

**Environmental Assessment to Approve Plan of Operations Amendment at
La Sal Mines Complex, San Juan County, Utah
DOI-BLM-UT-Y010-2011-0048-EA**

APPENDIX H
Monitoring and Surveys

Appendix H - Monitoring and Surveys

This table is a compilation of monitoring requirements from the EA and its appendices comparing Alternatives A and C. Final monitoring following decision would be in accordance with the final Plan Of Operations and the Conditions of Approval stipulated in the Agency decisions.

Resource	Alternative A	Alternative C	Triggers and Actions
AIR QUALITY			
Dust/Silica	<p>Denison is required by MSHA to monitor and control particulate and radiation exposure to workers at the mines. This program involves monitoring and control of dust, radon daughters and gamma radiation within the working areas of the mine. In addition, Denison maintains a health and safety plan for mine workers that include ear protection, respirator policies, an evacuation plan, fire drills, stench evacuation tests, and 40- hour MSHA training.</p> <p>Fugitive emissions, including airborne particulates, are regulated by permits issued by the UDEQ's Air Quality Division. Denison has received an Air Emissions Permit for the La Sal Mines which limits fugitive dust from truck haulage and loading operations to 20 percent visual opacity. Airborne particulates are controlled by spraying the haul roads with a magnesium chloride solution or water. In addition, the topsoil stockpiles and areas that will have not been used for extended periods of time are stabilized by vegetation to prevent erosion.</p> <p>Waste rock piles from mining are shielded by ground cover whenever</p>	Same as Alternative A.	<p>MSHA inspects and regulates the overall safety of mining operations.</p> <p>Fugitive emissions, including airborne particulates, are regulated by permits issued by the UDEQ's Air Quality Division. (EA – Appendix E and POA – Appendix H)</p>

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	<p>possible and, where necessary, by wetting to control dust.</p> <p>Breathing zone samples would also be taken in accordance with approved MSHA protocols to (30 CFR 56.5002 and 57.5002) assess potential exposures to both radon and dust. Equipment issued to miners includes a half-face respirator with a 99 percent efficiency rating for protection against radon and particulates. (See EA – Appendix E [pg. 9-1] and POA- Appendix H)</p>		
CULTURAL RESOURCES			
<p>Preconstruction Survey</p>	<p>None required</p>	<p>Pre-disturbance cultural resource surveys are required in accordance with the Programmatic Agreement (PA) (10/11/2016) between the company, the cooperating agencies, tribes, and SHPO.</p> <p>As specific locations for exploration drill holes, ventilation shafts, associated access roads, and related disturbances are identified, BLM, USFS, SITLA (State), and DOGM (for private lands) will be lead for their management areas. Lead agencies will ensure that all survey, identification, evaluation, documentation, and preservation efforts to satisfy the agreement, including reporting, consultation, and coordination requirements are met.</p> <p>The BLM Moab Field Office will compile a summary report of all actions that fall under the agreement at the end of each calendar year that include: number of</p>	<p>In accordance with the PA (10/11/2016) between the company, the cooperating agencies, tribes, and SHPO, the Lead Agency Official (LAO) will make a determination of effects. Appropriate consultation as required by the PA will be completed. All necessary efforts will be made to avoid eligible historic properties and all agreements specified in the PA will be followed.</p>

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		archaeological sites identified, acreage surveyed, and effects determinations to all signatories of the PA.	
Operational findings	If cultural resources are discovered during project-related operations, all ground-disturbing activities in the vicinity of the resource would cease immediately. The discovery would be immediately reported to BLM or USFS authorized officer as appropriate.	If cultural resources are discovered during project-related operations, all earth-disturbing activities within 30-meters of the discovery will cease and heavy equipment will be removed from the area until the discovery is assessed and documented. See PA (10/11/2016) for additional requirements.	In accordance with the PA (10/11/2016) between the company, cooperating agencies, tribes, and SHPO, the Lead Agency Official (LAO) will make a determination of effects. Appropriate consultation as required by the PA will be completed. All necessary efforts will be made to avoid eligible historic properties and all agreements specified in the PA will be followed.
DEVELOPMENT ROCK			
Development rock	Cover development rock piles with soil whenever possible based on the availability of stockpiled soil, and the surface of the DRA would be vegetated with native plant species.	<p>The same as alternative A.</p> <p>Additionally, topsoil borrow areas will be identified and a vegetated soil cover will be required to be placed on all DRAs during reclamation. The depth of soil placed during mine reclamation would likely be in the range of 6-12 inches (EA Appendix I, pg. I-6).</p> <p>A revegetation test plot plan will be completed. Test plots would be designed to evaluate reclamation practices at DRAs, exploration areas, and ventilation shafts, and would be installed and monitored at the La Sal Mines complex prior to final reclamation.</p> <p>Development rock piles at the La Sal Mines Complex would be reclaimed such</p>	If monitoring of reclamation practices indicates that required standards have not been met, additional soil depth and/or revegetation work would be required.

