ROCA HONDA RESOURCES, LLC
MINE OPERATIONS PLAN
FOR
ROCA HONDA MINE

REVISION 1

JANUARY 2012

Submitted To:

New Mexico Mining and Minerals Division
Energy, Minerals and Natural Resources Department
&
U.S. Forest Service (Cibola National Forest)

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Acronyms

BATF	Bureau of Alcohol, Tobacco and Firearms
BDR	Baseline Data Report
BLM	Bureau of Land Management
BMP	Best Management Practice
CFR	Code of Federal Regulations
CPRC	Cultural Properties Review Committee
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
gpm	gallons per minute
H	horizontal
HDPE	High Density Poly-Ethylene
LHD	Load/Haul/Dump
MSHA	Mine Safety and Health Administration
NMAC	New Mexico Administrative Code
NMDOT	New Mexico Department of Transportation
NM MMD	New Mexico Mining and Minerals Division
NM OSE	New Mexico Office of the State Engineer
NRCS	Natural Resource Conservation Service
Plan	Mine Operations Plan
POO	Plan of Operations
RGRC	Rio Grande Resources Corporation
RHR	Roca Honda Resources, LLC
SPCC	Spill Prevention, Control and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
USFS	U.S. Forest Service
V	vertical

1.0 Introduction

This Mine Operations Plan Revision 1 (Plan), prepared in accordance with the New Mexico Administrative Code (NMAC) 19.10.6.602 D.(15) regulations for new non-coal mining operations, provides a detailed description of the proposed mining operations plan for Roca Honda Resources, LLC (RHR) proposed underground uranium mine in McKinley County, New Mexico. The Plan is organized in conformance with the regulatory requirements outlined in NMAC Section 19.10.6.602 D.(15) and 19.10.6.603. This Plan is also prepared to meet the United States Forest Service (USFS) requirements for submittal of a Plan of Operations (POO) for operation of a mine on Forest Service lands.

This detailed Mine Operations Plan Revision 1 addresses the NMAC requirements of 19.10.6.602 D.(15)(a) through (e) and 19.10.6.603 A through H. Each section of the Plan has a reference to the specific NMAC requirement addressed for ease of review. The Introduction and Section 2.0, Geologic Setting, are included in addition to the NMAC requirements for information and clarity. The Plan provides the specifics of the design of the site facilities. The Plan also addresses USFS requirements presented in 36 CFR 228.4 Plan of Operations.

This Plan describes the type and method of mining and engineering techniques that will be utilized at the Roca Honda mine to meet the performance and reclamation standards and requirements of NMAC. The Plan contains the required general sequence to be followed in constructing and operating the mine, maps and drawings of the facilities, and an approximate time table for the activities.

On October 23, 2009 RHR submitted an application for a new mine permit to the New Mexico Mining and Minerals Division (NM MMD) of the New Mexico Energy, Minerals and Natural Resources Department for its proposed Roca Honda underground uranium mine. The application included a Mine Operations Plan. RHR committed in its October 2009 submittal to prepare a detailed Mine Operations Plan as more information becomes available and the final designs become more definitive with time. This revised Mine Operations Plan Revision 1 provides the detail committed to by RHR.

RHR's proposed underground mine site is located approximately 3 miles northwest of the community of San Mateo, New Mexico, at the southern boundary of McKinley County just north of the Cibola County line. Accessible from New Mexico State Highway 605, it is approximately 22 road miles northeast of Grants, New Mexico. Figure 1-1 is a map showing the location of the site and access from Grants.

The Roca Honda mine permit area includes all of Sections 9, 10, and 16, Township 13 North, Range 8 West, in McKinley County, New Mexico consisting of 63 unpatented, contiguous mining claims on Sections 9 and 10 located on 1,280 acres of land administered by the USFS and a general mining lease (New Mexico General Mining Lease number HG-0036-002) on Section 16 (640 acres), owned by the State of New Mexico as shown in Figure 1-2. The permit area also includes all of the haul roads, utility corridors and mine water discharge pipeline corridor (see Figure 1-3). The permit area for the Roca Honda mine is approximately 1,968 acres in size which is based on 640 acres for each of Sections 9, 10 and 16 and 48 acres of haul roads, utility corridors and mine water discharge pipeline corridor. The total disturbed acreage within the

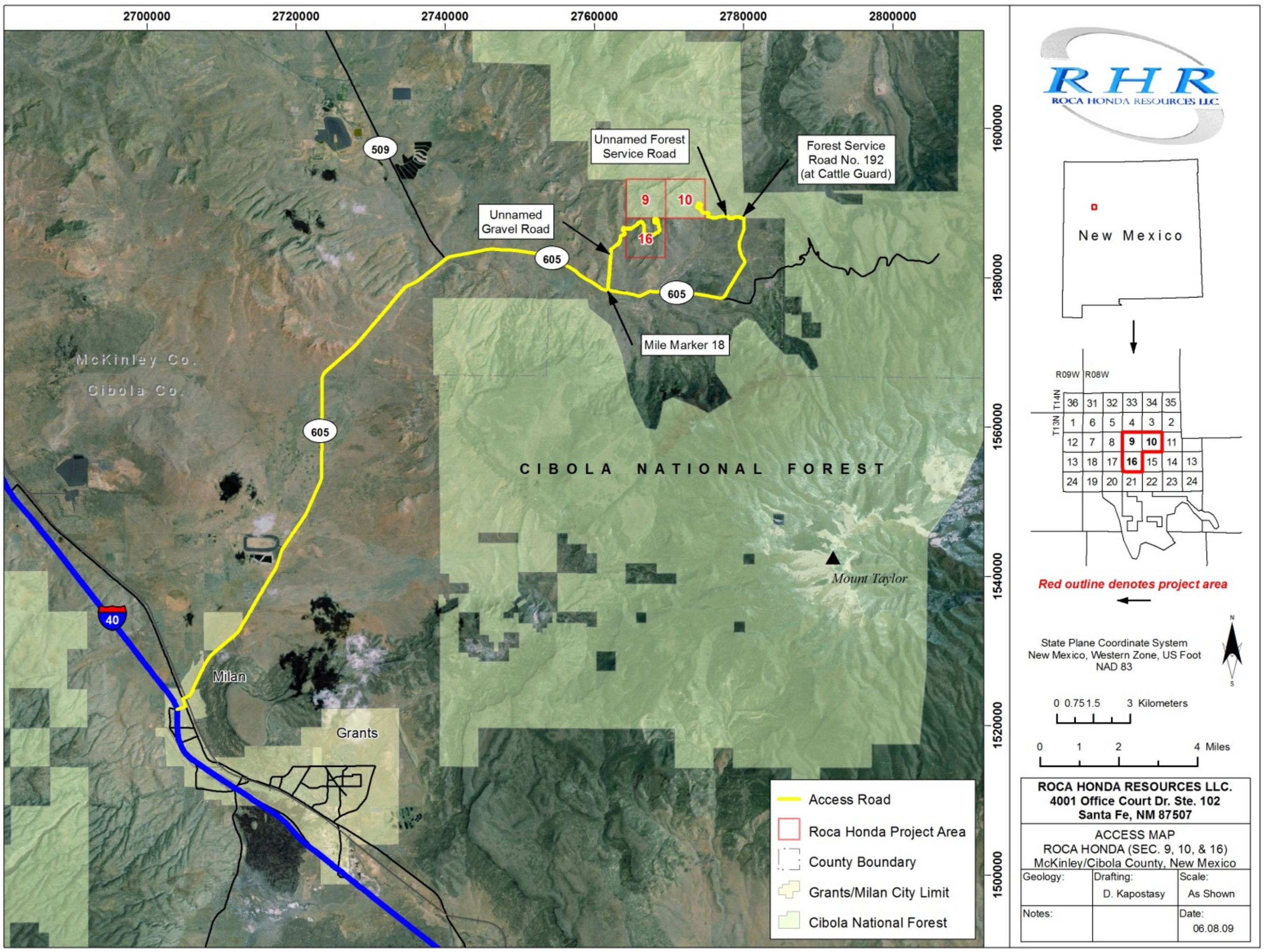

Figure 1-1. Location of and Access to the Roca Honda Mine

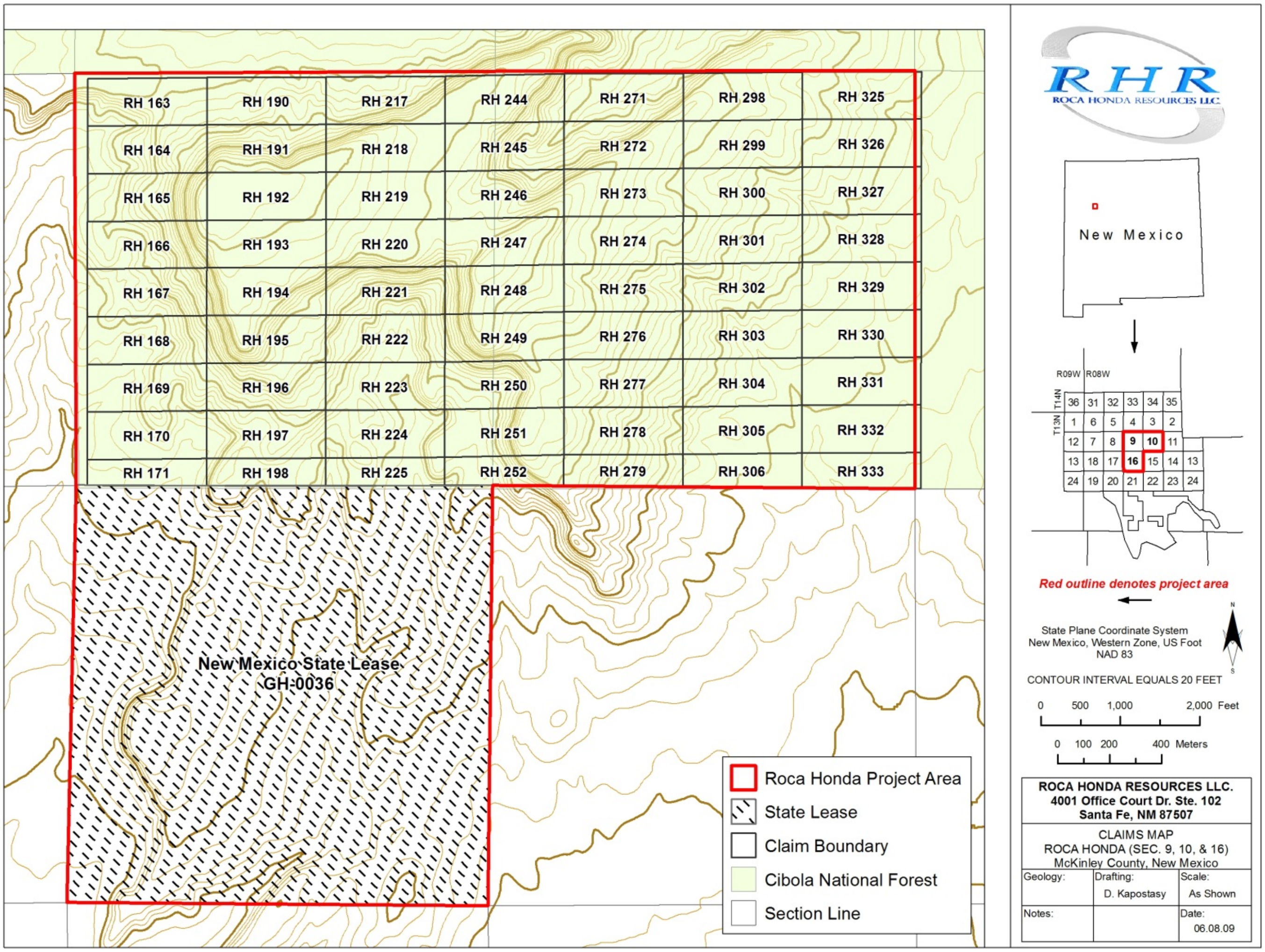

Figure 1-2. RHR Mining Claims and the New Mexico Mining Lease

permit area is significantly smaller, approximately 12 acres in Section 9, 71 acres in Section 10, and 100 acres in Section 16. An existing forest road in Section 11 will be upgraded and rerouted to the extent necessary (approximately 8 acres) to avoid archeological resources to accommodate haul truck traffic and general access to the Section 10 facilities. Similarly, the haul road providing access to Section 16 is an existing road on private land, i.e., Sections 20 and 17, will be upgraded as necessary (approximately 10 acres in Sections 17 and 20). A portion of the utility corridor is located on private land in Section 15 and totals approximately 4 acres of disturbance.

The majority of surface facilities for the proposed Roca Honda mine are planned to be located in Section 16. The remaining facilities, surface features, and associated permit area are located in Sections 9 and 10. Figure 1-3 shows the general surface facility footprints and associated disturbed area of the proposed mine project. This figure has been updated to depict the most recent detailed design of the Plan. Figure 1-3 also shows the location of a treated mine water transportation line and corridor leaving the site at the southeast corner of Section 10. This pipeline will run along the haul road to the southeast corner of Section 11 then turn north for a distance of approximately six miles where the water will be discharged on private land. This water line is a significant new addition to the Mine Operations Plan, not previously proposed in RHR's October 2009 permit application. The details of this pipeline are discussed in more detail later in this Plan.

Briefly, the pipeline is proposed by RHR in response to agency concerns and comments received upon review of RHR's October 2009 submittal. Comments were voiced regarding potential negative impacts of discharge of water upon the San Mateo Creek drainage. In response, RHR committed to transporting the water to a location outside of the San Mateo Creek drainage for discharge. This pipeline will be positioned next to the haul road and the utility corridor in Sections 16, 15, 10 and 11. The pipeline will turn north along the road at the junction with the Section 11 haul road and proceed north as shown on Figure 1-3. An estimated width of 20 feet was assumed to be disturbed during the placement of the pipeline for a distance of 28,919 feet which totals 13.3 acres, 2.5 acres on forest land and 10.8 acres on private land.

1.1 Surface Facilities

Selecting the optimum facilities location requires the evaluation of various practical geographic, technical, cultural resource, and regulatory considerations. While the general location of the mine is dictated by the location of the ore body, the location of the surface facilities can be managed to some extent to maximize efficiencies and balance the geographic and technical constraints that the site presents with the cultural resource protection, aesthetics and regulatory requirements.

Potential facility locations were evaluated in relation to the desired mine shaft location using topographic maps as base maps to develop the location of surface facilities. These locations, which include the major surface and associated mine facilities, are generally located on level or gently sloping ground to the extent possible and otherwise situated to maximize the natural topographic advantages available. Flood plains and steeply sloping ground were avoided. Each mine site was evaluated for geologic suitability (including proximity to future mining areas), soils and ground stability. Other factors were also considered, including archaeological and cultural resources, erosion potential, proximity to the neighboring rancher, and visibility and sightlines from the highway, as well as wildlife considerations and aesthetics.

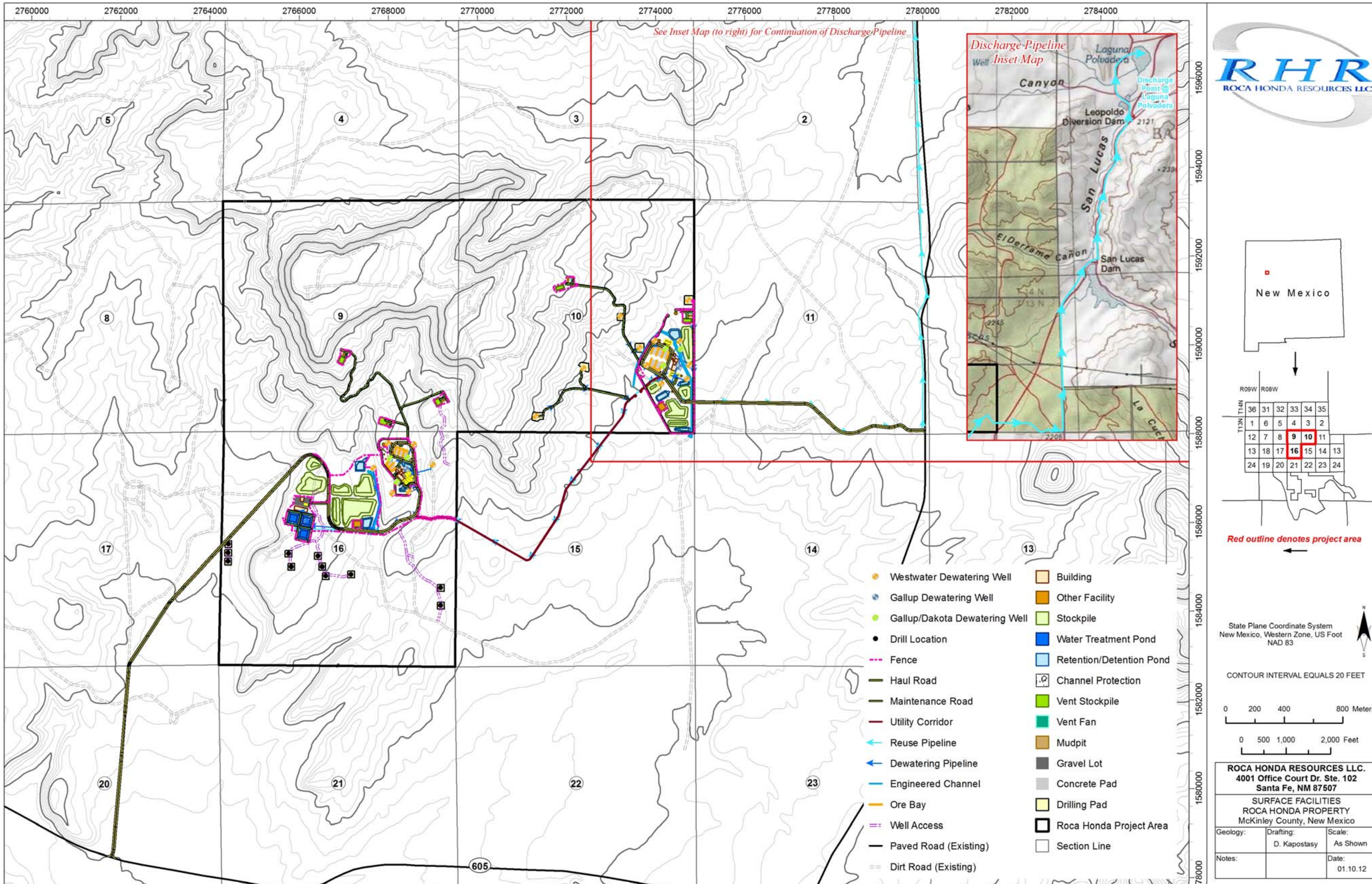

Figure 1-3. Roca Honda Mine Surface Facilities and Permit Area

RHR recognizes the sensitivity and importance of the presence of cultural resources on the Roca Honda permit area. RHR conducted archaeological surveys of the entire permit area and designed its surface facilities to avoid these sites wherever possible. The surveys produced a list of sites eligible for listing on the National Register of Historic Places on the state Register of Cultural Properties. Section 11.0, Historic Places and Cultural Properties, of the Baseline Data Report (BDR) Revision 1 provides the details of these survey results. RHR is working with the appropriate state and Federal authorities to ensure all of these sites are protected and/or the required clearances have been granted. RHR has committed to having an archaeologist on site for any surface disturbance activities during construction.

RHR, in concert with the USFS and state archaeologists, identified eleven sites (of the 193 sites found by the surveys) that required closer evaluation because of the proximity to proposed mining activities. These sites are being further investigated in more detail and mitigation plans will be devised to ensure their protection during construction, operations and reclamation. For example, some sites may be excavated to recover data prior to construction of mine facilities. The surface facility layout provided in the October 2009 Mine Operations Plan has been modified as described in this revised Mine Operations Plan in response to agency concerns upon review of RHR's October 2009 submittal. Access road corridors, fencing, stockpile areas and other surface facilities have been modified to protect and avoid sites. Further modification may be required as more information becomes available. Any such modifications are anticipated to be minor.

Section 5.3.3 of this Plan and Section 11.0 of the BDR describe in more detail the mitigation measures taken by RHR to protect cultural resources. Additional mitigation strategies will be devised and implemented as necessary. All such strategies will be approved by the appropriate state and Federal authorities prior to implementation.

Consideration of all of these factors resulted in locating the mine site facilities as shown in Figure 1–3. A CONFIDENTIAL cultural properties map package was submitted to the NM MMD and the USFS separately as part of RHR's October 2009 submittal that identified the specific locations of the archaeological and cultural resources inventoried by RHR at the site. RHR is providing a similar CONFIDENTIAL cultural properties map package that provides detail of its proposed facilities in relation to the archaeological sites. Submittal of this package has been limited to appropriate state and Federal agencies and may be available from them on request. RHR has endeavored to minimize surface disturbance impacts wherever possible on all environmental media.

2.0 Geologic Setting

2.1 Permit Area Regional Geology

The Roca Honda mine permit area is approximately 22 miles by road north-northeast of Grants in west-central New Mexico. The permit area is in the southeast part of the Ambrosia Lake subdistrict of the Grants uranium district (McLemore and Chenoweth 1989) and is near the boundary between the Chaco slope and the Acoma sag tectonic features. This subdistrict is in the southeastern part of the Colorado Plateau physiographic province and is mostly on the south flank (referred to as the Chaco slope) of the San Juan basin. The regional geology is shown in Figure 2–1. The Roca Honda permit area is also shown relative to the area depicted.

Bounding the San Juan basin to the south-southwest is the Zuni uplift, where rocks as old as Precambrian are exposed 25 to 30 miles southwest of the Roca Honda permit area (Figure 2–1). Less than 5 miles to the east and south of the permit area, Neogene volcanic rocks of the Mt. Taylor volcanic field cap Horace Mesa and Mesa Chivato. On the Chaco slope, sedimentary strata mainly of Mesozoic age dip gently northeast into the Central basin part of the San Juan basin. The permit area is structurally complex and is included in the part of the subdistrict that Santos (1970) described as the most folded and faulted part of the Chaco slope. Figure 2–2 identifies the regional structural features in relation to the permit area.

The San Juan basin and bounding structures were largely formed during the Laramide orogeny near the end of the Late Cretaceous through Eocene time (Lorenz and Cooper 2003). This Laramide tectonism produced compression of the San Juan basin between the San Juan and Zuni uplifts, resulting in faults and fold axes oriented north to north-northeast. The more intensively faulted east part of the Chaco slope may be related to the development of the McCartys syncline, which lies just east of the faulted Fernandez monocline (Kirk and Condon 1986).

The San Rafael fault zone cuts the Fernandez monocline and has right-lateral displacement (Figure 2–2) as evidence of shear near the San Juan basin margin. Other faults in or near the permit area are mostly normal with dip-slip displacement and vertical movement less than 40 feet. The large, northeast-striking San Mateo normal fault about 2 miles west of the Roca Honda permit area has vertical displacement of as much as 450 feet (Santos 1970). Strata in the permit area along the Fernandez monocline dip east to southeast at 4 to 8 degrees toward the McCartys syncline, an expression of the Acoma sag (Santos 1966a and 1966b).

Uranium ore deposits in the Grants uranium district are mainly in fluvial sandstones in the Westwater Canyon, Brushy Basin, and Jackpile Sandstone Members of the Upper Jurassic Morrison Formation. Other host rocks for minor uranium deposits are the Upper Jurassic Todilto Member of the Wanakah Formation and the Upper Cretaceous Dakota Sandstone. The Morrison Formation crops out near the south edge of the San Juan basin and dips gently northward into the basin. Formations of Late Cretaceous age that overlie the Morrison Formation, in ascending order, are: Dakota Sandstone, Mancos Shale, Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, and Menefee Formation. The Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, and Menefee Formation compose the Mesaverde Group.

The Morrison Formation was deposited in a continental environment, mainly under fluvial conditions. These deposits were derived from an uplifted arc terrane to the west and locally from

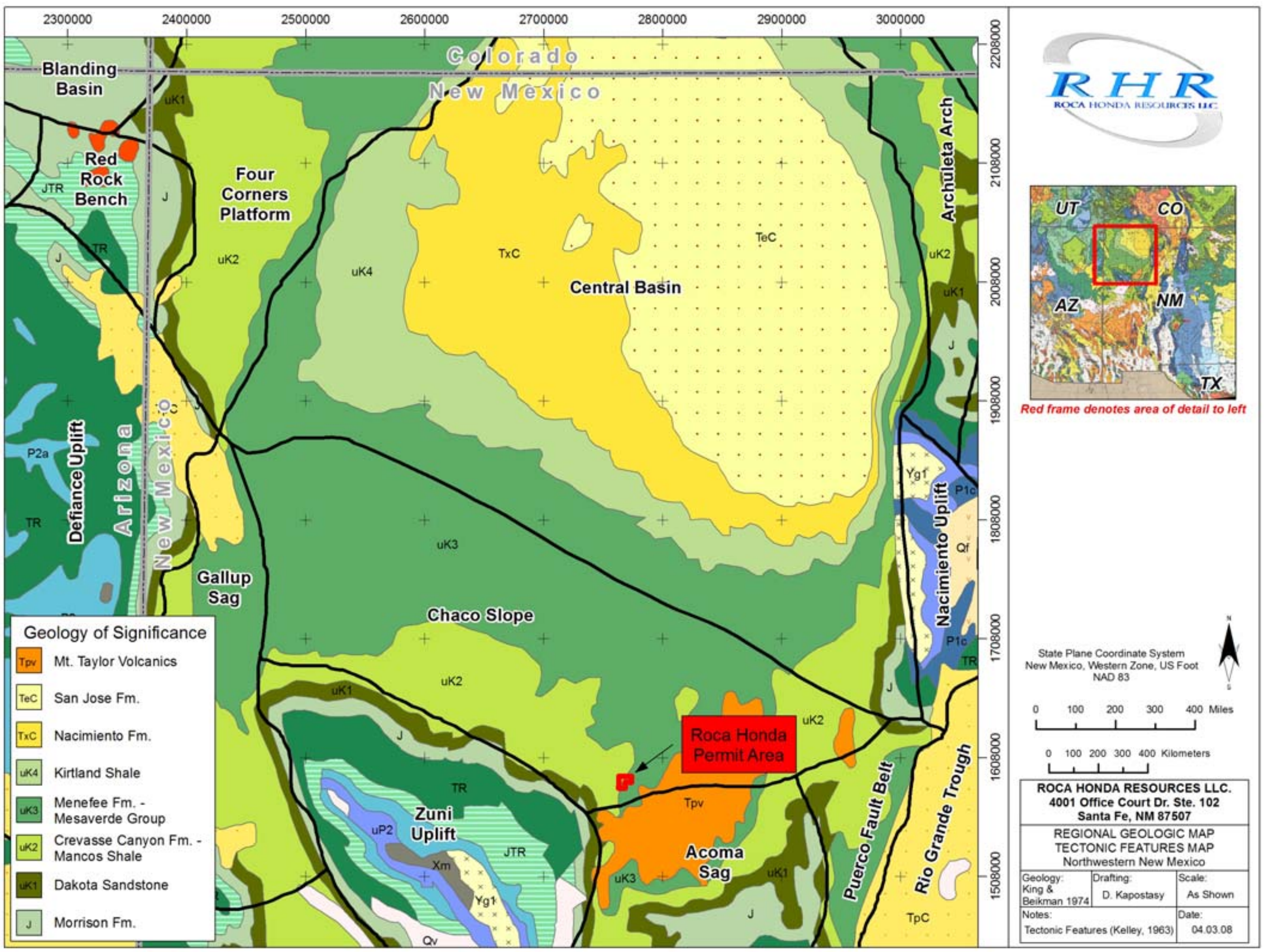

Figure 2-1. Regional Geologic Map of Northwestern New Mexico

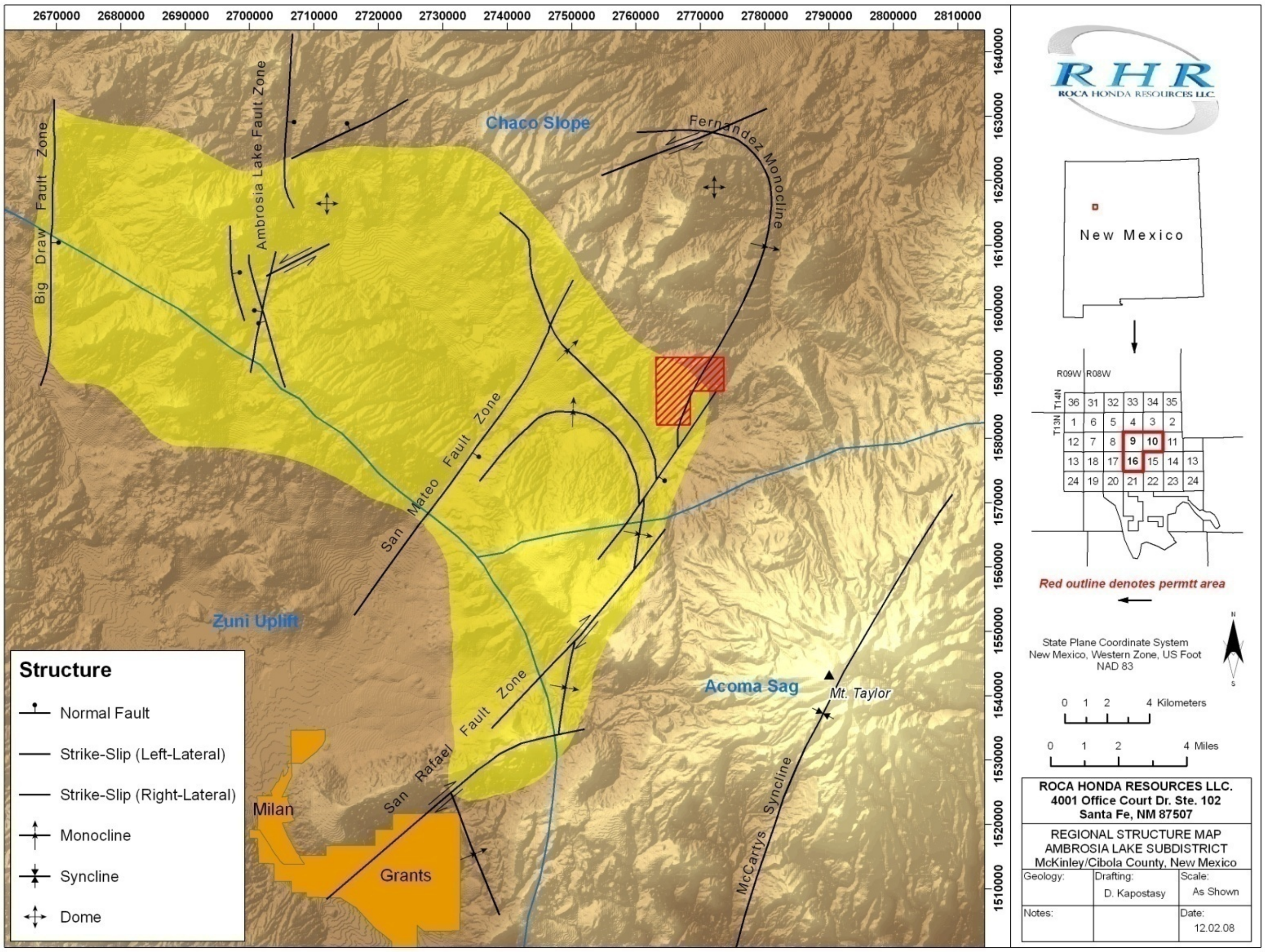

Figure 2-2. Regional Structural Features

the Mogollon highlands to the south (Lucas 2004). The Zuni uplift, currently bordering the San Juan basin to the southwest, did not exist in Late Jurassic time and therefore was not a source for Morrison Formation sediments.

Formations of Late Cretaceous age were deposited in or on the margin of the Western Interior Seaway, a shallow continental sea, and the formations represent transgressive or regressive episodes of the Seaway. The Mancos Shale and its several tongues were deposited on the shallow marine sea bottom, and the formations of the Mesaverde Group were deposited along the western shoreline of the Seaway.

2.2 Stratigraphy Beneath the Permit Area

Section 7.0, Geology, of the BDR Rev 1 contains a detailed description of the geology of the permit area. This section of the Plan summarizes that information to provide the reviewer with a context from which to better understand the details of the mine operations described herein.

Rocks exposed in the Ambrosia Lake subdistrict include marine and nonmarine sediments of Late Cretaceous age, unconformably overlying the uranium-ore-bearing Upper Jurassic Morrison Formation. In this section, geologic units are discussed from youngest to oldest. The uppermost sequence of conformable strata consists of Mesaverde Group, Mancos Shale, and Dakota Sandstone. All rocks that crop out at the Roca Honda permit area are of Late Cretaceous age; these rocks and the Quaternary deposits that cover them in some places are shown in the geologic map in Figure 2–3.

The formations and members and their approximate depth from the surface are shown in the stratigraphic section in Figure 2–4 which is based on historical drilling in the area. The Menefee Formation does not crop out in the Roca Honda permit area (and it is not shown in Figure 2–4), but a partial thickness of it is below Quaternary colluvium as subcrop in the SE¼ Section 10. The formations present at the permit area are in descending order: alluvium, Point Lookout Sandstone, Crevasse Canyon, Gallup Sandstone, Mancos Shale, Dakota Sandstone, and the Morrison Formation. The Westwater member of the Morrison Formation is the ore bearing horizon. Figure 2–5 depicts the stratigraphy of the Morrison Formation.

2.3 The Ore Body

The uranium found in the Roca Honda mine permit area is contained within five sandstone units of the Westwater Canyon Member (Figure 2–5). Core recovery from the 2007 drilling program indicates uranium occurs in sandstones with large amounts of organic/high carbon material. The uranium in the permit area is dark gray to black and is found between depths of approximately 1,650 to 2,600 feet below the surface. Zones of mineralization are 1 to 25 feet thick, 100 to 200 feet wide, and 200 to more than 1,200 feet long; also characteristic of the ore is pyrite and bleaching alteration (Fitch 2006). The ore averages four to eight pounds U_3O_8 per ton of host rock. Non-mineralized host rock is much lighter (light brown to light gray) and has a background to slightly elevated radiometric readings.

