Table of Contents

VOLUME A-2, Volume 2

SOILS AND VEGETATION

TERRESTRIAL WILDLIFE
Biological Studies in Winter Quarters Canyon Creek & Woods Canyon Creek

AVIFAUNA REPORTS

Mine # C/007/0005
File Incoming
Record # 0100
Doc. Date 10.21.05
Recd. Date 10.26.05

shales of the Blackhawk Formation in the permit area are irregularly bedded and due to their tendency to swell when wet, they should, in most cases, form an effective barrier to vertical movement of ground water.

A sample of the claystone from the Blackhawk Formation was obtained from an in-mine hole and was analyzed and determined to contain 58 percent montmorillonite (Lab sheet located in Mine File 3.1.2.7). Two drill logs were evaluated for the amount of claystone/mudstone present as a demonstration of the swelling capabilities of the formation. Drill hole 74-26-3 (SW/NW, Sec. 26, T13S, R6E) was selected due to is proximity to Burnout Canyon Creek, and Well 91-35-1 (SW/SW, Sec.35, T12S, R6E) being located in the North Lease area between Winter Quarters and Woods Canyons. In drill hole 74-26-3, mudstone was interbedded throughout the entire 1400-foot depth at a rate of 26-feet per every 100-feet of depth, or 26.3 percent. Similarly, Well 91-35-1 averaged 27.2 percent claystone throughout its entire 1500-foot drill depth. Table 2.3.1 illustrates the distribution of claystone/mudstone in the two drill holes. Studies in Burnout Canyon Creek have also demonstrated the self-sealing nature - inhibiting vertical movement of flow through the bedrock in the area. Based on the claystone/mudstone component observed in Well 91-35-1, the same effects are anticipated when undermining portions of Winter Quarters and Woods Canyon creeks.

Revised 10-19-05

Table 2.3.1

Depth (ft)	D.H. 74-26-3 (amount of claystone in ft.)	D.H. 91-35-1 (amount of claystone in ft.)
0-100	9	25
100-200	40	18
200-300	19	17.5
300-400	10	11
400-500	20	49
500-600	36	16

Drawing 2.3.4-2 ~~also~~ illustrates a potentiometric surface of the water in the Star Point Sandstone ~~in the North Lease area~~. The potentionmeteric surface is based on data from wells completed in the Star Point Sandstone throughout the permit area. ~~The water levels in wells 91-35-1 and 91-26-1 have not changed significantly since they were drilled and originally appeared not to be reacting to the mine dewatering taking place in Mine #2. The hydrologic disconnect appeared to be the result of the east-west fault that roughly separates the Mine #3 area and North Lease area from the Mine #2 area as discussed in Section 2.2.6. However, the numeric hydrologic model presented in the PHC Appendix J and K suggest the regional gradient is from south to north.~~ Drawing 2.3.4-2 is based on geologic information provided in Section 2.2.6, and the numeric hydrologic model presented in the PHC Appendix Jand K that provides additional information indicating the gradient of the Star Point Sandstone regional aquifer is from south to north.

Springs in the Blackhawk Formation are fed from perched water in shallow sandstone lenses underlain with shale well above the regional ground water level.

Useable quantities of water from wells in either the Storrs Sandstone or the lower tongues of the Star Point Sandstone are unlikely unless a fracture zone is encountered. Drawdown and recovery tests, which were conducted at two different depths in an open test well located in the proposed portal area, indicated that the transmissivity of the Blackhawk Formation is approximately 18 gallons per day per foot (Volume A-1, Hydrology). No significant difference in transmissivity exists between the coal zone and the Aberdeen Sandstone. The low transmissivities and discharge rates (approximately 5 gallons per minute) indicate that the Blackhawk Formation is, at best, a poor aquifer.

Potentiometric surfaces are below the ground surface, even in the canyon bottoms, with the deeper holes under the Blackhawk showing a generally higher potentiometric surface than the shallower holes. East of the permit area, where the Star Point Sandstone is exposed, the potentiometric surface intersects the ground surface in the canyons, thereby producing springs along the bottoms of the canyons. Water table conditions exist primarily in

shallow alluvial deposits along larger perennial streams. Potentiometric surfaces, as currently understood, are shown on Plate 2.3.4-2 and

LITERATURE CITED

EarthFax Engineering, Inc. 2002. Hydrologic and Channel-Stability Evaluation of Eccles and Mud Creeks. Letter report submitted to Canyon Fuel Company. Midvale, Utah.