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		that the potential dose to a member of the public, assumed to be a person camping on or near reclaimed areas for 14 days, is less than 15 mrem/yr above background.	
GROUNDWATER			
Groundwater Monitoring	Not Applicable.	<p>Within 6 months of approval of the Plan, the operator shall provide a groundwater monitoring plan for BLM and FS approval that will provide for monitoring of groundwater quality and quantity. (EA - Appendix G)</p> <p>Within 6 months of approval of the groundwater monitoring plan by BLM and FS, the operator shall install monitoring wells and/or other monitoring equipment and commence monitoring of groundwater quality and quantity.</p> <p>Groundwater monitoring shall continue until cessation of the groundwater monitoring program is approved by BLM and FS or all reclamation liability for the mine site is released in accordance with BLM and FS regulations.</p>	If monitoring identifies unanticipated changes in ground water quality or quantity, appropriate modifications to the POA will be made to protect ground water in accordance with BLM and FS regulations (i.e. 43 CFR 3809 and 36 CFR 228 Subpart A). See section 4.3.5.2 of the EA and EA – Appendix I.
HAZARDOUS WASTE			
	The authorized officer of BLM or USFS, as appropriate based on land status, shall be notified if a spill of a hazardous material occurs on public lands that exceeds a reportable quantity of 5 gallons. Spill containment shall be initiated immediately and contaminated material shall be moved to the nearest	Same as Alternative A	The authorized officer of BLM or USFS, as appropriate based on land status, shall be notified if a spill of a hazardous material occurs on public lands that exceeds a reportable quantity of 5 gallons. Spill containment shall be initiated immediately and contaminated material shall be moved to the nearest approved landfill or disposal facility as appropriate.

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	approved landfill or disposal facility as appropriate.		
NOISE			
	Where existing fans present a localized noise concern to La Sal residents, installation of sound barriers to direct noise away from receptors, extended risers on fans to dissipate noise, and baffles in cases where such modifications to existing fans are available.	<p>Same as Alternative A.</p> <p>In addition, where practicable and feasible, vent fans would be placed below ground surface.</p> <p>Noise levels from the new underground fans would be more than 10 dBA lower at a given distance to nearby receptors than the existing fan noise levels shown in Table 15 (EA pg. 69) at the same distance from the receptors. The 10 dBA difference would be heard by a listener as half as loud as Alternative A at each receptor location.</p>	Mine personnel would be responsible to monitor and ensure that fan noise levels near residences, public facilities, or adjacent to livestock or key wildlife habitat areas meet noise level requirements through installation of underground fans, sound barriers to direct noise away from receptors, extended risers on fans to dissipate noise, and baffles in cases where such modifications to existing fans are available. (EA pg. 143 and Appendix I Design Features)
RADIATION & RADON			
Radiation Monitoring	Under Federal regulations, the Operator monitors for radon-222 emissions from mine vent holes and submits an annual compliance report to the EPA in conformance with the standards set in 40 CFR 61, Subpart B. Radon-222 monitoring data submitted by Energy Fuels to EPA would be entered into an EPA computer model to determine if the radon-222 meets required standards. Energy Fuels would also provide pre-construction radon modeling to BLM and/or FS to demonstrate that the vent shaft would be expected to meet the 10 mrem/yr standard for radon emissions. (See EA – Appendix E, pg. 6-4)	<p>Same as Alternative A.</p> <p>Annual gamma surveys are required to be conducted to determine the gamma radiation dose in all areas of the underground and surface workings where radioactive ores are present.</p>	<p>If preconstruction radon modeling does not demonstrate that the vent shaft would be expected to comply with the regulation, design modifications would be implemented to comply with the regulation, or the ventilation shaft would not be constructed.</p> <p>The underground working environment, including mine safety and radiation exposure, is regulated by MSHA. MSHA inspects and regulates the overall safety of mining operations. Denison is required by MSHA to monitor and control particulate and radiation exposure to workers at the mines. MSHA would enforce correction of deficiencies related to radiation and radon.</p>