Uranium ore in the permit area trends west-northwest. This trend is consistent with trends of the fluvial sedimentary structures of the Westwater Canyon Member (Falkowski 1980, Kirk and Condon 1986) and the general trend of ore across the Ambrosia Lake subdistrict. Figure 2–6 depicts the location of the ore bodies within the permit area as projected to the surface.

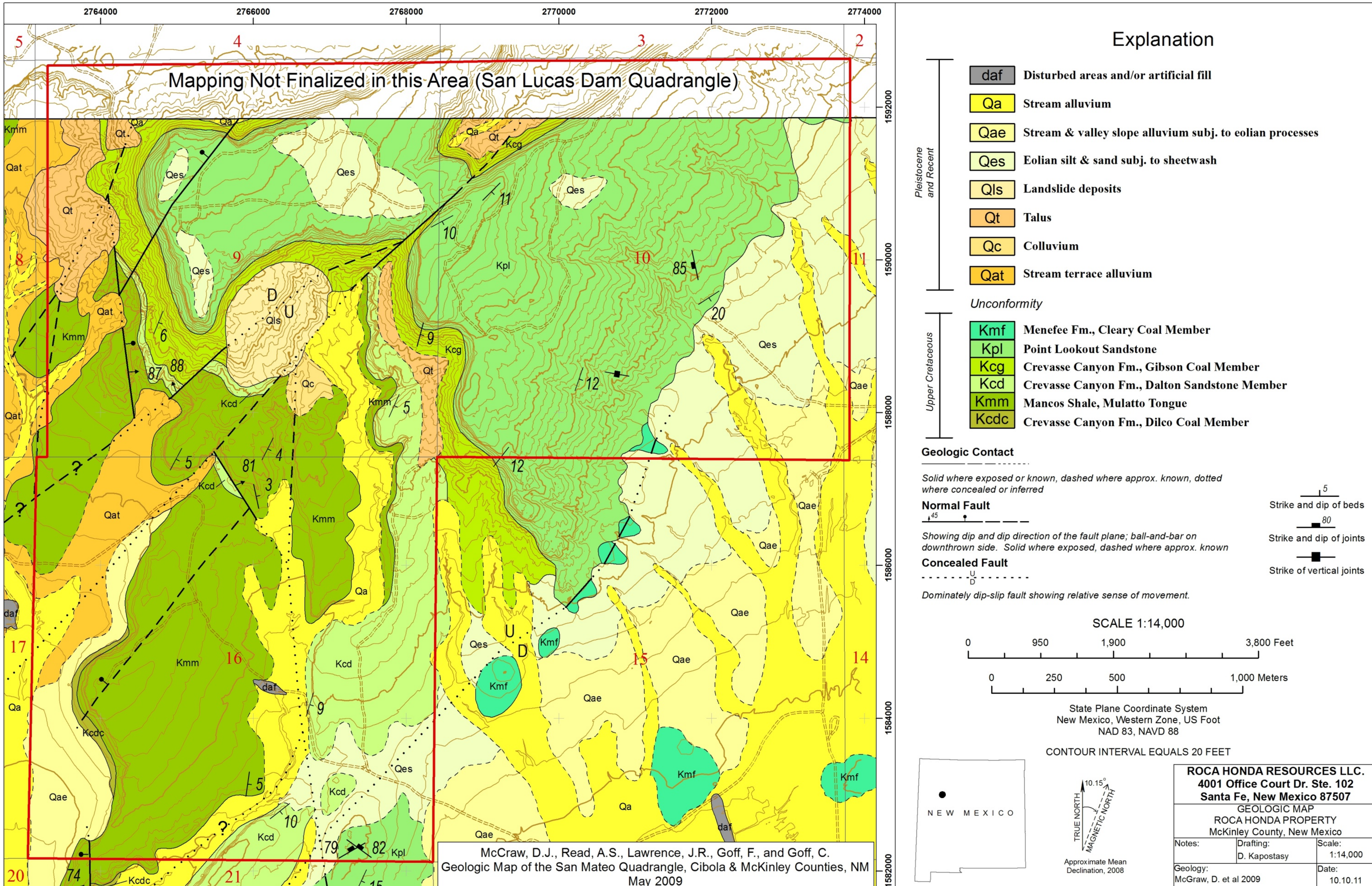

Figure 2-3. Geologic Map of the Roca Honda Permit Area

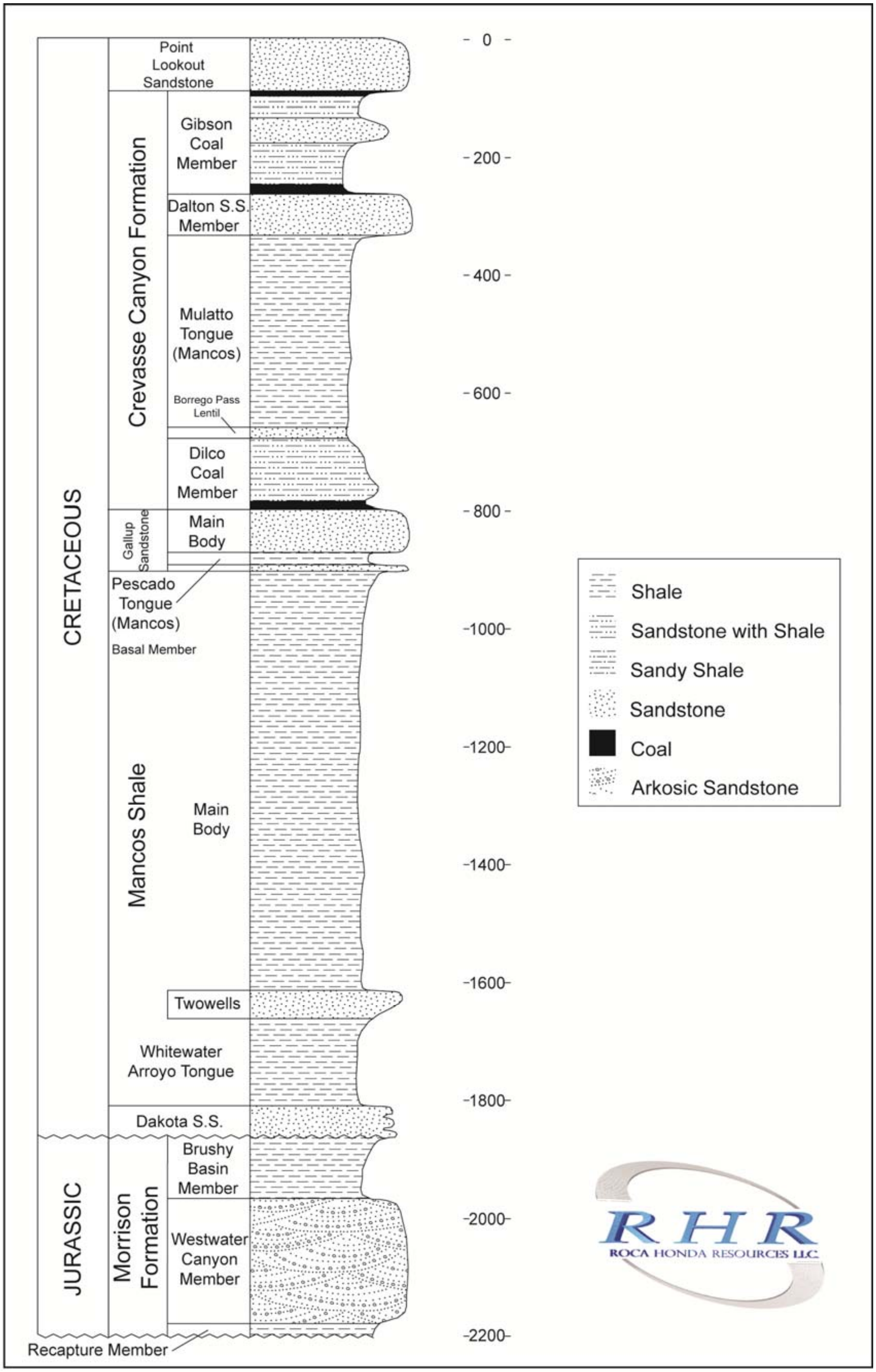

Figure 2-4. Typical Stratigraphic Section of the Roca Honda Permit Area

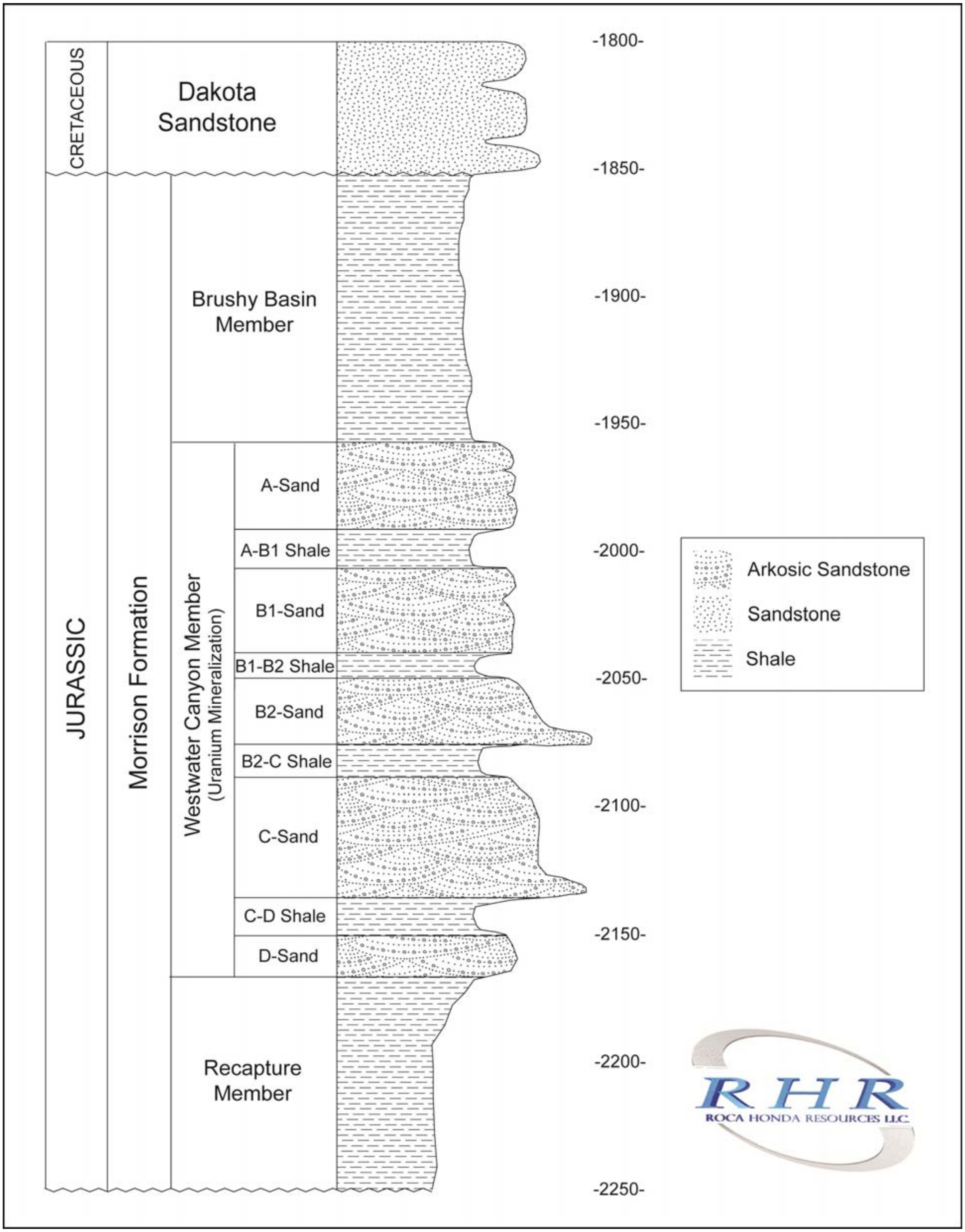

Figure 2-5. Typical Stratigraphic Section of the Morrison Formation

Figure 2-6. Ore Bodies within the Roca Honda Permit Area

3.0 Mining Methods and Techniques
NMAC 19.10.6.602 D.(15)(a) and (b)

A detailed description of the proposed mining operation and reclamation plan, including:

(a) A description of the type and method of mining and the engineering techniques proposed, and how the operation will meet the performance and reclamation standards and requirements of this Part.

(b) A map or maps at a scale approved by the Director and an approximate schedule or timetable indicating the mining operations including number of acres of land to be disturbed. A permittee will be required to follow the sequence described in the schedule or timetable, unless modified or revised. A permittee will not be required to meet specific dates for initiation or completion of mining according to the schedule or timetable.

This Mining Operations Plan Revision 1 provides a detailed description of the mining methods and engineering techniques to meet the requirements of the above cited regulations and Mining Act Section, and the performance and reclamation standards required by this Part. Mining operations at Roca Honda will be conducted using underground step room-and-pillar as well as drift-and-fill mining methods to extract the ore as described in more detail in Section 3.6.2 of this Plan. The ore body will be accessed by constructing two production shafts; the first in Section 16 and the other in Section 10, as shown in Figure 1–3. The current anticipated life of the Roca Honda mine is approximately eleven years. However, the ultimate life of the mine is dependent upon the mineralization and economics of the mine during development. Historically, the presence of more ore is identified as mining progresses.

3.1 Mining Operations Schedule

Table 3-1 provides a generalized schedule for construction, operation and reclamation of the Roca Honda mine project in compliance with NMAC Section 19.10.6.602 D.(15)(b). Fundamentally, it is an approximate schedule or time table of mining operations for a nominal 11-year period. However, the true life of the mine may well be different as recognized by the NM MMD regulation NMAC Section 19.10.6.602 D.(15)(b), wherein a permittee "not be required to meet specific dates for initiation or completion of mining according to the schedule or time table."

The schedule reflected in Table 3-1 begins with day one (1) as the day that permit approvals are received for the project. On that day, mobilization to begin many activities will occur, including importantly, preparation of many site areas to start the various initial construction activities. Two of the critical early activities include: installation of the dewatering wells necessary to begin the aquifer dewatering/depressurizing process in advance of mine shaft sinking activities reaching the water-bearing formations, and construction of the water treatment facilities to receive mine dewatering water that may have to be treated.

It is anticipated that initial site preparation for the major site construction activities will be completed within the first ninety (90) days, although additional site preparation work may continue for many months throughout the construction phase. It is also anticipated that the initial phase of the water treatment plant construction will be completed one hundred eighty (180) days

Table 3-1. General Schedule for Roca Honda Mine

Activity	Number of Days from Permit Approval
SECTION 16	
Mobilization – site preparation	1
Begin dewatering well construction at shaft	1
Begin water treatment plant construction	1
Complete site preparation/construct facilities	90
Complete water treatment plant construction	180
Begin dewatering	180
Begin shaft construction	180
Complete dewatering well construction at shaft	545
Complete Section 16 Production Shaft	1275
Begin Mine Development	1275
First Ore	1455
Initial Mine Development Complete/Begin Full Production	1640
Five Years Section 16 production	3495
SECTION 10	
Mobilization – site preparation	1490
Begin dewatering well construction at shaft	1490
Complete site preparation/construct facilities	1670
Begin dewatering	1670
Begin shaft construction	1670
Complete dewatering well construction at shaft	2035
Complete Section 10 Production Shaft	3130
Begin Initial Mine Development	3130
First Ore	3310
Initial Mine Development Complete/Begin Full Production	3495
Six Years Section 10 Production	5685
Reclamation Start (at Section 16)	After 3495
Reclamation Finish	6415

into the project, allowing treatment, as necessary, of water produced by the dewatering wells. It is assumed for the purpose of the Table 3-1 schedule that treatment of water produced from the wells may be required. However, quality of the water produced may be such that it can be discharged without undergoing treatment even before the water treatment plant is completed.

Construction of the Section 16 production shaft is scheduled to begin six (6) months into the project. This timeframe assumes that the dewatering wells into the Gallup Formation aquifer have been operating in advance of shaft construction in the Gallup, allowing sufficient dewatering of the formation for the shaft to be constructed through and beyond the formation. As such, the construction schedule of the shaft is dependent upon the dewatering activities. As described in more detail in Section 3.3, RHR has submitted a mine dewatering application to the New Mexico Office of the State Engineer (NM OSE) to depressurize the aquifers of the mine. The application describes the activity and the schedule.

The first ore is planned to be produced approximately 180 days following completion of the Section 16 production shaft (1455 days). Initial development is scheduled to be completed within four and one half years (1640 days) after commencement of the project at which time full production will begin.

Approximately 35 days after first ore in Section 16 is produced, site preparation will begin at the Section 10 site (1490 days). The Section 10 shaft and initial development is scheduled to be completed approximately nine and one half years (3495 days) after the Roca Honda project receives its permit. The first ore in Section 10 will be produced approximately 180 days after completion of the Section 10 production shaft.

The estimated life span of the Roca Honda project is approximately 18 years. The mine will produce ore for eleven and one half years. The remaining time consists of construction and reclamation activities. Reclamation will begin on portions of Section 16 after the end of production (after 3495 days). Some Section 16 surface facilities, in particular, the water treatment plant, will remain operational throughout the life of the mine. Reclamation of the entire mine will be completed approximately two years after mining has been completed (6415 days after permit approval).

As noted previously, the schedule presented in Table 3-1 is for planning purposes only. As provided for in the regulations, the actual schedule for the project will be dictated by many factors yet unknown, including the dates the permits are actually approved, the actual conditions encountered during construction, and the amount of ore ultimately available to be extracted. The remainder of this section is intended to provide the reviewer with a more detailed understanding of the work that will be undertaken to construct, operate and reclaim the Roca Honda mine in a manner that meets the performance and reclamation standards of the various state and Federal regulations that apply to the project.

3.2 Site Preparation

Upon obtaining permit approvals, RHR will mobilize a work force of company employees and contract personnel to begin site preparation. The three major areas of focus of site preparation will be the surface facility footprint around the production shaft in Section 16, the water treatment facilities and installation of the dewatering wells around the shaft. In addition, limited development drilling to further define the ore body will also begin. Figure 1–3 shows the location of these initial surface facilities. A detailed discussion of the surface facilities and more detailed maps and drawings are presented in Sections 4.0 and 5.0 of this Mine Operations Plan Revision 1.

Prior to initiating any surface disturbance activities, the proposed area for construction will be rechecked by a qualified archaeological expert against the site archaeological survey results conducted previously and presented in RHR's BDR Revision 1. Any mitigation measures to further protect cultural resources, as may be required by the regulatory agencies will be implemented prior to beginning construction activities. An archaeologist will be present to monitor surface disturbance.

Sedimentation control structures will be installed prior to facility improvement or construction. A Storm Water Pollution Prevention Plan (SWPPP) in compliance with U.S. Environmental Protection Agency and State of New Mexico requirements will be implemented.

RHR will clear and grub the surface facilities areas of the mine site and the water treatment plant to begin the process of preparing them for construction. Topsoil and subsoil will be removed, as necessary, and stockpiled. RHR's BDR Revision 1, Section 6.0, Topsoil, contains a detailed characterization of the topsoil that exists on-site. RHR's Reclamation Plan Revision 1, submitted in August 2011 provides the details of reclamation to be performed at the end of the mine's life. These documents describe in detail the soils available on-site and the amount that will be needed to carry out the proposed reclamation. As with much of the Southwest and New Mexico, soil horizons that exist in non-riparian zones of the state do not meet soils criteria for classification as "topsoil". Therefore, the topsoil and subsoil layers of soil material to be stockpiled for revegetation and reclamation are identified as "topdressing" in the Reclamation Plan Revision 1 and in this Plan. These soils that will be removed above the rock layer will be stockpiled together, identified as topdressing, and protected for use in future reclamation of the site.

Access road(s) will be constructed, and all ingress and egress will be via these roads. The surface facility areas will be leveled using traditional earthmoving equipment to cut and fill, as necessary, and the various construction activities will commence.

3.3 Dewatering Wells

Coincident with the surface facility construction, RHR will begin installation of the dewatering wells, initially around the vicinity of the Section 16 shaft, and eventually in the area of the Section 10 shaft. The approximate location of these wells is identified in Figure 3–1. These wells will be designed, permitted, and constructed in conformance with the NM OSE. Once constructed, the water produced at each well will be tested to establish its water quality and determine if treatment is necessary prior to discharge. Operation of these wells will occur pursuant to approved state and Federal requirements.

Depressurizing of some of the aquifers above the ore zone, i.e., the Gallup and the Dakota formations, will be necessary to facilitate shaft construction. Depressurizing of these formations and the Westwater Canyon formation, where the ore zone lies, will begin in advance of reaching the formations during construction of the shaft. The purpose of these wells for the aquifers above the Westwater formation, is to reduce the hydrostatic pressure in the formations in the vicinity of the shaft construction activities. This action will minimize the inflow of water

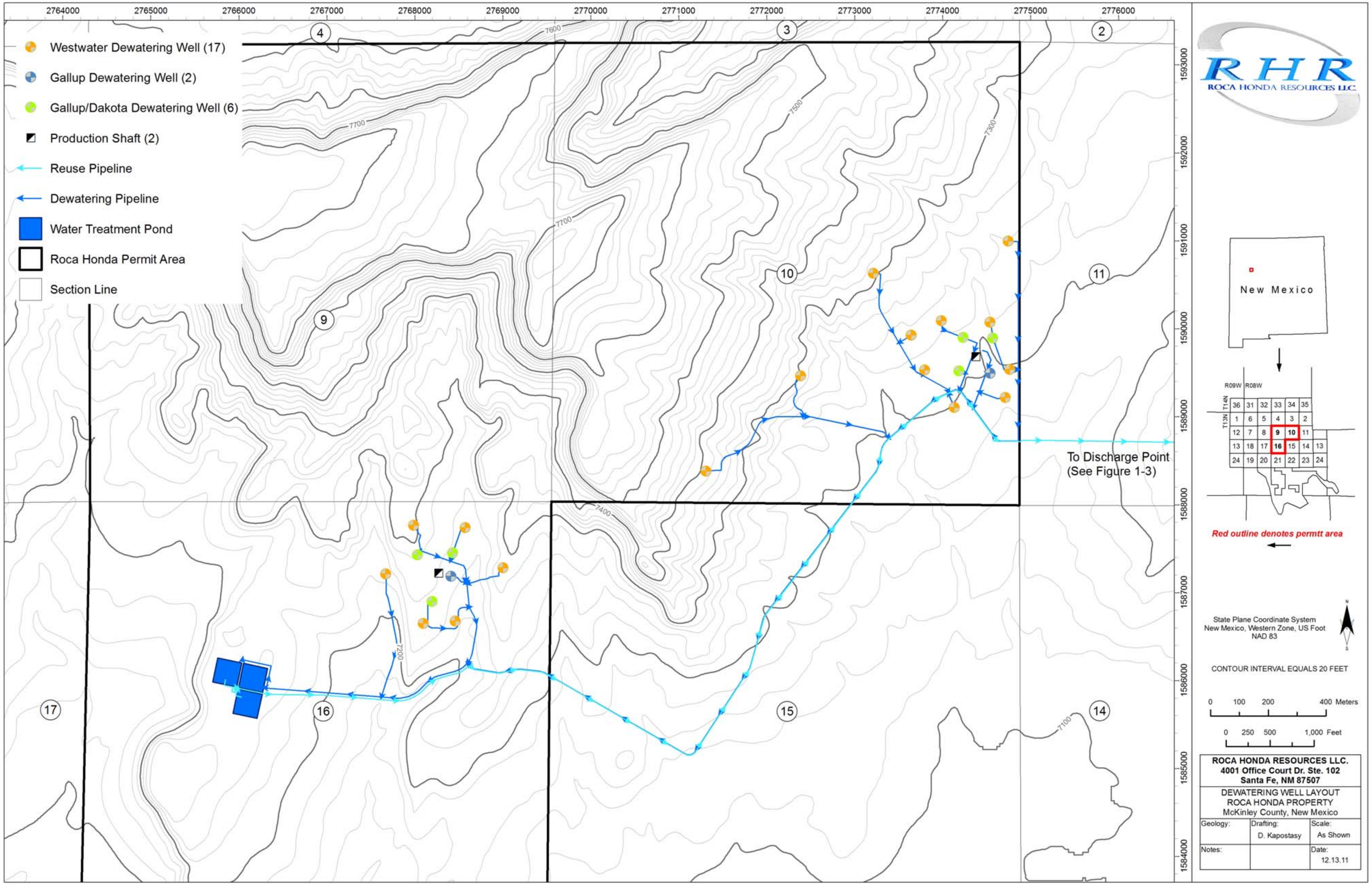

Figure 3-1. Generalized Mine Dewatering Well Layout

into the construction area of the shaft as the shaft cuts through the formation. A more detailed description of the shaft construction procedures is provided in Section 3.4 of this Plan.

Similarly, the purpose for the dewatering wells in the Westwater formation is to reduce the hydrostatic pressure in the ore-bearing formation so that this shaft can be completed and initial development begun. As the mine is developed in the ore zone, the mine itself will become the primary means of mine dewatering, and the wells for shaft construction will no longer be needed. One Westwater Canyon well at each shaft location will be drilled to a 42 inch diameter and cased to a 36 inch diameter. This well will serve a dual purpose; initially it will aid in depressurizing the Westwater aquifer. Thereafter, it will be used as a conduit from the surface into the mine to provide transport of aggregate and/or non-ore material, used as backfill in the mine. This transport conduit is commonly called a "backfill raise". The use of backfill is discussed later in Section 3.6.4 of this Plan.

The wells will have an approximately 50 feet by 50 feet final surface footprint, though it should be noted that the surface disturbance of the wells installed during shaft construction will be within the mine surface facility footprint. All water requiring treatment will be piped to the mine water treatment facility. Once the wells are no longer needed, the wells will be abandoned per NM OSE requirements and reclaimed. However, some wells will be kept to be used as a contingency in emergency situations, such as in the event of pump failure in the main shaft during mining.

Additional dewatering wells will be installed at various locations throughout the ore body. The purpose of these additional wells is to reduce hydrostatic pressure within mining horizons and to limit the amount of groundwater inflow to mine working areas. These additional wells will be drilled at a diameter of approximately 16 inches and cased with 12 to 14 inch steel casing into the Westwater Canyon Member of the Morrison Formation. Figure 3–1 contains the proposed locations for six additional Westwater Canyon dewatering wells. Locations of these additional dewatering wells are subject to change with additional groundwater modeling. All water requiring treatment will be piped to the water treatment facility.

All wells will be completed to State of New Mexico artesian well standards as outlined in New Mexico Administrative Code 19.27.4.31. Prior to being cased and grouted, all wells will be logged to determine screened intervals and construction requirements.

RHR has submitted an application to dewater the Roca Honda mine to the NM OSE. The application is contained in the Plan as Appendix A. As discussed in the application, construction and operation of the mine will proceed in several phases. The timing and intensity of dewatering/depressurizing and the aquifers dewatered will also proceed in phases that reflect the physical development of the mine. Construction of the Section 16 mine shaft and initial mine development phase will take approximately three years.

During the first phase, the mine shaft will be constructed in Section 16 from the surface to approximately 2,100 feet underground. The shaft will pass through the following geologic units: the Crevasse Canyon Formation, the Gallup Sandstone, the Mancos Shale, the Dakota Sandstone, and the Westwater Canyon Member. The Gallup Sandstone, the Dakota Sandstone, and the Westwater Canyon Member will contain sufficient quantities of groundwater to require temporarily dewatering (depressurizing) them within a limited area around the shaft to facilitate its construction.

Dewatering will begin in advance of constructing the mine shaft. Four wells will be installed around the shaft location approximately 240 feet from the shaft to a depth of 900 feet and screened in the Gallup. These four wells will be pumped at a total projected maximum rate of up to 600 gallons per minute (gpm), i.e., 150 gpm each, for up to six months prior to the shaft construction reaching the top of the Gallup Sandstone. During construction through the Gallup Sandstone the wells will be pumped at a projected total rate of 600 gpm for approximately four months while the shaft is constructed through the Gallup.

After the shaft has been completed through the Gallup Sandstone, three of the Gallup wells will be deepened to a depth of approximately 1,860 feet and screened in the Dakota Sandstone. The fourth Gallup well will be retained and will be pumped at a rate of approximately 20 gpm for the life of the mine to prevent over-pressurization of the shaft and also used for domestic water supply. The three deepened wells will be pumped for approximately three months prior to the shaft reaching the top of the Dakota Sandstone at a rate of up to 250 gpm, i.e., 83 gpm each, in order to temporarily dewater/depressurize the formation in the area of the shaft prior to construction of the shaft through the Dakota. The wells will be pumped for an additional four months while the shaft is constructed through the Dakota. After the shaft has been completed through the Dakota, pumping will cease from the wells. They will be used, thereafter, to monitor water levels in the Dakota Sandstone.

Concurrent with the beginning of shaft construction and construction of wells into the Gallup Sandstone, six (6) wells will also be drilled to a depth of approximately 2,100 feet and screened in the Westwater Canyon Formation, i.e., the formation containing the ore. These wells will be constructed around the perimeter of the shaft location about 650 to 800 feet from the shaft. These wells will be pumped at a rate of up to 2,000 gpm, i.e., 333 gpm each for up to a year prior to shaft construction reaching the top of the Westwater Canyon Formation in order to depressurize/dewater the Westwater Canyon in the immediate area of the mine shaft. The six wells and the shaft will be pumped at a rate of up to 2,000 gpm for up to six months while the shaft is constructed through the Westwater and initial mine development begins. After completion of the shaft through the Westwater Canyon Member, the wells will continue to be pumped for as long as they aid in dewatering the mine. However, as the mine development phase begins, it is anticipated that the shaft will function as the main point of production of water from the Westwater Canyon. The wells around the shaft will produce less and less water and eventually will no longer contribute to mine dewatering. At that point most of the water being produced from the mine will be discharged through the shaft. The Westwater wells will be turned off but retained for emergency purposes and monitoring.

After the shaft has been completed, the underground mine development and operations phases within the Westwater Canyon Member will begin. During these phases dewatering of the Westwater formation will be needed to facilitate continued mine development and operations over time and to ensure the safety of the miners during mining. Dewatering of the Westwater will continue throughout the life of the mine.

As the mine is developed over its mine life, as many as six additional wells will be constructed as needed into the Westwater Canyon Member along the course of the main underground workings. These wells will be installed in advance of underground construction and will be pumped so as to minimize inflow of groundwater into the mine workings.

In the long-term during the life of the mine, the shaft itself will become the major point from which water is produced. As the mine workings expand, the workings themselves will act as a gallery for gathering of the water within the mine. This water will be routed from the various working areas into a sump at the bottom of the shaft and pumped to the surface. The six wells along the underground workings will be pumped for as long as they provide an effective depressurization/dewatering mechanism. A total discharge of up to 4,500 gpm is anticipated from these wells and the Section 16 shaft.

As suggested by the schedule contained in Table 3-1, the process of constructing wells in advance of shaft construction will be repeated for the construction of the Section 10 mine shaft. RHR anticipates that the rates and duration of depressurizing the Gallup and Dakota formation aquifers in Section 10 will be similar to those experienced during construction of the Section 16 mine shaft. However, the amount and rate required in the Westwater formation aquifer will likely be different in the Section 10 shaft construction because of the amount of pumping that will have occurred as the Section 16 mine development activities proceed toward the Section 10 shaft area. The amount of pumping required from the Westwater formation aquifer during shaft construction and subsequent mine operations is likely to be significantly less than 4500 gpm. The true amount cannot be accurately assessed until such time as there is sufficient draw-down data available from the depressurizing activity described above. Nevertheless, for the purposes of design of the facilities, and therefore this Plan, it has been assumed that pumping rates from the Westwater Canyon formation when both shafts are operating will be a maximum of 8,000 gpm.

RHR submitted a report titled Assessment of Potential Impacts from Mine Dewatering at the Proposed Roca Honda Mine, McKinley County, NM (INTERA 2011) to the NM OSE on November 7, 2011 in support of its Mine Dewatering Application. The report was also submitted to the USFS, the NMED and the NM MMD in support of its Mine Permit Application and Plan of Operations. This report provides analysis of potential impacts on existing water uses when groundwater is pumped at the rates and for the period of mining described above.

INTERA, RHR's groundwater modeling consultants, constructed a numerical groundwater flow model of the San Juan Basin to evaluate the impact that the proposed dewatering activities might have on local and regional groundwater and surface water systems, including those for the nearby population centers of Grants, Gallup, Milan, Crownpoint, San Mateo, and the Acoma and Laguna Pueblos. Impacts are defined as changes in groundwater levels at wells and springs. Specifically INTERA constructed and calibrated a numerical model of groundwater flow to estimate predevelopment groundwater levels; i.e., groundwater levels prior to the year 1930, for conditions prior to the onset of large-scale mining in the Grants uranium belt. They constructed and calibrated a transient numerical model of groundwater flow to estimate changes in groundwater levels from 1930 to 2012 caused by pumping from public water supply wells, mine dewatering, and recovery from historic mine dewatering. They constructed and applied a predictive, transient, numerical groundwater flow model that simulates changes to the 2012 hydraulic groundwater levels during and after dewatering at the proposed Roca Honda Mine. The simulated changes in groundwater levels at locations near existing wells and springs represent the estimates of potential impacts due to Roca Honda Mine dewatering.

The groundwater flow model provides a reliable prediction of the potential impacts of proposed mine dewatering at the Roca Honda Mine. Based on the available data and the model calibration, dewatering the Roca Honda Mine will not adversely impact the water resources of the Village of Milan, Acoma Pueblo, Laguna Pueblo, the City of Grants, the community of San

Mateo, Crownpoint area, or the City of Gallup. Mine dewatering will not have any adverse impacts on area springs.

3.4 Shaft Construction

Site development will begin at Section 16 first. Construction of the Section 16 production shaft will begin as soon as possible after the site has been prepared. The shaft will be approximately 18-feet in diameter and will be constructed using conventional shaft sinking techniques.