Mayo and Associates, 1996. Investigation of Surface and Groundwater Systems in the Vicinity of the Skyline Mines, Carbon, Emery, and Sanpete Counties, Utah; Probable Hydrologic Consequences of Coal Mining at the Skyline Mines and Recommendations for Surface and Groundwater Monitoring.

Mundorff, J.C. 1972. Reconnaissance of Chemical Quality of Surface Water and Fluvial Sediment in the Price River Basin, Utah Department of Natural Resources, Division of Water Rights. Technical Publication No. 39. Salt Lake City, Utah.

Pacific Southwest Inter-Agency Committee. 1968. Factors Affecting Sediment Yield in the Pacific Southwest Area. Water Management Subcommittee. Sedimentation Task Force.

Rosgen, D.L., 1996. Applied River Morphology, Wildland Hydrology.

Rosgen, D.L., 2001. A Stream Channel Stability Assessment Methodology, Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol.2, pp. II-18-26, March 25-29, 2001, Reno, NV.

Southeastern Utah Association of Governments. 1979. Waste Water Quality Management Planning Program (208) for Emery, Carbon, and Grand Counties, Utah. Price, Utah.

similar stream systems naturally. Biweekly flow monitoring and aerial photographic surveys continue each year as mining continues in the area. Additionally, three years of macroinvertabrate studies and two years of fish population surveys have been conducted starting in 2000. These studies are described in greater detail in Section 2.8.1.

The purpose of the Burnout Canyon study was to determine the impacts of undermining perennial streams in the Skyline Mine area. The intent of the study was to determine if significant impacts would occur by undermining the Burnout stream and, if no significant impacts occurred, then the Forest would consider allowing the undermining of perennial streams with similar geologic and geomorphic conditions to occur. Skyline Mine intends to undermine Winter Quarters Canyon based on the ~~positive~~ results of the Burnout Canyon study. Skyline has collected or committed to collect additional baseline data necessary to adequately monitor environmental parameters possibly affected by subsiding Winter Quarters Canyon.

When subsidence occurs, the subsidence cracks tend to seal rapidly, preventing the deep percolation and subsequent loss of water previously destined for springs and other water sources. The location of a spring may change by a few feet, but no significant loss of water is anticipated. The sealing of potential cracks will be accelerated where subsidence occurs under stream bodies, due to the natural deposition of silt in the stream channel along with the swelling of the shale.

Although the Blackhawk Formation contains partially or completely saturated sandstone channels above the proposed mine workings, a relatively small quantity of water is being encountered in the mine due to the impermeable nature of the formation, which limits the recharge rate and the ability of the rock to readily yield water. Ground water within the Blackhawk formation above the mine workings was determined in the 1996 PHC to be found within highly localized perched aquifers. The 1996 PHC evaluation failed to locate a regional ground water aquifer within the immediate area. The relatively small quantity of water being encountered in the mine was believed due to 1) the general impermeable nature of the formation, which limits the recharge rate and the ability of the rock to readily yield water, and 2) the local nature of local perched aquifer systems.

The inflow to the mine had been less than 100 gallons per minute per active face, with mine entries generally dry approximately 100 to 200 feet up-dip from the face. Some roof bolt holes, however, continued to flow up to 2 GPM for an extended period of time. However, in 2002 a fractured

- 0.15 ac-ft/month (ET)
- 345,715 (gallons/year)
- 1.06 ac-ft/yr

Pond 002 (Rail Loadout) - 0.44 acre (surface area)
- 0.15 ac-ft/month (ET)
- 390,037 gallons/year
- 1.20 ac-ft/yr

Pond 003 (Refuse Pile) - 0.27 acre (surface area)
- 0.15 ac-ft/month (ET)
- 239,341 gallons/year
- 0.73 ac-ft/yr

Total Annual Pond Evaporation = 2.99 ac-ft

Springs and Seeps Effects From Subsidence - Not Applicable to this calculation

Alluvial Aquifer Abstractions into Mine - Not Applicable

Deep Aquifer Pumpage - Not Applicable

Postmining Inflow - (0)