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			(See EA – Appendix E, pg. 9-1 and Appendix I, pg. I-1) MSHA would inspect mine operations quarterly. (EA – 4.3.17.2)
Radon	Radon emissions from the mine exhaust vents will be monitored. (See EA – Appendix E pg. 6-4 and 9-1)	Same As Alternative A. In addition, after construction, monitoring of radon emissions would be conducted in accordance with 40 CFR 61, Subpart B or other EPA or UDEQ-approved methods for the life of the ventilation shafts. (EA – Appendix I, pg. I-1)	Radon emissions will be controlled in accordance with standards implemented under the support of UDEQ and EPA’s National Emissions Standards for Hazardous Air Pollutants (NESHAP). Measurements will be conducted consistent with MSHA requirements. MSHA would inspect mine operations quarterly. (EA – 4.3.17.2)
RECLAMATION			
Reclamation Monitoring	Routine monitoring of vent holes for dust as required by state and Federal regulations. Radon emissions from the mine exhaust vents are monitored and controlled in accordance with standards implemented under the support of UDEQ and EPA’s National Emissions Standards for Hazardous Air Pollutants (NESHAP).	Same as Alternative A.	Monitoring shall continue until reclamation liability for the mine site is released in accordance with BLM and FS regulations or as otherwise approved by the state of Utah, BLM, and the FS (EA pgs. 26, 36, EA section 4.3.9 Reclamation pgs. 157-159, EA –Appendix E POA section 5.9, and EA – Appendix G).
	Operator shall provide a soils monitoring plan to BLM and FS for approval. Provide bi-annual assessments of reclamation progress to BLM and FS.	Same as Alternative A.	Disturbed areas at the La Sal Mines Complex shall be reclaimed such that the potential dose to a member of the public, assumed to be a person camping on or near reclaimed areas for 14 days, is less than 15 mrem/yr above background. (EA – Appendix G)
	No revegetation test plot reclamation plan would be written. Upon the completion of all reclamation activities, revegetation success would be measured in accordance with UAC Rule R647-4-111, such that revegetation has	A revegetation test plot plan will be completed. Revegetation test plots would be established to test the performance of the soil, soil amendments, seed mixtures and reclamation methods. The reclamation approaches developed based on performance of the reclamation test plots	

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	<p>achieved 70 percent of the original or adjacent ground cover. In addition, the vegetation must survive three growing seasons following the last seeding unless agriculture is to continue as part of the post-mining land use. The standards of success for revegetation efforts are based on agency determination that the revegetation work has been satisfactorily completed within practical limits. Results of bi-annual assessments of reclamation progress would be reported to the agencies on an annual basis.</p>	<p>would then be utilized during reclamation of the La Sal Mines Complex, including providing additional soil to use during reclamation, if necessary (EA pg. 32).</p> <p>Monitoring of completion of revegetation success is the same as Alternative A.</p>	
SOIL & WATER			
Surface Water and Sediment Monitoring	<p>Monthly inspections will be done at any time during the month and may be completed immediately following a precipitation event. For temporarily inactive sites, the inspections will be completed quarterly.</p>	Same as Alternative A	<p>If damage to erosion and sediment control systems and devices is observed during inspections due to construction activities, stormwater runoff, wind erosion, or other disturbance, maintenance practices would be employed in accordance with the SWPPP and measures would be taken to ensure that the erosion and sediment control systems and devices remain functional and BMPs are met. (POA Appendix E)</p>
	<p>All material handling areas will be inspected for evidence of, or the potential for, pollutants entering the drainage system.</p>	Same as Alternative A	
	<p>Erosion and sediment control systems and devices will be inspected to determine if they are working properly.</p>	Same as Alternative A	
Stormwater Monitoring	<p>Inspection of stormwater management devices, including erosion and sediment control systems and devices, at the frequency required.</p>	Same as Alternative A.	<p>Appropriate actions must be taken in response to inspections to correct deficiencies.</p> <p>The SWPPP provides direction regarding monitoring for Active Mine Sites (monthly</p>

