Creek. The increased flow to Mud Creek of the 10,500 gpm of mine water discharge represents an increase of approximately 10.5 times the minimum measured base flow (approximately 1,000 gpm measured in 1981) at the USGS flow gaging station located below the confluence of Mud and Winter Quarters Creeks. The average daily flow of Mud Creek at the USGS gaging station from 1979 to 2001 is approximately 2,700 gpm. The mine discharge rate of 10,500 gpm is about 4 times average daily flow of Mud Creek. Skyline Mine anticipates the increased flows will last until at least ~~June of 2004~~May of 2003, after which the discharge rate will decline as areas of Mine #2, where the greatest volume of ground water inflow occurs, will be abandoned and allowed to flood and mine water discharge well JC-3 begins to produce. The anticipated changes to mine inflow volumes is discussed in greater detail in the July 2002 Addendum to the PHC, Appendix F.

An ongoing study of the effects of the increased flows on Eccles and Mud Creeks was initiated in the winter of 2001. EarthFax Engineering, Inc. was contracted with to establish six monitoring stations on Mud Creek and three on Eccles Creeks. The flow, water chemistry, stream channel morphology, vegetation are monitored at these sites for any significant changes that could be related to the increase in mine water discharge. Initial results of the study indicate that no significant effects have been noted at the monitoring sites due to increased discharges. However, the study will continue until the mine discharge volumes return to pre-March 1999 levels. Data collected will be included in the mine's annual report.

2.4.3 Sediment Yield

Prior to March 1999, the Skyline project area had a sediment yield which averaged approximately 0.44 acre-feet per square mile per year, based on methods developed by the Pacific Southwest Inter-Agency Committee (1968) (Volume A-1, Hydrology, page 49). This converts to a total annual yield of 1.25 acre-feet of sediment to the Price River Basin and 3.07 acre-feet of sediment to the San Rafael River Basin. The majority of this sediment

Creek. The increased flow to Mud Creek of the 10,500 gpm of mine water discharge represents an increase of approximately 10.5 times the minimum measured base flow (approximately 1,000 gpm measured in 1981) at the USGS flow gaging station located below the confluence of Mud and Winter Quarters Creeks. The average daily flow of Mud Creek at the USGS gaging station from 1979 to 2001 is approximately 2,700 gpm. The mine discharge rate of 10,500 gpm is about 4 times average daily flow of Mud Creek. Skyline Mine anticipates the increased flows will last until at least May of 2003, after which the discharge rate will decline as areas of Mine #2, where the greatest volume of ground water inflow occurs, will be abandoned and allowed to flood and mine water discharge well JC-3 begins to produce. The anticipated changes to mine inflow volumes is discussed in greater detail in the July 2002 Addendum to the PHC, Appendix F.

An ongoing study of the effects of the increased flows on Eccles and Mud Creeks was initiated in the winter of 2001. EarthFax Engineering, Inc. was contracted with to establish six monitoring stations on Mud Creek and three on Eccles Creeks. The flow, water chemistry, stream channel morphology, vegetation are monitored at these sites for any significant changes that could be related to the increase in mine water discharge. Initial results of the study indicate that no significant effects have been noted at the monitoring sites due to increased discharges. However, the study will continue until the mine discharge volumes return to pre-March 1999 levels. Data collected will be included in the mine's annual report.

2.4.3 Sediment Yield

Prior to March 1999, the Skyline project area had a sediment yield which averaged approximately 0.44 acre-feet per square mile per year, based on methods developed by the Pacific Southwest Inter-Agency Committee (1968) (Volume A-1, Hydrology, page 49). This converts to a total annual yield of 1.25 acre-feet of sediment to the Price River Basin and 3.07 acre-feet of sediment to the San Rafael River Basin. The majority of this sediment

2.5 HYDROLOGICAL IMPACTS OF MINING ACTIVITIES

Presented in the following subsections are summaries of the hydrological impacts of the mining activities of the Skyline project. The details backing the conclusions stated in this section and supplemental discussion can be found in the PHC evaluations included as part of this section, and within the Hydrology Section of Appendix Volume A-1 Volumes 1 and 2. Details of the consultant's flow calculations may be found in the flood plan calculations also in Appendix Volume A-1. The PHC was also updated in July 2002 ~~and,~~ October 2002, and April 2003 by the addition of the Addendum to the PHC associated with the drilling of the wells in James Canyon and the significant inflows to Mine #2.

The potential hydrologic impacts discussed herein represent the latest information available and, generally, correspond to the consultant's original report. (See General Hydrologic Consideration Related to Coal Development and Subsequent Impacts, Vaughn Hansen Associates, February 1981, found in Appendix Volume A-1. Updated analyses of the "Probable Hydrologic Consequences" reflecting all current data are appended to this section.

- **Exhibit A of Section 2.5**, "Probable Hydrologic Consequences of Mining at the Skyline Mines, Carbon and Emery Counties, Utah"; prepared by Earthfax Engineering, Inc., Salt Lake City, Utah; dated September 30, 1992.
- **Addendum to the Probable Hydrologic Consequences, July 2002 (James Canyon Update)**.
- **Appendix A-1, Volume 2** (September 2002), "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".

2.5.1 Potentially Affected Water Rights

Surface and groundwater rights in the general project area are primarily for stockwatering and irrigation. Stockwatering rights are located almost entirely and directly on the streams. The nearest irrigation rights are centered around the two areas of Scofield and in Flat Canyon, southwest of the permit area. Irrigated lands consist primarily of pasture. Only stockwatering rights are present in the Skyline permit area. A limited number of wells are located in the general area, none of which are located directly on the property or within the permit area. Recent large mine inflows to Mine #2 has resulted in concern voiced by local government and private interests that water entering the mine is coming from nearby Electric Lake. However, data collected and analyzed by Skyline Mine for the purpose of determining the source of the inflows strongly indicates there is no significant connection between the surface waters and the mine waters. As discussed in the July 2002 Addendum to the PHC (modified in October 2002 and April 2003), the Star Point does not transmit water easily. Fractures within the Star Point in the mine area has allowed the sandstone to begin dewatering by discharging to the mine. The Star point does not appear to have a significant discharge point located immediately down gradient of the mine. Indeed, the age of the water in the sandstone suggests it takes several thousand years to move through the aquifer in spite of the high transmissivity of the fractures within the sandstone. Therefore, it is unlikely any surface or ground water rights are being adversely affected. Because it is not certain that the ground water discharges into the Huntington Creek drainage, there is no evidence that water is being removed from that drainage to Eccles Creek, part of the Price River drainage. Tritium analysis of the water in the 10 Left area of Mine #2 and water from the James Canyon well JC-1 indicates a minor amount of modern water is being pumped from the well and the mine. However, this water is not necessarily originating from Electric Lake. Therefore, there does not appear to be a significant volume of surface water being transferred between drainage basins.

2.5.2 Mining Impact on Water Quantity

Due to the high shale content of the Blackhawk Formation, recharge to the deep ground water system through the Blackhawk Formation is slow. Fractures in the formation seal readily due to swelling of the bentonitic shale when wet. As a result, the impact of mining (including subsidence) on the quantity of water in the permit area will be minimal. This has been verified through the results of the study which is in Burnout Canyon. (A discussion of the mining impacts on the aquatic resources may be found in Section 2.8.) The Burnout Canyon study resulted in the determination that no significant impacts had occurred to the stream drainage as a result of mining induce subsidence. While the gradient of the stream was flattened in a few locations and slightly increased in others, the overall change in the stream morphology was not significantly different than changes that occur in 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 intents to petition the Forest to allow the undermining of Winter Quarters Canyon based on the positive results of the Burnout Canyon study. Skyline recognizes additional baseline data will need to be collected prior to receiving Forest permission to proceed with subsiding Winter Quarters Canyon. The current 2002 mine plans do not anticipated longwall mining in the Winter Quarters area thus allowing the mine time to obtain the needed baseline data.

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 channelized sandstone was encountered during mining of the southwestern permit area which produced approximately 1400 gpm. This was repeated at several locations in areas of Mine #2 until the mine was discharging approximately 8500 to 9500 gpm in August 2002 and 9000 to 10500 gpm in October 2002. Due to these large inflows of groundwater, the near future mining activities have been directed toward the North Lease area.

The PHC for the Skyline Mine was updated by an Addendum to the PHC dated July 2002 and further updated in October 2002 and April 2003. The addendum contains significant information regarding the large inflows to the mine. To better understand the hydrologic system and the water within the Star Point Sandstone, Skyline Mine contracted with Hydrologic Consultants, Inc. of Lakewood, Colorado produce a ground water model of the Star Point Sandstone. This model will endeavor to delineate the possible areal extent of the aquifer, the volume of water contained in the aquifer, and the potential sources and discharge locations of the aquifer. The model will be used to help determine what, if any, impacts are occurring to the waters available in mine area including State appropriated water rights. It is anticipated the model should be completed by ~~the end of 2002~~mid-2003 and a copy of the report describing the results of the modeling effort will be added to the PHC.

As described in the July 2002 Addendum to the PHC, draining of the ground water contained within the Star Point Sandstone does not appear to have a significant impact on discharges of ground water in the mine or adjacent area nor does it appear that the water entering the mine is causing a loss of surface water in the Huntington or Price River drainages. The majority of the flows into the mine enter through faults and fractures that trend generally north-south to northeast-southwest. The flows move up through the floor of the mine in almost all cases. The water is apparently stored in the Star Point Sandstone under significant potentiometric head. Ages of the water indicate that water moves very slowly through the

Star Point system in spite of the fractures and faults that appear to be open enough to allow water to flow freely into the mine in isolated locations. This suggests that the aquifer does not have a discharge point that releases large volumes of water nor is the aquifer replenished at a high rate of inflow. While the Star Point is exposed in out crop north, south, and east of the mine, significant volumes of water would need to be entering the system at an elevation great enough to create the potentiometric head encountered in the Star Point beneath the Mine #2 workings. Skyline continues to monitor stream flows in Winter Quarters, Eccles, and Mud Creeks to identify any impacts if they occur in these drainages related to the mine inflows.

No springs or water production wells in the mine permit or adjacent areas have reportedly been negatively impacted by the large mine inflows. There has been some concern voiced by local government and private interests that water entering the mine is coming from nearby Electric Lake. However, data collected and analyzed by Skyline Mine for the purpose of determining the source of the inflows strongly indicates there is no significant connection between the surface waters and the mine waters. As stated previously, this is discussed at length within the July 2002 Addendum to the PHC.

Water encountered in the mine is either utilized underground as processed water or is pumped from the mine. Procedures for handling of mine water are discussed in detail in Section 3.2. Indigenous water associated with the coal will be removed from the area. This, however, will represent only a small fraction compared to the water flowing from the Wasatch Plateau. The water pumped from the mine is added to the flow of Eccles Creek and into Electric Lake and has a positive effect on the aquatic flow systems.

The construction of surface facilities utilized in conjunction with the Skyline Mines (yard areas, roads, conveyor lines, etc.) resulted in temporary increases in the suspended sediment concentration of the adjacent stream. However, because of the regulatory requirement that sediment control measures be provided for all areas of surface disturbance, concentrations of suspended material were significantly reduced. Minimization efforts, however, met with varying degrees of success.

Over long periods of time, groundwater in the Wasatch Plateau can be expected to flow towards the lowlands if not removed, passing through saline shales and emerging to augment streamflow with a dissolved solids content that significantly exceeds the concentrations found in the headwaters area. Because the Skyline Mines will act as interceptor drains, the groundwater that is brought to the surface from the mines has a much lower dissolved solids content than would have existed if the water was to continue its downward movement through shaley layers. Thus, the mines will have some beneficial impact on the chemical quality of water in the region.

The increased stream flow resulting from mine discharges, particularly during the summer low flow period, appears to benefit the Eccles Creek fishery by creating flow and temperature stabilization. The increased flows to Scofield Reservoir most likely benefitted the fish population in the lake by maintaining a sufficient level of dissolved oxygen to avoid a general fish kill that frequently occurs in the lake during periods of drought periods, such as has been occurring in the mine area since 2000. The mine has also been discharging large volumes of water since August 2002 with TDS concentrations only slightly higher than background levels. This good quality water flows to and is stored in Scofield Reservoir. The water stored in Scofield Reservoir is used for culinary and irrigation purposes in Helper, Price, and Wellington, Utah. The State Engineers office in Price, Utah indicated that without the additional discharge from Skyline Mine to the Price River drainage, the reservoir would have been at a dead pool level in late August of 2002, thus cutting short the irrigation season downstream.

Similarly, discharges to Electric Lake will be an overall benefit to the water users on Huntington Creek. The discharge of high quality water from mine dewatering wells JC-1 and JC-3 will increase the volume of water in Electric Lake, provide additional cooling water for the Huntington Power Plant, and provide additional irrigation water for agricultural uses in Emery County. Without the additional discharge of water to Electric Lake from the James Canyon wells, it is possible that in the summer and fall of 2003, the Huntington Power Plant would need to significantly scale back the production of electrical power due to insufficient cooling water. A reduction in power generation from the plant would have significant economic impacts on Carbon and Emery Counties from the loss of jobs and an increase in power rates for consumers of power generated by PacifiCorp.

The large volume of ground water inflow to the mine has resulted in the mine discharging significantly greater volume of water than were initially anticipated when the mine was planned and opened. The current mine UPDES permit was written when flows were expected to be less than 1000 gpm and limits on total dissolved solids (TDS) were created based on this volume of flow. A 7.1 ton/ day limit of TDS was assigned to the mine with a maximum TDS concentration of 1310 mg/l TDS. It was not unusual for the mine, prior to March 1999 to discharge water with 1000 mg/l TDS. However, after the large inflows into the mine were encountered in March 1999, the volume of water discharge increased steadily and the concentration of TDS decreased. Also, at that time the mine began to have trouble passing the chronic Ceriodaphnia dubia toxicity test required by the UPDES permit. It was determined through extensive testing that the toxicity test was failed due to a slight increase in the nickel concentration in the water. The toxic limit of dissolved nickel concentration appeared to be 15 ug/l or greater and the water discharged from the mine in late 1999 until the end of 2001 contained a maximum of 42 ug/l dissolved nickel. These concentrations of dissolved nickel are well below drinking water standards. The significant inflow to the mine from the 10 Left area and changes of how water was handled underground resulted in a decline in TDS and dissolved nickel over time. As a result, the mine has been able to pass its chronic water testing. However, while the mine has been producing water with a TDS concentration less than 500 mg/l, the total volume of water discharged results in more than 7.1 tons/day of TDS released to Eccles Creek. The mine and the Utah Division of Water Quality are currently working on modifying the mine's UPDES discharge permit to limit the water discharged to a 500 mg/l concentration of TDS and no total ton per day limit.

A second UPDES permit is being obtained to operate the JC-3 mine dewatering well in James Canyon. This well will discharge high quality mine water to Electric Lake. PacifiCorp has seeked to obtain the UPDES permit from the Utah Division of Water Quality by May 1, 2003 and will act as the UPDES permit operator. However, since it is mine water, Skyline will be obligated under SMCRA to assure the quality of the water discharged is within the UPDES permit limits assigned to JC-3. Skyline will submit the required DMRs to the Division as required in Section 2.3.7.

Periodically due to difficult recovery conditions or roof collapse, mining equipment is abandoned underground. Prior to leaving equipment underground, hazardous materials and lubricating fluids are drained when possible. Since the equipment is steel and not too different compositionally from the roof support throughout the mine, contamination to ground water from abandoned equipment is not anticipated. A map illustrating the location of equipment left underground is provided as Drawing 2.3.6-2. The drawing includes a description of each piece of equipment.

Because of the high alkalinity and low acidity concentrations in the area (differing normally by two orders of magnitude), acid drainage problems do not occur as a result of mining. This is supported by the fact that coal in the area has a low sulphur content.

The amount of water that is discharged from the mine will equal the inflow minus that which is consumed in the mining operation (dust suppression and evaporation). Based on experience at Skyline Mine, the rate of water to be consumed is estimated to be 51,870,720 gallons per year (approximately 271 gpm). The projected discharged for Skyline during development and longwall mining of the North Lease and development of West Mains in Mine #2 is 2,800 g.p.m. Assumptions used in developing the discharge amount can be found in July 2002 Addendum to the PHC in Appendix F.

The water consumed in operating underground equipment, dust suppression, and evaporation is obtained from ground water sources within the mine. These underground water sources are not connected to the surface waters in the area. Extensive research has been performed by the mine to verify that water currently entering the mine is not coming from the surface or depleting surface waters. The recent July 2002 Addendum to the PHC presents data supporting this statement. The data suggests the water intercepted underground is at least 4,000 to 25,000 years old and is very slowly moving through the ground water system. Continued monitoring by the mine of the surface waters and seeps and springs flows in the permit and adjacent areas have shown no discernable impacts due to the increased mine inflows that were encountered in March 1999 and have continued through November 2002. It is the operator's position that the water consumed in operating Skyline Mine is not depleting surface water sources. In fact, there is an overall net gain to local river systems discharging to the Colorado River as a result of Skyline Mine discharge.

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.

However, the Permittee presently owns approximately 556 acre-feet of water rights in the Scofield Reservoir. Of these water rights, water sufficient for the Permittee's needs has been exchanged for rights from wells located near the mine site and at the mouth of Eccles Canyon for use in culinary and dust suppression water systems. Of this 556 acre-feet, a 148 acre-foot exchange has already been approved by the State Engineer of Utah.

It is recognized that seeps and springs are important to wildlife, particularly to small, less mobile species, and that flow reduction could potentially negatively impact these species. While flow reduction from mining related activities, including subsidence, is not expected to cause a problem, however, should such a loss be documented, mitigation measures will be taken after consultation with the Division of Oil, Gas and Mining and the Division of Wildlife Resources.

The Permittee will replace the water supply of any land owner if such a water supply proves to be contaminated, diminished or interrupted as a result of the Skyline mining operations. First, a determination will be made by the Division in accordance with R645 - 301- 731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, Skyline will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it was capable of supporting before subsidence damage. Negotiations will be held immediately with the impacted party to determine the appropriate mitigation activities. The restoration of water flows to impacted sources will be accomplished using the Best Technology Currently Available (BTCA). These activities may include, but not necessarily be limited to: piping or trucking water to the location of the loss; sealing surface fractures to prevent further losses (i.e., stream floors on bed rock or in shallow alluvium), and; construction of a ground water well and the installation of pumps to restore flows. If the above efforts are not successful, then Skyline will explore the transferring water rights to the injured party in flow equal to the determined loss and/or monetary reimbursement for proven material damages.

Historically, the mining activities at Skyline Mine have not resulted in the loss of surface waters or significant changes in the discharge of seeps and springs within the permit area. While significant volumes of ground water have been encountered while mining in the west and southwest portions of the permit area, no impacts to surface discharges of seeps and springs, the flow of streams, or bodies of water have been found. Age-dating of samples of water obtained from the mine indicate the water has been in place for several thousands of years. This suggests that ground water is moving very slowly through the area strata and does not discharge at a significant rate down gradient of the mine.

Very little ground water was encountered while mining in the northern portion of the existing permit area prior to the addition of the North Lease. The same geologic and hydrogeologic conditions are anticipated to occur in the North Lease as occurred in the northern portion of the existing permit area (Mine 3). Therefore, no significant inflows of ground water are anticipated as mining progresses into the North Lease area. Selected surface discharges of ground water and stream flows in the areas that could be impacted by mining activities will be monitored. Mining related subsidence is the only surface impact anticipated since no new surface facilities are currently planned for the North Lease area. If impacts to the waters within the permit area are determined to have occurred, mitigation will be implemented immediately using BTCA as described previously.

There has been some concern that Electric Lake has been impacted by the inflows of ground water to the Skyline Mine since 1998. As presented in the Addendum to the Probable Hydrologic Consequences, July 2002 and updated in October 2002, a direct connection between the water in Electric Lake and the mine inflows cannot be found. However, the water flowing into the 10 Left area of the mine and discharging from the James Canyon JC-1 well contains a slight percentage of tritium. No other significant inflows of ground water into the mine contained tritium levels that would suggest a modern component of recharge. As stated by Petersen (Appendix A, Addendum to the Probable Hydrologic Consequences, July 2002, Updated October 2002):

> "It is calculated that the maximum modern component in the fault-related system could range from approximately 6.9 to 12.4 percent. It is also apparent that since routine sampling of the 10 Left groundwater system began in May 2002, the percentage of modern recharge in the groundwater system has not increased. Based on the potential modern recharge percentage calculations presented above, it is determined that of the

total inflow to the 10 Left region (approximately 3,800 gpm), a maximum of approximately 262 to 471 gpm could have originated as modern recharge. Inasmuch as Canyon Fuel has been pumping approximately 2,200 gpm from the 10 Left groundwater system into Electric Lake since September 2001, the potential net impact to the Electric Lakewatershed, were it occurring, would be completely mitigated by the current pumping. Additionally, groundwater that would not otherwise be available for use without the pumping activity is being added to the watershed. Since October 2002, PacifiCorp has increased the pumping rate at JC-1 to more than 4,000 gpm. Thus, currently, the amount of groundwater being pumped into Electric Lake from JC-1 represents a volume approximately one order of magnitude greater than that which could potentially be derived from modern sources. It should be noted that there is currently **no** information that would indicate that the potential modern component in the fault-related mine inflows is directly or indirectly related to losses from Electric Lake."

Assuming the same percentages of modern versus ancient water applies to the water pumped from the JC-1 well, a maximum of approximately 152 gpm to 273 gpm could have originated as modern recharge. The maximum estimated volumes of modern recharge water being discharged to the mine and from the James Canyon well would be 744 gallons. This volume is still less than the approximately 2,200 gpm that JC-1 discharged to Electric Lake from September 2001 through September 2002. In October 2002, PacifiCorp negotiated with Skyline Mine to install a higher capacity pump in JC-1 well. The discharge after the new pump was installed was approximately 4,200 gpm. ~~It is anticipated this rate of discharge will continue at least for the next year.~~ The rate of discharge from JC-1 dropped to approximately 3,900 gpm in March of 2003 and should be sustained at that rate through at least 2003.

JC-3 will produce approximately 4,700 gpm upon completion in May 2003. This well will discharge water flowing into the mine in the 10 Left area as well as water piped from the 11 and 12 Left panel areas to the 10 Left area. Without the JC-3 well, the water would be pumped to Eccles Creek and not Electric Lake. The pumping of the JC-3 well could be considered to further mitigate for the maximum possible inflow of modern water to the mine. The JC-3 well is expected to be operated for at least several years or until the persistent drought conditions end.

If a determination were made that Skyline Mine impacted Electric Lake and upper Huntington Creek waters, the JC-1 and JC-3 wells would continue to be operated by the mine to discharge water into the Huntington Creek drainage. Thus, through the mine's effort to dewater the Star point Sandstone to allow for the continuation of mining in the southwest portions of Mine 2, specifically panels 11, 12A and 12B Left and to maintain the West Mains, any potential mitigation for the loss of water has been and continues to be accomplished.

2.5 HYDROLOGICAL IMPACTS OF MINING ACTIVITIES

Presented in the following subsections are summaries of the hydrological impacts of the mining activities of the Skyline project. The details backing the conclusions stated in this section and supplemental discussion can be found in the PHC evaluations included as part of this section, and within the Hydrology Section of Appendix Volume A-1 Volumes 1 and 2. Details of the consultant's flow calculations may be found in the flood plan calculations also in Appendix Volume A-1. The PHC was also updated in July 2002, October 2002, and April 2003 by the addition of the Addendum to the PHC associated with the drilling of the wells in James Canyon and the significant inflows to Mine #2.

The potential hydrologic impacts discussed herein represent the latest information available and, generally, correspond to the consultant's original report. (See General Hydrologic Consideration Related to Coal Development and Subsequent Impacts, Vaughn Hansen Associates, February 1981, found in Appendix Volume A-1. Updated analyses of the "Probable Hydrologic Consequences" reflecting all current data are appended to this section.

- **Exhibit A of Section 2.5**, "Probable Hydrologic Consequences of Mining at the Skyline Mines, Carbon and Emery Counties, Utah"; prepared by Earthfax Engineering, Inc., Salt Lake City, Utah; dated September 30, 1992.
- **Addendum to the Probable Hydrologic Consequences, July 2002 (James Canyon Update)**.
- **Appendix A-1, Volume 2** (September 2002), "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".

2.5.1 Potentially Affected Water Rights

Surface and groundwater rights in the general project area are primarily for stockwatering and irrigation. Stockwatering rights are located almost entirely and directly on the streams. The nearest irrigation rights are centered around the two areas of Scofield and in Flat Canyon, southwest of the permit area. Irrigated lands consist primarily of pasture. Only stockwatering rights are present in the Skyline permit area. A limited number of wells are located in the general area, none of which are located directly on the property or within the permit area. Recent large mine inflows to Mine #2 has resulted in concern voiced by local government and private interests that water entering the mine is coming from nearby Electric Lake. However, data collected and analyzed by Skyline Mine for the purpose of determining the source of the inflows strongly indicates there is no significant connection between the surface waters and the mine waters. As discussed in the July 2002 Addendum to the PHC (modified in October 2002 and April 2003), the Star Point does not transmit water easily. Fractures within the Star Point in the mine area has allowed the sandstone to begin dewatering by discharging to the mine. The Star point does not appear to have a significant discharge point located immediately down gradient of the mine. Indeed, the age of the water in the sandstone suggests it takes several thousand years to move through the aquifer in spite of the high transmissivity of the fractures within the sandstone. Therefore, it is unlikely any surface or ground water rights are being adversely affected. Because it is not certain that the ground water discharges into the Huntington Creek drainage, there is no evidence that water is being removed from that drainage to Eccles Creek, part of the Price River drainage. Tritium analysis of the water in the 10 Left area of Mine #2 and water from the James Canyon well JC-1 indicates a minor amount of modern water is being pumped from the well and the mine. However, this water is not necessarily originating from Electric Lake. Therefore, there does not appear to be a significant volume of surface water being transferred between drainage basins.

2.5.2 Mining Impact on Water Quantity

Due to the high shale content of the Blackhawk Formation, recharge to the deep ground water system through the Blackhawk Formation is slow. Fractures in the formation seal readily due to swelling of the bentonitic shale when wet. As a result, the impact of mining (including subsidence) on the quantity of water in the permit area will be minimal. This has been verified through the results of the study which is in Burnout Canyon. (A discussion of the mining impacts on the aquatic resources may be found in Section 2.8.) The Burnout Canyon study resulted in the determination that no significant impacts had occurred to the stream drainage as a result of mining induce subsidence. While the gradient of the stream was flattened in a few locations and slightly increased in others, the overall change in the stream morphology was not significantly different than changes that occur in 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 intents to petition the Forest to allow the undermining of Winter Quarters Canyon based on the positive results of the Burnout Canyon study. Skyline recognizes additional baseline data will need to be collected prior to receiving Forest permission to proceed with subsiding Winter Quarters Canyon. The current 2002 mine plans do not anticipated longwall mining in the Winter Quarters area thus allowing the mine time to obtain the needed baseline data.

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 channelized sandstone was encountered during mining of the southwestern permit area which produced approximately 1400 gpm. This was repeated at several locations in areas of Mine #2 until the mine was discharging approximately 8500 to 9500 gpm in August 2002 and 9000 to 10500 gpm in October 2002. Due to these large inflows of groundwater, the near future mining activities have been directed toward the North Lease area.

The PHC for the Skyline Mine was updated by an Addendum to the PHC dated July 2002 and further updated in October 2002 and April 2003. The addendum contains significant information regarding the large inflows to the mine. To better understand the hydrologic system and the water within the Star Point Sandstone, Skyline Mine contracted with Hydrologic Consultants, Inc. of Lakewood, Colorado produce a ground water model of the Star Point Sandstone. This model will endeavor to delineate the possible areal extent of the aquifer, the volume of water contained in the aquifer, and the potential sources and discharge locations of the aquifer. The model will be used to help determine what, if any, impacts are occurring to the waters available in mine area including State appropriated water rights. It is anticipated the model should be completed by mid-2003 and a copy of the report describing the results of the modeling effort will be added to the PHC.

As described in the July 2002 Addendum to the PHC, draining of the ground water contained within the Star Point Sandstone does not appear to have a significant impact on discharges of ground water in the mine or adjacent area nor does it appear that the water entering the mine is causing a loss of surface water in the Huntington or Price River drainages. The majority of the flows into the mine enter through faults and fractures that trend generally north-south to northeast-southwest. The flows move up through the floor of the mine in almost all cases. The water is apparently stored in the Star Point Sandstone under significant potentiometric head. Ages of the water indicate that water moves very slowly through the Star Point system in spite of the fractures and faults that appear to be open enough to allow water to flow freely into the mine in isolated locations. This suggests that the aquifer does not have a discharge point that releases large volumes of water nor is the aquifer replenished at a high rate of inflow. While the Star Point is exposed in out crop north, south, and east of the mine, significant volumes of water would need to be entering the system at an elevation great enough to create the potentiometric head encountered in the Star Point beneath the Mine #2 workings. Skyline continues to monitor stream flows in Winter Quarters, Eccles, and Mud Creeks to identify any impacts if they occur in these drainages related to the mine inflows.

No springs or water production wells in the mine permit or adjacent areas have reportedly been negatively impacted by the large mine inflows. There has been some concern voiced by local government and private interests that water entering the mine is coming from nearby Electric Lake. However, data collected and analyzed by Skyline Mine for the purpose of determining the source of the inflows strongly indicates there is no significant connection between the surface waters and the mine waters. As stated previously, this is discussed at length within the July 2002 Addendum to the PHC.

Water encountered in the mine is either utilized underground as processed water or is pumped from the mine. Procedures for handling of mine water are discussed in detail in Section 3.2. Indigenous water associated with the coal will be removed from the area. This, however, will represent only a small fraction compared to the water flowing from the Wasatch Plateau. The water pumped from the mine is added to the flow of Eccles Creek and into Electric Lake and has a positive effect on the aquatic flow systems.

The construction of surface facilities utilized in conjunction with the Skyline Mines (yard areas, roads, conveyor lines, etc.) resulted in temporary increases in the suspended sediment concentration of the adjacent stream. However, because of the regulatory requirement that sediment control measures be provided for all areas of surface disturbance, concentrations of suspended material were significantly reduced. Minimization efforts, however, met with varying degrees of success.

Over long periods of time, groundwater in the Wasatch Plateau can be expected to flow towards the lowlands if not removed, passing through saline shales and emerging to augment streamflow with a dissolved solids content that significantly exceeds the concentrations found in the headwaters area. Because the Skyline Mines will act as interceptor drains, the groundwater that is brought to the surface from the mines has a much lower dissolved solids content than would have existed if the water was to continue its downward movement through shaley layers. Thus, the mines will have some beneficial impact on the chemical quality of water in the region.

The increased stream flow resulting from mine discharges, particularly during the summer low flow period, appears to benefit the Eccles Creek fishery by creating flow and temperature stabilization. The increased flows to Scofield Reservoir most likely benefitted the fish population in the lake by maintaining a sufficient level of dissolved oxygen to avoid a general fish kill that frequently occurs in the lake during periods of drought periods, such as has been occurring in the mine area since 2000. The mine has also been discharging large volumes of water since August 2002 with TDS concentrations only slightly higher than background levels. This good quality water flows to and is stored in Scofield Reservoir. The water stored in Scofield Reservoir is used for culinary and irrigation purposes in Helper, Price, and Wellington, Utah. The State Engineers office in Price, Utah indicated that without the additional discharge from Skyline Mine to the Price River drainage, the reservoir would have been at a dead pool level in late August of 2002, thus cutting short the irrigation season downstream.

Similarly, discharges to Electric Lake will be an overall benefit to the water users on Huntington Creek. The discharge of high quality water from mine dewatering wells JC-1 and JC-3 will increase the volume of water in Electric Lake, provide additional cooling water for the Huntington Power Plant, and provide additional irrigation water for agricultural uses in Emery County. Without the additional discharge of water to Electric Lake from the James Canyon wells, it is possible that in the summer and fall of 2003, the Huntington Power Plant would need to significantly scale back the production of electrical power due to insufficient cooling water. A reduction in power generation from the plant would have significant economic impacts on Carbon and Emery Counties from the loss of jobs and an increase in power rates for consumers of power generated by PacifiCorp. The large volume of ground water inflow to the mine has resulted in the mine discharging significantly greater volume of water than were initially anticipated when the mine was planned and opened. The current mine UPDES permit was written when flows were expected to be less than 1000 gpm and limits on total dissolved solids (TDS) were created based on this volume of flow. A 7.1 ton/day limit of TDS was assigned to the mine with a maximum TDS concentration of 1310 mg/l TDS. It was not unusual for the mine, prior to March 1999 to discharge water with 1000 mg/l TDS. However, after the large inflows into the mine were encountered in March 1999, the volume of water discharge increased steadily and the concentration of TDS decreased. Also, at that time the mine began to have trouble passing the chronic Ceriodaphnia dubia toxicity test required by the UPDES permit. It was determined through extensive testing that the toxicity test was failed due to a slight increase in the nickel concentration in the water. The toxic limit of dissolved nickel concentration appeared to be 15 ug/l or greater and the water discharged from the mine in late 1999 until the end of 2001 contained a maximum of 42 ug/l dissolved nickel. These concentrations of dissolved nickel are well below drinking water standards. The significant inflow to the mine from the 10 Left area and changes of how water was handled underground resulted in a decline in TDS and dissolved nickel over time. As a result, the mine has been able to pass its chronic water testing. However, while the mine has been producing water with a TDS concentration less than 500 mg/l, the total volume of water discharged results in more than 7.1 tons/day of TDS released to Eccles Creek. The mine and the Utah Division of Water Quality are currently working on modifying the mine's UPDES discharge permit to limit the water discharged to a 500 mg/l concentration of TDS and no total ton per day limit.

A second UPDES permit is being obtained to operate the JC-3 mine dewatering well in James Canyon. This well will discharge high quality mine water to Electric Lake. PacifiCorp has sought to obtain the UPDES permit from the Utah Division of Water Quality by May 1, 2003 and will act as the UPDES permit operator. However, since it is mine water, Skyline will be obligated under SMCRA to assure the quality of the water discharged is within the UPDES permit limits assigned to JC-3. Skyline will submit the required DMRs to the Division as required in Section 2.3.7.

Periodically due to difficult recovery conditions or roof collapse, mining equipment is abandoned underground. Prior to leaving equipment underground, hazardous materials and lubricating fluids are drained when possible. Since the equipment is steel and not too different compositionally from the roof support throughout the mine, contamination to ground water from abandoned equipment is not anticipated. A map illustrating the location of equipment left underground is provided as Drawing 2.3.6-2. The drawing includes a description of each piece of equipment.

Because of the high alkalinity and low acidity concentrations in the area (differing normally by two orders of magnitude), acid drainage problems do not occur as a result of mining. This is supported by the fact that coal in the area has a low sulphur content.

The amount of water that is discharged from the mine will equal the inflow minus that which is consumed in the mining operation (dust suppression and evaporation). Based on experience at Skyline Mine, the rate of water to be consumed is estimated to be 51,870,720 gallons per year (approximately 271 gpm). The projected discharged for Skyline during development and longwall mining of the North Lease and development of West Mains in Mine #2 is 2,800 g.p.m. Assumptions used in developing the discharge amount can be found in July 2002 Addendum to the PHC in Appendix F.

The water consumed in operating underground equipment, dust suppression, and evaporation is obtained from ground water sources within the mine. These underground water sources are not connected to the surface waters in the area. Extensive research has been performed by the mine to verify that water currently entering the mine is not coming from the surface or depleting surface waters. The recent July 2002 Addendum to the PHC presents data supporting this statement. The data suggests the water intercepted underground is at least 4,000 to 25,000 years old and is very slowly moving through the ground water system.

Continued monitoring by the mine of the surface waters and seeps and springs flows in the permit and adjacent areas have shown no discernable impacts due to the increased mine inflows that were encountered in March 1999 and have continued through November 2002. It is the operator's position that the water consumed in operating Skyline Mine is not depleting surface water sources. In fact, there is an overall net gain to local river systems discharging to the Colorado River as a result of Skyline Mine discharge.

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.

However, the Permittee presently owns approximately 556 acre-feet of water rights in the Scofield Reservoir. Of these water rights, water sufficient for the Permittee's needs has been exchanged for rights from wells located near the mine site and at the mouth of Eccles Canyon for use in culinary and dust suppression water systems. Of this 556 acre-feet, a 148 acre-foot exchange has already been approved by the State Engineer of Utah.

It is recognized that seeps and springs are important to wildlife, particularly to small, less mobile species, and that flow reduction could potentially negatively impact these species. While flow reduction from mining related activities, including subsidence, is not expected to cause a problem, however, should such a loss be documented, mitigation measures will be taken after consultation with the Division of Oil, Gas and Mining and the Division of Wildlife Resources.

The Permittee will replace the water supply of any land owner if such a water supply proves to be contaminated, diminished or interrupted as a result of the Skyline mining operations.

First, a determination will be made by the Division in accordance with R645 - 301- 731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, Skyline will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it was capable of supporting before subsidence damage. Negotiations will be held immediately with the impacted party to determine the appropriate mitigation activities. The restoration of water flows to impacted sources will be accomplished using the Best Technology Currently Available (BTCA). These activities may include, but not necessarily be limited to: piping or trucking water to the location of the loss; sealing surface fractures to prevent further losses (i.e., stream floors on bed rock or in shallow alluvium), and; construction of a ground water well and the installation of pumps to restore flows. If the above efforts are not successful, then Skyline will explore the transferring water rights to the injured party in flow equal to the determined loss and/or monetary reimbursement for proven material damages.

Historically, the mining activities at Skyline Mine have not resulted in the loss of surface waters or significant changes in the discharge of seeps and springs within the permit area. While significant volumes of ground water have been encountered while mining in the west and southwest portions of the permit area, no impacts to surface discharges of seeps and springs, the flow of streams, or bodies of water have been found. Age-dating of samples of water obtained from the mine indicate the water has been in place for several thousands of years. This suggests that ground water is moving very slowly through the area strata and does not discharge at a significant rate down gradient of the mine.

Very little ground water was encountered while mining in the northern portion of the existing permit area prior to the addition of the North Lease. The same geologic and hydrogeologic conditions are anticipated to occur in the North Lease as occurred in the northern portion of the existing permit area (Mine 3). Therefore, no significant inflows of ground water are anticipated as mining progresses into the North Lease area. Selected surface discharges of ground water and stream flows in the areas that could be impacted by mining activities will be monitored. Mining related subsidence is the only surface impact anticipated since no new surface facilities are currently planned for the North Lease area. If impacts to the waters within the permit area are determined to have occurred, mitigation will be implemented immediately using BTCA as described previously.

There has been some concern that Electric Lake has been impacted by the inflows of ground water to the Skyline Mine since 1998. As presented in the Addendum to the Probable Hydrologic Consequences, July 2002 and updated in October 2002, a direct connection between the water in Electric Lake and the mine inflows cannot be found. However, the water flowing into the 10 Left area of the mine and discharging from the James Canyon JC-1 well contains a slight percentage of tritium. No other significant inflows of ground water into the mine contained tritium levels that would suggest a modern component of recharge. As stated by Petersen (Appendix A, Addendum to the Probable Hydrologic Consequences, July 2002, Updated October 2002):

> "It is calculated that the maximum modern component in the fault-related system could range from approximately 6.9 to 12.4 percent. It is also apparent that since routine sampling of the 10 Left groundwater system began in May 2002, the percentage of modern recharge in the groundwater system has not increased. Based on the potential modern recharge percentage calculations presented above, it is determined that of the
>
> total inflow to the 10 Left region (approximately 3,800 gpm), a maximum of approximately 262 to 471 gpm could have originated as modern recharge. Inasmuch as Canyon Fuel has been pumping approximately 2,200 gpm from the 10 Left groundwater system into Electric Lake since September 2001, the potential net impact to the Electric Lake watershed, were it occurring, would be completely mitigated by the current pumping. Additionally, groundwater that would not otherwise be available for use without the pumping activity is being added to the watershed. Since October 2002, PacifiCorp has increased the pumping rate at JC-1 to more than 4,000 gpm. Thus, currently, the amount of groundwater being pumped into Electric Lake from JC-1 represents a volume approximately one order of magnitude greater than that which

could potentially be derived from modern sources. It should be noted that there is currently **no** information that would indicate that the potential modern component in the fault-related mine inflows is directly or indirectly related to losses from Electric Lake."

Assuming the same percentages of modern versus ancient water applies to the water pumped from the JC-1 well, a maximum of approximately 152 gpm to 273 gpm could have originated as modern recharge. The maximum estimated volumes of modern recharge water being discharged to the mine and from the James Canyon well would be 744 gallons. This volume is still less than the approximately 2,200 gpm that JC-1 discharged to Electric Lake from September 2001 through September 2002. In October 2002, PacifiCorp negotiated with Skyline Mine to install a higher capacity pump in JC-1 well. The discharge after the new pump was installed was approximately 4,200 gpm. The rate of discharge from JC-1 dropped to approximately 3,900 gpm in March of 2003 and should be sustained at that rate through at least 2003.

JC-3 will produce approximately 4,700 gpm upon completion in May 2003. This well will discharge water flowing into the mine in the 10 Left area as well as water piped from the 11 and 12 Left panel areas to the 10 Left area. Without the JC-3 well, the water would be pumped to Eccles Creek and not Electric Lake. The pumping of the JC-3 well could be considered to further mitigate for the maximum possible inflow of modern water to the mine. The JC-3 well is expected to be operated for at least several years or until the persistent drought conditions end.

If a determination were made that Skyline Mine impacted Electric Lake and upper Huntington Creek waters, the JC-1 and JC-3 wells would continue to be operated by the mine to discharge water into the Huntington Creek drainage. Thus, through the mine's effort to dewater the Star point Sandstone to allow for the continuation of mining in the southwest portions of Mine 2, specifically panels 11, 12A and 12B Left and to maintain the West Mains, any potential mitigation for the loss of water has been and continues to be accomplished.

Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.

JAMES CANYON DISTURED AREA MAP - PLATE 3.4-1

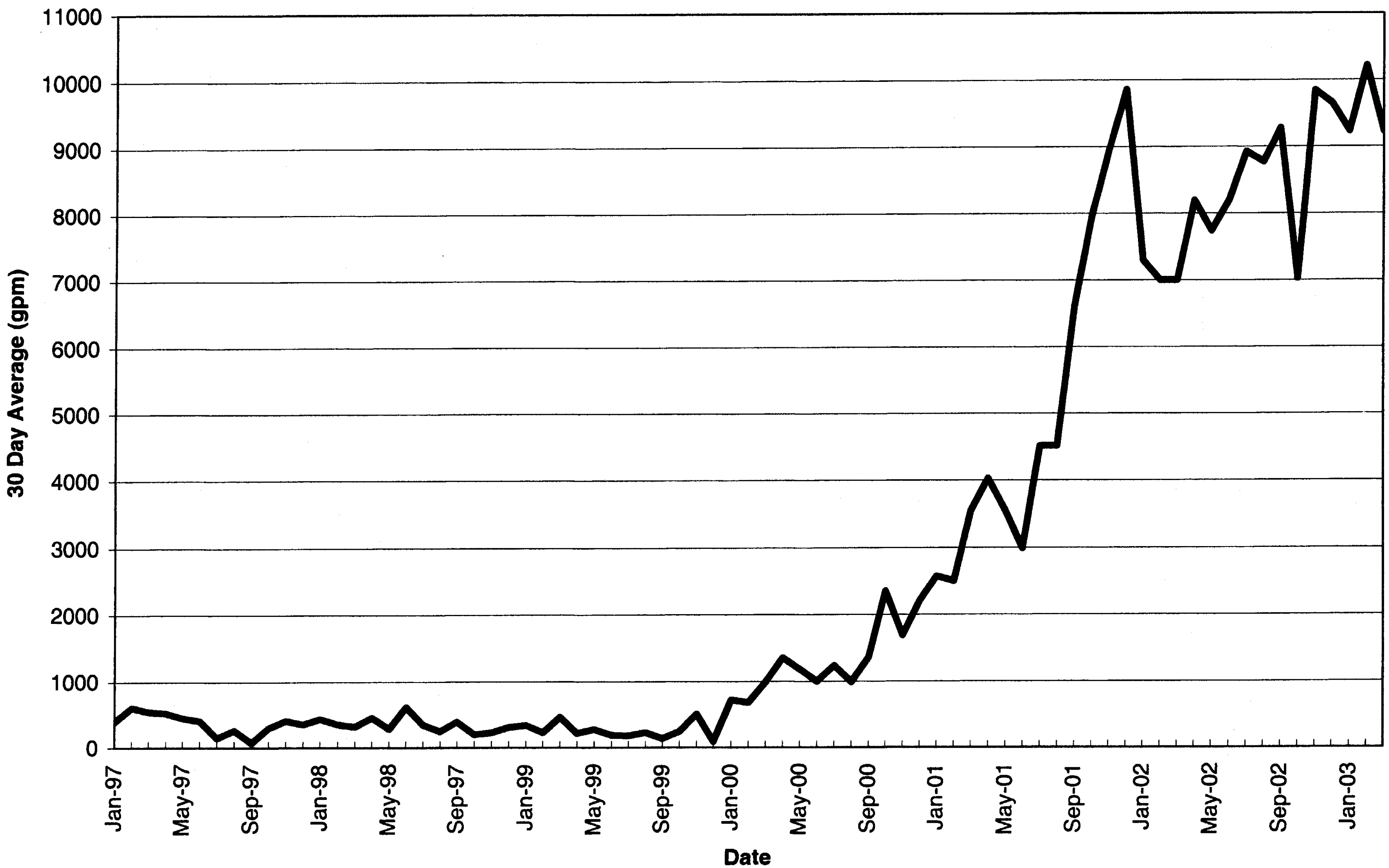
Introduction

This addendum to the Probable Hydrologic Consequences (PHC) has been included in this permit to address the effects of recent ground water inflows into the active mine workings of Skyline Mine 2, the completion of ~~two~~three ground water wells in James Canyon near the southwest extent of current mining constructed to alleviate mine in-flows, and the effects of discharging significant volumes of water to both Eccles Creek and Electric Lake. This addendum describes the effects to the surface waters and ground waters within the permit and adjacent areas of the recent inflows to the mine and the pumping of the James Canyon wells. This addendum contains this introduction, a discussion of the recent mine inflows, the effects of the flows on both surface and ground water, and conclusions. Appendices to this addendum contain graphs, discussions, and tables concerning monitoring data of numerous spring, well, and stream monitoring sites, reports by consultants related to water issues at Skyline, and reports prepared by or for State agencies regarding the water quality of Scofield Reservoir. This addendum is included as supplemental information to the existing PHC and, in some cases, updates or supercedes information provided in the existing PHC. It is important to bear in mind while reviewing the consultants reports included in this addendum that data collected after publication of the reports may have resulted in updates and refinements to previous theories and conclusions.

