casing is cut off at least three feet below ground level and capped by welding a steel plate on the casing stub. After plugging, all equipment and debris would be removed, and the site would be restored as near as reasonably possible to its original condition. A dry hole marker is often placed at the surface to identify the well location. If the surface owner prefers, the marker may be buried. Any new roads not needed for other purposes would be reclaimed.

It is estimated that one or two exploratory wells would be plugged and abandoned during the life of this plan.

Geothermal Power Plant Development

It is projected that no geothermal power plants would be constructed during the life of this plan. However, the following scenario describes operations and impacts associated with development of a geothermal power plant. Before geothermal development could occur, site-specific baseline studies and environmental analyses, with public involvement, would be done. The scenario below describes the level of disturbance that would likely occur from the development of a 24-megawatt power plant.

Five to seven production wells and one or two injection wells would be drilled. It is anticipated that access would be provided by existing roads, and the construction of short (0.5- to one mile long) roads with a surface of 18 to 20 feet wide, totaling up to 40 feet wide with ditches, cuts, and fills. Surface disturbance from well pad and road construction would probably range from two to six acres per well. The power plant facility, including separators, energy converters, turbines, generators, condensers, cooling towers, and switchyard, would involve an estimated five to ten acres. Pipelines and power lines would disturb an additional three to six acres. If a water cooling system is employed, 1 to 3 water wells, requiring about 0.25-acre per well, would be drilled, unless the cooling water was obtained from the geothermal steam condensate. Depending upon location, terrain, geothermal reservoir characteristics, and type of generating facility, total surface disturbance for a 24-megawatt (gross) geothermal power plant, and ancillary structures, would probably range from about 26 to 76 acres, or about one to three acres per megawatt. After construction, approximately one-third to one-half of the disturbed area would be re-vegetated. Prior to abandonment, 30 to 50 years later, the remaining disturbed area would be reclaimed.

Direct Use of Geothermal Energy

Low- and moderate-temperature (50 to 300 degrees Fahrenheit) geothermal resources have many direct use applications. Direct applications, and potential development scenarios, include space heating and cooling of residences and businesses, applications in agriculture, aquaculture, and industry, and recreational and therapeutic bathing. Depending upon the type of use and magnitude of operation, surface disturbance could range from a few acres for a well and greenhouses, or food processing facility, to tens of acres for larger agricultural or aquacultural developments.

It is anticipated that no direct use of geothermal energy will occur during the plan period.

Solid Minerals

Future Trends and Assumptions

The potential for the occurrence of solid leasable mineral resources (both energy and non-energy) has been rated as low to zero throughout the planning area. This information, coupled with the fact no leasing of solid minerals has occurred on BLM lands in the planning area over the past 20-plus years, strongly indicates there will be no future activity. As such, the potential surface impacts associated with solid minerals exploration and leasing is predicted to be zero and will not be discussed. If for some reason interest does pick up regarding solid minerals, then the appropriate inventories and NEPA compliance would be conducted to prevent unnecessary and undue degradation. Any activities related to these resources would be subject to the regulations found in 43 CFR 3400 and 3500.

Salable Mineral Resources

Future Trends and Assumptions

The major use of salable minerals (primarily sand, gravel, and crushed rock) would continue to be in support of federal, state, county, and private roads/highways; and to a lesser extent, sales of decorative stone to individuals for private purposes. It is anticipated the need for these resources will increase due to the continued urbanization of northern Idaho. Existing quarries and pits on Federal, State, and private lands are currently satisfying the demand for these resources; however, new site development on planning area lands is not precluded in this plan. These sites could occur anywhere throughout the planning area where not precluded by law or policy.

The development and reclamation of mineral material sites would be subject to the regulations found in 43 CFR 3600.

Rock Quarry, Sand & Gravel Pit Development

Developed material sites typically disturb approximately 15 to 20 acres of land each. This acreage is necessary for the mine itself, rock crushing operations, truck turn-around areas, access trails for bulldozers and drills, overburden stockpile sites, and aggregate stockpile areas. For access to a new quarry site, approximately 0.5-acre of land would be disturbed by new road construction.