Typical conventional shaft sinking involves vertical excavation from the ground surface downward. Little difficulty is anticipated in shaft sinking through solid rock. Excavation consists of a cycle of drilling, blasting, excavating or removing rubble (i.e., mucking and hoisting), constructing a liner in the excavated area and repeating the process until the ore horizon is reached. When sinking the shaft through water-bearing strata, careful shoring and sealing of the shaft lining will be necessary, and pumping facilities will be needed.

In addition to dewatering/depressurizing as described in Section 3.3, grout will be used to further reduce the inflow of water into the shaft. Grout is a liquid material that when solidified, forms a seal that reduces or eliminates the flow of water in the area where it is applied. Using grout technology facilitates control of the inflow of water from the formation being grouted during the construction of the shaft, and importantly, during the operating life of the mine.

There are a number of ways grout can be introduced into the formation. Fundamentally, the approach is to drill a number of holes from above the formation around the circumference of the shaft and pump the grout into the formation, forming a "curtain" in the formation in the area surrounding the shaft sinking excavation. In the grouting process, liquid cement is forced into the water-bearing earth under very high pressure. On mixing with the water, the cement solidifies the adjacent area, and it is removed by drilling and blasting as with rock.

The use of the conventional shaft sinking method will allow the segregation of the various aquifers by facilitating the ability to grout water-bearing formations prior to penetrating the formation. The Gallup and Dakota Sandstone formations are expected to be under hydraulic pressure and to flow at significant volumes. Grouting will be used to prevent water flow into the shaft during construction. When shaft sinking reaches the pad elevation for the formation, a probe hole will be drilled into the water-bearing formation. The hole will be equipped with special packers and gauges to measure water volumes and pressures. If volumes and pressures are within acceptable tolerance levels, shaft sinking will resume without grouting. If volumes and pressures are outside of these levels, grouting will be implemented prior to advancing the shaft sinking process. Figure 3–2 shows the typical stratigraphy anticipated to be encountered at Roca Honda. Figure 3–3 shows a typical grout curtain scenario in more detail.

The shaft sinking activities will proceed as described above through the water-bearing formation. The grout will remain in the surrounding formation providing a seal to minimize water inflow. Any water which continues to flow into the shaft will be controlled by installing "water rings" to gather the water and direct it to temporary collection sumps at the shaft bottom. The water will be pumped to the surface where it will be treated at the water treatment plant. These rings are heavy cast-iron segments, with flanges for connecting, and bolted together in place.

As noted above, the excavated shaft material will be brought to the surface during shaft construction using conventional hoisting equipment. This material will be segregated as

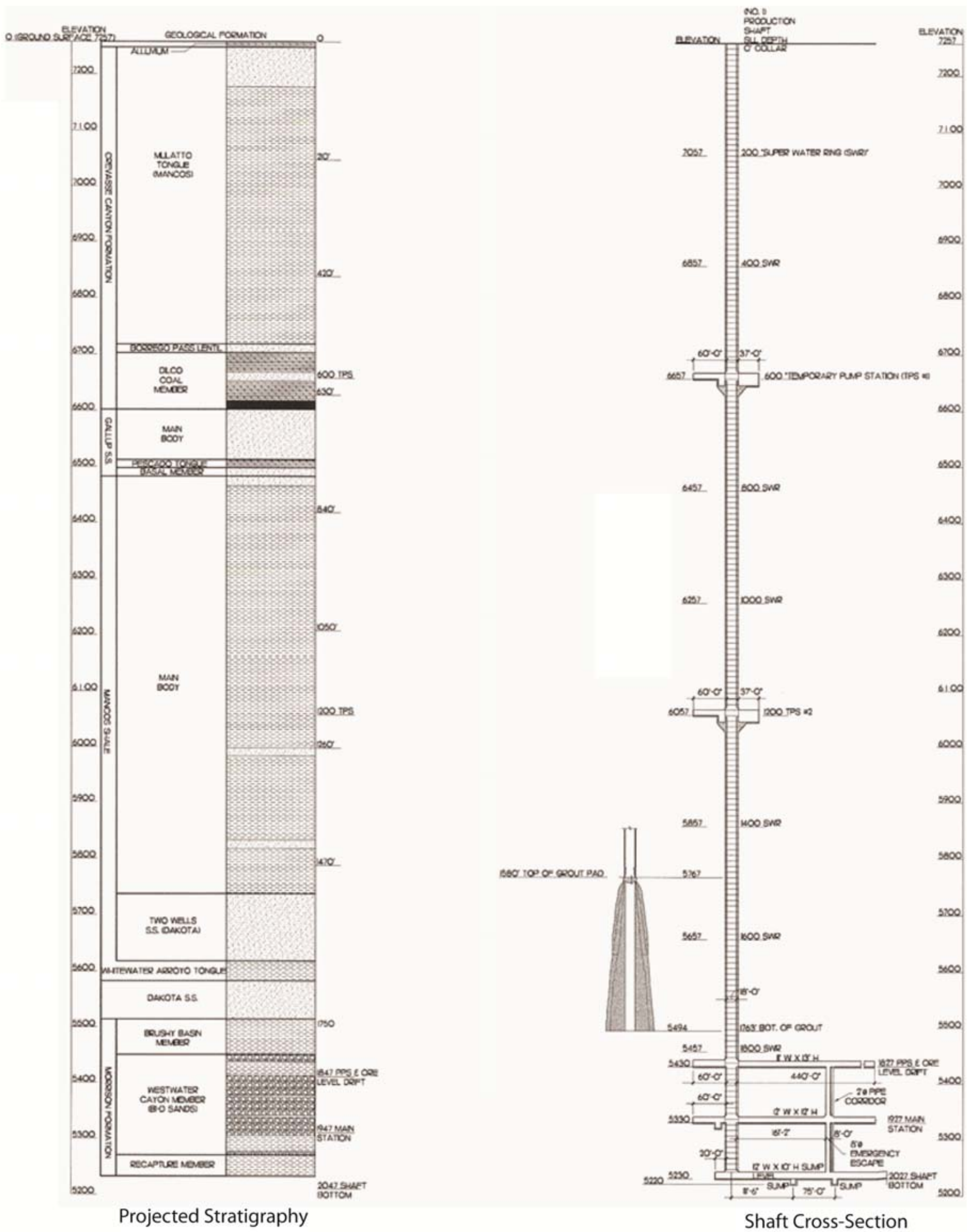

Figure 3-2. Typical Stratigraphy at Roca Honda Shaft Location

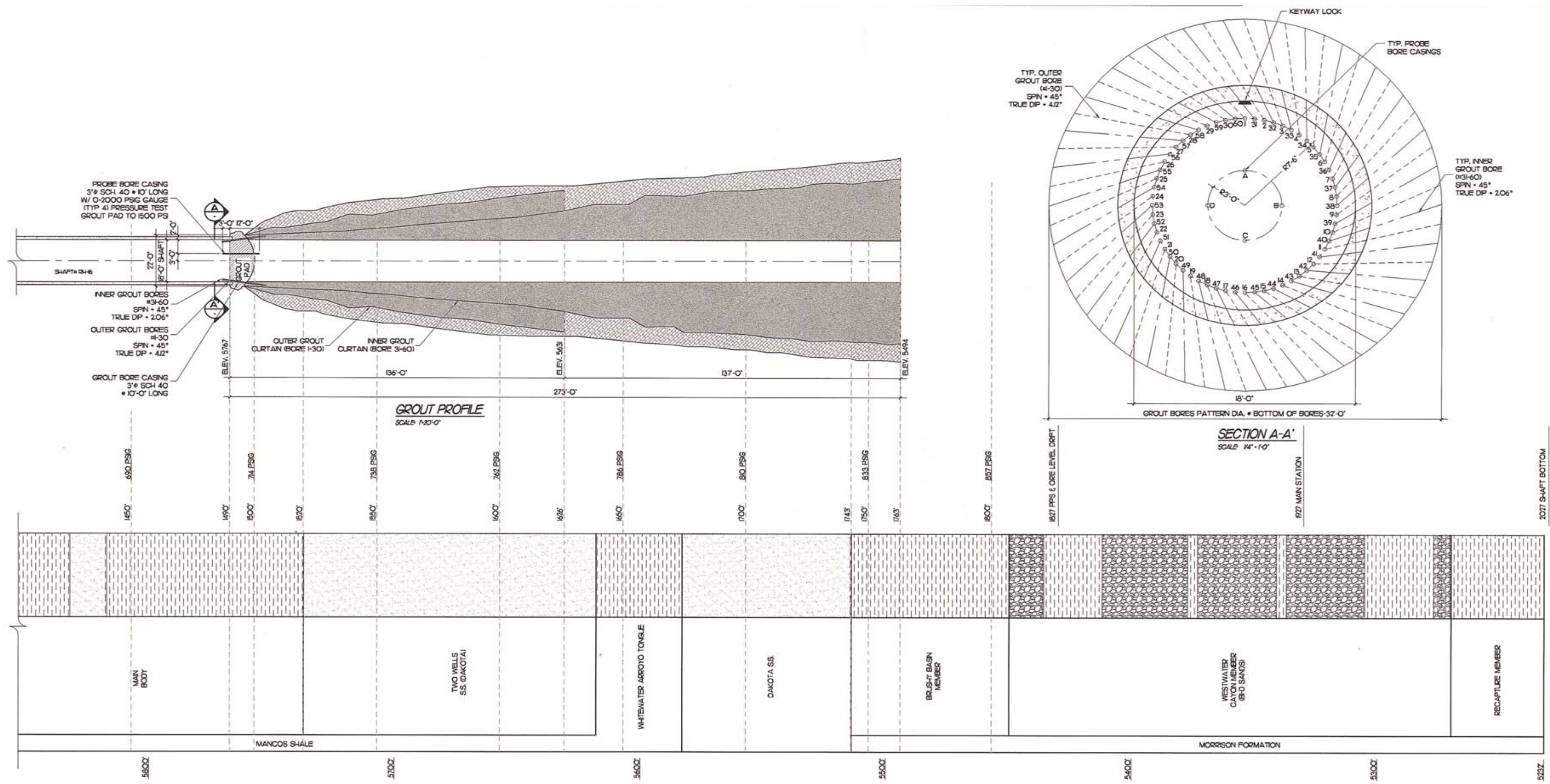

Figure 3-3. Typical Grouting Technique for Shaft Construction

appropriate and placed in designated stockpile areas on the surface at the mine site. A permanent hoist house for operations will be installed before shaft construction is completed.

Upon completing shaft construction, a permanent pumping level station will be developed to accommodate mine dewatering during mine operations. Figure 3–4 shows details of a typical pump station. Ultimately, the production shaft will be fitted with a permanent 90-120 foot tall headframe and hoist for operations. After completion of the Section 16 shaft, the contractor will mobilize to Section 10 and begin construction of that production shaft. The sequence of construction activities at the Section 10 shaft will be the same as those of Section 16.

3.5 Ventilation Holes and Escape Shafts Construction

An estimated five ventilation shafts will be installed in the Roca Honda permit area. Their locations are shown in Figure 1–3. The size of each ventilation shaft will be approximately nine feet in diameter. The first ventilation shaft will be installed (after the Section 16 production shaft is completed) immediately north in Section 9. Ventilation shafts will be constructed using the blind boring method, which is similar to the construction method for a large diameter well. In this method, a hole will be bored from the surface using a large mechanical boring machine.

Figure 3–5 shows a typical blind boring equipment setup. Blind boring uses a shaft drilling rig with a rotary table connected to a reamer body (or cutting tool) by a heavy double walled rod or "drill string." The rotary table provides the torque or turning action for the reamer. To create upflow, the boring is filled with water which is maintained at a constant level throughout the entire shaft development, similar to drilling a well. The water fills both the shaft and the hollow drill string creating two independent columns of water. Compressed air is injected into the water column of the drill string, displacing the fluid and creating a much lighter column. As the reamer cuts, the heavier water column inside the shaft pushes down and across the bottom of the shaft. The water is then forced through a small opening called a "pick-up" on the reamer body, which displaces the lighter water column in the drill string.

The displacement of the lighter drill string fluid results in an upward flow or "reverse circulation." The volume of fluids being displaced creates a vacuum at the pickup point that sucks the cuttings from the face. The reverse circulation is maintained by providing a constant level of water in the shaft, which provides both a downward pressure for flow and the added benefit of concentric outward pressure on the shaft wall. Concentric pressure reduces the potential for surrounding strata to shift or move and, in turn, increases overall stability.

Material produced from ventilation shaft excavation will be contained in a large segmented pit or container and the water decanted for recirculation in drilling. The material will be allowed to dry and periodically transported to a stockpile on Section 16 or Section 10 (depending on the location of the ventilation shaft). The ventilation holes will be designed with upcast or exhaust ventilation air direction and a volume of approximately 200,000 cubic feet per minute. The air movement will be provided by an electric motor and fan assembly mounted horizontally on the surface on a concrete pad. This design will allow dual purpose use of some of the ventilation holes as emergency escape ways for mine personnel at the haulage level and mine working level elevations.

The production shafts are designed using downcast ventilation, in which fresh air is pulled down the shaft and is distributed throughout the mine. Fresh air will also be vented upward from the haulage level, which is below the ore level, to the mine working level (ore level) by means of

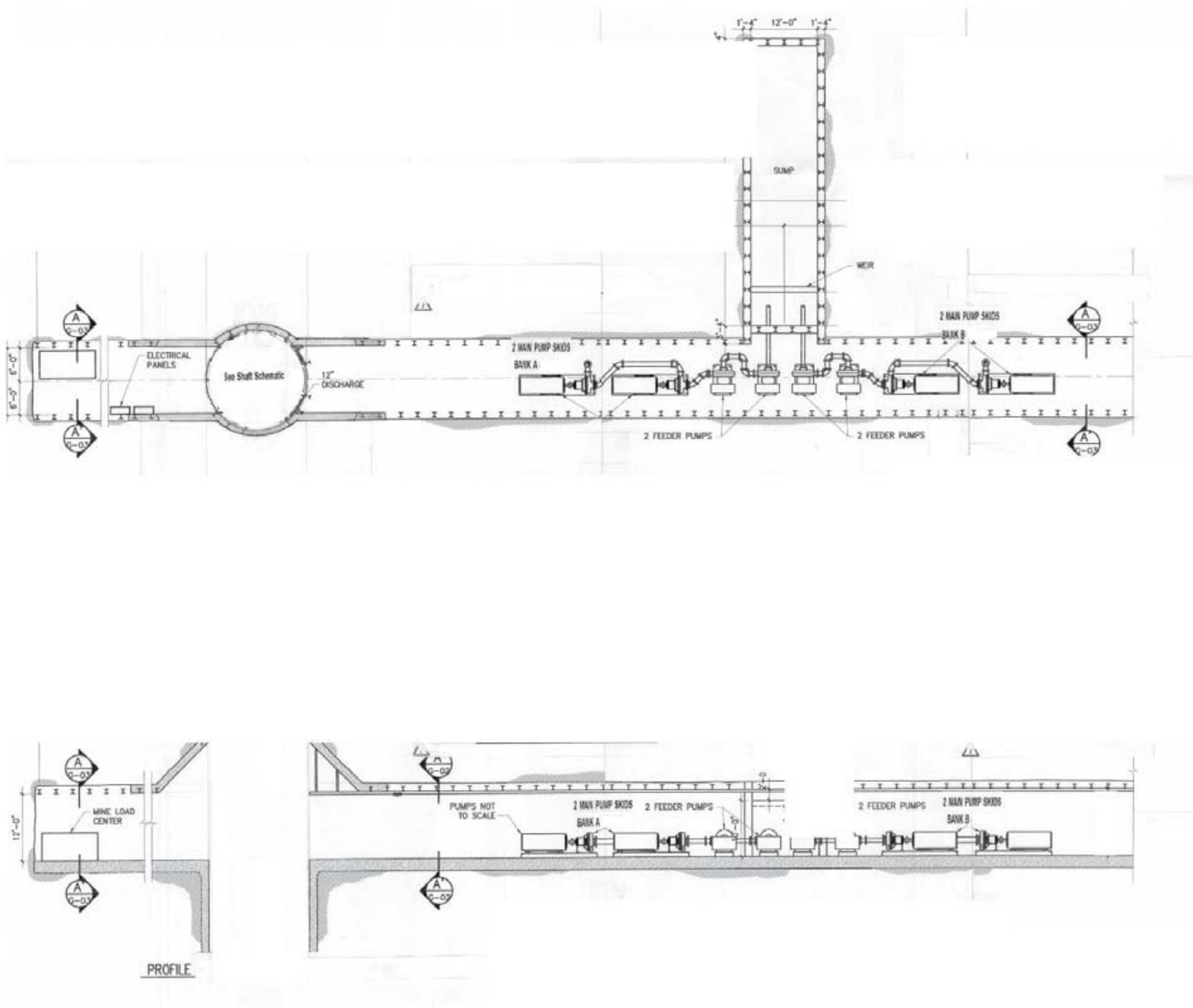

Figure 3-4. Typical Pumping Level Station

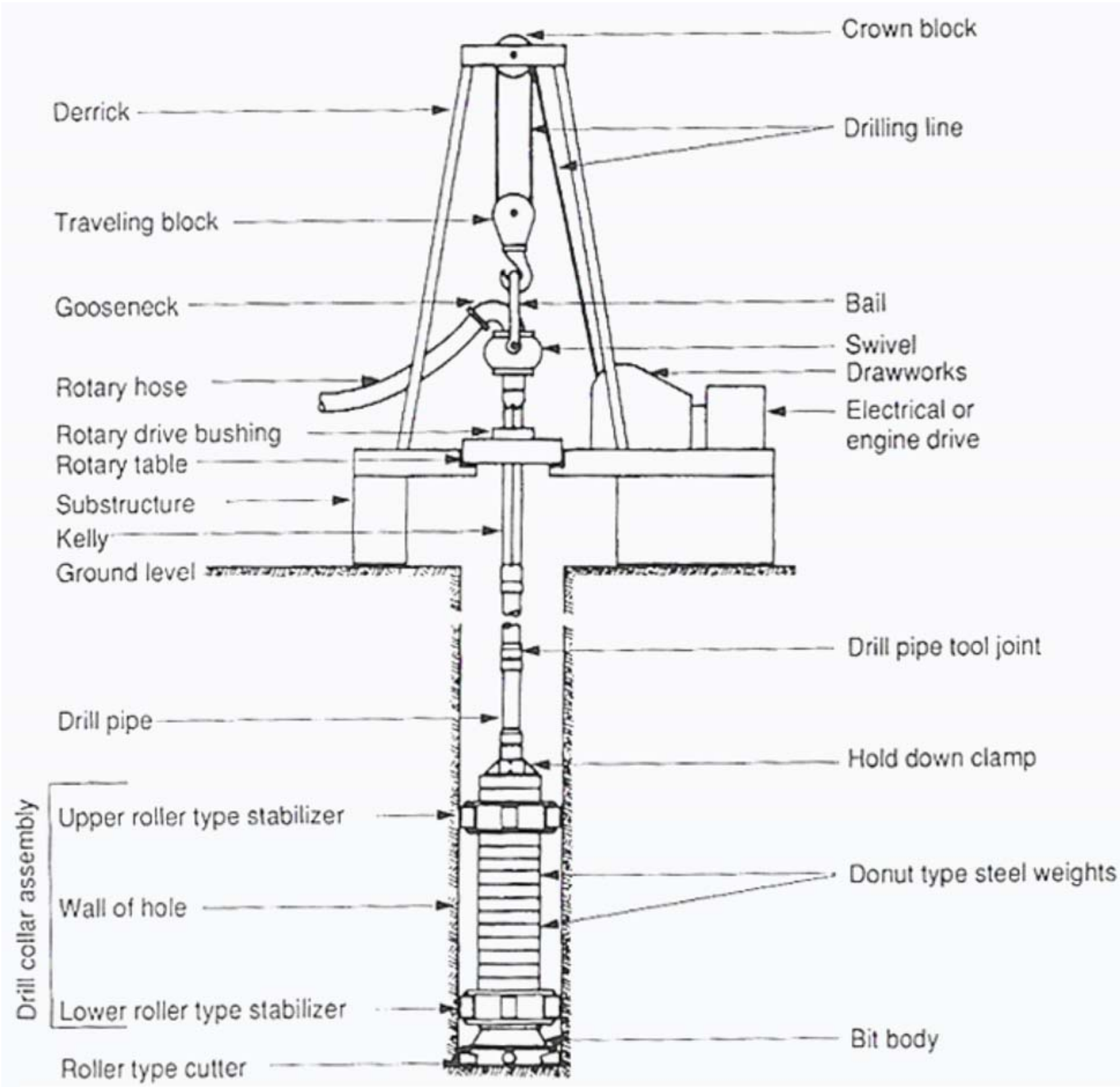

Figure 3-5. Typical Blind Boring Equipment Setup

raises or development drifts. These two mine levels are discussed in more detail later in this Plan. Once completed to full depth, each ventilation shaft will be lined with steel, concrete or composite material. In constructing the ventilation shafts, it is anticipated that the water-bearing formations encountered may produce water such that grout may be used to lessen the amount of water flowing into the boring as the formation is transected.

3.6 Mine Operations

Once the production shaft is completed, a permanent sump will be constructed at the lowest point of the mine shaft(s) to provide a collection point for mine water. Water produced from the mine as the mine is developed and work areas are excavated will be collected and held in the sump to remove sediment with the aid of decantation trenches. The collected water will be pumped through a series of pump stations to the surface, where it will be pumped to the water treatment plant for treatment, as necessary.

3.6.1 Haulage Level

The haulage level development will begin under the ore horizon as soon as practical after shaft construction has been completed. The haulage level of the mine serves several purposes. It provides a location from which to conduct longhole drilling underground that further defines the ore body. The longholes then provide a means of further dewatering the mining level by providing drainage from below. The haulage level also provides the clean air ventilation passageway and importantly, it provides the ore transport route from ore chutes to the hoisting transfer facilities.

Figure 3–6 illustrates the concept of longhole drilling in underground mining. Longhole drilling is a dual-purpose technique used to define the location of the ore and to dewater the portion of the formation to be mined. A comprehensive longhole program will be used to define the ore prior to extraction. Information obtained from the longholes will be used to develop a detailed view of the approach to use in extracting the ore. The longholes will allow RHR to delineate, with specificity, the location of ore-containing pods within the mining horizon. Use of this technique reduces significantly the surface disturbances required for development drilling. Development drifts will be excavated to provide access to and outline the uranium pod defined by the longhole drilling.

As shown in Figure 3–6, the longhole drilling machine, located at the haulage and/or ore level, is capable of drilling at the face (see front view) for distances into the rock of 200-300 feet ahead of the excavation in predetermined patterns. The top and side views show how the longhole drilling will be performed radiating out and up into the rock at various angles. The longholes will allow the water to drain from the rock in advance of excavation. The holes will also provide access into the rock with probes that will allow the ore to be more carefully defined.

During initial development of the haulage level, the excavated material will be hoisted to the surface and placed in stockpiles. As noted previously, the haulage level is located below the ore horizon. Therefore, the excavated material is not expected to contain radiological constituents of concern. Nonetheless, all of this material will be stored in stockpiles on the surface of the mine site and handled in a manner protective of human health and the environment. The details

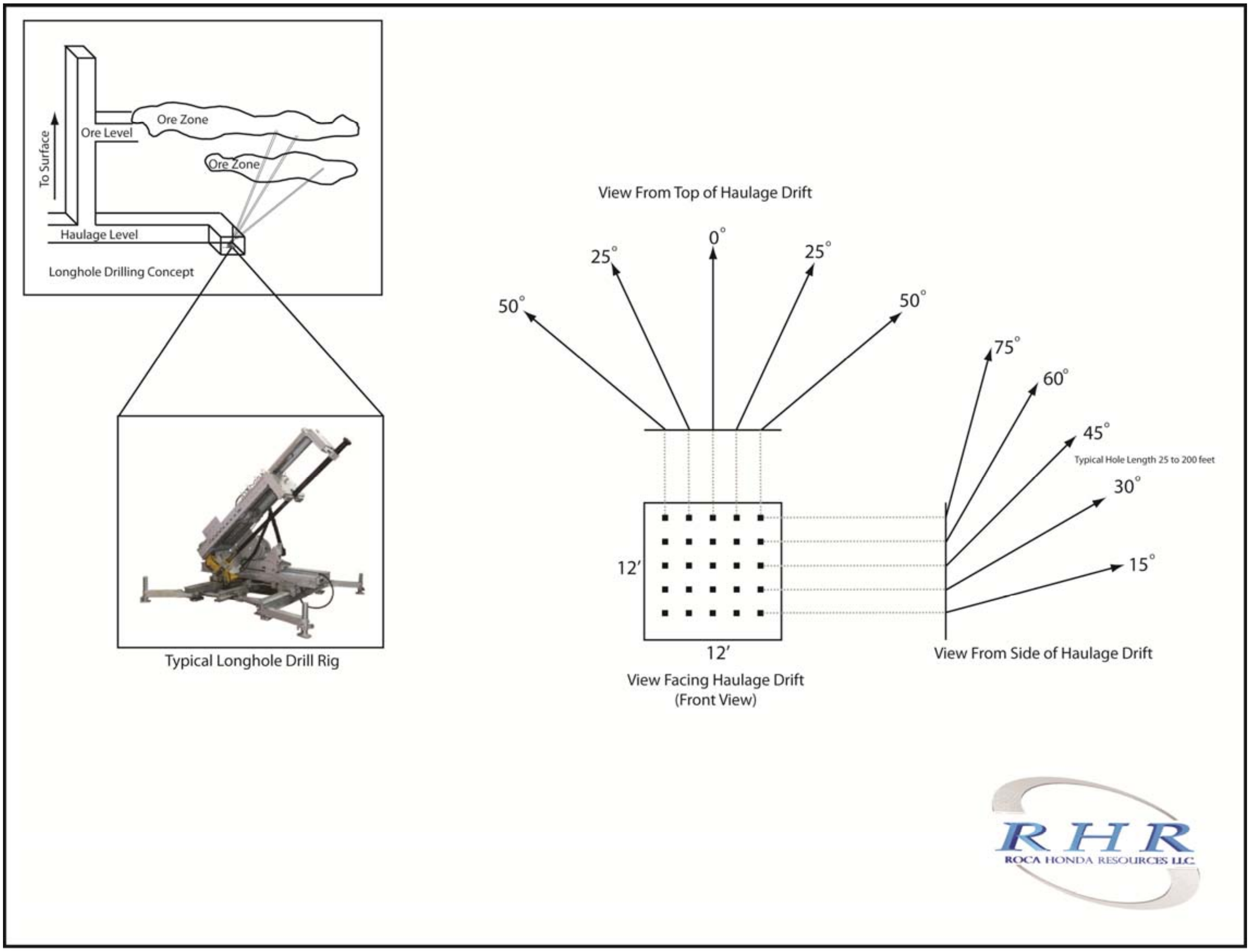

Figure 3-6. Typical Longhole Drilling Technique

regarding the mitigation measures implemented at the site to ensure this protection are described later in this Plan.

As development of the mine continues, more and more of this excavated material will be used as backfill in areas of the mine that were previously excavated and no further mining is planned. In this manner, much of the mine excavated material will never be brought to the surface. Ore will be removed by drilling holes into the working face when the ore is located and inserting explosives in the drilled locations. After blasting the material face, the rubblized (blasted) ore materials will be moved away from the face using a load/haul/dump (LHD) or a cable drag machine, known as a slusher, to a designated collection point. From the collection point, the ore will be loaded on a truck, transported to the bottom of the production shaft, and loaded and hoisted to the surface.

3.6.2 Ore Mining Method

Ore at the Roca Honda mine will be extracted using either a step room-and-pillar or drift-and-fill mining method. Both are common mining methods which are flexible and economically viable. Figures 3–7 and 3–8 illustrate the layout in step room-and-pillar and drift-and-fill extraction methods, respectively.

In room-and-pillar mining, mined material is extracted across a horizontal plane while leaving "pillars" of material in place to support the rock above and resulting in open areas or "rooms" (stopes) underground. Step room-and-pillar mining is a variation in which the sill or bottom elevation of an inclined ore body is adapted for the use of rubber tired equipment. Because every ore body is different, applications of step room-and-pillar mining cannot be fully generalized, however, this type of mining applies ore deposits with thicknesses from 6 to 20 feet and dips ranging from 15 to 30 degrees.

This type of mine is normally developed on a grid creating a regular mining pattern. Geologic features such as faults may require this pattern to be modified. The percentage of material mined varies depending on many factors, including the material mined, width of the pillar required for roof support, and roof conditions.

Step room-and-pillar mining features a layout in which stopes and haulage-ways cross the dip of the ore body in a polar coordinate system. By orienting haulage-ways at certain angles across dip, stope floors assume an angle ($<10°$) that is easily traversed by rubber tired equipment (See Figure 3–7). The main development of step room-and-pillar mining includes a network of parallel transport drifts on either side of the ore pod. These transport drifts provide one-way traffic for mine equipment and also provide fresh air ventilation into mine working areas. Stopes are advanced forward by drifting from the center haulage-way outwards to the parallel transport drifts. The next step is to excavate a similar drift or side slash one step updip or downdip and adjacent to the first drive. This procedure is repeated until the roof span becomes too wide to remain stable and an elongated strip is left as a “pillar”. Pillars left in place to support the roof of the mine are typically either barron of ore or are of such low grade that they are left in place rather than removed. In some cases, the pillars contain sufficiently high mineralization that they can ultimately be removed using the drift and fill method discussed below.

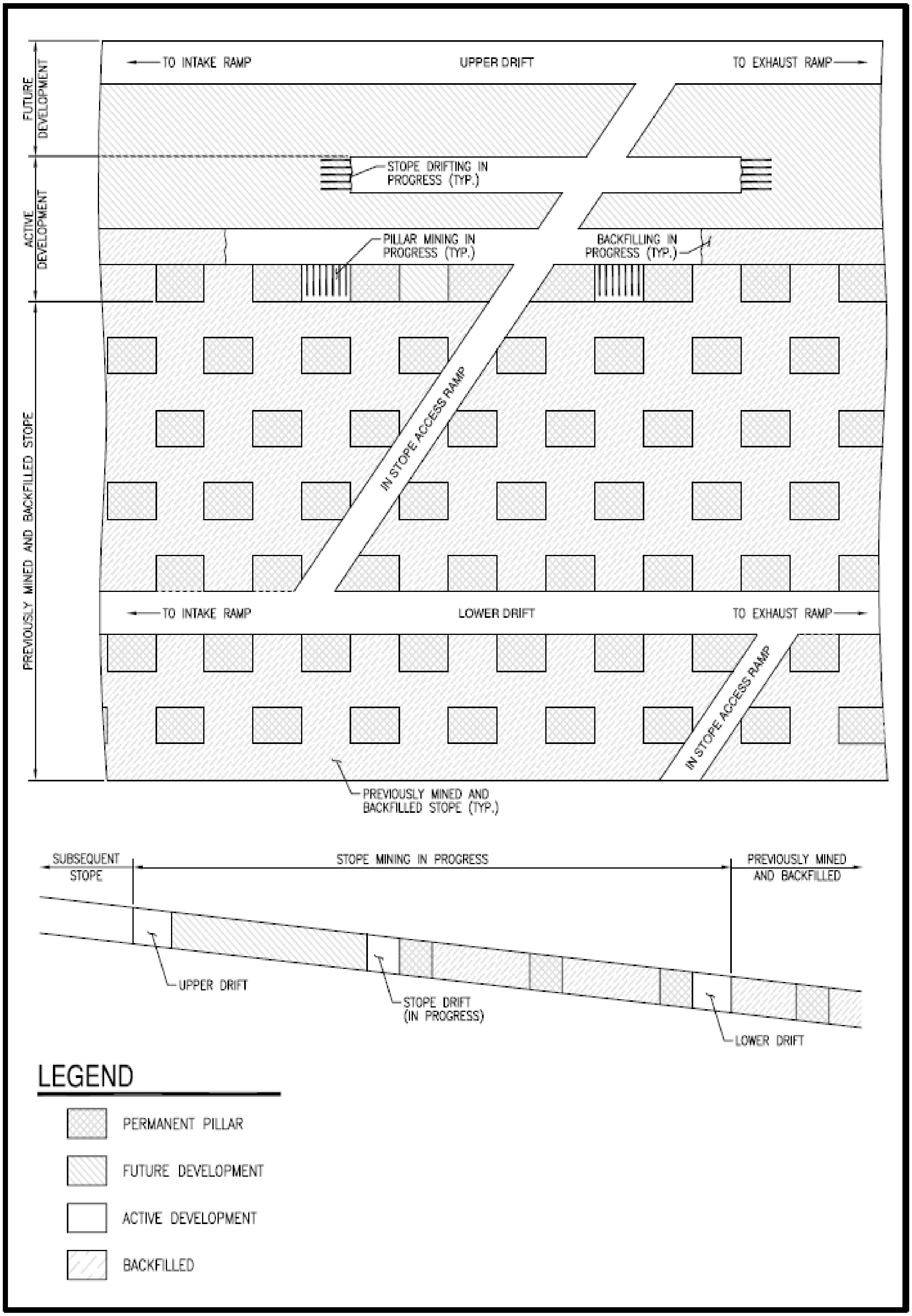

Figure 3-7. Typical Step Room and Pillar Mine Design

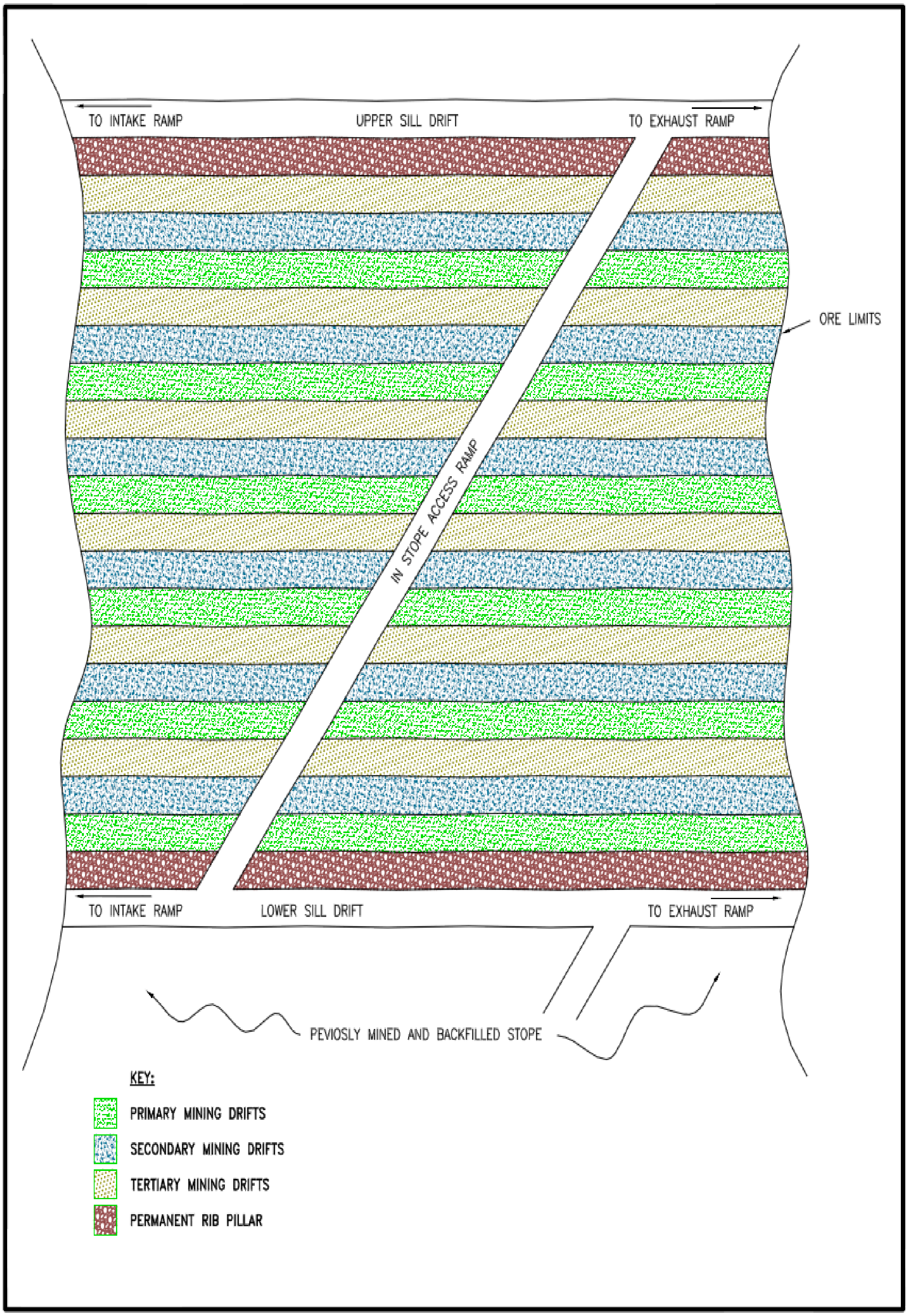

Figure 3-8. Typical Drift and Fill Mine Design (Plan View)

At Roca Honda, one 10 foot wide room will be excavated followed by leaving a 10 foot wide pillar for support. Heights of rooms and pillars are not expected to exceed 12 feet. In cases where stope thickness exceeds 12 feet the stope will be mined in equal vertical lifts to the extent possible (i.e. a 20 foot thick stope will be mined in two 10 foot intervals). The first 10 foot interval is mined and then backfilled so the second 10 foot interval can be mined. In this case the backfill becomes the floor for the second 10 foot interval that will be extracted. The length of any particular room or pillar is determined by the width of the ore pod being extracted. The width of pillars at the Roca Honda Mine is normally expected to be 10 feet. Room widths can vary with rock strength but are not expected to be smaller than 10 feet nor greater than 50 feet. Each ore pod will be separated into 200 foot stopes. Stopes will be separated by a sill (lowest elevation of ore) drift connecting each parallel transport drift on either side of the ore pod. This sill drift aids in ventilation and transportation of material.