History of Recent Inflows

Prior to January 1999, Skyline Mine discharged exclusively to Eccles Creek, a Price River tributary, at an average rate of approximately 350 gpm or less of water intercepted during mining (Figure PHC A-1). This volume was somewhat representative of the average inflows of ground water into the mine. Significant new inflows were encountered in March of 1999 during the development of the south end of the 14 Left panel in Mine 2 (Drawings PHC A-1 and PHC A-2). Ground water flowed into the mine from a small displacement fault at a rate of approximately ~~2,000~~ 1,600 gpm. Initially the water flowed from both the roof and floor but soon only discharged from the floor. The water was captured and pumped to the abandoned workings of Mine 1 and Mine 3 (Drawing PHC A-2). Mine personnel anticipated that this inflow,

FIGURE PHC A-1
SKYLINE MINE DISCHARGE



as with other past previous significant inflows, would soon diminish and possibly cease altogether. However, in December 1999, another water producing fault was encountered in the headgate of the 16 Left panel. The inflow from this fault was initially estimated to be greater than 2,000 1200 gpm and resulted in significant mine flooding. This new water was also pumped to the abandoned Mine 1 and Mine 3 workings. By January 2000, the abandoned Mine 3 workings were flooded and water was pumped from behind the Mine 3 seals to the mine site sediment pond. Eventually, the water was pumped to the overflow structure of the sediment pond and directly to Eccles Creek. Water discharge rates from the mine to Eccles Creek were generally between 700 gpm and 1,200 gpm until September 2000. In March 2000, approximately 1,2000 gpm of ground water was encountered in the West Submains near the head of 8 Left (Drawing PHC A-2). Water discharge rates from the mine to Eccles Creek were generally between 700 gpm and 1,200 gpm until September 2000. Pumping and piping changes made underground allowed the mine to discharge more of the stored water from Mines 1 and 3 and mine discharge flows reached about 2,400 gpm in March of 2001.

Additional mine inflows were encountered during development mining in the 9 Left panel area in March of 2001. At nearly the same time, additional pumping capacity was added to the mine water system allowing more of the water stored in Mine 1 and Mine 3 to be discharged. This increased the total discharge from the mine from 2,400 gpm to between 3,500 to 4,500 gpm. Significant water inflows were encountered in the development of the 10 Left panel of Mine 2 in August 2001. The new inflows from this area of the mine alone were initially estimated to be approximately 6,000 to 6,500 gpm but shortly thereafter stabilized at about 4,500 gpm. The new water flooded significant portions of the mine, caused a halt in production, and required emergency action by the mine to deal with the water. Several tens of miles of 128- to 228-inch diameter steel and HDPE pipe were laid within the mine to pump water to other active and inactive workings as well as to the surface and Eccles Creek.

In February and March of 2002, three additional inflows of approximately 1,000 gpm to 1,500 gpm were encountered in the headgate and set-up room of the 11 Left panel (Drawing PHC A-2). Also, Decreases in the flow rates of the 14 Left, 16 Left, and 10 Left ground water inflows have occurred over time. As of June 2002, the flow rates in the 14 Left and 16 Left had dropped to approximately 800 gpm each (these areas are not accessible as of June 2002). The flow rates in the 10 Left area in the first week of July 2002 appeared to have dropped to approximately 4,700 gpm or less. In the last week of September 2002, the inflows in the 10 Left area were estimated to be approximately 3,200 to 3,800 gpm.

~~The total discharge rate from the mine in June 2002 averaged approximately 8,200 gpm but measurements in the first week in July indicated that discharges have increased to approximately 9,200 gpm.~~In October 2002, the 10 Left area was sealed and flooded. The 10 Left and 9 Left areas were allowed to partially fill with water up to the entrance of the 8 Left panel. Seals and a containment dam were built in this area and the water is pumped from behind the seals to Eccles Creek.

The total discharge rate from the mine in June 2002 averaged approximately 8,200 gpm but measurements in the first week in July indicated that discharges increased to approximately 9,200 gpm due primarily to the draining of Mines #1 and #3. From July to September 2002, the discharge volume fluctuated between approximately 8,400 gpm and 9,400 gpm~~. The~~ due to an increase in ~~total mine discharge is related to the~~ new ground water inflows encountered in the 11 Left panel. While this water was originally encountered in February and March 2002, a great deal of time was involved in getting pumps, piping, and the collection systems set up. Frequently, water from new inflow locations encountered during mining is sent to gob areas such as the 14, 15, and 16 Left panels or the abandoned portions of Mines 1 and 3 to allow for the suspended load to drop out of the water column. ~~Currently, water~~Water removed from the active mine faces in the 11 Left panel ~~is~~has been pumped both to the south end of the 14, 15, and 16 Left gob areas and to Mine 1. ~~Water~~Until October 2002, water in the 14, 15 and 16 Left gob area ~~is~~was picked up on the north end of the panels and pumped to the surface to temporary sand filters. After the water ~~passes~~passed through the sand filters, it ~~is~~was discharged directly to Eccles Creek. The portion of the water pumped to Mine 1 ~~is~~ dropped into the southeast end of panels 1 Right, 2 Right, and 3 Right. This water ~~moves~~moved through the gob and passed through 2-inch diameter drill holes ~~drops down drill holes that~~ connecting Mine 1 with Mine 3 at the west-northwest end of each ~~the~~ panel~~s~~ (Drawing PHC A-2). Eventually, this water ~~is~~was pumped from Mine 3 and directly to Eccles Creek. Water pumped from the 10 Left area and the West Submains ~~contains~~contained very little suspended load and ~~is currently~~was pumped directly to temporary sand filters and then to Eccles Creek. Table PHC A-1 summarizes this information.

Skyline Mine sealed~~abandoned~~ the 8, 9, and 10 Left area of the mine in September 2002 and flows from this portion of the mine ~~should be~~were reduced by approximately ~~40~~20 % as the area ~~floods~~flooded and hydrostatic head ~~builds~~built on the inflow point. Additionally, while the 10 Left area ~~floods~~flooded, a ~~loss~~descrease of about 3,200 to 3,800 gpm of mine discharge ~~may occur~~occurred for about ~~30~~24 days. ~~Once~~Seals and a retention dam were built at the ~~area floods, it is anticipated that as little as 2,400 gpm will need to be pumped from the flooded area of 10~~entrance to 8 Left Diagonal Mains~~.~~

TABLE PHC A-1

MINE INFLOWS				
Location	Initial Volume gpm	Date	Current Volume April 2003	Current Discharge Location
14 Left Headgate Fault	1800	Mar-99	300	Eccles Creek
16 Left Headgate Fault	1600	Dec-99	300	Eccles Creek
West Submains Fault - Currently referred to as the Diagonal Fault	1000	Mar-00	300	Eccles Creek
10 Left Fault	6500	Aug-01	3200	Eccles Creek
East Submains XC 5 - Currently referred to as West Submains	1000	Oct-01	370	Eccles Creek
11 Left Headgate XC 24	1000	Feb-02	1000	Eccles Creek
11 Left Headgate XC 40	1000	Feb-02	1500	Eccles Creek
11 Left Set-up Room	1500	Mar-02	1300	Eccles Creek

Revised 4/2002

~~Skyline Mine also anticipates dewatering a portion of the abandoned Mine 3 workings in advance of mining new areas~~ and pumps were installed to take water from behind the seals and discharge it to ~~the north~~Eccles Creek. Also, the majority of the clean water encountered in the 11 and 12 Left areas of the mine is pumped behind the 8 Left seals. This allowed for a simplified pumping system to be installed where most of the water encountered in the southwest area of the mine could be picked-up at one location and pumped to Eccles Creek. The water laden with coal fines generated during mining activities in the 11 and 12 Left panel areas is pumped through a horizontal borehole into the 14, 15, and 16 Left sump.

In October 2002, the sand filters were removed from the mine water discharge system since the 14, 15, and 16 Left sump was fully functional and the 8, 9, and 10 Left areas were sealed. All water carrying suspended solids is directed through underground sump systems and allowed settling time before discharge. This allowed the mine to remove the expensive sand filtering systems and still discharge water without suspended loads and compliant with the Mine's UPDES Permit.

Skyline Mine has removed a portion of the water previously stored in the abandoned Mine 3 workings in advance of mining new areas to the north. The dewatering ~~will start~~started about the same time as the 10 Left flooding ~~occurs~~occurred. Dewatering ~~will be~~is accomplished by withdrawing ~~1,500~~ 1,100 to 2,000 gpm of water from Mine # 3 through a series of in-mine horizontal boreholes. ~~Therefore, while total ground~~It is anticipated that the Mine #3 dewatering project will reach a point in late April 2003 where the volume of water ~~inflows~~discharged from that mine ~~the~~will begin to ~~may diminish (10 Left), significant drops in mine discharges in the next several months may be short lived~~significantly diminsh as the level of water stored drops.- Overall, if new ground water inflow points are not encountered in panels 12 Left A and 12 Left B, mine discharge should diminish gradually over time. Experience has shown that new water inflows occur in gate roads as panels are developed, not from the areas that are being lonwalled. All development in the 12 Left A and B panels has been completed and only longwall extraction remains to be accomplished. Therefore, no new inflows are expected in this area of the mine.

The proposed timetable for abandoning the mined out areas of Mine #2 has been included with this document as Appendix F. This timetable was prepared on October 1, 2002 and distributed at Skyline Mine in the form of an Internal Correspondence addressed to the Mine Manager. Four figures accompanied the document and illustrated the locations within the mine to be abandoned and flooded. The document itself discusses the timing of abandonment, the location of present significant inflows into the mine with initial and current estimated inflow rates, and anticipated inflow rates after flooding has occurred. Following is a brief discussion regarding the timing of mining and flooding of the mined areas of Mine #2.

The 10 Left area of Mine #2 was abandoned in late September 2002. The pumps that were used to remove water from the 10 Left area and the southern portions of the 8 Left and 9 Left panels were removed. Seals were constructed at the ~~head of~~ entrance to the 8 Left panel and Diagonal Mains where the water was expected to rise and pump stations were established to handle the water once it flooded the 10 Left and western portions of the 9 Left panels. The initial estimate of the volume of water to be pumped from these seals ~~is~~was approximately 2500 gpm. However, actual volume was estimated to be slightly more than 3000 gpm after the area was flooded. The 10 Left area of the mine was abandoned to reduce the cost of maintaining a mined out portion of the mine and improve mine ventilation.

Skyline Mine continues to mine the 11 Left panel and will mine the 12 Left A and 12 Left B panels. It is anticipated these panels will be completely mined and the area sealed by March 2004. Seals will be built at the head of the 7 Left panel and the 7 Left, 8 Left, 11 Left, 12 Left A, and 12 Left B areas of the mine will be flooded. Without operating JC-3, the volume of water that is estimated to be pumped from the 7 Left seals is approximately 4200 gpm. With JC-3 operational, the volume of water to be pumped from the 7 Left seals may be less than 1,000 gpm.

By June 2002, the 6 Left B panel will be completely mined and seals will be built to completely seal the mined areas south of the West Mains (panels 1 Left through 6 Left). By the end of 2004, the only areas of Mine #2 that will be ventilated will be the West Mains to allow access to the 14, 15, 16 Left sump. Leaving these mains open will allow access to the area west of sump if additional mining is deemed economically feasible. Pumps will be stationed at the seals near the head of the 6 Left panel and it is anticipated that water may be pumped from the seals at a rate of approximately 2900 gpm.

Once mining is completed at Skyline and the mine abandoned, the water level in the flooded portions of the mine may reach as high as approximately 8550 feet above sea level. Since the lowest most portal is approximately 8580 feet above sea level, it is not anticipated water will discharge from the mine.

~~Skyline continues to discharge water intercepted underground to Eccles Creek at the mine's UPDES permitted discharge site. The mine currently has no plans to discharge mine water to Electric Lake. However, PacifiCorp has been studying the possibility of developing a well into the 10 Left area of the mine. Several problems will need to be solved before this type of well can be approved. Water quality will be the single largest issue since Electric Lake is classified as a Category II water and cannot accept water of lesser quality than already is in the lake.~~

In addition to pumping water from within the mine to Eccles Creek, two ground water wells were drilled and completed in James Canyon in September and October 2001 (Drawings PHC A-1 and PHC A-3). JC-1 was completed with 14-inch casing and screen while JC-2 was completed with 20-inch casing and screen. Both wells were screened in the Star Point Sandstone approximately 70 feet below the current mine workings in the Lower O'Conner B seam. JC-1 encountered a significant fracture and initially produced about 2,200 gallons per minute using a 600 hp down hole electric pump. JC-2 did not encounter significant fractures and produced approximately 320 gpm using a 300~~250~~ hp down hole electric pump. JC-2 was operated for only a short period of time and has not operated since December 2001.

In October 2002, PacifiCorp ~~was allowed by the mine to~~ installed a new pump into the JC-1 well and it is currently producing approximately 4,200 gpm. This new pump was placed in the well to increase the discharge of ground water to Electric Lake to further decrease the volume of water flowing into the mine workings at 10 Left and to increase water available to downstream water users including the Huntington Power Plant. It is anticipated this pump will be operated at least for one year. Operation of the pump beyond that time will depend on how fast the lake refills during spring runoff and the length of time Skyline Mine plans to be mining in the area.

~~Water discharged from the wells is piped from the James Canyon well site to Electric Lake in~~In March and April of 2003, PacifiCorp was drilling a ~~buried 16-inch HDPE pipe~~third well, JC-3, at

the James Canyon well site to intercept the mine workings in the 10 Left area. The purpose of this well is to remove water from the mine as close as possible to its inflow point in 10 Left and discharge it to Electric Lake. The JC-3 well will have a down hole casing diameter of 24-inch and will be screened through the mine works. The well will be completed to a total depth of approximately 350 feet below the mine workings to provide the head required by the pump. PacifiCorp, with Skyline Mines aid, is obtaining a UPDES discharge permit to allow discharge of mine water to the lake. It is anticipated the well will be pumped at a maximum rate of 4,700 gpm.
It will be outfitted with a variable frequency drive to allow lower volumes to be pumped.

Water discharged from JC-1 and JC-3 is piped from the James Canyon well site to Electric Lake through a buried 16-inch HDPE pipe. When initially constructed in September 2001, the end of the 16-inch pipe was submerged approximately 8 feet below the water level of Electric Lake. A 90-degree elbow was attached to the pipe at approximately 45 degrees above horizontal to avoid disturbing sediments on the bottom of the lake. However, continuing drought conditions in 2001 and 2002 resulted in the lake water level dropping below the end of the discharge pipe. A small area of lake sediments were washed away and the water discharged onto large rocks and cobbles on the surface of the pre-lake ground surface, in effect creating its own rip-rapped energy dissipation area.

The James Canyon wells are ~~not connected to the mine workings and are~~ considered to be mine dewatering wells. ~~The Utah Division of Water Quality does not consider these wells to require a~~A UPDES permit, however, is only ~~at this time~~required for the discharge of JC-3 since ~~only ground~~this is the only water ~~is discharged~~coming directly from the ~~wells~~mine works.
JC-1 and JC-2 are completed in the Star Point Formation and do not intercept the mine works.

A geologic cross section through wells/drill holes W2-1, JC-1, JC-2, W79-35-1, 75-26-3, 74-26-2, and 79-22-1 has been provided as Drawing PHC A-4. The location of the mined coal seams, faults, apparent dip of the beds along the cross section, and a site index map are provided. Also, the location of the mine in-flows of ground water have been projected horizontally to the cross sections. The location of selected springs have been illustrated on the cross section. The elevation of Electric Lake and the dates these measurements were taken are illustrated on the wells with ground water levels.

Effects of Intercepted Water within the Mine on the Local Ground Water Systems

Skyline Mine has continued to monitor ground and surface water flows at all of the Mining and Reclamation Plan (M&RP) required water monitoring sites. No discernable impacts to surface springs or surface waters from the increased ground water inflows to the mine has been observed to date. Specifically, quarterly flow monitoring of seeps and springs in ~~both~~ the Huntington Creek drainage area indicates the significant inflows of ground water to the mine and pumping of the wells in James Canyon has not had an observable effect on ground water discharges in these areas. Furthermore, historical spring and seep data do not indicate a reduction in spring, seep and stream flows related to mining.

Included in this document in Appendix A are several graphs generated from measurements of springs and stream flows and well water levels located throughout the Skyline Mine permit area. Each graph illustrates the discharge or water levels compared to the Palmer Hydrologic Drought Index (PHDI) for Region 5, which includes the mine area, from 1982 to May 2002. Data from the following springs, stream, and well monitoring locations have been graphed: springs S15-3, S22-11, S24-12, S26-13, S34-12, S35-8, S36-12, 2-413; stream monitoring point Burnout Creek F-5; and wells W2-1, W20-4-1, W20-4-2, W99-28-1, W99-21-1,W79-14-2A, W79-10-1, W79-35-1A, W79-35-1B, and W79-26-1. Also, a single graph illustrating the water levels in W79-35-1A, W79-35-1B, W2-1 and the PHDI is presented to compare the effects of mine dewatering on the three wells. Graphs of transducer data for wells W79-35-1A, W20-4-1, and W2-1, which are completed in the Starpoint Sandstone beneath the mine, are presented to illustrate in greater detail the recent draw down of the wells. These last three graphs can be found following the graphs containing the PHDI. Accompanying each spring, stream and well graph is a brief comparison of the discharge or water level and the PHDI. Table PHC A-2 contains a summary of the well completion and water level measurement data for the Skyline Mine water monitoring wells.

TABLE PHC A-2

WELL SUMMARY DATA

Well Designation	Other Designation	In Monitoring Plan, yes/no	Formation Name & Type	Screened Interval, Top & Bottom Elevations, Mean Sea Level	Date & Current Water Level Elevation, Mean Sea Level	Historical Range of Water Level Elevation, Mean Sea Level	Name of Associated Coal Seam	Vertical Distance From Screened Interval to Associated Coal Seams (Above or Below)	Well Location, Township, Range, & Section
W10-1	W79-10-1A*	Yes	Star Point - Sandstone (Storrs Tongue)	7393.0-7373.0	5 Sept. 2002, 9017.3	9034.6-8891.7	Lower O'Connor "A"	Through Coal Seam	T 13 S, R 6 E, Sec. 10
	W79-10-1B	No							T 13 S, R 6 E, Sec. 10
W14-2	W79-14-2A*	Yes	Star Point - Sandstone (Storrs Tongue)	8342.0-8322.0	5 Sept.2002, 8947.5	8992.64-8963.1	Lower O'Connor "A"	Through Coal Seam	T 13 S, R 6 E, Sec. 14
	W79-14-2B	No							T 13 S, R 6 E, Sec. 14
	W79-22-2-1	No							T 13 S, R 6 E, Sec. 22
W22-2	W79-22-2-2	No							T 13 S, R 6 E, Sec. 22
W26-1	W79-26-1*	Yes	Blackhawk - Sandy Siltsone	8411.0-8391.0	15 Aug 2002, 8919.2	8976.5-8902.9	Lower O'Connor "B"	Through Coal Seam	T 13 S, R 6 E, Sec. 26
W35-1	W79-35-1A*	Yes	Star Point - Sandstone (Storrs Tongue)	8092.0-8072.0	10 Sept 2002, 88381.6	8557.4-8195.19	Lower O'Connor "A"	5' Below Coal Seam	T 13 S, R 6 E, Sec. 35
	W79-35-1B	Yes	Blackhawk - Sandy Siltsone	8542.4-8504.4	10 Sept 2002, 8552.7	8591.5-8547.9	Not associated with coal seam		T 13 S, R 6 E, Sec. 35
W2-1	98-2-1	Yes	Blackhawk - Sandy Siltsone	8030.4-8000.4	2 Aug 2002, 8364.4	8551.4-8364.4	Lower O'Connor "B"	Through Coal Seam	T 14 E, R 6 E, Sec. 2
JC-1		Yes	Star Point - Sandstone (Storrs Tongue)	7918.0-7858.0	No Current Data	No Current Data	Lower O'Connor "B"	11.5' Below Coal Seam	T 13 S, R 6 E, Sec. 35
JC-2		No	Star Point - Sandstone (Storrs Tongue)				Lower O'Connor "B"		T 13 S, R 6 E, Sec. 35
JC-3		Yes	Star Point - Sandstone (Storrs Tongue)	8061.7-8018.0, 7730.5-1-7711.1	Not Yet Completed	No Data Available	Lower O'Connor "B"	Though Coal Seam	T 13 S, R 6 E, Sec. 35
99-4-1		Yes	Blackhawk - Sandy Siltsone	7551.0-7521.0	10 Sept 2002, 8520.5	8571.2-8520.5	Lower O'Connor "B"	Through Coal Seam	T 14 S, R 6 E, Sec. 4
99-21-1		Yes	Star Point - Sandstone (Panther Tongue)	7431.3-7401.3	24 Sept 2002, 8322.6	8419.5-8322.6	Flat Canyon (Middle Seam)	Through Coal Seam	T 13 S, R 6 E, Sec. 21
99-28-1		Yes	Star Point - Sandstone (Panther Tongue)	7477.0-7447.0	24 Sept 2002, 8377.3	8510.0-8377.3	Flat Canyon (Middle Seam)	Through Coal Seam	T 13 S, R 6 E, Sec. 28
20-4-1		Yes	Star Point - Sandstone (Storrs Tongue)	7491.0-7464.0	27 Sept 2002, 8490.7	8559.0-8490.7	Lost Core	Lost Core	T 14 S, R 6 E, Sec. 4
20-4-2		Yes	Star Point - Sandstone (Storrs Tongue)	7574.0-7544.0	10 Sept 2002, 8420.5	8532.0-8420.5	Lower O'Connor "A"	16' Below Coal Seam	T 14 S, R 6 E, Sec. 4
20-28-1		Yes	Blackhawk - Sandy Siltsone	7420.0-7390.0	24 Sept 2002, 8393.7	8403.8-8393.7	Lower O'Connor "B"	Through Coal Seam	T 13 S, R 6 E, Sec. 28
91-26-1	North Lease	Yes	Blackhawk - Sandy Siltsone	7698.1-7668.1	9 Sept 2002, 7941.0	7941.0-7937.1	Lower O'Connor "B"	Through Coal Seam	T 12 S, R 6 E, Sec. 26
91-35-1	North Lease	Yes	Blackhawk - Sandy Siltsone	7616.9-7586.9	5 Sept 2002, 8011.4	8033.9-8011.4	Lower O'connor "B"	Through Coal Seam	T 12 S, R 6 E, Sec. 35

Note:

* The screen interval was determined by using the lowest minable coal seam; the screen was placed 3 feet below top the coal seam; and a 20 foot screen was installed.

Spring discharges, as shown in the graphs, aptly illustrate that almost all discharges from the shallow ground water aquifers are controlled by the fluctuations in yearly precipitation or drought cycles as illustrated by the PHDI. A notable exception is spring S24-12. The graph appears to illustrate a significant drop in spring discharge beginning in 1989. However, as presented in the text attached to the graph, the apparent change in discharge is related to a minor shift in the location of the discharge and not in the total volume of water released from the aquifer in the spring area.

Several springs, for which graphs of flow data have been provided, have been undermined since mining began at the Skyline Mine in 1982 (Drawing PHC A-3). As stated above, the fluctuations in spring discharge are easily related to fluctuations in climatic conditions and not mining activity. The relationship between spring discharge and mining activity was studied in great detail as part of an EIS performed by the Manti-La Sal National Forest for the Flat Canyon Tract located west of the existing mine leases. The study was performed by Norwest in the summer of 2000. The water monitoring data compiled by the mine since mining activities began in 1982 were studied for any effects on surface and shallow ground water discharge. The conclusion of the study was there is very little evidence that undermining or mining within the vicinity of the springs in the Skyline Mine area has resulted in the diminishment of discharges from the springs. A copy of the Norwest study has been provided in Appendix B of this document.

A comparison of the water chemistry of five springs, the JC-1 well, and three in-mine sample locations has been provided in Appendix A. Stiff Diagrams are provided for springs S22-11, S26-13, S34-12, S35-8, 2-413 and the James Canyon well JC-1. Stiff Diagrams are also provided for water samples obtained from the 10 Left Entry 3 Borehole, Fault Crossing at the West Submains (now referred to as the East Submains), and the 9 Left Horizontal Borehole. ~~The most~~ A notable difference between the spring water and the James Canyon and in-mine waters is the amount of magnesium in the water. Significantly greater amounts of magnesium are found in the mine and well water than in the spring waters.

Notable differences in the chemistry of intercepted ground water in the mine and the waters found in Electric Lake were found by Hydrologic Consultants, Inc. (HCI) of Lakewood, Colorado. HCI was contracted by Skyline Mine in August 2001 to aid in determining the source of the ground water entering the mine, ~~and~~ to help the mine determine how long the inflows could be anticipated to continue and if in-mine water wells could be used to aid in dewatering the aquifer discharging to the mine. HCI initially submitted a brief report to Skyline in November 2001 regarding where they thought the water coming into the mine may be originating. Subsequent to their initial report, more data were gathered concerning water chemistries, monitoring well data, and water age dating information (Tritium and Carbon 14). A copy of their ~~2nd~~ second report is included as Appendix C. Briefly, the conclusion of their report (page 12) was that chemical and isotopic differences between water entering the mine and Electric Lake suggested strongly that no direct conduit exists between the mine and the lake.

Petersen prepared a report titled "Investigation of Fault-related Groundwaters Inflows at the Skyline Mine, 27 October 2002". This report is included as Appendix G to this document. This report expands upon the data presented and conclusions of the Petersen Report in Appendix A and the HCI report in Appendix C. Petersen evaluated the chemical composition of the in-mine and surface waters. He concluded that water in the 10 Left area is significantly dissimilar to surface waters and surface waters cannot evolve chemically into the 10 Left waters in the hydrogeologic environment of the mine (Petersen, October 2002, Appendix G, Section 6.5, p. 17). Following is excerpt from his report that details the differences between surface and in-mine waters:

> "Likewise, solute and isotopic data indicate the Electric Lake cannot be a major source of the fault-related groundwater that is flowing into the Skyline Mine. Based on the

solute compositions of Electric Lake water and water from the fracture system associated with the 10 Left inflow, it is readily apparent that the water flowing into the mine is chemically distinct from that in Electric Lake. The recent solute chemical composition of the 10 Left inflow water and Electric Lake water are summarized in Table 5. Most notably, the average chloride content of the water in Electric Lake (6.5 mg/l) is nearly four times greater than the average chloride content in the fault-related systems (1.7 mg/l). Chloride is considered a conservative species, meaning that the constituent is not attenuated from a groundwater system, other than by dilution (Fetter, 1988). In other words, there is no mechanism whereby the chloride in the lake water could be removed were it to flow through a fault system, regardless of the residence time in the fracture. Although the calcium contents of the in-mine and lake water are similar (Table 5), the magnesium and bicarbonate content of the waters are dissimilar. The average bicarbonate content of the fault-related groundwater (216 mg/l) is approximately 50% greater than the average lake content (148 mg/l). The average magnesium content of the fault-related groundwater (23.0 mg/l) is more than three times that of the average lake water (7.5 mg/l). Mineral saturation indices for calcite, dolomite, and gypsum are listed in Table 5. Saturation indices at 0 ± 0.1 indicate that a water is saturated with respect to that mineral. Waters at saturation with respect to a mineral will not dissolve additional quantities of that mineral or precipitate the mineral should the water come into contact with it. Waters with a saturation index less than 0 are undersaturated with respect to that mineral. Undersaturated waters have a thermodynamic tendency to dissolve that mineral if it comes into contact with the water. Waters with a saturation index above about 0.1 are supersaturated and have a tendency to precipitate that mineral. Electric Lake waters are supersaturated with respect to both calcite and dolomite, indicating that they have the thermodynamic tendency to precipitate rather than dissolve those minerals. Thus, in the absence of an external source of CO_2, such as deep, metamorphic CO_2 or bacterially mediated organic decay (both of which are considered unlikely in the sandstones of the Star

Point Sandstone), the lake water cannot dissolve carbonate minerals (likely the only plausible mechanism whereby the groundwater could acquire additional bicarbonate and magnesium) along a groundwater flowpath regardless of the residence time in the fracture system. That external sources of CO_2 have not influenced the carbon history of the fault-related groundwater is apparent in the $d^{13}C$ composition of these groundwaters (Table 2). As discussed previously, groundwaters with $d^{13}C$ compositions near -10‰ are consistent with the dissolution of carbonate minerals in the presence of soil-zone CO_2 gas. Groundwaters that have been influenced by metamorphic CO_2 or by biogenic CO_2 will likely have $d^{13}C$ contents that deviate significantly from -10‰."

Numerous age-dating samples of surface and in-mine waters have been obtained over the past nine years. Samples from springs, surface streams, and mine in-flows have been analyzed for tritium and carbon 14 content. This sampling has been done to monitor the ages of the water intercepted underground so that if surface waters, or "young" waters, were encountered, steps could be taken to determine its source and replace the waters at the surface, if necessary. Carbon 14 dates indicate that water intercepted underground ranges in age from 5,500 years to 25,800 years old. A single roof drip sample obtained in Mine 3 in 1996 was dated at 2,500 years old. Generally, tritium analyses of water intercepted in the mine indicates that none of the water is younger than 50 years old. Surface waters and most of the spring waters have been determined to be modern water based on their tritium content. Samples of water from shallow wells, W24-1 and W17-3, and from spring S17-2 analyzed for carbon 14 and tritium content indicate waters about 2,000 to 3,500 years old are mixed with modern water. The well samples suggest water from more than one aquifer is being produced from the ~~well~~ JC-1. A table listing the location and ages of samples collected within the mine and permit area is provided in Appendix A.

Petersen (October 2002) discussed in detail the relationship between the stable isotopic composition and tritium and carbon 14 contents of the surface waters and mine waters. His results show significant evidence that the recharge water to the aquifer draining to the mine is fundamentally different from the overlying surface and shallow ground waters systems based upon their stable isotopic composition. Petersen (October 2002) states:

> "Stable and unstable isotopic data from Electric Lake, active-zone springs, and streams, indicate that these systems are not a primary source of the water in the fault-related Star Point Sandstone groundwater systems encountered in the Skyline Mine. As discussed previously, Active-zone groundwaters and surface waters in the region contain abundant tritium, have modern radiocarbon ages, and contain anthropogenic carbon. In contrast, the fault-related groundwaters have very old radiocarbon ages and contain little or no tritium (Table 2). In order to validate the conclusions that the isotopic compositions of groundwaters encountered in the fault-related Star Point Sandstone groundwater system are statistically different from those in Electric Lake, two tailed T-Tests were performed. The T-tests confirm that the fault-related groundwaters are statistically different from the Electric Lake waters based on each of their stable isotopic d^2H, $d^{18}O$ content and unstable tritium and radiocarbon contents at the 95% confidence level."

Water level data obtained from wells W79-35-1A, W79-35-1B and W2-1 present a fairly distinct picture of the effects the mine inflows and pumping of the James Canyon wells is having on the aquifer beneath the mine and the lack of impact of an aquifer within the Blackhawk Formation above the mine. The graph labeled "Wells W79-35-1 A, B and W2-1" contains water level data for the two W79-35-1 wells beginning in 1982 and water level data for W2-1 beginning in 1999. The PHDI for region 5 is also plotted. Minor fluctuations in the water levels of the two W79-35-1 wells can be seen from 1982 through 1999. The fluctuations do not appear to be related to climatic conditions. Also, both wells appear to have a slight downward trend of the water level elevations. This downward trend is unlikely related to mining since mining did not occur in this area until the mid 1990's. W79-35-1A is completed at a depth of approximately 1000 feet below ground surface into the Starpoint Sandstone, while W79-35-1B is competed to a depth of approximately 220 feet below ground surface. W2-1 is completed to a depth of approximately 1,520 feet below ground surface. In 1999, a sharp decline in the water level in W79-35-1A began, probably related to the mine inflows encountered in 14 and 16 Left panels in Mine 2. In late 2000, a significant drop in the water level in W2-1 began. (This delay in the drop may be related to measuring error. The well is constricted at about 720 feet below ground surface and, until recently, often resulted in false positive readings at that elevation. The cause of the false positive reading is unknown.) The wells appear to be completed in the same fracture zone as the JC-1 well (Drawing PHC A-3). The drop in water level in these wells is undoubtably related to the mine inflow in both the East Submains and 10 Left. The steady decline in both ~~wells~~ W79-35-1A amd W2-1 has continued to this date. However, W79-35-1B ~~has~~did not ~~declined~~decline over the same time period as the other wells. The mine related drawdown effects that ~~are~~were observed in W79-35-1A and W2-1 and not in W79-35-1B strongly suggest a disconnect between the deep aquifer and shallow aquifer. In about October 2002, the water level in W79-35-1A appeared to slowly rise by approximately one foot until mid-December 2002. Since that time the water level has dropped about six feet. The slight rise in the water level and subsequent drop appears to be related to the approach and subsequent passing by of the well location of longwall mining activities. Since this well is located only a few hundred feet east of the 11 Left panel, this type of response to mining and subsidence is not unexpected. The change in water level in the well will continue to be monitored.

As discussed previously, the water encountered in the western- and southern-most portions of Mine 2 generally enters the mine through fractures in the floor. The potentiometric head on the water has been measured at up to 200 psi in horizontal boreholes that have been drilled into fractures and faults from within the mine. As illustrated on Drawing PHC A-4, water levels in wells W2-1 and W79-35-1A were several hundred feet above the mined coal seam prior to

1999. Also illustrated on the cross-section are Electric Lake water level measurements that were obtained within a few weeks of the well data. The level of the water initially in W2-1 was higher than the Electric Lake level but dropped below the lake level after the significant flows were encountered in the 14 and 16 Left panels in the mine. At the same time, the lake water level was higher than the ground water measured in W79-35-1A. Once the fractures in 14, 16, and 10 Left panels were encountered, the water levels in these wells began to drop noticeably and were consistently lower than the lake level.

Figure "W2-1 James Canyon South Ridge Transducer Data" (Appendix A), formerly provided as Figure PHC A-5 in an earlier version of the PHC James Canyon Addendum (November 2001), illustrates 1) there is hydraulic communication between the well and the 10 Left fractures; and 2) the fractures system in the Star Point Sandstone is being dewatered and depressurized as the result of 10 Left discharge and pumping JC-1. As evidenced by the stabilization and flattening of the recovery curve observed while the pump was off mid-November to mid-December 2002, the system is indeed being dewatered and not recharging at a significant rate. Activities related to mining, pump operation, discharge of water from the fracture to the mine have introduced numerous unknown variables to the aquifer system thus precluding more detailed analysis of the drawdown data.

The water levels in these wells represent a potentiometric surface and not a saturated ground water table surface. As discussed in the PHC and extensively in Petersen (October 2002), the Blackhawk Formation forms an effective seal overlying the Starpoint Sandstone, thus creating a confined aquifer. No evidence has been found that water rose to the surface through any of the recently encountered fractures and faults. Indeed, monitoring of the surface seeps, springs, and streams overlying~~in the area of those~~ fractures and faults that discharge ground water to the mine indicate reductions in flow are most certainly related to climatic conditions and not mining activities as evidenced by the PHDI.

Drawdown and/or depressurization of the deep aquifer related to mine dewatering can also be observed in wells W20-4-1, W20-4-2, and W 99-21-1. These wells are located west of Electric Lake (Drawing PHC A-3). The graphs of the monitored water levels in these wells show some responses to changes in the operation of the JC-1 well. This suggests that the aquifer underlying the mine is continuous to the west. As discussed in the main body of the PHC, the calculated velocity of water passing through the Starpoint Sandstone is 0.01 foot per day. The rapid response of these wells and wells W2-1 and W79-35-1 to the mine dewatering suggest that the sandstone is fractured and water is moving toward the mine through these fractures.

No significant sustained inflows of water were encountered in Mine 1. However, as illustrated on Drawing PHC A-2, Mine 1 did not develop far enough west to mine ~~above~~ through the fracture locations in the14, 16, 10, and 11 Left panels of Mine 2 that produce water.

The results of the age dating work at Skyline Mine suggest waters currently being intercepted in Mine 2 are "old" waters and not recharging directly from the surface. Age-date samples are periodically obtained both underground and from JC-1. Specifically, samples of the water from the 14, 16, 10, and some of the 11 Left panel inflow points have been obtained and analyzed for tritium and carbon 14 content. The results of the sampling and corresponding sampling times are listed in Table 2 of the Petersen (October 2002) report. The tritium analyses in the 10 Left area and East Submains E1 XC 5 Fault site has not significantly changed since sampling began in these areas. Additional tritium and carbon 14 results for these sites is pending.

~~If there is an apparent shift in age of these waters indicating younger water is being drawn into the mine, Skyline will endeavor to find the source of the young water and take immediate steps to comply with the appropriate water replacement regulations.~~Since the initial start-up of the JC-1 well, periodic samples have been obtained of the discharge water and analyzed for tritium content. The results of the analyses are included as Table 2 of Appendix G. The average tritium value measured in the water discharged from the well since September 2001 is 1.47 TU. Initially, the first sample had a tritium concentration of 0.24 TU. Samples obtained between May and September 2002 had tritium concentrations ranging from 0.98 to 1.50 TU. In October 2002, PacifiCorp installed a pump in JC-1 capable of pumping approximately 4,200 gpm of water, approximately 2,100 gpm greater than the last production rate of the pump previously in the well. Initially, the tritium concentrations increased to 2.22 TU but have since declined to 1.71 TU. It appears that since January 7, 2003 the tritium concentration in the JC-1 well water has stabilized and is slightly decreasing, ranging between 1.83 and 1.71 TU. This suggests that between 6 and 22 percent of the water being pumped from the JC-1 well has a component of water that could be considered younger than 50 years old (The percentages are based on tritium concentrations measured in water samples from area springs and Electric Lake and range between 8.6 and 30 TU. Table 2 of Appendix G). During the same time period in which the tritium values have fluctuated in the JC-1 well water, no significant changes have occurred in the in-mine water ages.

HCI and mine personnel have attempted to determine the geometry of the aquifer that lies beneath the mine. Most of the coal exploration drill holes in the mine area do not penetrate more than a ~~few~~ couple hundred feet into the Star Point Sandstone. However, logs from oil and gas exploration drill holes in the general permit area have been obtained and studied. From these drill hole logs, the thickness of the Star Point Sandstone is estimated to be approximately 900 to 1,000 feet thick in the permit area. The sandstone appears to thicken to the west. The Star Point is not one continuous unit of sandstone but is comprised of interbedded sandstone, siltstone, and shale. While the sandstone fraction dominates the overall formation in the area, many of the sandstone tongues of the formation are separated by thin units of less permeable siltstone and shale. This relationship is illustrated on Plate III of HCI report (Appendix C).

HCI has been working on a model of the aquifer within the Star Point Sandstone. Several assumptions have been made on the volume, porosity, and transmissivity of the aquifer. The results of the modeling could provide ~~the mine with~~ rates and volumes of water that must be removed from the aquifer to lower the potentiometric head to a point below the coal seam in the western portion of the permit area. However, to construct an accurate ground water model, several ground water monitoring points are needed. No additional monitoring wells in the permit area are planned at this time. Thus the model that HCI attempts to produce will contain a number of assumed aquifer parameters and the aquifer geometry. If a suitable ground water model can be produced by HCI, it is anticipated a copy of the results will be forwarded to the Division as an update to this PHC Addendum.

Currently, Skyline Mine believes the available data suggests the water entering the mine is sourced by the Star Point Sandstone. The water in the Star Point is under potentiometric head and is forced up through faults and fractures encountered during development mining. Water moves slowly out of the sandstone formation into the fractures and faults and then along the fractures and faults toward the mine (Petersen October 2002, pages 11 through 13). Vertical movement above the Star Point Sandstone is limited by the tight, impermeable beds of the Blackhawk Formation. The current mine inflows are depressing the potentiometric surface of the aquifer in the mine area (HCI Figure 6, Appendix C and Petersen Figure 4 Appendix G). The size of the aquifer is unknown at this time but appears to have limits as demonstrated by the steady decrease in the potentiometric head measured in the mine monitoring wells.

Recharge to the Star Point Sandstone appears to be slow as evidenced by the continued draw down of the aquifer and the age of the in-mine water. The drawdown rate of 0.08 feet per day in W79-35-1A was calculated for the time period between April 17, 2002 and July 1, 2002 (6 feet of drawdown over 74 days) and suggests that the potentiometric head of the ground water in the area at the head of the 9 Left panel will be at or near the elevation of the coal seam (a drop of 85 feet) in approximately 1060 days. It is reasonable to assume that mine inflows will decrease as the head is removed from the aquifer. Quantifying the rate of decrease and times at which the flows will decrease is difficult at best. The model HCI is preparing for Skyline may give the mine the ability to provide the Division with a very crude estimate of the time it will take for mine in-flows to diminish.

Skyline Mine continues to provide periodic updates to the holders of the water rights in the mine area of the results of the studies the mine is performing to determine the sources and impacts of the mine dewatering on the area ground water resources.

Effects on Surface Waters

Discharge from the Skyline Mine to Eccles Creek has steadily increased since January 1999 as discussed previously. Currently, the mine discharges water to Eccles Creek at a rate of approximately 9,500 to 10,500 gpm, with a portion of the water discharged coming from stored water in Mine #3. Eccles Creek runs at near bank full conditions when the mine discharges at a rate of 9,000 gpm to 15,000 gpm). The channel has a fairly steep gradient, is well armored, often flows directly over bedrock, has few meanders, and has extensive vegetative growth on its banks (EarthFax, Appendix D). Several abandoned beaver dams have been or are in the process of being eroded. However, the rate of erosion is very slow and addition of sediments from the dams and ponds is slight.

Mud Creek has a much lower gradient than Eccles Creek and has increasing numbers of meanders as it approaches the town of Scofield. The channel banks and floors consist of fine grained sediment with minimal vegetative cover. At current discharge rates, the channel is not yet at bank full conditions and not subjected to significant erosion (EarthFax, Appendix D). Increased flow rates from the mine could impact this stream channel more significantly than the Eccles Creek channel if flows from the mine increase. However, Mud Creek has a significantly higher full carrying capacity than does Eccles Creek. EarthFax was contracted by

Skyline to prepare and implement a work plan that involved locating several sites on both Mud and Eccles Creek where the stream channel morphology, vegetation, flow volume, and water chemistry would be monitored on a regular basis. The purpose of the monitoring is to determine what, if any, impacts may be occurring as Skyline Mine discharges ~~the~~ large volumes of ground water to these creeks. The monitoring of these aspects of the Mud and Eccles Creeks will continue until at least one year after the mine discharge volume drops to or below pre-March 1999 discharge levels of approximately 350 gpm.

Scofield Reservoir was constructed to serve as flood control, storage for irrigation water, and a drinking water source for Price and the surrounding communities. It has a storage capacity of 73,600 acre feet of water. Assuming the mine continues to discharge at an average rate of approximately 10,000 gpm, this would add approximately 44 acre feet per day of water to the reservoir. This represent approximately 0.06% of the maximum daily storage capacity of the lake. Normally, Eccles Creek drainage contributes less than 1 acre foot per day of water during minimum baseline flow conditions.

The concentration of salts in the mine water discharged to Eccles Creek as measured by the Total Dissolved Solids (TDS) concentration was ~~has averaged less than~~ between 400 and 650~~600~~ mg/l ~~since~~ from July 2000 to June 2001. ~~Since~~ Between June of 2001 and February 2003, the average TDS concentration of the water discharged from the mine ~~is~~ was less than 500 mg/l. ~~Since~~ Between March 2002 and September 2002, the TDS concentration in the mine discharge water ~~has been~~ was consistently less than 400 mg/l. Since September 2002, the TDS concentration has ranged between 425 mg/l and 625 mg/l. The increase in TDS since September 2002 is related to the discharge of additional stored Mine #3 water. The average concentration of TDS in Eccles Creek above the mine is slightly less than 300 mg/l with seasonal variations of concentrations between 165 and 435 mg/l. Skyline Mine is working with the Utah Division of Water Quality (DWQ) on methods to reduce the overall concentration of TDS in the mine discharge water. Discussions center around a new TDS discharge limit of

500 mg/l for mine water. This has not yet been approved. The mine is pursuing several potential projects to either reduce TDS concentration or mitigate its effect on the downstream water bodies. These potential projects include capturing more of the mine water underground at its source to eliminate TDS that enters the water as it passes through gob, and participating in salinity reduction programs in the Castle Valley area.

Total Suspended Solids (TSS) concentrations in the mine water discharged to Eccles Creek have typically been within the limits set by the mine's UPDES permit. Over the past 10 years, infrequent exceedances of the limit have occurred. These occurrences have become rare since 1999 with one exception. In August 2001, a release of coal fines to Eccles Creek was reported by the mine to DWQ and DOGM. No significant environmental damage occurred as a result of the release because of its short duration and minimal volume. Changes to the mine's water handling system were instigated to prevent future occurrences of this type of release.

No increase in nitrogen or phosphorous compounds above background level has been detected in the mine water discharged to Eccles Creek for several years. A brief study on the effects of mine discharge with regard to total phosphorous was performed by EarthFax in December 2001 as part of the Flat Canyon EIS. A copy of the ~~brief~~ study is included in Appendix D. The results of this preliminary study indicate that it is unlikely that mine water itself will contribute significant concentrations of total phosphorous to Scofield Reservoir. However, since the Scofield Reservoir is a drinking water source for Price, a top cold water fishery in the State, and has been listed as an~~d~~ impaired water body by the EPA, increases in total phosphorous released to the reservoir is of special concern. Several studies have been conducted since the mid 1970's by the Utah Division of Wildlife Resources, Utah Department of Environmental Quality, and the USGS to determine the sources of phosphorous pollution in the lake. Copies of several of these studies are included in Appendix E. Generally, the studies have identified two significant sources of phosphorous pollution - sediments entering the reservoir and runoff from lands carrying animal waste into the lake. A report written 1992 by Harry Lewis Judd of the Utah Division of Water Quality, Utah Department of Environmental Quality titled "Scofield Reservoir Restoration through Phosphorous Control" suggest that as much as 29% of the total phosphorous load in Scofield Reservoir is delivered by Mud Creek. He sites the poor conditions of stream banks in the lower sections of the creek south of the town of Scofield and the recreational and industrial activities that occur in the drainage as the source of much of the sediment that contains the phosphorous that is detrimental to the lake's water quality. The idea that sediments transported to the lake by its tributaries is a significant source of phosphorous is supported by previous studies.