Currently there are two authorized permits for stone (crushed) covering approximately 40 acres in the planning area, and one pending that would cover an estimated 40 acres. Also, two material rights-of-way have been issued to the Idaho Department of Transportation for use in highway and road construction and maintenance. These two rights-of-way cover 34.55 acres and are valid in perpetuity. It is anticipated that up to four new sites affecting an estimated 15 acres each would be opened up in the planning area during the next 20 years. Any existing pit expansion that causes surface disturbance beyond previously inventoried limits, or the development of any new site, would require resource inventories, site-specific NEPA compliance, and development and reclamation plans.

After all useable material has been removed, reclamation work would proceed according to an approved interdisciplinary plan. Upon depletion, reclamation work would be conducted on the material sites as well as on all unneeded access roads and trails. Oversize rock would be put back into the quarries or pits, and, where possible, cut-slopes would be graded to conform with the existing topography. Stockpiled topsoil would be spread over side-slopes and floors, and seeded as directed by BLM. Access roads and trails would be graded for proper drainage, scarified, and seeded.

Decorative Stone

It is speculated that the Cottonwood office could receive one or two sale requests per year for decorative stone. In most cases, existing roads would provide access to areas where the stone is scattered on the surface. In these areas, the rock would be hand-picked and loaded directly onto pick-ups or flatbed trucks, or onto pallets and then loaded onto trucks. There could be both on and off-road vehicle travel. This type of activity typically results in negligible surface disturbance. There is a possibility that temporary road or trail construction could be necessary to gain access in some areas. Prior to designating an area as a decorative rock gathering area, and prior to any road or trail construction, appropriate inventories and NEPA compliance would be conducted to prevent unnecessary and undue degradation. Reclamation plans would be developed for any designated collecting areas and their access roads and trails.

Locatable Mineral Resources

Future Trends and Assumptions

The major commodity of interest would continue to be gold. This is based on the mining history and the favorable geology for gold occurrences. The most active areas over the past 20-plus years have been around Elk City, in the Marshall Mountain area, and along the banks of the Salmon River. The other possible commodity of interest could be an uncommon variety of building stone; however, none have been identified in the planning area. Both placer mining and the development of underground lode deposits are anticipated. Reclamation science would continue to advance due to experience and research. More detailed design effort would be placed on the reclamation of mined lands in the future. This would result in an overall increase in reclamation costs but those costs would pay dividends in the future with increased reclamation success.

The economics of mining in the planning area would be driven by the relationship between production costs and the market price of the commodity. While production costs can be controlled or anticipated through management and technology, the price of mineral commodities could vary widely from year to year. The overall profitability of an operation, and hence the level of activity at the prospecting, exploration, and mining phases, for development of ore bodies would be closely related to the price of the mineral commodity.

There is a possibility that at least one chemical heap-leaching operation would be permitted on BLM land northwest of Elk City during the life of this plan. If this occurs, the operation would be subjected to environmental review under a plan of operations pursuant to regulations found in 43 CFR 3809.

Casual Use, Notices, Plans of Operations, Use and Occupancy

There are three levels of use defined by the 43 CFR 3809 regulations; casual, notice, and plan of operations. Generally, casual use means activities resulting in negligible, if any, disturbance of public lands or resources. Mechanized earth-moving equipment or truck-mounted drills are not allowed under casual use. Notice-level operations involve surface-disturbing exploration operations of 5 acres or less. Casual use and notice-level operations do not involve Federal actions that require compliance with NEPA. A plan of operations is required for all mining activity that is not casual use, regardless of the number of acres disturbed. A plan is also required for all exploration activities that disturb over five acres, bulk sampling which will remove 1,000 tons or more of presumed ore for testing, or for any surface-disturbing operations greater than casual use in certain Special Management Area's and lands/waters that contain federally-proposed or listed threatened or endangered species or their proposed or designated critical habitat. The approval of plans of operations is a Federal action that requires NEPA compliance. Mining claim occupancy associated with notice- or plan-level operations also requires compliance with NEPA.

Details of plan of operations filing and processing requirements can be found in 43 CFR 3809.400. Generally, plans must include a detailed description of all operations, including a map showing all areas to be disturbed by mining, processing, and access, all equipment that would be used, periods of use, and any necessary buildings or structures. A detailed reclamation plan to meet the standards found in 43 CFR 3809.420, and a monitoring plan to monitor the effect of operations are also required. An interim management plan showing how the project area would be managed during periods of temporary closure to prevent unnecessary and undue degradation must also be submitted. The operator also must submit a reclamation cost estimate. The BLM may require operational and baseline environmental information, and any other information, needed to ensure that operations will not cause unnecessary and undue degradation.