As mining advances in an up-dip direction, rooms mined first will be filled with a cemented backfill and pillars will be partially mined. The purpose of cemented backfill is to provide a safe working environment for the miners. It will prevent the mine roof from collapsing or caving when the pillars are partially removed. Cemented backfill will also help in reduction of radon emanation from low grade pillars. As mining advances in the "room," roof bolts will be placed in the ceiling of the rooms to prevent ceiling collapse. Roof bolts are long steel rods that are inserted and tightened into holes drilled up into the ceiling of the rooms. The roof bolts will be further supplemented as necessary with the use of wire mesh draped on the ceiling and sidewalls and held in place with the roof bolt. The use of these techniques will further enhance the safety of the working environment. Figure 3–9 shows a typical roof bolting operation.

In some areas of the Roca Honda Mine, ore grade will be high enough to support drift-and-fill mining. Drift-and-fill mining allows for a higher extraction rate of ore but operating costs associated with this type of mining are greater than costs associated with step room-and-pillar mining.

The drift-and-fill mining method is the same as the step room-and-pillar mining method except that in the drift and fill method pillars created while mining are ultimately removed because of the high ore grade they contain. The higher ore grade can justify the additional cost of using additional engineered backfill to provide the stability needed to safely extract the pillars while maintaining a safe working environment. At Roca Honda those areas of the ore body that contain sufficiently high ore grade to justify use of the drift and fill method will first be mined using the step-room and pillar method. Backfill will then be used to replace the pillars while the drift and fill method is employed.

3.6.3 Pillar Extraction

Rooms down-dip from a pillar will be backfilled with mine development excavated non-ore material and/or aggregate imported into the mine from the surface. This material will be mixed with a pre-determined amount of cement to strengthen the backfill to a point which will prevent the roof from collapsing. Prevention of roof collapse will be further ensured by only partially removing pillars when necessary. Figure 3–10 demonstrates the pillar extraction process.

To prepare an ore block for extraction, the pillars will be split for drilling and blasting access. The size of the area to be extracted will be based on results of rock mechanic studies of the

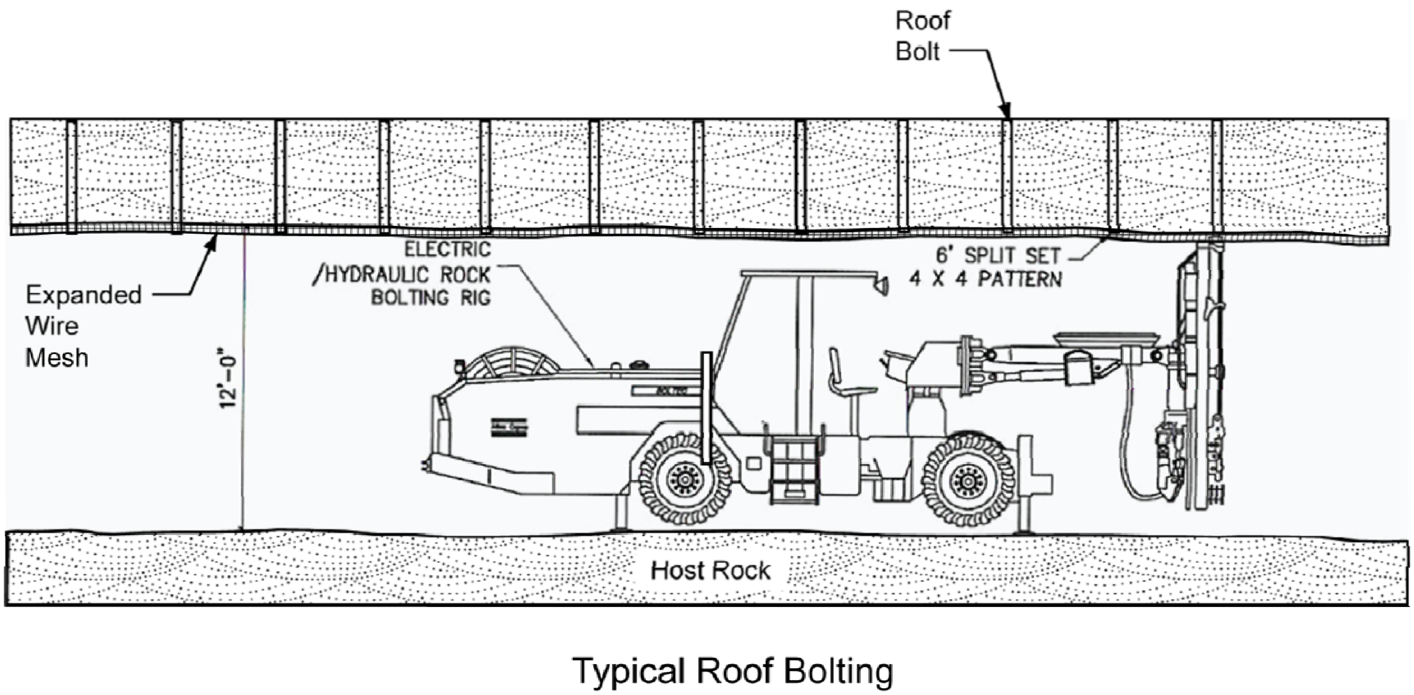

Figure 3-9. Typical Roof Bolting Method for Room and Pillar Mining

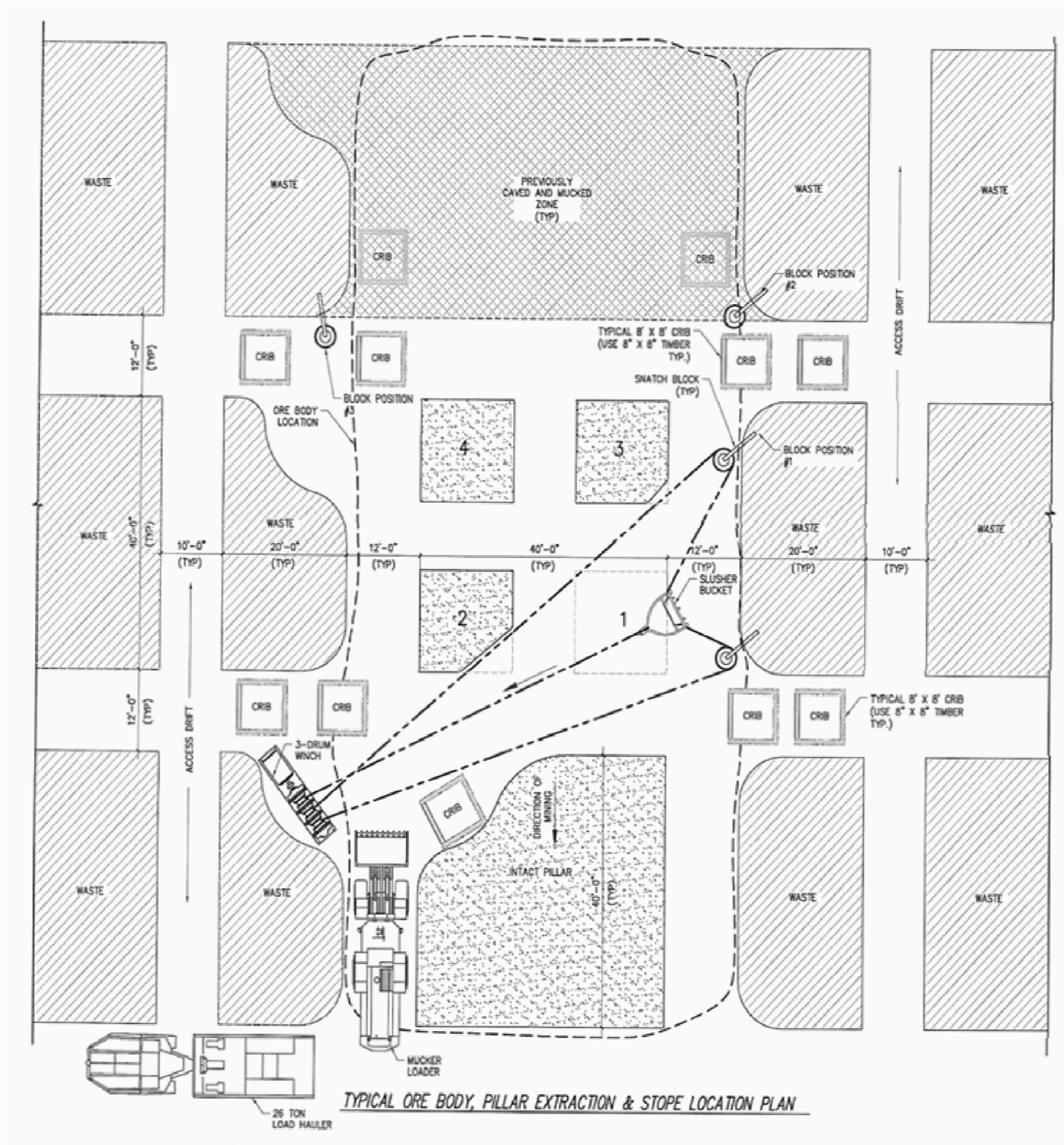

Figure 3-10. Typical Ore Body Pillar Extraction and Stope Location Plan

ground conducted during mining. The pillars will be monitored and if the geomechanics of the ground prove to be sufficiently stable, the pillars will be split again to facilitate more drilling and blasting.

When the pillars are blasted and extraction begins, a slusher may be used to remove the broken ore. Miners will not enter an active pillar extraction area with unstable ground conditions. The ore will be dragged out by the slusher, and LHDs will load trucks or haul the ore to a chute to be transported to the production shaft. When the pillar extraction is complete, the area will be backfilled and mining will progress in an up-dip direction until the stope is completely mined out.

3.6.4 Backfill

Roof collapse or caving will be prevented at the Roca Honda Mine by backfilling previously mined rooms with mine development excavated non-ore grade material and/or aggregate imported into the mine from the surface. Early in the development and operation excavated non-ore material of the Roca Honda Mine will have to be hoisted to the surface and stockpiled as it is produced. This material cannot be stockpiled underground initially because of the limited space. As the mine matures and stope mining begins, this material will be reintroduced to the mine as backfill. However, before it can be used as backfill it will be tested and characterize to ensure that its reintroduction into the mine will not have a detrimental impact on groundwater.

As discussed in Section 3.3 of this Plan one Westwater Canyon dewatering well that will be installed in the vicinity of each production shaft will be constructed and cased at 36 inch diameter. This will allow the well to serve as a “backfill raise” in the future once it is no longer functions as a dewatering well. Stockpiled non-ore material on the surface will be transported through this backfill raise into the mine, as needed, mixed with cement and placed in mined out rooms as stope mining progresses. Backfill aids in ground support by supporting the roof which in turn allows for adjacent pillars to be completely or partially removed, depending on which type of extraction technique is being used.

Ore extraction from stopes will continue for some time after development access to ore pods has been completed. The surface stockpile of backfill material will continue to be depleted until all material has been reintroduced to the mine. When this occurs, material will be sourced from a local quarry to continue with backfill operations. This material will be a clean aggregate with sufficient geotechnical characteristics to be used as backfill. This material will also be characterized to ensure that it does not present a potential impact to groundwater.

4.0 Mine Surface Facilities (NMAC 19.10.6.602 D.(15)(c))

(c) Maps and plans indicating the location, size and capacities for the mine facilities including:

- *(i) leach pads, heaps, ore dumps and stockpiles;*
- *(ii) impoundments;*
- *(iii) ponds;*
- *(iv) diversions;*
- *(v) disposal systems;*
- *(vi) pits;*
- *(vii) tailings disposal facilities;*
- *(viii) mills;*
- *(ix) water treatment facilities;*
- *(x) storage areas for equipment, vehicles, chemicals and solutions;*
- *(xi) topsoil and topdressing stockpiles;*
- *(xii) waste rock dumps; and*
- *(xiii) other facilities or structures.*

As described in Section 1 the Roca Honda mine permit area encompasses three sections of land, i.e., Sections 9, 10, and 16 as well as approximately 48 acres of haul road, utility corridor and the mine water discharge pipeline leading into and out of the mine. Anticipated surface facilities include haul and utility roads, ore pads, retention (holding) ponds, detention basins, diversions, wastewater treatment facilities, water treatment facilities, warehouse and storage areas for equipment, vehicles, chemicals and solutions, maintenance building, topdressing stockpiles, excavated materials stockpiles, parking areas, mine shafts, vent shafts and escape ways, hoist buildings and head frames, roads, drill holes, dewatering wells, fences, power and water lines, surface water runoff control features, and a mine water discharge pipeline. The NMAC requirements specify the various mine facilities that must be discussed. The Roca Honda mine will not have leach pads, heaps, pits, tailings disposal facilities, or mills. This Section discusses those facilities that remain in the NMAC subject area.

Figures 4–1, 4–2, and 4–3, provide a more detailed view of the proposed surface facilities and associated surface disturbances in Sections 9, 10, and 16, including the anticipated location of the production shafts and ventilation shafts. Figure 1-3 shows the additional 48 acres of disturbance for the haul roads, utility corridor and mine water discharge pipeline. The majority of the surface area disturbance will occur on Section 16. Section 16 will have the majority of the stockpile areas, larger support facilities, and the water treatment facility. It should be noted that the only disturbances anticipated in Section 9 are the construction of three ventilation shafts and associated mud pits and an access road with utility lines in the extreme southeast corner of the section.

Attachment 1 to this Mine Operations Plan Revision 1 is a selected drawing package of design details for the mine project prepared by RHR’s contractor, Wilson & Company, Inc. The package is a subset of the many design drawings and details prepared for the project. The contents of this package provide pertinent details as required by NM MMD. This selected drawing package is referenced throughout the text of this document and in many cases specific drawing sheets are identified and are submitted with this document as a bound 11 by 17 inch set and a few copies of the American National Standards Institute D series (22 by 34 inch) drawings. The package of D series drawings is available on request. The attached package includes

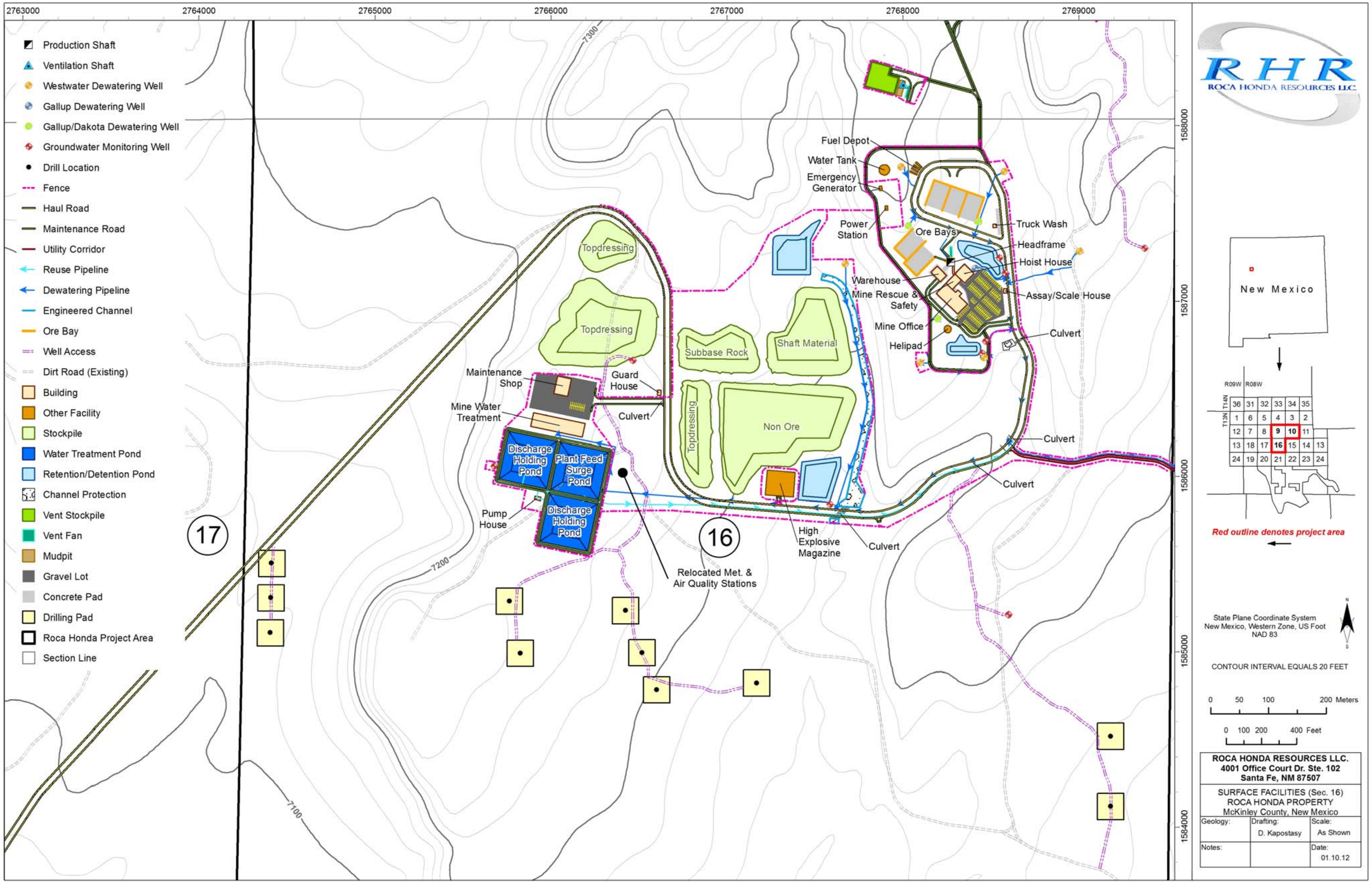

Figure 0-1. Section 16 Surface Facility Layout

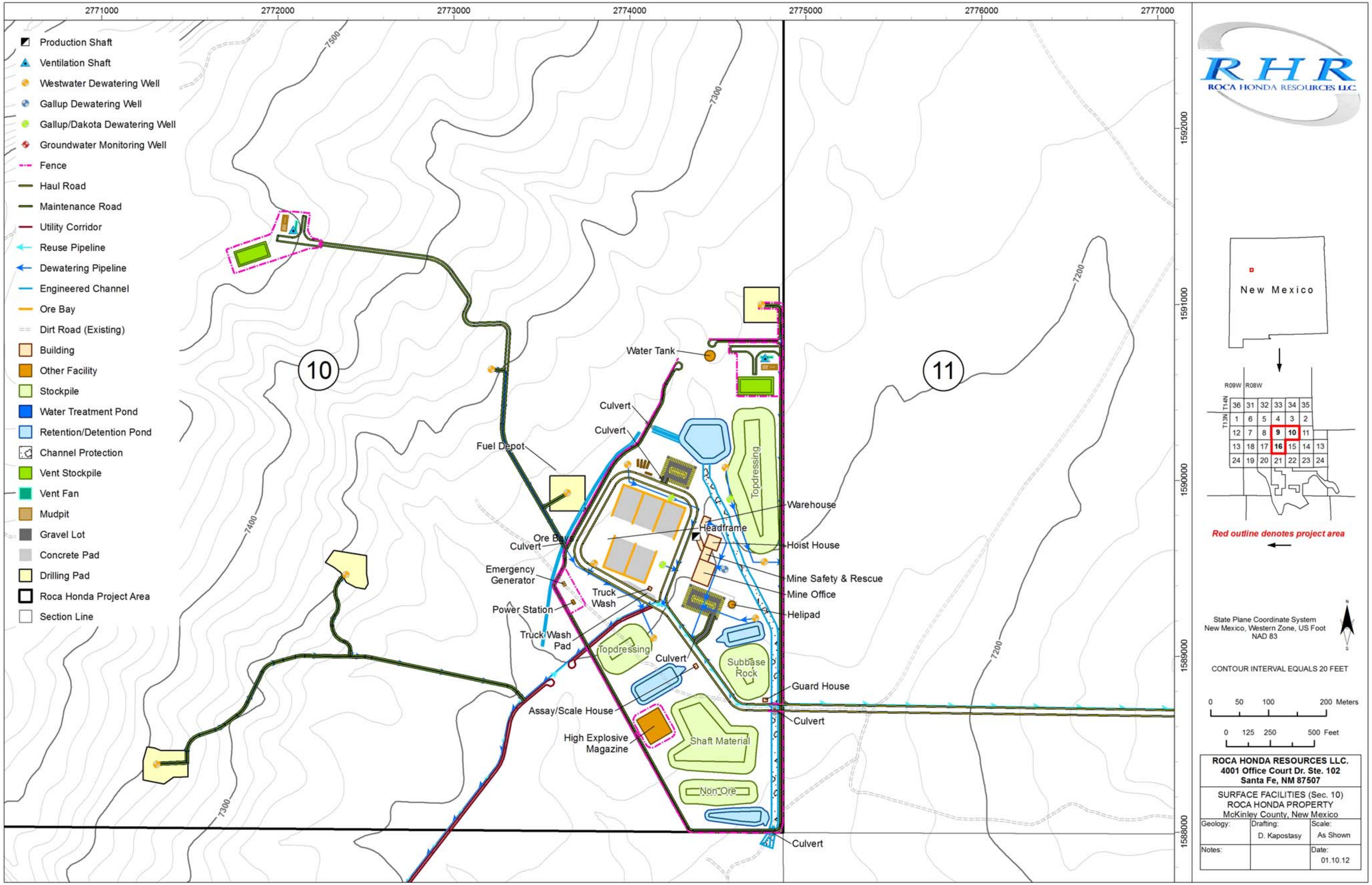

Figure 0-2. Section 10 Surface Facility Layout

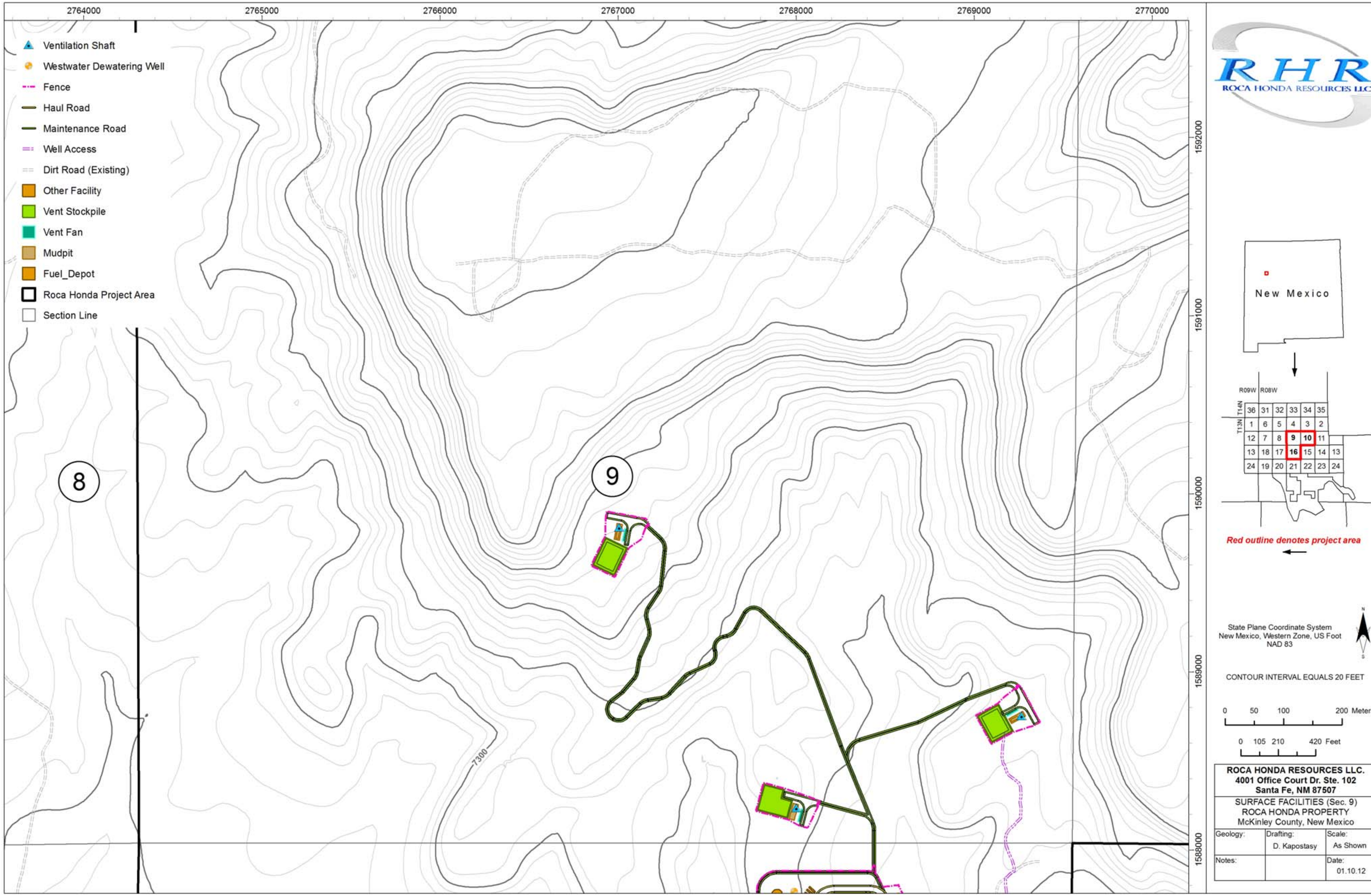

Figure 0-3. Section 9 Surface Facilitiy Layout

selected civil and architectural drawings which detail the design to date. The design task will continue until a final construction package is available.

The package is organized to complement the Plan and provide engineering detail. Sheet 1 contains the Index of the selected drawing package. It includes a description of each drawing and the sheet number. The sheet number is used to reference drawings in this Plan. This allows the reviewer to more easily find the drawing(s) referenced herein.

Sheet 3 is a partial list of specifications which will be expanded in the final construction package. Sheet 4 is similar to and contains much of the same information as Figure 1-3. Sheets 5, 12 and 16 are detail drawings of the Section 16, 10 and 9 surface facilities and are similar to Figure 4-1, 4-2 and 4-3 respectively. In addition to depicting the surface facilities, these sheets are indexed to succeeding sheets that provide more detail of specific portions of the surface facilities. The "indexed" areas are shown as hash-marked rectangles on Sheets 5 and 12. Sheets 6 through 11 provide the additional detail for Section 16 indexed on Sheet 5. Sheets 13 through 15 provide the additional detail for Section 10 indexed on Sheet 12.

The succeeding sheets, 85 in all, provide details of all aspects of the surface facilities. The descriptions contained in Plan will make reference to the pertinent sheets in the selected drawing package to provide additional detail.

Figure 1-3 shows the locations of access roads, utility corridor and mine water discharge pipeline outside of the permit area. Attachment 1 contains the detailed design for these facilities.

Additionally, as part of continual development of baseline conditions, a surface water hydrology study was conducted to present the concepts, methodology and calculations associated with the storm water management proposed for the permit area. The study results were used as a design tool to determine the location and size of the storm water collection, conveyance, retention, detention, and protection facilities. The study is referenced in several sections of the Mine Operations Plan Revision 1 and is Attachment 2 to this Plan.

Concurrent with dewatering facilities (see Section 3.3 of this Plan) and shaft construction, will be the construction of all other pertinent surface facilities. An archaeologist will monitor all surface disturbance activities, as discussed previously. Archaeological sites will be protected as necessary, topdressing will be removed and stockpiled, and the sites will be graded to their designed elevations; facilities will then be constructed. Buildings will be constructed with exteriors of a color selected from an approved Federal or state land management agency list or as agreed upon with the regulatory agencies. Architectural drawings of the buildings and interior details are found in the drawing package as the A-series of drawings (Attachment 1, Sheets 69-85), including the administration, rescue and emergency, warehouse, maintenance shop, assay building and guard house. The selected drawing package contains floor plans and elevations of the buildings in Section 16. The same buildings are to be constructed in Section 10 but smaller than those in Section 16. The selected drawing package does not repeat the building drawings for Section 10.

The location *(NMAC 19.10.6.602 D.(15)(c)(i-xiii))* of all surface facilities has been determined after careful consideration to minimize environmental impact and cultural resources disturbance, as described in more detail later herein. The surface facilities will be fenced with 8-foot cyclone fencing material topped with angled 3-strand barbed wire or equivalent.

Mined ore will be brought to the surface and staged on pads *(NMAC 19.10.6.602 D.(15)(c)(i))* in the ore bays on Sections 16 and 10 awaiting transport off-site for processing. The capacity of each of these bays is approximately 12,500 tons. These three-walled concrete bays will have a sloped concrete floor with a drain to catch and transport water to the process area retention/holding pond. The pond will have a sump to collect any solids before the water enters the pond. The solids will be cleaned out periodically, allowed to dry and transported off-site with the ore. The water from the pond will be pumped to the water treatment plant for treatment along with the water produced from mine dewatering. Details of the ore bays are included in the drawing package (Attachment 1, Sheets 10, 14, 37 and 41).

Ore will be segregated and loaded into over-the-road haul trucks for transport off-site for processing. Each load will be assayed and weighed. Trucks will be inspected and cleaned of any detrital materials at the washing station prior to leaving the site. The water from the truck wash station will also be collected in a retention pond, re-used/re-circulated and ultimately pumped to the water treatment facility.

Stockpiles *(NMAC 19.10.6.602 D.(15)(c)(i))* will contain various types of materials segregated during site preparation activities and mining operations. Separate stockpiles will include topdressing, sub-base rock, shaft excavation material, and non-ore material. Generally, the term non-ore material is described as material that is excavated from the ore bearing formation, i.e., the Westwater Canyon, and brought to the surface but contains no uranium in economic quantities. The non-ore will either be stockpiled and hauled off-site for future processing or returned to the mine for use as backfill (see Section 3.6.4). The total stockpile disturbed area is approximately 27 acres and 13 acres for Sections 16 and 10, respectively. The stockpile for each type of material is discussed in more detail below. Estimated volumes of the materials generated over the anticipated life of the mine by type and origin are presented in Table 4-1. The volumes of the stockpiles are shown on the design drawings (Attachment 1, Sheets 33-38 and 40-42) where the grading plan details are shown. Each stockpile is identified in cross section on Sheets 43-47 in Attachment 1.