Beginning in 2002, the total phosphorous concentration in the water discharged into Eccles Creek from the mine ~~will be~~ has been monitored. Orthophosphate concentrations have historically been monitored in the discharge water along with periodic monitoring for total phosphorous concentrations. A new monitoring plan to evaluate the effects of increased mine discharges on the stream channels of Mud and Eccles Creek was instigated in the summer of 2002. This study includes monitoring several locations on both creeks for changes in stream morphology and water chemistry. Two sites on Eccles and six sites on Mud Creek will be monitored for total flow, TDS, TSS, and total phosphorous. If significant increases in TDS, TSS, and total phosphorous or changes in stream morphology and/or plant communities are noted, the sources will be investigated. If they are related to Skyline Mine activities, remedial actions will be taken. These actions may consist of, but not limited to, armoring stream channel banks, planting of stream bank stabilizing vegetation, or redirection of some flows to the Huntington Creek drainage. Monitoring information is provided in the "Addendum to the Probable Hydrologic Consequences, July 2002, Appendix D and the work plan for monitoring is provided in Attachment 3 of Section 2.12. Future monitoring information will be provided in the Annual Report.

Total and dissolved iron concentrations in the water are typically below 1 mg/l, similar to background water concentrations. Nickel concentrations have reached as high as 40 μg/l.

This concentration is well below the UPDES permit levels. However, it has been determined that levels greater than 15 μg/l in the mine discharge inhibits the reproductive capabilities of Ceriodaphnia dubia, an invertebrate used to biologically monitor the quality of water of industrial and municipal discharges. The mine is working with the DWQ to mitigate the effects of discharging nickel at concentrations below established discharge limits. No other elements or compounds of concern have been detected in the increased mine water discharge.

The increased mine discharges have been a benefit to Scofield reservoir. Scofield Reservoir has a capacity of ~~31,500~~ 73,600 acre feet of water storage. Currently, the mine discharges approximately 9.2 acre feet of water per day to the lake. Since August 2001, the mine has discharged approximately 21,957 acre feet of water to the lake (March 31, 2003). The mine water discharge not only helps to alleviate some of the problems related to ~~water shortages~~the effects of drought within the Price River drainage area ~~as a result of the ongoing drought~~ but is also helping to maintain the first class cold water fishery in Scofield Reservoir. Low lake levels in past years have resulted in increased water temperatures and deadly algal blooms. The added water discharged from the mine reduces the potential for algal blooms related to low lake levels.

Currently, Skyline Mine discharges approximately ~~4200~~3,900 gpm of ground water from the James Canyon JC-1 well directly to Electric Lake (JC-2 has not operated as of October ~~2002~~2001). The quality of the water is similar to the water of James, Huntington, Swen's and Little Swen's Creeks, the major tributaries to Electric Lake. TDS concentrations of the well water range between 175 mg/l to 205 mg/l (Appendix A). TDS concentrations in the waters of the tributaries range from 143 mg/l to 274 mg/l (Division EDI, Skyline Mine). Iron, both dissolved and total, concentration in the well water is less than 0.2 mg/l, similar to or less than stream and ground water concentrations in the Electric Lake basin. Nitrogen and phosphorous compounds have not been detected in the well water above background levels. Since the ~~wells discharge~~JC-1 well discharges ground water only, it is reasonable to assume that the chemical composition of the water is similar to the waters discharged by the seeps and springs in the area that feed the tributaries of Electric Lake.

The JC-3 well will be permitted to discharge water from the mine workings to Electric Lake at a rate not to exceed 5000 gpm, a anticipated stipulation of the not-yet-approved-UPDES permit. The pump will likely only be capable of producing approximately 4700 gpm. The water chemistry of the groundwater flowing into the 10 Left area of the mine has the same chemistry as the water described above. It is anticipated the chemistry will not significantly change during its short residence time within the mine works prior to being pumped to the surface. The UPDES permit is anticipated to have limits of 242 mg/l TDS and less than 1 mg/l iron concentrations in the discharge water. The discharge water from JC-3 will be monitored for total phosphorous as well as all other parameters as required by the UPDES permit. If the water quality of the discharged mine water does not exceed the UPDES quality limits, Electric Lake and Huntington Creek waters will not be degraded. The JC-3 well is anticipated to be operated while drought conditions persist in the area and the mine needs to maintain access to the West Mains. If either conditions changes, modification to the operation schedule of JC-1 and JC-3 may be appropriate. Appropriate regulatory organizations and water users will be notified of the operational changes. The mine anticipates there will be short-lived periods of time where the pumps may be taken off-line for maintenance purposes. Plans have been made underground to handle the increased inflows and discharges should this occur.

Once JC-3 is operational, the total discharge of mine water to Eccles Creek should diminish by approximately 4,700 gpm. As discussed previously and detailed in Appendix F, over time the overall discharge of mine water to Eccles Creek will be reduced as portions of the mine are abandoned and allowed to flood. The actual mine inflow and discharge rates will probably vary slightly from the numbers given in Appendix F, but the overall downward trend of the rates is expected to continue.

As discussed previously, water from the James Canyon wells is piped directly to Electric Lake. Initially, when the pipeline was laid, the end of the pipe was beneath the surface of the lake. This allowed water to be discharged without disturbing lake sediments. However, as the lake level dropped throughout the late summer and fall of 2001, the end of the pipe was exposed. This resulted in the slow erosion of the accumulated lake sediments in the immediate area of the pipeline discharge. The erosion of the sediments resulted in the moving of the material a short distance away from the pipeline to the standing lake level where they were redeposited. The pre-lake ground surface has been exposed and it consists of sands, gravels and cobbles. This area appears to be naturally well armored and no further erosion is expected to occur. As the lake level rises, the end of the pipe will again be under water.

The capacity of Electric Lake is 31,500 acre feet of water. The reservoir was constructed and is operated by ~~Utah Power & Light~~PacifiCorp to maintain a reliable source of cooling water to the Huntington Power Plant. Assuming the James Canyon ~~wells continue to~~JC-1 and JC-3 well pump at a combined rate of ~~4,200~~8,600 gpm (a current rate of 3,900 gpm from JC-1 and an anticipated rate of 4,700 gpm from JC-3), a daily average of approximately ~~18.4~~36 acre feet of water would enter the lake. During low flow periods, the volume of water entering Electric Lake from all its tributaries is about -4,000 gpm or less. During high flow periods, inflows ~~can~~ may be many times this rate, but accurate inflow records have never been kept. The discharge of the wells to Electric Lake represents ~~0.06%~~0.12% of the total maximum daily storage capacity of the lake~~ and currently about 81% of the total inflow to the lake~~. Since low flow periods generally occur when the lake is at or near its lowest annual level, the well water discharge volume should not significantly affect the daily operation of the reservoir. Indeed, in times of drought, the well water is a significant benefit to both the power company and downstream water users.

The recent drought conditions in the Huntington Creek drainage have resulted in historic low water levels in Electric Lake. This has raised concerns of many of the downstream water users, including ~~UP&L~~ PacifiCorp and Huntington Cleveland Irrigation Company. These two entities hold the rights to the water stored in ~~Electric Lake~~the Huntington Creek drainage. Because of the close proximity of the reservoir to the mine, many naturally have assumed water is entering the mine from the lake. However, age dating of the mine waters, a comparison of the water chemistry of the lake and mine waters, and the low permeability of the formations overlying the coal seam suggest that no direct conduit is present between the lake and the mine (Petersen October 2002). The maximum surface acreage of Electric Lake is 485 acres and a maximum depth of water at the dam ~~of~~ is approximately 180 feet. Star Point Sandstone crops out downstream of dam and through Huntington Canyon. The Connelville and O'Connor Faults appear to extend to the south west and into Electric Lake. However, the age-dating and water chemistry data obtained from in-mine water samples does not suggest the faults transmit large volumes of water to the subsurface aquifers intercepted in the mine. Petersen (October 2002) states:

".... groundwater flow through the Star Point Sandstone occurs primarily through fracture openings and groundwater flow through the matrix of the sandstone occurs only at a very slow rate. Based on these findings, it is apparent that large volumes of leaking Electric Lake water cannot be the source of the large fault-related inflows in the Skyline Mine. If Electric Lake water was flowing through fractures directly to the 10 Left area, it would be anticipated that the "pulse" of lake water would arrive at the mine in a short period of time. This conclusion is reached because the fracture system in the local area between the lake and the mine has only limited storage potential. Thus, it would be necessary for the potential large volumes of lake water to migrate very rapidly through the fracture network to accommodate continued water movement from the lake into the fracture system. This condition can be likened to the movement of cars on the interstate freeway during rush hour. Because the total surface area available for cars is limited, the only way to move a large number of vehicles over large distances it to move them rapidly. Calculations of the potential storage capacity of the fracture network in the vicinity of the 10 Left inflow and Electric Lake indicate that were a large inflow of lake water to be migrating through the fracture system, that water should have arrived in the mine in a period of several hours to several days (based on the amount of time required to fill the fracture volume). Based on stable isotopic evidence, solute chemical evidence, tritium concentrations, and radiocarbon contents, it is clear that this is not occurring (i.e., there is not a large slug of modern recharge water anywhere in the Skyline Mine). Similarly, if Electric Lake water were migrating through the pore spaces of the Star Point Sandstone, based on the low hydraulic conductivity of the rock (1.3×10^{-6} to 2.3×10^{-6} cm/sec), it is calculated that the time required for this water to reach the mine workings would likely be measured in the hundreds or thousands of years. Clearly, the lake water could not have migrated through the sandstone pore spaces in the short time that has elapsed since the fracture system was first encountered in the mine."

Skyline Mine continues to study the mine water in-flow problem in an effort to more effectively and efficiently mine coal. The results of these studies are shared with the water right holders and will continue to be shared with the Division.

If operation of the JC-1 ~~well~~and JC-3 wells continues to aid in reducing the overall volume of ground water entering the mine, the well may be operated for the life of mine or until the potentiometric surface of the aquifer has dropped below the mined coal seams. It is reasonable to assume that as the potentiometric surface of the ground water is lowered, the efficiency of the pumps will decrease. This will result in lower rates of water pumped from the wells. Since it appears there is not a direct connection between the water being pumped from the James Canyon wells and surface waters or surface discharges of ground water, continued operation of the wells should not affect the normal discharge rates of these waters. A table illustrating the daily and computed discharge volumes from the James Canyon wells through ~~June 2002~~ March 2003 is attached in Appendix A.

Several reaches of Burnout Creek have been undermined beginning in 1993. Prior to mining, a study of the effects of undermining the creek was jointly funded by Skyline Mine and the Manti - La Sal National Forest. The study included monitoring the flows of the stream at several locations, monitoring changes to the stream morphology, and maintaining numerous photo monitoring points over the length of the creek. The study was essentially completed in 1998 and the results reported in 2002 by R.C. Sidle in Environmental Geology, volume 39. The conclusion of the study was that no significant impacts to the stream could be related to mining. Flows were not diminished in the stream and the morphology was not significantly modified by subsidence. Norwest used this report along with additional monitoring data to reach essentially the same conclusion (Appendix B). They found that climatic conditions greatly influenced flows in the creek and found no evidence of water loss due to mining induced subsidence. The graph illustrating the stream flows, as measured at flume 5 near the mouth of Burnout Canyon, ~~since~~from 1991 to the present and the PHDI for the same time period is included in Appendix A. The graphed flows demonstrate the changes in stream flow are heavily influenced by climatic conditions.

Conclusions

Significant new ground water inflows into the mine have been encountered since March 1999. The inflows have resulted in increases in the discharge volume of mine water to Eccles Creek. Additionally, two ground water wells have been drilled in James Canyon and one is being pumped in an effort to reduce the volume of ground water entering the mine. A third well will be pumping water from the 10 Left area of the mine to Electric Lake beginning in May, 2003. The waterthis from these wells is dischargedischarged directly to Electric Lake. Continued monitoring of the surface seeps and springs and surface water flows in the permit area demonstrates that the increases in ground water inflows to the mine has not adversely impacted the volume of discharges of ground water to the surface in and adjacent to the mine area. Specifically, monitoring of selected wells, springs, and surface waters in Burnout and James Canyons has demonstrated there is no discernable affect to the flow of these water sources by the increase in ground water inflows to the mine. Indeed, most of the fluctuations in spring flows can be attributed to changes in climatic conditions. Analysis of the monitoring of the aforementioned waters further demonstrates the isolation of the ground water encountered in the mine from surface waters in the mine area as described in the existing PHC.

Increased discharges of mine water to Eccles Creek has resulted in near bank full channel conditions. Significant erosion has not been noted in the stream channel. However, if the high discharge volumes continue, erosion of the stream channel will occur at a rate faster than would occur without the mine water discharge. Since the stream channel is well armored and vegetated, increased bank erosion should still occur only at a very slow rate. The Mud Creek channel will need to be monitored closely for increased rates of erosion. Mitigation efforts may be required for both stream channels if significant erosion is observed. Increased discharges to Scofield Reservoir has helped to alleviate the current drought conditions.

The chemistry of the mine water discharged to Eccles Creek is closely monitored. While TDS concentrations have been reduced in the mine water, the total volume of ~~TDS~~ dissolved solids has increased. The mine is currently working with DWQ in an effort to mitigate TDS and nickel concentrations in the mine water discharge. No other significant chemical impacts due to increased mine water flows have been noted.

Discharges of water from the James Canyon wells should not have a significant impact on the quality of Electric Lake. The well water is piped directly to the lake, there~~fore~~by eliminating ~~the~~ concerns of over loading James Creek. The ~~total~~ volume of water discharged to the lake from the wells is a small percentage of the total daily volume of the reservoir. The additional inflows should not adversely impact the operation of the reservoir. In fact, the discharge of ground water and the mine water to Electric Lake ~~is~~should be considered a benefit to the water users in the Huntington Creek drainage.

The operation of JC-3 will benefit the mine since it reduces the overall power, maintenance, and personnel costs associated with discharging mine water to Eccles Creek. If JC-3 were not operated, that volume of mine water would have to be pumped through the mine works and discharged to Eccles Creek. Operation of the well will reduce the discharge of water to Eccles Creek and increase the flow of water to Electric Lake. In times of drought, operation of JC-1 and JC-3 could significantly reduce the chance of the Huntington Power Plant needing to scale back their operations and could result in additional agricultural water to users downstream in Emery County.

Statement of Qualifications

The majority of the text of this addendum to the PHC was prepared by Chris D. Hansen, an employee of Canyon Fuel Company, LLC and Mr. Erik Petersen. Mr. Hansen has been employed by Canyon Fuel Company at the Skyline Mine since 1998 as the Environmental Coordinator. Mr. Hansen has been responsible for the collection, interpretation and reporting of the data collected as part of the hydrologic monitoring requirements of the mine's permit. Prior to coming to Canyon Fuel Company, Mr. Hansen was employed by EarthFax Engineering, an environmental and geotechnical engineering consulting firm, as a senior project manager from 1992 to 1998. While at EarthFax, Mr. Hansen worked on several ground water projects including contamination investigations at a major oil refinery located in Salt Lake City, Utah and helped prepare several mine ground water studies and PHCs for several coal mines in Utah and Colorado.

Mr. Hansen has a Bachelor of Science degree and Masters of Science degree in Geology from Brigham Young University. He has also taken post graduate courses in hydrogeology offered through BYU.

Erik Petersen is the Principal and Senior Hydrogeologist for Petersen Hydrologic. Mr. Petersen has more than 10 years of experience performing hydrologic investigations in the Wasatch Plateau and Book Cliffs coal fields. He has performed major ground water and surface water investigations at nearly every active coal mine in Utah.

Mr. Petersen has a Bachelor of Science degree in Geology and Masters of Science degree in Hydrogeology from Brigham Young University. Mr Petersen has authored Probable Hydrologic Consequences determinations and prepared hydrologic monitoring plans for many Utah coal mines. He has also had more than 10 years experience performing ground water age dating and stable isotopic investigations.

ADDENDUM TO THE PHC
JULY 2002

REVISED OCTOBER 2002 AND APRIL 2003

Addendum to the Probable Hydrologic Consequences

Table of Contents

List of Figures

List of Tables

List of Drawings

List of Appendices

Appendix A Petersen Hydrologic Report

Information in this appendix have been listed in order of their position within the appendix.

Table of Contents

Historic Water Levels in Monitoring Wells in the Skyline Mine Area Discussion

Field and Laboratory Data:
Swens Canyon Creek (CS-16)
Little Swens Canyon Creek (CS-17)
James Canyon Creek (F-10)
Huntington Creek Above Electric Lake (UPL-10)
James Canyon Well (JC-1)
James Canyon Well (JC-2)

Stiff Diagram:
Stiff Diagram for springs and in-mine groundwaters from the Skyline Mine and discussion

Groundwater mean residence times in the Skyline Mine area

Mud Creek:
Mud Creek Discharge figure
Mud Creek Flow Duration figure
Discussion of Mud Creek

Laboratory Data Sheets:
James Canyon Well (JC-1)

Water Discharged to Eccles Creek/Scofield Reservoir

Water Discharged to Electric Lake

Appendix B Norwest Mine Services, Inc

Technical Report Surface Water and Groundwater Resources in Flat Canyon Area
Table of Contents provided at front of the report within the appendix.

Appendix C Hydrologic Consultants, Inc

Progress Report No. 2, Updated Conceptual Hydrogeology, evaluation of Current and Future Dewatering and Proposed Testing Program for Skyline Mine
Table of Contents provided at front of the report within the appendix.

Appendix D EarthFax Engineering, Inc

Hydrologic and Channel-Stability Evaluation of Eccles and Mud Creeks

Table of Contents

Section | Page

List of Tables

Table

List of Figures

Figure

List of Appendices

Appendix

Addendum to Skyline Mine Discharge Evaluation

Table of Contents

List of Tables

Appendix E Scofield Reservoir Studies

Table of Contents

6. Scofield Reservoir Phase I, 314 Clean Lakes Study, 1980 - 1982, Richard L. Denton, Project Officer; Myron I Cox, Water Quality Specialist; Lavere B Merritt, Ph. D., Brigham Young University in cooperation with the Utah Department of Health, Division of Environmental Health, Bureau of Water Pollution Control, and Brigham Young University

Appendix F October 1, 2002 Internal Correspondence, Expected Water Inflow Rates

Appendix G Petersen Hydrologic Report

Investigation of Fault-related Groundwater Inflows at the Skyline Mine
27 October 2002
Table of Contents provided at the front of the report in the appendix

Statement of Qualifications

The majority of the text of this addendum to the PHC was prepared by Chris D. Hansen, an employee of Canyon Fuel Company, LLC and Mr. Erik Petersen. Mr. Hansen has been employed by Canyon Fuel Company at the Skyline Mine since 1998 as the Environmental Coordinator. Mr. Hansen has been responsible for the collection, interpretation and reporting of the data collected as part of the hydrologic monitoring requirements of the mine's permit. Prior to coming to Canyon Fuel Company, Mr. Hansen was employed by EarthFax Engineering, an environmental and geotechnical engineering consulting firm, as a senior project manager from 1992 to 1998. While at EarthFax, Mr. Hansen worked on several ground water projects including contamination investigations at a major oil refinery located in Salt Lake City, Utah and helped prepare several mine ground water studies and PHCs for several coal mines in Utah and Colorado.

Mr. Hansen has a Bachelor of Science degree and Masters of Science degree in Geology from Brigham Young University. He has also taken post graduate courses in hydrogeology offered through BYU.

Erik Petersen is the Principal and Senior Hydrogeologist for Petersen Hydrologic. Mr. Petersen has more than 10 years of experience performing hydrologic investigations in the Wasatch Plateau and Book Cliffs coal fields. He has performed major ground water and surface water investigations at nearly every active coal mine in Utah.

Mr. Petersen has a Bachelor of Science degree in Geology and Masters of Science degree in Hydrogeology from Brigham Young University. Mr Petersen has authored Probable Hydrologic Consequences determinations and prepared hydrologic monitoring plans for many Utah coal mines. He has also had more than 10 years experience performing ground water age dating and stable isotopic investigations.

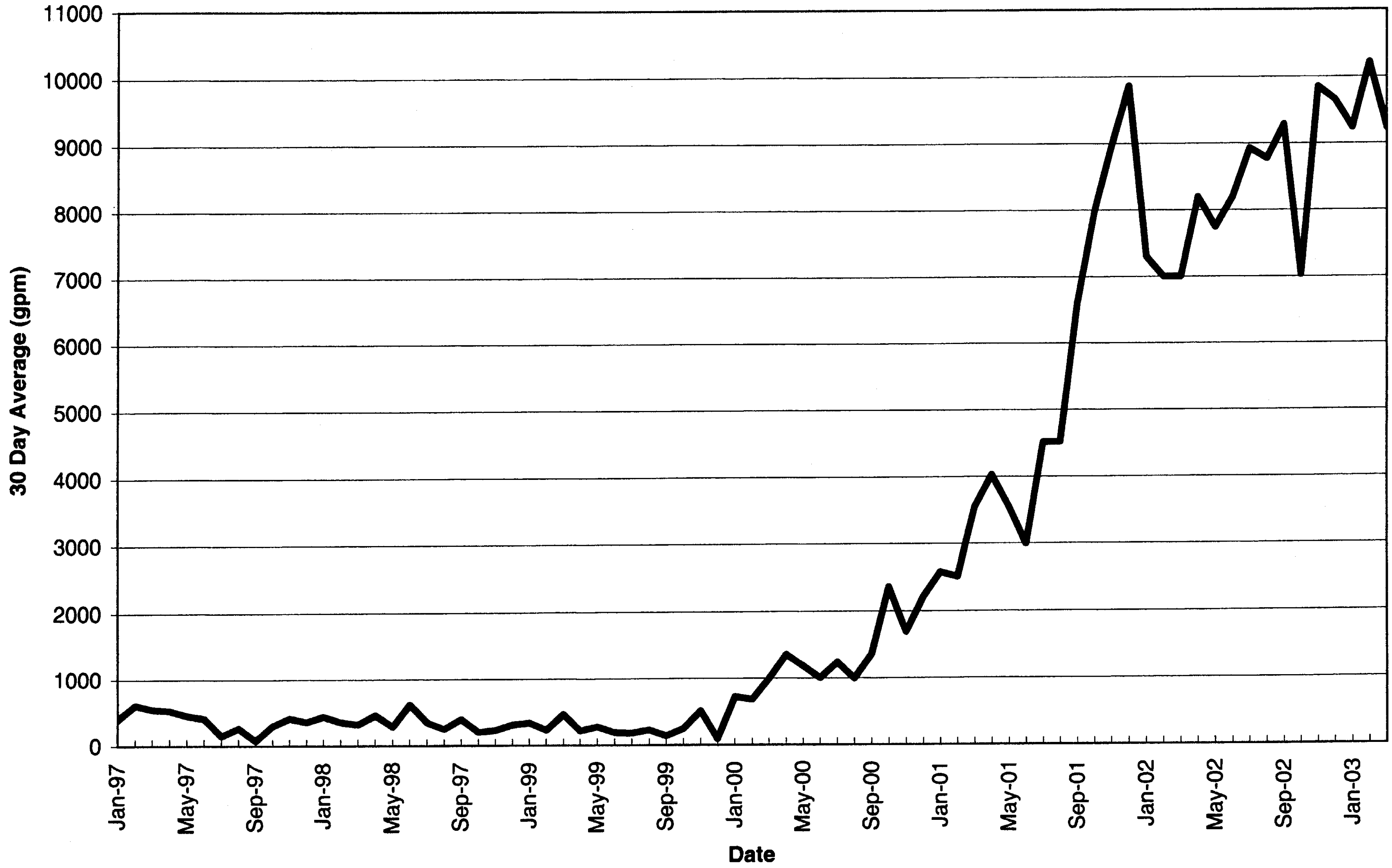
Introduction

This addendum to the Probable Hydrologic Consequences (PHC) has been included in this permit to address the effects of recent ground water inflows into the active mine workings of Skyline Mine 2, the completion of three ground water wells in James Canyon near the southwest extent of current mining constructed to alleviate mine in-flows, and the effects of discharging significant volumes of water to both Eccles Creek and Electric Lake. This addendum describes the effects to the surface waters and ground waters within the permit and adjacent areas of the recent inflows to the mine and the pumping of the James Canyon wells. This addendum contains this introduction, a discussion of the recent mine inflows, the effects of the flows on both surface and ground water, and conclusions. Appendices to this addendum contain graphs, discussions, and tables concerning monitoring data of numerous spring, well, and stream monitoring sites, reports by consultants related to water issues at Skyline, and reports prepared by or for State agencies regarding the water quality of Scofield Reservoir. This addendum is included as supplemental information to the existing PHC and, in some cases, updates or supercedes information provided in the existing PHC. It is important to bear in mind while reviewing the consultants reports included in this addendum that data collected after publication of the reports may have resulted in updates and refinements to previous theories and conclusions.

History of Recent Inflows

Prior to January 1999, Skyline Mine discharged exclusively to Eccles Creek, a Price River tributary, at an average rate of approximately 350 gpm or less of water intercepted during mining (Figure PHC A-1). This volume was somewhat representative of the average inflows of ground water into the mine. Significant new inflows were encountered in March of 1999 during the development of the south end of the 14 Left panel in Mine 2 (Drawings PHC A-1 and PHC A-2). Ground water flowed into the mine from a small displacement fault at a rate of approximately 1,600 gpm. Initially the water flowed from both the roof and floor but soon only discharged from the floor. The water was captured and pumped to the abandoned workings of Mine 1 and Mine 3 (Drawing PHC A-2). Mine personnel anticipated that this inflow,

FIGURE PHC A-1
SKYLINE MINE DISCHARGE



as with previous significant inflows, would soon diminish and possibly cease altogether. However, in December 1999, another water producing fault was encountered in the headgate of the 16 Left panel. The inflow from this fault was initially estimated to be greater than 1200 gpm and resulted in significant mine flooding. This new water was also pumped to the abandoned Mine 1 and Mine 3 workings. By January 2000, the abandoned Mine 3 workings were flooded and water was pumped from behind the Mine 3 seals to the mine site sediment pond. Eventually, the water was pumped to the overflow structure of the sediment pond and directly to Eccles Creek. In March 2000, approximately 1,000 gpm of ground water was encountered in the West Submains near the head of 8 Left (Drawing PHC A-2). Water discharge rates from the mine to Eccles Creek were generally between 700 gpm and 1,200 gpm until September 2000. Pumping and piping changes made underground allowed the mine to discharge more of the stored water from Mines 1 and 3 and mine discharge flows reached about 2,400 gpm in March of 2001.

Additional mine inflows were encountered during development mining in the 9 Left panel area in March of 2001. At nearly the same time, additional pumping capacity was added to the mine water system allowing more of the water stored in Mine 1 and Mine 3 to be discharged. This increased the total discharge from the mine from 2,400 gpm to between 3,500 to 4,500 gpm. Significant water inflows were encountered in the development of the 10 Left panel of Mine 2 in August 2001. The new inflows from this area of the mine alone were initially estimated to be approximately 6,000 to 6,500 gpm but shortly thereafter stabilized at about 4,500 gpm. The new water flooded significant portions of the mine, caused a halt in production, and required emergency action by the mine to deal with the water. Several tens of miles of 8- to 28-inch diameter steel and HDPE pipe were laid within the mine to pump water to other active and inactive workings as well as to the surface and Eccles Creek.

In February and March of 2002, three additional inflows of approximately 1,000 gpm to 1,500 gpm were encountered in the headgate and set-up room of the 11 Left panel (Drawing PHC A-2). Decreases in the flow rates of the 14 Left, 16 Left, and 10 Left ground water inflows have occurred over time. As of June 2002, the flow rates in the 14 Left and 16 Left had dropped to approximately 800 gpm each (these areas are not accessible as of June 2002). The flow rates in the 10 Left area in the first week of July 2002 appeared to have dropped to approximately

4,700 gpm or less. In the last week of September 2002, the inflows in the 10 Left area were estimated to be approximately 3,200 to 3,800 gpm. In October 2002, the 10 Left area was sealed and flooded. The 10 Left and 9 Left areas were allowed to partially fill with water up to the entrance of the 8 Left panel. Seals and a containment dam were built in this area and the water is pumped from behind the seals to Eccles Creek.

The total discharge rate from the mine in June 2002 averaged approximately 8,200 gpm but measurements in the first week in July indicated that discharges increased to approximately 9,200 gpm due primarily to the draining of Mines #1 and #3. From July to September 2002, the discharge volume fluctuated between approximately 8,400 gpm and 9,400 gpm due to an increase in new ground water inflows encountered in the 11 Left panel. While this water was originally encountered in February and March 2002, a great deal of time was involved in getting pumps, piping, and the collection systems set up. Frequently, water from new inflow locations encountered during mining is sent to gob areas such as the 14, 15, and 16 Left panels or the abandoned portions of Mines 1 and 3 to allow for the suspended load to drop out of the water column. Water removed from the active mine faces in the 11 Left panel has been pumped both to the south end of the 14, 15, and 16 Left gob areas and to Mine 1. Until October 2002, water in the 14, 15 and 16 Left gob area was picked up on the north end of the panels and pumped to the surface to temporary sand filters. After the water passed through the sand filters, it was discharged directly to Eccles Creek. The portion of the water pumped to Mine 1 dropped into the southeast end of panels 1 Right, 2 Right, and 3 Right. This water moved through the gob and passed through 2-inch diameter drill holes connecting Mine 1 with Mine 3 at the west-northwest end of each panel (Drawing PHC A-2). Eventually, this water was pumped from Mine 3 and directly to Eccles Creek. Water pumped from the 10 Left area and the West Submains contained very little suspended load and was pumped directly to temporary sand filters and then to Eccles Creek. Table PHC A-1 summarizes this information.

Skyline Mine sealed the 8, 9, and 10 Left area of the mine in September 2002 and flows from this portion of the mine were reduced by approximately 20 % as the area flooded and hydrostatic head built on the inflow point. Additionally, while the 10 Left area flooded, a descrease of about 3,200 to 3,800 gpm of mine discharge occurred for about 24 days. Seals and a retention dam were built at the entrance to 8 Left Diagonal Mains and pumps were installed to take water from behind the seals and discharge it to Eccles Creek. Also, the majority of the clean water encountered in the 11 and 12 Left areas of the mine is pumped behind the 8 Left seals. This allowed for a simplified pumping system to be installed where most of the water encountered in the southwest area of the mine could be picked-up at one location and pumped to Eccles Creek. The water laden with coal fines generated during mining activities in the 11 and 12 Left panel areas is pumped through a horizontal borehole into the 14, 15, and 16 Left sump.

In October 2002, the sand filters were removed from the mine water discharge system since the 14, 15, and 16 Left sump was fully functional and the 8, 9, and 10 Left areas were sealed. All water carrying suspended solids is directed through underground sump systems and allowed settling time before discharge. This allowed the mine to remove the expensive sand filtering systems and still discharge water without suspended loads and compliant with the Mine's UPDES Permit.

Skyline Mine has removed a portion of the water previously stored in the abandoned Mine 3 workings in advance of mining new areas to the north. The dewatering started about the same time as the 10 Left flooding occurred. Dewatering is accomplished by withdrawing 1,100 to 2,000 gpm of water from Mine # 3 through a series of in-mine horizontal boreholes. It is anticipated that the Mine #3 dewatering project will reach a point in late April 2003 where the volume of water discharged from that mine will begin to significantly diminsh as the level of water stored drops. Overall, if new ground water inflow points are not encountered in panels 12 Left A and 12 Left B, mine discharge should diminish gradually over time. Experience has shown that new water inflows occur in gate roads as panels are developed, not from the areas that are being lonwalled. All development in the 12 Left A and B panels has been completed and only longwall extraction remains to be accomplished. Therefore, no new inflows are expected in this area of the mine.

TABLE PHC A-1

MINE INFLOWS				
Location	Initial Volume gpm	Date	Current Volume April 2003	Current Discharge Location
14 Left Headgate Fault	1800	Mar-99	300	Eccles Creek
16 Left Headgate Fault	1600	Dec-99	300	Eccles Creek
West Submains Fault - Currently referred to as the Diagonal Fault	1000	Mar-00	300	Eccles Creek
10 Left Fault	6500	Aug-01	3200	Eccles Creek
East Submains XC 5 - Currently referred to as West Submains	1000	Oct-01	370	Eccles Creek
11 Left Headgate XC 24	1000	Feb-02	1000	Eccles Creek
11 Left Headgate XC 40	1000	Feb-02	1500	Eccles Creek
11 Left Set-up Room	1500	Mar-02	1300	Eccles Creek

Revised 4/2002

The proposed timetable for abandoning the mined out areas of Mine #2 has been included with this document as Appendix F. This timetable was prepared on October 1, 2002 and distributed at Skyline Mine in the form of an Internal Correspondence addressed to the Mine Manager. Four figures accompanied the document and illustrated the locations within the mine to be abandoned and flooded. The document itself discusses the timing of abandonment, the location of present significant inflows into the mine with initial and current estimated inflow rates, and anticipated inflow rates after flooding has occurred. Following is a brief discussion regarding the timing of mining and flooding of the mined areas of Mine #2.

The 10 Left area of Mine #2 was abandoned in late September 2002. The pumps that were used to remove water from the 10 Left area and the southern portions of the 8 Left and 9 Left panels were removed. Seals were constructed at the entrance to the 8 Left panel and Diagonal Mains where the water was expected to rise and pump stations were established to handle the water once it flooded the 10 Left and western portions of the 9 Left panels. The initial estimate of the volume of water to be pumped from these seals was approximately 2500 gpm. However, actual volume was estimated to be slightly more than 3000 gpm after the area was flooded. The 10 Left area of the mine was abandoned to reduce the cost of maintaining a mined out portion of the mine and improve mine ventilation.

Skyline Mine continues to mine the 11 Left panel and will mine the 12 Left A and 12 Left B panels. It is anticipated these panels will be completely mined and the area sealed by March 2004. Seals will be built at the head of the 7 Left panel and the 7 Left, 8 Left, 11 Left, 12 Left A, and 12 Left B areas of the mine will be flooded. Without operating JC-3, the volume of water that is estimated to be pumped from the 7 Left seals is approximately 4200 gpm. With JC-3 operational, the volume of water to be pumped from the 7 Left seals may be less than 1,000 gpm.

By June 2002, the 6 Left B panel will be completely mined and seals will be built to completely seal the mined areas south of the West Mains (panels 1 Left through 6 Left). By the end of

2004, the only areas of Mine #2 that will be ventilated will be the West Mains to allow access to the 14, 15, 16 Left sump. Leaving these mains open will allow access to the area west of sump if additional mining is deemed economically feasible. Pumps will be stationed at the seals near the head of the 6 Left panel and it is anticipated that water may be pumped from the seals at a rate of approximately 2900 gpm.

Once mining is completed at Skyline and the mine abandoned, the water level in the flooded portions of the mine may reach as high as approximately 8550 feet above sea level. Since the lowest most portal is approximately 8580 feet above sea level, it is not anticipated water will discharge from the mine.

In addition to pumping water from within the mine to Eccles Creek, two ground water wells were drilled and completed in James Canyon in September and October 2001 (Drawings PHC A-1 and PHC A-3). JC-1 was completed with 14-inch casing and screen while JC-2 was completed with 20-inch casing and screen. Both wells were screened in the Star Point Sandstone approximately 70 feet below the current mine workings in the Lower O'Conner B seam. JC-1 encountered a significant fracture and initially produced about 2,200 gallons per minute using a 600 hp down hole electric pump. JC-2 did not encounter significant fractures and produced approximately 320 gpm using a 300 hp down hole electric pump. JC-2 was operated for only a short period of time and has not operated since December 2001.

In October 2002, PacifiCorp installed a new pump into the JC-1 well and it is currently producing approximately 4,200 gpm. This new pump was placed in the well to increase the discharge of ground water to Electric Lake to further decrease the volume of water flowing into the mine workings at 10 Left and to increase water available to downstream water users including the Huntington Power Plant. It is anticipated this pump will be operated at least for one year. Operation of the pump beyond that time will depend on how fast the lake refills during spring runoff and the length of time Skyline Mine plans to be mining in the area.

In March and April of 2003, PacifiCorp was drilling a third well, JC-3, at the James Canyon well site to intercept the mine workings in the 10 Left area. The purpose of this well is to remove water from the mine as close as possible to its inflow point in 10 Left and discharge it to Electric Lake. The JC-3 well will have a down hole casing diameter of 24-inch and will be screened through the mine works. The well will be completed to a total depth of approximately 350 feet below the mine workings to provide the head required by the pump. PacifiCorp, with Skyline Mines aid, is obtaining a UPDES discharge permit to allow discharge of mine water to the lake. It is anticipated the well will be pumped at a maximum rate of 4,700 gpm.
It will be outfitted with a variable frequency drive to allow lower volumes to be pumped.

Water discharged from JC-1 and JC-3 is piped from the James Canyon well site to Electric Lake through a buried 16-inch HDPE pipe. When initially constructed in September 2001, the end of the 16-inch pipe was submerged approximately 8 feet below the water level of Electric Lake. A 90-degree elbow was attached to the pipe at approximately 45 degrees above horizontal to avoid disturbing sediments on the bottom of the lake. However, continuing drought conditions in 2001 and 2002 resulted in the lake water level dropping below the end of the discharge pipe. A small area of lake sediments were washed away and the water discharged onto large rocks and cobbles on the surface of the pre-lake ground surface, in effect creating its own rip-rapped energy dissipation area.

The James Canyon wells are considered to be mine dewatering wells. A UPDES permit, however, is only required for the discharge of JC-3 since this is the only water coming directly from the mine works.JC-1 and JC-2 are completed in the Star Point Formation and do not intercept the mine works.

A geologic cross section through wells/drill holes W2-1, JC-1, JC-2, W79-35-1, 75-26-3, 74-26-2, and 79-22-1 has been provided as Drawing PHC A-4. The location of the mined coal seams, faults, apparent dip of the beds along the cross section, and a site index map are provided. Also, the location of the mine in-flows of ground water have been projected horizontally to the cross sections. The location of selected springs have been illustrated on the cross section. The elevation of Electric Lake and the dates these measurements were taken are illustrated on the wells with ground water levels.

Effects of Intercepted Water within the Mine on the Local Ground Water Systems

Skyline Mine has continued to monitor ground and surface water flows at all of the Mining and Reclamation Plan (M&RP) required water monitoring sites. No discernable impacts to surface springs or surface waters from the increased ground water inflows to the mine has been observed to date. Specifically, quarterly flow monitoring of seeps and springs in the Huntington Creek drainage area indicates the significant inflows of ground water to the mine and pumping of the wells in James Canyon has not had an observable effect on ground water discharges in these areas. Furthermore, historical spring and seep data do not indicate a reduction in spring, seep and stream flows related to mining.

Included in this document in Appendix A are several graphs generated from measurements of springs and stream flows and well water levels located throughout the Skyline Mine permit area. Each graph illustrates the discharge or water levels compared to the Palmer Hydrologic Drought Index (PHDI) for Region 5, which includes the mine area, from 1982 to May 2002. Data from the following springs, stream, and well monitoring locations have been graphed: springs S15-3, S22-11, S24-12, S26-13, S34-12, S35-8, S36-12, 2-413; stream monitoring point Burnout Creek F-5; and wells W2-1, W20-4-1, W20-4-2, W99-28-1, W99-21-1,W79-14-2A, W79-10-1, W79-35-1A, W79-35-1B, and W79-26-1. Also, a single graph illustrating the water levels in W79-35-1A, W79-35-1B, W2-1 and the PHDI is presented to compare the effects of mine dewatering on the three wells. Graphs of transducer data for wells W79-35-1A, W20-4-1, and W2-1, which are completed in the Starpoint Sandstone beneath the mine, are presented to illustrate in greater detail the recent draw down of the wells. These last three graphs can be found following the graphs containing the PHDI. Accompanying each spring, stream and well graph is a brief comparison of the discharge or water level and the PHDI. Table PHC A-2 contains a summary of the well completion and water level measurement data for the Skyline Mine water monitoring wells.

Spring discharges, as shown in the graphs, aptly illustrate that almost all discharges from the shallow ground water aquifers are controlled by the fluctuations in yearly precipitation or drought cycles as illustrated by the PHDI. A notable exception is spring S24-12. The graph appears to illustrate a significant drop in spring discharge beginning in 1989. However, as presented in the text attached to the graph, the apparent change in discharge is related to a minor shift in the location of the discharge and not in the total volume of water released from the aquifer in the spring area.

Several springs, for which graphs of flow data have been provided, have been undermined since mining began at the Skyline Mine in 1982 (Drawing PHC A-3). As stated above, the fluctuations in spring discharge are easily related to fluctuations in climatic conditions and not mining activity. The relationship between spring discharge and mining activity was studied in great detail as part of an EIS performed by the Manti-La Sal National Forest for the Flat Canyon Tract located west of the existing mine leases. The study was performed by Norwest in the summer of 2000. The water monitoring data compiled by the mine since mining activities began in 1982 were studied for any effects on surface and shallow ground water discharge. The conclusion of the study was there is very little evidence that undermining or mining within the vicinity of the springs in the Skyline Mine area has resulted in the diminishment of discharges from the springs. A copy of the Norwest study has been provided in Appendix B of this document.

A comparison of the water chemistry of five springs, the JC-1 well, and three in-mine sample locations has been provided in Appendix A. Stiff Diagrams are provided for springs S22-11, S26-13, S34-12, S35-8, 2-413 and the James Canyon well JC-1. Stiff Diagrams are also provided for water samples obtained from the 10 Left Entry 3 Borehole, Fault Crossing at the West Submains (now referred to as the East Submains), and the 9 Left Horizontal Borehole. A notable difference between the spring water and the James Canyon and in-mine waters is the

TABLE PHC A-2

WELL SUMMARY DATA

Well Designation	Other Designation	In Monitoring Plan, yes/no	Formation Name & Type	Screened Interval, Top & Bottom Elevations, Mean Sea Level	Date & Current Water Level Elevation, Mean Sea Level	Historical Range of Water Level Elevation, Mean Sea Level	Name of Associated Coal Seam	Vertical Distance From Screened Interval to Associated Coal Seams (Above or Below)	Well Location, Township, Range, & Section
W10-1	W79-10-1A*	Yes	Star Point - Sandstone (Storrs Tongue)	7393.0-7373.0	5 Sept. 2002, 9017.3	9034.6-8891.7	Lower O'Connor "A"	Through Coal Seam	T 13 S, R 6 E, Sec. 10
	W79-10-1B	No							T 13 S, R 6 E, Sec. 10
W14-2	W79-14-2A*	Yes	Star Point - Sandstone (Storrs Tongue)	8342.0-8322.0	5 Sept.2002, 8947.5	8992.64-8963.1	Lower O'Connor "A"	Through Coal Seam	T 13 S, R 6 E, Sec. 14
	W79-14-2B	No							T 13 S, R 6 E, Sec. 14
	W79-22-2-1	No							T 13 S, R 6 E, Sec. 22
W22-2	W79-22-2-2	No							T 13 S, R 6 E, Sec. 22
W26-1	W79-26-1*	Yes	Blackhawk - Sandy Siltsone	8411.0-8391.0	15 Aug 2002, 8919.2	8976.5-8902.9	Lower O'Connor "B"	Through Coal Seam	T 13 S, R 6 E, Sec. 26
W35-1	W79-35-1A*	Yes	Star Point - Sandstone (Storrs Tongue)	8092.0-8072.0	10 Sept 2002, 88381.6	8557.4-8195.19	Lower O'Connor "A"	5' Below Coal Seam	T 13 S, R 6 E, Sec. 35
	W79-35-1B	Yes	Blackhawk - Sandy Siltsone	8542.4-8504.4	10 Sept 2002, 8552.7	8591.5-8547.9	Not associated with coal seam		T 13 S, R 6 E, Sec. 35
W2-1	98-2-1	Yes	Blackhawk - Sandy Siltsone	8030.4-8000.4	2 Aug 2002, 8364.4	8551.4-8364.4	Lower O'Connor "B"	Through Coal Seam	T 14 E, R 6 E, Sec. 2
JC-1		Yes	Star Point - Sandstone (Storrs Tongue)	7918.0-7858.0	No Current Data	No Current Data	Lower O'Connor "B"	11.5' Below Coal Seam	T 13 S, R 6 E, Sec. 35
JC-2		No	Star Point - Sandstone (Storrs Tongue)				Lower O'Connor "B"		T 13 S, R 6 E, Sec. 35
JC-3		Yes	Star Point - Sandstone (Storrs Tongue)	8061.7-8018.0, 7730.5-1-7711.1	Not Yet Completed	No Data Available	Lower O'Connor "B"	Though Coal Seam	T 13 S, R 6 E, Sec. 35
99-4-1		Yes	Blackhawk - Sandy Siltsone	7551.0-7521.0	10 Sept 2002, 8520.5	8571.2-8520.5	Lower O'Connor "B"	Through Coal Seam	T 14 S, R 6 E, Sec. 4
99-21-1		Yes	Star Point - Sandstone (Panther Tongue)	7431.3-7401.3	24 Sept 2002, 8322.6	8419.5-8322.6	Flat Canyon (Middle Seam)	Through Coal Seam	T 13 S, R 6 E, Sec. 21
99-28-1		Yes	Star Point - Sandstone (Panther Tongue)	7477.0-7447.0	24 Sept 2002, 8377.3	8510.0-8377.3	Flat Canyon (Middle Seam)	Through Coal Seam	T 13 S, R 6 E, Sec. 28
20-4-1		Yes	Star Point - Sandstone (Storrs Tongue)	7491.0-7464.0	27 Sept 2002, 8490.7	8559.0-8490.7	Lost Core	Lost Core	T 14 S, R 6 E, Sec. 4
20-4-2		Yes	Star Point - Sandstone (Storrs Tongue)	7574.0-7544.0	10 Sept 2002, 8420.5	8532.0-8420.5	Lower O'Connor "A"	16' Below Coal Seam	T 14 S, R 6 E, Sec. 4
20-28-1		Yes	Blackhawk - Sandy Siltsone	7420.0-7390.0	24 Sept 2002, 8393.7	8403.8-8393.7	Lower O'Connor "B"	Through Coal Seam	T 13 S, R 6 E, Sec. 28
91-26-1	North Lease	Yes	Blackhawk - Sandy Siltsone	7698.1-7668.1	9 Sept 2002, 7941.0	7941.0-7937.1	Lower O'Connor "B"	Through Coal Seam	T 12 S, R 6 E, Sec. 26
91-35-1	North Lease	Yes	Blackhawk - Sandy Siltsone	7616.9-7586.9	5 Sept 2002, 8011.4	8033.9-8011.4	Lower O'connor "B"	Through Coal Seam	T 12 S, R 6 E, Sec. 35

Note:

* The screen interval was determined by using the lowest minable coal seam; the screen was placed 3 feet below top the coal seam; and a 20 foot screen was installed.

amount of magnesium in the water. Significantly greater amounts of magnesium are found in the mine and well water than in the spring waters.