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	<p>Routine inspections will be conducted for leaks or conditions that could lead to discharges of pollutants or contact of stormwater with pollutants. Minimum monthly inspection interval required.</p> <p>A recordkeeping system of mining activities and inspections with respect to the SWPPP will be maintained. The following list of activities and information should be recorded in the SWPPP:</p> <ul style="list-style-type: none"> • A record of spills, leaks, or overflows, including time and date, weather conditions, and related factors; • Implementation of specific items in the SWPPP and stormwater site plans; • Training events (given or attended); • Events involving material storage and handling; • Contacts with regulatory agencies and personnel; • Notes of employee activities, contacts, and notifications; • Dated photographs for documenting the condition and maintenance of BMPs; • Field notebooks and figures; and • Follow-up maintenance actions, replacement actions, or BMP change requirements. 		<p>inspection), Temporarily Inactive Mines (quarterly inspections), and Comprehensive Site Compliance Evaluation (semi-annual inspection). The document contains information relative to best management practices (BMPs), good housekeeping practices, preventive maintenance, spill prevention and response procedures, inspections, training, recordkeeping and reporting, non-stormwater discharges, sediment and erosion control, management or runoff, capping, and materials handling and response procedures. (See EA Appendix E POA: Appendix E - Stormwater Pollution Prevention Plan [SWPPP])</p>
Soils Monitoring	Not Applicable	Within 6 months of approval of the Plan, the operator shall provide a soils monitoring plan to BLM and FS for	During reclamation, soils exceeding background levels for gamma radiation near vent shafts will be removed and

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		<p>approval that will provide for monitoring of effects to soils from mine vent shafts. (EA – Appendix G)</p> <p>Soils monitoring shall continue until reclamation liability for the mine site is released in accordance with BLM and FS regulations or as otherwise approved by BLM and/or FS as appropriate based on land status. (EA – Appendix G Conditions of Approval)</p>	disposed of at least 3 feet below the ground surface. Refer to section 4.3.8 of the EA.
Fuel Storage Area Monitoring	<p>Mine personnel would complete monthly external visual inspections for any oil spilled outside the tank, especially at seams, joints, and piping. Monthly and annual inspections of the facilities will be conducted in accordance with the requirements of the SPCC plan.</p>	Same as Alternative A	<p>If evidence of a spill is detected during operations or scheduled inspections the primary mine contact would direct spill response actions in accordance with the SPCC to stop, contain and clean up the leak or spill. Refer to EA Appendix E POA Attachment H – SPCC Plan.</p>
	<p>Each aboveground storage tank will be tested for integrity every 10 years, and whenever material repairs are made. This integrity testing will combine visual inspection with another testing technique such as hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or another system of nondestructive shell testing. The frequency and type of testing will take into account container size and design as specified in Steel Tank Institute (STI) Standard SP001-3.</p>	Same as Alternative A	<p>If a storage tank shows evidence of damage during visual inspections or fails integrity testing, the storage tank would be repaired or replaced as appropriate.</p>
VEGETATION			
General	N/A	Vegetation surveys will be conducted prior to exploration drilling, road	Surveys will define baseline vegetative ground cover to inform reclamation