Table 0-1. Roca Honda Mine Materials Volume

MATERIAL	MATERIAL VOLUME (cubic yards)		TOTAL
TYPE	SECTION 16	SECTION 10	
Production Shafts (50% swell)	83,970	51,970	135,940
Typical Vent Shafts (50% swell)	26,230[1]	20,750[2]	46,980[3]
Non-Ore (50% swell)	216,900	4,050	220,950
Topdressing (15% swell)	190,000	105,000	295,000
Sub-base rock (50% swell)	50,200	9,400	59,600
Total	**567,300**	**191,170**	**758,470**

1. Three vents in Section 9
2. Two vents in Section 10
3. Total of five vents

As with much of the Southwest and New Mexico, and discussed in detail in RHR's Reclamation Plan Revision 1, soil horizons that exist in non-riparian zones of the state do not meet soils criteria for classification as "topsoil" *(NMAC 19.10.6.602 D.(15)(c)(xi))*. Therefore, the final layer of soil material to be placed for revegetation and reclamation is identified as topdressing in this Plan. This material is representative of a majority of soils that exist in the project area and in New Mexico in general. Vegetative communities that exist in the project area and New Mexico are adapted to these soil conditions. The topdressing stockpiles will be located within the operational facility footprint but out of the traffic patterns and will be placed in areas cleared of vegetation but not scraped of topsoil. The slopes will be 4H:1V (horizontal (H):vertical (V)) and at an estimated height of approximately 25 feet. The 4:1 slopes will accommodate ease of access to work on the piles and reduce erosion loss.

After archaeological inspection/clearance, grading of the disturbed areas will begin with the removal of vegetation located in the footprint of facilities before the topdressing is collected during the site grading process. Prior to the salvaging of topdressing, areas of salvage will be staked to allow equipment operators to salvage the available good quality topdressing to the depth that it is available. Many locations within the planned disturbance area (i.e., the 180 acres) have material that meets good topdressing criteria to a depth of more than 24 inches (see Section 6.0 of the RHR BDR Revision 1). These areas will be identified and staked in the field and material removed from these areas to the depth of suitable material or until the required volume is achieved.

A total of approximately 295,000 cubic yards of topdressing material will be required for site reclamation to cover the total disturbance area of approximately 180 acres with 12 inches of topdressing (Reclamation Plan Revision 1, August 2011). This volume is conservative, as some areas disturbed may be retained after completion of the project to benefit the Post Mining Land Use of grazing, such as some roadways, water catchments and channels. Areas with additional topdressing material will be recorded and used as on-site borrow sources if required during reclamation.

The topdressing material will be hauled and dumped on the stockpile area and then graded into layers and compacted with the weight of the equipment driving over it. The plan view and a cross-section of the stockpiles are presented in the drawing package (Attachment 1, Sheets 32-47). When a stockpile is completed, it will be seeded with a seed mix (see Table 5.3 in Section 5.7 of this Plan). The selected seed mix will perform well in the topdressing soils of the Roca Honda Project Area, based on precipitation at the time of seeding. The vegetation will reduce erosion while providing microhabitat for beneficial soil organisms.

Drainage swales will be constructed around the topsoil stockpiles where necessary to minimize storm water runon/runoff and erosion of the stockpiles. Wattles (Fiber rolls) or other Best Management Practices (BMPs) will be installed below the stockpiles to minimize sediment release due to storm water erosion of the stockpile. The storm water will be directed to the nearest arroyo. Topdressing from areas not directly related to the mining facility, such as roads, ventilation/escape shaft fan pads, and the water treatment facility area, will be added to an existing stockpile or placed in localized areas if transport of the soil is impractical or small in quantity, such as the more remote ventilation shaft locations.

The excavated sub-base rock below the soil will be placed in a separate stockpile designated for sub-base rock in Sections 16 and 10. During initial construction activities, excavated rock will be used as fill or stockpiled for fill during reclamation. The topdressing will be removed and added to the topdressing stockpile before the sub-base rock is placed. The stockpile will be constructed with 3H:1V side slopes with a maximum height of 25 feet. The material will be placed in piles from the haul trucks and a dozer will push the material into flat layers. The movement of the dozer on top of the rock will crush and partially compact the material which improves the stability and reduces the volume. The dozer will slowly construct the side slopes and level the top. The stockpile surface will be sprayed with a soil stabilizer if necessary to control wind erosion. The plan view and a cross-section of the stockpile are presented in the drawing package (Attachment 1, Sheets 33-47). Drainage swales will be constructed around the stockpile to minimize storm water runon erosion. Wattles or other BMPs will be installed below the stockpiles to minimize sediment release from the stockpile due to storm water on the stockpile. The storm water will be directed to the nearest arroyo.

The shaft material stockpiles will be placed in separate stockpiles designated for shaft excavation material and kept for return to the shafts during reclamation, assuming the material characteristics are determined to be of such quality to not cause impact to groundwater. As previously discussed in this Plan, RHR will characterize the shaft excavation material to ensure the material can be used in this manner. The material from the vent shafts will be hauled to the production shaft material stockpiles to decrease the disturbed area around the vents. The volume of production shafts and vent shafts material are separated in Table 4-1, but the shaft material stockpiles in Sections 16 and 10 contain the total volumes. The topdressing at the ventilation shaft areas will be removed and added to the topdressing stockpile. These shaft material stockpiles will be located as near the production shafts as possible to reduce the haulage and keep the material accessible for return to the shafts during reclamation. The side slopes will be 3H:1V, and the height will be limited to 25 feet to minimize the visual impact.

The material will be placed in piles from the haul trucks and a dozer will push the material into flat layers. The movement of the dozer on top of the rock will crush and partially compact the material which improves the stability and reduces the volume. The dozer will slowly construct the side slopes and level the top. The plan view and a cross-section of the stockpile are presented in the drawing package (Attachment 1, Sheets 32-47). The stockpile surface will be sprayed with a soil stabilizer if necessary to control wind erosion. Drainage swales will be constructed around the stockpile where necessary to minimize storm water runon erosion. The storm water runoff from the stockpile will be directed to the nearest arroyo.

The non-ore material from Sections 16 and 10 will initially be brought to the surface and placed in separate, labeled stockpiles. The stockpile areas will be cleared of topdressing and lined to prevent seepage from the non-ore material into the ground surface. As the mine operations progress, material from the underground station and haulage levels of the mine (just below the shafts) will be added to the shaft material stockpile. This stockpile will have 3H:1V slopes and an estimated height of 25 feet. The material will be placed in piles from the haul trucks and a dozer will push the material into flat layers. The movement of the dozer on top of the rock will crush and partially compact the material which improves the stability and reduce the volume. The dozer will slowly construct the side slopes and level the top. The plan view and a cross-section of the stockpile are presented in the drawing package (Attachment 1, Sheets 32-47). The surface of the stockpile will be sprayed with a soil stabilizer to reduce wind erosion. Drainage swales will be constructed around the stockpile to prevent runon erosion. Storm water runoff from the stockpile will be diverted to a lined retention pond.

As discussed in Section 3.6.4, Backfill, and Section 5.2, Contemporaneous Reclamation of this Plan and in the Roca Honda Reclamation Plan Revision 1, the non-ore material will be returned to the mine as backfill material. As such the non-ore stockpile will be removed over time.

Several water impoundments and ponds *(NMAC 19.10.6.602 D.(15)(c)(ii)(iii)*), i.e., retention ponds, detention basins and water treatment plant ponds are planned within the permit area to control storm water flow, reduce the quantity of potentially contaminated water and treat water when necessary. Their design and function are described in more detail in Section 5.3.6 of this Plan. Treatment and holding ponds will be constructed as part of the water treatment plant discussed below.

A water treatment facility will be constructed on Section 16 (see Figure 4-1) to collect and treat mine water from the permit area for discharge *(NMAC 19.10.6.602 D.(15)(c)(ix))*. This facility encompasses approximately 10 acres and consists of the water treatment process building, an influent surge pond and two treated water holding ponds. The effluent flow rate is expected to be 2,500 to 4,500 gpm. The maximum design capacity of the treatment facility is 8,000 gpm, which adds redundancy for most treatment units. Water generated from mine dewatering activities, water collected from within the Roca Honda permit area in the retention ponds and the effluent from the sanitary wastewater treatment system will be treated onsite at the water treatment facility. RHR submitted the Water Treatment Plan 60% Design Revision 1 (Lyntek 2011) in response to NMED comments in December 2011 in support of the Discharge Plan and the NM MMD Permit Application. Attachment 1, Sheet 7 also shows the location of the water treatment plant.

The water from the dewatering wells will be pumped to the water treatment plant in a collection of 18 inch High Density Poly-Ethylene (HDPE) pipelines with fused joints. The water from the mine dewatering will be pumped to the water treatment plant in a separate 18 inch HDPE pipeline. This allows options for treatment within the treatment plant based on the influent quality. These pipelines will be monitored for change in pressure utilizing pressure gages throughout the system. In the unlikely event a leak occurred, specifically designed leak proof saddle would be installed on the damaged area to seal the leak without a pump shutdown. A redundant plan would involve a system of piping and valves to switch the flow of water from one dewater pipeline to the other until the leaking portion of a line can be replaced. This system will be designed as a part of the construction drawings.

The water produced from the mine dewatering wells (see Section 3.3) will be pumped to the water treatment facility for treatment prior to disposal. Water produced by the mine will be gathered in a sump located within the mine itself to remove sand and grit. The water will be pumped to the surface and delivered to the water treatment plant. The water will be pumped into the reaction tank(s) where barium chloride will be added and any necessary pH adjustment will be made. Radium will be precipitated and the solution will be pumped to the pressure leaf filters to separate solids from the water. The solids will proceed to the filter press to remove the remaining water. The solids will be bagged for offsite disposal. The filtrate from the leaf filters will flow to the ion exchange columns. A selective resin will remove and bind the uranium. The water from the ion exchange columns will be adjusted for pH and sent to the treated water holding ponds and discharged in compliance with Federal and state requirements. The resins will be regenerated offsite. The plant is not only designed with some redundant treatment units but it has piping flexibility to bypass units if they are not needed. The water treatment design package contains a monitoring plan with instrumentation read-outs at a logic control panel.

Treated water will be transported via a 20 inch pipeline as shown in Figure 1-3 to a location approximately eight miles northeast of the mine site. The water will be made available for reuse by the local rancher for irrigation and may also be discharged. The pipeline will be installed on the surface of the ground for ease of maintenance and inspection.

RHR's mine permit application and Discharge Plan application submitted to NM MMD and NMED, respectively, in 2009 proposed discharge of the treated effluent to San Mateo Creek. In response to agency comments and concerns RHR developed an alternative discharge location to allay those concerns. The discharge will occur on private property in the vicinity of Laguna Polvadera. At that location the water will become available for reuse by others or may simply flow down the San Lucas Arroyo as a permitted discharge.

Sanitary wastewater treatment facilities will be constructed in Section 16 and later in Section 10 to treat the toilet, sinks, showers, and laundry wastewater (Attachment 1, Sheet 51). The water will be collected in a series of buried septic tanks which are designed to treat approximately 10,000 gallons per day. The effluent from these tanks will be pumped to the water treatment plant and combined with the mine water for additional treatment as necessary.

Diversions are currently planned in certain areas in Section 16 and Section 10 at locations where surface water flows could potentially impact the surface facilities *(NMAC 19.10.6.602 D.(15)(c)(iv))*. Overland flow and storm water from a small drainage area north of the stockpile area on Section 16 will be collected in a detention basin *(NMAC 19.10.6.602 D.(15)(c)(ii & iii))*, which in turn will flow to a constructed drainage channel which directs the water around the stockpile area and into the original existing arroyo (see Figure 4-1 and Attachment 1, Sheets 8 and 9).

Overland flow and small arroyos on the west side of the Section 10 facilities will be diverted away from and/or around facilities or other site structures via a constructed swale to an existing arroyo (see Figure 4-2). A detention basin will be constructed in an existing arroyo on the northern portion of the facility area to control the flow. An arroyo from the west will also be diverted into this basin. The flow from the detention basin will be controlled by a graduated standpipe and enter an improved existing arroyo which travels south to an existing channel (see Figure 4-2 and Attachment 1, Sheets 13-15). Other surface water control features will be constructed within the permit area arroyos such as armorment (riprap) to minimize erosion. These features are discussed in detail in Sections 4.2 and 5.0 of this Plan.

Warehouse storage areas for chemicals, fuels, explosives and supplies, parking areas for equipment and vehicles, maintenance facility for vehicles, and electrical substations will be constructed where appropriate for the designated activities *(NMAC 19.10.6.602 D.(15)(c)(x))*. Power and water lines will be constructed to support mine operations. Their current locations are indicated on Figures 4-1, 4-2, and 4-3 and the details are found in the drawing package (Attachment 1, Sheets 6-11 and 13-15).

Construction of the mine shafts is described in Section 3.4 of this Plan. Ventilation shafts will be constructed as described in Section 3.5 for the required air ventilation and egress in the event of an emergency. The estimated disturbed area for these vent shaft structures is approximately two acres for each. This area includes the vent shaft material stockpile and drilling recirculation mud pit associated with each shaft (Attachment 1, Sheets 10 and 16). Each vent shaft disturbed area will include an approximate 100 x 250 feet mud pit for the shaft material, and a 100–foot radius drill pad. Wattles or other BMPs will be installed around these areas to minimize sediment release from storm water on the drill area. Additionally, the areas around the ventilation holes and escape shafts will be graded to minimize storm water runon.

Roads and fences will be constructed to provide access to and security for surface facilities and associated utilities *(NMAC 19.10.6.602 D.(15)(c)(xiii))*. These features are indicated on Figures 4-1, 4-2, and 4-3. Roads are discussed in more detail in Sections 4.2.2 and 5.3.9. Total road surface disturbance within the permit area (access and haul roads) is estimated to be approximately 34 acres. Separate exclusionary fences will be constructed around explosives facilities, electrical substations, and shafts. Fencing specifications are discussed in Section 5.3.1.

The existing meteorological and air quality monitoring stations in Section 16 will be relocated prior to construction activities in the area where it is currently located. Additional stations (largely air quality stations) will be installed as necessary in and around the facility at locations to be determined in the future.

RHR has installed three monitor wells around several of the impoundments in Section 16 in response to NMED request as shown on Figure 4-1. One well was completed into the Gallup formation at the mine water treatment ponds area. Two wells into the Dilco formation were completed in the vicinity of the process and truck wash retention pond. These wells will be incorporated in the NMED Discharge Plan approval. An additional three alluvial wells will be installed at locations approved by the NMED in the approved Discharge Plan. They will be installed after the permit has been approved.

RHR will conduct some additional limited development drilling. This activity will begin immediately upon approval of the mine permit application and will be continuous through the construction process. The purpose of the development drilling is to provide additional data for future planning of the mine. Total surface disturbance in these areas is minimal, approximately ½ acre per site, or 7.5 acres, not including access roads. However, most of the access will be in conjunction with other planned surface disturbance. Drilling will be performed pursuant to approvals obtained from the NM OSE, as will plugging and abandonment of boreholes and wells.

4.1 Wildlife Mitigation Contingency Plan (NMAC 19.10.6.602 D.(15)(d))

(d) A contingency plan to mitigate impacts to wildlife when there has been an emergency or accidental discharge of toxic substances that may impact wildlife.

RHR considers it highly unlikely that there will be any emergency or accidental discharge of toxic substances from the Roca Honda mine and its related surface facilities. With the exception of the storage and use of diesel fuel and/or gasoline, all other materials and supplies used onsite will be in small quantities.

Small amounts of sulfuric acid, in a small bulk tank used in the WTP, will be stored onsite at the water treatment facility in an area having secondary containment and sumps to prevent accidental release. Hydraulic oils, lubricants, antifreeze and other such liquids will all be stored in relatively small quantities, insufficient to cause any impact should they somehow be accidentally released. All such materials will be stored in compliance with state and Federal requirements.

The mine facilities will house fuel storage tanks for diesel and gasoline. The tanks will be constructed above ground with secondary containment of sufficient capacity to hold all of the contents of the tanks.

The Roca Honda mine operations will be required to have a Spill Prevention, Control and Countermeasure (SPCC) Plan as part of its operating protocols. This SPCC Plan will be sufficient to address mitigation of potential impacts to wildlife from emergency or accidental releases of toxic substances.

4.2 Sediment Reduction, Surface Runoff Control/Non-Point Source Monitoring (NMAC 19.10.6.602 D.(15)(e))

(e) A description of measures which will be undertaken to reduce sedimentation from the permit area and a plan for the monitoring of non-point source sediment pollution from the disturbed area.

Roca Honda site soils have a high potential for erosion. Development of the mine surface facilities and associated infrastructure support, as well as the actual mining activities will disturb portions of the permit area, making them more vulnerable to erosion. Therefore, surface runoff control measures will be implemented within the Roca Honda permit area to ensure that non-point sources of suspended solids and other potential surface water contaminants are contained and not released from the permit area.

Best Management Practices (BMPs) will be used to stabilize the site and ensure that the permit area does not contribute suspended solids or other constituents of concern to off-site areas in excess of regulatory standards. A Storm Water Pollution Prevention Plan will be developed and implemented for the facility. The following types of BMPs will be designed, constructed and maintained at the Roca Honda permit area in accordance with the requirements of the New Mexico Department of Transportation (NMDOT 2009) and the U.S. Environmental Protection Agency (US EPA 2009). Typical erosion control devices on shown in Attachment 1, Sheets 62-68.

- Runoff control devices (swales, ditches, wattles).
- Energy dissipaters
- Slope drains
- Excavated sediment traps
- Retention ponds
- Diversion channels (overland flow and stream)
- Detention basins
- Stockpile slope construction
- Stockpile soil cover and vegetation

All controls will be inspected and maintained as designed, as described in Section 5.1.2.

4.2.1 Surface Facilities

The proposed site grading and drainage plans for the mine operation support facilities are shown in Attachment 1, Sheets 32-42. The installation of site drainage and erosion control BMPs for these facilities will generally proceed according to the following sequence.

Prior to installing or constructing any erosion control BMPs, the proposed area for construction will be surveyed on the ground, as necessary, and checked against the site archaeological survey by a qualified archaeological expert and inspected onsite. When the location is “cleared” for cultural resource parameters, the topdressing will be removed, as necessary, and stockpiled.

The topdressing storage locations are indicated on Figures 4-1 and 4-2 and detailed in Attachment 1 Sheets 43-47. Slopes of these stockpiles will be constructed at a ratio of 4H:1V. A diversion ditch will be constructed around the base of the stockpiles and terminated at an excavated sediment trap with rock filter per NMDOT Standard 603-01-5/7 (NMDOT 2009). Wattles or other similar BMP will be installed below the stockpiles to minimize sediment release due to storm water erosion of the stockpile. Runoff will be directed to the nearest arroyo.

Excavated rock will be placed in the sub-base rock stockpile, shaft excavation material (including material excavated from the station and haulage levels) in the shaft material stockpile, and non-ore material in the non-ore material stockpile, as shown in Figures 4-1 and 4-2 and detailed in Attachment 1 Sheets 43-47. These stockpiles will have 3H:1V side slopes. A diversion ditch will be constructed around the base of the sub-base rock, shaft, and non-ore material stockpiles and terminated at an excavated sediment trap with rock filter per NMDOT Standard 603-01-5/7. Wattles or other similar BMP will be installed below the stockpiles. Runoff from the sub-base stockpile will be diverted to the nearest arroyo. The storm water runoff from the shaft and non-ore material stockpiles will be directed to a lined retention pond.

To further minimize mass movement of sediments from the site, the stockpiles will be compacted in layers as they are constructed. The topdressing stockpiles will be covered with soil and revegetated, and the rock material piles will be stabilized with spray, as discussed previously in describing building and placement of stockpile materials in Section 4.0.

The upslope diversion channel, perimeter runoff control swales, detention basins and/or retention ponds will be installed. Slope drains and energy dissipaters, used to carry diverted water to nearby arroyos will be constructed in accordance with the NMDOT detail on their Standard Drawing 603-01-6/7 (NMDOT 2009) (Attachment 1 Sheets 62-68). The site will be finished to grade. All cut slopes will be 2H:1V and all fill slopes will be 3H:1V. Runoff control swales and excavated sediment traps will be installed at the toe of cut slopes.

Retention ponds will be constructed with a liner and leak detection system (e.g., shallow monitoring wells), as necessary, to retain water that has run through the mine site. Disposal of this water will be accomplished by pumping to the water treatment facility. Detention basins will be unlined and allow for capture of water that has been directed around the site and controlled release to receiving drainages. When necessary, drainages may be enhanced (e.g., straightened, armored) (Attachment 1 Sheets 52-60).

Following installation of all runoff control measures, construction of buildings and other site features will commence. After construction is complete the disturbed areas will be seeded to reduce erosion by rain and wind.

4.2.2 Roadways and Utility Transmission Corridors

As with the previously described installation of BMPs, prior to constructing new roadways and utility corridors, or improving existing roadways, RHR will ensure that there are no impacts to archaeological and/or cultural resources. Where appropriate, topdressing will be removed and stockpiled for future use and reclamation.

Access roadways and utility corridors will be constructed at or near existing grade, where possible. Some cut and/or fill may be necessary. Roads and utility corridors are indicated on Figures 1-3, 4-1, 4-2, and 4-3 and in plan view in the selected drawing package. Detailed plan and profile drawings for the roads will be included in the final bid package drawings. Seven culvert crossings will be constructed in the permit area for access and haul roads. The location and size of the culverts are presented in the surface water hydrologic study (Attachment 2) and their locations shown on the detailed drawings (Attachment 1). A typical culvert crossing design is shown on Sheet 48.

Roadside swales, designed to safely convey a 10-year, 24-hour precipitation event, will be constructed adjacent to all access roadways to collect surface runoff and convey it along the corridor to the nearest drainage channel (Attachment 2). Excavated sediment traps will be used immediately upstream of all locations where roadside swales discharge to existing drainage channels. Swales and sediment traps will be checked and maintained following runoff events. Maintenance will include restoring all roadside swale damage to their original constructed condition and repairing any slope erosion damage. In some cases, it may be necessary to install water bars across roads to decrease erosion potential (Attachment 1, Sheets 48-50).

4.2.3 Water Treatment Facility

The water treatment facility will be located in Section 16. The Water Treatment Plant 60% Design Revision 1 as revised to address agency comments was submitted December 2011. Site drainage and erosion control BMPs will generally be installed at the site of construction of the water treatment plant in the following sequence, after archaeological clearance has been confirmed:

- Install the perimeter runoff control swales.
- Strip topdressing and store in the designated location as indicated on Figure 4-1. Topdressing slopes will be at a ratio of 4H:1V. Install diversion ditch around base of the stockpile and terminate at an excavated sediment trap with rock filter per NMDOT Standard 603-01-5/7 (NMDOT 2009). Install wattles below the stockpile. Divert runoff to nearest arroyo.
- Grade site to finish grade. All cut slopes will be 2H:1V and all fill slopes will be 3H:1V. Place all subsoil in the subsoil stockpile and excavated rock in the sub-base rock stockpile, both located in Section 16. These stockpiles will have 3H:1V side slopes.
- Install runoff control swale and excavated sediment trap at toe of cut slopes.

- Following installation of all runoff control measures, begin construction of the treatment facility, associated ponds and pipeline. The ponds will be designed and constructed with a minimum of two feet of freeboard (Lyntek 2011).

4.2.4 Non-Point Source Sediment Monitoring Plan

The Roca Honda permit area is drained by ephemeral arroyos that in turn drain to San Mateo Creek, as discussed in more detail in Section 8, Surface Water, of the BDR Revision 1. The drainage basins associated with the permit area are discussed in Attachment 2 and are shown in Attachment 1, Sheets 27-31. Storm water discharges from the permit area will enter the ephemeral drainages and flow southward to San Mateo Creek, potentially reaching areas of ephemeral or intermittent flow in San Mateo Creek. Storm water in the process areas will be contained in retention ponds and will not leave the site. Therefore, these discharges, which include potential sheet flow or other runoff from the permit area during storm events, will be monitored. The primary regulatory requirements for monitoring the receiving drainages affected by the Roca Honda mine operations discharges are identified in NMAC 20.6.4, which establishes water quality standards for surface waters of the state and includes an anti-degradation policy.

The general requirements for monitoring the quality of the receiving drainage, including ephemeral, intermittent, and perennial water bodies, are established in NMAC 20.6.4.13 and include limits on the following constituents:

- Suspended or settleable solids
- Floating solids
- Oil and grease
- Color
- Odor and taste of water
- Concentrations of plant nutrients
- Toxic pollutants
- Radioactivity
- Pathogens
- Temperature
- Turbidity
- TDS
- Dissolved gases (nitrogen, oxygen and ammonia)

Potential non-point source sediment from storm water discharges from the permit area as a result of storm events will be monitored during and/or following storm events, to the extent practicable. Locations to be monitored will include the outlets from two planned detention basins, from a graduated standpipe (Attachment 1 Sheets 56 and 60) to the energy dissipater at the receiving drainage in Section 16 and at the south end of the fenced area in Section 10.

The detention basins will be designed to temporarily hold surface runoff from specified drainage basins within the permit area in order to slow discharge to the receiving drainage(s). The surface water hydrology study, Attachment 2, contains the details on the quantity of storm water for the detention basin and the size of the discharge channel. Runoff to the detention basins will not come in contact with the mine site. Only water diverted around and/or captured prior to reaching the mine site will be held in a detention basin. More detail on detention basins is found in Section 5.3.6 of this Plan. One basin will be located in Section 16 and one in Section 10 (Attachment 1, Sheets 8 and 13 respectively). The planned locations of these detention basins are indicated on Figures 4-1 and 4-2, and are described below:

- *Section 16* - north of the material stockpile area to capture runon from a small drainage basin in Section 9 and the surface runoff from the northern portion of Section 16 prior to entering the stockpile area. Water released from this detention basin will enter a channel constructed east of the stockpile area, flow southward around the stockpile area and merge with runoff from the natural channel located along the east side of the Section 16 surface facilities area (Attachment 1, Sheets 8 and 9). This combined flow will continue south through a culvert under the new haul road to an energy dissipater which creates the normal sheet flow into the receiving drainage arroyo that continues southward.

- *Section 10* - north of the surface facilities within the fenced area to capture runon from the watershed basin north of the facilities area. This basin will also receive runon from a drainage beginning west of the facilities area. Water will be released from the detention basin to the arroyo running through the eastern portion of the surface facilities area (Attachment 1, Sheets 13-15). Current design plans call for the arroyo to be straightened and armored through the surface facilities area, and then discharged to an energy dissipater at the south end of the fenced area where it joins an existing arroyo.

During operations the two detention basins will be sampled at the outlets after a storm event, when practical, to provide background sediment and water quality data. Samples will also be collected at predetermined locations below the operational areas in the arroyos. Analyses will include major cations, major anions, other water quality parameters, and targeted constituents for ephemeral, intermittent, and perennial receiving drainages.

4.2.5 Mine Excavated Materials Management

Management of the excavated material generated during Roca Honda mining operations will generally be addressed in the following ways. Shaft material will be stockpiled separately in a designated area (Attachment 1, Sheet 8 for Section 16 and Sheet 15 for Section 10). Non-mineralized material is excavated outside of the mineralized zone to gain access to the ore. These excavations include haulageways, drifts, raises and other mine development passages that are designed and located so as to minimize the possibility of containing mineralization. Some of these materials will be hoisted to the surface and stockpiled, particularly in the early development of the mine as discussed in Section 3.6.1. As the mine develops and matures, this type of material produced in the underground excavations will be managed in a manner that it will be excavated and immediately deposited as mine backfill as described in Section 3.6.4. As a result, these materials will never reach the surface of the mine site. When mining has been completed RHR anticipates that the stockpiled material will have been re-deposited in the mine and the shaft as part of the final reclamation activities, pending the results of materials characterization.

The majority of the excavated materials, i.e., the ore brought to the surface of the mine, will be transported off-site for processing. Some sub-grade mineralized material, approximately 221,000 cubic yards, will be temporarily stockpiled at the mine surface in a non-ore stockpile (Attachment 1, Sheet 9 for Section 16 and Sheet 15 for Section 10). This material will either eventually be blended with the ore and transported off-site for processing or returned to the mine as backfill (see Section 3.1.4). Production of this material will be minimized to the extent possible as production of this material results in increased mining costs.

5.0 Performance Standards and Requirements – Mine Operations (NMAC 19.10.6.603 A through H)

This section addresses the performance standards and requirements that will be used to operate the RHR mine in a manner that will lead to reclamation of the permit area once operations are completed to achieve its approved post-mining land use, i.e., grazing. The design of the mine and surface facilities have progressed to a sixty percent completion level as presented in this Revision 1 of the Mine Operations Plan. While there will likely be some changes to the design they are not expected to be major. A subset of selected civil and architectural drawings is included with this Plan as Attachment 1. The design of several of the surface facilities discussed in this section was based on the results of the surface water hydrologic study. The results of a 100-year, 24-hour storm event are detailed in Attachment 2 as it effects channels, roads, detention basins, retention ponds, and project area erosion protection

5.1 Most Appropriate Technology and Best Management Practices (NMAC 19.10.6.603 A.)

The mining operation and the reclamation plan shall be designed and operated using the most appropriate technology and the best management practices.

"Most appropriate technology" means the most suitable technology for a given application, in this case, mining operations. In practice, it means selecting and using the appropriate level of technology that can effectively achieve the intended purpose while disturbing the environment as little as possible. Best Management Practices (BMPs) are effective, practical, structural or nonstructural methods that prevent or reduce the impact of a particular activity on the environment. They include currently accepted, tested methods and materials.

RHR has chosen to use a step room and pillar or drift and fill conventional underground mining method to extract the ore as described in more detail in Section 3.6.2 of this Plan. Conventional underground mining is considered the most appropriate technology at this location because of the depth at which the ore is located, i.e. 2,000 to 2,600 feet below ground surface. Surface mining is obviously completely impractical at this site. In-situ recovery is an alternative technology that was initially considered. However, conventional underground mining is considerably more economic for this ore body, and conventional reclamation of surface disturbances created is more certain than restoration of the groundwater regime as would be required by in-situ recovery.

The Roca Honda mine will be designed and operated using both most appropriate technology and BMPs. The sequencing of activities and the implementation of BMPs such as erosion control and sediment control will be scheduled to take into account local climate (rainfall, wind, etc.) in order to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking. These measures and practices are described in the following sections.

5.1.1 Coordination of BMPs with Site Preparation

Structural BMPs will be coordinated with site preparation and construction activities so that BMPs are in place before these activities begin. The BMPs placed prior to site preparation activities will be placed away from and downgradient enough to allow an operating perimeter so that equipment can operate safely and efficiently without damage to the BMPs. After the site preparation operations are complete for an area, the BMPs will be relocated to the edge of the newly constructed areas. The following BMP coordination with site preparation and construction activities will occur:

- The temporary downgradient perimeter controls (i.e., wattles, straw bales, etc.) will be installed before any clearing and grading begin.
- Once site preparation activities cease permanently in an area, that area will be stabilized (i.e., permanent seed and mulch, soil amendments, revegetation).
- The temporary perimeter controls will not be removed until all site preparation and construction activities are complete and soils have been stabilized.

5.1.2 Storm Water Quality

Potential effects on storm water quality during mine operation come primarily from the heavy equipment activities associated with transportation of ore and stockpile materials. When precipitation occurs, the potential for downgradient effects from transport of sediment, and to a lesser extent, fuels and lubricants from equipment are the greatest. To minimize the potential effects from precipitation during mining operations, sediment control BMPs will be established downgradient of activity areas to localize effects of rain during operations. A list of potential constituents that could affect storm water quality appears in Tables 5-1 and 5-2.

Table 0-1. Potential Site Storm Water Constituents from Equipment

Material	Chemical/Physical Description	Use	Storm Water Constituent[1]
Antifreeze	Colorless or colored oily liquid	Antifreeze coolant for equipment	Ethylene glycol
Cleaning solvents	Colorless, blue, or yellow-green liquid	Cleaning equipment	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillate
Diesel fuel	Clear, blue-green, or yellow liquid	Fuel for generator, trucks, heavy equipment	Petroleum distillates, oil and grease, naphthalene, xylene
Gasoline	Colorless, pale brown or pink liquid	Fuel for trucks	Petroleum hydrocarbon, benzene, ethyl benzene, toluene, xylene, methyl tertiary-butyl ether
Grease, petroleum based	Reddish color, semi-solid gel	Lubricant	Petroleum hydrocarbon
Hydraulic fluid	Brown oily petroleum hydrocarbon	Hydraulic devices	Mineral oil
Oil	Brown or dark brown oily liquid	Lubricant	Petroleum hydrocarbon

[1]*Data from Material Safety Data Sheets, if available*

Several constituents of concern are identified as having the potential to impact storm water during the mining activities. Table 5-1 includes information regarding material type, chemical and physical description, use, and the specific regulated storm water contaminants associated with each material.

Table 5-2 presents site-specific information regarding the following potential source areas of storm water contamination:

- Material stockpile areas
- Refueling and maintenance areas
- Site entrance(s) and exit(s) and access roads

Table 0-2. Potential Sources of Storm Water Constituents – Non-equipment Related

Drainage Area	Potential Contributors	Source of Potential Constituents of Concern
Material stockpile areas	Soil and sediments	Erosion from material stockpile areas
Refueling and maintenance areas	Soil; sediments; hydraulic fluid, oil, gasoline, and diesel from heavy equipment	Leaking equipment and support vehicles Spills during fueling and maintenance of equipment and vehicles
Site entrance(s) and exit(s), and access roads	Soil, sediments, gasoline, diesel, oil, and hydraulic fluid	Leaking equipment and vehicles Spills during fueling and maintenance of equipment and vehicles Tracking of soil to and from work areas

Potential radiological constituents from the ore and non-ore material are not included in these tables. Storm water that may contact these materials in the ore bays, the non-ore stockpiles, and traffic areas within the facility will be collected in constructed channels and directed to the retention ponds. These controls are discussed in separate paragraphs in this section.

5.1.3 Storm Water Management Controls

The typical temporary and permanent BMPs proposed to be used at the Roca Honda mine site will provide soil stabilization for work areas and structural controls to divert runon and runoff and remove sediment (Attachment 1, Sheets 63-68). These measures will also address potential storm water constituent sources from activities such as vehicle tracking and wind erosion. Practices to minimize effects to storm water are discussed, such as the coordination of the operation activities with the implementation of the BMPs.