Notable differences in the chemistry of intercepted ground water in the mine and the waters found in Electric Lake were found by Hydrologic Consultants, Inc. (HCI) of Lakewood, Colorado. HCI was contracted by Skyline Mine in August 2001 to aid in determining the source of the ground water entering the mine, to help the mine determine how long the inflows could be anticipated to continue and if in-mine water wells could be used to aid in dewatering the aquifer discharging to the mine. HCI initially submitted a brief report to Skyline in November 2001 regarding where they thought the water coming into the mine may be originating. Subsequent to their initial report, more data were gathered concerning water chemistries, monitoring well data, and water age dating information (Tritium and Carbon 14). A copy of their second report is included as Appendix C. Briefly, the conclusion of their report (page 12) was that chemical and isotopic differences between water entering the mine and Electric Lake suggested strongly that no direct conduit exists between the mine and the lake.

Petersen prepared a report titled "Investigation of Fault-related Groundwaters Inflows at the Skyline Mine, 27 October 2002". This report is included as Appendix G to this document. This report expands upon the data presented and conclusions of the Petersen Report in Appendix A and the HCI report in Appendix C. Petersen evaluated the chemical composition of the in-mine and surface waters. He concluded that water in the 10 Left area is significantly dissimilar to surface waters and surface waters cannot evolve chemically into the 10 Left waters in the hydrogeologic environment of the mine (Petersen, October 2002, Appendix G, Section 6.5, p. 17). Following is excerpt from his report that details the differences between surface and in-mine waters:

> "Likewise, solute and isotopic data indicate the Electric Lake cannot be a major source of the fault-related groundwater that is flowing into the Skyline Mine. Based on the solute compositions of Electric Lake water and water from the fracture system associated with

the 10 Left inflow, it is readily apparent that the water flowing into the mine is chemically distinct from that in Electric Lake. The recent solute chemical composition of the 10 Left inflow water and Electric Lake water are summarized in Table 5. Most notably, the average chloride content of the water in Electric Lake (6.5 mg/l) is nearly four times greater than the average chloride content in the fault-related systems (1.7 mg/l). Chloride is considered a conservative species, meaning that the constituent is not attenuated from a groundwater system, other than by dilution (Fetter, 1988). In other words, there is no mechanism whereby the chloride in the lake water could be removed were it to flow through a fault system, regardless of the residence time in the fracture. Although the calcium contents of the in-mine and lake water are similar (Table 5), the magnesium and bicarbonate content of the waters are dissimilar. The average bicarbonate content of the fault-related groundwater (216 mg/l) is approximately 50% greater than the average lake content (148 mg/l). The average magnesium content of the fault-related groundwater (23.0 mg/l) is more than three times that of the average lake water (7.5 mg/l). Mineral saturation indices for calcite, dolomite, and gypsum are listed in Table 5. Saturation indices at 0 ± 0.1 indicate that a water is saturated with respect to that mineral. Waters at saturation with respect to a mineral will not dissolve additional quantities of that mineral or precipitate the mineral should the water come into contact with it. Waters with a saturation index less than 0 are undersaturated with respect to that mineral. Undersaturated waters have a thermodynamic tendency to dissolve that mineral if it comes into contact with the water. Waters with a saturation index above about 0.1 are supersaturated and have a tendency to precipitate that mineral. Electric Lake waters are supersaturated with respect to both calcite and dolomite, indicating that they have the thermodynamic tendency to precipitate rather than dissolve those minerals. Thus, in the absence of an external source of CO_2, such as deep, metamorphic CO_2 or bacterially mediated organic decay (both of which are considered unlikely in the sandstones of the Star Point Sandstone), the lake water cannot dissolve carbonate minerals (likely the only plausible mechanism whereby the groundwater could acquire additional bicarbonate and magnesium) along a groundwater flowpath regardless of the residence time in the fracture system. That external sources of CO_2 have not influenced the carbon history of the fault-related groundwater is apparent in the $d^{13}C$ composition of these groundwaters (Table 2). As discussed previously, groundwaters with $d^{13}C$ compositions near -10‰ are consistent with the dissolution of carbonate minerals in the presence of soil-zone CO_2 gas. Groundwaters that have been influenced by metamorphic CO_2 or by biogenic CO_2 will likely have $d^{13}C$ contents that deviate significantly from -10‰."

Numerous age-dating samples of surface and in-mine waters have been obtained over the past nine years. Samples from springs, surface streams, and mine in-flows have been analyzed for tritium and carbon 14 content. This sampling has been done to monitor the ages of the water intercepted underground so that if surface waters, or "young" waters, were encountered, steps could be taken to determine its source and replace the waters at the surface, if necessary. Carbon 14 dates indicate that water intercepted underground ranges in age from 5,500 years to 25,800 years old. A single roof drip sample obtained in Mine 3 in 1996 was dated at 2,500 years old. Generally, tritium analyses of water intercepted in the mine indicates that none of the water is younger than 50 years old. Surface waters and most of the spring waters have been determined to be modern water based on their tritium content. Samples of water from shallow wells, W24-1 and W17-3, and from spring S17-2 analyzed for carbon 14 and tritium content indicate waters about 2,000 to 3,500 years old are mixed with modern water. The well samples suggest water from more than one aquifer is being produced from the JC-1. A table listing the location and ages of samples collected within the mine and permit area is provided in Appendix A.

Petersen (October 2002) discussed in detail the relationship between the stable isotopic composition and tritium and carbon 14 contents of the surface waters and mine waters. His results show significant evidence that the recharge water to the aquifer draining to the mine is fundamentally different from the overlying surface and shallow ground waters systems based upon their stable isotopic composition. Petersen (October 2002) states:

"Stable and unstable isotopic data from Electric Lake, active-zone springs, and streams, indicate that these systems are not a primary source of the water in the fault-related Star Point Sandstone groundwater systems encountered in the Skyline Mine. As discussed previously, Active-zone groundwaters and surface waters in the region contain abundant tritium, have modern radiocarbon ages, and contain anthropogenic carbon. In contrast, the fault-related groundwaters have very old radiocarbon ages and contain little or no tritium (Table 2). In order to validate the conclusions that the isotopic compositions of groundwaters encountered in the fault-related Star Point Sandstone groundwater system are statistically different from those in Electric Lake, two tailed T-Tests were performed. The T-tests confirm that the fault-related groundwaters are statistically different from the Electric Lake waters based on each of their stable isotopic d^2H, $d^{18}O$ content and unstable tritium and radiocarbon contents at the 95% confidence level."

Water level data obtained from wells W79-35-1A, W79-35-1B and W2-1 present a fairly distinct picture of the effects the mine inflows and pumping of the James Canyon wells is having on the aquifer beneath the mine and the lack of impact of an aquifer within the Blackhawk Formation above the mine. The graph labeled "Wells W79-35-1 A, B and W2-1" contains water level data for the two W79-35-1 wells beginning in 1982 and water level data for W2-1 beginning in 1999. The PHDI for region 5 is also plotted. Minor fluctuations in the water levels of the two W79-35-1 wells can be seen from 1982 through 1999. The fluctuations do not appear to be related to climatic conditions. Also, both wells appear to have a slight downward trend of the water level elevations. This downward trend is unlikely related to mining since mining did not occur in this area until the mid 1990's. W79-35-1A is completed at a depth of approximately 1000 feet below ground surface into the Starpoint Sandstone, while W79-35-1B is competed to a depth of approximately 220 feet below ground surface. W2-1 is completed to a depth of approximately 1,520 feet below ground surface. In 1999, a sharp decline in the water level in W79-35-1A began, probably related to the mine inflows encountered in 14 and 16 Left panels in Mine 2. In late 2000, a significant drop in the water level in W2-1 began. (This delay in the drop may be related to measuring error. The well is constricted at about 720 feet below ground surface and, until recently, often resulted in false positive readings at that elevation. The cause of the false positive reading is unknown.) The wells appear to be completed in the same fracture zone as the JC-1 well (Drawing PHC A-3). The drop in water level in these wells is undoubtably related to the mine inflow in both the East Submains and 10 Left. The steady decline in both W79-35-1A amd W2-1 has continued to this date. However, W79-35-1B did not decline over the same time period as the other wells. The mine related drawdown effects that were observed in W79-35-1A and W2-1 and not in W79-35-1B strongly suggest a disconnect between the deep aquifer and shallow aquifer. In about October 2002, the water level in W79-35-1A appeared to slowly rise by approximately one foot until mid-December 2002. Since that time the water level has dropped about six feet. The slight rise in the water level and subsequent drop appears to be related to the approach and subsequent passing by of the well location of longwall mining activities. Since this well is located only a few hundred feet east of the 11 Left panel, this type of response to mining and subsidence is not unexpected. The change in water level in the well will continue to be monitored.

As discussed previously, the water encountered in the western- and southern-most portions of Mine 2 generally enters the mine through fractures in the floor. The potentiometric head on the water has been measured at up to 200 psi in horizontal boreholes that have been drilled into fractures and faults from within the mine. As illustrated on Drawing PHC A-4, water levels in wells W2-1 and W79-35-1A were several hundred feet above the mined coal seam prior to 1999. Also illustrated on the cross-section are Electric Lake water level measurements that were obtained within a few weeks of the well data. The level of the water initially in W2-1 was higher than the Electric Lake level but dropped below the lake level after the significant flows were encountered in the 14 and 16 Left panels in the mine. At the same time, the lake water level was higher than the ground water measured in W79-35-1A. Once the fractures in 14, 16, and 10 Left panels were encountered, the water levels in these wells began to drop noticeably and were consistently lower than the lake level.

Figure "W2-1 James Canyon South Ridge Transducer Data" (Appendix A), formerly provided as

Figure PHC A-5 in an earlier version of the PHC James Canyon Addendum (November 2001), illustrates 1) there is hydraulic communication between the well and the 10 Left fractures; and 2) the fractures system in the Star Point Sandstone is being dewatered and depressurized as the result of 10 Left discharge and pumping JC-1. As evidenced by the stabilization and flattening of the recovery curve observed while the pump was off mid-November to mid-December 2002, the system is indeed being dewatered and not recharging at a significant rate. Activities related to mining, pump operation, discharge of water from the fracture to the mine have introduced numerous unknown variables to the aquifer system thus precluding more detailed analysis of the drawdown data.

The water levels in these wells represent a potentiometric surface and not a saturated ground water table surface. As discussed in the PHC and extensively in Petersen (October 2002), the Blackhawk Formation forms an effective seal overlying the Starpoint Sandstone, thus creating a confined aquifer. No evidence has been found that water rose to the surface through any of the recently encountered fractures and faults. Indeed, monitoring of the surface seeps, springs, and streams overlying fractures and faults that discharge ground water to the mine indicate reductions in flow are most certainly related to climatic conditions and not mining activities as evidenced by the PHDI.

Drawdown and/or depressurization of the deep aquifer related to mine dewatering can also be observed in wells W20-4-1, W20-4-2, and W 99-21-1. These wells are located west of Electric Lake (Drawing PHC A-3). The graphs of the monitored water levels in these wells show some responses to changes in the operation of the JC-1 well. This suggests that the aquifer underlying the mine is continuous to the west. As discussed in the main body of the PHC, the calculated velocity of water passing through the Starpoint Sandstone is 0.01 foot per day. The rapid response of these wells and wells W2-1 and W79-35-1 to the mine dewatering suggest that the sandstone is fractured and water is moving toward the mine through these fractures.

No significant sustained inflows of water were encountered in Mine 1. However, as illustrated on

Drawing PHC A-2, Mine 1 did not develop far enough west to mine through the fracture locations in the14, 16, 10, and 11 Left panels of Mine 2 that produce water.

The results of the age dating work at Skyline Mine suggest waters currently being intercepted in Mine 2 are "old" waters and not recharging directly from the surface. Age-date samples are periodically obtained both underground and from JC-1. Specifically, samples of the water from the 14, 16, 10, and some of the 11 Left panel inflow points have been obtained and analyzed for tritium and carbon 14 content. The results of the sampling and corresponding sampling times are listed in Table 2 of the Petersen (October 2002) report. The tritium analyses in the 10 Left area and East Submains E1 XC 5 Fault site has not significantly changed since sampling began in these areas. Additional tritium and carbon 14 results for these sites is pending.

Since the initial start-up of the JC-1 well, periodic samples have been obtained of the discharge water and analyzed for tritium content. The results of the analyses are included as Table 2 of Appendix G. The average tritium value measured in the water discharged from the well since September 2001 is 1.47 TU. Initially, the first sample had a tritium concentration of 0.24 TU. Samples obtained between May and September 2002 had tritium concentrations ranging from 0.98 to 1.50 TU. In October 2002, PacifiCorp installed a pump in JC-1 capable of pumping approximately 4,200 gpm of water, approximately 2,100 gpm greater than the last production rate of the pump previously in the well. Initially, the tritium concentrations increased to 2.22 TU but have since declined to 1.71 TU. It appears that since January 7, 2003 the tritium concentration in the JC-1 well water has stabilized and is slightly decreasing, ranging between 1.83 and 1.71 TU. This suggests that between 6 and 22 percent of the water being pumped from the JC-1 well has a component of water that could be considered younger than 50 years old (The percentages are based on tritium concentrations measured in water samples from area springs and Electric Lake and range between 8.6 and 30 TU. Table 2 of Appendix G). During the same time period in which the tritium values have fluctuated in the JC-1 well water, no significant changes have occurred in the in-mine water ages.

HCI and mine personnel have attempted to determine the geometry of the aquifer that lies beneath the mine. Most of the coal exploration drill holes in the mine area do not penetrate more than a couple hundred feet into the Star Point Sandstone. However, logs from oil and gas exploration drill holes in the general permit area have been obtained and studied. From these drill hole logs, the thickness of the Star Point Sandstone is estimated to be approximately 900 to 1,000 feet thick in the permit area. The sandstone appears to thicken to the west. The Star Point is not one continuous unit of sandstone but is comprised of interbedded sandstone, siltstone, and shale. While the sandstone fraction dominates the overall formation in the area, many of the sandstone tongues of the formation are separated by thin units of less permeable siltstone and shale. This relationship is illustrated on Plate III of HCI report (Appendix C).

HCI has been working on a model of the aquifer within the Star Point Sandstone. Several assumptions have been made on the volume, porosity, and transmissivity of the aquifer. The results of the modeling could provide rates and volumes of water that must be removed from the aquifer to lower the potentiometric head to a point below the coal seam in the western portion of the permit area. However, to construct an accurate ground water model, several ground water monitoring points are needed. No additional monitoring wells in the permit area are planned at this time. Thus the model that HCI attempts to produce will contain a number of assumed aquifer parameters and the aquifer geometry. If a suitable ground water model can be produced by HCI, it is anticipated a copy of the results will be forwarded to the Division as an update to this PHC Addendum.

Currently, Skyline Mine believes the available data suggests the water entering the mine is sourced by the Star Point Sandstone. The water in the Star Point is under potentiometric head and is forced up through faults and fractures encountered during development mining. Water moves slowly out of the sandstone formation into the fractures and faults and then along the fractures and faults toward the mine (Petersen October 2002, pages 11 through 13). Vertical movement above the Star Point Sandstone is limited by the tight, impermeable beds of the Blackhawk Formation. The current mine inflows are depressing the potentiometric surface of the aquifer in the mine area (HCI Figure 6, Appendix C and Petersen Figure 4 Appendix G). The size of the aquifer is unknown at this time but appears to have limits as demonstrated by the steady decrease in the potentiometric head measured in the mine monitoring wells.

Recharge to the Star Point Sandstone appears to be slow as evidenced by the continued draw down of the aquifer and the age of the in-mine water. The drawdown rate of 0.08 feet per day in W79-35-1A was calculated for the time period between April 17, 2002 and July 1, 2002 (6 feet of drawdown over 74 days) and suggests that the potentiometric head of the ground water in the area at the head of the 9 Left panel will be at or near the elevation of the coal seam (a drop of 85 feet) in approximately 1060 days. It is reasonable to assume that mine inflows will decrease as the head is removed from the aquifer. Quantifying the rate of decrease and times at which the flows will decrease is difficult at best. The model HCI is preparing for Skyline may give the mine the ability to provide the Division with a very crude estimate of the time it will take for mine in-flows to diminish.

Skyline Mine continues to provide periodic updates to the holders of the water rights in the mine area of the results of the studies the mine is performing to determine the sources and impacts of the mine dewatering on the area ground water resources.

Effects on Surface Waters

Discharge from the Skyline Mine to Eccles Creek has steadily increased since January 1999 as discussed previously. Currently, the mine discharges water to Eccles Creek at a rate of approximately 9,500 to 10,500 gpm, with a portion of the water discharged coming from stored water in Mine #3. Eccles Creek runs at near bank full conditions when the mine discharges at a rate of 9,000 gpm to 15,000 gpm. The channel has a fairly steep gradient, is well armored, often flows directly over bedrock, has few meanders, and has extensive vegetative growth on its banks (EarthFax, Appendix D). Several abandoned beaver dams have been or are in the process of being eroded. However, the rate of erosion is very slow and addition of sediments from the dams and ponds is slight.

Mud Creek has a much lower gradient than Eccles Creek and has increasing numbers of meanders as it approaches the town of Scofield. The channel banks and floors consist of fine grained sediment with minimal vegetative cover. At current discharge rates, the channel is not yet at bank full conditions and not subjected to significant erosion (EarthFax, Appendix D). Increased flow rates from the mine could impact this stream channel more significantly than the Eccles Creek channel if flows from the mine increase. However, Mud Creek has a significantly higher full carrying capacity than does Eccles Creek. EarthFax was contracted by Skyline to prepare and implement a work plan that involved locating several sites on both Mud and Eccles Creek where the stream channel morphology, vegetation, flow volume, and water chemistry would be monitored on a regular basis. The purpose of the monitoring is to determine what, if any, impacts may be occurring as Skyline Mine discharges large volumes of ground water to these creeks. The monitoring of these aspects of the Mud and Eccles Creeks will continue until at least one year after the mine discharge volume drops to or below pre-March 1999 discharge levels of approximately 350 gpm.

Scofield Reservoir was constructed to serve as flood control, storage for irrigation water, and a drinking water source for Price and the surrounding communities. It has a storage capacity of 73,600 acre feet of water. Assuming the mine continues to discharge at an average rate of approximately 10,000 gpm, this would add approximately 44 acre feet per day of water to the reservoir. This represent approximately 0.06% of the maximum daily storage capacity of the lake. Normally, Eccles Creek drainage contributes less than 1 acre foot per day of water during minimum baseline flow conditions.

The concentration of salts in the mine water discharged to Eccles Creek as measured by the Total Dissolved Solids (TDS) concentration was between 400 and 650 mg/l from July 2000 to June 2001. Between June of 2001 and February 2003, the average TDS concentration of the water discharged from the mine was less than 500 mg/l. Between March 2002 and September

2002, the TDS concentration in the mine discharge water was consistently less than 400 mg/l. Since September 2002, the TDS concentration has ranged between 425 mg/l and 625 mg/l. The increase in TDS since September 2002 is related to the discharge of additional stored Mine #3 water. The average concentration of TDS in Eccles Creek above the mine is slightly less than 300 mg/l with seasonal variations of concentrations between 165 and 435 mg/l. Skyline Mine is working with the Utah Division of Water Quality (DWQ) on methods to reduce the overall concentration of TDS in the mine discharge water. Discussions center around a new TDS discharge limit of 500 mg/l for mine water. This has not yet been approved. The mine is pursuing several potential projects to either reduce TDS concentration or mitigate its effect on the downstream water bodies. These potential projects include capturing more of the mine water underground at its source to eliminate TDS that enters the water as it passes through gob, and participating in salinity reduction programs in the Castle Valley area.

Total Suspended Solids (TSS) concentrations in the mine water discharged to Eccles Creek have typically been within the limits set by the mine's UPDES permit. Over the past 10 years, infrequent exceedances of the limit have occurred. These occurrences have become rare since 1999 with one exception. In August 2001, a release of coal fines to Eccles Creek was reported by the mine to DWQ and DOGM. No significant environmental damage occurred as a result of the release because of its short duration and minimal volume. Changes to the mine's water handling system were instigated to prevent future occurrences of this type of release.

No increase in nitrogen or phosphorous compounds above background level has been detected in the mine water discharged to Eccles Creek for several years. A brief study on the effects of mine discharge with regard to total phosphorous was performed by EarthFax in December 2001 as part of the Flat Canyon EIS. A copy of the study is included in Appendix D. The results of this preliminary study indicate that it is unlikely that mine water itself will contribute significant concentrations of total phosphorous to Scofield Reservoir. However, since the Scofield Reservoir is a drinking water source for Price, a top cold water fishery in the State, and has been listed as an impaired water body by the EPA, increases in total phosphorous released to the reservoir is of special concern. Several studies have been conducted since the mid 1970's by the Utah Division of Wildlife Resources, Utah Department of Environmental Quality, and the USGS to determine the sources of phosphorous pollution in the lake. Copies of several of these studies are included in Appendix E. Generally, the studies have identified two significant sources of phosphorous pollution - sediments entering the reservoir and runoff from lands carrying animal waste into the lake. A report written 1992 by Harry Lewis Judd of the Utah Division of Water Quality, Utah Department of Environmental Quality titled "Scofield Reservoir Restoration through Phosphorous Control" suggest that as much as 29% of the total phosphorous load in Scofield Reservoir is delivered by Mud Creek. He sites the poor conditions of stream banks in the lower sections of the creek south of the town of Scofield and the recreational and industrial activities that occur in the drainage as the source of much of the sediment that contains the phosphorous that is detrimental to the lake's water quality. The idea that sediments transported to the lake by its tributaries is a significant source of phosphorous is supported by previous studies.

Beginning in 2002, the total phosphorous concentration in the water discharged into Eccles Creek from the mine has been monitored. Orthophosphate concentrations have historically been monitored in the discharge water along with periodic monitoring for total phosphorous concentrations. A new monitoring plan to evaluate the effects of increased mine discharges on the stream channels of Mud and Eccles Creek was instigated in the summer of 2002. This study includes monitoring several locations on both creeks for changes in stream morphology and water chemistry. Two sites on Eccles and six sites on Mud Creek will be monitored for total flow, TDS, TSS, and total phosphorous. If significant increases in TDS, TSS, and total phosphorous or changes in stream morphology and/or plant communities are noted, the sources will be investigated. If they are related to Skyline Mine activities, remedial actions will be taken. These actions may consist of, but not limited to, armoring stream channel banks, planting of stream bank stabilizing vegetation, or redirection of some flows to the Huntington Creek drainage. Monitoring information is provided in the "Addendum to the Probable Hydrologic

Consequences, July 2002, Appendix D and the work plan for monitoring is provided in Attachment 3 of Section 2.12. Future monitoring information will be provided in the Annual Report.

Total and dissolved iron concentrations in the water are typically below 1 mg/l, similar to background water concentrations. Nickel concentrations have reached as high as 40 μg/l. This concentration is well below the UPDES permit levels. However, it has been determined that levels greater than 15 μg/l in the mine discharge inhibits the reproductive capabilities of Ceriodaphnia dubia, an invertebrate used to biologically monitor the quality of water of industrial and municipal discharges. The mine is working with the DWQ to mitigate the effects of discharging nickel at concentrations below established discharge limits. No other elements or compounds of concern have been detected in the increased mine water discharge.

The increased mine discharges have been a benefit to Scofield reservoir. Scofield Reservoir has a capacity of 73,600 acre feet of water storage. Currently, the mine discharges approximately 9.2 acre feet of water per day to the lake. Since August 2001, the mine has discharged approximately 21,957 acre feet of water to the lake (March 31, 2003). The mine water discharge not only helps to alleviate some of the problems related to the effects of drought within the Price River drainage area but is also helping to maintain the first class cold water fishery in Scofield Reservoir. Low lake levels in past years have resulted in increased water temperatures and deadly algal blooms. The added water discharged from the mine reduces the potential for algal blooms related to low lake levels.

Currently, Skyline Mine discharges approximately 3,900 gpm of ground water from the James Canyon JC-1 well directly to Electric Lake (JC-2 has not operated as of October 2001). The quality of the water is similar to the water of James, Huntington, Swen's and Little Swen's Creeks, the major tributaries to Electric Lake. TDS concentrations of the well water range between 175 mg/l to 205 mg/l (Appendix A). TDS concentrations in the waters of the tributaries range from 143 mg/l to 274 mg/l (Division EDI, Skyline Mine). Iron, both dissolved and total, concentration in the well water is less than 0.2 mg/l, similar to or less than stream and ground water concentrations in the Electric Lake basin. Nitrogen and phosphorous compounds have not been detected in the well water above background levels. Since the JC-1 well discharges ground water only, it is reasonable to assume that the chemical composition of the water is similar to the waters discharged by the seeps and springs in the area that feed the tributaries of Electric Lake.

The JC-3 well will be permitted to discharge water from the mine workings to Electric Lake at a rate not to exceed 5000 gpm, a anticipated stipulation of the not-yet-approved-UPDES permit. The pump will likely only be capable of producing approximately 4700 gpm. The water chemistry of the groundwater flowing into the 10 Left area of the mine has the same chemistry as the water described above. It is anticipated the chemistry will not significantly change during its short residence time within the mine works prior to being pumped to the surface. The UPDES permit is anticipated to have limits of 242 mg/l TDS and less than 1 mg/l iron concentrations in the discharge water. The discharge water from JC-3 will be monitored for total phosphorous as well as all other parameters as required by the UPDES permit. If the water quality of the discharged mine water does not exceed the UPDES quality limits, Electric Lake and Huntington Creek waters will not be degraded. The JC-3 well is anticipated to be operated while drought conditions persist in the area and the mine needs to maintain access to the West Mains. If either conditions changes, modification to the operation schedule of JC-1 and JC-3 may be appropriate. Appropriate regulatory organizations and water users will be notified of the operational changes. The mine anticipates there will be short-lived periods of time where the pumps may be taken off-line for maintenance purposes. Plans have been made underground to handle the increased inflows and discharges should this occur.

Once JC-3 is operational, the total discharge of mine water to Eccles Creek should diminish by approximately 4,700 gpm. As discussed previously and detailed in Appendix F, over time the overall discharge of mine water to Eccles Creek will be reduced as portions of the mine are abandoned and allowed to flood. The actual mine inflow and discharge rates will probably vary slightly from the numbers given in Appendix F, but the overall downward trend of the rates is expected to continue.

As discussed previously, water from the James Canyon wells is piped directly to Electric Lake. Initially, when the pipeline was laid, the end of the pipe was beneath the surface of the lake. This allowed water to be discharged without disturbing lake sediments. However, as the lake level dropped throughout the late summer and fall of 2001, the end of the pipe was exposed. This resulted in the slow erosion of the accumulated lake sediments in the immediate area of the pipeline discharge. The erosion of the sediments resulted in the moving of the material a short distance away from the pipeline to the standing lake level where they were redeposited. The pre-lake ground surface has been exposed and it consists of sands, gravels and cobbles. This area appears to be naturally well armored and no further erosion is expected to occur. As the lake level rises, the end of the pipe will again be under water.

The capacity of Electric Lake is 31,500 acre feet of water. The reservoir was constructed and is operated by PacifiCorp to maintain a reliable source of cooling water to the Huntington Power Plant. Assuming the James Canyon JC-1 and JC-3 well pump at a combined rate of 8,600 gpm (a current rate of 3,900 gpm from JC-1 and an anticipated rate of 4,700 gpm from JC-3), a daily average of approximately 36 acre feet of water would enter the lake. During low flow periods, the volume of water entering Electric Lake from all its tributaries is about 4,000 gpm or less. During high flow periods, inflows may be many times this rate, but accurate inflow records have never been kept. The discharge of the wells to Electric Lake represents 0.12% of the total maximum daily storage capacity of the lake. Since low flow periods generally occur when the lake is at or near its lowest annual level, the well water discharge volume should not significantly affect the daily operation of the reservoir. Indeed, in times of drought, the well water is a significant benefit to both the power company and downstream water users.

The recent drought conditions in the Huntington Creek drainage have resulted in historic low water levels in Electric Lake. This has raised concerns of many of the downstream water users, including PacifiCorp and Huntington Cleveland Irrigation Company. These two entities hold the rights to the water stored in the Huntington Creek drainage. Because of the close proximity of the reservoir to the mine, many naturally have assumed water is entering the mine from the lake. However, age dating of the mine waters, a comparison of the water chemistry of the lake and mine waters, and the low permeability of the formations overlying the coal seam suggest that no direct conduit is present between the lake and the mine (Petersen October 2002). The maximum surface acreage of Electric Lake is 485 acres and a maximum depth of water at the dam is approximately 180 feet. Star Point Sandstone crops out downstream of dam and through Huntington Canyon. The Connelville and O'Connor Faults appear to extend to the south west and into Electric Lake. However, the age-dating and water chemistry data obtained from in-mine water samples does not suggest the faults transmit large volumes of water to the subsurface aquifers intercepted in the mine. Petersen (October 2002) states:

> ".... groundwater flow through the Star Point Sandstone occurs primarily through fracture openings and groundwater flow through the matrix of the sandstone occurs only at a very slow rate. Based on these findings, it is apparent that large volumes of leaking Electric Lake water cannot be the source of the large fault-related inflows in the Skyline Mine. If Electric Lake water was flowing through fractures directly to the 10 Left area, it would be anticipated that the "pulse" of lake water would arrive at the mine in a short period of time. This conclusion is reached because the fracture system in the local area between the lake and the mine has only limited storage potential. Thus, it would be necessary for the potential large volumes of lake water to migrate very rapidly through the fracture network to accommodate continued water movement from the lake into the fracture system. This condition can be likened to the movement of cars on the interstate freeway during rush hour. Because the total surface area available for cars is limited, the only way to move a large number of vehicles over large distances it to move them rapidly. Calculations of the potential storage capacity of the fracture network in the vicinity of the 10 Left inflow and Electric Lake indicate that were a large inflow of lake water to be migrating through the fracture system, that water should have arrived in the mine in a period of several

hours to several days (based on the amount of time required to fill the fracture volume). Based on stable isotopic evidence, solute chemical evidence, tritium concentrations, and radiocarbon contents, it is clear that this is not occurring (i.e., there is not a large slug of modern recharge water anywhere in the Skyline Mine). Similarly, if Electric Lake water were migrating through the pore spaces of the Star Point Sandstone, based on the low hydraulic conductivity of the rock (1.3×10^{-6} to 2.3×10^{-6} cm/sec), it is calculated that the time required for this water to reach the mine workings would likely be measured in the hundreds or thousands of years. Clearly, the lake water could not have migrated through the sandstone pore spaces in the short time that has elapsed since the fracture system was first encountered in the mine."

Skyline Mine continues to study the mine water in-flow problem in an effort to more effectively and efficiently mine coal. The results of these studies are shared with the water right holders and will continue to be shared with the Division.

If operation of the JC-1 and JC-3 wells continues to aid in reducing the overall volume of ground water entering the mine, the well may be operated for the life of mine or until the potentiometric surface of the aquifer has dropped below the mined coal seams. It is reasonable to assume that as the potentiometric surface of the ground water is lowered, the efficiency of the pumps will decrease. This will result in lower rates of water pumped from the wells. Since it appears there is not a direct connection between the water being pumped from the James Canyon wells and surface waters or surface discharges of ground water, continued operation of the wells should not affect the normal discharge rates of these waters. A table illustrating the daily and computed discharge volumes from the James Canyon wells through March 2003 is attached in Appendix A.

Several reaches of Burnout Creek have been undermined beginning in 1993. Prior to mining, a study of the effects of undermining the creek was jointly funded by Skyline Mine and the Manti - La Sal National Forest. The study included monitoring the flows of the stream at several locations, monitoring changes to the stream morphology, and maintaining numerous photo monitoring points over the length of the creek. The study was essentially completed in 1998 and the results reported in 2002 by R.C. Sidle in Environmental Geology, volume 39. The conclusion of the study was that no significant impacts to the stream could be related to mining. Flows were not diminished in the stream and the morphology was not significantly modified by subsidence. Norwest used this report along with additional monitoring data to reach essentially the same conclusion (Appendix B). They found that climatic conditions greatly influenced flows in the creek and found no evidence of water loss due to mining induced subsidence. The graph illustrating the stream flows, as measured at flume 5 near the mouth of Burnout Canyon, from 1991 to the present and the PHDI for the same time period is included in Appendix A. The graphed flows demonstrate the changes in stream flow are heavily influenced by climatic conditions.

Conclusions

Significant new ground water inflows into the mine have been encountered since March 1999. The inflows have resulted in increases in the discharge volume of mine water to Eccles Creek. Additionally, two ground water wells have been drilled in James Canyon and one is being pumped in an effort to reduce the volume of ground water entering the mine. A third well will be pumping water from the 10 Left area of the mine to Electric Lake beginning in May, 2003. The water from these wells is discharged directly to Electric Lake. Continued monitoring of the surface seeps and springs and surface water flows in the permit area demonstrates that the increases in ground water inflows to the mine has not adversely impacted the volume of discharges of ground water to the surface in and adjacent to the mine area. Specifically, monitoring of selected wells, springs, and surface waters in Burnout and James Canyons has demonstrated there is no discernable affect to the flow of these water sources by the increase in ground water inflows to the mine. Indeed, most of the fluctuations in spring flows can be attributed to changes in climatic conditions. Analysis of the monitoring of the aforementioned waters further demonstrates the isolation of the ground water encountered in the mine from surface waters in the mine area as described in the existing PHC.

Increased discharges of mine water to Eccles Creek has resulted in near bank full channel conditions. Significant erosion has not been noted in the stream channel. However, if the high discharge volumes continue, erosion of the stream channel will occur at a rate faster than would occur without the mine water discharge. Since the stream channel is well armored and vegetated, increased bank erosion should still occur only at a very slow rate. The Mud Creek channel will need to be monitored closely for increased rates of erosion. Mitigation efforts may be required for both stream channels if significant erosion is observed. Increased discharges to Scofield Reservoir has helped to alleviate the current drought conditions.

The chemistry of the mine water discharged to Eccles Creek is closely monitored. While TDS concentrations have been reduced in the mine water, the total volume of dissolved solids has increased. The mine is currently working with DWQ in an effort to mitigate TDS and nickel concentrations in the mine water discharge. No other significant chemical impacts due to increased mine water flows have been noted.

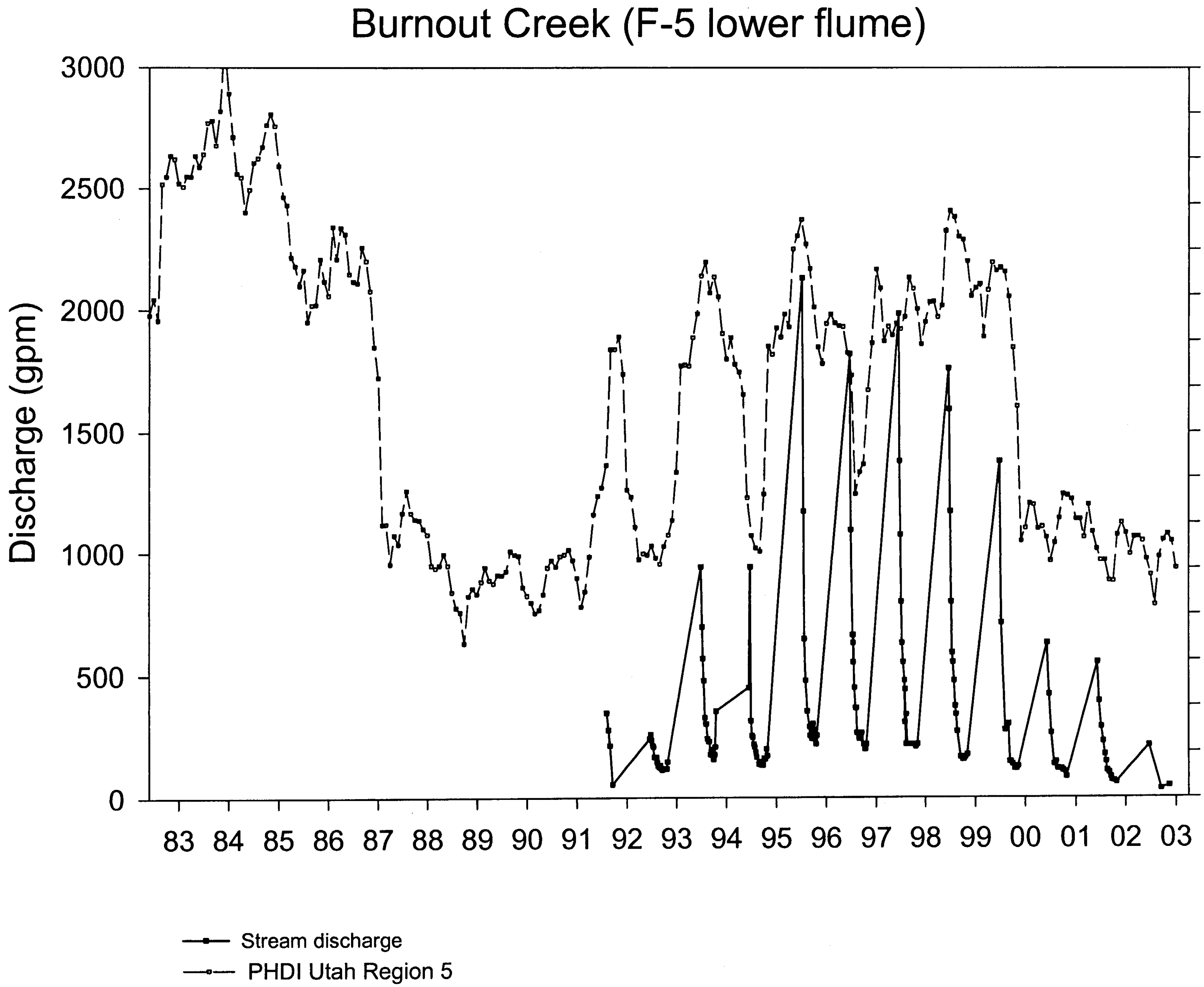
Discharges of water from the James Canyon wells should not have a significant impact on the quality of Electric Lake. The well water is piped directly to the lake, thereby eliminating concerns of over loading James Creek. The volume of water discharged to the lake from the wells is a small percentage of the total daily volume of the reservoir. The additional inflows should not adversely impact the operation of the reservoir. In fact, the discharge of ground water and the mine water to Electric Lake should be considered a benefit to the water users in the Huntington Creek drainage.

The operation of JC-3 will benefit the mine since it reduces the overall power, maintenance, and personnel costs associated with discharging mine water to Eccles Creek. If JC-3 were not operated, that volume of mine water would have to be pumped through the mine works and discharged to Eccles Creek. Operation of the well will reduce the discharge of water to Eccles

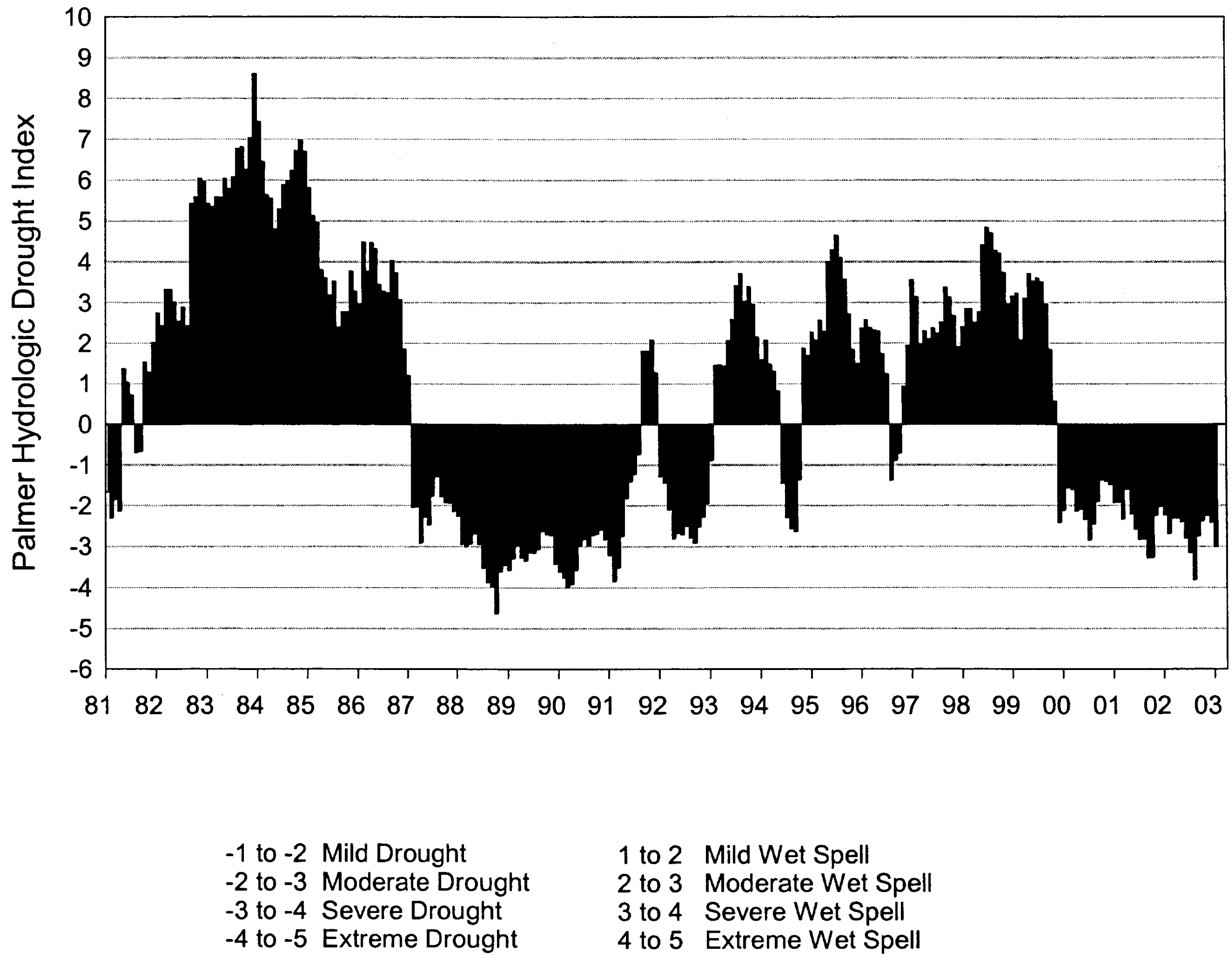
Creek and increase the flow of water to Electric Lake. In times of drought, operation of JC-1 and JC-3 could significantly reduce the chance of the Huntington Power Plant needing to scale back their operations and could result in additional agricultural water to users downstream in Emery County.

Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.