Direct Diversions - Not Applicable

Dust Suppression - 5,000 gallons/truck load. Data based on 2003 use; last fully active year. = 3.7 ac-ft/yr

Mine Discharge - last 6 month average = 3,757 gpm = 6,059 ac-ft/yr

Using the Windy Gap Process at the Mine site, water depletions include Mine Consumption, Ventilation Consumption, Coal Producing Consumption, Sediment Pond Evaporation, and Dust Suppression totaling approximately 94 acre-feet per year. The only addition to the system, as defined by the Windy Gap process is the mine discharge which is currently averaging approximately 6,060 acre-feet per year, indicating the Skyline Mine has a net gain of approximately 5,966 acre-feet year to the Colorado River drainage system.

2.5.3 Alternative Water Supply

OSM Regulation 30 CFR 783.17 requires that alternative sources of water supply be identified if mining impacts will result in the contamination, diminution, or interruption of existing sources. Because no significant adverse hydrologic impacts are expected as a result of mining in the Skyline permit area, no individual or collective source of alternative water supply has been identified.

Project Impacts on Fisheries Resources

The surface facility disturbances in the portal area encroached on sections of all three upper Eccles Creek forks. In order to reduce sedimentation of these stream segments and the main stream, the tributaries and a section of Eccles Creek proper immediately below the tributary confluences were diverted into closed culverts. This modified approximately 4,200 feet of total stream habitat but did not reduce available fish habitat since fish were not found above the U.S. Forest boundary, prior to the diversion. Downstream drift of macroinvertebrates from the upper reaches of these forks still occurs as before.

At the coal loadout facilities near the mouth of the canyon (Station ECO5), approximately 600 feet of stream was moved to the north into a new channel. The new channel is 100 feet shorter but has nearly the same gradient (3 feet additional vertical drop/1,000 feet horizontal channel).

Degredation of Eccles Creek between the National Forest boundary and the coal loadout facilities should continue to be minimal since road and conveyor plans were developed and are being implemented to minimize effects on the stream.

Water being discharged from the mine is augmenting the Eccles Creek stream flow. This increased stream flow is especially beneficial during summer months when normal stream flows are low. Water temperatures are also moderated by this increased flow.

There should be little impact on Huntington Creek above Electric Lake. Impacts to date have been associated only with the construction of a new UDOT highway. Sediment control measures minimized the impact during the construction activity.

At this point in time there are believed to be ~~no~~ potentially minimal impacts on either Winter Quarters or Woods Canyon Creeks ~~since~~ and no effects to the fisheries are anticipated~~surface mining impacts are planned.~~

magnification. The mean, standard deviation, density per square meter, and standing crop will be calculated and estimated using the same methods as in previous analysis.

Calculations of the USFS Biotic Condition Index (Winget and Mangum 1979) will be completed using the abundances of the benthic taxa to generate the dominance weighted community tolerant quotient (CTQd). The predicted community tolerant quotient (CTQp) will be calculated using water chemistry data provided in Winget (1972) for the Huntington Creek drainage.

Cluster analysis will be run using the Bray-Curtis dissimilarity index with the UPGM clustering algorithm.

Winter Quarters Canyon and Woods Canyon Creeks

~~During the~~From Fall of 2002 ~~and~~ through early Summer of 200~~3~~4 baseline macroinvertebrate data for the perennial reaches within Winter Quarters Canyon and Woods Canyon Creeks in the North Lease area were gathered. Also during 2002, a fish survey was conducted in both Winter Quarters Canyon and Woods Canyon Creeks. Copies of the reports are included in Appendix Volume A-3, Volume 2.

A macroinvertebrate survey of portions of Winter Quarters Canyon and Woods Canyon Creeks will be performed twice a year for two consecutive years and then every third year thereafter or for a period determined by Canyon Fuel Company, LLC, DOGM, USFS, and the DWR. This survey will be performed in the fall and spring of each year on or about the same date. ~~The fall macroinvertebrate survey will be performed in conjunction with a fish survey.~~

The following methods have been and will be used for macroinvertebrate sampling. Slight variations to the methods may occur during the field work or based on comments from regulatory agencies.