Temporary and Permanent Best Management Practices

The following BMPs may be implemented, as appropriate, during the construction activities at the Roca Honda mine permit area:

*Preserving existing vegetation***.** Vegetation will be preserved to the maximum extent possible and for as long as possible in the work areas to reduce or eliminate erosion in those areas and provide visual barriers to the site for adjacent land owners and the public. The area will be revegetated after construction to help control rain and wind erosion.

Wattles. Straw wattles are tubes of rice, straw, fiber or composted material used for erosion control, sediment control, and storm water runoff control. They help to stabilize slopes by slowing, spreading, and filtering overland water flow, which in turn helps to prevent sheet erosion, and rill and gully development. A typical design of wattles and their placement is shown on Sheet 50 of Attachment 1. Wattles will be placed along the perimeter downgradient of the areas that have been cleared and/or graded. They may also be placed along washes and arroyos, down-slope of exposed soil areas, and around stockpiles. Because wattles are typically only a few inches in diameter, they may be stacked in areas where height is needed for erosion control purposes. Once in place, they will be staked to anchor them in position.

Straw bales. Two (2) or three (3) string bales of weed-free straw are effective materials for the control of overland water flow, and act to filter, reduce velocity and divert surface flow. Straw bales have more weight and mass than wattles, and can often be left in place to naturally degrade over time and add organic matter to the area. Straw bales are secured with two (2) wooden stakes driven through the bales about ten (10) inches from each end (Attachment 1, Sheet 63).

Ditches/swales. A drainage ditch or swale is a shaped and sloped depression constructed in the soil surface used to divert and convey runoffs to a desired location (Attachment 1, Sheet 48 and 68). These BMPs will be used, as necessary, in conjunction with earthen berms, which typically result from construction of the ditch or swale.

Energy dissipaters. An energy (or velocity) dissipater is a physical device comprised of rock, grouted riprap, or concrete rubble that is placed over a fabric filter or mat at the outlet of a pipe or channel to prevent scour of the soil by concentrated flows (Attachment 1, Sheet 50). These devices will be used where appropriate. Anticipated depth of flow, gradient, side slopes, discharge rate, and velocity will be considered when designing the outlet.

Slope drains. A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area (Attachment 1, Sheet 67). Slope drains will be used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes, as necessary. When used, the drain will be sized sufficiently for the area being drained to prevent clogging or overflow.

Sediment traps. A sediment trap is an area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged (Attachment 1, Sheet 66). They are most effective for drainage areas less than 5 acres. Sediment traps will be installed by excavating or constructing an earthen embankment across a waterway or low drainage area, as necessary.

Diversion channels. A diversion channel is a device constructed across a slope where runoff from areas of higher elevation may damage property, cause erosion, or interfere with the establishment of vegetation on lower areas or where slope length needs to be reduced to minimize soil loss. These devices will be constructed with supporting earthen berms on at least the lower side of the channel (both sides if necessary), and will be lined with riprap or other material to prevent erosion of the channel (Attachment 1, Sheets 8 and 9 for Section 16 and Sheets 13-15 for Section 10). A check dam may be installed at the outlet from the diversion channel to reduce the velocity of concentrated storm water flow into the receiving drainage. Check dams can range from straw bales to loose rocks to gabions (cages made from woven wire mesh and filled with rocks).

<u>Detention basins</u>. A detention basin is an area where excess storm water is temporarily stored and then slowly drained to a receiving channel. It is designed to allow large flows of water to enter but limit the outflow by having variable sized openings at different levels of a standpipe structure. Detention basins will be constructed to control the flow of runon water diverted and captured so that it does not pass over or through the mine site and requires no treatment and/or monitoring. The locations of the detention basins are shown in Figures 4-1 and 4-2 and Sheets 8 and 13 of Attachment 1.

<u>Retention ponds</u>. A retention pond is a constructed pond designed with a surface area large enough to hold the water from a designed storm event with an additional two feet of freeboard. The design detail is described in Section 5.3.6 and presented in the attached design drawing package (Attachment 1, Sheets 52-60). Several lined retention ponds will be constructed at the Roca Honda site. They will capture and store potentially contaminated water. The retention ponds will be constructed with sumps to collect solids for periodic removal and disposal before the water is pumped to the water treatment facility. These ponds will be constructed with leak detection (e.g., monitoring wells). The locations of the retention ponds at the Roca Honda mine are shown on Figures 4-1 and 4-2.

<u>Stockpile management procedures and practices</u>. These practices are designed to reduce or eliminate release of materials from stockpiles. Stockpiles will be appropriately sloped and designed with diversion ditches and/or wattles to minimize storm water runon and runoff during rainy periods.

<u>Wind erosion control</u>. Wind erosion control consists of applying water and/or other dust suppressants or topdressing and vegetation as necessary to prevent or reduce erosion by the forces of wind. Water spray may be applied to roads and to small, temporary soil piles during construction activities. Larger and/or inactive stockpiles may be covered with topdressing and revegetated to prevent blowing dust and erosion.

<u>Practices to Minimize Effects to Storm Water</u>

Specific management practices can be applied to operation activities to help minimize the potential for effects to storm water at the Roca Honda permit area. These practices typically involve good housekeeping and spill control practices, as discussed below.

Project site access. The entrance and exit points to the project area will be stabilized to reduce the amount of mud and dirt tracked onto public roads by project vehicles and heavy equipment. Stabilization will be accomplished by:

- Limiting the points of entrance/exit to the project site.
- Limiting the speed of vehicles to control dust.
- Properly grading each entrance/exit point to direct runoff away from the entrance/exit.

Vehicle and equipment fueling. Vehicles that are taken from the site at the end of a work shift will be refueled off site whenever possible (i.e., in town). Equipment and vehicles refueled on site will follow the practices outlined below:

- Mobile fueling of equipment throughout the site will be minimized. Whenever practical, equipment will be transported to the designated fueling area.
- Absorbent spill clean-up materials and spill kits will be available in the fueling area and on fueling trucks used to refuel equipment outside the designated fueling area, and will be disposed of properly after use.
- Drip pans or absorbent pads will be used as necessary during vehicle and equipment fueling.
- Fueling will be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling will be equipped with an automatic shut-off to control drips. Fueling operations will not be left unattended.
- Fuel tanks will not be "topped off." Attendant will be present during all fueling operations.
- If fueling is required away from the central fueling are, the fueling area will be located at least 100 feet from drainages and waterways.

Vehicle and equipment maintenance. Vehicle and equipment maintenance procedures and practices will be designed to minimize or eliminate the discharge of fuel spills and leaks to site waterways.

- All site vehicles will be monitored for leaks, and will receive regular preventive maintenance to reduce the potential of leaks. Vehicles with leaks will be repaired immediately or will be removed from the project site, if further maintenance is required. A checklist will be maintained by all operators for their equipment.
- The maintenance facility will be used whenever practical.
- Drip pans or absorbent pads will be used during vehicle and equipment maintenance work.
- If maintenance is required away from the central maintenance shop, maintenance areas will be located at least 100 feet from drainage facilities and waterways.
- Absorbent spill clean-up materials will be available in maintenance areas and will be disposed of properly after use.
- Used oils, fluids, lubricants, and spill clean-up materials will be disposed of immediately and properly.

BMP Monitoring

As discussed previously in this section, several BMPs are planned to be implemented to control non-point source runoff, primarily water and sediments, from the Roca Honda permit area. These BMP controls will be monitored routinely to ensure that they are functioning as designed and are protective of receiving waterways. Best Management Practices monitoring will be discussed in detail in the SWPPP and will generally be monitored as follows:

General

- Inspect, to the extent practicable, BMPs prior to forecast rain, daily during extended rain events and after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

Wattles (Fiber roll)

- Repair or replace split, torn, unraveling, or slumping wattles.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment will be removed when accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface.

Ditches/swales

- Inspect ditches/swales and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect linings, embankments, and beds of ditches/swales and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.

Energy Dissipaters

- Inspect outlet area for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. Evaluate the use of larger riprap material, as necessary.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

Slope drains

- Inspect slope drain outlets for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures.
- Insert inlet to slope drain if clogging or undercutting is occurring. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or riprap around the inlet.
- Inspect drain pipes for leakage. Repair leaks and restore damaged slopes.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from drain entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Prevent water from ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Check pipe anchors to ensure that the pipe remains anchored to the slope. Install additional anchors as necessary.

Sediment traps

- Inspect outlet area for erosion and stabilize as necessary.
- Inspect trap banks for seepage and structural soundness, repair as needed.

- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect for areas of standing water. Take corrective measures if the BMP does not dewater completely in 72 hours or less to prevent vector (e.g. mosquitoes, flies, and rodents) production.
- Remove accumulated sediment when it reaches one-third of the trap capacity.
- Remove vegetation from the sediment trap as necessary to prevent pools of standing water and subsequent vector production.

Diversion channels

- Inspect berm(s) after storm events, as necessary, and at least once every two weeks.
- Repair damage to channel and lining promptly.
- Inspect check dam for damage and sediment accumulation after storm events, as necessary, and at least once every two weeks.
- Repair damage promptly. Remove sediment as needed when it accumulates.

Detention basins

- Inspect inlet and outlet pipes for crumbling, breaks or damage; repair or replace as needed.
- Inspect area around inlets and outlets for debris, obstructions and erosion; repair as needed.
- Inspect banks for erosion and debris; replace soil in eroded areas, if needed, and remove debris.

Retention ponds

- Inspect and clean sumps; inspect and maintain the pumps and discharge lines to the water treatment facility.
- Inspect berms around pond perimeter for erosion; repair as needed.

Stockpile management

- Soil stockpiles will be covered or protected with soil stabilization measures as necessary and a perimeter sediment barrier at all times.
- Repair and/or replace covers (e.g., vegetative covers) as needed to keep them functioning properly.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.

Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.

5.2 Contemporaneous Reclamation (NMAC 19.10.6.603 B)

Contemporaneous reclamation is required to the maximum extent practicable and in a manner that is consistent with the approved reclamation plan.

Contemporaneous reclamation will be implemented by RHR to the maximum extent practicable. However, in an underground mining operation such as the Roca Honda project, opportunities for contemporaneous reclamation are limited relative to a surface mining operation. Many of the areas that will be disturbed early in the project will remain disturbed until mine closure and reclamation. Since the majority of activity will take place below the surface, a relatively small percentage of project operation affects surface resources.

Surface disturbances will consist of the administrative buildings and support facilities, water treatment plant and ponds, excavation material stockpiles, roads, utility corridors, surface water flow channels and detention basins, retention ponds, and other facilities as described in more detail in Section 4.0 of this Plan. The majority of these areas must remain as constructed until mining operations cease and final site reclamation begins. However, because the RHR mining will be split between Section 16 and Section10, some contemporaneous reclamation will begin to the extent possible in Section 16 on facilities and areas not required for the mining efforts in Section 10.

The approach to contemporaneous reclamation is to avoid site disturbance where possible and minimize the area that must be disturbed. Contemporaneous reclamation will be initiated with topdressing salvage and continue through mine operations with protection and maintenance of excavation material stockpiles, closure and reclamation of dewatering wells when they are no longer needed, and reclamation of drill sites as soon as possible after drilling. This early reclamation reduces erosion, isolates and protects material for later use, provides mitigation of potential effects, and reduces the final reclamation work and costs.

Contemporaneous reclamation also involves avoidance of disturbance and the use of existing roads and access corridors whenever possible. For example, there are a number of previously disturbed areas within the permit area consisting of historic drill pads and existing dirt roads. RHR will improve some of these existing roads for its needs and locate ventilation holes and escape shafts on old drill pads whenever possible. Candidate areas for contemporaneous reclamation include the mud pits, development drill pads and the excavated material stockpiles, which consist of: 1) topdressing, 2) sub-base rock, 3) shaft material, and 4) non-ore material. Contemporaneous reclamation and design features for these areas are discussed below.

5.2.1 Mud Pits/Drill Pits

The construction of the ventilation escape shafts on Sections 16, 10 and 9, as described in Section 3.5, will result in one drill pad and two drilling mud pits adjacent to each shaft. One pit will contain primarily drilling mud used during drilling operations. The mud consists of drill cuttings and water and will be dried prior to being stockpiled. Drying will be accomplished by removing the mud to a second pit (or area) and allowing the water to evaporate. The dried material will then be removed and placed in a designated stockpile. These pits will be reclaimed as soon as the shafts are completed and the material is dry. Similarly, the installation of the dewatering wells and confirmatory development drilling will also require drill pads and mud pits. These areas will also be reclaimed to the extent possible during operations.

5.2.2 Topdressing

Topdressing will be salvaged to the extent it exists in each area. A total of approximately 295,000 cubic yards of topdressing material will be required to cover the total disturbance area of approximately 180 acres with 12 inches of topdressing (see Reclamation Plan Revision 1). This volume is conservative, as some areas disturbed may be retained after completion of the project to benefit the Post Mining Land Use of grazing, such as some roadways, water catchments and channels.

Salvaged topdressing will be segregated, and stored in a stockpile designated and labeled for topdressing only (see Section 4.0 and Attachment 1 for stockpile construction details). Topdressing from areas not directly related to the mining facility, such as roads, ventilation/escape shaft fan pads, and the water treatment facility area, will be added to an existing stockpile or placed in localized areas if transport of the soil is impractical or small in quantity, such as the more remote ventilation shaft locations. The stockpiles will be stabilized with a grass cover until ready for use. The cover will be comprised of plant species to be used in the reclamation seed mix for the site as these species are adapted to the region and several are quick to establish on disturbed soils (e.g. Sideoats grama). Table 5-3 found in Section 5.7 shows a seed mix for final reclamation and will be used as a temporary soil stockpile grass cover. The vegetation will reduce erosion while providing microhabitat for beneficial soil organisms. Diversion ditches will be constructed around the stockpiles where necessary to minimize storm water runon and runoff erosion and/or wattles installed to minimize runoff from the stockpile.

5.2.3 Sub-base Rock

The excavated rock from construction of the surface facilities will be stored in a separate and labeled stockpile (see Section 4.0 and Attachment 1 for stockpile construction details). Some of this material may be used as riprap and/or crushed and used for road base. These stockpiles will not be covered with soil. The stockpile will be protected with diversion ditches around the stockpiles where necessary to minimize storm water runon erosion and contain any runoff from the stockpile.

5.2.4 Shaft Excavated Materials

The production and ventilation shaft excavation material brought to the surface will be stockpiled separately (see Section 4.0 and Attachment 1 for stockpile construction details). This material will be characterized per NM MMD and NMED requirements to determine the leachability of acid or toxic constituents. If the material is inert it will be returned to the mine as engineered backfill for stability in mined out areas. If the material has the potential to generate acid or toxic conditions it will be loaded into highway trucks and transported off of the permit area to be disposed off-site. The stockpile will be protected with diversion ditches around the stockpiles where necessary to minimize storm water runon erosion and contain any runoff from the stockpile.

5.2.5 Non-Ore Material Stockpile

Contemporaneous reclamation handling of this material consists of minimizing the amount to be hoisted to the surface for stockpiling by selectively mining the ore and placing non-ore into previously mined voids and, to the extent that it is brought to the surface, returning it to the mined out areas during mining operations and/or at the end of operations. The typical rule of thumb for ore production versus non-ore production is that every four tons of ore mined also produces one ton of non-ore. This ratio means that while initial non-ore material produced from early mining will have to be hoisted to the surface and stockpiled, as mine development matures, there will be sufficient previously mined “void spaces” where the non-ore material can and will be deposited. As such, the majority of the non-ore material produced by the mine will never be brought to the surface. In addition, there will be sufficient room in the mature mine so that the non-ore stockpile will be returned into the mine as part of final reclamation.

While the non-ore material, by RHR’s definition, is material that does not contain uranium mineralization sufficient to be recognized as ore, i.e., material that will be transported to a processing facility, some yet unspecified amount of that non-ore material will likely be blended with ore material and transported. The amount of such material that is removed from the mine site will ultimately depend on the amount of mineralization it contains (i.e., the grade) and the economics of the uranium industry at the time of operation. Nonetheless, what is not transported off-site will be returned underground.

The non-ore material brought to the surface will be placed in a separate designated stockpile (see Section 4.0 and Attachment 1 for stockpile construction details). The stockpile will be protected with diversion ditches around the stockpiles where necessary to minimize storm water runon erosion and contain any runoff from the stockpile. Storm water runoff from the stockpile will be diverted to a retention pond.

5.3 Protection Assurance (NMAC 19.10.6.603 C.)

The mining operation and completed reclamation shall meet the following requirements established to assure protection of human health and safety, the environment, wildlife and domestic animals.

The mining operations requirements described below will be established by RHR to protect human health and safety, the environment, wildlife and domestic animals. The completed reclamation requirements are discussed in the Reclamation Plan, Revision 1.

5.3.1 Signs, Markers, and Safeguarding (NMAC 19.10.6.603 C.(1))

Measures will be taken to safeguard the public from unauthorized entry into shafts, adits, and tunnels and to prevent falls from highwalls or pit edges. Depending on site-specific characteristics, the following measures shall be required:

Access to the permit area will be controlled during mining operations to protect the public from possible injury due to operating conditions such as heavy equipment and truck traffic and other operations that have the potential to cause injury to untrained personnel. All personnel entering the site will be checked in, and will be allowed access to the administration building only without a company escort.

(a) closing shafts, adits or tunnels to prevent entry;

RHR will permanently close all of the production and ventilation shafts at the Roca Honda mine in a manner that will safeguard the public from unauthorized entry into the shafts. Each shaft will be plugged in accordance with good engineering practices. Section 2.1, item 4, of the Reclamation Plan, Revision 1 provides a description of how the shafts will be closed.

(b) posting warning signs in locations near hazardous areas;

Signs will be installed in and around the mine permit area to address various aspects of the mining operations to safeguard the public from unauthorized entry. Signs will be in English and Spanish where appropriate. Signs planned include, but are not limited to, those indicating RHR contact names and numbers on perimeter fences, public-to-private road crossings, traffic crossing warnings, wildlife crossings, explosives storage, and electrical hazards.

(c) restricting access to hazardous areas;

All hazardous areas within the perimeter of the mine fence, such as ponds, electrical installations, power lines, reclaimed areas, explosives storage areas, etc, will be fenced and/or posted with appropriate warning signs. All underground mine openings and ventilation fan installations will be fenced and posted against unauthorized entry.

(d) marking the permit area boundaries;

Fences will be installed on both Sections 16 and 10 for both security and safety purposes, as shown in Figures 4-1, 4-2 and Attachment 1. The Section 16 mine total working area is approximately 100 acres. However, the layout of the surface facilities will require several perimeter fences to secure the various surface facilities. An 8-foot cyclone fence with angled 3-strand barbed wire or equivalent is planned to be installed around individual facilities or groups of facilities. The Section 10 mine working area is approximately 71 acres. The configuration of its facilities allows for installation of a single facility perimeter fence. Fences and locked gates will be placed at all secondary road entrances to the mine permit area.

The facility perimeter will be posted with signs attached to the fence or to posts warning of unauthorized entry and stating the appropriate hazard warning. An access point will be established at the entrance(s) to the mine site. They will be posted with the company name and contact names and telephones numbers and will serve as the main point of entry to the mine site for both mine employees and visitors.

(e) posting a sign at the main entrances giving a telephone number of a person to call in the event of emergencies related to the mine; or

The main entrances to the permit area will have a manned guard shack to stop and check reason for entry. Signs will be posted listing the name of the project, the operator and a telephone number and other contact information to contact in the event of emergencies related to the mining operation.

(f) other measures as needed to protect human safety.

The fence at the mine offices will exclude all unauthorized traffic. If a visitor requires entrance beyond the mine office, the mine personnel will accompany all visitors to their destination.

5.3.2 Wildlife Protection (NMAC 19.10.6.603 C.(2))

Measures shall be taken to minimize adverse impacts on wildlife and important habitat. Based on site-specific characteristics, the following measures will be required:

(a) restricting access of wildlife and domestic animals to toxic chemicals or otherwise harmful materials;

Impacts to wildlife were considered in the location of the surface facilities/features in order to minimize or avoid adverse impacts to wildlife and important habitat. Additional mitigative measures planned include installing fences around mine shafts and ventilation holes to keep wildlife out of these areas and posting signs along access roads to and around the permit area alerting drivers to the presence of wildlife onsite. Screens will be placed over ventilation openings to deter birds and bats. Feeding of wildlife will be prohibited. Power lines and associated equipment such as transformers and substations will be built raptor-safe.

(b) minimizing harm to wildlife habitat during mining; and

To minimize harm to habitat, trees will be limbed, rather than felled, whenever possible. Pruned and felled trees will be scattered to provide cover, where appropriate. When trees are chipped, the mulch will be spread on site in open areas away from personnel traffic.

When large pipelines are laid on the ground surface, wildlife “ramps” will be constructed across the pipeline at about 300-foot intervals. Trenches left open overnight will have ramps built into them to provide an exit out for animals that might enter. Culverts will be placed on grade wherever possible to allow animal passage. Gates will be installed where appropriate to deter public access to the mine site permit area. Maximum speed limit on the mine permit area will be posted at 15 miles per hour.

(c) reclaiming areas of wildlife habitat if not in conflict with the approved post-mining land use.

No open water ponds will remain after reclamation, except for previously existing stock ponds, which may be rebuilt to pre-mining conditions. With geomorphic design considerations and planting of trees and shrubs in clumps, islands and rows, “Edge Effect” can be created which is beneficial to wildlife and livestock as wind breaks, shade and habitat diversity.

The New Mexico Department of Game and Fish (NMDGF) *Habitat Guidelines for Mine Operations and Reclamation* (NMDGF 2004) describes measures that minimize potential adverse effects to wildlife and their habitat. Specific measures to be taken to mitigate wildlife habitat loss and degradation include:

- Creating topographic variability during grading (rather than traditional smooth slopes). Where feasible, topographic variability will be created that reflects the natural site surroundings (geomorphic character of the area). Such features include, where practicable, undulating profiles, niches or ledges on slope faces, clumps or rows of planted shrubs, brush piles, and rock piles.
- The exclusive use of native plant species.
- The exclusive use of certified weed-free seed and mulch.
- Implementing weed control to prevent the introduction and spread of noxious weeds, particularly those harmful to livestock and wildlife.

5.3.3 Cultural Resources (NMAC 19.10.6.603 C.(3))

Cultural resources listed on or eligible for listing on the National Register of Historic Places or the State Register of Cultural Properties, and any cemeteries or burial grounds shall be protected until clearance has been granted by the State Historic Preservation Office or other appropriate authority.

RHR recognizes the sensitivity and importance of the presence of cultural properties on the Roca Honda permit area. RHR conducted archaeological surveys of the entire permit area and designed its surface facilities to avoid these sites wherever possible. The surveys produced a list of sites eligible for listing on the National Register of Historic Places on the state Register of Cultural Properties. Section 11.0, Historic Places and Cultural Properties, of the BDR Revision 1 provides the details of these survey results. RHR is working with the appropriate state and Federal authorities to ensure all of these sites are protected and/or the required clearances have been granted.

In late 2010 the USFS began preparation of an Environmental Impact Statement (EIS) for the RHR mine project. Part of the process requires that cultural properties issues be evaluated, pursuant to Section 106, Protection of Historic Properties (CFR Title 36 2004). In early 2011 USFS in coordination with the State of New Mexico began detailed evaluation of RHR's proposed mine on cultural properties. A number of site visits were conducted to evaluate the location of the identified archaeological sites identified by RHR in relation to the location of RHR's proposed surface facilities. Those site visits resulted in RHR making certain changes to its October 2009 permit application submittal, including rerouting access roads and corridors to further avoid archaeological sites of concern, modifying its proposed fencing plans to isolate sites from potential disturbance, and changing the location of stockpiles and other surface facilities. All of these changes have been incorporated into this Mine Operations Plan Revision 1. Further modifications may be required as more information becomes available. However, any such modifications are anticipated to be minor.

Also, as part of the EIS cultural properties investigations, RHR in concert with the USFS and state archaeologists identified eleven sites (of the 193 sites found by the surveys) that required closer evaluation because of the proximity to proposed mining activities. At USFS' direction, RHR prepared a Testing Plan to further investigate in more detail. The investigation will examine the extent of these sites and make recommendations as to their continued eligibility to the list of sites on the historic register. Mitigation plans may be devised to ensure their protection during construction, operations and reclamation depending on the results and recommendations of the report. The Testing Plan Report will be submitted to the USFS in late 2011 for use in the EIS process.

In addition to the additional testing performed, the Section 106 process identified that there were additional ethnographic considerations that must be addressed. These issues require that various Indian tribes be given the opportunity to provide ethnographic information specific to their individual cultural concerns. USFS and RHR have coordinated these efforts providing a contractual mechanism whereby the tribes of Acoma, Laguna, Hopi, and Zuni have been provided funding through the EIS process whereby each tribe will conduct individual site ethnographic surveys and report their findings and concerns to the USFS. The Forest Service will use that information to further address cultural properties issues in the EIS. The investigations are ongoing. Individual tribal reports will be available in early 2012. RHR will continue to work with the USFS and the tribes to address concerns.

As noted in Section 1.1 of this Plan RHR has provided a cultural properties map package that provides the location of archaeological sites in relation to its proposed facilities. The package includes the drawings contained in Attachment 1 that also show the archaeological sites in relation to the facilities.

Prior to commencement of construction an archaeologist will be onsite during surface disturbances to issue clearances for construction activities and to provide guidance and expertise to ensure the protection of cultural properties, including those not previously documented. The appropriate agency will be notified immediately if additional cultural sites are discovered during these activities. Mitigation strategies will be developed in consultation with the agency.

In addition to the cultural properties identified in the surveys conducted in support of this application by RHR consultants, in April 2008, the USFS determined that certain areas of Mt. Taylor and surrounding forest property, known commonly as the Mt. Taylor Traditional Cultural Property (TCP), were eligible for listing on the National Historic Register. Sections 9 and 10 of the permit area are mostly within the boundary of the USFS Mt. Taylor TCP. Also, in June 2009, the New Mexico Cultural Properties Review Committee (CPRC) placed a certain area of Mt. Taylor and surrounding property on the state Register of Cultural Properties. Sections 9 and 10 of the permit area are located within the boundary of the property identified as the Mt. Taylor TCP. As part of their designation, the CPRC exempted private property from the designation as "non-contributing" properties. RHR owns the minerals beneath the surface of Sections 9 and 10 and believes that the mineral estate is private property. The status of the private property mineral estate of these sections with respect to the TCP and the state designation remains unclear as the issue is currently under litigation.

In conformance with state and Federal requirements, RHR recognizes that certain consultation with Indian Tribes will be performed by the agencies regarding the Mt. Taylor TCP. RHR will assist the agencies to any extent desired by them to help facilitate those consultations. Mitigation strategies will be developed in coordination with the agencies.

5.3.4 Hydrologic Balance (NMAC 19.10.6.603 C.(4))

Operations shall be planned and conducted to minimize change to the hydrologic balance in both the permit and potentially affected areas. If not in conflict with the approved post-mining land use, reclamation shall result in a hydrologic balance similar to pre-mining conditions unless non-mining impacts have substantially changed the hydrologic balance.

Mine operations surface facilities have been designed and located to avoid disturbance to minimize potential effects to surface hydrologic resources and the hydrologic balance through minimizing alteration of arroyos or other water bodies (see Sheets 35 and 36 and 40-42 of Attachment 1 and Attachment 2). To the extent possible, surface water will be routed around the disturbed area via constructed diversion channels. Surface water entering the permit area will continue to flow through and exit the permit area in its natural channels during operations. Some of the arroyos that transect the operational area may be armored or reconfigured to avoid further erosion into the site, stabilizing and enhancing the surface hydrologic resources, and otherwise be unaltered. Detention basins will also be added to control the flow rate through the watercourses. If desired and approved by the land owners, these basins may be retained as enhancements to the hydrologic stability of the area and to the post mining land use and for wildlife use.

As discussed in Section 3.3 of this Plan, RHR has conducted a detailed groundwater hydrologic study of the potential impacts of mine dewatering on groundwater levels and the hydrologic balance. The groundwater flow model provides a reliable prediction of the potential impacts of proposed mine dewatering at the Roca Honda Mine. It provides a detailed analysis of the extent, duration and potential impacts from mine dewatering activities. Based on the available data and the model calibration, dewatering the Roca Honda mine will not adversely impact the water resources of the Village of Milan, Acoma Pueblo, Laguna Pueblo, the City of Grants, the community of San Mateo, Crownpoint area, or the City of Gallup. Mine dewatering will not have any adverse impacts on area springs. The model predicts that there will be only limited lowering of the water levels in the Westwater aquifer and no impact on existing water rights.

After operations have ceased, mine water will no longer be discharged. If desired by the land owners, final reclamation will include removal of armaments and flow structures in the arroyos, removal of the detention basins, and reclamation of the retention ponds. The natural drainage will be allowed to flow as before mining. The disturbed areas will be returned to grazing land use.

As shown in Figure 1-3 and discussed in Section 1.0 and 4.0 of this Mine Operations Plan Revision 1, RHR will transport the treated mine water to be discharged at a location approximately eight miles northeast of the mine site on private land. The change to the original mine plan was precipitated in response to agency review comments and concerns regarding RHR's proposal to discharge into the San Mateo Creek drainage. When discharged, the water will become available for reuse by others or flow down the San Lucas Arroyo. Impacts to the surface water hydrologic balance at the discharge point will depend on the use of the water. It is anticipated that the water will be used for irrigating pasture land by the local rancher. In that case the water will be distributed onto aerable land to grow a food crop for cattle or to improve native grasses.

While the expectation is that all of the water will be used for irrigation some of the water may be allowed to flow down an otherwise ephemeral drainage. That water would recharge to the shallow alluvial system or the various formations outcropping in the arroyo bed. It may also eventually reach the Rio Puerco drainage on the east side of Mt. Taylor. Whatever the ultimate disposition of the water, the impact to the hydrologic balance will be relatively short-term as the water will no longer be available for irrigation or recharge once mine dewatering ceases.

(a) Operations shall be designed so that non-point source surface releases of acid or other toxic substances shall be contained within the permit area, and that all other surface flows from the disturbed area are treated to meet all applicable state and federal regulations.

Excavated materials will be managed as described in Sections 4.0 and 4.2.5 of this Plan within the permit area in stockpiles. All stockpiles will be designed to minimize mass movement. As discussed in more detail in Section 4.0 the shaft excavation material will be analyzed to determine if it has the potential to release acid or toxic substances. If so, the runoff will be collected in a retention pond. The runoff from the non-ore stockpile will be collected in a retention pond. The constructed retention ponds will be lined (see Attachment1, Sheets 53-55 and 57-59). Storm water that falls on the operation areas will also be directed to a retention pond. The retention ponds will have a lift station (see Attachment 1, Sheet 52) so that the water can be pumped to the water treatment facility for treatment before it is discharged.

(b) The disturbed areas shall not contribute suspended solids above background levels, or where applicable the Water Quality Control Commission's standards, to intermittent and perennial streams.

Sediment control will be achieved by the use of BMPs to stabilize the site and ensure that the permit area does not contribute suspended solids or other contaminants to intermittent and perennial streams in excess of regulatory standards. The following BMPs, discussed in detail in Section 5.1, will be designed, constructed and maintained in accordance with the requirements of NMDOT and the U.S. EPA (NMDOT 2009, US EPA 2009) (see Attachment 1, Sheets 62-68):

- Wattles and straw bales
- Ditches/swales
- Diversion channels
- Energy dissipaters
- Slope drains
- Sediment traps
- Detention basins
- Retention ponds

A SWPPP will be developed for the Roca Honda mine permit area that outlines the mechanisms to control storm water runon and runoff from disturbed areas. The SWPPP will be based on the final mine design. Mine employees will be trained to its requirements prior to commencement of construction and/or mining operations.

Armoring may be used in the arroyos within the permit area to prevent flow from cutting into operational areas and structures. Portions of the site facilities in Sections 16 and 10 will be protected from storm water runon by construction of overland flow diversions. These diversions may be lined and/or armored and will divert runon into detention basins to slow the water flow into the receiving drainages (Attachment 1, Sheets 35 and 40).

Material stockpiles will be protected from runon by berms or diversion ditches. The stockpiles will be constructed with side slopes no steeper than 3H:1V (4V:1H for topsoil piles) and some covered and vegetated to reduce erosion. Storm water runoff from the site area will be reduced by limiting the slope of the footprint to no greater than three percent and directing runoff to retention ponds. Roads will be constructed with a center crown to direct storm water to the side ditches. The ditches will have sediment control features such as water bars, wattles or other traps to reduce sediment if the water enters an arroyo. These sediment control devices will be placed around construction or operational areas for temporary surface disturbance activities (see Section 5.1).

(c) To provide data to determine background levels for surface water entering the permit area, appropriate monitoring shall be conducted on drainages leading into the permit area.

The drainages leading into the Roca Honda permit area, which enter from Sections 9 and 10, are ephemeral. Therefore, obtaining surface water data for these drainages is problematic.

Surface water samples will be collected from drainages leading into the permit area as part of the baseline data collection effort prior to beginning operations. Samples will be collected following a storm event, as determined possible in the field. If background characterization efforts have been unsuccessful prior to commencing construction of the mine, water samples will be collected from two detention basins, shown on Figures 4-1and 4-2, during or immediately following the first storm event (or when sufficient water is available for sampling) after the basins are constructed. One basin will be located near the northern boundary of Section 16, just north of the material stockpile area. The second basin will be located in Section 10 near the north end of the surface facilities within the fenced area. This strategy will ensure that background levels for surface water are determined in compliance with the NMAC 19.10.6.603 C.(4)(c) regulations. Samples will be analyzed for major cations, major anions, other water quality parameters, and targeted constituents to allow comparison of the same constituents for receiving drainages.

(d) All diversions of overland flow shall be designed, constructed and maintained to minimize adverse impacts to the hydrologic balance and to assure the safety of the public.