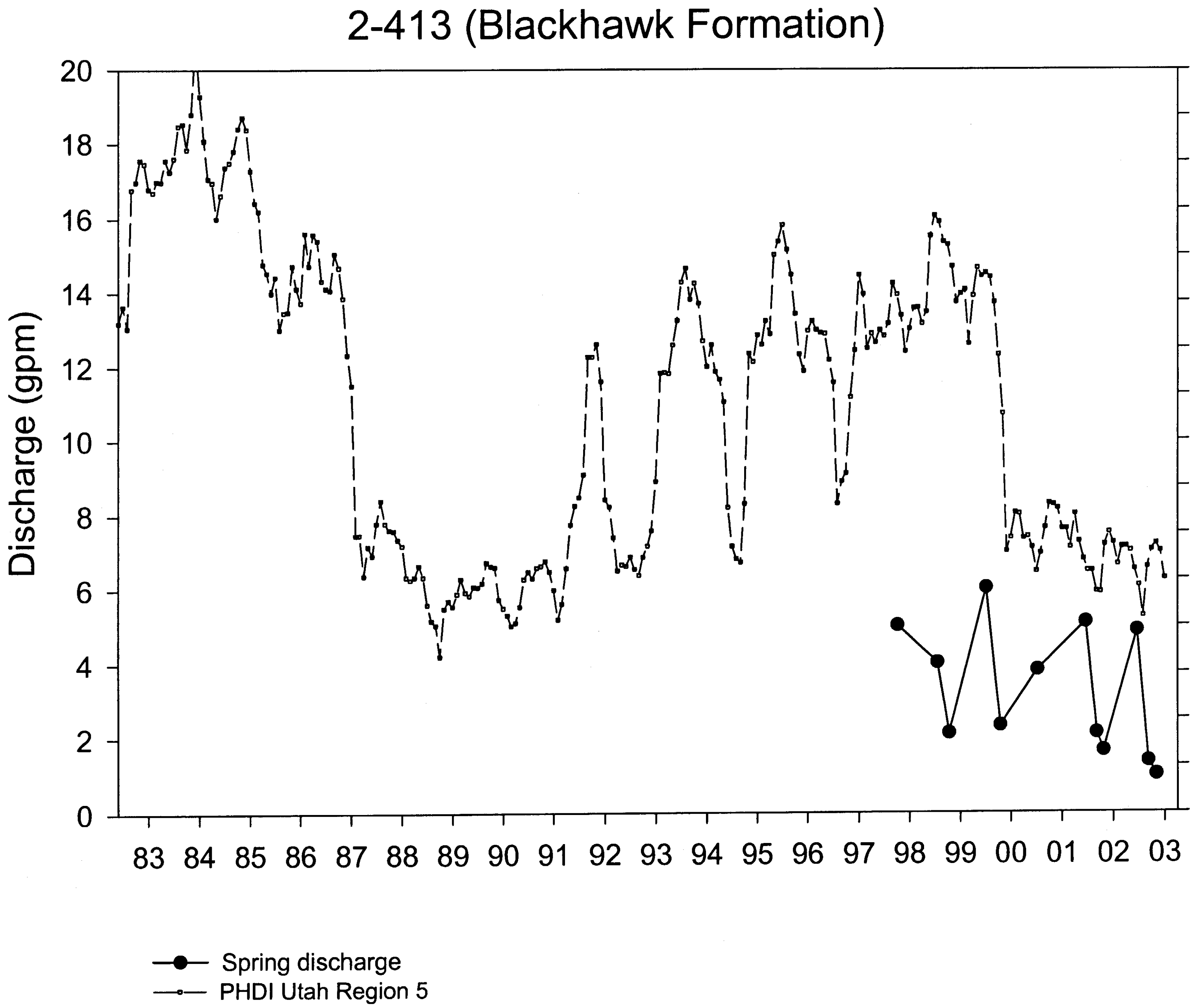
MINE INFLOW MAP



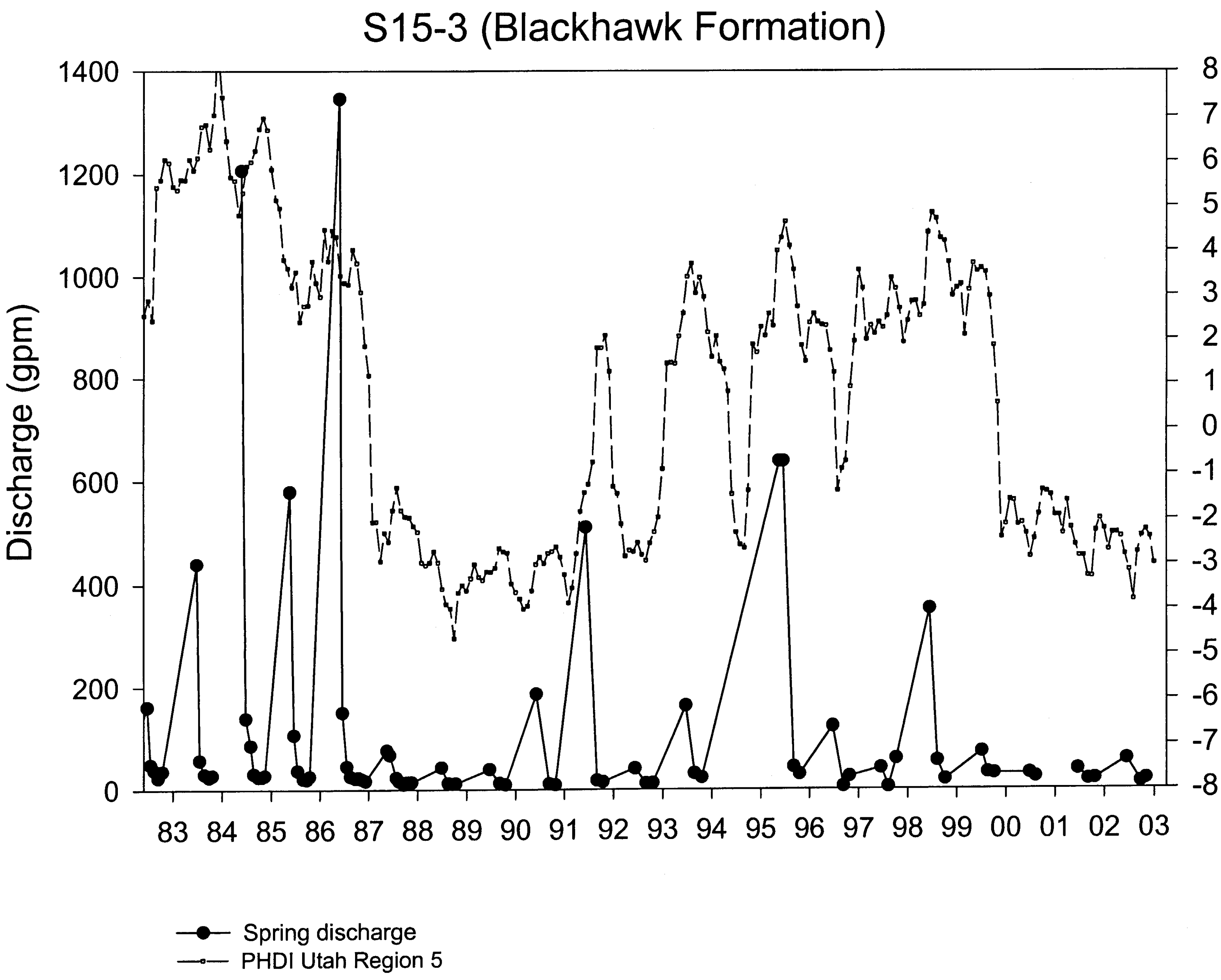
Burnout Creek (F-5 lower flume)
Discharge (gpm)
3000
2500
2000
1500
1000
500
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Stream discharge
PHDI Utah Region 5



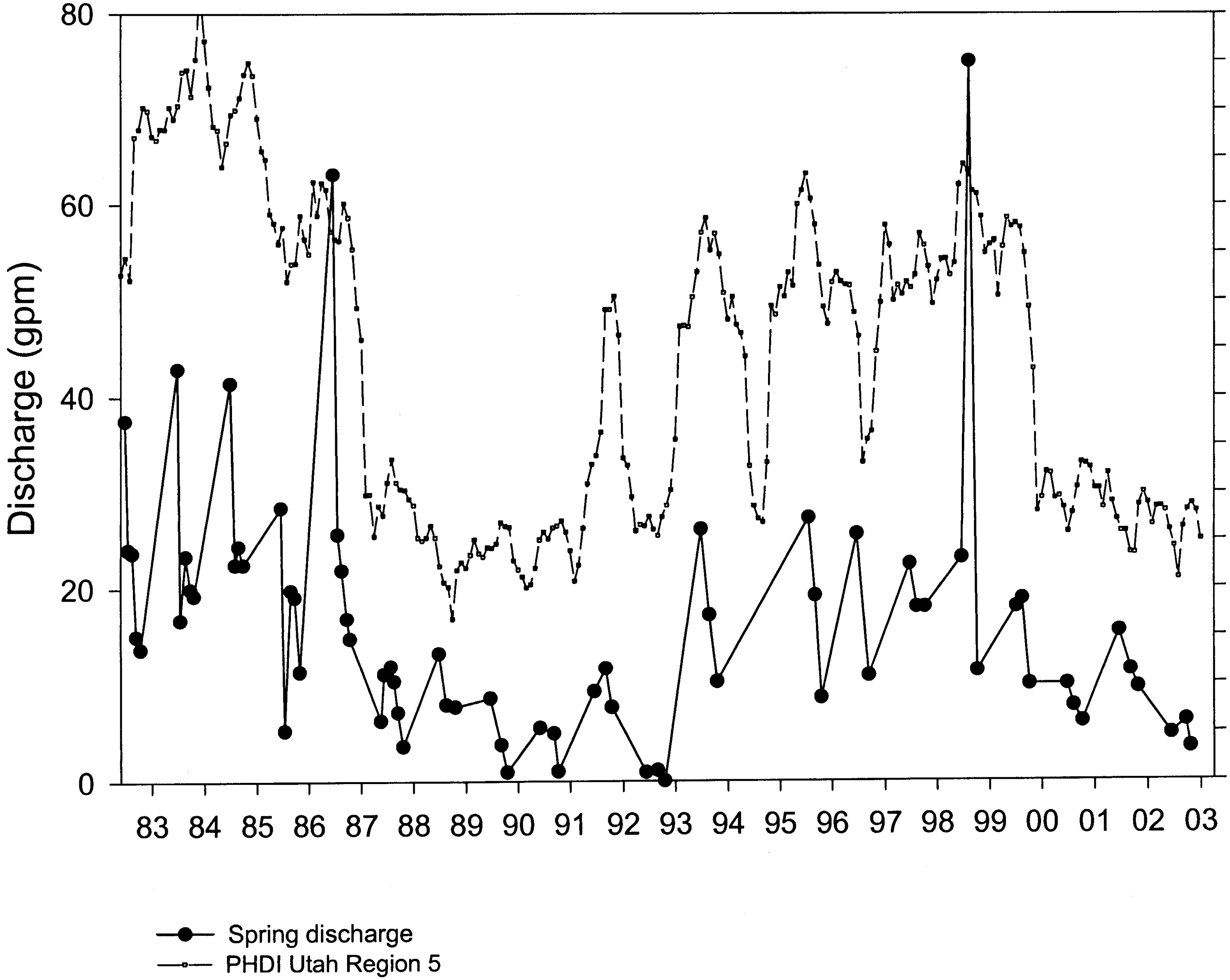
Palmer Hydrologic Drought Index, Utah Region 5 (Skyline Mine area).

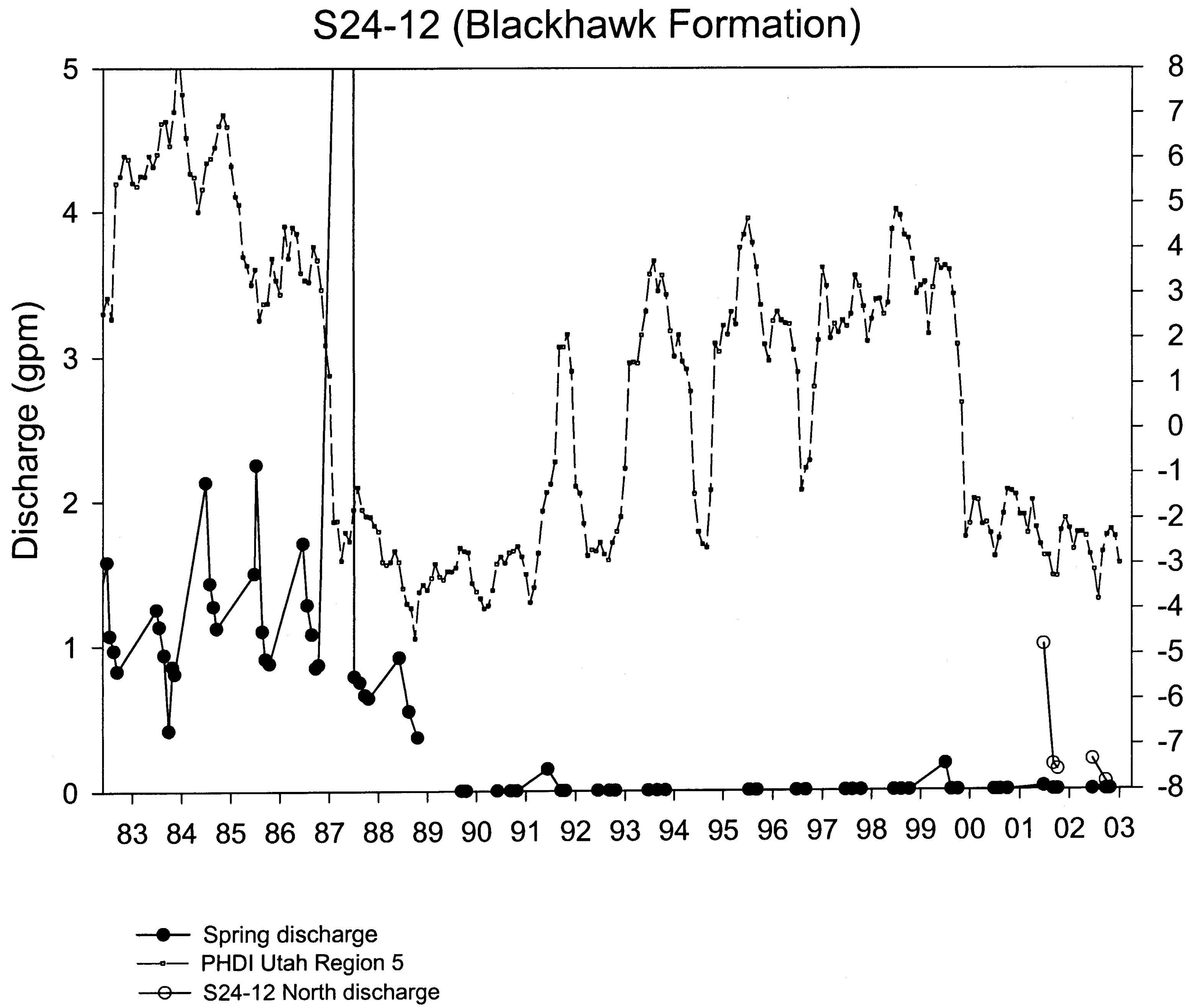


2-413 (Blackhawk Formation)
Discharge (gpm)
20
18
16
14
12
10
8
6
4
2
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5

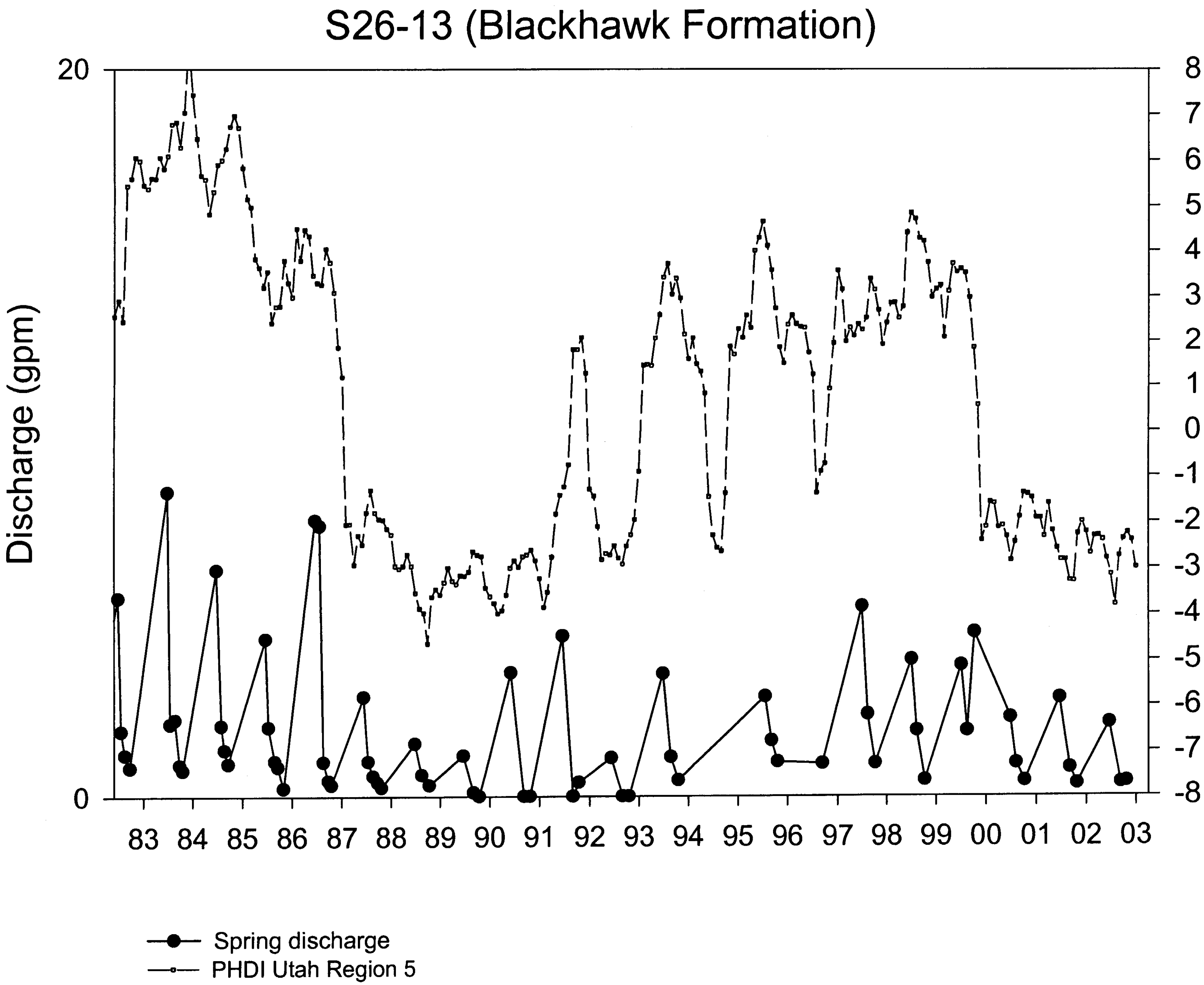

S15-3 (Blackhawk Formation)
Discharge (gpm)
1400
1200
1000
800
600
400
200
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5

S22-11 (Blackhawk Formation)



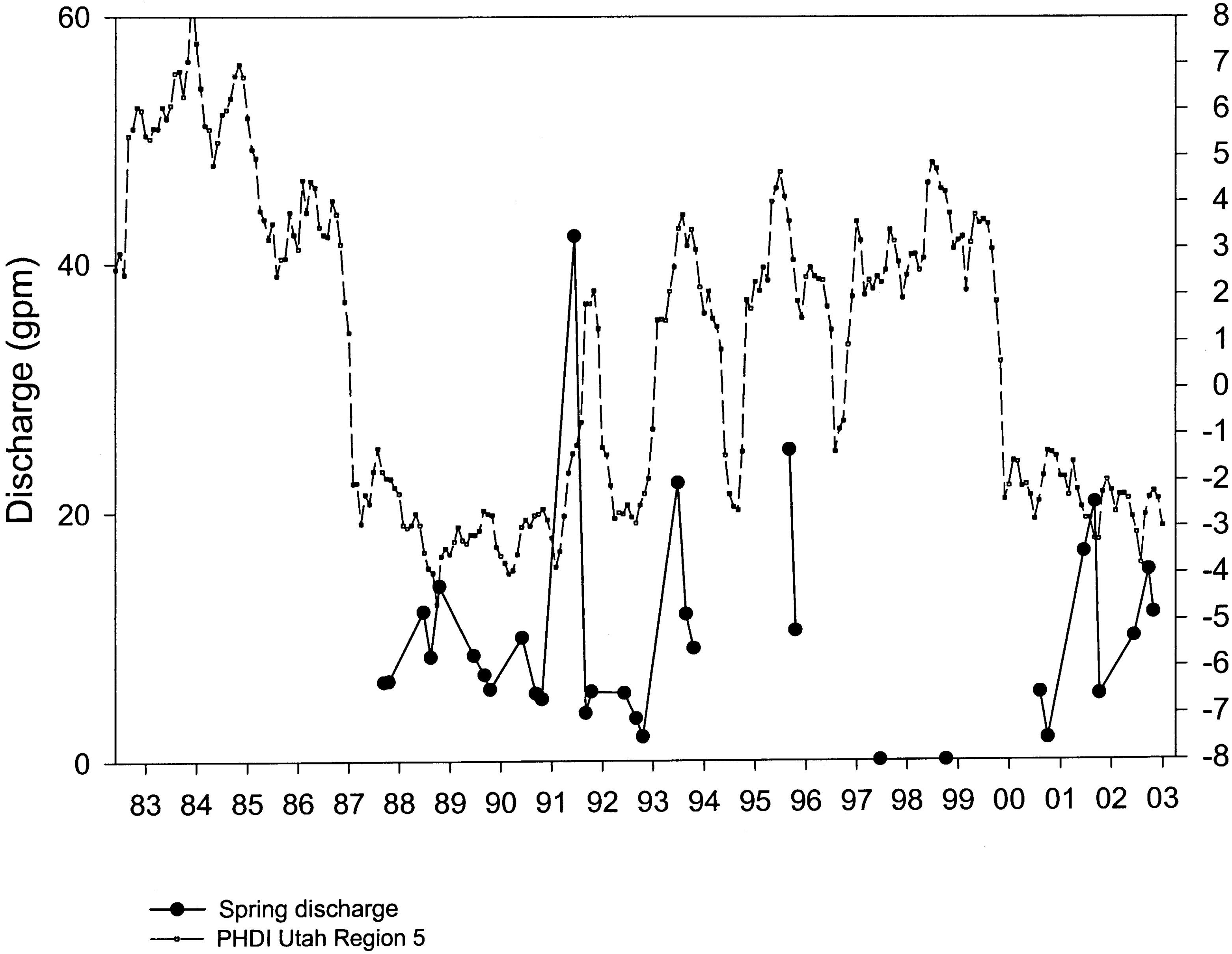


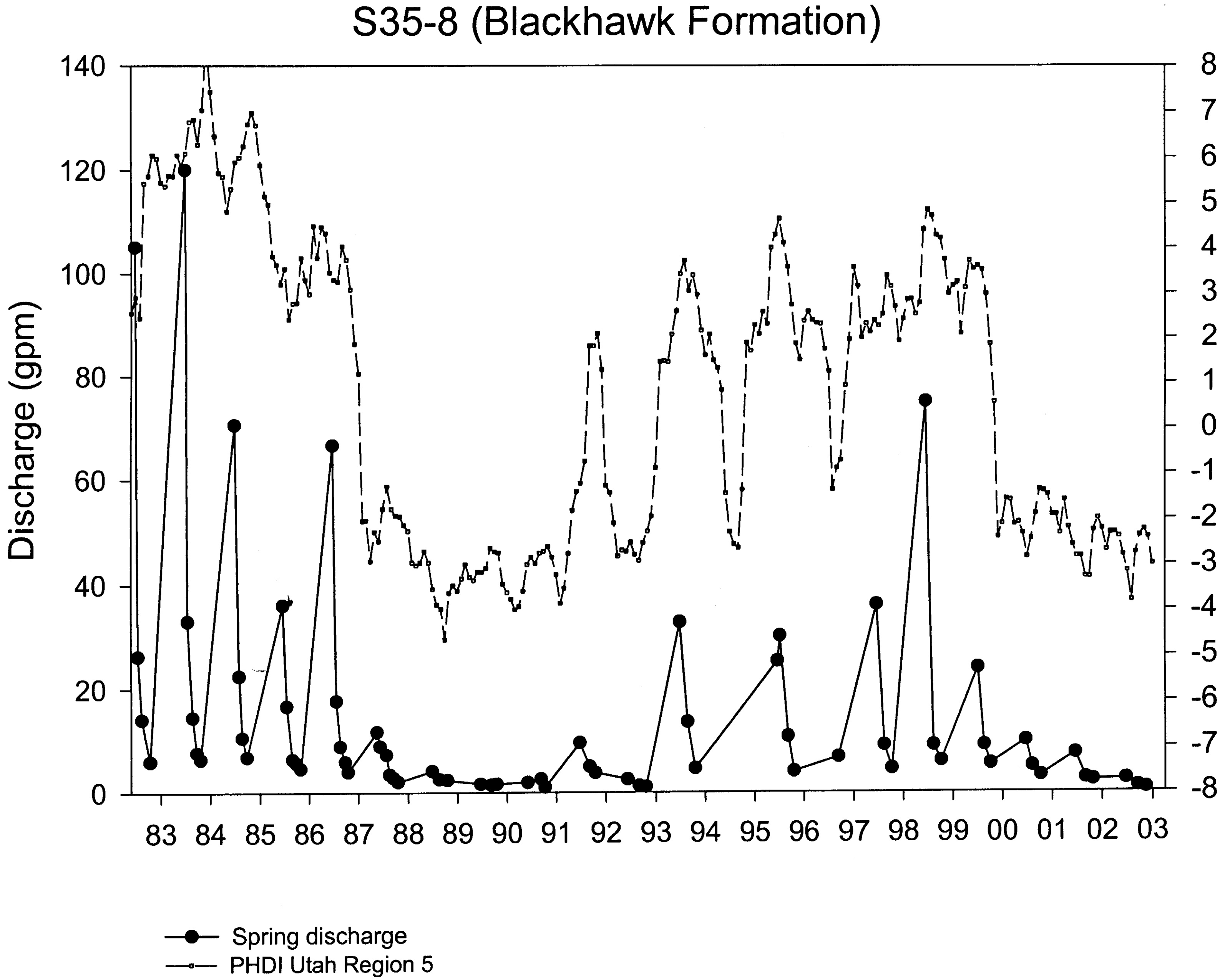
S24-12 (Blackhawk Formation)
Discharge (gpm)
5
4
3
2
1
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5
S24-12 North discharge



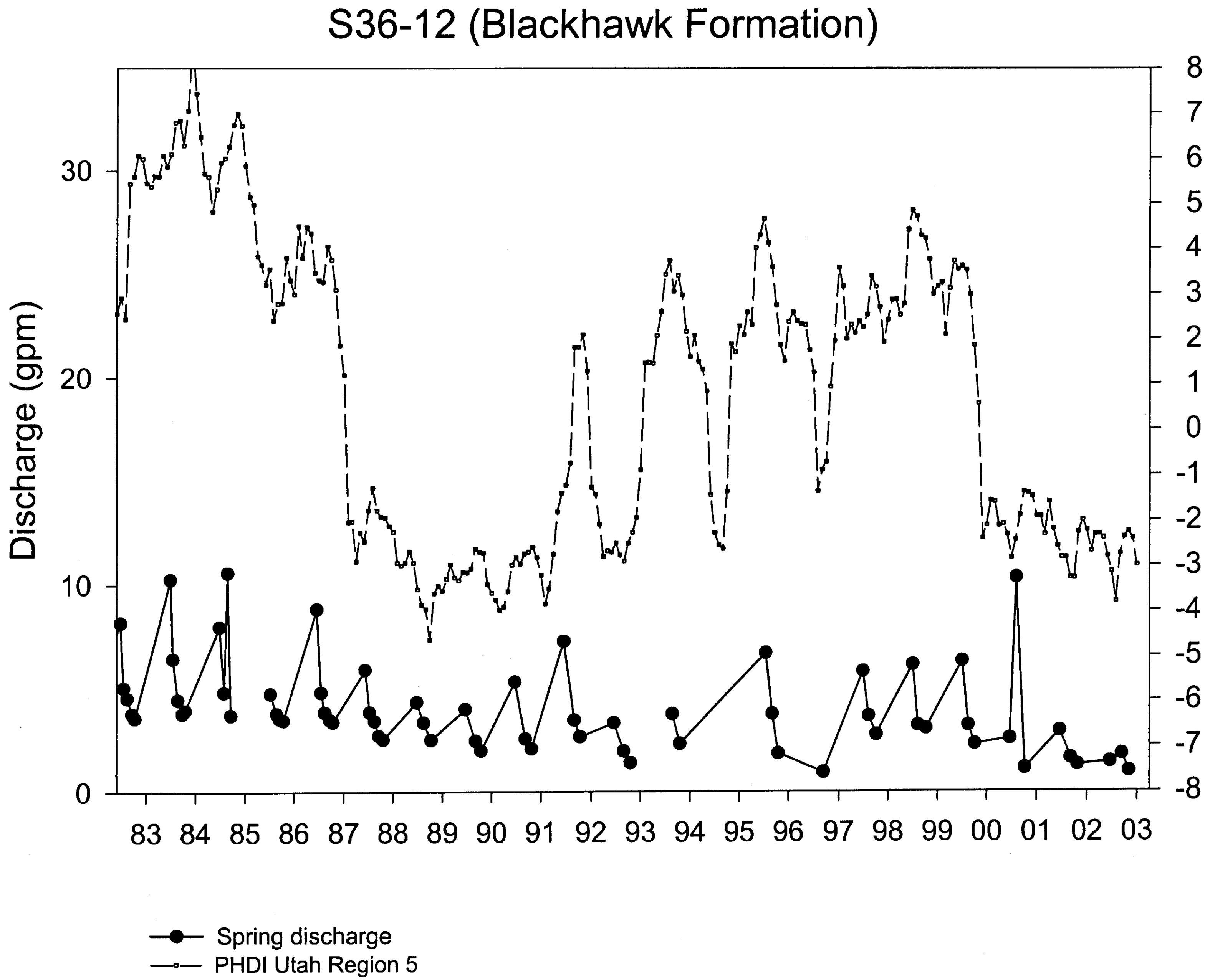
S26-13 (Blackhawk Formation)
Discharge (gpm)
20
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5

S34-12 (Blackhawk Formation)

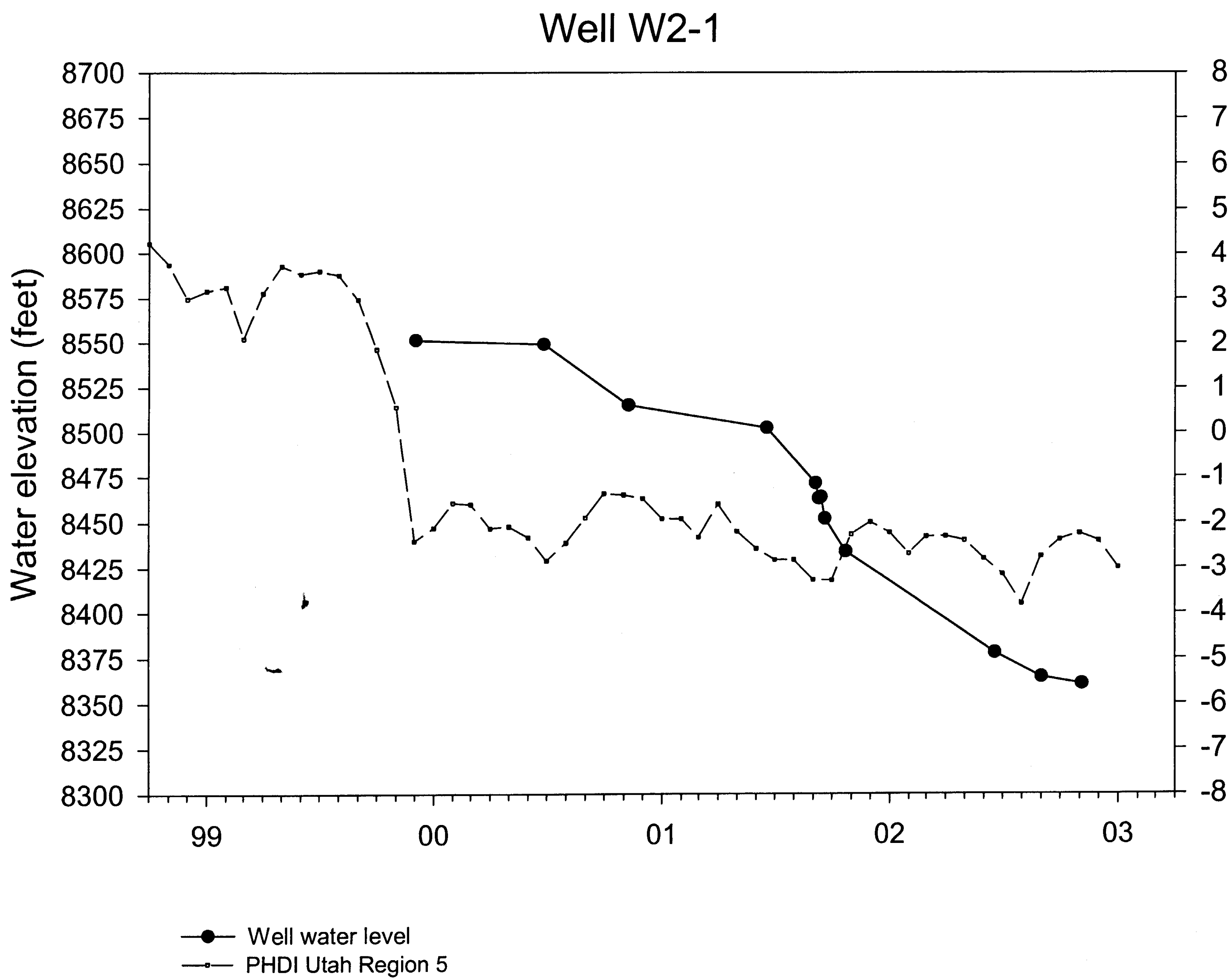


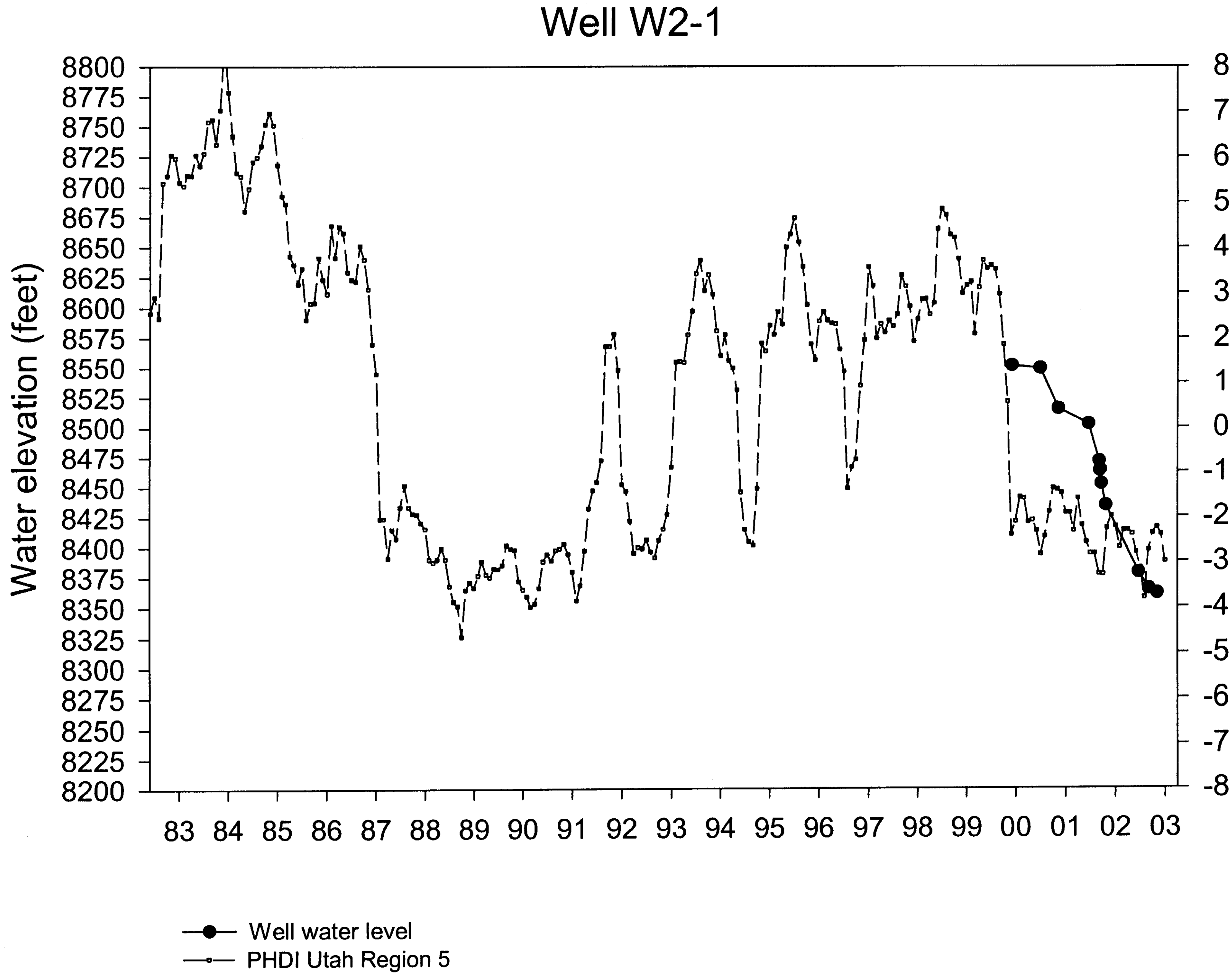


S35-8 (Blackhawk Formation)
Discharge (gpm)
140
120
100
80
60
40
20
0
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5

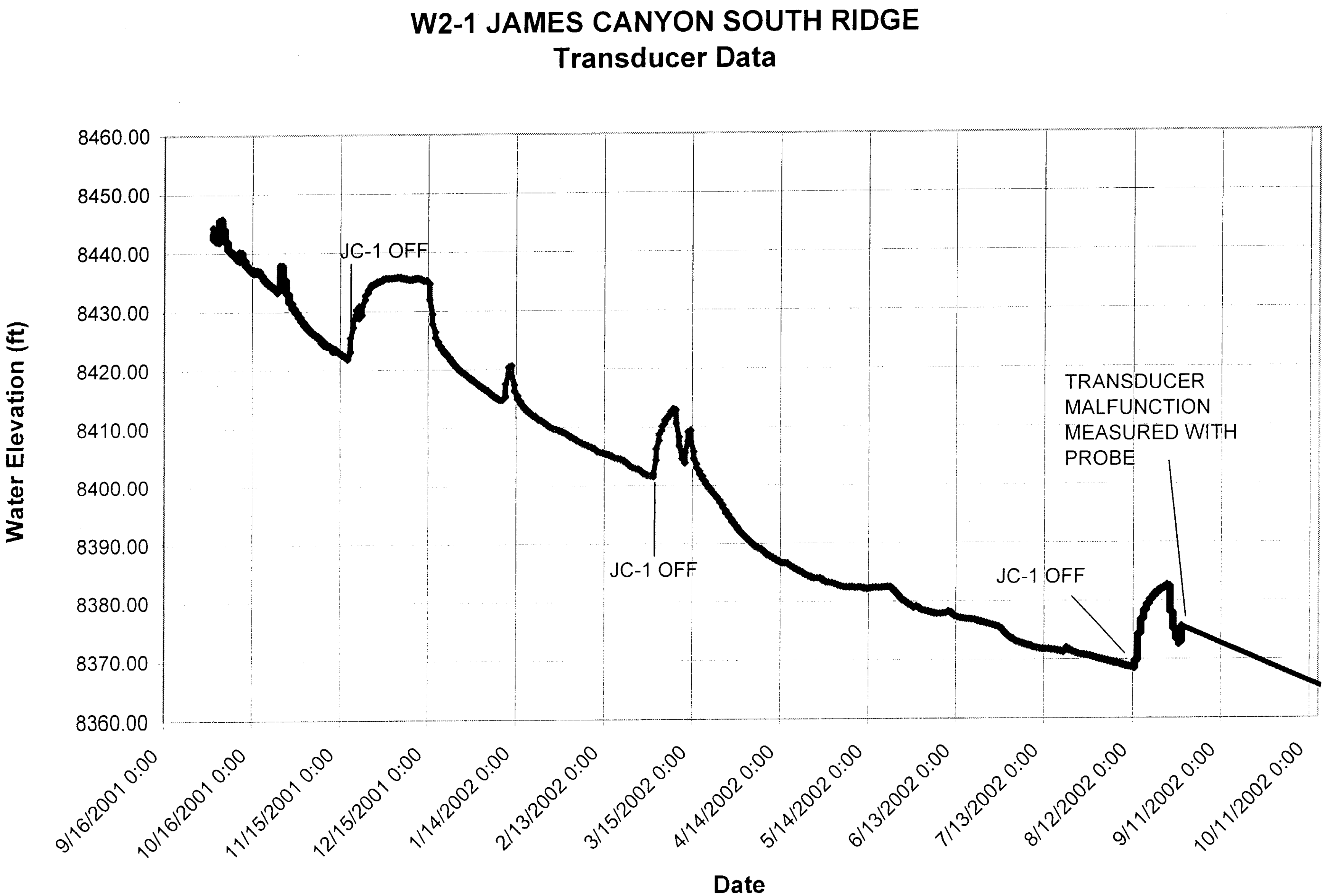


S36-12 (Blackhawk Formation)
Discharge (gpm)
0
10
20
30
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Spring discharge
PHDI Utah Region 5

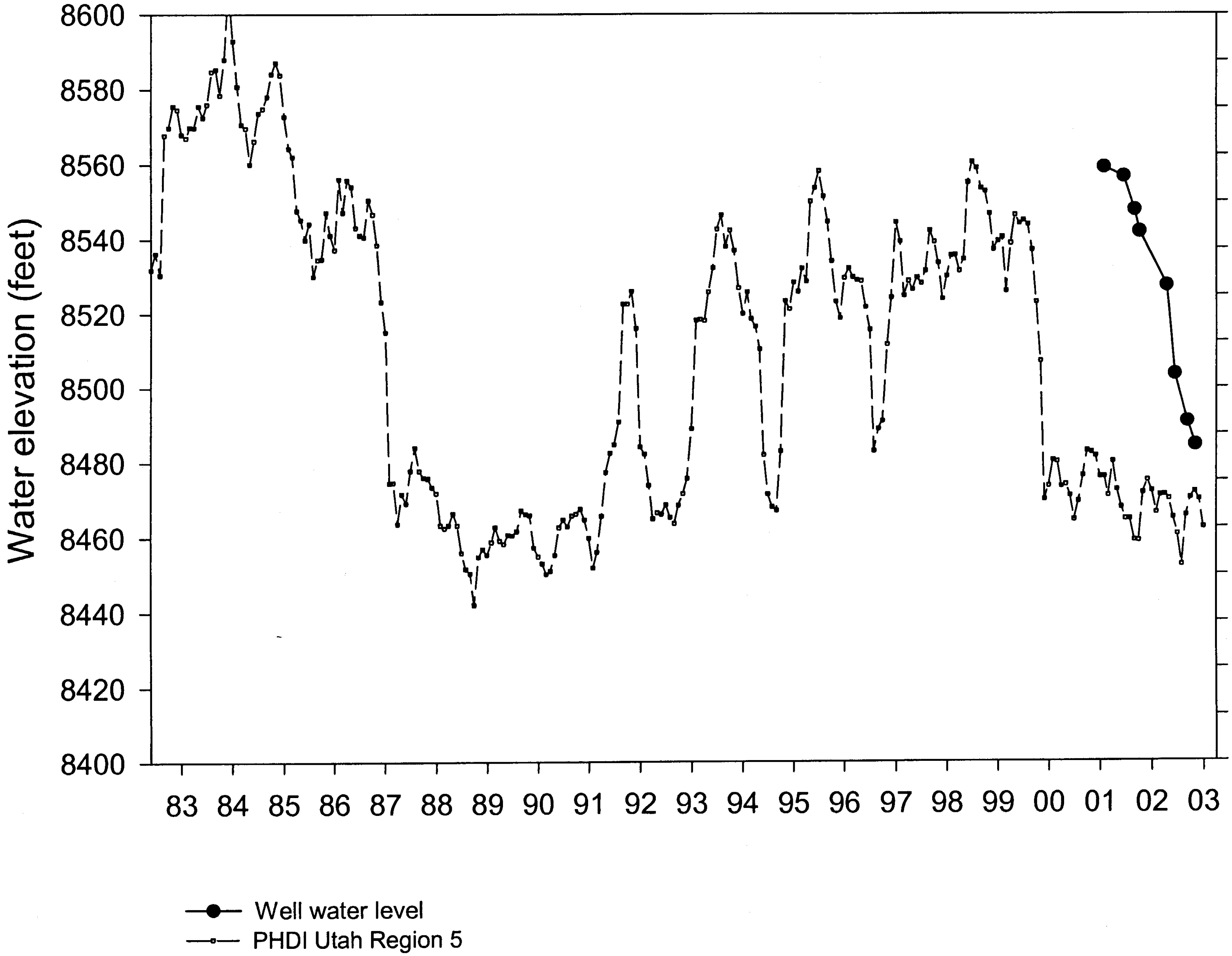

Well W2-1
Water elevation (feet)
8700
8675
8650
8625
8600
8575
8550
8525
8500
8475
8450
8425
8400
8375
8350
8325
8300
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
99
00
01
02
03
Well water level
PHDI Utah Region 5



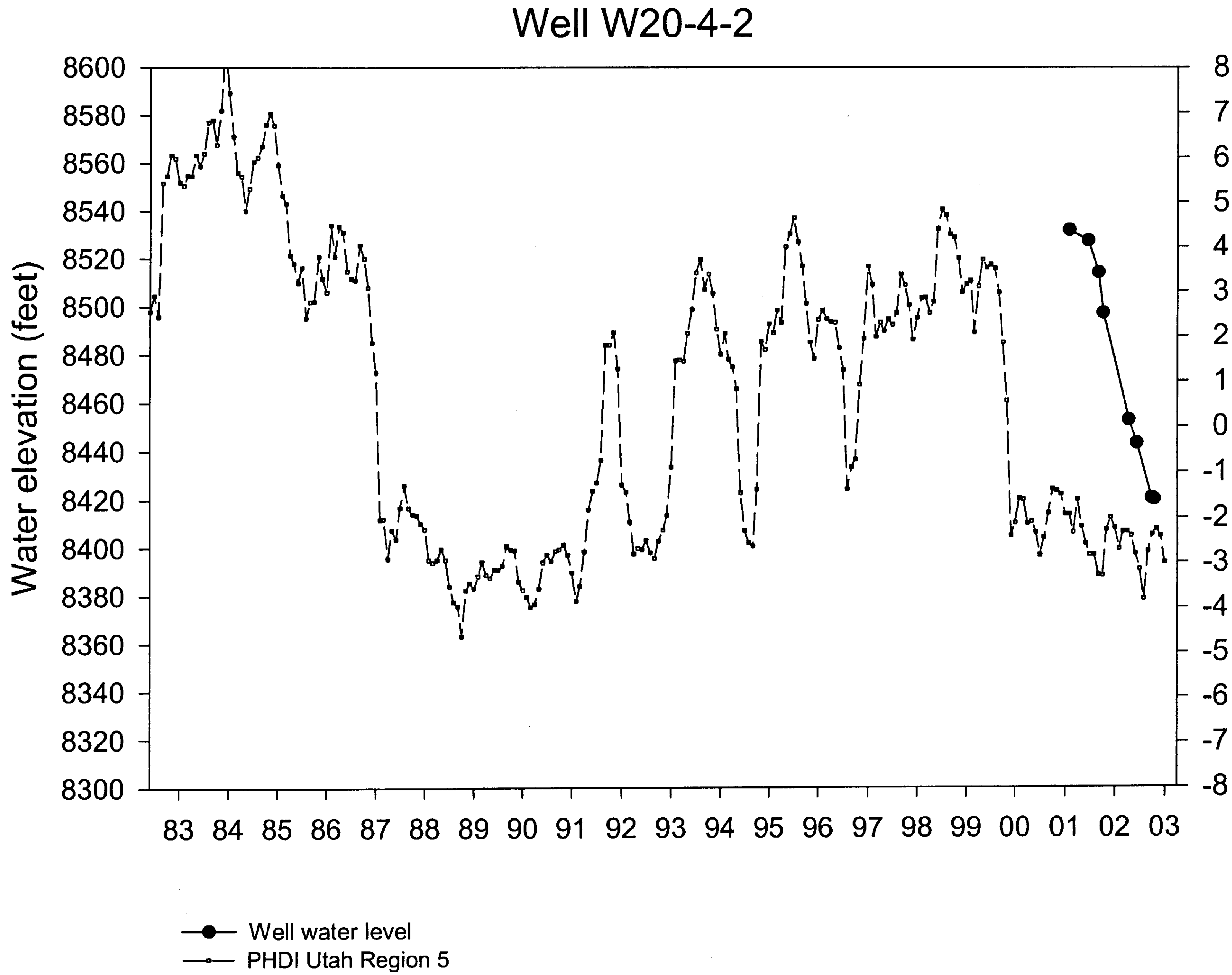
Well W2-1
Water elevation (feet)
8800
8775
8750
8725
8700
8675
8650
8625
8600
8575
8550
8525
8500
8475
8450
8425
8400
8375
8350
8325
8300
8275
8250
8225
8200
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5


W2-1 JAMES CANYON SOUTH RIDGE
Transducer Data
Water Elevation (ft)
8460.00
8450.00
8440.00
8430.00
8420.00
8410.00
8400.00
8390.00
8380.00
8370.00
8360.00
JC-1 OFF
JC-1 OFF
JC-1 OFF
TRANSDUCER MALFUNCTION MEASURED WITH PROBE
9/16/2001 0:00
10/16/2001 0:00
11/15/2001 0:00
12/15/2001 0:00
1/14/2002 0:00
2/13/2002 0:00
3/15/2002 0:00
4/14/2002 0:00
5/14/2002 0:00
6/13/2002 0:00
7/13/2002 0:00
8/12/2002 0:00
9/11/2002 0:00
10/11/2002 0:00
Date