Three benthic sites will be sampled in each creek. Following the first survey a map with these stations will be prepared and submitted with the next sample report (included in the following year's annual report). Quantitative samples will be taken with a modified box sampler. The samples taken will be field preserved in 70% ethyl alcohol and returned to the laboratory for processing. The samples will be sorted and invertebrates identified to the lowest possible taxonomic level using the keys of Merritt and Cummins (1996). Those of questionable identity will be further examined and identified under magnification. The mean, standard deviation, density per square meter, and

the Lower O'Connor "A" (See Section 4.17.3 Subsidence Prevention Measures). No buildings, pipelines, or maintained roads were found in the areas to be subsided as a result of implementing the current North Lease mine plan. The only mapped pack trail in the North Lease area runs east-west on the ridge between Winter Quarters Canyon and Woods Canyon, dropping down into Winter Quarters Canyon. The trail is outside the area to be subsided, therefore, no subsidence related impact is anticipated on the trail.

As discussed in detail in Section 2.2 of this M&RP, the rocks in the North Lease area are in compression. The state of compression of the rocks in the North Lease area will likely allow the subsidence forces to be transmitted across fault and fracture planes thus resulting in uniform subsidence. Previous mining in Mine #3, where the rocks are also under compression, did not result in focused subsidence along faults or fractures. Indeed, in the southern portion of the mine permit area where the rocks are subjected to extensional forces, focused subsidence did not take place.
Drilling and field work conducted in the North Lease by Skyline geologist Mr. Mark Bunnell indicates the Castlegate Sandstone in the head of Winter Quarters and Woods Canyons in the permit area consist of two thin sandstone units, separated by slope-forming shale and siltstone. Because of the thinner, "ledge and slope" nature of the Castlegate in the permit area, the potential for subsidence-induced escarpment failures or landslides is minimal (3/3/05 M.Bunnell memo). As discussed in Section 4.17.3 and illustrated in Drawing 4.17.3-1A, the combination of geology, depth of cover, and mine plan should keep subsidence affects to a minimum (See Section 2.2 for detailed geology discussion). Drawings 4.17.1-1 and 4.17.1-2 illustrate that, if the maximum subsidence does occur, no reduction or significant alteration of the perennial stream flow should occur. This is due primarily to the existing

stream gradient, projected worst-case subsidence, depth of cover, and depth of alluvium within the drainage corridor. Although the gradient is reduced in some areas, no significant ponding or over-steepening of the gradient is anticipated. Potential areas of *minor* cracking, as illustrated on Drawing 4.17.3-1A, are primarily a function of the advancement direction of the longwall panel, steepness of slope, the lack of confining pressure, and how the bedrock subsides into the void left by longwall mining.

The mine will not subside any of the perennial streams in the North Lease without approval from the Forest and Division. The Burnout Canyon Study (Appendix A-1, Volume 2), conducted in cooperation with Canyon Fuel Company, LLC, and The Manti-Lasal National Forest, was completed in July 1998. ~~The study was specifically designed as a demonstration for successful undermining of perennial streams.~~ Quoting the Burnout Final Report, "This study was initiated in 1992...to address the effects of longwall minnig and related subsidence in the Wasatch Pleateau on hydrology, channel condition and habitat changes in perennial and intermittent reaches of a mountain stream." ~~Stream flow measurements taken in~~ The Burnout Canyon study concluded that ~~during and subsequent to the study and compared to flows in drainages outside the permit area also demonstrate~~ any changes in flow in Burnout Creek areas were likely related to climatic changes (drought) and not mining activities (DOGM EDI). The stratigraphy, depth of cover, and general dip of the formations in Woods and Winter Quarters Canyons are very similar to Burnout Canyon (See sections 2.3.1, 2.5, 4.17.3, and Appendix A-1, Volume 2 for details). The permittee believes the Burnout Canyon Study can be used to predict the impacts of undermining both Winter Quarters and Woods Canyons and that mining in the North Lease area can be conducted with minimal impacts to perennial streams due to subsidence.

The Forest has indicated that the forest land is considered to have renewable resources related to wildlife and grazing. The timber resources are extremely limited and isolated in this

area of the forest and will likely never be harvested (Carter Reed, Manti-La Sal National Forest, Oral Communication 10-2002).