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Measures will be taken to promote establishment of a self-sustaining ground cover until reclamation is established that meets performance standards.		construction, ventilation shaft construction, or other ground disturbing activities.	activities, and measure compliance with the proposed reclamation performance criterion of 70 percent of the pre-mining vegetative ground cover.
	N/A	Revegetation of disturbed soil and development rock piles (DRAs) will be monitored following reclamation to ensure that vegetation reclamation meets a minimum of the 70% pre-mining vegetative cover standard.	If the 70 percent criteria is not met, additional revegetation work will be required to bring the area to the reclamation standard/requirement.
Beaman's townsendia	Field surveys will be conducted as determined by the authorized officer of BLM or the USFS as applicable.	Same as Alternative A. Species-specific preconstruction surveys will be conducted for Beaman's townsendia (BLM sensitive plant species)	If Beaman's townsendia is discovered, then either the BLM or FS would be informed (as applicable). Mitigation measures would be directed by the appropriate agency and may include avoidance.
Noxious Weeds	A weed control plan is required (Appendix E). The Weed Management Plan presented in the POA would be implemented.	Same as Alternative A. The operator shall monitor disturbed areas in the project area for project-related establishment and spread of noxious and exotic weeds. (EA – Appendix G Conditions of Approval)	Incursions of noxious weeds and invasive plants will be treated by the operator as necessary and approved by the BLM or USFS to prevent additional spread (EA Appendix I pg. I-7). Prior to disturbance known weed populations will be flagged and avoided during construction activities (POA - Weed Management Plan pg. 5).
	Following annual spraying, a monitoring survey will be conducted to verify locations of noxious weeds and invasive plants in the project vicinity. (POA - Weed Management Plan pg. 5)	Same as Alternative A	

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	Personnel will be trained on methods for cleaning equipment, identification of problem plant species in the project area, and procedures to follow when an invasive or noxious weed is located. To assist in identification, the contractor would be supplied with a list and pictures of noxious and invasive species that may exist within the project area. (POA - Weed Management Plan pg. 4)	Same as Alternative A	
	All equipment, including on-road and off-road equipment, shall be cleaned to remove weed seed and soil prior to operations on public lands (EA – Appendix I, pg. I-7).	Same as Alternative A.	
	Disturbed areas will be promptly seeded following completion of activities to reduce the potential for the spread and establishment of noxious weeds and invasive plants. Seeding should occur as soon as possible following construction and during the optimal time period (POA – Weed Management Plan pg. 5).	Same as Alternative A.	
WILDLIFE			
General	Biological surveys for the areas of future disturbance, including exploration, that are not yet complete will be performed when specific areas of future disturbance are identified.	Same as Alternative A. With the addition of buffers and standard timing restrictions for some species when found to be nesting.	If wildlife species identified below are found in or near potential disturbance areas, the appropriate authorized officer will be notified for a determination regarding actions, including application of buffers identified in EA - Appendix I.

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	Records of any wildlife mortality will be maintained for BLM and USFS inspection upon request.	Same as Alternative A	Records will be available for BLM and USFS inspection upon request. (See Appendix E – Section 6.3)
Bats	When mine personnel or contractors enter a mine the first time following breeding season (spring & summer), a visual observation of the mine will be made.	Same as Alternative A (visual observation of mine). Wildlife design features under Alternative C include screening of mine openings to prevent bats from entering shafts and adits.	In the event that any bats are observed in the mine workings, all activities will cease in the area and the findings reported to BLM and USFS (EA – Appendix E POA Appendix K). Recommendations from BLM or USFS (as applicable) will be implemented.
Raptors	Biological surveys for all raptors will be performed in the nesting season preceding any anticipated disturbances for the following years. Survey results will be reported to BLM and USFS.	Same as Alternative A. Additionally, if construction is scheduled between January 1 and September 31, breeding season raptor surveys will be required within a five-day window of vegetation removal to aid in nest avoidance.	Based on the result of field survey, the authorized officer of the BLM or USFS (as applicable) will determine if appropriate buffers and timing limitations are necessary prior to authorization of construction activities. (EA section 2.4.4 and Appendices G, I, and J)
Bald Eagle	If construction is scheduled between the dates of January 1 and September 31, breeding season raptor surveys will be required prior to construction.	If construction is scheduled between the dates of January 1 and September 31, breeding season raptor surveys will be required prior to construction.	If any nesting bald eagles are observed, a 1.0 mile spatial buffer will be required to restrict disturbance of eagles from mining near active nests from Jan. 1 – August 31. (EA Section 4.3.16.2 and Appendices G, I, & J)
Golden Eagle	If construction is scheduled between the dates of January 1 and September 31, breeding season raptor surveys will be required prior to construction.	If construction is scheduled between the dates of January 1 and September 31, breeding season raptor surveys will be required prior to construction.	If any nesting golden eagles are observed, a 0.5 mile spatial buffer will be required to restrict disturbance of eagles from mining near active nests from January 1 – August 31. (EA Section 4.3.16.2 and Appendices G, I, & J)
Ferruginous Hawk	Biological surveys for all raptors would be performed in the nesting season	Biological surveys for all raptors would be performed in the nesting season preceding	If nesting ferruginous hawks are observed, a 0.5 mile spatial buffer will be required to