Well W20-4-1



Water elevation (feet)
8600
8580
8560
8540
8520
8500
8480
8460
8440
8420
8400
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5


Well W20-4-2
Water elevation (feet)
8600
8580
8560
8540
8520
8500
8480
8460
8440
8420
8400
8380
8360
8340
8320
8300
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

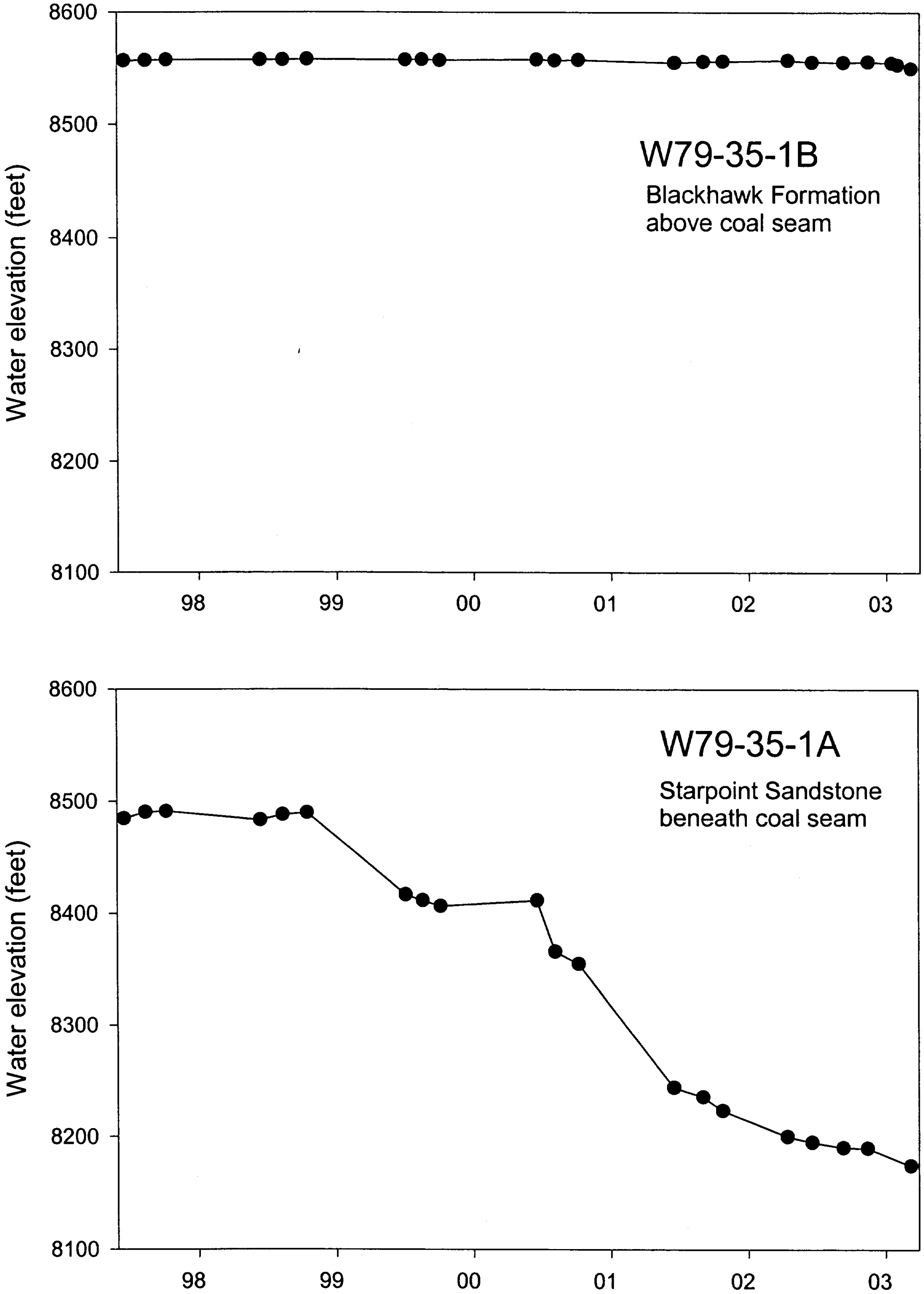
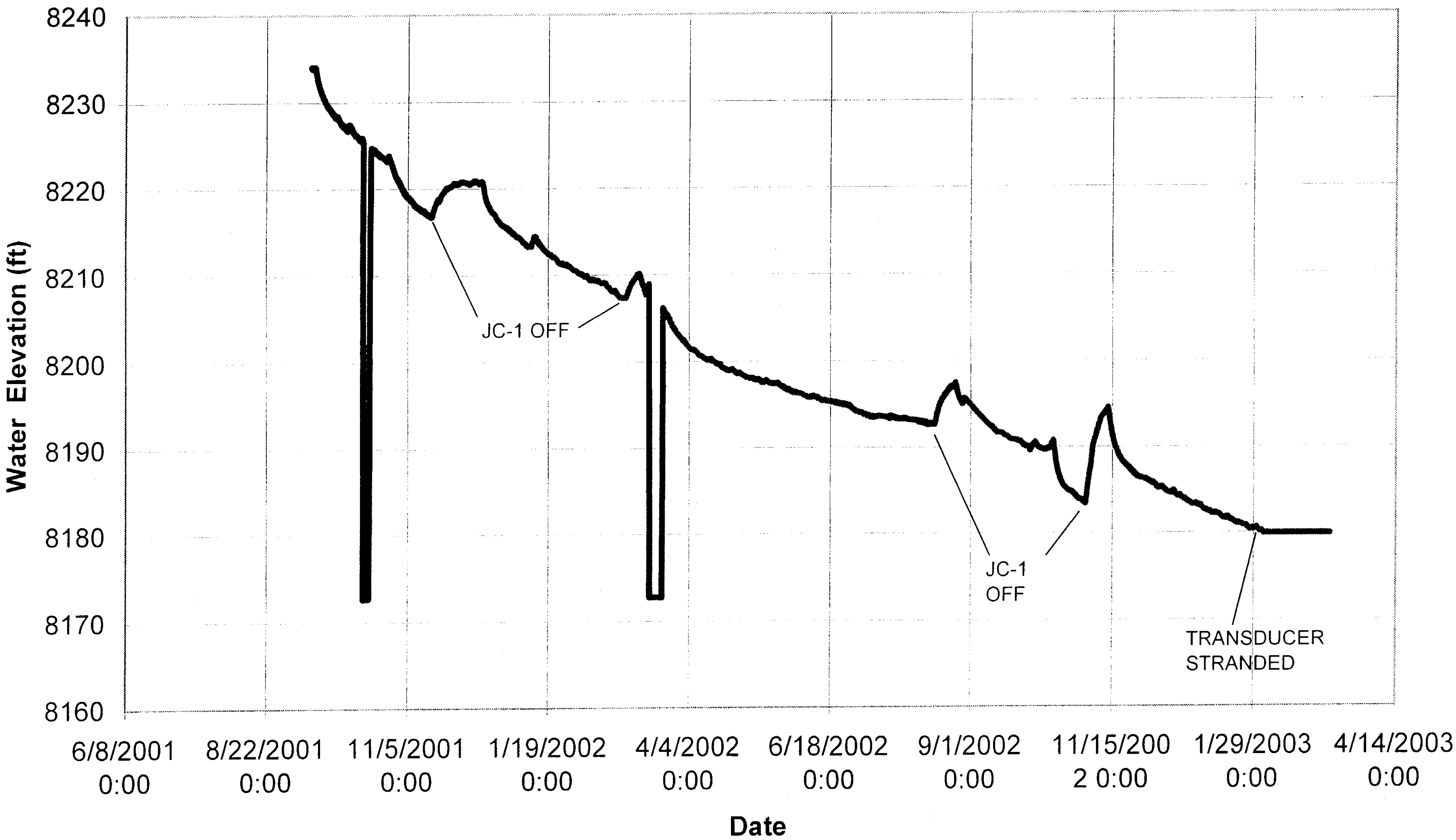
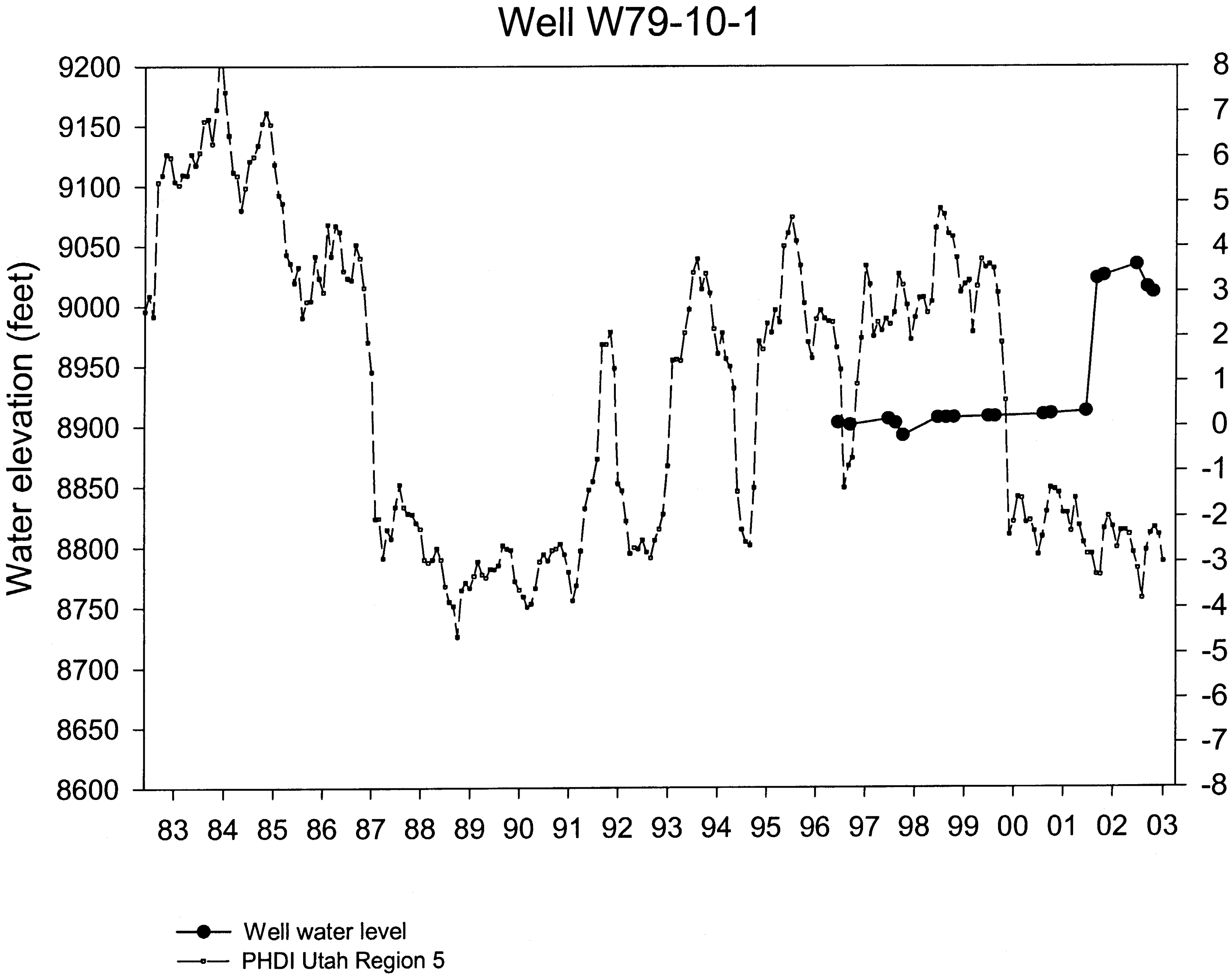
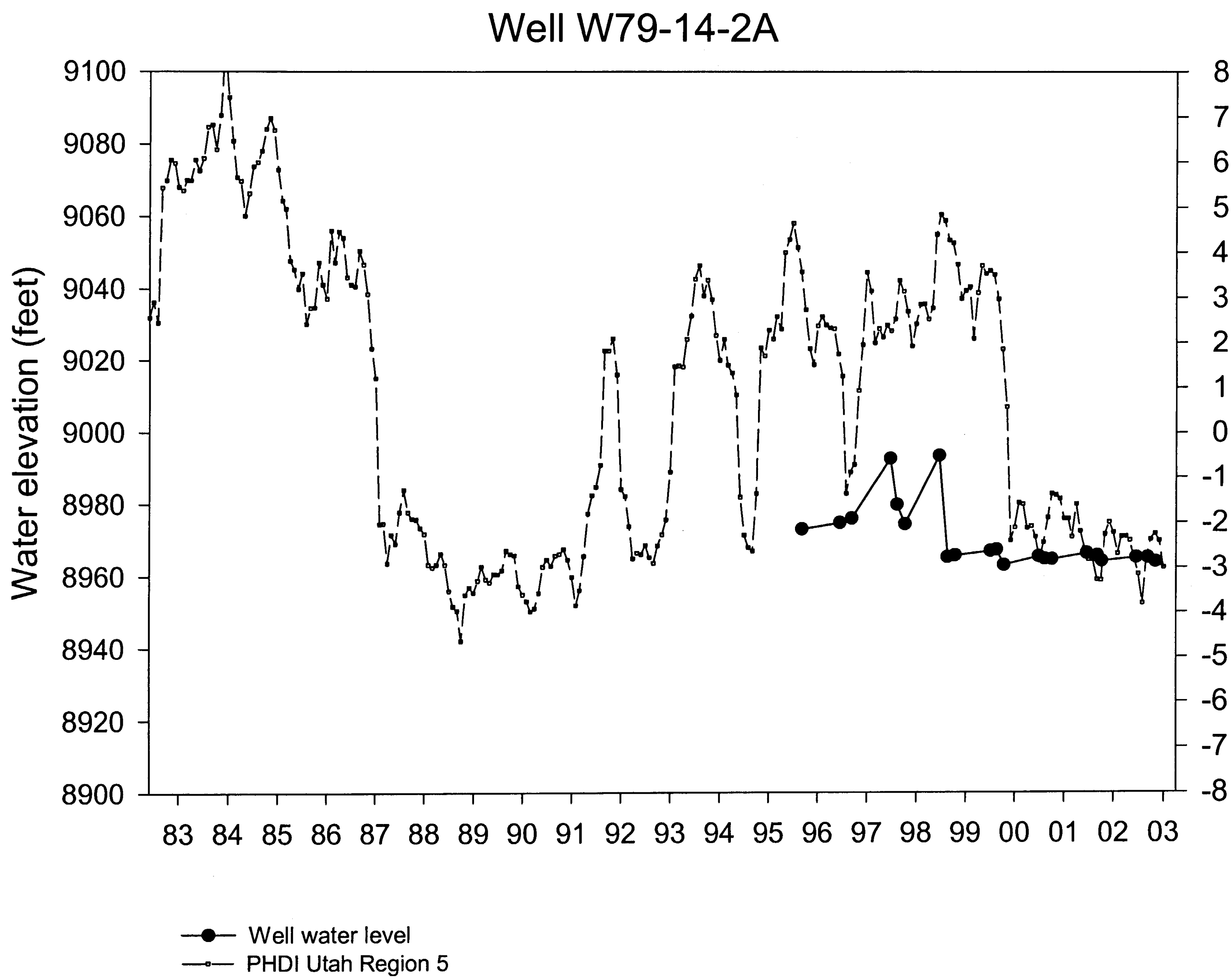


Figure 5 Comparison of water level declines at the nested piezometers at W79-35-1.

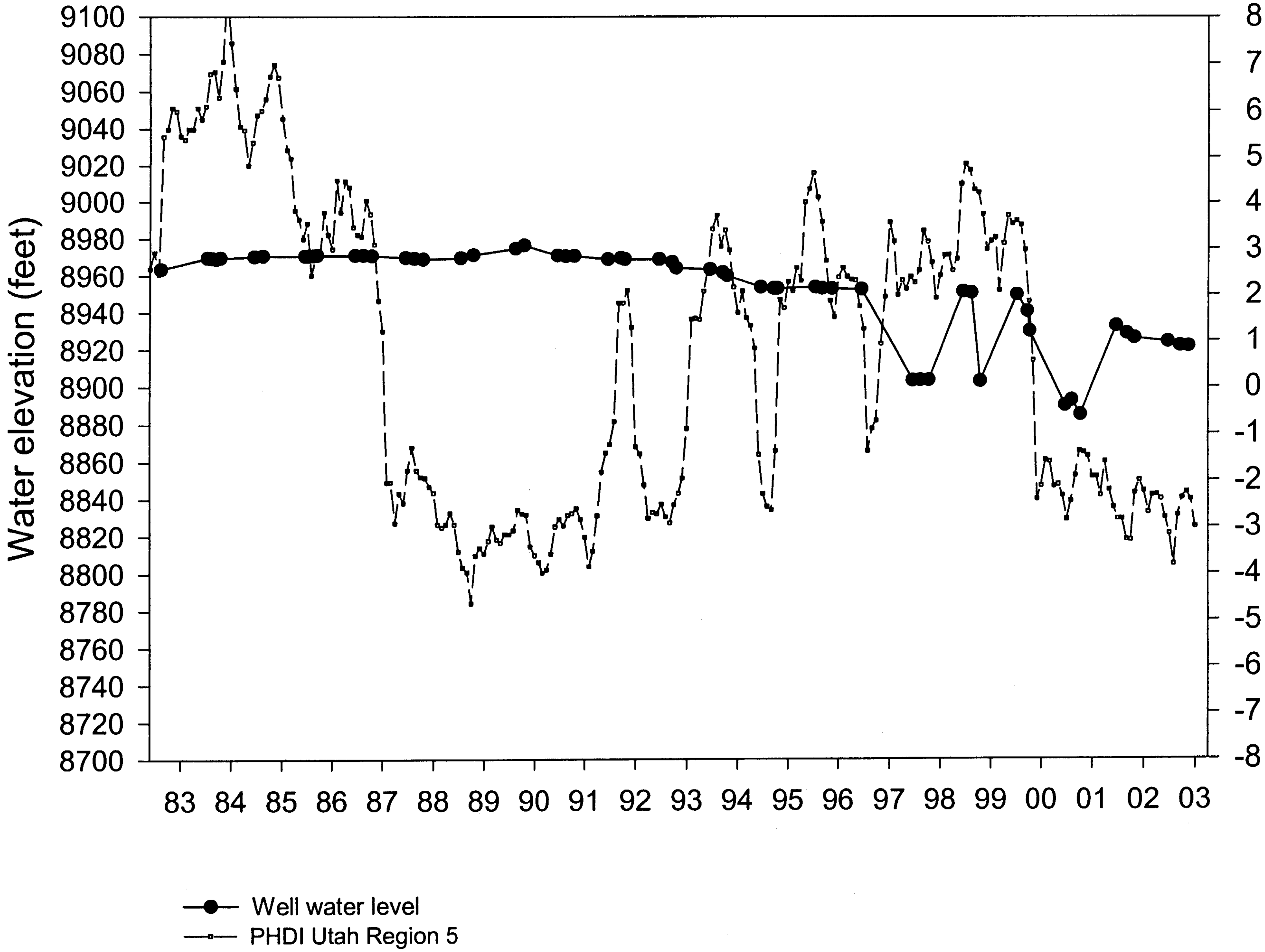
W79-35-1A BURNOUT CANYON
Transducer Data



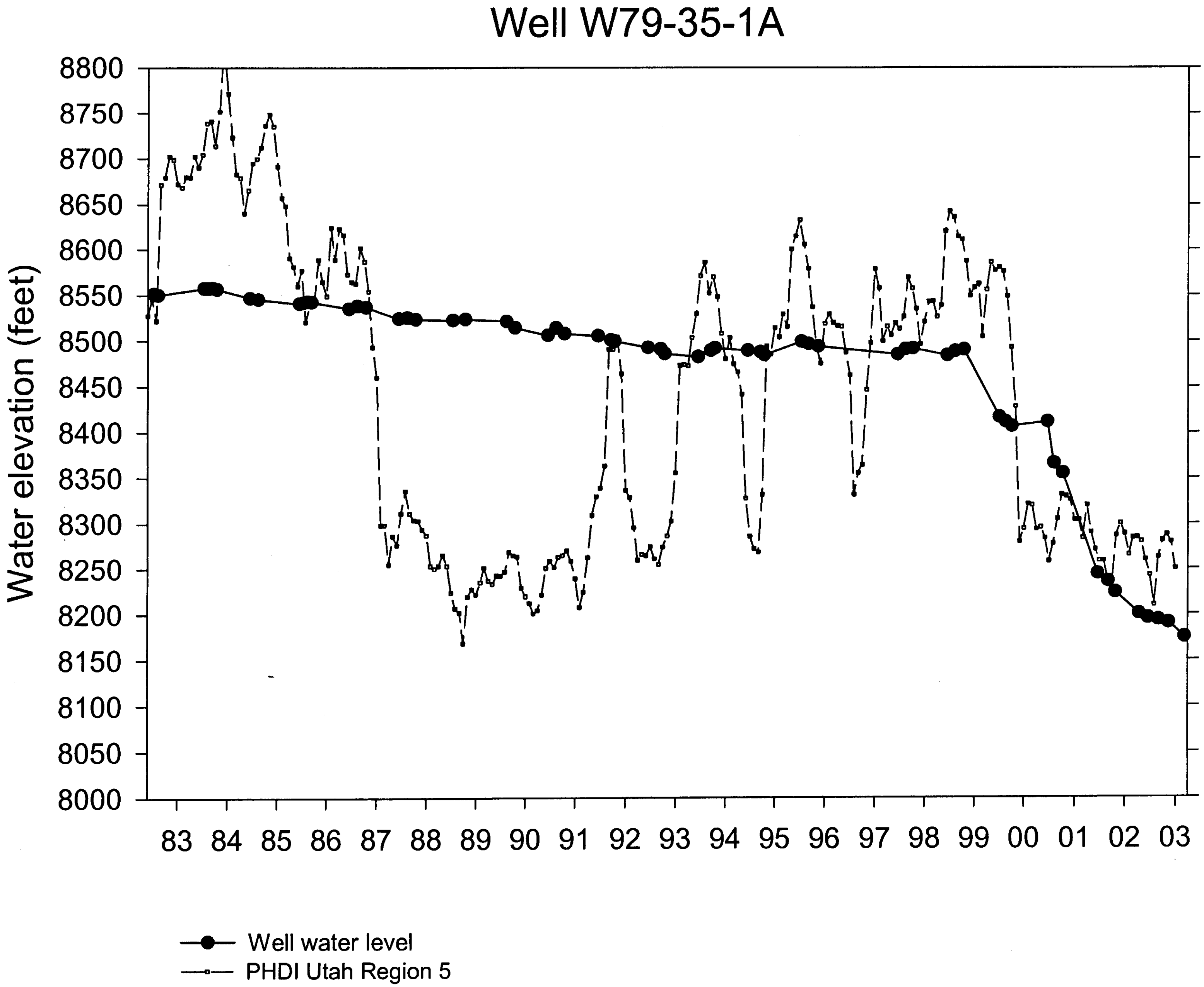

Well W79-10-1
Water elevation (feet)
9200
9150
9100
9050
9000
8950
8900
8850
8800
8750
8700
8650
8600
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

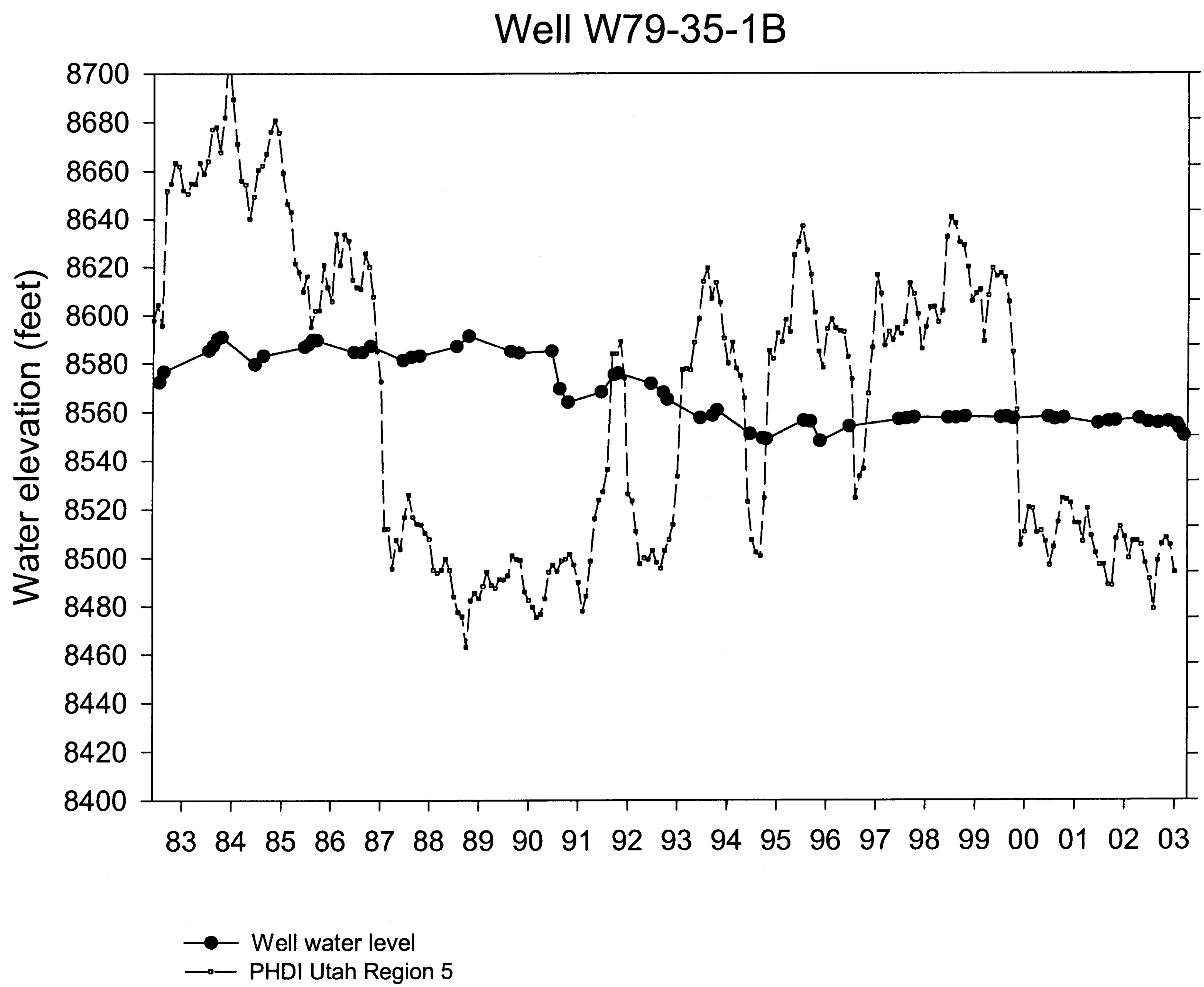

Well W79-14-2A
Water elevation (feet)
9100
9080
9060
9040
9020
9000
8980
8960
8940
8920
8900
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

Well W79-26-1

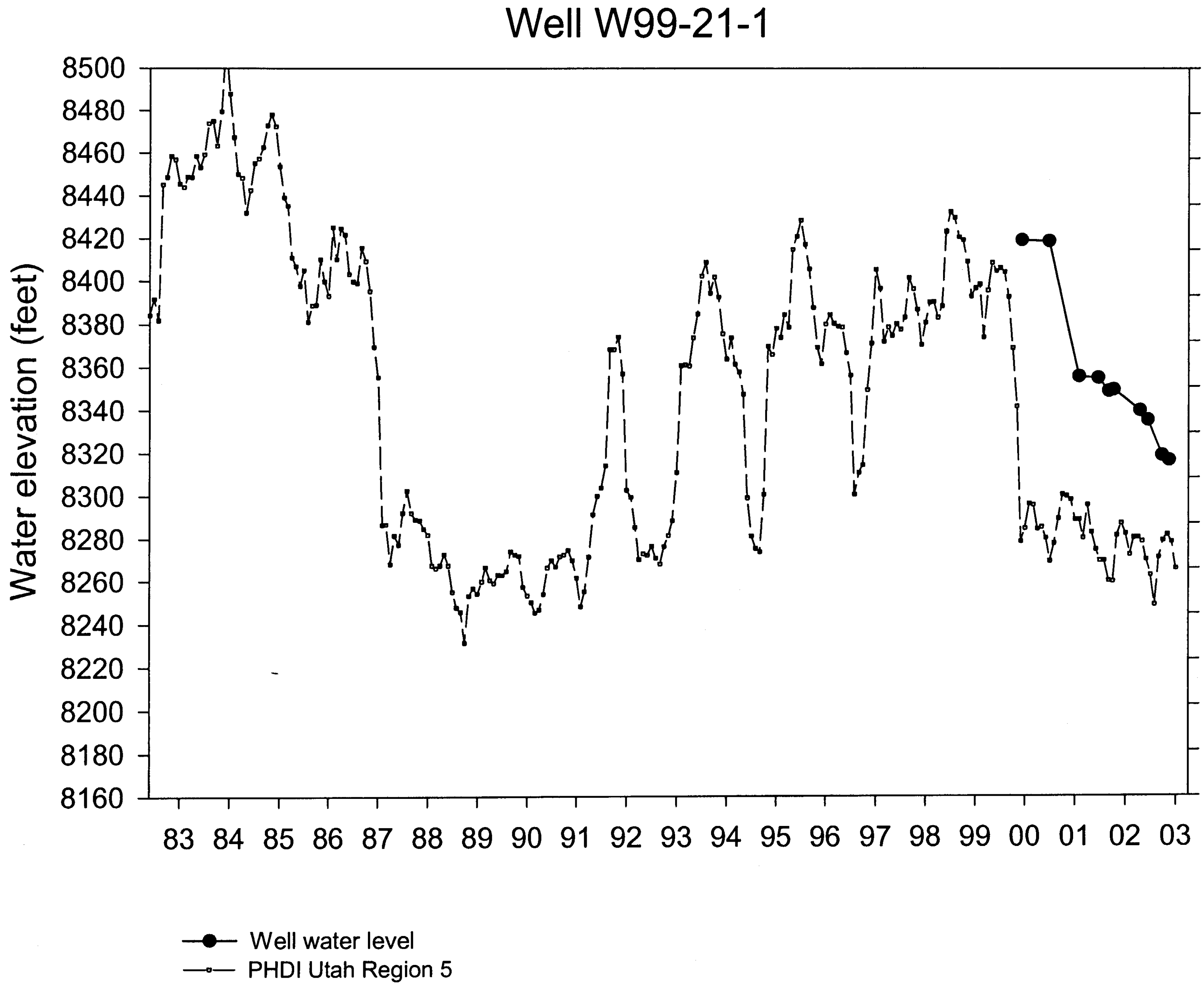


Water elevation (feet)
9100
9080
9060
9040
9020
9000
8980
8960
8940
8920
8900
8880
8860
8840
8820
8800
8780
8760
8740
8720
8700
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5


Well W79-35-1A
Water elevation (feet)
8800
8750
8700
8650
8600
8550
8500
8450
8400
8350
8300
8250
8200
8150
8100
8050
8000
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

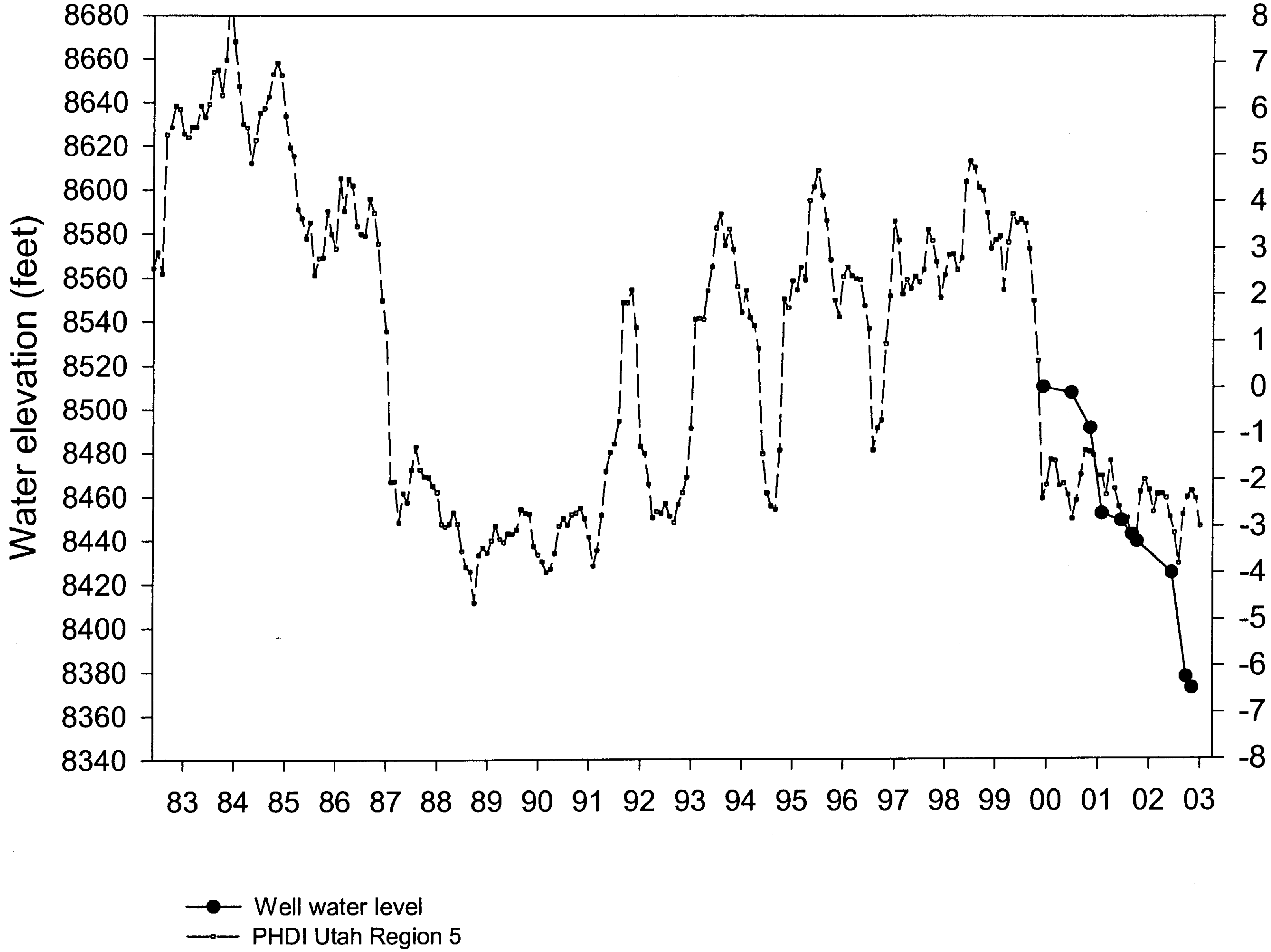


Well W79-35-1B
Water elevation (feet)
8700
8680
8660
8640
8620
8600
8580
8560
8540
8520
8500
8480
8460
8440
8420
8400
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

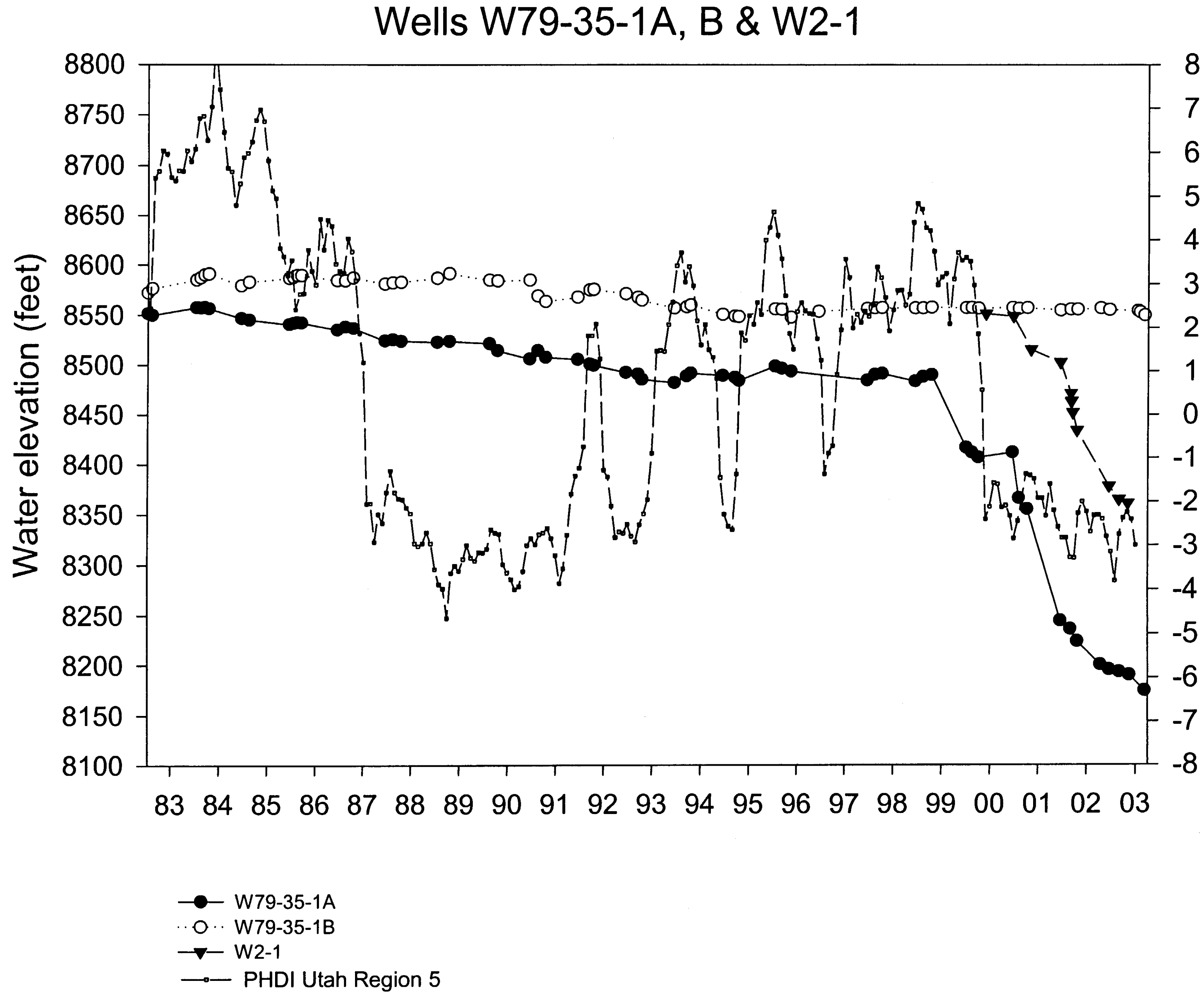


Well W99-21-1
Water elevation (feet)
8500
8480
8460
8440
8420
8400
8380
8360
8340
8320
8300
8280
8260
8240
8220
8200
8180
8160
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5

Well W99-28-1



Well W99-28-1
Water elevation (feet)
8680
8660
8640
8620
8600
8580
8560
8540
8520
8500
8480
8460
8440
8420
8400
8380
8360
8340
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
Well water level
PHDI Utah Region 5


Wells W79-35-1A, B & W2-1
Water elevation (feet)
8800
8750
8700
8650
8600
8550
8500
8450
8400
8350
8300
8250
8200
8150
8100
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03
W79-35-1A
W79-35-1B
W2-1
PHDI Utah Region 5

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
8/16/2001	24	4,500	10.0	6,480,000	6,480,000	19.9	20
8/17/2001	24	4,500	10.0	6,480,000	12,960,000	19.9	40
8/18/2001	24	4,500	10.0	6,480,000	19,440,000	19.9	60
8/19/2001	24	4,500	10.0	6,480,000	25,920,000	19.9	80
8/20/2001	24	4,500	10.0	6,480,000	32,400,000	19.9	99
8/21/2001	24	4,500	10.0	6,480,000	38,880,000	19.9	119
8/22/2001	24	4,500	10.0	6,480,000	45,360,000	19.9	139
8/23/2001	24	4,500	10.0	6,480,000	51,840,000	19.9	159
8/24/2001	24	4,500	10.0	6,480,000	58,320,000	19.9	179
8/25/2001	24	4,500	10.0	6,480,000	64,800,000	19.9	199
8/26/2001	24	4,500	10.0	6,480,000	71,280,000	19.9	219
8/27/2001	24	4,500	10.0	6,480,000	77,760,000	19.9	239
8/28/2001	24	4,500	10.0	6,480,000	84,240,000	19.9	259
8/29/2001	24	4,500	10.0	6,480,000	90,720,000	19.9	278
8/30/2001	24	6,000	13.4	8,640,000	99,360,000	26.5	305
8/31/2001	24	6,000	13.4	8,640,000	108,000,000	26.5	331
9/1/2001	24	6,000	13.4	8,640,000	116,640,000	26.5	358
9/2/2001	24	6,000	13.4	8,640,000	125,280,000	26.5	385
9/3/2001	24	6,000	13.4	8,640,000	133,920,000	26.5	411
9/4/2001	24	6,000	13.4	8,640,000	142,560,000	26.5	438
9/5/2001	24	6,000	13.4	8,640,000	151,200,000	26.5	464
9/6/2001	24	6,000	13.4	8,640,000	159,840,000	26.5	491
9/7/2001	24	6,000	13.4	8,640,000	168,480,000	26.5	517
9/8/2001	24	6,000	13.4	8,640,000	177,120,000	26.5	544
9/9/2001	24	6,000	13.4	8,640,000	185,760,000	26.5	570
9/10/2001	24	8,000	17.8	11,520,000	197,280,000	35.4	606
9/11/2001	24	8,000	17.8	11,520,000	208,800,000	35.4	641
9/12/2001	24	8,000	17.8	11,520,000	220,320,000	35.4	676
9/13/2001	24	8,500	18.9	12,240,000	232,560,000	37.6	714
9/14/2001	24	8,500	18.9	12,240,000	244,800,000	37.6	751
9/15/2001	24	8,500	18.9	12,240,000	257,040,000	37.6	789
9/16/2001	24	8,500	18.9	12,240,000	269,280,000	37.6	827
9/17/2001	24	8,763	19.5	12,618,720	281,898,720	38.7	865
9/18/2001	24	8,850	19.7	12,744,000	294,642,720	39.1	904
9/19/2001	24	8,850	19.7	12,744,000	307,386,720	39.1	943
9/20/2001	24	8,952	19.9	12,890,880	320,277,600	39.6	983
9/21/2001	24	7,595	16.9	10,936,800	331,214,400	33.6	1,017
9/22/2001	24	8,315	18.5	11,973,600	343,188,000	36.8	1,053
9/23/2001	24	8,685	19.4	12,506,400	355,694,400	38.4	1,092
9/24/2001	24	8,893	19.8	12,805,920	368,500,320	39.3	1,131
9/25/2001	24	8,030	17.9	11,563,200	380,063,520	35.5	1,167
9/26/2001	24	8,812	19.6	12,689,280	392,752,800	38.9	1,205
9/27/2001	24	9,114	20.3	13,124,160	405,876,960	40.3	1,246
9/28/2001	24	9,000	20.1	12,960,000	418,836,960	39.8	1,286
9/29/2001	24	9,000	20.1	12,960,000	431,796,960	39.8	1,325
9/30/2001	24	9,000	20.1	12,960,000	444,756,960	39.8	1,365
10/1/2001	24	9,000	20.1	12,960,000	457,716,960	39.8	1,405
10/2/2001	24	9,000	20.1	12,960,000	470,676,960	39.8	1,445
10/3/2001	24	9,000	20.1	12,960,000	483,636,960	39.8	1,484
10/4/2001	24	9,000	20.1	12,960,000	496,596,960	39.8	1,524
10/5/2001	24	9,000	20.1	12,960,000	509,556,960	39.8	1,564
10/6/2001	24	9,000	20.1	12,960,000	522,516,960	39.8	1,604
10/7/2001	24	9,000	20.1	12,960,000	535,476,960	39.8	1,644
10/8/2001	24	9,000	20.1	12,960,000	548,436,960	39.8	1,683
10/9/2001	24	9,000	20.1	12,960,000	561,396,960	39.8	1,723
10/10/2001	24	9,000	20.1	12,960,000	574,356,960	39.8	1,763
10/11/2001	24	9,000	20.1	12,960,000	587,316,960	39.8	1,803
10/12/2001	24	9,000	20.1	12,960,000	600,276,960	39.8	1,842
10/13/2001	24	9,000	20.1	12,960,000	613,236,960	39.8	1,882
10/14/2001	24	9,000	20.1	12,960,000	626,196,960	39.8	1,922
10/15/2001	24	9,000	20.1	12,960,000	639,156,960	39.8	1,962
10/16/2001	24	9,000	20.1	12,960,000	652,116,960	39.8	2,002
10/17/2001	24	9,000	20.1	12,960,000	665,076,960	39.8	2,041