4.17.2 Mining Methods

The mining methods to be used by the Permittee include longwall mining, room and pillar mining with pillar removal, and room and pillar mining with pillars left in place. Certain room and pillar mining systems are designed to provide full support and will prevent subsidence. Subsection 3.1.5 contains descriptions of the mining methods to be implemented.

Full extraction areas include room and pillar panels with pillar removal and longwall panels. Subsidence prediction work has shown the expected maximum planned and controlled subsidence will vary from 0 to 24 feet, assuming that the total cumulative extraction from the three mineable seams will not exceed 30 feet.

4.17.3 Subsidence Effect Prevention Measures

It is anticipated that the planned subsidence will result in a generally uniform lowering of the surface lands in broad areas, thereby limiting the extent of material effect to those lands and causing no appreciable change to present land uses and renewable resources. The Permittee established a subsidence monitoring program in the early stage of mining for use in reviewing the surface effect of mining and as an aid in future mine planning.

Table of Contents

VOLUME A-2, Volume 2

SOILS AND VEGETATION

TERRESTRIAL WILDLIFE
Biological Studies in Winter Quarters Canyon Creek & Woods Canyon Creek

AVIFAUNA REPORTS

shales of the Blackhawk Formation in the permit area are irregularly bedded and due to their tendency to swell when wet, they should, in most cases, form an effective barrier to vertical movement of ground water.

A sample of the claystone from the Blackhawk Formation was obtained from an in-mine hole and was analyzed and determined to contain 58 percent montmorillonite (Lab sheet located in Mine File 3.1.2.7). Two drill logs were evaluated for the amount of claystone/mudstone present as a demonstration of the swelling capabilities of the formation. Drill hole 74-26-3 (SW/NW, Sec. 26, T13S, R6E) was selected due to is proximity to Burnout Canyon Creek, and Well 91-35-1 (SW/SW, Sec.35, T12S, R6E) being located in the North Lease area between Winter Quarters and Woods Canyons. In drill hole 74-26-3, mudstone was interbedded throughout the entire 1400-foot depth at a rate of 26-feet per every 100-feet of depth, or 26.3 percent. Similarly, Well 91-35-1 averaged 27.2 percent claystone throughout its entire 1500-foot drill depth. Table 2.3.1 illustrates the distribution of claystone/mudstone in the two drill holes. Studies in Burnout Canyon Creek have also demonstrated the self-sealing nature - inhibiting vertical movement of flow through the bedrock in the area. Based on the claystone/mudstone component observed in Well 91-35-1, the same effects are anticipated when undermining portions of Winter Quarters and Woods Canyon creeks.

Table 2.3.1

Depth (ft)	D.H. 74-26-3 (amount of claystone in ft.)	D.H. 91-35-1 (amount of claystone in ft.)
0-100	9	25
100-200	40	18
200-300	19	17.5
300-400	10	11
400-500	20	49
500-600	36	16

Drawing 2.3.4-2 illustrates a potentiometric surface of the water in the Star Point Sandstone. The potentionmeteric surface is based on data from wells completed in the Star Point Sandstone throughout the permit area. Drawing 2.3.4-2 is based on geologic information provided in Section 2.2.6, and the numeric hydrologic model presented in the PHC Appendix Jand K that provides additional information indicating the gradient of the Star Point Sandstone regional aquifer is from south to north.

Springs in the Blackhawk Formation are fed from perched water in shallow sandstone lenses underlain with shale well above the regional ground water level.

Useable quantities of water from wells in either the Storrs Sandstone or the lower tongues of the Star Point Sandstone are unlikely unless a fracture zone is encountered. Drawdown and recovery tests, which were conducted at two different depths in an open test well located in the proposed portal area, indicated that the transmissivity of the Blackhawk Formation is approximately 18 gallons per day per foot (Volume A-1, Hydrology). No significant difference in transmissivity exists between the coal zone and the Aberdeen Sandstone. The low transmissivities and discharge rates (approximately 5 gallons per minute) indicate that the Blackhawk Formation is, at best, a poor aquifer.