Surface water flow diversions are planned for Sections 16 and 10. These diversions will be designed, constructed and maintained to minimize adverse impacts to the hydrologic balance of the permit area, and to assure the safety of the public downstream of the permit area.

Overland flow from above the stockpile area in Section 16 will be collected in a constructed detention basin from a 83 acre watershed originating in Section 9 (see Attachment 1, Sheet 29 and Attachment 2). Release of the detained water will be controlled by the basin graduated standpipe (Attachment 1, Sheet 56). The discharge will flow southward in a constructed channel that will join an arroyo from the east side of the operations area and continue under the new haul road through culverts (Attachment 1, Sheet 36). A velocity dissipater after the culverts will create sheet flow until it enters the original arroyo channel. The arroyo on the east side of the operations area will be armored in segments where the water flow has the potential to erode the bank into the facility.

The largest arroyo that passes through the western portion of the Section 10 operations area will be controlled with the construction of a detention basin. The watershed size and design storm flow is contained in Attachment 2 and the detention basin design detail is in Attachment 1, Sheet 60. The channel out of the detention basin will be improved to direct the flow south where the water will enter an existing arroyo at a velocity dissipater (Attachment 1, Sheet 42). Overland flow west of the facility area in Section 10 will be collected in a constructed swale (Figure 4-2 and Attachment 1, Sheets 40 and 41) which drains southward to an existing arroyo. One of the larger arroyos from the western slope will be diverted into the detention basin. When no longer needed, all temporary diversions will be removed and the disturbed area reclaimed.

Material stockpiles will be designed with 3H:1V side slopes (4H:1V slopes for topsoil stockpiles) and runoff control ditches/swales with berms and/or fiber rolls around their base to control water runon and runoff. Clean runon will be directed to receiving arroyos. Potentially contaminated runoff will be directed to retention ponds for storage and treatment in the water treatment plant. The retention ponds will be sized to handle runoff from a 100-year, 24-hour event with 2 feet of freeboard (Attachment 1, Sheets 53-55 and 57-59).

(i) No diversion shall be located so as to increase the potential for landslides.

All cut slopes will be designed at 2H:1V; fill slopes will be 3H:1V. Runoff control ditches/swales and excavated sediment traps will be installed at the toe of cut slopes.

(ii) Unless site-specific characteristics require a different standard which is included in the approved permit, diversions which have watersheds larger than 10 acres shall be designed, constructed and maintained to safely pass the peak runoff from a 10-year, 24-hour precipitation event.

(iii) All diversion designs which have watersheds larger than 10 acres shall be certified by a professional engineer registered in New Mexico as having been designed in accordance with 19.10 NMAC. Diversion designs shall be kept on-site or otherwise be made available, upon request, to the Director for inspection.

Hydrologic analysis for the watersheds was performed using the United State Army Corps of Engineers Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) computer program. HEC-HMS generated hydrographs for each site by utilizing the Soil Conservation Service Unit Hydrograph methodology for runoff transformation and the Runoff Curve Number method to determine infiltration losses. This hydrologic analysis was performed to size the various drainage improvements and to verify that the flow in the temporary structures would safely pass the peak runoff from a 10-year, 24-hour precipitation event, as certified by a professional engineer registered in New Mexico. The detailed flood hydrograph package and water surface profile analysis was performed and is available in Attachment 2.

(iv) When no longer needed, temporary diversions shall be removed and the disturbed area reclaimed.

Temporary surface water diversions will be removed, regraded consistent with the geomorphological character of the region, and reclaimed as part of reclamation.

5.3.5 Stream Diversions (NMAC 19.10.6.603 C.(5))

When streams are to be diverted, the stream channel diversion shall be designed, constructed, and removed in accordance with the following:

No perennial stream channels exist within the RHR permit area. One ephemeral arroyo draining approximately 21 acres to the west of the Section 10 facility area will be directed into the arroyo that flows from north to south through the facility area. The diversion will enter the constructed detention basin within the existing arroyo (Attachment 1, Sheet 40). Other small ephemeral arroyos will be directed into a constructed drainage swale along the western fence line of the Section 10 operations area. This constructed swale will drain into an existing arroyo (Attachment 1, Sheets 40 and 41). The arroyos near the operations area in Section 16 will not be diverted.

As-built drawings will be prepared as soon as practical after construction of the diversions and kept onsite and available for inspection in conformance with NMAC 19.10.6.603 C.(5)(b) regulations. When no longer needed, the temporary stream channels will be reconstructed to be a permanent channel as discussed in the Reclamation Plan and in conformance with NMAC 19.10.6.603 C.(5)(b) regulations.

(a) unless site-specific characteristics require different measures to meet the performance standard and are included in the approved permit, the combination of channel, bank and flood plain configurations shall be adequate to safely pass the peak run-off of a 10-year, 24-hour precipitation event for temporary diversions, a 100-year, 24-hour precipitation event for permanent diversions;

The hydrologic analysis (Attachment 2) was used to size the drainage improvement structures to safely pass the peak runoff from a 10-year, 24-hour precipitation event, as certified by a professional engineer registered in New Mexico.

(b) the design and construction of all intermittent and perennial stream channel diversions shall be certified as meeting 19.10 NMAC by a professional engineer registered in New Mexico. As-built drawings shall be completed promptly after construction and be retained on site or otherwise made available upon request to the Director; and

There are no intermittent or perennial streams within the permit area but the design and construction of all stream channel diversions will be certified as meeting 19.10 NMAC by a professional engineer registered in New Mexico. As-built drawings will be completed promptly after construction and be retained on site or otherwise made available upon request to the Director.

(c) when no longer needed, temporary stream channel diversions shall be removed and the disturbed area reclaimed.

When no longer needed, temporary surface water diversions will be removed, regraded consistent with the geomorphological character of the region, and reclaimed as part of reclamation.

5.3.6 Impoundments (NMAC 19.10.6.603 C.(6))

If impoundments are required they shall be designed, constructed and maintained to minimize adverse impacts to the hydrologic balance and adjoining property and to assure the safety of the public.

Three types of impoundments will be constructed at the Roca Honda permit area: a surge pond and treated water holding ponds (for the water treatment plant), detention basins (to control runon), and retention ponds (to capture runoff and treat as necessary). Details of the design of these impoundments are provided in the attached design drawing package (Attachment 1) and the Water Treatment Plant 60 % Design Revision 1 (Lyntek 2011) and described in the following subsections.

(a) Unless site-specific characteristics require different measures to meet the performance standard and are included in the approved permit, impoundments having earthen embankments but not subject to the jurisdiction of the Mine Safety and Health Administration or the State Engineer shall:

The Office of the State Engineer Dam Safety Bureau refers to Section 72-5-32 of the New Mexico Statutory Authority definition of a jurisdictional dam as 25 feet or greater in height and storing more than 15 acre-feet or a dam that stores 50 acre-feet or greater and is 6 feet or more in height. The impoundments proposed for the RHR mine permit area do not fall into either jurisdictional category. However, the State Engineer recommends that NMAC 19.25.12 be followed for non-jurisdictional dams to ensure the dams are designed and constructed in a safe manner. Additionally, the Dam Safety Bureau requests the review of jurisdictional status with the submittal of design information. The RHR design for the impoundments will meet the requirements for NMAC 19.10.6.603 C (6) and NMAC 19.25.12.

The water treatment plant will have one pond as part of the treatment process and two ponds as treated water reservoirs. The design of each of these below grade ponds is found in the water treatment plant design report submitted in December 2011.

The detention basins in Sections 16 and 10 have been designed to collect and control the storm water flow from arroyos that pass close to constructed operation facilities. The design flow was calculated from the analysis and modeling of the drainage basins above each detention basin. The results of the surface water hydrologic study may be found in Attachment 2. Typical earthwork equipment will be used to excavate the basin and construct the berms. The storm water will be released through a graduated standpipe into a newly constructed earthen channel in Section 16 and the existing arroyo with some armorment and channel improvements in Section 10. All discharged water will eventually join its natural channels. Earthen berms will be constructed to collect the storm water. The basin capacity could be 10 acre feet, however, the water will be released through the graduated standpipe as it fills. The design details are shown in the drawing package (Attachment 1, Sheets 56 and 60).

The retention ponds as identified in the Section 16 and Section 10 process areas will be excavated below grade with part of the excavation material used for the perimeter berms. The sizes and capacity of these ponds were determined as a result of the hydrologic analysis (Attachment 2). The ponds were placed downgradient from areas that could potentially collect constituents of concern that could otherwise be washed away with a storm event. Typical earthwork equipment will be used to excavate the ponds and construct the perimeter berms. The ponds will be lined. The design details, including capacity of each pond is shown in Attachment 1, Sheets 53-55 and 57-59.

(i) have a minimum elevation at the top of the settled embankment of 1.0 foot above the water surface in the pond with the spillway flowing at the design depth;

The details of the detention basin embankments are shown in Attachment 1, Sheets 56 and 60. A typical emergency spillway detail is shown on Sheet 49, however, the water will discharged as it fills via the graduated standpipe. The retention ponds will be below ground.

(ii) have a top width of the embankment not less than 6 feet;

The details of the embankment are shown in Attachment 1, Sheet 49.

(iii) have combined upstream and downstream side slopes of the settled embankment not less than 5 horizontal : 1 vertical with neither slope steeper than 2 horizontal : 1 vertical. Slopes shall be vegetated or otherwise stabilized to control erosion;

The details of the embankment and slopes are shown in Attachment 1, Sheets 49, 56 and 60.

(iv) have the embankment foundation cleared of all vegetative matter, all surfaces sloped to no steeper than 1 horizontal : 1 vertical and the entire foundation area scarified;

The construction details of the ponds and embankment are shown in Attachment 1, Sheets 49, 56 and 60.

(v) have fill material free of vegetative matter and frozen soil;

The area will be cleared of vegetation and no frozen materials will be used.

(vi) have spillways provided to safely discharge the peak runoff of a 25-year, 24-hour precipitation event, or an event with a 90-percent chance of not being exceeded for the design life of the structure; or

A hydrologic analysis was performed for the drainage basins and the resulting storm flow was used to design the basins and ponds. The report and model results are in Attachment 2. The ponds have no spillways because the water is pumped to the WTP.

(vii) have other site-specific design criteria for embankments as long as they result in a minimum static safety factor of 1.3 with water impounded to the design level;

The hydraulic components of the project including the detention basins and retention ponds were designed for the 100-year, 24-hour storm event which satisfies requirement 19.10.6.603 C. (6) (a) (vi) and, therefore, 19.10.6.603 C. (6) (a) (vii) is not required.

(viii) be designed and certified by a professional engineer registered in New Mexico as having been designed and constructed in accordance with 19.10 NMAC. As-built drawings shall be completed promptly after construction and be retained on site or otherwise made available upon request to the Director; and

The impoundments have been designed by a professional engineer and the final drawings will be sealed. As-built drawings will be prepared after construction and retained.

(ix) if necessary for sediment control be, in place before any other disturbance to the watershed for the impoundment.

BMPs will be in place before construction of the impoundments begins (see Section 5.1).

(b) When no longer required, impoundments shall be graded to achieve positive drainage unless:

(i) the surface estate owner has requested in writing that they be retained;

(ii) they are consistent with the approved reclamation plan; and

(iii) they are appropriate for the post-mining land use or the self-sustaining ecosystem.

The reclamation of impoundments is discussed in Section 3.3.6 in the Reclamation Plan, Revision 1.

5.3.7 Minimization of Mass Movement (NMAC 19.10.6.603 C.(7))

All man-made piles such as waste dumps, topsoil stockpiles and ore piles shall be constructed and maintained to minimize mass movement.

All material stockpiles have been designed and will be constructed and maintained to minimize mass movement from the stockpiles. Material stockpile design is discussed in detail in Sections 4.0 of this Plan.

Briefly, the stockpile design of each of the stockpiles calls for side-slopes of 3H:1V. The topdressing stockpiles are designed to have side slopes of 4H:1V to provide a more gentle sloping surface to facilitate vegetation growth and maintenance. The stockpiles will be constructed in layers by placing material on the stockpile and grading it to specific depths. The layers will be compacted by the weight of the equipment driving over it. The height of the stockpiles will be limited to approximately 25 feet. The combination of the design slopes, height limitation and compaction will provide sufficient stability to the stockpiles to minimize mass movement. Materials handling is discussed in Sections 7.2 and 7.3.

5.3.8 Riparian and Wetland Areas (NMAC 19.10.6.603 C.(8))

Disturbance to riparian and wetland areas shall be minimized during mining. Adverse effects to riparian and wetland areas shall be mitigated during reclamation unless the mitigation conflicts with the approved post-mining land use.

RHR surveyed the permit area and surrounding areas for riparian and wetland areas. There are no riparian or wetland areas as defined by the Clean Water Act Section 404 in the Roca Honda permit area. The survey results are included as a revision to the BDR Revision 1.

5.3.9 Roads (NMAC 19.10.6.603 C.(9))

Roads shall be constructed and maintained to control erosion.

(a) Drainage control structures shall be used as necessary to control runoff and to minimize erosion, sedimentation and flooding. Drainage facilities shall be installed as road construction progresses and shall be capable of safely passing a 10-year, 24 hour precipitation event unless site-specific characteristics indicate a different standard is appropriate and is included in the approved permit. Culverts and drainage pipes shall be constructed and maintained to avoid plugging, collapsing, or erosion.

New roads and improvements to existing roads are planned within the mine permit area for construction of the facilities and operation of the mine, as shown in Figures 4-1, 4-2, and 4-3. Road construction and improvement activities include clearing/grubbing vegetation and performing cut and fill for new roads as needed, widening existing roads, surfacing with gravel, constructing drainage slopes and ditches, and installing arroyo crossings. Typical road drainage swales and arroyo crossings are shown in Attachment 1, Sheet 48. Multiple culvert crossings have been designed within the permit area. The location and sizes of the crossings are included in the surface water hydrologic study (Attachment 2) and shown on drawings in the drawing package (Attachment 1, Sheets 27-31). Prior to final reclamation, the USFS, State of New Mexico, and the neighboring rancher will determine what roads will be left on the project site for future use by the land owner.

The surface disturbance area associated with road construction (new roads and improvements to existing roads) is estimated for the following sections:

Section 9 – 3 acres

Section 10 – 13 acres

Section 16 – 18 acres

Section 11 – 8 acres

Sections 17 and 20—11 acres

New roads will be constructed to access surface facilities and vent shafts in Sections 9, 10, and 16. Improvements to existing dirt roads and/or construction of new sections of roads will be made in Section 11 to access the surface facilities in Section 10, and in Section 17 to access Section 16. The improvements on Sections 11 and 17 are not part of the permit area. Prior to final reclamation, the USFS and the private landowner will be consulted to determine the disposition of these roads.

Storm water best management practices including runon and runoff controls, and drainage control structures will be used as necessary to prevent and minimize erosion, sedimentation and flooding. Drainage facilities will be installed as road construction progresses and will be capable of safely passing a 10-year, 24-hour precipitation event. Culverts and drainage pipes will be constructed and maintained to avoid plugging, collapsing, or erosion.

(b) Roads to be constructed in or across intermittent or perennial streams require site-specific designs to be submitted with the permit application.

There are no roads to be constructed in or across intermittent or perennial streams within or near the permit area. Design details of typical ephemeral arroyos road crossings are shown in Attachment 1, Sheet 48.

(c) Roads to be made permanent must be approved by the surface owner and be consistent with the approved post-mining land use.

Roads constructed for the Roca Honda project will aid in management of the lands for livestock grazing operations, and are therefore consistent with the approved post-mining land use. The surface owners will be contacted by RHR to determine if it is their desire to have roads made permanent, after mining operations, and if so, a request will be made to the NM Mining and Minerals Division to retain roads.

5.3.10 Subsidence Control (NMAC 19.10.6.603 C.(10))

Underground and in situ solution mining activities shall be planned and conducted, to the extent technologically and economically feasible, to prevent subsidence which may cause material damage to structures or property not owned by the operator.

Underground mining activities at Roca Honda will be planned and constructed in a manner to prevent subsidence and damage to structures and/or property not owned by RHR.

The target ore zone of the Roca Honda mine is contained within sandstones of the Westwater Canyon Member of the Morrison Formation at a depth of approximately 1,650 to 2,600 feet below ground surface at the mine site. Between the Westwater Canyon Member and land surface are approximately 2,000 feet of primarily shale with thinner sandstone layers. Mining will occur only within sandstones of the Westwater Canyon Member, and lateral drifts will be restricted to that geologic unit. The vertical depth to the mining area from the surface makes it highly unlikely that mining activities will cause surface subsidence to occur.

In 1994, Rio Grande Resources Corporation (RGRC) submitted to NM MMD, in support of its permit application, an evaluation of potential subsidence. The evaluation indicated that "under the most extreme conditions that could reasonably occur in the underground workings, … the maximum height of subsidence propagating upward from the (Mt. Taylor) mine workings should be less than 300 feet." The RGRC evaluation postulated very large mine openings for this analysis and acknowledged that actual subsidence would be expected to be even less than calculated because the actual dimensions of the underground workings would be smaller and the geologic units overlying the mine are very thick with significant potential to swell. The conditions at the Roca Honda mine, while not as deep as the Mt. Taylor mine, are relatively the same. Therefore, the RGRC evaluation is consistent with what would be expected at the Roca Honda mine.

(a) Underground and in situ solution mining activities near any aquifer that serves as a significant source of water supply to a public water system shall be conducted so as to avoid disruption of the aquifer and consequent exchange of ground water between the aquifer and other strata.

The Roca Honda mining activities will be conducted so as to avoid disruption of aquifers and exchange of groundwater between the aquifer and other strata. The Roca Honda mine shaft, ventilation holes, and dewatering wells will pass through three saturated geologic units which function as aquifers in parts of the San Juan Basin. From highest to lowest in the geologic section, these units are the Gallup Sandstone, the Dakota Sandstone, and the Westwater Canyon Member of the Morrison Formation. Groundwater within all three of these units is expected to occur under artesian conditions.

As described in more detail in Section 3.3 of this Plan, RHR will depressurize the Gallup, Dakota and Westwater Formations. This activity will result in limited groundwater level drawdown in the vicinity of the mine. This is described in more detail in RHR's report titled "Assessment of Potential Groundwater Level Changes from Dewatering at the Proposed Roca Honda Mine" prepared by INTERA and submitted to the regulatory agencies in November 2011. INTERA constructed a numerical groundwater flow model to evaluate the impact that the proposed dewatering activities might have on local and regional groundwater and surface water systems, including those for the nearby population centers of Grants, Gallup, Milan, Crownpoint, San Mateo, and the Acoma and Laguna Pueblos. Impacts are defined as changes in groundwater levels at wells and springs. Specifically INTERA constructed and calibrated a numerical model of groundwater flow to estimate predevelopment groundwater levels; i.e., groundwater levels prior to the year 1930, for conditions prior to the onset of large-scale mining in the Grants uranium belt. They constructed and calibrated a transient numerical model of groundwater flow to estimate changes in groundwater levels from 1930 to 2012 caused by pumping from public water supply wells, mine dewatering, and recovery from mine dewatering. They constructed and applied a predictive, transient, numerical groundwater flow model that simulates changes to the 2012 hydraulic groundwater levels during and after dewatering at the proposed Roca Honda Mine. The simulated changes in groundwater levels at locations near existing wells and springs represent the estimates of potential impacts due to Roca Honda Mine dewatering.

The groundwater flow model provides a reliable prediction of the potential impacts of proposed mine dewatering at the Roca Honda Mine. Based on the available data and the model calibration, dewatering the Roca Honda Mine will not adversely impact the water resources of the Village of Milan, Acoma Pueblo, Laguna Pueblo, the City of Grants, the community of San Mateo, Crownpoint area, or the City of Gallup. Mine dewatering will not have any adverse impacts on area springs.

Mine dewatering is regulated by the New Mexico State Engineer under the Mine Dewatering section of the New Mexico Statutes Annotated §72.12A.1 through §72.12A.13, which was developed to balance the rights of existing water users with maximum economic development of mineral resources. RHR will obtain a mine dewatering permit from the NM OSE. The potential impacts on existing water users, including public water systems, of dewatering the aquifers within the mine area, was assessed under these statutes and §72.12.1 through §72.12.38, which regulate appropriation of groundwater. RHR has performed a groundwater hydrologic study to assess impacts on existing water uses. As noted above, this study has been submitted to the regulatory agencies for review.

State law requires that the waters of artesian aquifers be prevented from moving into another aquifer or geologic unit. The NM OSE requires that RHR dewatering wells be constructed according to 19.27.4 NMAC regulations, in particular, 19.27.4.31.A NMAC, which regulates construction of artesian wells. The provisions of 19.27.4.31.A NMAC were written to prevent inter-formational movement of groundwater, and state: "No artesian well shall be constructed that allows groundwater to flow uncontrolled to the land surface or move appreciably between geologic units." Casing and coupling requirements, annular space requirements, acceptable grouting techniques, and acceptable formation sealing tests are specified in the regulation. RHR will comply with 19.27.4 NMAC regulations and will employ licensed drillers or shaft constructors who will work with the NM OSE representatives to ensure that the dewatering wells and shafts are constructed properly.

The NM OSE also has drill hole abandonment requirements designed to protect aquifers. The RHR development drill holes will be plugged and abandoned in accordance with NM OSE requirements.

(b) Underground and in situ solution mining activities conducted beneath or adjacent to any perennial stream must be performed in a manner so that subsidence is not likely to cause material damage to streams, water bodies and associated structures.

The Roca Honda mine is not located beneath or adjacent to a perennial stream or water body. The closest intermittent stream, San Mateo Creek, is located two miles to the south of the mine area. The sources of the creek waters are runoff from precipitation of Mt. Taylor and spring flow. The springs, which augment surface runoff, get their source of water from the volcanics of Mt. Taylor in the headwater area of the creek and springs which source further down along the creek near the contact of the Menefee Formation and Point Look out Sandstone of the Mesa Verde Group. Neither of these geologic units is saturated within the mine area, and both are separated vertically from the ore zone in Westwater Canyon Member by over 1,500 feet of shales and sandstones. Mining within the Roca Honda permit area will not cause subsidence such that material damage would occur to streams, water bodies and/or associated structures.

5.3.11 Explosives (NMAC 19.10.6.603 C.(11))

Blasting shall be conducted to prevent injury to persons or damage to property not owned by the operator. Fly rock shall be confined to the permit area. The Director may require a detailed blasting plan, pre-blast surveys or specify blast design limits to control possible adverse effects to structures.

Blasting at the Roca Honda mine will take place as part of the sequence of excavating and constructing the production shafts and as part of the ongoing mining operations deep inside the mine, approximately 2,000 feet below the surface. As such, there is no likelihood that such blasting activity will cause injury to persons or damage to property not owned or under the control of RHR. An experienced and certified contractor will do all of the blasting at the site.

The explosives storage magazines will be located at the surface within the controlled perimeter fence (see Figure 4-1 and 4-2). One magazine will contain explosives the other blasting caps. The magazines will be constructed to meet all Bureau of Alcohol Tobacco and Firearms (BATF) standards. Each magazine will be secured with two locks. A typical magazine is shown in Attachment 1, Sheet 61.

The magazines will be situated away from occupied buildings in compliance with the BATF Standard Table of Distances for the Storage of Explosives. The BATF distances are based on the maximum quantity of explosives at any one time. Therefore, the final placement of the storage area and the distances between the magazines will be finalized with the completion of facility design. The powder magazine and the blasting cap magazine will be separated by an earthen berm. A berm will also be placed around the perimeter of the magazine area. These berms will be, at a minimum, two feet higher than the tallest magazine. A fence with a locked gate will be placed on the outside of the berm. Appropriate warning signs will be placed on the fence in such a way that a bullet passing through the sign will not strike the magazines.

An inventory will be kept of all explosives received in to and distributed out of the surface magazines. All explosives taken from the surface magazines to the underground mine will be inventoried into the underground magazines. An inventory will also be kept of all explosives used in the underground mine.

All transportation of explosives, on the surface and in the underground mine; will meet all Mine Safety and Health Administration (MSHA) and state requirements.

All employees, who handle explosives on the surface and in the underground mine, will meet all BATF, MSHA and state qualification and certification requirements.

5.4 Site Stabilization and Configuration (NMAC 19.10.6.603 D.)

The permit area shall be stabilized, to the extent practicable, to minimize future impact to the environment and protect air and water resources. The final surface configuration of the disturbed area shall be suitable for achieving a self-sustaining ecosystem or approved post-mining land use.

This section addresses the requirements for stabilization and configuration of the project site after final reclamation in order to minimize impact to the environment and protect air and water resources. The current surface land use of the permit area is grazing. The final surface configuration of the disturbed area upon final reclamation at the Roca Honda permit area will be suitable for achieving the approved post-mining land use of grazing. Coincident with stabilization and configuration is minimizing the size of the area to be disturbed within the permit area, which consists of three sections of land. The disturbed area will be limited to approximately 180 acres within the 1,920 acre permit area.

The Reclamation Plan, Revision 1 submitted in August 2011, contains a detailed discussion of the steps to be taken to stabilize and configure the site so as to achieve the approved grazing post-mining land use. These steps are summarized below for the purposes of addressing the requirements of NMAC 19.10.6.603.D (1 through 5) regulations.

(1) Final slopes and drainage configurations must be compatible with a self-sustaining ecosystem or approved post-mining land use.

Final slopes and drainage configurations will be constructed to conform with the geomorphic character of the region and surrounding area, and will be compatible with the approved post-mining land use of grazing.

(2) Backfilling or partial backfilling shall be required only when necessary to achieve reclamation objectives that cannot be accomplished through other mitigation measures.

Shafts, impoundments, roads and other depressions will be backfilled, as described in the Reclamation Plan, Revision 1 to meet stability requirements and the geomorphic character of the region and surrounding areas.

(3) All reconstructed slopes, embankments and roads shall be designed, constructed and maintained to minimize mass movement.

Prevention of mass movement of reclaimed slopes, embankments, roads or other fill areas will be achieved through the construction of fill areas in lifts of 24 inches or less, with the addition of water, and the areas wheel rolled to achieve compaction. Since the areas will not be required to support any structures or weight other than overlying material, these procedures will be adequate to prevent mass movement.

The soil and rock stockpiles will be used as part of the final reclamation for fill and vegetation growth. No stockpiles will remain on the surface in the permit area after final reclamation.

(4) Measures must be taken to reduce, to the extent practicable, the formation of acid and other toxic drainage that may otherwise occur following closure to prevent releases that cause federal or state standards to be exceeded.

As discussed in the BDR Revision 1 and Section 2.5 of the Reclamation Plan Revision 1 historically, acid mine drainage has not been a problem in the Grants Mineral Belt. While some sulfides are known to exist in the rock formations of the project area, acid neutralization potential exceeds acid generation potential.

There is little or no potential for geochemical alteration of overburden, the ore body or other material. The material excavated during shaft construction and operations will primarily be overburden from rocks overlying the Westwater Formation and material from the Westwater Formation, i.e., the ore zone. The only materials overlying the Westwater Formation in the permit area that have a potential to contribute to acid drainage are the thin coal beds in the Dilco Coal and the Gibson Coal Members of the Crevasse Canyon Formation.

The Dilco Coal Member is present only deep below ground surface in the permit area. Section 7.3.1, Figures 7-7 through 7-11 of the BDR Revision 1, indicate that the Dilco is approximately 600 feet below the surface in Section 16 and 900 feet below the surface in Section 10. The Dilco has an average thickness of 120 feet and a maximum thickness of 128 feet in the permit area.

The Gibson Coal Member crops out at the surface sideslopes of the mesas in Sections 9 and 10 of the permit area (see Section 7.3.1 of the BDR). At the location of the shafts the Gibson is typically 100 to 300 feet below the surface. The Gibson has a maximum thickness of 240 feet in the permit area.

The individual thickness of the coal seams in the Dilco and the Gibson Members is in the order of 5 feet thick or less. The Gibson has a reported sulfur content of 0.6 percent sulfur due to trace amounts of pyrite (Kirschbaum and Biewick 2000). While this could theoretically lead to the production of acid drainage, laboratory studies show that shale/coal with sulfur content less than one percent rarely produce significant acid drainage (Morrison 1985).

Moreover, RHR's activities in the Dilco and Gibson are limited to transecting the formations during construction of the production and ventilation shafts. As such, the potential for acid and other toxic drainage is inconsequential.

In the Westwater Canyon Member, clay minerals are the primary iron-bearing phase (Riese, 1980). The Westwater Sandstone contains areas where the dominant iron mineral is hematite, and areas where the dominant iron mineral is limonite (Saucier, 1980). However, since both limonite and hematite form at the expense of pyrite the Westwater formation has little potential to generate acid solutions.

RHR will characterize the excavated materials as a condition of an approved NMED Discharge Plan. The excavated material will be analyzed to determine the potential for release of acid or other toxic constituents. Material excavated during construction of the mine shafts and vent holes will be temporarily stored in designed stockpiles to prevent mass movement and protected from storm water run-on. If the material is inert it will be returned to the mine and used to backfill areas for stability during mining. If the analytical results indicate that acid producing or other toxic constituents could be leached, the material will be taken off-site for disposal at a site with the appropriate permits or permission to accept such materials. Runoff from these stockpiles will be collected in storm water retention ponds. The water will be pumped to the on-site water treatment plant before it is discharged. The bottom sediment from the ponds will be analyzed for constituent makeup and disposed of appropriately in an off-site facility. Consequently, material with the potential to release acid and other toxic drainage will not be on the permit area after reclamation.

(5) Nonpoint source surface releases for acid or other toxic substances shall be contained within the permit area.

See Item 4 above.

5.5 Topsoil (Topdressing) (NMAC 19.10.6.603 E.)

Where sufficient topsoil is present, the operator shall take measures to preserve it from erosion or contamination and assure that it is in a usable condition for sustaining vegetation when needed. The following requirements shall be met unless site-specific characteristics mandate different requirements and those requirements are included in the approved permit.

The removal, storage and protection of topdressing material are discussed in Sections 4.0 and 5.2.2 of this Plan.

(1) Topsoil and topdressing shall be sampled and analyzed for vegetation establishment suitability:

(a) sample spacing and interval shall be based on site-specific materials; and

(b) suitability will be identified by analysis based on site-specific materials.

As part of the Baseline Data Report Revision 1 and Mine Operations Plan, topdressing has been sampled and analyzed for vegetation establishment suitability. Ample material has been identified to replace sufficient growth media for re-establishment of a vegetative community that will support the approved post-mining land use of livestock grazing.

(2) If revegetation is a component of the reclamation plan and if sufficient topsoil is present in the disturbed or borrow areas, it shall be collected and preserved to the extent practicable. Sufficient topsoil means that it is of sufficient quality to conform to the definition of topsoil. Any necessary topdressing may be obtained from areas to be disturbed or borrow areas and shall be salvaged separately from other materials as needed to ensure its availability for distribution when needed for reclamation.

It has been determined from BDR Revision 1 soil studies that sufficient topdressing material will be present within the permit area. The storage and protection of the material are discussed in Section 5.2.2 of this Plan.

(3) Where direct distribution of topsoil or topdressing is not possible, it shall be stockpiled separately and in a manner to prevent loss of the resource.

The majority of the disturbed area for the mine operation will not be reclaimed until the operation ceases. Therefore, the surface soils and rock will be stockpiled until needed for reclamation.

(4) Topsoil and topdressing shall be distributed in a manner to establish and maintain vegetation, consistent with the approved permit.

The topsoil/topdressing distribution and application on reclamation areas is discussed in detail, in the Reclamation Plan Revision 1 in Section 3.2.1.

(5) After distribution, topsoiled and topdressed areas shall be stabilized to protect loss of the resource.

After topdressing distribution/application, the materials will be lightly ripped or disked to prepare a suitable seed bed, and seed applied by seed drill or broadcast seeding. The seeded areas will then be mulched and stabilized.

(6) Where topsoil has been stockpiled for more than one year, the permittee may be required to conduct analyses to determine if amendments are necessary.

Topdressing that has been stockpiled for more than one year will be analyzed to determine if soil amendments are necessary to support successful reclamation of disturbed areas.

5.6 Erosion Control (NMAC 19.10.6.603 F.)

Reclamation of disturbed lands must result in a condition that controls erosion. Revegetated lands must not contribute suspended solids above background levels, or where applicable the Water Quality Control Commission's standards, to streamflow of intermittent and perennial streams. Acceptable practices to control erosion include but are not limited to the following:

(1) stabilizing disturbed areas through land shaping, berming, or grading to final contour;

As part of reclamation operations, disturbed areas will be stabilized through grading areas to conform to the geomorphic character of the region and surrounding area, including shaping, berming and grading to final contour.

(2) minimizing reconstructed slope lengths and gradients;

Reclamation of slopes will incorporate the practice minimizing slope lengths and gradients, while conforming to the geomorphic character of the region and surrounding areas to minimize the potential for excessive erosion.

(3) diverting runoff;

Runoff, and runon, will be diverted from reclaimed areas to prevent erosion of reclaimed areas.

(4) establishing vegetation;

Establishment of vegetation is the highest priority of the Roca Honda reclamation operations, and is described in detail in Section 3.7 of the Reclamation Plan Revision 1.

(5) regulating channel velocity of water;

Section 5.3.4 of this Plan discusses the systems to manage surface water flows in the arroyos that exist within the permit area (see Attachments 1 and 2 for details on the control systems). These systems will be removed during reclamation and the arroyos allowed to return to natural conditions. The reclaimed slopes will be protected with BMPs to reduce erosion into the channels. If a channel has the potential to erode into a reclaimed slope, the bank will be temporally armored until the reclamation project has been approved.

(6) lining drainage channels with rock, vegetation or other geotechnical materials; and

No new drainage channels will be constructed during reclamation. Temporary armorment will be added to existing channels if a potential for erosion exists as discussed in this Plan.

(7) mulching.

Weed-free mulch will be applied to reseeded areas at a rate of two (2) tons per acre.

The reclaimed areas will be monitored for erosion until stabilization and revegetation has been achieved. Areas of major erosion discovered during this monitoring will be repaired, stabilized, and revegetated.