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
10/18/2001	24	9,000	20.1	12,960,000	678,036,960	39.8	2,081
10/19/2001	24	9,000	20.1	12,960,000	690,996,960	39.8	2,121
10/20/2001	24	9,000	20.1	12,960,000	703,956,960	39.8	2,161
10/21/2001	24	9,000	20.1	12,960,000	716,916,960	39.8	2,200
10/22/2001	24	9,000	20.1	12,960,000	729,876,960	39.8	2,240
10/23/2001	24	9,000	20.1	12,960,000	742,836,960	39.8	2,280
10/24/2001	24	9,000	20.1	12,960,000	755,796,960	39.8	2,320
10/25/2001	24	9,000	20.1	12,960,000	768,756,960	39.8	2,360
10/26/2001	24	9,000	20.1	12,960,000	781,716,960	39.8	2,399
10/27/2001	24	9,000	20.1	12,960,000	794,676,960	39.8	2,439
10/28/2001	24	9,000	20.1	12,960,000	807,636,960	39.8	2,479
10/29/2001	24	9,000	20.1	12,960,000	820,596,960	39.8	2,519
10/30/2001	24	9,000	20.1	12,960,000	833,556,960	39.8	2,558
10/31/2001	24	9,000	20.1	12,960,000	846,516,960	39.8	2,598
11/1/2001	24	9,000	20.1	12,960,000	859,476,960	39.8	2,638
11/2/2001	24	9,000	20.1	12,960,000	872,436,960	39.8	2,678
11/3/2001	24	9,000	20.1	12,960,000	885,396,960	39.8	2,718
11/4/2001	24	9,000	20.1	12,960,000	898,356,960	39.8	2,757
11/5/2001	24	9,000	20.1	12,960,000	911,316,960	39.8	2,797
11/6/2001	24	9,000	20.1	12,960,000	924,276,960	39.8	2,837
11/7/2001	20	9,000	20.1	10,800,000	935,076,960	33.1	2,870
11/8/2001	24	9,000	20.1	12,960,000	948,036,960	39.8	2,910
11/9/2001	24	9,000	20.1	12,960,000	960,996,960	39.8	2,950
11/10/2001	24	9,000	20.1	12,960,000	973,956,960	39.8	2,989
11/11/2001	24	9,000	20.1	12,960,000	986,916,960	39.8	3,029
11/12/2001	24	9,000	20.1	12,960,000	999,876,960	39.8	3,069
11/13/2001	12	9,000	20.1	6,480,000	1,006,356,960	19.9	3,089
11/14/2001	24	9,000	20.1	12,960,000	1,019,316,960	39.8	3,129
11/15/2001	24	9,200	20.5	13,248,000	1,032,564,960	40.7	3,169
11/16/2001	24	9,200	20.5	13,248,000	1,045,812,960	40.7	3,210
11/17/2001	24	9,200	20.5	13,248,000	1,059,060,960	40.7	3,251
11/18/2001	24	9,200	20.5	13,248,000	1,072,308,960	40.7	3,291
11/19/2001	24	9,200	20.5	13,248,000	1,085,556,960	40.7	3,332
11/20/2001	24	9,200	20.5	13,248,000	1,098,804,960	40.7	3,373
11/21/2001	24	9,200	20.5	13,248,000	1,112,052,960	40.7	3,413
11/22/2001	24	9,200	20.5	13,248,000	1,125,300,960	40.7	3,454
11/23/2001	24	9,200	20.5	13,248,000	1,138,548,960	40.7	3,495
11/24/2001	24	9,200	20.5	13,248,000	1,151,796,960	40.7	3,535
11/25/2001	24	9,200	20.5	13,248,000	1,165,044,960	40.7	3,576
11/26/2001	24	9,200	20.5	13,248,000	1,178,292,960	40.7	3,617
11/27/2001	24	9,200	20.5	13,248,000	1,191,540,960	40.7	3,657
11/28/2001	24	9,200	20.5	13,248,000	1,204,788,960	40.7	3,698
11/29/2001	24	9,200	20.5	13,248,000	1,218,036,960	40.7	3,739
11/30/2001	24	9,200	20.5	13,248,000	1,231,284,960	40.7	3,779
12/1/2001	24	8,500	18.9	12,240,000	1,243,524,960	37.6	3,817
12/2/2001	24	8,500	18.9	12,240,000	1,255,764,960	37.6	3,854
12/3/2001	24	8,500	18.9	12,240,000	1,268,004,960	37.6	3,892
12/4/2001	24	8,500	18.9	12,240,000	1,280,244,960	37.6	3,929
12/5/2001	24	8,500	18.9	12,240,000	1,292,484,960	37.6	3,967
12/6/2001	24	8,500	18.9	12,240,000	1,304,724,960	37.6	4,005
12/7/2001	24	8,500	18.9	12,240,000	1,316,964,960	37.6	4,042
12/8/2001	24	8,500	18.9	12,240,000	1,329,204,960	37.6	4,080
12/9/2001	24	8,500	18.9	12,240,000	1,341,444,960	37.6	4,117
12/10/2001	24	8,000	17.8	11,520,000	1,352,964,960	35.4	4,153
12/11/2001	24	8,000	17.8	11,520,000	1,364,484,960	35.4	4,188
12/12/2001	24	8,000	17.8	11,520,000	1,376,004,960	35.4	4,223
12/13/2001	24	7,700	17.2	11,088,000	1,387,092,960	34.0	4,257
12/14/2001	24	7,700	17.2	11,088,000	1,398,180,960	34.0	4,291
12/15/2001	24	7,700	17.2	11,088,000	1,409,268,960	34.0	4,326
12/16/2001	24	7,700	17.2	11,088,000	1,420,356,960	34.0	4,360
12/17/2001	24	7,687	17.1	11,069,280	1,431,426,240	34.0	4,394
12/18/2001	24	7,674	17.1	11,050,560	1,442,476,800	33.9	4,427
12/19/2001	24	7,661	17.1	11,031,840	1,453,508,640	33.9	4,461

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
12/20/2001	24	7,648	17.0	11,013,120	1,464,521,760	33.8	4,495
12/21/2001	24	7,635	17.0	10,994,400	1,475,516,160	33.7	4,529
12/22/2001	24	7,622	17.0	10,975,680	1,486,491,840	33.7	4,563
12/23/2001	24	7,609	17.0	10,956,960	1,497,448,800	33.6	4,596
12/24/2001	24	7,596	16.9	10,938,240	1,508,387,040	33.6	4,630
12/25/2001	24	7,583	16.9	10,919,520	1,519,306,560	33.5	4,663
12/26/2001	24	7,570	16.9	10,900,800	1,530,207,360	33.5	4,697
12/27/2001	24	7,557	16.8	10,882,080	1,541,089,440	33.4	4,730
12/28/2001	24	7,544	16.8	10,863,360	1,551,952,800	33.3	4,763
12/29/2001	24	7,531	16.8	10,844,640	1,562,797,440	33.3	4,797
12/30/2001	24	7,518	16.8	10,825,920	1,573,623,360	33.2	4,830
12/31/2001	24	7,505	16.7	10,807,200	1,584,430,560	33.2	4,863
1/1/2002	24	7,492	16.7	10,788,480	1,595,219,040	33.1	4,896
1/2/2002	24	7,479	16.7	10,769,760	1,605,988,800	33.1	4,929
1/3/2002	24	7,466	16.6	10,751,040	1,616,739,840	33.0	4,962
1/4/2002	24	7,453	16.6	10,732,320	1,627,472,160	32.9	4,995
1/5/2002	24	7,440	16.6	10,713,600	1,638,185,760	32.9	5,028
1/6/2002	24	7,427	16.5	10,694,880	1,648,880,640	32.8	5,061
1/7/2002	24	7,414	16.5	10,676,160	1,659,556,800	32.8	5,094
1/8/2002	24	7,401	16.5	10,657,440	1,670,214,240	32.7	5,126
1/9/2002	24	7,388	16.5	10,638,720	1,680,852,960	32.7	5,159
1/10/2002	24	7,375	16.4	10,620,000	1,691,472,960	32.6	5,192
1/11/2002	24	7,362	16.4	10,601,280	1,702,074,240	32.5	5,224
1/12/2002	24	7,349	16.4	10,582,560	1,712,656,800	32.5	5,257
1/13/2002	24	7,336	16.3	10,563,840	1,723,220,640	32.4	5,289
1/14/2002	24	7,323	16.3	10,545,120	1,733,765,760	32.4	5,321
1/15/2002	24	7,310	16.3	10,526,400	1,744,292,160	32.3	5,354
1/16/2002	24	7,297	16.3	10,507,680	1,754,799,840	32.3	5,386
1/17/2002	24	7,284	16.2	10,488,960	1,765,288,800	32.2	5,418
1/18/2002	24	7,271	16.2	10,470,240	1,775,759,040	32.1	5,450
1/19/2002	24	7,258	16.2	10,451,520	1,786,210,560	32.1	5,482
1/20/2002	24	7,245	16.1	10,432,800	1,796,643,360	32.0	5,514
1/21/2002	24	7,232	16.1	10,414,080	1,807,057,440	32.0	5,546
1/22/2002	24	7,219	16.1	10,395,360	1,817,452,800	31.9	5,578
1/23/2002	24	7,206	16.1	10,376,640	1,827,829,440	31.8	5,610
1/24/2002	24	7,193	16.0	10,357,920	1,838,187,360	31.8	5,642
1/25/2002	24	7,180	16.0	10,339,200	1,848,526,560	31.7	5,674
1/26/2002	24	7,167	16.0	10,320,480	1,858,847,040	31.7	5,705
1/27/2002	24	7,154	15.9	10,301,760	1,869,148,800	31.6	5,737
1/28/2002	24	7,141	15.9	10,283,040	1,879,431,840	31.6	5,769
1/29/2002	24	7,128	15.9	10,264,320	1,889,696,160	31.5	5,800
1/30/2002	24	7,115	15.9	10,245,600	1,899,941,760	31.4	5,832
1/31/2002	24	7,102	15.8	10,226,880	1,910,168,640	31.4	5,863
2/1/2002	24	7,089	15.8	10,208,160	1,920,376,800	31.3	5,894
2/2/2002	24	7,076	15.8	10,189,440	1,930,566,240	31.3	5,926
2/3/2002	24	7,063	15.7	10,170,720	1,940,736,960	31.2	5,957
2/4/2002	24	7,050	15.7	10,152,000	1,950,888,960	31.2	5,988
2/5/2002	24	7,037	15.7	10,133,280	1,961,022,240	31.1	6,019
2/6/2002	24	7,024	15.6	10,114,560	1,971,136,800	31.0	6,050
2/7/2002	24	7,000	15.6	10,080,000	1,981,216,800	30.9	6,081
2/8/2002	24	7,000	15.6	10,080,000	1,991,296,800	30.9	6,112
2/9/2002	24	7,000	15.6	10,080,000	2,001,376,800	30.9	6,143
2/10/2002	24	7,000	15.6	10,080,000	2,011,456,800	30.9	6,174
2/11/2002	24	7,000	15.6	10,080,000	2,021,536,800	30.9	6,205
2/12/2002	24	7,000	15.6	10,080,000	2,031,616,800	30.9	6,236
2/13/2002	24	7,000	15.6	10,080,000	2,041,696,800	30.9	6,267
2/14/2002	24	7,000	15.6	10,080,000	2,051,776,800	30.9	6,298
2/15/2002	24	7,000	15.6	10,080,000	2,061,856,800	30.9	6,329
2/16/2002	24	7,000	15.6	10,080,000	2,071,936,800	30.9	6,359
2/17/2002	24	7,000	15.6	10,080,000	2,082,016,800	30.9	6,390
2/18/2002	24	7,000	15.6	10,080,000	2,092,096,800	30.9	6,421
2/19/2002	24	7,000	15.6	10,080,000	2,102,176,800	30.9	6,452
2/20/2002	24	7,000	15.6	10,080,000	2,112,256,800	30.9	6,483

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
2/21/2002	24	7,000	15.6	10,080,000	2,122,336,800	30.9	6,514
2/22/2002	24	7,000	15.6	10,080,000	2,132,416,800	30.9	6,545
2/23/2002	24	7,000	15.6	10,080,000	2,142,496,800	30.9	6,576
2/24/2002	24	7,000	15.6	10,080,000	2,152,576,800	30.9	6,607
2/25/2002	24	7,000	15.6	10,080,000	2,162,656,800	30.9	6,638
2/26/2002	24	7,000	15.6	10,080,000	2,172,736,800	30.9	6,669
2/27/2002	24	7,000	15.6	10,080,000	2,182,816,800	30.9	6,700
2/28/2002	24	7,000	15.6	10,080,000	2,192,896,800	30.9	6,731
3/1/2002	24	7,000	15.6	10,080,000	2,202,976,800	30.9	6,762
3/2/2002	24	7,000	15.6	10,080,000	2,213,056,800	30.9	6,793
3/3/2002	24	7,000	15.6	10,080,000	2,223,136,800	30.9	6,824
3/4/2002	24	7,000	15.6	10,080,000	2,233,216,800	30.9	6,854
3/5/2002	24	7,000	15.6	10,080,000	2,243,296,800	30.9	6,885
3/6/2002	24	7,000	15.6	10,080,000	2,253,376,800	30.9	6,916
3/7/2002	24	7,000	15.6	10,080,000	2,263,456,800	30.9	6,947
3/8/2002	20	7,000	15.6	8,400,000	2,271,856,800	25.8	6,973
3/9/2002	24	7,000	15.6	10,080,000	2,281,936,800	30.9	7,004
3/10/2002	24	7,000	15.6	10,080,000	2,292,016,800	30.9	7,035
3/11/2002	20	7,000	15.6	8,400,000	2,300,416,800	25.8	7,061
3/12/2002	24	7,000	15.6	10,080,000	2,310,496,800	30.9	7,092
3/13/2002	24	7,000	15.6	10,080,000	2,320,576,800	30.9	7,123
3/14/2002	24	7,000	15.6	10,080,000	2,330,656,800	30.9	7,154
3/15/2002	24	7,000	15.6	10,080,000	2,340,736,800	30.9	7,184
3/16/2002	24	7,000	15.6	10,080,000	2,350,816,800	30.9	7,215
3/17/2002	24	7,000	15.6	10,080,000	2,360,896,800	30.9	7,246
3/18/2002	24	7,000	15.6	10,080,000	2,370,976,800	30.9	7,277
3/19/2002	24	7,000	15.6	10,080,000	2,381,056,800	30.9	7,308
3/20/2002	24	7,000	15.6	10,080,000	2,391,136,800	30.9	7,339
3/21/2002	24	7,000	15.6	10,080,000	2,401,216,800	30.9	7,370
3/22/2002	24	7,000	15.6	10,080,000	2,411,296,800	30.9	7,401
3/23/2002	24	7,000	15.6	10,080,000	2,421,376,800	30.9	7,432
3/24/2002	24	7,000	15.6	10,080,000	2,431,456,800	30.9	7,463
3/25/2002	24	8,200	18.3	11,808,000	2,443,264,800	36.2	7,499
3/26/2002	24	8,200	18.3	11,808,000	2,455,072,800	36.2	7,535
3/27/2002	24	8,200	18.3	11,808,000	2,466,880,800	36.2	7,572
3/28/2002	24	8,200	18.3	11,808,000	2,478,688,800	36.2	7,608
3/29/2002	24	8,200	18.3	11,808,000	2,490,496,800	36.2	7,644
3/30/2002	24	8,200	18.3	11,808,000	2,502,304,800	36.2	7,680
3/31/2002	24	8,200	18.3	11,808,000	2,514,112,800	36.2	7,717
4/1/2002	24	8,200	18.3	11,808,000	2,525,920,800	36.2	7,753
4/2/2002	24	8,200	18.3	11,808,000	2,537,728,800	36.2	7,789
4/3/2002	24	8,200	18.3	11,808,000	2,549,536,800	36.2	7,825
4/4/2002	24	8,200	18.3	11,808,000	2,561,344,800	36.2	7,862
4/5/2002	24	8,200	18.3	11,808,000	2,573,152,800	36.2	7,898
4/6/2002	24	8,200	18.3	11,808,000	2,584,960,800	36.2	7,934
4/7/2002	24	8,200	18.3	11,808,000	2,596,768,800	36.2	7,970
4/8/2002	24	8,200	18.3	11,808,000	2,608,576,800	36.2	8,007
4/9/2002	24	8,200	18.3	11,808,000	2,620,384,800	36.2	8,043
4/10/2002	24	8,200	18.3	11,808,000	2,632,192,800	36.2	8,079
4/11/2002	24	8,200	18.3	11,808,000	2,644,000,800	36.2	8,115
4/12/2002	24	8,200	18.3	11,808,000	2,655,808,800	36.2	8,152
4/13/2002	24	8,200	18.3	11,808,000	2,667,616,800	36.2	8,188
4/14/2002	24	8,200	18.3	11,808,000	2,679,424,800	36.2	8,224
4/15/2002	24	8,200	18.3	11,808,000	2,691,232,800	36.2	8,260
4/16/2002	24	8,200	18.3	11,808,000	2,703,040,800	36.2	8,297
4/17/2002	24	8,200	18.3	11,808,000	2,714,848,800	36.2	8,333
4/18/2002	24	8,200	18.3	11,808,000	2,726,656,800	36.2	8,369
4/19/2002	24	8,200	18.3	11,808,000	2,738,464,800	36.2	8,405
4/20/2002	24	8,200	18.3	11,808,000	2,750,272,800	36.2	8,441
4/21/2002	24	8,200	18.3	11,808,000	2,762,080,800	36.2	8,478
4/22/2002	24	8,200	18.3	11,808,000	2,773,888,800	36.2	8,514
4/23/2002	24	8,200	18.3	11,808,000	2,785,696,800	36.2	8,550
4/24/2002	24	8,200	18.3	11,808,000	2,797,504,800	36.2	8,586

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
4/25/2002	24	8,200	18.3	11,808,000	2,809,312,800	36.2	8,623
4/26/2002	24	8,200	18.3	11,808,000	2,821,120,800	36.2	8,659
4/27/2002	24	8,200	18.3	11,808,000	2,832,928,800	36.2	8,695
4/28/2002	24	8,200	18.3	11,808,000	2,844,736,800	36.2	8,731
4/29/2002	24	8,200	18.3	11,808,000	2,856,544,800	36.2	8,768
4/30/2002	24	8,200	18.3	11,808,000	2,868,352,800	36.2	8,804
5/1/2002	24	7,740	17.2	11,145,600	2,879,498,400	34.2	8,838
5/2/2002	24	7,740	17.2	11,145,600	2,890,644,000	34.2	8,872
5/3/2002	24	7,740	17.2	11,145,600	2,901,789,600	34.2	8,907
5/4/2002	24	7,740	17.2	11,145,600	2,912,935,200	34.2	8,941
5/5/2002	24	7,740	17.2	11,145,600	2,924,080,800	34.2	8,975
5/6/2002	24	7,740	17.2	11,145,600	2,935,226,400	34.2	9,009
5/7/2002	24	7,740	17.2	11,145,600	2,946,372,000	34.2	9,043
5/8/2002	24	7,740	17.2	11,145,600	2,957,517,600	34.2	9,078
5/9/2002	24	7,740	17.2	11,145,600	2,968,663,200	34.2	9,112
5/10/2002	24	7,740	17.2	11,145,600	2,979,808,800	34.2	9,146
5/11/2002	24	7,740	17.2	11,145,600	2,990,954,400	34.2	9,180
5/12/2002	24	7,740	17.2	11,145,600	3,002,100,000	34.2	9,214
5/13/2002	24	7,740	17.2	11,145,600	3,013,245,600	34.2	9,249
5/14/2002	24	7,740	17.2	11,145,600	3,024,391,200	34.2	9,283
5/15/2002	24	7,740	17.2	11,145,600	3,035,536,800	34.2	9,317
5/16/2002	24	7,740	17.2	11,145,600	3,046,682,400	34.2	9,351
5/17/2002	24	7,740	17.2	11,145,600	3,057,828,000	34.2	9,385
5/18/2002	24	7,740	17.2	11,145,600	3,068,973,600	34.2	9,420
5/19/2002	24	7,740	17.2	11,145,600	3,080,119,200	34.2	9,454
5/20/2002	24	7,740	17.2	11,145,600	3,091,264,800	34.2	9,488
5/21/2002	24	7,740	17.2	11,145,600	3,102,410,400	34.2	9,522
5/22/2002	24	7,740	17.2	11,145,600	3,113,556,000	34.2	9,557
5/23/2002	24	7,740	17.2	11,145,600	3,124,701,600	34.2	9,591
5/24/2002	24	7,740	17.2	11,145,600	3,135,847,200	34.2	9,625
5/25/2002	24	7,740	17.2	11,145,600	3,146,992,800	34.2	9,659
5/26/2002	24	7,740	17.2	11,145,600	3,158,138,400	34.2	9,693
5/27/2002	24	7,740	17.2	11,145,600	3,169,284,000	34.2	9,728
5/28/2002	24	7,740	17.2	11,145,600	3,180,429,600	34.2	9,762
5/29/2002	24	7,740	17.2	11,145,600	3,191,575,200	34.2	9,796
5/30/2002	24	7,740	17.2	11,145,600	3,202,720,800	34.2	9,830
5/31/2002	24	7,740	17.2	11,145,600	3,213,866,400	34.2	9,864
6/1/2002	24	7,077	15.8	10,190,880	3,224,057,280	31.3	9,896
6/2/2002	24	7,077	15.8	10,190,880	3,234,248,160	31.3	9,927
6/3/2002	24	7,077	15.8	10,190,880	3,244,439,040	31.3	9,958
6/4/2002	24	7,077	15.8	10,190,880	3,254,629,920	31.3	9,990
6/5/2002	24	7,077	15.8	10,190,880	3,264,820,800	31.3	10,021
6/6/2002	24	7,077	15.8	10,190,880	3,275,011,680	31.3	10,052
6/7/2002	24	7,077	15.8	10,190,880	3,285,202,560	31.3	10,083
6/8/2002	24	7,077	15.8	10,190,880	3,295,393,440	31.3	10,115
6/9/2002	24	7,077	15.8	10,190,880	3,305,584,320	31.3	10,146
6/10/2002	24	7,077	15.8	10,190,880	3,315,775,200	31.3	10,177
6/11/2002	24	7,077	15.8	10,190,880	3,325,966,080	31.3	10,208
6/12/2002	24	8,681	19.3	12,500,640	3,338,466,720	38.4	10,247
6/13/2002	24	8,681	19.3	12,500,640	3,350,967,360	38.4	10,285
6/14/2002	24	8,681	19.3	12,500,640	3,363,468,000	38.4	10,324
6/15/2002	24	8,681	19.3	12,500,640	3,375,968,640	38.4	10,362
6/16/2002	24	8,681	19.3	12,500,640	3,388,469,280	38.4	10,400
6/17/2002	24	8,681	19.3	12,500,640	3,400,969,920	38.4	10,439
6/18/2002	24	8,681	19.3	12,500,640	3,413,470,560	38.4	10,477
6/19/2002	24	8,681	19.3	12,500,640	3,425,971,200	38.4	10,515
6/20/2002	24	8,681	19.3	12,500,640	3,438,471,840	38.4	10,554
6/21/2002	24	8,681	19.3	12,500,640	3,450,972,480	38.4	10,592
6/22/2002	24	8,681	19.3	12,500,640	3,463,473,120	38.4	10,631
6/23/2002	24	8,681	19.3	12,500,640	3,475,973,760	38.4	10,669
6/24/2002	24	8,681	19.3	12,500,640	3,488,474,400	38.4	10,707
6/25/2002	24	8,681	19.3	12,500,640	3,500,975,040	38.4	10,746
6/26/2002	24	9,250	20.6	13,320,000	3,514,295,040	40.9	10,787

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
6/27/2002	24	9,250	20.6	13,320,000	3,527,615,040	40.9	10,827
6/28/2002	24	9,250	20.6	13,320,000	3,540,935,040	40.9	10,868
6/29/2002	24	9,250	20.6	13,320,000	3,554,255,040	40.9	10,909
6/30/2002	24	9,250	20.6	13,320,000	3,567,575,040	40.9	10,950
7/1/2002	24	9,245	20.6	13,312,800	3,580,887,840	40.9	10,991
7/2/2002	24	9,245	20.6	13,312,800	3,594,200,640	40.9	11,032
7/3/2002	24	9,245	20.6	13,312,800	3,607,513,440	40.9	11,073
7/4/2002	24	9,245	20.6	13,312,800	3,620,826,240	40.9	11,114
7/5/2002	24	9,245	20.6	13,312,800	3,634,139,040	40.9	11,154
7/6/2002	24	9,245	20.6	13,312,800	3,647,451,840	40.9	11,195
7/7/2002	24	9,245	20.6	13,312,800	3,660,764,640	40.9	11,236
7/8/2002	24	9,245	20.6	13,312,800	3,674,077,440	40.9	11,277
7/9/2002	24	9,245	20.6	13,312,800	3,687,390,240	40.9	11,318
7/10/2002	24	9,245	20.6	13,312,800	3,700,703,040	40.9	11,359
7/11/2002	24	8,645	19.3	12,448,800	3,713,151,840	38.2	11,397
7/12/2002	24	8,645	19.3	12,448,800	3,725,600,640	38.2	11,435
7/13/2002	24	8,645	19.3	12,448,800	3,738,049,440	38.2	11,473
7/14/2002	24	8,645	19.3	12,448,800	3,750,498,240	38.2	11,512
7/15/2002	24	8,645	19.3	12,448,800	3,762,947,040	38.2	11,550
7/16/2002	24	8,645	19.3	12,448,800	3,775,395,840	38.2	11,588
7/17/2002	24	8,645	19.3	12,448,800	3,787,844,640	38.2	11,626
7/18/2002	24	8,820	19.7	12,700,800	3,800,545,440	39.0	11,665
7/19/2002	24	8,820	19.7	12,700,800	3,813,246,240	39.0	11,704
7/20/2002	24	8,820	19.7	12,700,800	3,825,947,040	39.0	11,743
7/21/2002	24	8,820	19.7	12,700,800	3,838,647,840	39.0	11,782
7/22/2002	24	8,849	19.7	12,742,560	3,851,390,400	39.1	11,821
7/23/2002	24	8,849	19.7	12,742,560	3,864,132,960	39.1	11,860
7/24/2002	24	8,849	19.7	12,742,560	3,876,875,520	39.1	11,899
7/25/2002	24	8,849	19.7	12,742,560	3,889,618,080	39.1	11,939
7/26/2002	24	8,849	19.7	12,742,560	3,902,360,640	39.1	11,978
7/27/2002	24	8,849	19.7	12,742,560	3,915,103,200	39.1	12,017
7/28/2002	24	8,849	19.7	12,742,560	3,927,845,760	39.1	12,056
7/29/2002	24	8,849	19.7	12,742,560	3,940,588,320	39.1	12,095
7/30/2002	24	8,849	19.7	12,742,560	3,953,330,880	39.1	12,134
7/31/2002	24	8,849	19.7	12,742,560	3,966,073,440	39.1	12,173
8/1/2002	24	8,710	19.4	12,542,400	3,978,615,840	38.5	12,212
8/2/2002	24	8,710	19.4	12,542,400	3,991,158,240	38.5	12,250
8/3/2002	24	8,710	19.4	12,542,400	4,003,700,640	38.5	12,289
8/4/2002	24	8,710	19.4	12,542,400	4,016,243,040	38.5	12,327
8/5/2002	24	8,710	19.4	12,542,400	4,028,785,440	38.5	12,366
8/6/2002	24	8,710	19.4	12,542,400	4,041,327,840	38.5	12,404
8/7/2002	24	8,471	18.9	12,198,240	4,053,526,080	37.4	12,442
8/8/2002	24	8,471	18.9	12,198,240	4,065,724,320	37.4	12,479
8/9/2002	24	8,471	18.9	12,198,240	4,077,922,560	37.4	12,516
8/10/2002	24	8,471	18.9	12,198,240	4,090,120,800	37.4	12,554
8/11/2002	24	8,471	18.9	12,198,240	4,102,319,040	37.4	12,591
8/12/2002	24	8,471	18.9	12,198,240	4,114,517,280	37.4	12,629
8/13/2002	24	8,471	18.9	12,198,240	4,126,715,520	37.4	12,666
8/14/2002	24	8,471	18.9	12,198,240	4,138,913,760	37.4	12,704
8/15/2002	24	8,627	19.2	12,422,880	4,151,336,640	38.1	12,742
8/16/2002	24	8,627	19.2	12,422,880	4,163,759,520	38.1	12,780
8/17/2002	24	8,627	19.2	12,422,880	4,176,182,400	38.1	12,818
8/18/2002	24	8,627	19.2	12,422,880	4,188,605,280	38.1	12,856
8/19/2002	24	8,627	19.2	12,422,880	4,201,028,160	38.1	12,894
8/20/2002	24	8,627	19.2	12,422,880	4,213,451,040	38.1	12,932
8/21/2002	24	9,119	20.3	13,131,360	4,226,582,400	40.3	12,973
8/22/2002	24	9,119	20.3	13,131,360	4,239,713,760	40.3	13,013
8/23/2002	24	9,119	20.3	13,131,360	4,252,845,120	40.3	13,053
8/24/2002	24	9,119	20.3	13,131,360	4,265,976,480	40.3	13,094
8/25/2002	24	9,119	20.3	13,131,360	4,279,107,840	40.3	13,134
8/26/2002	24	9,119	20.3	13,131,360	4,292,239,200	40.3	13,174
8/27/2002	24	9,119	20.3	13,131,360	4,305,370,560	40.3	13,215
8/28/2002	24	9,119	20.3	13,131,360	4,318,501,920	40.3	13,255

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
8/29/2002	24	9,078	20.2	13,072,320	4,331,574,240	40.1	13,295
8/30/2002	24	9,078	20.2	13,072,320	4,344,646,560	40.1	13,335
8/31/2002	24	9,078	20.2	13,072,320	4,357,718,880	40.1	13,375
9/1/2002	24	9,078	20.2	13,072,320	4,370,791,200	40.1	13,415
9/2/2002	24	9,078	20.2	13,072,320	4,383,863,520	40.1	13,456
9/3/2002	24	9,078	20.2	13,072,320	4,396,935,840	40.1	13,496
9/4/2002	24	9,078	20.2	13,072,320	4,410,008,160	40.1	13,536
9/5/2002	24	9,174	20.4	13,210,560	4,423,218,720	40.5	13,576
9/6/2002	24	9,174	20.4	13,210,560	4,436,429,280	40.5	13,617
9/7/2002	24	9,174	20.4	13,210,560	4,449,639,840	40.5	13,657
9/8/2002	24	9,174	20.4	13,210,560	4,462,850,400	40.5	13,698
9/9/2002	24	9,174	20.4	13,210,560	4,476,060,960	40.5	13,739
9/10/2002	24	9,174	20.4	13,210,560	4,489,271,520	40.5	13,779
9/11/2002	24	9,174	20.4	13,210,560	4,502,482,080	40.5	13,820
9/12/2002	24	9,321	20.8	13,422,240	4,515,904,320	41.2	13,861
9/13/2002	24	9,321	20.8	13,422,240	4,529,326,560	41.2	13,902
9/14/2002	24	9,321	20.8	13,422,240	4,542,748,800	41.2	13,943
9/15/2002	24	9,321	20.8	13,422,240	4,556,171,040	41.2	13,984
9/16/2002	24	9,321	20.8	13,422,240	4,569,593,280	41.2	14,026
9/17/2002	24	9,321	20.8	13,422,240	4,583,015,520	41.2	14,067
9/18/2002	24	9,321	20.8	13,422,240	4,596,437,760	41.2	14,108
9/19/2002	24	8,954	19.9	12,893,760	4,609,331,520	39.6	14,148
9/20/2002	24	8,954	19.9	12,893,760	4,622,225,280	39.6	14,187
9/21/2002	24	8,954	19.9	12,893,760	4,635,119,040	39.6	14,227
9/22/2002	24	8,954	19.9	12,893,760	4,648,012,800	39.6	14,266
9/23/2002	24	8,954	19.9	12,893,760	4,660,906,560	39.6	14,306
9/24/2002	24	8,954	19.9	12,893,760	4,673,800,320	39.6	14,345
9/25/2002	24	9,827	21.9	14,150,880	4,687,951,200	43.4	14,389
9/26/2002	24	9,827	21.9	14,150,880	4,702,102,080	43.4	14,432
9/27/2002	24	9,827	21.9	14,150,880	4,716,252,960	43.4	14,476
9/28/2002	24	9,827	21.9	14,150,880	4,730,403,840	43.4	14,519
9/29/2002	24	9,827	21.9	14,150,880	4,744,554,720	43.4	14,563
9/30/2002	24	9,827	21.9	14,150,880	4,758,705,600	43.4	14,606
10/1/2002	24	9,827	21.9	14,150,880	4,772,856,480	43.4	14,649
10/2/2002	24	6,247	13.9	8,995,680	4,781,852,160	27.6	14,677
10/3/2002	24	6,247	13.9	8,995,680	4,790,847,840	27.6	14,705
10/4/2002	24	6,247	13.9	8,995,680	4,799,843,520	27.6	14,732
10/5/2002	24	6,247	13.9	8,995,680	4,808,839,200	27.6	14,760
10/6/2002	24	6,247	13.9	8,995,680	4,817,834,880	27.6	14,788
10/7/2002	24	6,247	13.9	8,995,680	4,826,830,560	27.6	14,815
10/8/2002	24	6,247	13.9	8,995,680	4,835,826,240	27.6	14,843
10/9/2002	24	4,883	10.9	7,031,520	4,842,857,760	21.6	14,864
10/10/2002	24	4,883	10.9	7,031,520	4,849,889,280	21.6	14,886
10/11/2002	24	4,883	10.9	7,031,520	4,856,920,800	21.6	14,907
10/12/2002	24	4,883	10.9	7,031,520	4,863,952,320	21.6	14,929
10/13/2002	24	4,883	10.9	7,031,520	4,870,983,840	21.6	14,951
10/14/2002	24	4,883	10.9	7,031,520	4,878,015,360	21.6	14,972
10/15/2002	24	4,883	10.9	7,031,520	4,885,046,880	21.6	14,994
10/16/2002	24	4,883	10.9	7,031,520	4,892,078,400	21.6	15,015
10/17/2002	24	6,500	14.5	9,360,000	4,901,438,400	28.7	15,044
10/18/2002	24	6,500	14.5	9,360,000	4,910,798,400	28.7	15,073
10/19/2002	24	6,500	14.5	9,360,000	4,920,158,400	28.7	15,102
10/20/2002	24	6,500	14.5	9,360,000	4,929,518,400	28.7	15,130
10/21/2002	24	6,500	14.5	9,360,000	4,938,878,400	28.7	15,159
10/22/2002	24	6,637	14.8	9,557,280	4,948,435,680	29.3	15,188
10/23/2002	24	6,637	14.8	9,557,280	4,957,992,960	29.3	15,218
10/24/2002	24	6,637	14.8	9,557,280	4,967,550,240	29.3	15,247
10/25/2002	24	10,500	23.4	15,120,000	4,982,670,240	46.4	15,293
10/26/2002	24	10,500	23.4	15,120,000	4,997,790,240	46.4	15,340
10/27/2002	24	10,500	23.4	15,120,000	5,012,910,240	46.4	15,386
10/28/2002	24	10,500	23.4	15,120,000	5,028,030,240	46.4	15,433
10/29/2002	24	10,500	23.4	15,120,000	5,043,150,240	46.4	15,479
10/30/2002	24	10,098	22.5	14,541,120	5,057,691,360	44.6	15,524

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
10/31/2002	24	10,098	22.5	14,541,120	5,072,232,480	44.6	15,568
11/1/2002	24	10,098	22.5	14,541,120	5,086,773,600	44.6	15,613
11/2/2002	24	10,098	22.5	14,541,120	5,101,314,720	44.6	15,658
11/3/2002	24	10,098	22.5	14,541,120	5,115,855,840	44.6	15,702
11/4/2002	24	10,098	22.5	14,541,120	5,130,396,960	44.6	15,747
11/5/2002	24	10,098	22.5	14,541,120	5,144,938,080	44.6	15,792
11/6/2002	24	10,200	22.7	14,688,000	5,159,626,080	45.1	15,837
11/7/2002	24	10,200	22.7	14,688,000	5,174,314,080	45.1	15,882
11/8/2002	24	10,200	22.7	14,688,000	5,189,002,080	45.1	15,927
11/9/2002	24	10,200	22.7	14,688,000	5,203,690,080	45.1	15,972
11/10/2002	24	10,200	22.7	14,688,000	5,218,378,080	45.1	16,017
11/11/2002	24	10,200	22.7	14,688,000	5,233,066,080	45.1	16,062
11/12/2002	24	10,200	22.7	14,688,000	5,247,754,080	45.1	16,107
11/13/2002	24	9,054	20.2	13,037,760	5,260,791,840	40.0	16,147
11/14/2002	24	9,054	20.2	13,037,760	5,273,829,600	40.0	16,187
11/15/2002	24	9,054	20.2	13,037,760	5,286,867,360	40.0	16,227
11/16/2002	24	9,054	20.2	13,037,760	5,299,905,120	40.0	16,267
11/17/2002	24	9,054	20.2	13,037,760	5,312,942,880	40.0	16,307
11/18/2002	24	9,054	20.2	13,037,760	5,325,980,640	40.0	16,347
11/19/2002	24	9,054	20.2	13,037,760	5,339,018,400	40.0	16,387
11/20/2002	24	10,028	22.3	14,440,320	5,353,458,720	44.3	16,432
11/21/2002	24	10,028	22.3	14,440,320	5,367,899,040	44.3	16,476
11/22/2002	24	10,028	22.3	14,440,320	5,382,339,360	44.3	16,520
11/23/2002	24	10,028	22.3	14,440,320	5,396,779,680	44.3	16,564
11/24/2002	24	10,028	22.3	14,440,320	5,411,220,000	44.3	16,609
11/25/2002	24	10,028	22.3	14,440,320	5,425,660,320	44.3	16,653
11/26/2002	24	10,028	22.3	14,440,320	5,440,100,640	44.3	16,697
11/27/2002	24	10,028	22.3	14,440,320	5,454,540,960	44.3	16,742
11/28/2002	24	9,962	22.2	14,345,280	5,468,886,240	44.0	16,786
11/29/2002	24	9,962	22.2	14,345,280	5,483,231,520	44.0	16,830
11/30/2002	24	9,962	22.2	14,345,280	5,497,576,800	44.0	16,874
12/1/2002	24	9,962	22.2	14,345,280	5,511,922,080	44.0	16,918
12/2/2002	24	9,962	22.2	14,345,280	5,526,267,360	44.0	16,962
12/3/2002	24	9,962	22.2	14,345,280	5,540,612,640	44.0	17,006
12/4/2002	24	9,962	22.2	14,345,280	5,554,957,920	44.0	17,050
12/5/2002	24	9,308	20.7	13,403,520	5,568,361,440	41.1	17,091
12/6/2002	24	9,308	20.7	13,403,520	5,581,764,960	41.1	17,132
12/7/2002	24	9,308	20.7	13,403,520	5,595,168,480	41.1	17,173
12/8/2002	24	9,308	20.7	13,403,520	5,608,572,000	41.1	17,215
12/9/2002	24	9,308	20.7	13,403,520	5,621,975,520	41.1	17,256
12/10/2002	24	9,308	20.7	13,403,520	5,635,379,040	41.1	17,297
12/11/2002	24	9,617	21.4	13,848,480	5,649,227,520	42.5	17,339
12/12/2002	24	9,617	21.4	13,848,480	5,663,076,000	42.5	17,382
12/13/2002	24	9,617	21.4	13,848,480	5,676,924,480	42.5	17,424
12/14/2002	24	9,617	21.4	13,848,480	5,690,772,960	42.5	17,467
12/15/2002	24	9,617	21.4	13,848,480	5,704,621,440	42.5	17,509
12/16/2002	24	9,403	20.9	13,540,320	5,718,161,760	41.6	17,551
12/17/2002	24	9,403	20.9	13,540,320	5,731,702,080	41.6	17,592
12/18/2002	24	9,403	20.9	13,540,320	5,745,242,400	41.6	17,634
12/19/2002	24	9,403	20.9	13,540,320	5,758,782,720	41.6	17,676
12/20/2002	24	9,403	20.9	13,540,320	5,772,323,040	41.6	17,717
12/21/2002	24	9,403	20.9	13,540,320	5,785,863,360	41.6	17,759
12/22/2002	24	9,403	20.9	13,540,320	5,799,403,680	41.6	17,800
12/23/2002	24	9,403	20.9	13,540,320	5,812,944,000	41.6	17,842
12/24/2002	24	9,403	20.9	13,540,320	5,826,484,320	41.6	17,883
12/25/2002	24	9,403	20.9	13,540,320	5,840,024,640	41.6	17,925
12/26/2002	24	10,232	22.8	14,734,080	5,854,758,720	45.2	17,970
12/27/2002	24	10,232	22.8	14,734,080	5,869,492,800	45.2	18,015
12/28/2002	24	10,232	22.8	14,734,080	5,884,226,880	45.2	18,061
12/29/2002	24	10,232	22.8	14,734,080	5,898,960,960	45.2	18,106
12/30/2002	24	10,232	22.8	14,734,080	5,913,695,040	45.2	18,151
12/31/2002	24	10,232	22.8	14,734,080	5,928,429,120	45.2	18,196
1/1/2003	24	9,153	20.4	13,180,320	5,941,609,440	40.5	18,237

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
1/2/2003	24	9,153	20.4	13,180,320	5,954,789,760	40.5	18,277
1/3/2003	24	9,153	20.4	13,180,320	5,967,970,080	40.5	18,318
1/4/2003	24	9,153	20.4	13,180,320	5,981,150,400	40.5	18,358
1/5/2003	24	9,153	20.4	13,180,320	5,994,330,720	40.5	18,399
1/6/2003	24	9,153	20.4	13,180,320	6,007,511,040	40.5	18,439
1/7/2003	24	9,153	20.4	13,180,320	6,020,691,360	40.5	18,479
1/8/2003	24	9,153	20.4	13,180,320	6,033,871,680	40.5	18,520
1/9/2003	24	10,046	22.4	14,466,240	6,048,337,920	44.4	18,564
1/10/2003	24	10,046	22.4	14,466,240	6,062,804,160	44.4	18,609
1/11/2003	24	10,046	22.4	14,466,240	6,077,270,400	44.4	18,653
1/12/2003	24	10,046	22.4	14,466,240	6,091,736,640	44.4	18,698
1/13/2003	24	10,046	22.4	14,466,240	6,106,202,880	44.4	18,742
1/14/2003	24	10,046	22.4	14,466,240	6,120,669,120	44.4	18,786
1/15/2003	24	8,920	19.9	12,844,800	6,133,513,920	39.4	18,826
1/16/2003	24	8,920	19.9	12,844,800	6,146,358,720	39.4	18,865
1/17/2003	24	8,920	19.9	12,844,800	6,159,203,520	39.4	18,905
1/18/2003	24	8,920	19.9	12,844,800	6,172,048,320	39.4	18,944
1/19/2003	24	8,920	19.9	12,844,800	6,184,893,120	39.4	18,983
1/20/2003	24	8,920	19.9	12,844,800	6,197,737,920	39.4	19,023
1/21/2003	24	8,998	20.0	12,957,120	6,210,695,040	39.8	19,063
1/22/2003	24	8,998	20.0	12,957,120	6,223,652,160	39.8	19,102
1/23/2003	24	8,998	20.0	12,957,120	6,236,609,280	39.8	19,142
1/24/2003	24	8,998	20.0	12,957,120	6,249,566,400	39.8	19,182
1/25/2003	24	8,998	20.0	12,957,120	6,262,523,520	39.8	19,222
1/26/2003	24	8,998	20.0	12,957,120	6,275,480,640	39.8	19,262
1/27/2003	24	8,998	20.0	12,957,120	6,288,437,760	39.8	19,301
1/28/2003	24	8,998	20.0	12,957,120	6,301,394,880	39.8	19,341
1/29/2003	24	9,050	20.2	13,032,000	6,314,426,880	40.0	19,381
1/30/2003	24	9,050	20.2	13,032,000	6,327,458,880	40.0	19,421
1/31/2003	24	9,050	20.2	13,032,000	6,340,490,880	40.0	19,461
2/1/2003	24	9,050	20.2	13,032,000	6,353,522,880	40.0	19,501
2/2/2003	24	9,050	20.2	13,032,000	6,366,554,880	40.0	19,541
2/3/2003	24	9,050	20.2	13,032,000	6,379,586,880	40.0	19,581
2/4/2003	24	9,050	20.2	13,032,000	6,392,618,880	40.0	19,621
2/5/2003	24	9,050	20.2	13,032,000	6,405,650,880	40.0	19,661
2/6/2003	24	9,050	20.2	13,032,000	6,418,682,880	40.0	19,701
2/7/2003	24	9,528	21.2	13,720,320	6,432,403,200	42.1	19,743
2/8/2003	24	9,528	21.2	13,720,320	6,446,123,520	42.1	19,785
2/9/2003	24	9,528	21.2	13,720,320	6,459,843,840	42.1	19,827
2/10/2003	24	9,528	21.2	13,720,320	6,473,564,160	42.1	19,870
2/11/2003	24	9,528	21.2	13,720,320	6,487,284,480	42.1	19,912
2/12/2003	24	9,158	20.4	13,187,520	6,500,472,000	40.5	19,952
2/13/2003	24	9,158	20.4	13,187,520	6,513,659,520	40.5	19,993
2/14/2003	24	9,158	20.4	13,187,520	6,526,847,040	40.5	20,033
2/15/2003	24	9,158	20.4	13,187,520	6,540,034,560	40.5	20,074
2/16/2003	24	9,158	20.4	13,187,520	6,553,222,080	40.5	20,114
2/17/2003	24	9,158	20.4	13,187,520	6,566,409,600	40.5	20,154
2/18/2003	24	9,158	20.4	13,187,520	6,579,597,120	40.5	20,195
2/19/2003	24	9,381	20.9	13,508,640	6,593,105,760	41.5	20,236
2/20/2003	24	9,381	20.9	13,508,640	6,606,614,400	41.5	20,278
2/21/2003	24	9,381	20.9	13,508,640	6,620,123,040	41.5	20,319
2/22/2003	24	9,381	20.9	13,508,640	6,633,631,680	41.5	20,361
2/23/2003	24	9,381	20.9	13,508,640	6,647,140,320	41.5	20,402
2/24/2003	24	9,381	20.9	13,508,640	6,660,648,960	41.5	20,444
2/25/2003	24	9,381	20.9	13,508,640	6,674,157,600	41.5	20,485
2/26/2003	24	9,250	20.6	13,320,000	6,687,477,600	40.9	20,526
2/27/2003	24	9,250	20.6	13,320,000	6,700,797,600	40.9	20,567
2/28/2003	24	9,250	20.6	13,320,000	6,714,117,600	40.9	20,608
3/1/2003	24	9,580	21.3	13,795,200	6,727,912,800	42.3	20,650
3/2/2003	24	9,580	21.3	13,795,200	6,741,708,000	42.3	20,693
3/3/2003	24	9,580	21.3	13,795,200	6,755,503,200	42.3	20,735
3/4/2003	24	9,580	21.3	13,795,200	6,769,298,400	42.3	20,777
3/5/2003	24	9,580	21.3	13,795,200	6,783,093,600	42.3	20,820