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	preceding any anticipated disturbances for the following years. Survey results would be reported to BLM and USFS	any anticipated disturbances for the following years. Survey results would be reported to BLM and USFS	restrict disturbance from mine activities near active nests from March 1 – August 1.
Northern Goshawk	Field surveys will be conducted as determined by the authorized officer of BLM or the USFS (as applicable).	Biological surveys for all raptors will be performed in the nesting season preceding any anticipated disturbances for the following years. Survey results will be reported to BLM and USFS.	If any nesting northern goshawk are observed, activities that cause noise or other disturbance for a 0.5-mile buffer around the nest will be required from March 1 to August 1, annually.
Flammulated Owl	Field surveys will be conducted as determined by the authorized officer of BLM or the USFS as applicable.	Biological surveys for all raptors will be performed in the nesting season preceding any anticipated disturbances for the following years. Survey results will be reported to BLM and USFS. Additionally, if construction is scheduled between January 1 and September 31, breeding season raptor surveys will be required within a five-day window of vegetation removal to aid in nest avoidance.	If any nesting flammulated owl are observed, activities that cause noise or other disturbance for a 0.24-mile buffer around the nest will be required from March 1 to September 30, annually.
Peregrine Falcon	Field surveys will be conducted as determined by the authorized officer of BLM or the USFS (as applicable). Field surveys will be conducted as determined by the authorized officer of BLM or the USFS as applicable.	Biological surveys for all raptors will be performed in the nesting season preceding any anticipated disturbances for the following years. Survey results will be reported to BLM and USFS. Additionally, if construction is scheduled between January 1 and September 31, breeding season raptor surveys will be required within a five-day window of vegetation removal to aid in nest avoidance.	If any nesting peregrine falcons are observed, the 1 mile active nest buffer design feature would exclude activities from February 1 – August 31, annually.
WORKER HEALTH AND SAFETY			
Worker Health and Safety	Monitor and control particulate and radiation exposure to workers at the mines. This program involves monitoring and control of dust, radon	Pre-construction radon modeling for new shafts would be required. The modeling would evaluate potential adverse effects associated with radon emissions prior to	MSHA regulations - Standard operating procedures and experience. Compliance with the requirements of 40 CFR 61 Subpart B which limit the impact of vent shaft radon emissions on members of the

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	<p>daughters and gamma radiation within the working areas of the mine.</p> <p>Within the mine, Applicant would perform annual gamma exposure measurements consistent with MSHA requirements.</p>	<p>commencing operation of the new vent shaft.</p> <p>Monitor and control particulate and radiation exposure to workers at the mines. This program involves monitoring and control of dust, radon daughters and gamma radiation within the working areas of the mine.</p> <p>Within the mine, Applicant would perform annual gamma exposure measurements consistent with MSHA requirements.</p>	<p>public. Exceedances require corrective actions.</p>
	<p>None</p>	<p>Revegetation of DRA's will be monitored. The environmental characteristics of the develop rock produced would be monitored annually.</p>	<p>Measures will be taken to promote establishment of a self-sustaining ground cover until reclamation is established that meets performance standards.</p> <p>If monitoring detects exceedances of air quality standards, control measures would be implemented.</p>
	<p>Non-routine monitoring of vent holes for dust as required by state and Federal regulations</p>	<p>The environmental characteristics of the develop rock produced would be monitored annually. Same as Alternative A.</p>	

* Authorized Officer: BLM lands - Moab Field Manager or designee; USFS lands - Manti-La Sal N.F. Forest Supervisor or designee.

* All required surveys (wildlife, vegetation, or cultural resources) will be performed by qualified specialists (agency or contract) as approved by the applicable authorized Officer.