When a plan of operations is received, BLM reviews it to make sure that it is complete. Where necessary, the BLM would consult with the State to ensure operations would be consistent with State requirements. In addition, the BLM would conduct any consultation required under the National Historic Preservation Act or Endangered Species Act. On-site visits would be scheduled when necessary. BLM could require changes to the plan of operations to ensure that the performance standards found in 43 CFR 3809.420 are met, and that no unnecessary or undue degradation of lands or resources would occur. In addition, site specific mitigating measures would be imposed when necessary. A financial guarantee covering the estimated cost of reclamation, as if BLM were to contract with a third-party, would have to be provided before operations could begin. The financial guarantee would have to be sufficient not only to cover costs of reclamation, but also costs associated with interim stabilization and compliance with federal, state, and local environmental requirements while third-party contracts would be developed and executed.

BLM approval is necessary to occupy public land for more than 14 calendar days in any 90-day period within a 25-mile radius of the initially occupied site. Details for the submittal and approval of use and occupancy are contained in 43 CFR 3715. As defined in these regulations, occupancy means full or part-time residence on the public lands. It also means activities that involve residence; the construction, presence, or maintenance of temporary or permanent structures that may be used for such purposes; or the use of a watchman or caretaker for the purpose of monitoring activities. Residence or structures include, but are not limited to, tents, motor homes, trailers, campers, cabins, houses, buildings, and storage of equipment or supplies. Also included are barriers to access, fences, gates, and signs intended to restrict public access.

Permanent structure means a structure fixed to the ground by any of the various types of foundations, slabs, piers, or poles, or other means allowed by building codes. The term also includes a structure placed on the ground that lacks foundations, slabs, piers, or poles, and that can only be moved through disassembly into its component parts or by techniques commonly used in house moving. The term does not apply to tents or lean-tos.

The disposal of sewage and gray-water would be subject to the rules and regulations of IDEQ. The disposal of garbage and other debris would be subject to all appropriate federal, state, and local rules and regulations. Likewise, the drilling of any water wells would be subject to all Idaho Department of Water Resources requirements. Permanent structures would be subject to all state and county permitting. Copies of all required state and local approvals and permits would be filed with the BLM prior to allowing any occupancy.

Background on the Development of a Locatable Minerals Mine

The development of a mine from exploration to production can be divided into four stages. Each stage requires the application of more discriminating (and more expensive) techniques over a successively smaller land area to identify, develop, and produce an economic mineral deposit. A full sequence of developing a mineral project involves reconnaissance, prospecting, exploration, and mine development.

Reconnaissance: Reconnaissance-level activity is the first stage in exploring for a mineral deposit. This activity involves initial literature search of an area of interest, using available references such as publications, reports, maps, aerial photos, etc. The area of study can vary from hundreds to thousands of square miles. Activity that would normally take place includes large scale mapping, regional geochemical and geophysical studies, and remote sensing with aerial photography or satellite imagery. These studies are usually undertaken by academic or government entities, or major corporations.

The type of surface-disturbing activity associated with reconnaissance-level mineral inventory is usually no more than occasional stream sediment, or soil and rock, sampling. Minor off-road vehicle use could be required.

Prospecting: The prospecting area of interest is identified based on the information gathered during reconnaissance. This area could range from a single square mile to an entire mountain range of several hundred square miles. Activity that would take place in an effort to locate a mineral prospect includes more detailed mapping, sampling, geochemical and geophysical study programs. Also, this is the time when property acquisition efforts usually begin and most mining claims are located in order to secure ground while trying to make a mineral discovery. Prospecting on an annual basis is considered a minimum requirement, under the mining laws, to secure a claim.

Types of surface disturbing activity associated with prospecting would involve more intense soil and rock chip sampling using mostly hand tools, frequent off-road vehicle use, and placement and maintenance of mining claim monuments. This activity is normally considered “casual use” (43 CFR 3809.5) and does not require BLM notification or approval.

Exploration: Upon location of a sufficiently anomalous mineral occurrence, or favorable occurrence indicator, a mineral prospect is established and is subjected to more intense evaluation through exploration techniques. Activities that take place during exploration include those utilized during prospecting but at a more intense level in a smaller area. In addition, activities such as road building, trenching, and drilling are conducted. In later stages of exploration, an exploratory adit or shaft may be driven. If the prospect already has underground workings these may be sampled, drilled, or extended. Exploration activities utilize mechanized earth-moving equipment, drill rigs, etc., and may involve the use of explosives.