5.7 Revegetation (NMAC 19.10.6.603 G.)

To obtain the release of financial assurance revegetated lands must meet the following standards:

Revegetation of areas disturbed by mining operations will be achieved following the practices and procedures outlined in the Reclamation Plan Revision 1. Affected areas will be backfilled, regraded and shaped to conform with the geomorphic character of the area before mining operations and of areas surrounding the disturbed areas. Salvaged topdressing will be redistributed over regraded areas, amended with mycorrhyzae, organic fertilizers and seeded using native, adapted species which are characteristic of the region and supportive of the PMLU of livestock grazing. The proposed seed mix shown in Table 5-3 is utilized at the Lee Ranch Coal Mine, which is located in the same region as the Roca Honda Mine and in similar topography, soils and climatic regime. This seed mix has been developed and shown to be effective over the past 30+ years. The seed mix is a mixture of cool and warm season species of grasses, forbs and shrubs that have demonstrated ability to re-establish in mine reclamation soils and also support livestock grazing. All species are known for their palatability to livestock and wildlife, are high in nutritive value for native plant species, and have differing seasonal value between species, which makes the mix supportive of the post mining land use of grazing on a year round basis.

Table 0-3. Proposed Reclamation Seed Mix for the Roca Honda Mine

Common Name	Scientific Name	Variety/Source	Application Rate – Pure Live Seed lbs/acre (Broadcast)
Cool Season Grasses			
Thickspike Wheatgrass	*Agropyron dasystacyum*	Critana	2.0
Western Wheatgrass	*Agropyron smithii*	Arriba	3.0
Warm Season Grasses			
Blue Grama	*Bouteloua curtipendula*	Hachita or Alma	2.0
Sideoats Grama	*Bouteloua gracilis*	Niner or Vaughn	2.0
Galleta	*Hilaria jamesii*	Viva	3.0
Alkali sacaton	*Bouteloua curtipendula*	Native	0.1
Forbs			
Munro Globemallow	*Sphaeralcea munroana*	Native	0.4
Blue Flax	*Linum lewisii*	Appar	0.5
Violet Prairie Clover	*Dalea purpurea*	Native	2.0
Shrubs			
4-Wing Saltbush	*Atriplex canescens*	Native	3.0
Winterfat	*Ceratoides lanata*	Native	1.0
Shadscale	*Atriplex confertifolia*	Native	1.0

NMAC 19.10.6.603 G. *(1-3)* *Revegetation success for a self-sustaining ecosystem shall be determined through comparison of ground cover, productivity and diversity and shall be made on the basis of the following approved reference areas; through the use of technical guidance procedures published by the U. S. Department of Agriculture; other reasonably attainable standards approved by the Director; or a combination. Data collection shall be performed using the same methods and techniques on reference areas and reclaimed areas.*

The success of the revegetation for the approved land use of grazing is discussed in the Reclamation Plan Revision 1. Each of the NMAC requirements are presented with a response.

5.8 Perpetual Care (NMAC 19.10.6.603 H.)

The operation will be designed to meet without perpetual care all applicable environmental requirements of the Act, 19.10 NMAC and other laws following closure.

The Roca Honda mine will be reclaimed in conformance with the Reclamation Plan Revision 1 submitted in August 2011. The Plan is designed to meet all of the applicable environmental requirements of the Act, 19.10.6 NMAC and other laws following closure.

6.0 Compliance with Other Applicable Laws (NMAC 19.10.6.604)

(A) Enforcement of other state or federal laws, regulations or standards shall be conducted by the agency charged with the responsibility under the applicable state or federal law, regulation or standard.

(B) Enforcement of non-point source surface releases of acids or other toxic substances shall be performed by the Environment Department.

(C) During the term of a permit issued pursuant to 19.10 NMAC, the permittee must maintain environmental permits required for the permit area. Revocation or termination of such a permit or the forfeiture of financial assurance related to the permit area by another governmental agency is adequate grounds for the Director to issue a cessation order pursuant to 19.10.11 NMAC.

In accordance with NMAC 19.10.6.604 (A-C), RHR is committed to complying with all other applicable law in the construction, operation, closure and reclamation of the Roca Honda mine.

7.0 USFS Requirements

7.1 Scenic Values

Visual Resource Management is a tool used to assess aesthetic value as a resource. The scenic value component of the RHR mining proposal merits evaluation among the various environmental impacts that may occur as a result of constructing and operating the Roca Honda mine. As a general matter, the location of the project within sight of Mt. Taylor requires that scenic values be considered. The Mt. Taylor area has been designated as a TCP and there exists significant interest in protecting resources, such as scenic values. As such, the evaluation of scenic values at the permit area will be addressed to protect them.

Scenic values in and around the permit area will be protected by minimizing visual exposure by the general public to the various surface facilities of the mine complex. The natural topographic location of the permit area in Section 16 is at an elevation such that the general public would not normally see the mine site from State Route 605. RHR has taken advantage of these topographic features to protect scenic values. The facility on Section 16 has been located such that it is largely hidden from view from the public road to the south. The visual angle from Route 605, north to the mesa tops, will prevent many of the activities and facilities construction from being seen from Route 605. Some structures such as the top of the head frame and the top of some buildings may be visible. Additional protection will be utilized such as screening and berming soil with vegetation as a visual barrier and painting structures to blend with surrounding landscape colors. All exterior colors will be selected from a list of colors approved by BLM or USFS.

At Section 10, scenic values will be protected by utilizing the existing vegetation as a visual break between the facility and the public road. The Section 10 facility, located in the southeastern corner of the section, will be situated in a relatively low-lying area protected by pinõn-juniper tree stands. While the surface facilities will be more visible that those on Section 16, RHR has endeavored to develop Section 16 as the main facility, placing most of the facilities where they would be the most protective of scenic values. The combination of use of existing vegetation, berming of soil wherever possible, vegetation of exposed stockpiles and selection of appropriate use of color schemes for the facilities will all aid in mitigating impact to scenic values.

Timely reclamation in the permit area will include contemporaneous reclamation techniques to establish revegetation as soon as possible. Avoiding site disturbance where possible and minimizing the area when it must be disturbed, using existing roads and old drill pads where possible, removing, segregating, and stockpiling topdressing, and returning non-ore stockpiles below ground will also be used as mitigation techniques for scenic value protection. Early reclamation reduces erosion, isolates and protects material for later use, provides mitigation of potential impacts, and reduces the amount of final reclamation work required. Timely and contemporaneous reclamation will commence before mining begins and continue concurrently to the extent possible with mining activities until final reclamation begins.

7.2 Hazardous Substances

The use of hazardous materials and toxic substances at the Roca Honda mine will be minimal. Such materials will be inventoried and used in small quantities that require minimal handling and storage. All such substances will be used, stored, and disposed in accordance with applicable regulations.

The following hazardous materials may be present onsite from time to time in the approximated quantities during site construction and mining operations in the form of vehicle/equipment fluids, cleaning solvents and water treatment system process chemicals.

- Antifreeze (>500 gallons) – or ethylene glycol, is a colorless or colored, oily liquid used as an antifreeze coolant for equipment.
- Cleaning solvents (>50 gallons) – generally colorless, blue, or yellow-green liquids used for cleaning equipment. Constituents include perchloroethylene, methylene, chloride, trichloroethylene, and petroleum distillate.
- Diesel fuel (>25,000 gallons) – a clear, blue-green, or yellow liquid used as a fuel for generators, trucks, and heavy equipment. Constituents include petroleum distillates, oil and grease, naphthalene, and xylene.
- Gasoline (>2,000 gallons) – a colorless, pale brown or pink liquid used as fuel for cars and trucks. Constituents include petroleum hydrocarbon, benzene, ethyl benzene, toluene, xylene, and methyl tertiary-butyl ether.
- Petroleum based grease (>50 gallons) – a reddish colored, semi-solid gel used as a lubricant.
- Hydraulic fluid (>1,000 gallons) – a brown, oily petroleum hydrocarbon used in hydraulic devices. Constituents include mineral oil.
- Oil (>1,000 gallons) – a brown or dark brown liquid used as a lubricant. Constituents include petroleum hydrocarbon.
- Barium chloride (three 55 gallon drums) – reagent used in the water treatment process to precipitate radium out of the liquid.
- Hydrochloric or sulfuric acid (five 55 gallon drums) – reagent used in the water treatment process to adjust pH.
- Sodium hydroxide (two 55 gallon drums) – reagent used in the water treatment process to adjust pH.

Handling and storage of hazardous substances will follow guidance and preventative measures from the onsite Material Safety Data Sheets and the RHR Site Safety Officer instructions. A SPCC Plan will be developed before construction of the mining facilities begins. The SPCC Plan will be used to train workers and employees on handling hazardous substances, prevention of spills, cleaning up spills, emergency or accidental releases, and the notifications and reporting requirements.

7.3 Solid Waste

Municipal solid waste will be generated during construction and mining operations at the Roca Honda site from sources such as the packaging for equipment and supplies, office paper, plastic and paper cups, paper towels, sanitary wipes, and Kleenex-type tissue. Any non-contact solid waste will be considered municipal solid waste and will be disposed of at an appropriate municipal waste disposal facility.

Resource Conservation and Recovery Act-regulated waste may be generated from cleanup of leaks or spills, including materials such as soil, sorbent pads, etc. Personal protective equipment used in cleanup of such spills, sampling waste and any hazardous waste will be containerized and disposed of at an appropriate disposal facility.

Waste in the form of diesel fuel, oil, or hydraulic fluid leaks or spills may be generated during construction and operation activities. Such waste, designated as New Mexico Special Waste, will be containerized and disposed of at an appropriate disposal facility.

7.4 Equipment and Vehicles

The following types of equipment and vehicles are anticipated to be used during site construction and mining operations activities at the Roca Honda site. Specific details of equipment and vehicles will be provided as the project design progresses.

Surface Equipment

Generator Set – Provide emergency, standby, prime, and continuous power to the mine operations. Anticipated to be used on an as-needed basis.

Air Compressors – Used to power equipment during construction and mining.

Switchgear – Provides single standby/load management or multi-unit utility paralleling when integrated with the generator set at the facility. Daily use is anticipated.

Bulldozers (various sizes) – Primarily used for road construction and cut-and-fill leveling for large areas. Daily use is anticipated during site preparation.

Graders (various sizes) – Primarily used for leveling large areas. Daily use anticipated during site preparation. Regular use during mining and to maintain roads.

Excavators (wheel and track) – Primarily used for digging, material handling, lifting heavy objects, general grading and landscaping. Daily use anticipated during site preparation.

Scrapers – Primarily used for earth-moving and cut-and-fill operations. Anticipated to be used on an as-needed basis during construction.

Hydraulic Hammer – Primarily used for breaking rock or concrete. Anticipated to be used on an as-needed basis.

Backhoe – Primarily used for digging and backfilling. Anticipated to be used on an as needed basis during construction.

Vibratory Roller – Primarily used for compacting materials such as road base. Anticipated to be used on an as-needed basis during construction.

Crane – Primarily used for constructing or lifting heavy objects such as a head frame. Anticipated to be used on an as-needed basis during construction and mining.

Loaders (various sizes) – Primarily used to load material (asphalt, demolition debris, dirt, gravel, raw minerals, rock, etc.) into or onto another type of machinery (e.g. dump truck, conveyor belt, etc.). Daily use is anticipated.

Tractors – Used for reclamation.

Drill Rigs – Used for constructing wells, development drilling, and vent shafts.

Forklifts – Industrial truck with metal forks used to lift and transport materials. Daily use is anticipated.

Winch Truck (2 ton) – Truck with a winch attached to pull in, let out or otherwise adjust the tension of a cable. Anticipated to be used on an as-needed basis.

Dump Trucks – Primarily used to move and stockpile excavated material. Daily use is anticipated.

Haul Trucks – Used to transport ore from the mine site to the mill. The type of truck will be determined when the mill location is selected.

Concrete Batch Plant – Primarily used for mixing concrete to be used at various locations. Anticipated to be used on an as-needed basis during construction.

Water truck (4,000 gallon) – Primarily used to haul water for dust suppression on roads and disturbed areas. Daily use anticipated.

Pickup Trucks – Pickup trucks will be used for various support activities. Daily use anticipated.

Mine Rescue Ambulance – Primarily used in mine rescue emergencies to administer medical assistance and to transport injured personnel to hospital/medical facilities. Anticipated to be used on an as-needed basis.

Underground Equipment

ST-1 ½ LHDs – Standard 1 ½ cubic yard load/haul/dump used to move mined material. Daily use anticipated during mining operations.

ST-3 ½ LHDs – Standard 3 ½ cubic yard load/haul/dump used to move mined material. Daily use anticipated during mining operations.

Haul Trucks – Standard 12 cubic yard trucks used to transport ore from the LHD work area to the production shaft. Daily use during mining operations.

Skid-Steer Loader – Compact loading equipment used to access confined areas, capable of handling a variety of small loading operations. Daily use anticipated during operations.

Single Boom Jumbos – Drill used for efficient drilling of headings and capable of handling face, bench, and roof bolt drilling requirements in underground mining operations. Daily use anticipated during mining operations.

Longhole Drills – Used to drill ore pass blast holes from the cross cut or from a cubby from the bottom up. Also used for the drilling of drain and cable holes and traveling ways. Daily use anticipated during mining operations.

Fletcher Bolters – Machine used for the installation of roof bolts. Daily use anticipated during mining operations.

Shotcrete Machines – Machine used to spray concrete (e.g. to strengthen tunnels). Anticipated to be used on an as-needed basis.

UG Communications – Leaker feeder cables (a radio frequency cable with weak shielding which allows radio signals to enter or leave the cable at any point), VHF system, UHF system (minimizes the impairment of radio wave transmission in curves, branches, and other spatial limitations inside of a mine), intrinsically safe system (allows for system use in mines or other hazardous areas where explosions are possible as a result of the surrounding environment), tagging and tracking (locates personnel in an emergency situation). Daily use anticipated.

Compressors, Slushers & Jacklegs/Drills - Equipment used to drill holes for blasting and then collect the blasted material for loading at the shaft hoist. Daily use anticipated during mining operations.

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Attachment 1
Selected Construction Drawings

Submitted as separate bound set of 11 x 17 inch drawings

Attachment 2

Surface Water Hydrologic Analysis Summary

Roca Honda Mine

Surface Water Hydrologic Analysis Summary

1. Purpose

The purpose of this drainage summary includes the following:

- Indentify the watershed that contributes surface runoff to the proposed surface disturbance area associated with development of the Roca Honda Mine.
- Identify existing and proposed drainage patterns in the contributing watershed and in the proposed disturbance area.
- Quantify peak rates and volumes of runoff resulting from the 100-year recurrence, 24-hour rainfall event in both the existing and proposed conditions.
- Identify proposed facilities to manage storm water surface flow in the proposed condition.

The hydrologic analysis performed in the preparation of this summary should be considered as a high level planning analysis which will be refined with a detail design level analysis in the spring of 2012.

2. Hydrologic Analysis

Analysis Methodology

Hydrologic analysis for the watershed was performed using the United State Army Corps of Engineers (USACE) Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) computer program. HEC-HMS generated hydrographs for each site by utilizing the Soil Conservation Service (SCS) Unit Hydrograph methodology for runoff transformation and the SCS Runoff Curve Number method to determine infiltration losses. Several watershed and climate characteristics must be identified to perform a hydrologic analysis with this methodology. Required characteristics include precipitation depths and distribution over time; watershed size; main flow path length, slope and other conveyance characteristics; soil characteristics; and types and condition of vegetation and or other surface treatments covering the watershed.

Watershed and Design Precipitation Characteristics

Estimated Precipitation

The 100-year point precipitation depth estimates were obtained from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the 24 hour storm event. The 100-year 24-hour precipitation depth utilized in the current hydrologic modeling is 2.77" which corresponds to the

NOAA Atlas 14 upper bound of the 90% confidence interval for an average location in the tributary watershed. The Natural Resource Conservation Service (NRCS) NM Type IIa-70 rainfall distribution was utilized to simulate storm events utilizing the previously mentioned rainfall depth. Both the rainfall depth and distribution used in the current model are thought to be conservative. Additional consideration to using the mean 100-year 24-hour point precipitation depth of 2.50" and the less intense New Mexico Department of Transportation Modified NOAA-SCS rainfall distribution will be done prior to final design of the project facilities.

Watershed Delineation

The tributary watershed and sub-basins were delineated based on 5' vertical interval contour mapping generated from 2008 photogrammetry for the majority of the watershed, and United States Geological Survey (USGS) Quadrangle Sheet contour information for a small upland area on the extreme eastern edge of the watershed. Sub-basins were defined to provide flow data at points of interest throughout the proposed surface disturbance area. These points typically represent locations where drainage structures are thought to be needed in the proposed condition or are logical locations to compare existing and proposed condition peak flow rates and volumes. Sub-Basins were further subdivided for the developed condition analysis, where needed to reflect changes in drainage patterns that will occur with the proposed development of the mine facilities.

Watershed Area and Flow Paths

The longest significant flow paths through the delineated sub-basins were determined based on the topographic mapping. Flow path characteristics were then utilized in calculating times of concentrations and lag times for each sub-basin as described in the following section.

Time of Concentration / Lag Time

The SCS Unit Hydrograph method requires user input of the lag time (Tlag) for each drainage basin in order to develop a hydrograph. The lag time parameter for the HEC-HMS hydrologic model was determined from time of concentration (Tc) values by utilizing the following relationship from the SCS National Engineering Handbook dated 1972. :

$$T_{lag} = 0.6T_c$$

The time of concentration (Tc) represents the time required for runoff from the most hydraulically remote point in a basin to travel to the point of discharge at the downstream limit of the basin. For the current analysis Tcs were estimated using the upland method for the upper un-gullied portion of the sub-basins and the Kirpich formula for the lower gullied portion of sub-basins. The results of these two methods were added together to estimate overall Tcs for each of the sub-basins included in the analysis.

The overland flow method formula is Tc = L / 60V

Where : Tc = Time of concentration, in minutes

L = Length along the primary drainage path

V = Estimated flow velocity (in feet per second) as determined from Figure 15.2 of the NRCS National Engineering Handbook, Section 4, Chapter 15, based on slope and conveyance characteristics.

The Kirpich formula is Tc =0.0078 L0.77 S-0.385

Where : Tc = Time of concentration, in minutes

L = Length along the primary drainage path

S = Average slope along the primary drainage path in ft./ft.

Hydrologic Soils Groups

Soil characteristics, composition, and structure influence runoff potential by affecting the rate that precipitation is able to infiltrate the soil. The infiltration rate is the key factor in determining the amount of rainfall that will be held in the soil and how much contributes to surface runoff. Soils with a high infiltration rate generally have low runoff potential while soils with a low infiltration rate typically have a high runoff potential.

The Natural Resources Conservation Service (NRCS) has defined four hydrologic soil groups based on the potential rate of water infiltration of the soils. Group A soils have high infiltration rates and low runoff potential and Group D soils have low infiltration rates and high runoff potential. The groups are more specifically defined as follows:

Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission (greater than 0.30 in/hr).

Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission (0.15 to 0.30 in/hr).

Group C: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission (0.05 to 0.15 in/hr).

Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These soils consists mostly of soils that have high shrink swell potential, soils that have a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission (0 to 0.05 in/hr).

Hydrologic soil group boundaries associated with the tributary watershed were obtained from the NRCS Web Soil Survey for use in the analysis where this data was available. A portion of the watershed is not included in the NRCS Soil Survey. For this portion of the watershed, hydrologic soil group D has been assumed. This assumption is thought to be conservative. Additional soil information will be obtained and analyzed prior to performing the detailed hydrologic analysis and adjustments to this parameter will been made if found to be appropriate.

Land Cover/Vegetation

Land cover in the tributary watershed was determined based on aerial photography, and GIS spatial data from the USGS National GAP Program. The vegetation primarily consists of sparse pinion/juniper woodlands in upper portions of the watershed to desert shrubs and grasslands in the lower portions. The vegetation was assumed to be in poor condition (as defined by the NRCS) for the purpose of the analysis.

Runoff Curve Numbers

The SCS developed curve numbers (CNs) to represent the physical characteristics of watersheds when calculating excess rainfall from a storm event. Factors such as hydrologic soil group, land cover and condition, and moisture content in watershed soils prior to design storms (antecedent moisture condition) are utilized in the selection of CN values to represent the watershed, and in turn influence calculated runoff rates and volumes. The relationship between CN and excess rainfall is such that larger CN values correlate to higher runoff values. CN for the current analysis were based on curve number values provided in Technical Release 55 (TR-55) Second Edition, published by the Soil Conservation Service (SCS) in June 1986. The CN values utilized in the current analysis are based on average antecedent moisture condition.

3. Hydraulic Analysis

Culverts

The majority of the proposed culverts have been preliminarily sized using the Bentley CulvertMaster computer program. The program considers tailwater, friction losses, and entrance losses in the analysis of culverts. A few of the proposed culverts associated with incised channels that were analyzed with a detailed HEC-RAS hydraulic model were sized using the HEC-RAS program.

Diversion Channels and Roadside Ditches

The proposed diversion channels have been preliminarily sized using the Bentley FlowMaster program. The FlowMaster program performs manning's normal depth analysis using user input for channel shape, slope, roughness factors, and flow rates.

Existing Natural Channels

The natural ephemeral channel that skirts the east side of the Section 16 main mine operations area was analyzed with the USACE HEC-RAS computer program. The program performs one dimensional hydraulic modeling of open channels and culverts using user input for cross section geometry, roughness factors, slope, flow rates and other conditions.

4. Watershed Description

Existing Condition General

The watershed that is tributary to proposed surface improvements associated with the Roca Honda Mine covers portions of Sections 8, 9, 10, 11, 12, 15, 16, 17 and 20 in Township 13 North, Range 8 West of the 6th Principle Meridian. The majority of the watershed generally drains from north to south and is tributary to San Mateo Creek via small ephemeral arroyos and broad valley sections. Elevations in the watershed vary from over 7,830 to approximately 7,000 feet. Slopes vary considerably throughout the watershed ranging from nearly vertical on the rocky escarpments in the upper limits, to less than one percent in the extreme lower limits.

The tributary watershed encompasses approximately 3,000 acres of mostly undeveloped land. Existing development in the watershed is limited to a few existing rural roadways, buildings, and stock ponds. Vegetation ranges from sparse pinion/juniper woodlands in upper portions of the watershed to desert shrubs and grasslands in the lower portions. Soils vary from rock outcropping in the upper areas to more pervious sandy loam in the lower areas. The existing condition tributary watershed and its relationship to the proposed improvements are shown on attached Figures 1 though 5.

Proposed Condition General

The proposed surface improvements associated with development of the Roca Honda Mine are shown schematically on attached Figure 1 and Figures 6 though 11. Proposed drainage improvements to support this development are also shown on these figures along with the sub-basins that will contribute runoff to each of the proposed facilities.

Proposed condition drainage patterns and facilities have been planned to minimize impacts to areas located upstream and downstream of the proposed disturbance areas. The primary surface disturbance areas associated with mine operations are planned for locations that are relatively sheltered from large offsite watersheds. The majority of the runoff that reaches these areas from off-site will be detained in proposed detention ponds and released at a slow rate over an extended period of time to the downstream historic watercourses. A smaller portion of the flow from offsite areas will be diverted around the sites in small earthen stabilized channels and returned to the historic watercourse downstream of the sites.

Runoff from the majority of the area within these primary surface disturbance areas will be collected in retention ponds. Retention ponds that collect runoff that may come in contact with ore or other mine processing operations will be lined and be equipped with leak detection monitoring wells. Runoff collected in the retention ponds will be pumped to a water treatment plant over a 72 hour period of time and treated prior to pumping it approximately seven miles north of the site through a proposed pipeline to be used for irrigation. Detention and retention ponds will be designed to manage runoff from up to and including the 100-year, 24-hour rainfall event.

Haul roads and surface utility corridors needed to support the mine will cross over several ephemeral drainage courses. Proposed culverts are planned to pass flow under the proposed roadway and utility corridors to protect the facilities and minimize disruptions of historic flow paths to the extent practical. Culverts will be designed to convey runoff from up to and including the 100-year, 24-hour rainfall event. Energy dissipation facilities will be constructed at the outlet ends of culverts that are determined to have significant potential to accelerate downstream erosion.

Facilities are discussed in greater detail in the following sections. For the purpose of description the watershed has been divided into several sub-areas. Descriptions start at the southern portion of the Section 16 haul road and progress to the northeast.

Proposed Condition Detailed Description

Sub-Basins 101 through 107 (Figures 6 and 7)

Runoff from Sub-Basins 101 through 104 will be conveyed south along the west side of the Unit 16 haul road in a roadside ditch to Analysis Point 3 along the north side of NM Highway 605. It will then flow west along NM 605 along its existing condition flow path. Runoff from Sub-Basins 105 through 107.2 will concentrate at historic low points along the west and northwest sides of the haul road. The majority of the flow will be conveyed along historic flow paths to these low points. The remainder of the flow will be conveyed in a roadside ditch along the west and northwest sides of the haul road. Steep portions of the ditch will be stabilized to mitigate the potential for erosion. Adequate culverts will be constructed at the low points to convey the flow under the haul road and release it to the historic flow paths downstream of the roadway. The change to peak flow rates from these sub-basins due to proposed improvements will be insignificant.

Sub-Basins 108 through 111.4 (Figures 7 and 10)

Runoff from Sub-Basin 108 will be collected and detained in a detention pond. Runoff collected in the pond will be released through an outlet structure and conduit to a constructed channel armored with riprap. Runoff from Sub-Basin 109.1 will also be collected and conveyed in this channel. The combined runoff will be routed in the channel to Analysis Point 5.

Runoff from Sub-Basins 109.2, 110.2, and 110.3 will be collected in lined retention ponds to be located within each of the respective Sub-Basins. The majority of the runoff collected in these retention ponds will be pumped to a water treatment plant and treated, then pumped approximately seven miles north of the site in a pipeline for irrigation use. A portion of the runoff will evaporate from the ponds. Runoff from Sub-Basin 109.3 will be collected and conveyed in a roadside ditch along the west and south sides of the Unit 16 haul road. The flow conveyed in the ditch will combine with discharge from the culvert at Analysis Point 5.

Runoff from Sub-Basins 110.1, 111.1, 111.2, and 111.3 will be conveyed under the haul road to a natural incised channel within Sub-Basin 111.4. The combined runoff from these Sub-Basins will be conveyed in the channel along with runoff from Sub-Basin 111.4 to Analysis Point 5 where it will combine with the runoff from Sub-basin 109.1 and the controlled discharge from Sub-Basin 108. The runoff concentrated at Analysis Point 5 will be conveyed under the haul road in a culvert and discharged along the historic flow path. The hydrologic analysis indicates that peak flow rates and proposed condition runoff volumes will be less at Analysis Point 5 than they are in the existing condition due to the effect of the detention and retention ponds.

Sub-Basins 112 through 121 (Figures 7 and 8)

Runoff from Sub-Basins 112 through 120 will concentrate at historic low points along the north and west sides of the above ground utility corridor and access road. The majority of the flow will be conveyed along historic flow paths to these low points. The remainder of the flow will be conveyed in a shallow ditch along the north and west side of the utility corridor. Steep portions of the ditch will be stabilized to mitigate the potential for erosion. Adequate culverts will be constructed at the low points to convey the flow under the corridor and release it to the historic flow path downstream of the corridor. The change to peak flow rates from these sub-basins due to the improvements is insignificant.

A portion of the runoff from Sub-Basin 121 historically passed through the Section 10 mine operation area. This runoff will be diverted southwest along the boundary of the operation area in a small channel to a natural incised channel in Sub-Basin 121. Runoff in the channel will cross the utility corridor below a utility bridge and will combine with runoff from Sub-Basin 120 at Analysis Point 6. The hydrologic analysis indicates that proposed condition peak flow rates and runoff volumes will be approximately 14 percent higher at Analysis Point 6 than they are in the existing condition due to the effect of the minor diversion. Analysis will be done during final design to determine if stabilization measures will be needed due to this small increase.

Sub-Basins 122.1 through 122.8 (Figures 8 and 11)

Runoff from Sub-Basins 122.2 will be conveyed under the maintenance road along the west side of the Section 10 mine operations area through culverts, then will be conveyed to a extended detention pond in a constructed channel. Runoff from Sub-Basins 122.1 and 122.3 will also be conveyed to the extended detention pond. Runoff collected in the pond will be released through an outlet structure and conduit to a constructed channel armored with riprap. Runoff from Sub-Basin 122.4 will also be collected and conveyed in this channel to Analysis Point 7.1. Runoff from Sub-Basin 122.4 will be routed through sediment traps prior to discharge to the channel. The combined runoff will be routed in the channel to Analysis Point 7.1. At Analysis Point 7.1 the runoff in the constructed channel will be conveyed under the Section 10 haul road in culverts. This runoff will then be conveyed south in another segment of constructed channel to a vent shaft road. It will be conveyed under the vent shaft road in culverts to Analysis Point 7 located along the historic flow path.

Runoff from Sub-Basins 122.6, 122.7, and 122.8 will be collected in lined retention ponds to be located within each of the respective Sub-Basins. The majority of the runoff collected in these retention ponds will be pumped to a water treatment plant and treated, then pumped approximately seven miles north of the site in a pipeline for irrigation use. A portion of the runoff will evaporate from the ponds.

Runoff from Sub-Basin 123 will concentrate at a historic low point along the north side of the Section 10 haul road. The majority of the flow will be conveyed along historic flow paths to this low point. The remainder of the flow will be conveyed in a shallow ditch along the north side of the haul road. Steep portions of the ditch will be stabilized to mitigate the potential for erosion. Adequate culverts will be constructed at the low point to convey the flow under the corridor and release it to the historic flow path downstream of the corridor. This flow will be added to the flow discharged from the culvert under the vent shaft road at Analysis Point 7 along with runoff from Sub-Basin 122.5. The hydrologic analysis indicates that proposed condition peak flow rates and runoff volumes will be less at Analysis Point 7 than they are in the existing condition due to the effect of the detention and retention ponds and small diversion along the west side of the Section 10 operations area. The runoff at Analysis Point 7 will then be conveyed south along historic flow paths.

Analysis Point 8 combines the routed peak flow rates and volumes from Analysis Points 6 and 7 for comparison with the existing condition. The hydrologic analysis indicates that proposed condition peak flow rates and runoff volumes will be less at Analysis Point 8 than they are in the existing condition due to the effect of the detention and retention ponds.

Sub-Basins 124 and 125 (Figure 9)

Runoff from Sub-Basins 124 and 125 will concentrate at historic low points along the north side of the Unit 10 haul road. The majority of the flow will be conveyed along historic flow paths to these low points. The remainder of the flow will be conveyed in a roadside ditch along the north side of the haul road. Steep portions of the ditch will be stabilized to mitigate the potential for erosion. Adequate culverts will be constructed at the low points to convey the flow under the haul road and release it to the historic flow paths downstream of the roadway. The change to peak flow rates from these sub-basins due to constructed improvements is insignificant.

Detention and Retention Ponds

Detention ponds have been preliminarily sized using the using the HEC-HMS hydrologic model (described in Section 3) prepared for the watershed. The HEC-HMS program uses the model generated inflow hydrograph along with user defined stage-storage (storage volume available at various water surface elevations) and stage-discharge (discharge rates at various water surface elevations) to determine the maximum water surface elevation and peak discharge rate associated with the modeled storm event.

The detention ponds and retention ponds will be sized to provide two foot of freeboard below the crest of the emergency spillways in the 100-year, 24-hour storm event. Emergency spillways for detention ponds will be designed to pass the 100-year routed inflow hydrograph with the water surface in the ponds at 2 feet below the crest of the emergency spillway and the normal outlets inoperable at the beginning of the storm event. At least one foot of freeboard below the dam crest will be provided with the spillway discharging the 100-year routed flow. Spillways will be designed to resist breeching during the design flood event. Consideration of volume for sediment storage and maintenance frequency will also be given in final design.

The ponds will be designed to store less than 15 acre feet and will have dams less than 25 feet tall and thus are expected to be considered non-jurisdictional and therefore not regulated by the state engineer. However, a request for evaluation of jurisdictional status will be submitted to the New Mexico Office of the State Engineer Dam Safety Bureau for their confirmation of this status.

Culverts

Culverts have been preliminarily sized to convey the runoff from the 100-year, 24-hour storm without overtopping of the roadways and with minimized disruptions to historic flow paths. The erosion potential will be evaluated at the outlet end of each of the culverts in final design and appropriate outlet protection and or energy dissipation will be designed and constructed mitigate erosion potential. Constructing erosion resistant dip sections for the drainage to cross the over the roadway may be considered in some locations as well in final design.

Diversion Channels and Roadside Ditches

Diversion channels and ditches will be designed to safely convey runoff from the 100-year, 24-hour storm. Constructed channels will be evaluated for erosion potential in final design and appropriate erosion mitigation will be designed if determined to be needed.

5. Analysis Results

The existing condition watershed that contributes surface runoff to the surface disturbance area associated with development of the Roca Honda Mine is shown on attached Figures 1 through 5. The watershed has been broken down into logical sub-basins for the purpose of estimating peak flow rates and volumes at points where drainage facilities will likely be needed and or comparison of existing and developed condition peak flow rates and volumes may be important. 100-year, 24-hour peak flow rates and volumes as estimated in the current analysis are shown on Figures 1 through 5 for individual sub-basins as well as significant analysis points.

The surface improvements associated with development of the Roca Honda Mine are shown schematically on attached Figures 6 though 11. Drainage improvements to support this development are also shown on these figures along with the sub-basins that will contribute runoff to each of the facilities. The 100-year, 24-hour peak flow rates and volumes as estimated in the current analysis are shown on Figures 6 through 11 for individual sub-basins as well as significant analysis points for both the existing and developed conditions.

Given that increases to storm water runoff, peak flow rates and volumes will be relatively insignificant with construction of the facilities, and the fact that diversions from historic flow paths will be minimized, it is not anticipated that the project will have significant impacts during runoff events on the watercourses located downstream of the project area. However, behavior of natural systems is not always predictable and small disruptions can sometimes initiate downstream erosion. Thus, it is recommended that monitoring of the downstream watercourses be done on a regular basis and after large runoff events to indentify issues early (if they occur) so that they can be mitigated before significant damage occurs.