Potentiometric surfaces are below the ground surface, even in the canyon bottoms, with the deeper holes under the Blackhawk showing a generally higher potentiometric surface than the shallower holes. East of the permit area, where the Star Point Sandstone is exposed, the potentiometric surface intersects the ground surface in the canyons, thereby producing springs along the bottoms of the canyons. Water table conditions exist primarily in shallow alluvial deposits along larger perennial streams. Potentiometric surfaces, as currently understood, are shown on Plate 2.3.4-2 and

LITERATURE CITED

EarthFax Engineering, Inc. 2002. Hydrologic and Channel-Stability Evaluation of Eccles and Mud Creeks. Letter report submitted to Canyon Fuel Company. Midvale, Utah.

Mayo and Associates, 1996. Investigation of Surface and Groundwater Systems in the Vicinity of the Skyline Mines, Carbon, Emery, and Sanpete Counties, Utah; Probable Hydrologic Consequences of Coal Mining at the Skyline Mines and Recommendations for Surface and Groundwater Monitoring.

Mundorff, J.C. 1972. Reconnaissance of Chemical Quality of Surface Water and Fluvial Sediment in the Price River Basin, Utah Department of Natural Resources, Division of Water Rights. Technical Publication No. 39. Salt Lake City, Utah.

Pacific Southwest Inter-Agency Committee. 1968. Factors Affecting Sediment Yield in the Pacific Southwest Area. Water Management Subcommittee. Sedimentation Task Force.

Rosgen, D.L., 1996. Applied River Morphology, Wildland Hydrology.

Rosgen, D.L., 2001. A Stream Channel Stability Assessment Methodology, Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol.2, pp. II-18-26, March 25-29, 2001, Reno, NV.

Southeastern Utah Association of Governments. 1979. Waste Water Quality Management Planning Program (208) for Emery, Carbon, and Grand Counties, Utah. Price, Utah.

similar stream systems naturally. Biweekly flow monitoring and aerial photographic surveys continue each year as mining continues in the area. Additionally, three years of macroinvertabrate studies and two years of fish population surveys have been conducted starting in 2000. These studies are described in greater detail in Section 2.8.1.

The purpose of the Burnout Canyon study was to determine the impacts of undermining perennial streams in the Skyline Mine area. The intent of the study was to determine if significant impacts would occur by undermining the Burnout stream and, if no significant impacts occurred, then the Forest would consider allowing the undermining of perennial streams with similar geologic and geomorphic conditions to occur. Skyline Mine intends to undermine Winter Quarters Canyon based on the results of the Burnout Canyon study. Skyline has collected or committed to collect additional baseline data necessary to adequately monitor environmental parameters possibly affected by subsiding Winter Quarters Canyon.

When subsidence occurs, the subsidence cracks tend to seal rapidly, preventing the deep percolation and subsequent loss of water previously destined for springs and other water sources. The location of a spring may change by a few feet, but no significant loss of water is anticipated. The sealing of potential cracks will be accelerated where subsidence occurs under stream bodies, due to the natural deposition of silt in the stream channel along with the swelling of the shale.

Although the Blackhawk Formation contains partially or completely saturated sandstone channels above the proposed mine workings, a relatively small quantity of water is being encountered in the mine due to the impermeable nature of the formation, which limits the recharge rate and the ability of the rock to readily yield water. Ground water within the Blackhawk formation above the mine workings was determined in the 1996 PHC to be found within highly localized perched aquifers. The 1996 PHC evaluation failed to locate a regional ground water aquifer within the immediate area. The relatively small quantity of water being encountered in the mine was believed due to 1) the general impermeable nature of the formation, which limits the recharge rate and the ability of the rock to readily yield water, and 2) the local nature of local perched aquifer systems.