Typical exploration projects in the planning area could include: in-stream dredging with portable suction dredges, exploratory drilling which could include construction of new roads, use of explosives to sample rock outcroppings, and excavation of test pits. If the exploration project disturbs 5 acres or less, it is conducted under a “Notice” (43 CFR 3809.301) which requires the operator to notify BLM 15 days before beginning the activity. If the project disturbs more than five acres, it is conducted under a "Plan of Operations" (43 CFR 3809.401) and requires NEPA compliance before approval.

Mine Development: If exploration results show that an economically viable mineral deposit is present, activity would intensify to obtain detailed knowledge regarding reserves, possible mining methods, and mineral processing requirements. This would involve applying all the previously utilized exploration tools in a more intense effort. Once enough information is acquired, a feasibility study would be done to decide whether to proceed with mine development and what mining and ore processing methods would be utilized.

Once the decision to develop the property is made, the mine permitting process begins. Any mining that involves greater than casual use, regardless of the number of acres, requires the submittal of a plan of operations and appropriate NEPA analysis under 43 CFR 3809.401 and .411 Upon approval, work begins on development of the mine infrastructure. This can include constructing the mill, offices, and laboratory; driving development workings if the property is to be underground mined, or pre-stripping if it is to be open pit mined; building access roads or haulage routes; and placement of utility services. During this time additional refinement of ore reserves is made.

Once enough facilities are in place, actual mine production begins. Concurrent with production there often are "satellite" exploration efforts to expand the mine's reserve base and extend the project life. Reclamation of the property is conducted concurrently with, or upon completion of, the mining operation. Often sub-economic resources remain unmined and the property is dormant, waiting for changes in commodity price or production technology that would make these resources economic.

Activities that occur on these lands include: actual mining, ore processing, tailings disposal, waste rock placement, solution processing, metal refining, and placement of support facilities such as repair shops, labs, and offices. These activities involve the use of heavy earthmoving equipment and explosives for mining and materials handling, exploration equipment for refinement of the ore reserve base, hazardous or dangerous reagents for processing requirements, and general construction activities.

The size of mines varies greatly and not all mines would require all the previously mentioned facilities and equipment. The amount of surface disturbance can range from less than five acres for small operations into the hundreds of acres for large deposits. In the planning area, 11 of the 12 open locatable minerals cases have disturbed about 15 total acres. The one exception is the Buffalo Gulch Mine northwest of Elk City. This operation was an open pit mine using heap leach technology to recover the gold. It was permitted around 1990 and had an anticipated extent of disturbance near 200 acres. The mine never went into full production and currently only about 60 acres are considered un-reclaimed.

Notices

Based on the mineral exploration over the past twenty years, it is anticipated that one or two notices per year would be submitted over the life of this plan. These notices could be located anywhere, but likely they would affect BLM lands in the Elk City and Marshall Mountain areas. Each notice covers exploration activities which cause less than five acres of disturbance, therefore it is anticipated that on average no more than ten acres per year will be affected. Upon completion of activities covered by each notice, which is typically within two years of approval, the disturbed lands are reclaimed as outlined in the proposal. This typically requires a two- to three-year time period for reestablishment of an acceptable vegetative cover.

In addition to the exploration efforts mentioned above, it is speculated that up to five notices for in-stream suction dredging could be filed during the life of the plan. In-stream dredging is usually a one to two person operation using a floating suction dredge with a five- to seven-horsepower engine. The dredge pulls up all the gravel in the stream down to bedrock. The gravels are passed over a sluice box and returned to the stream without the gold. This process does not require any chemicals. Most of the dredges have an intake nozzle opening diameter of less than five inches. Other activities associated with dredging include temporary occupancy and negligible road and trail construction. These operations would be monitored pursuant to the regulations found in 43 CFR 3809.

Mine Plans

With the recent recovery of gold prices, interest in the property previously covered by the Buffalo Gulch Mine permit has returned. As with the original permit, it is possible that up to 200 acres could be affected by mining related activities if a mine does get permitted. At this time however, only exploration activities are occurring. No other recent exploration in the planning area has produced results that would indicate the presents of an ore body sufficient to proceed to preliminary property development.

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