The inflow to the mine had been less than 100 gallons per minute per active face, with mine entries generally dry approximately 100 to 200 feet up-dip from the face. Some roof bolt holes, however, continued to flow up to 2 GPM for an extended period of time. However, in 2002 a fractured

- 0.15 ac-ft/month (ET)
- 345,715 (gallons/year)
- 1.06 ac-ft/yr

Pond 002 (Rail Loadout) - 0.44 acre (surface area)
- 0.15 ac-ft/month (ET)
- 390,037 gallons/year
- 1.20 ac-ft/yr

Pond 003 (Refuse Pile) - 0.27 acre (surface area)
- 0.15 ac-ft/month (ET)
- 239,341 gallons/year
- 0.73 ac-ft/yr

Total Annual Pond Evaporation = 2.99 ac-ft

Springs and Seeps Effects From Subsidence - Not Applicable to this calculation

Alluvial Aquifer Abstractions into Mine - Not Applicable

Deep Aquifer Pumpage - Not Applicable

Postmining Inflow - (0)

Direct Diversions - Not Applicable

Dust Suppression - 5,000 gallons/truck load. Data based on 2003 use; last fully active year. = 3.7 ac-ft/yr

Mine Discharge - last 6 month average = 3,757 gpm = 6,059 ac-ft/yr

Using the Windy Gap Process at the Mine site, water depletions include Mine Consumption, Ventilation Consumption, Coal Producing Consumption, Sediment Pond Evaporation, and Dust Suppression totaling approximately 94 acre-feet per year. The only addition to the system, as defined by the Windy Gap process is the mine discharge which is currently averaging approximately 6,060 acre-feet per year, indicating the Skyline Mine has a net gain of approximately 5,966 acre-feet year to the Colorado River drainage system.

2.5.3 Alternative Water Supply

OSM Regulation 30 CFR 783.17 requires that alternative sources of water supply be identified if mining impacts will result in the contamination, diminution, or interruption of existing sources. Because no significant adverse hydrologic impacts are expected as a result of mining in the Skyline permit area, no individual or collective source of alternative water supply has been identified.

Project Impacts on Fisheries Resources

The surface facility disturbances in the portal area encroached on sections of all three upper Eccles Creek forks. In order to reduce sedimentation of these stream segments and the main stream, the tributaries and a section of Eccles Creek proper immediately below the tributary confluences were diverted into closed culverts. This modified approximately 4,200 feet of total stream habitat but did not reduce available fish habitat since fish were not found above the U.S. Forest boundary, prior to the diversion. Downstream drift of macroinvertebrates from the upper reaches of these forks still occurs as before.

At the coal loadout facilities near the mouth of the canyon (Station ECO5), approximately 600 feet of stream was moved to the north into a new channel. The new channel is 100 feet shorter but has nearly the same gradient (3 feet additional vertical drop/1,000 feet horizontal channel).

Degredation of Eccles Creek between the National Forest boundary and the coal loadout facilities should continue to be minimal since road and conveyor plans were developed and are being implemented to minimize effects on the stream.

Water being discharged from the mine is augmenting the Eccles Creek stream flow. This increased stream flow is especially beneficial during summer months when normal stream flows are low. Water temperatures are also moderated by this increased flow.

There should be little impact on Huntington Creek above Electric Lake. Impacts to date have been associated only with the construction of a new UDOT highway. Sediment control measures minimized the impact during the construction activity.

At this point in time there are believed to be ~~no~~ potentially minimal impacts on either Winter Quarters or Woods Canyon Creeks and no effects to the fisheries are anticipated.

magnification. The mean, standard deviation, density per square meter, and standing crop will be calculated and estimated using the same methods as in previous analysis.

Calculations of the USFS Biotic Condition Index (Winget and Mangum 1979) will be completed using the abundances of the benthic taxa to generate the dominance weighted community tolerant quotient (CTQd). The predicted community tolerant quotient (CTQp) will be calculated using water chemistry data provided in Winget (1972) for the Huntington Creek drainage.

Cluster analysis will be run using the Bray-Curtis dissimilarity index with the UPGM clustering algorithm.

Winter Quarters Canyon and Woods Canyon Creeks

From Fall of 2002 through early Summer of 2004 baseline macroinvertebrate data for the perennial reaches within Winter Quarters Canyon and Woods Canyon Creeks in the North Lease area were gathered. Also during 2002, a fish survey was conducted in both Winter Quarters Canyon and Woods Canyon Creeks. Copies of the reports are included in Appendix Volume A-3, Volume 2.

A macroinvertebrate survey of portions of Winter Quarters Canyon and Woods Canyon Creeks will be performed twice a year for two consecutive years and then every third year thereafter or for a period determined by Canyon Fuel Company, LLC, DOGM, USFS, and the DWR. This survey will be performed in the fall and spring of each year on or about the same date.

The following methods have been and will be used for macroinvertebrate sampling. Slight variations to the methods may occur during the field work or based on comments from regulatory agencies.

Three benthic sites will be sampled in each creek. Following the first survey a map with these stations will be prepared and submitted with the next sample report (included in the following year's annual report). Quantitative samples will be taken with a modified box sampler. The samples taken will be field preserved in 70% ethyl alcohol and returned to the laboratory for processing. The samples will be sorted and invertebrates identified to the lowest possible taxonomic level using the keys of Merritt and Cummins (1996). Those of questionable identity will be further examined and identified under magnification. The mean, standard deviation, density per square meter, and

the Lower O'Connor "A"(See Section 4.17.3 Subsidence Prevention Measures). No buildings, pipelines, or maintained roads were found in the areas to be subsided as a result of implementing the current North Lease mine plan. The only mapped pack trail in the North Lease area runs east-west on the ridge between Winter Quarters Canyon and Woods Canyon, dropping down into Winter Quarters Canyon. The trail is outside the area to be subsided, therefore, no subsidence related impact is anticipated on the trail.

As discussed in detail in Section 2.2 of this M&RP, the rocks in the North Lease area are in compression. The state of compression of the rocks in the North Lease area will likely allow the subsidence forces to be transmitted across fault and fracture planes thus resulting in uniform subsidence. Previous mining in Mine #3, where the rocks are also under compression, did not result in focused subsidence along faults or fractures. Indeed, in the southern portion of the mine permit area where the rocks are subjected to extensional forces, focused subsidence did not take place.
Drilling and field work conducted in the North Lease by Skyline geologist Mr. Mark Bunnell indicates the Castlegate Sandstone in the head of Winter Quarters and Woods Canyons in the permit area consist of two thin sandstone units, separated by slope-forming shale and siltstone. Because of the thinner, "ledge and slope" nature of the Castlegate in the permit area, the potential for subsidence-induced escarpment failures or landslides is minimal (3/3/05 M.Bunnell memo). As discussed in Section 4.17.3 and illustrated in Drawing 4.17.3-1A, the combination of geology, depth of cover, and mine plan should keep subsidence affects to a minimum (See Section 2.2 for detailed geology discussion). Drawings 4.17.1-1 and 4.17.1-2 illustrate that, if the maximum subsidence does occur, no reduction or significant alteration of the perennial stream flow should occur. This is due primarily to the existing

stream gradient, projected worst-case subsidence, depth of cover, and depth of alluvium within the drainage corridor. Although the gradient is reduced in some areas, no significant ponding or over-steepening of the gradient is anticipated. Potential areas of *minor* cracking, as illustrated on Drawing 4.17.3-1A, are primarily a function of the advancement direction of the longwall panel, steepness of slope, the lack of confining pressure, and how the bedrock subsides into the void left by longwall mining.

The mine will not subside any of the perennial streams in the North Lease without approval from the Forest and Division. The Burnout Canyon Study (Appendix A-1, Volume 2), conducted in cooperation with Canyon Fuel Company, LLC, and The Manti-Lasal National Forest, was completed in July 1998. Quoting the Burnout Final Report, "This study was initiated in 1992...to address the effects of longwall minnig and related subsidence in the Wasatch Pleateau on hydrology, channel condition and habitat changes in perennial and intermittent reaches of a mountain stream." The Burnout Canyon study concluded that any changes in flow in Burnout Creek areas were likely related to climatic changes (drought) and not mining activities (DOGM EDI). The stratigraphy, depth of cover, and general dip of the formations in Woods and Winter Quarters Canyons are very similar to Burnout Canyon (See sections 2.3.1, 2.5, 4.17.3, and Appendix A-1, Volume 2 for details). The permittee believes the Burnout Canyon Study can be used to predict the impacts of undermining both Winter Quarters and Woods Canyons and that mining in the North Lease area can be conducted with minimal impacts to perennial streams due to subsidence.

The Forest has indicated that the forest land is considered to have renewable resources related to wildlife and grazing. The timber resources are extremely limited and isolated in this