Water Discharged to Eccles Creek/Scofield Reservoir

Storage capacity of Scofield Reservoir = 73,600 ac-ft

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
3/6/2003	24	9,537	21.2	13,733,280	6,796,826,880	42.2	20,862
3/7/2003	24	9,537	21.2	13,733,280	6,810,560,160	42.2	20,904
3/8/2003	24	9,537	21.2	13,733,280	6,824,293,440	42.2	20,946
3/9/2003	24	9,537	21.2	13,733,280	6,838,026,720	42.2	20,988
3/10/2003	24	9,537	21.2	13,733,280	6,851,760,000	42.2	21,030
3/11/2003	24	9,537	21.2	13,733,280	6,865,493,280	42.2	21,072
3/12/2003	24	9,537	21.2	13,733,280	6,879,226,560	42.2	21,115
3/13/2003	24	10,220	22.8	14,716,800	6,893,943,360	45.2	21,160
3/14/2003	24	10,220	22.8	14,716,800	6,908,660,160	45.2	21,205
3/15/2003	24	10,220	22.8	14,716,800	6,923,376,960	45.2	21,250
3/16/2003	24	10,220	22.8	14,716,800	6,938,093,760	45.2	21,295
3/17/2003	24	10,220	22.8	14,716,800	6,952,810,560	45.2	21,340
3/18/2003	24	10,220	22.8	14,716,800	6,967,527,360	45.2	21,386
3/19/2003	24	9,527	21.2	13,718,880	6,981,246,240	42.1	21,428
3/20/2003	24	9,527	21.2	13,718,880	6,994,965,120	42.1	21,470
3/21/2003	24	9,527	21.2	13,718,880	7,008,684,000	42.1	21,512
3/22/2003	24	9,527	21.2	13,718,880	7,022,402,880	42.1	21,554
3/23/2003	24	9,527	21.2	13,718,880	7,036,121,760	42.1	21,596
3/24/2003	24	9,527	21.2	13,718,880	7,049,840,640	42.1	21,638
3/25/2003	24	9,527	21.2	13,718,880	7,063,559,520	42.1	21,680
3/26/2003	24	10,427	23.2	15,014,880	7,078,574,400	46.1	21,726
3/27/2003	24	10,427	23.2	15,014,880	7,093,589,280	46.1	21,773
3/28/2003	24	10,427	23.2	15,014,880	7,108,604,160	46.1	21,819
3/29/2003	24	10,427	23.2	15,014,880	7,123,619,040	46.1	21,865
3/30/2003	24	10,427	23.2	15,014,880	7,138,633,920	46.1	21,911
3/31/2003	24	10,427	23.2	15,014,880	7,153,648,800	46.1	21,957

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
9/16/2001	12.5	2,150	4.8	1,612,500	1,612,500	4.9	5
9/17/2001	24	2,150	4.8	3,096,000	4,708,500	9.5	14
9/18/2001	24	2,150	4.8	3,096,000	7,804,500	9.5	24
9/19/2001	24	2,150	4.8	3,096,000	10,900,500	9.5	33
9/20/2001	24	2,150	4.8	3,096,000	13,996,500	9.5	43
9/21/2001	24	2,150	4.8	3,096,000	17,092,500	9.5	52
9/22/2001	24	2,150	4.8	3,096,000	20,188,500	9.5	62
9/23/2001	24	2,150	4.8	3,096,000	23,284,500	9.5	71
9/24/2001	24	2,150	4.8	3,096,000	26,380,500	9.5	81
9/25/2001	24	2,150	4.8	3,096,000	29,476,500	9.5	90
9/26/2001	24	2,150	4.8	3,096,000	32,572,500	9.5	100
9/27/2001	0	2,150	4.8	-	32,572,500	-	100
9/28/2001	24	2,150	4.8	3,096,000	35,668,500	9.5	109
9/29/2001	24	2,150	4.8	3,096,000	38,764,500	9.5	119
9/30/2001	24	2,150	4.8	3,096,000	41,860,500	9.5	128
10/1/2001	24	2,150	4.8	3,096,000	44,956,500	9.5	138
10/2/2001	24	2,150	4.8	3,096,000	48,052,500	9.5	147
10/3/2001	24	2,150	4.8	3,096,000	51,148,500	9.5	157
10/4/2001	24	2,150	4.8	3,096,000	54,244,500	9.5	166
10/5/2001	24	2,150	4.8	3,096,000	57,340,500	9.5	176
10/6/2001	24	2,150	4.8	3,096,000	60,436,500	9.5	185
10/7/2001	24	2,150	4.8	3,096,000	63,532,500	9.5	195
10/8/2001	24	2,150	4.8	3,096,000	66,628,500	9.5	205
10/9/2001	24	2,150	4.8	3,096,000	69,724,500	9.5	214
10/10/2001	24	2,150	4.8	3,096,000	72,820,500	9.5	224
10/11/2001	24	2,150	4.8	3,096,000	75,916,500	9.5	233
10/12/2001	24	2,150	4.8	3,096,000	79,012,500	9.5	243
10/13/2001	24	2,150	4.8	3,096,000	82,108,500	9.5	252
10/14/2001	24	2,150	4.8	3,096,000	85,204,500	9.5	262
10/15/2001	24	2,150	4.8	3,096,000	88,300,500	9.5	271
10/16/2001	24	2,150	4.8	3,096,000	91,396,500	9.5	281
10/17/2001	24	2,150	4.8	3,096,000	94,492,500	9.5	290
10/18/2001	24	2,150	4.8	3,096,000	97,588,500	9.5	300
10/19/2001	24	2,150	4.8	3,096,000	100,684,500	9.5	309
10/20/2001	24	2,150	4.8	3,096,000	103,780,500	9.5	319
10/21/2001	24	2,150	4.8	3,096,000	106,876,500	9.5	328
10/22/2001	24	2,150	4.8	3,096,000	109,972,500	9.5	338
10/23/2001	24	2,150	4.8	3,096,000	113,068,500	9.5	347
10/24/2001	24	2,150	4.8	3,096,000	116,164,500	9.5	357
10/25/2001	24	-	-	-	116,164,500	-	357
10/26/2001	16	2,150	4.8	2,064,000	118,228,500	6.3	363
10/26/2001	8	2,470	5.5	1,185,600	119,414,100	3.6	367
10/27/2001	24	2,470	5.5	3,556,800	122,970,900	10.9	377
10/28/2001	24	2,470	5.5	3,556,800	126,527,700	10.9	388
10/29/2001	24	2,470	5.5	3,556,800	130,084,500	10.9	399
10/30/2001	24	2,470	5.5	3,556,800	133,641,300	10.9	410

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
10/31/2001	24	2,470	5.5	3,556,800	137,198,100	10.9	421
11/1/2001	24	2,470	5.5	3,556,800	140,754,900	10.9	432
11/2/2001	24	2,470	5.5	3,556,800	144,311,700	10.9	443
11/3/2001	24	2,470	5.5	3,556,800	147,868,500	10.9	454
11/4/2001	24	2,470	5.5	3,556,800	151,425,300	10.9	465
11/5/2001	24	2,470	5.5	3,556,800	154,982,100	10.9	476
11/6/2001	24	2,470	5.5	3,556,800	158,538,900	10.9	487
11/7/2001	24	2,470	5.5	3,556,800	162,095,700	10.9	498
11/8/2001	24	2,470	5.5	3,556,800	165,652,500	10.9	508
11/9/2001	24	2,470	5.5	3,556,800	169,209,300	10.9	519
11/10/2001	24	2,470	5.5	3,556,800	172,766,100	10.9	530
11/11/2001	24	2,470	5.5	3,556,800	176,322,900	10.9	541
11/12/2001	24	2,470	5.5	3,556,800	179,879,700	10.9	552
11/13/2001	24	2,470	5.5	3,556,800	183,436,500	10.9	563
11/14/2001	24	2,470	5.5	3,556,800	186,993,300	10.9	574
11/15/2001	24	2,470	5.5	3,556,800	190,550,100	10.9	585
11/16/2001	24	2,470	5.5	3,556,800	194,106,900	10.9	596
11/17/2001	24	2,470	5.5	3,556,800	197,663,700	10.9	607
11/18/2001	8	2,470	5.5	1,185,600	198,849,300	3.6	610
11/19/2001	16	2,470	5.5	2,371,200	201,220,500	7.3	618
11/20/2001	8	2,470	5.5	1,185,600	202,406,100	3.6	621
11/21/2001	0		-	-	202,406,100	-	621
11/22/2001	0		-	-	202,406,100	-	621
11/23/2001	0		-	-	202,406,100	-	621
11/24/2001	0		-	-	202,406,100	-	621
11/25/2001	0		-	-	202,406,100	-	621
11/26/2001	0		-	-	202,406,100	-	621
11/27/2001	0		-	-	202,406,100	-	621
11/28/2001	0		-	-	202,406,100	-	621
11/29/2001	0		-	-	202,406,100	-	621
11/30/2001	0		-	-	202,406,100	-	621
12/1/2001	0		-	-	202,406,100	-	621
12/2/2001	0		-	-	202,406,100	-	621
12/3/2001	0		-	-	202,406,100	-	621
12/4/2001	0		-	-	202,406,100	-	621
12/5/2001	0		-	-	202,406,100	-	621
12/6/2001	0		-	-	202,406,100	-	621
12/7/2001	0		-	-	202,406,100	-	621
12/8/2001	0		-	-	202,406,100	-	621
12/9/2001	0		-	-	202,406,100	-	621
12/10/2001	0		-	-	202,406,100	-	621
12/11/2001	0		-	-	202,406,100	-	621
12/12/2001	0		-	-	202,406,100	-	621
12/13/2001	0		-	-	202,406,100	-	621
12/14/2001	12	2,250	5.0	1,620,000	204,026,100	5.0	626
12/15/2001	24	2,250	5.0	3,240,000	207,266,100	9.9	636

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
12/16/2001	24	2,250	5.0	3,240,000	210,506,100	9.9	646
12/17/2001	24	2,250	5.0	3,240,000	213,746,100	9.9	656
12/18/2001	24	2,250	5.0	3,240,000	216,986,100	9.9	666
12/19/2001	24	2,250	5.0	3,240,000	220,226,100	9.9	676
12/20/2001	24	2,250	5.0	3,240,000	223,466,100	9.9	686
12/21/2001	24	2,250	5.0	3,240,000	226,706,100	9.9	696
12/22/2001	24	2,250	5.0	3,240,000	229,946,100	9.9	706
12/23/2001	24	2,250	5.0	3,240,000	233,186,100	9.9	716
12/24/2001	24	2,250	5.0	3,240,000	236,426,100	9.9	726
12/25/2001	24	2,250	5.0	3,240,000	239,666,100	9.9	736
12/26/2001	24	2,250	5.0	3,240,000	242,906,100	9.9	746
12/27/2001	24	2,250	5.0	3,240,000	246,146,100	9.9	756
12/28/2001	24	2,250	5.0	3,240,000	249,386,100	9.9	765
12/29/2001	24	2,250	5.0	3,240,000	252,626,100	9.9	775
12/30/2001	24	2,250	5.0	3,240,000	255,866,100	9.9	785
12/31/2001	24	2,250	5.0	3,240,000	259,106,100	9.9	795
1/1/2002	24	2,250	5.0	3,240,000	262,346,100	9.9	805
1/2/2002	24	2,250	5.0	3,240,000	265,586,100	9.9	815
1/3/2002	24	2,250	5.0	3,240,000	268,826,100	9.9	825
1/4/2002	24	2,250	5.0	3,240,000	272,066,100	9.9	835
1/5/2002	24	2,250	5.0	3,240,000	275,306,100	9.9	845
1/6/2002	24	2,250	5.0	3,240,000	278,546,100	9.9	855
1/7/2002	24	2,250	5.0	3,240,000	281,786,100	9.9	865
1/8/2002	24	2,250	5.0	3,240,000	285,026,100	9.9	875
1/9/2002	24	2,250	5.0	3,240,000	288,266,100	9.9	885
1/10/2002	24	2,250	5.0	3,240,000	291,506,100	9.9	895
1/11/2002	24	2,250	5.0	3,240,000	294,746,100	9.9	905
1/12/2002	24	2,250	5.0	3,240,000	297,986,100	9.9	915
1/13/2002	24	2,250	5.0	3,240,000	301,226,100	9.9	925
1/14/2002	24	2,250	5.0	3,240,000	304,466,100	9.9	935
1/15/2002	24	2,250	5.0	3,240,000	307,706,100	9.9	944
1/16/2002	24	2,250	5.0	3,240,000	310,946,100	9.9	954
1/17/2002	24	2,250	5.0	3,240,000	314,186,100	9.9	964
1/18/2002	24	2,250	5.0	3,240,000	317,426,100	9.9	974
1/19/2002	24	2,250	5.0	3,240,000	320,666,100	9.9	984
1/20/2002	24	2,250	5.0	3,240,000	323,906,100	9.9	994
1/21/2002	24	2,250	5.0	3,240,000	327,146,100	9.9	1,004
1/22/2002	24	2,250	5.0	3,240,000	330,386,100	9.9	1,014
1/23/2002	24	2,250	5.0	3,240,000	333,626,100	9.9	1,024
1/24/2002	24	2,250	5.0	3,240,000	336,866,100	9.9	1,034
1/25/2002	24	2,250	5.0	3,240,000	340,106,100	9.9	1,044
1/26/2002	24	2,250	5.0	3,240,000	343,346,100	9.9	1,054
1/27/2002	24	2,250	5.0	3,240,000	346,586,100	9.9	1,064
1/28/2002	24	2,250	5.0	3,240,000	349,826,100	9.9	1,074
1/29/2002	24	2,250	5.0	3,240,000	353,066,100	9.9	1,084
1/30/2002	24	2,250	5.0	3,240,000	356,306,100	9.9	1,094

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
1/31/2002	24	2,250	5.0	3,240,000	359,546,100	9.9	1,104
2/1/2002	24	2,250	5.0	3,240,000	362,786,100	9.9	1,114
2/2/2002	24	2,250	5.0	3,240,000	366,026,100	9.9	1,123
2/3/2002	24	2,250	5.0	3,240,000	369,266,100	9.9	1,133
2/4/2002	24	2,250	5.0	3,240,000	372,506,100	9.9	1,143
2/5/2002	24	2,250	5.0	3,240,000	375,746,100	9.9	1,153
2/6/2002	24	2,250	5.0	3,240,000	378,986,100	9.9	1,163
2/7/2002	24	2,250	5.0	3,240,000	382,226,100	9.9	1,173
2/8/2002	24	2,250	5.0	3,240,000	385,466,100	9.9	1,183
2/9/2002	24	2,250	5.0	3,240,000	388,706,100	9.9	1,193
2/10/2002	24	2,250	5.0	3,240,000	391,946,100	9.9	1,203
2/11/2002	24	2,250	5.0	3,240,000	395,186,100	9.9	1,213
2/12/2002	24	2,250	5.0	3,240,000	398,426,100	9.9	1,223
2/13/2002	24	2,250	5.0	3,240,000	401,666,100	9.9	1,233
2/14/2002	24	2,250	5.0	3,240,000	404,906,100	9.9	1,243
2/15/2002	24	2,250	5.0	3,240,000	408,146,100	9.9	1,253
2/16/2002	24	2,250	5.0	3,240,000	411,386,100	9.9	1,263
2/17/2002	24	2,250	5.0	3,240,000	414,626,100	9.9	1,273
2/18/2002	24	2,250	5.0	3,240,000	417,866,100	9.9	1,283
2/19/2002	24	2,250	5.0	3,240,000	421,106,100	9.9	1,293
2/20/2002	24	2,250	5.0	3,240,000	424,346,100	9.9	1,302
2/21/2002	24	2,250	5.0	3,240,000	427,586,100	9.9	1,312
2/22/2002	24	2,250	5.0	3,240,000	430,826,100	9.9	1,322
2/23/2002	24	2,250	5.0	3,240,000	434,066,100	9.9	1,332
2/24/2002	24	2,250	5.0	3,240,000	437,306,100	9.9	1,342
2/25/2002	24	2,250	5.0	3,240,000	440,546,100	9.9	1,352
2/26/2002	24	2,250	5.0	3,240,000	443,786,100	9.9	1,362
2/27/2002	24	2,250	5.0	3,240,000	447,026,100	9.9	1,372
2/28/2002	24	2,250	5.0	3,240,000	450,266,100	9.9	1,382
3/1/2002	24	2,250	5.0	3,240,000	453,506,100	9.9	1,392
3/2/2002	24	2,250	5.0	3,240,000	456,746,100	9.9	1,402
3/3/2002	24	2,250	5.0	3,240,000	459,986,100	9.9	1,412
3/4/2002	24	2,250	5.0	3,240,000	463,226,100	9.9	1,422
3/5/2002	24	2,250	5.0	3,240,000	466,466,100	9.9	1,432
3/6/2002	24	2,250	5.0	3,240,000	469,706,100	9.9	1,442
3/7/2002	24	2,250	5.0	3,240,000	472,946,100	9.9	1,452
3/8/2002	24	2,250	5.0	3,240,000	476,186,100	9.9	1,462
3/9/2002	24	2,250	5.0	3,240,000	479,426,100	9.9	1,472
3/10/2002	24	2,250	5.0	3,240,000	482,666,100	9.9	1,481
3/11/2002	16	2,250	5.0	2,160,000	484,826,100	6.6	1,488
3/12/2002	0	2,250	5.0	-	484,826,100	-	1,488
3/13/2002	0	2,250	5.0	-	484,826,100	-	1,488
3/14/2002	12	2,250	5.0	1,620,000	486,446,100	5.0	1,493
3/15/2002	24	2,250	5.0	3,240,000	489,686,100	9.9	1,503
3/16/2002	24	2,250	5.0	3,240,000	492,926,100	9.9	1,513
3/17/2002	24	2,250	5.0	3,240,000	496,166,100	9.9	1,523

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
3/18/2002	24	2,250	5.0	3,240,000	499,406,100	9.9	1,533
3/19/2002	24	2,250	5.0	3,240,000	502,646,100	9.9	1,543
3/20/2002	24	2,250	5.0	3,240,000	505,886,100	9.9	1,553
3/21/2002	24	2,250	5.0	3,240,000	509,126,100	9.9	1,563
3/22/2002	24	2,250	5.0	3,240,000	512,366,100	9.9	1,573
3/23/2002	24	2,250	5.0	3,240,000	515,606,100	9.9	1,583
3/24/2002	24	2,250	5.0	3,240,000	518,846,100	9.9	1,593
3/25/2002	24	2,250	5.0	3,240,000	522,086,100	9.9	1,602
3/26/2002	24	2,250	5.0	3,240,000	525,326,100	9.9	1,612
3/27/2002	24	2,250	5.0	3,240,000	528,566,100	9.9	1,622
3/28/2002	24	2,250	5.0	3,240,000	531,806,100	9.9	1,632
3/29/2002	24	2,250	5.0	3,240,000	535,046,100	9.9	1,642
3/30/2002	24	2,250	5.0	3,240,000	538,286,100	9.9	1,652
3/31/2002	24	2,250	5.0	3,240,000	541,526,100	9.9	1,662
4/1/2002	24	2,250	5.0	3,240,000	544,766,100	9.9	1,672
4/2/2002	24	2,250	5.0	3,240,000	548,006,100	9.9	1,682
4/3/2002	24	2,250	5.0	3,240,000	551,246,100	9.9	1,692
4/4/2002	24	2,250	5.0	3,240,000	554,486,100	9.9	1,702
4/5/2002	24	2,250	5.0	3,240,000	557,726,100	9.9	1,712
4/6/2002	24	2,250	5.0	3,240,000	560,966,100	9.9	1,722
4/7/2002	24	2,250	5.0	3,240,000	564,206,100	9.9	1,732
4/8/2002	24	2,250	5.0	3,240,000	567,446,100	9.9	1,742
4/9/2002	24	2,250	5.0	3,240,000	570,686,100	9.9	1,752
4/10/2002	24	2,250	5.0	3,240,000	573,926,100	9.9	1,762
4/11/2002	24	2,250	5.0	3,240,000	577,166,100	9.9	1,772
4/12/2002	24	2,250	5.0	3,240,000	580,406,100	9.9	1,781
4/13/2002	24	2,250	5.0	3,240,000	583,646,100	9.9	1,791
4/14/2002	24	2,250	5.0	3,240,000	586,886,100	9.9	1,801
4/15/2002	24	2,250	5.0	3,240,000	590,126,100	9.9	1,811
4/16/2002	24	2,250	5.0	3,240,000	593,366,100	9.9	1,821
4/17/2002	24	2,250	5.0	3,240,000	596,606,100	9.9	1,831
4/18/2002	24	2,250	5.0	3,240,000	599,846,100	9.9	1,841
4/19/2002	24	2,250	5.0	3,240,000	603,086,100	9.9	1,851
4/20/2002	24	2,250	5.0	3,240,000	606,326,100	9.9	1,861
4/21/2002	24	2,250	5.0	3,240,000	609,566,100	9.9	1,871
4/22/2002	24	2,250	5.0	3,240,000	612,806,100	9.9	1,881
4/23/2002	24	2,250	5.0	3,240,000	616,046,100	9.9	1,891
4/24/2002	24	2,250	5.0	3,240,000	619,286,100	9.9	1,901
4/25/2002	24	2,250	5.0	3,240,000	622,526,100	9.9	1,911
4/26/2002	24	2,250	5.0	3,240,000	625,766,100	9.9	1,921
4/27/2002	24	2,250	5.0	3,240,000	629,006,100	9.9	1,931
4/28/2002	24	2,250	5.0	3,240,000	632,246,100	9.9	1,941
4/29/2002	24	2,250	5.0	3,240,000	635,486,100	9.9	1,951
4/30/2002	24	2,250	5.0	3,240,000	638,726,100	9.9	1,960
5/1/2002	24	2,250	5.0	3,240,000	641,966,100	9.9	1,970
5/2/2002	24	2,250	5.0	3,240,000	645,206,100	9.9	1,980

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
5/3/2002	24	2,250	5.0	3,240,000	648,446,100	9.9	1,990
5/4/2002	24	2,250	5.0	3,240,000	651,686,100	9.9	2,000
5/5/2002	24	2,250	5.0	3,240,000	654,926,100	9.9	2,010
5/6/2002	24	2,250	5.0	3,240,000	658,166,100	9.9	2,020
5/7/2002	24	2,250	5.0	3,240,000	661,406,100	9.9	2,030
5/8/2002	24	2,250	5.0	3,240,000	664,646,100	9.9	2,040
5/9/2002	24	2,250	5.0	3,240,000	667,886,100	9.9	2,050
5/10/2002	24	2,250	5.0	3,240,000	671,126,100	9.9	2,060
5/11/2002	24	2,250	5.0	3,240,000	674,366,100	9.9	2,070
5/12/2002	24	2,100	4.7	3,024,000	677,390,100	9.3	2,079
5/13/2002	24	2,100	4.7	3,024,000	680,414,100	9.3	2,088
5/14/2002	24	2,100	4.7	3,024,000	683,438,100	9.3	2,098
5/15/2002	24	2,100	4.7	3,024,000	686,462,100	9.3	2,107
5/16/2002	24	2,100	4.7	3,024,000	689,486,100	9.3	2,116
5/17/2002	24	2,100	4.7	3,024,000	692,510,100	9.3	2,126
5/18/2002	24	2,100	4.7	3,024,000	695,534,100	9.3	2,135
5/19/2002	24	2,100	4.7	3,024,000	698,558,100	9.3	2,144
5/20/2002	24	2,100	4.7	3,024,000	701,582,100	9.3	2,153
5/21/2002	24	2,100	4.7	3,024,000	704,606,100	9.3	2,163
5/22/2002	24	2,100	4.7	3,024,000	707,630,100	9.3	2,172
5/23/2002	24	2,100	4.7	3,024,000	710,654,100	9.3	2,181
5/24/2002	24	2,100	4.7	3,024,000	713,678,100	9.3	2,191
5/25/2002	24	2,100	4.7	3,024,000	716,702,100	9.3	2,200
5/26/2002	24	2,100	4.7	3,024,000	719,726,100	9.3	2,209
5/27/2002	24	2,100	4.7	3,024,000	722,750,100	9.3	2,218
5/28/2002	24	2,100	4.7	3,024,000	725,774,100	9.3	2,228
5/29/2002	21	2,100	4.7	2,646,000	728,420,100	8.1	2,236
5/30/2002	24	2,100	4.7	3,024,000	731,444,100	9.3	2,245
5/31/2002	24	2,100	4.7	3,024,000	734,468,100	9.3	2,254
6/1/2002	24	2,080	4.6	2,995,200	737,463,300	9.2	2,264
6/2/2002	24	2,080	4.6	2,995,200	740,458,500	9.2	2,273
6/3/2002	24	2,080	4.6	2,995,200	743,453,700	9.2	2,282
6/4/2002	24	2,080	4.6	2,995,200	746,448,900	9.2	2,291
6/5/2002	24	2,080	4.6	2,995,200	749,444,100	9.2	2,300
6/6/2002	24	2,080	4.6	2,995,200	752,439,300	9.2	2,309
6/7/2002	24	2,080	4.6	2,995,200	755,434,500	9.2	2,319
6/8/2002	24	2,080	4.6	2,995,200	758,429,700	9.2	2,328
6/9/2002	24	2,080	4.6	2,995,200	761,424,900	9.2	2,337
6/10/2002	24	2,080	4.6	2,995,200	764,420,100	9.2	2,346
6/11/2002	24	2,080	4.6	2,995,200	767,415,300	9.2	2,355
6/12/2002	24	2,080	4.6	2,995,200	770,410,500	9.2	2,365
6/13/2002	24	2,080	4.6	2,995,200	773,405,700	9.2	2,374
6/14/2002	24	2,080	4.6	2,995,200	776,400,900	9.2	2,383
6/15/2002	24	2,080	4.6	2,995,200	779,396,100	9.2	2,392
6/16/2002	24	2,080	4.6	2,995,200	782,391,300	9.2	2,401
6/17/2002	24	2,080	4.6	2,995,200	785,386,500	9.2	2,411

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
6/18/2002	24	2,080	4.6	2,995,200	788,381,700	9.2	2,420
6/19/2002	24	2,080	4.6	2,995,200	791,376,900	9.2	2,429
6/20/2002	24	2,080	4.6	2,995,200	794,372,100	9.2	2,438
6/21/2002	24	2,080	4.6	2,995,200	797,367,300	9.2	2,447
6/22/2002	24	2,080	4.6	2,995,200	800,362,500	9.2	2,457
6/23/2002	24	2,080	4.6	2,995,200	803,357,700	9.2	2,466
6/24/2002	24	2,080	4.6	2,995,200	806,352,900	9.2	2,475
6/25/2002	24	2,080	4.6	2,995,200	809,348,100	9.2	2,484
6/26/2002	24	2,080	4.6	2,995,200	812,343,300	9.2	2,493
6/27/2002	24	2,080	4.6	2,995,200	815,338,500	9.2	2,503
6/28/2002	24	2,080	4.6	2,995,200	818,333,700	9.2	2,512
6/29/2002	24	2,080	4.6	2,995,200	821,328,900	9.2	2,521
6/30/2002	24	2,080	4.6	2,995,200	824,324,100	9.2	2,530
7/1/2002	24	2,080	4.6	2,995,200	827,319,300	9.2	2,539
7/2/2002	24	2,080	4.6	2,995,200	830,314,500	9.2	2,549
7/3/2002	24	2,080	4.6	2,995,200	833,309,700	9.2	2,558
7/4/2002	24	2,080	4.6	2,995,200	836,304,900	9.2	2,567
7/5/2002	24	2,080	4.6	2,995,200	839,300,100	9.2	2,576
7/6/2002	24	2,080	4.6	2,995,200	842,295,300	9.2	2,585
7/7/2002	24	2,080	4.6	2,995,200	845,290,500	9.2	2,594
7/8/2002	24	2,080	4.6	2,995,200	848,285,700	9.2	2,604
7/9/2002	24	2,080	4.6	2,995,200	851,280,900	9.2	2,613
7/10/2002	24	2,080	4.6	2,995,200	854,276,100	9.2	2,622
7/11/2002	24	2,080	4.6	2,995,200	857,271,300	9.2	2,631
7/12/2002	24	2,080	4.6	2,995,200	860,266,500	9.2	2,640
7/13/2002	24	2,080	4.6	2,995,200	863,261,700	9.2	2,650
7/14/2002	24	2,080	4.6	2,995,200	866,256,900	9.2	2,659
7/15/2002	24	2,080	4.6	2,995,200	869,252,100	9.2	2,668
7/16/2002	24	2,080	4.6	2,995,200	872,247,300	9.2	2,677
7/17/2002	24	2,080	4.6	2,995,200	875,242,500	9.2	2,686
7/18/2002	24	2,080	4.6	2,995,200	878,237,700	9.2	2,696
7/19/2002	24	2,080	4.6	2,995,200	881,232,900	9.2	2,705
7/20/2002	24	2,080	4.6	2,995,200	884,228,100	9.2	2,714
7/21/2002	24	2,080	4.6	2,995,200	887,223,300	9.2	2,723
7/22/2002	24	2,080	4.6	2,995,200	890,218,500	9.2	2,732
7/23/2002	24	2,080	4.6	2,995,200	893,213,700	9.2	2,742
7/24/2002	24	2,080	4.6	2,995,200	896,208,900	9.2	2,751
7/25/2002	24	2,080	4.6	2,995,200	899,204,100	9.2	2,760
7/26/2002	24	2,080	4.6	2,995,200	902,199,300	9.2	2,769
7/27/2002	24	2,080	4.6	2,995,200	905,194,500	9.2	2,778
7/28/2002	24	2,080	4.6	2,995,200	908,189,700	9.2	2,788
7/29/2002	24	2,080	4.6	2,995,200	911,184,900	9.2	2,797
7/30/2002	24	2,080	4.6	2,995,200	914,180,100	9.2	2,806
7/31/2002	24	2,080	4.6	2,995,200	917,175,300	9.2	2,815
8/1/2002	24	2,080	4.6	2,995,200	920,170,500	9.2	2,824
8/2/2002	24	2,080	4.6	2,995,200	923,165,700	9.2	2,833

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
8/3/2002	24	2,080	4.6	2,995,200	926,160,900	9.2	2,843
8/4/2002	24	2,080	4.6	2,995,200	929,156,100	9.2	2,852
8/5/2002	24	2,080	4.6	2,995,200	932,151,300	9.2	2,861
8/6/2002	24	2,080	4.6	2,995,200	935,146,500	9.2	2,870
8/7/2002	24	2,080	4.6	2,995,200	938,141,700	9.2	2,879
8/8/2002	24	2,080	4.6	2,995,200	941,136,900	9.2	2,889
8/9/2002	24	2,080	4.6	2,995,200	944,132,100	9.2	2,898
8/10/2002	24	2,080	4.6	2,995,200	947,127,300	9.2	2,907
8/11/2002	24	2,080	4.6	2,995,200	950,122,500	9.2	2,916
8/12/2002	9	2,080	4.6	1,123,200	951,245,700	3.4	2,920
8/13/2002	0	-	-	-	951,245,700	-	2,920
8/14/2002	0	-	-	-	951,245,700	-	2,920
8/15/2002	0	-	-	-	951,245,700	-	2,920
8/16/2002	0	-	-	-	951,245,700	-	2,920
8/17/2002	0	-	-	-	951,245,700	-	2,920
8/18/2002	0	-	-	-	951,245,700	-	2,920
8/19/2002	0	-	-	-	951,245,700	-	2,920
8/20/2002	0	-	-	-	951,245,700	-	2,920
8/21/2002	0	-	-	-	951,245,700	-	2,920
8/22/2002	0	-	-	-	951,245,700	-	2,920
8/23/2002	8.7	2,100	4.7	1,092,420	952,338,120	3.4	2,923
8/24/2002	24	2,100	4.7	3,024,000	955,362,120	9.3	2,932
8/25/2002	24	2,100	4.7	3,024,000	958,386,120	9.3	2,942
8/26/2002	24	2,100	4.7	3,024,000	961,410,120	9.3	2,951
8/27/2002	12.5	2,100	4.7	1,575,000	962,985,120	4.8	2,956
8/28/2002	0	-	-	-	962,985,120	-	2,956
8/29/2002	7.7	2,100	4.7	968,100	963,953,220	3.0	2,959
8/30/2002	24	2,100	4.7	3,024,000	966,977,220	9.3	2,968
8/31/2002	24	2,100	4.7	3,024,000	970,001,220	9.3	2,977
9/1/2002	24	2,100	4.7	3,024,000	973,025,220	9.3	2,987
9/2/2002	24	2,100	4.7	3,024,000	976,049,220	9.3	2,996
9/3/2002	24	2,100	4.7	3,024,000	979,073,220	9.3	3,005
9/4/2002	24	2,100	4.7	3,024,000	982,097,220	9.3	3,014
9/5/2002	24	2,100	4.7	3,024,000	985,121,220	9.3	3,024
9/6/2002	24	2,100	4.7	3,024,000	988,145,220	9.3	3,033
9/7/2002	24	2,100	4.7	3,024,000	991,169,220	9.3	3,042
9/8/2002	24	2,100	4.7	3,024,000	994,193,220	9.3	3,052
9/9/2002	24	2,100	4.7	3,024,000	997,217,220	9.3	3,061
9/10/2002	24	2,100	4.7	3,024,000	1,000,241,220	9.3	3,070
9/11/2002	24	2,100	4.7	3,024,000	1,003,265,220	9.3	3,079
9/12/2002	24	2,100	4.7	3,024,000	1,006,289,220	9.3	3,089
9/13/2002	24	2,100	4.7	3,024,000	1,009,313,220	9.3	3,098
9/14/2002	24	2,100	4.7	3,024,000	1,012,337,220	9.3	3,107
9/15/2002	24	2,100	4.7	3,024,000	1,015,361,220	9.3	3,116
9/16/2002	24	2,100	4.7	3,024,000	1,018,385,220	9.3	3,126
9/17/2002	24	2,100	4.7	3,024,000	1,021,409,220	9.3	3,135

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
9/18/2002	24	2,100	4.7	3,024,000	1,024,433,220	9.3	3,144
9/19/2002	24	2,100	4.7	3,024,000	1,027,457,220	9.3	3,154
9/20/2002	24	2,100	4.7	3,024,000	1,030,481,220	9.3	3,163
9/21/2002	24	2,100	4.7	3,024,000	1,033,505,220	9.3	3,172
9/22/2002	24	2,100	4.7	3,024,000	1,036,529,220	9.3	3,181
9/23/2002	24	2,100	4.7	3,024,000	1,039,553,220	9.3	3,191
9/24/2002	24	2,100	4.7	3,024,000	1,042,577,220	9.3	3,200
9/25/2002	24	2,100	4.7	3,024,000	1,045,601,220	9.3	3,209
9/26/2002	24	2,100	4.7	3,024,000	1,048,625,220	9.3	3,219
9/27/2002	24	2,100	4.7	3,024,000	1,051,649,220	9.3	3,228
9/28/2002	24	2,100	4.7	3,024,000	1,054,673,220	9.3	3,237
9/29/2002	24	2,100	4.7	3,024,000	1,057,697,220	9.3	3,246
9/30/2002	24	2,100	4.7	3,024,000	1,060,721,220	9.3	3,256
10/1/2002	24	2,100	4.7	3,024,000	1,063,745,220	9.3	3,265
10/2/2002	10	2,100	4.7	1,260,000	1,065,005,220	3.9	3,269
10/3/2002	0		-	-	1,065,005,220	-	3,269
10/4/2002	0		-	-	1,065,005,220	-	3,269
10/5/2002	0		-	-	1,065,005,220	-	3,269
10/6/2002	0		-	-	1,065,005,220	-	3,269
10/7/2002	0		-	-	1,065,005,220	-	3,269
10/8/2002	0		-	-	1,065,005,220	-	3,269
10/9/2002	0		-	-	1,065,005,220	-	3,269
10/10/2002	0		-	-	1,065,005,220	-	3,269
10/11/2002	0		-	-	1,065,005,220	-	3,269
10/12/2002	0		-	-	1,065,005,220	-	3,269
10/13/2002	0		-	-	1,065,005,220	-	3,269
10/14/2002	11	4,200	9.4	2,772,000	1,067,777,220	8.5	3,277
10/15/2002	24	4,200	9.4	6,048,000	1,073,825,220	18.6	3,296
10/16/2002	24	4,200	9.4	6,048,000	1,079,873,220	18.6	3,314
10/17/2002	24	4,200	9.4	6,048,000	1,085,921,220	18.6	3,333
10/18/2002	24	4,200	9.4	6,048,000	1,091,969,220	18.6	3,352
10/19/2002	24	4,200	9.4	6,048,000	1,098,017,220	18.6	3,370
10/20/2002	24	4,200	9.4	6,048,000	1,104,065,220	18.6	3,389
10/21/2002	24	4,200	9.4	6,048,000	1,110,113,220	18.6	3,407
10/22/2002	24	4,200	9.4	6,048,000	1,116,161,220	18.6	3,426
10/23/2002	24	4,200	9.4	6,048,000	1,122,209,220	18.6	3,444
10/24/2002	24	4,200	9.4	6,048,000	1,128,257,220	18.6	3,463
10/25/2002	24	4,200	9.4	6,048,000	1,134,305,220	18.6	3,482
10/26/2002	24	4,200	9.4	6,048,000	1,140,353,220	18.6	3,500
10/27/2002	24	4,200	9.4	6,048,000	1,146,401,220	18.6	3,519
10/28/2002	24	4,200	9.4	6,048,000	1,152,449,220	18.6	3,537
10/29/2002	24	4,200	9.4	6,048,000	1,158,497,220	18.6	3,556
10/30/2002	24	4,200	9.4	6,048,000	1,164,545,220	18.6	3,574
10/31/2002	10	4,200	9.4	2,520,000	1,167,065,220	7.7	3,582
11/1/2002	0	4,200	9.4	-	1,167,065,220	-	3,582
11/2/2002	0	4,200	9.4	-	1,167,065,220	-	3,582

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
11/3/2002	0	4,200	9.4	-	1,167,065,220	-	3,582
11/4/2002	0	4,200	9.4	-	1,167,065,220	-	3,582
11/5/2002	0	4,200	9.4	-	1,167,065,220	-	3,582
11/6/2002	0		-	-	1,167,065,220	-	3,582
11/7/2002	0		-	-	1,167,065,220	-	3,582
11/8/2002	0		-	-	1,167,065,220	-	3,582
11/9/2002	0		-	-	1,167,065,220	-	3,582
11/10/2002	0		-	-	1,167,065,220	-	3,582
11/11/2002	0		-	-	1,167,065,220	-	3,582
11/12/2002	14	4,100	9.1	3,444,000	1,170,509,220	10.6	3,593
11/13/2002	24	4,100	9.1	5,904,000	1,176,413,220	18.1	3,611
11/14/2002	24	4,100	9.1	5,904,000	1,182,317,220	18.1	3,629
11/15/2002	24	4,100	9.1	5,904,000	1,188,221,220	18.1	3,647
11/16/2002	24	4,100	9.1	5,904,000	1,194,125,220	18.1	3,665
11/17/2002	24	4,100	9.1	5,904,000	1,200,029,220	18.1	3,683
11/18/2002	24	4,100	9.1	5,904,000	1,205,933,220	18.1	3,701
11/19/2002	24	4,100	9.1	5,904,000	1,211,837,220	18.1	3,720
11/20/2002	24	4,100	9.1	5,904,000	1,217,741,220	18.1	3,738
11/21/2002	24	4,100	9.1	5,904,000	1,223,645,220	18.1	3,756
11/22/2002	24	4,100	9.1	5,904,000	1,229,549,220	18.1	3,774
11/23/2002	24	4,100	9.1	5,904,000	1,235,453,220	18.1	3,792
11/24/2002	24	4,100	9.1	5,904,000	1,241,357,220	18.1	3,810
11/25/2002	24	4,100	9.1	5,904,000	1,247,261,220	18.1	3,828
11/26/2002	24	4,100	9.1	5,904,000	1,253,165,220	18.1	3,846
11/27/2002	24	4,100	9.1	5,904,000	1,259,069,220	18.1	3,864
11/28/2002	24	4,100	9.1	5,904,000	1,264,973,220	18.1	3,883
11/29/2002	24	4,100	9.1	5,904,000	1,270,877,220	18.1	3,901
11/30/2002	24	4,100	9.1	5,904,000	1,276,781,220	18.1	3,919
12/1/2002	24	4,100	9.1	5,904,000	1,282,685,220	18.1	3,937
12/2/2002	24	4,100	9.1	5,904,000	1,288,589,220	18.1	3,955
12/3/2002	24	4,100	9.1	5,904,000	1,294,493,220	18.1	3,973
12/4/2002	24	4,100	9.1	5,904,000	1,300,397,220	18.1	3,991
12/5/2002	24	4,100	9.1	5,904,000	1,306,301,220	18.1	4,009
12/6/2002	24	4,100	9.1	5,904,000	1,312,205,220	18.1	4,028
12/7/2002	24	4,100	9.1	5,904,000	1,318,109,220	18.1	4,046
12/8/2002	24	4,100	9.1	5,904,000	1,324,013,220	18.1	4,064
12/9/2002	24	4,100	9.1	5,904,000	1,329,917,220	18.1	4,082
12/10/2002	24	4,100	9.1	5,904,000	1,335,821,220	18.1	4,100
12/11/2002	24	4,100	9.1	5,904,000	1,341,725,220	18.1	4,118
12/12/2002	24	4,100	9.1	5,904,000	1,347,629,220	18.1	4,136
12/13/2002	24	4,100	9.1	5,904,000	1,353,533,220	18.1	4,154
12/14/2002	24	4,100	9.1	5,904,000	1,359,437,220	18.1	4,173
12/15/2002	24	4,100	9.1	5,904,000	1,365,341,220	18.1	4,191
12/16/2002	24	4,100	9.1	5,904,000	1,371,245,220	18.1	4,209
12/17/2002	24	4,100	9.1	5,904,000	1,377,149,220	18.1	4,227
12/18/2002	24	4,100	9.1	5,904,000	1,383,053,220	18.1	4,245

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
12/19/2002	24	4,100	9.1	5,904,000	1,388,957,220	18.1	4,263
12/20/2002	24	4,100	9.1	5,904,000	1,394,861,220	18.1	4,281
12/21/2002	24	4,100	9.1	5,904,000	1,400,765,220	18.1	4,299
12/22/2002	24	4,100	9.1	5,904,000	1,406,669,220	18.1	4,318
12/23/2002	24	4,100	9.1	5,904,000	1,412,573,220	18.1	4,336
12/24/2002	24	4,100	9.1	5,904,000	1,418,477,220	18.1	4,354
12/25/2002	24	4,100	9.1	5,904,000	1,424,381,220	18.1	4,372
12/26/2002	24	4,100	9.1	5,904,000	1,430,285,220	18.1	4,390
12/27/2002	24	4,100	9.1	5,904,000	1,436,189,220	18.1	4,408
12/28/2002	24	4,100	9.1	5,904,000	1,442,093,220	18.1	4,426
12/29/2002	24	4,100	9.1	5,904,000	1,447,997,220	18.1	4,444
12/30/2002	24	4,100	9.1	5,904,000	1,453,901,220	18.1	4,463
12/31/2002	24	4,100	9.1	5,904,000	1,459,805,220	18.1	4,481
1/1/2003	24	4,100	9.1	5,904,000	1,465,709,220	18.1	4,499
1/2/2003	24	4,100	9.1	5,904,000	1,471,613,220	18.1	4,517
1/3/2003	24	4,100	9.1	5,904,000	1,477,517,220	18.1	4,535
1/4/2003	24	4,100	9.1	5,904,000	1,483,421,220	18.1	4,553
1/5/2003	24	4,100	9.1	5,904,000	1,489,325,220	18.1	4,571
1/6/2003	24	4,100	9.1	5,904,000	1,495,229,220	18.1	4,589
1/7/2003	24	4,100	9.1	5,904,000	1,501,133,220	18.1	4,607
1/8/2003	24	4,100	9.1	5,904,000	1,507,037,220	18.1	4,626
1/9/2003	24	4,100	9.1	5,904,000	1,512,941,220	18.1	4,644
1/10/2003	24	4,100	9.1	5,904,000	1,518,845,220	18.1	4,662
1/11/2003	24	4,100	9.1	5,904,000	1,524,749,220	18.1	4,680
1/12/2003	24	4,100	9.1	5,904,000	1,530,653,220	18.1	4,698
1/13/2003	24	4,100	9.1	5,904,000	1,536,557,220	18.1	4,716
1/14/2003	24	4,100	9.1	5,904,000	1,542,461,220	18.1	4,734
1/15/2003	24	4,100	9.1	5,904,000	1,548,365,220	18.1	4,752
1/16/2003	24	4,100	9.1	5,904,000	1,554,269,220	18.1	4,771
1/17/2003	24	4,100	9.1	5,904,000	1,560,173,220	18.1	4,789
1/18/2003	24	4,100	9.1	5,904,000	1,566,077,220	18.1	4,807
1/19/2003	24	4,100	9.1	5,904,000	1,571,981,220	18.1	4,825
1/20/2003	24	4,100	9.1	5,904,000	1,577,885,220	18.1	4,843
1/21/2003	24	4,100	9.1	5,904,000	1,583,789,220	18.1	4,861
1/22/2003	24	4,100	9.1	5,904,000	1,58[illegible],693,220	18.1	4,879
1/23/2003	24	4,100	9.1	5,904,000	1,595,597,220	18.1	4,897
1/24/2003	24	4,100	9.1	5,904,000	1,601,501,220	18.1	4,916
1/25/2003	24	4,100	9.1	5,904,000	1,607,405,220	18.1	4,934
1/26/2003	24	4,100	9.1	5,904,000	1,613,309,220	18.1	4,952
1/27/2003	24	4,100	9.1	5,904,000	1,619,213,220	18.1	4,970
1/28/2003	24	4,100	9.1	5,904,000	1,625,117,220	18.1	4,988
1/29/2003	24	4,100	9.1	5,904,000	1,631,021,220	18.1	5,006
1/30/2003	24	4,100	9.1	5,904,000	1,636,925,220	18.1	5,024
1/31/2003	24	4,100	9.1	5,904,000	1,642,829,220	18.1	5,042
2/1/2003	24	4,100	9.1	5,904,000	1,648,733,220	18.1	5,061
2/2/2003	24	4,100	9.1	5,904,000	1,654,637,220	18.1	5,079

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
2/3/2003	24	4,100	9.1	5,904,000	1,660,541,220	18.1	5,097
2/4/2003	24	4,100	9.1	5,904,000	1,666,445,220	18.1	5,115
2/5/2003	24	4,100	9.1	5,904,000	1,672,349,220	18.1	5,133
2/6/2003	24	4,100	9.1	5,904,000	1,678,253,220	18.1	5,151
2/7/2003	24	4,100	9.1	5,904,000	1,684,157,220	18.1	5,169
2/8/2003	24	4,100	9.1	5,904,000	1,690,061,220	18.1	5,187
2/9/2003	24	4,100	9.1	5,904,000	1,695,965,220	18.1	5,205
2/10/2003	24	4,100	9.1	5,904,000	1,701,869,220	18.1	5,224
2/11/2003	24	4,100	9.1	5,904,000	1,707,773,220	18.1	5,242
2/12/2003	24	4,100	9.1	5,904,000	1,713,677,220	18.1	5,260
2/13/2003	24	4,100	9.1	5,904,000	1,719,581,220	18.1	5,278
2/14/2003	24	4,100	9.1	5,904,000	1,725,485,220	18.1	5,296
2/15/2003	24	4,100	9.1	5,904,000	1,731,389,220	18.1	5,314
2/16/2003	24	4,100	9.1	5,904,000	1,737,293,220	18.1	5,332
2/17/2003	24	4,100	9.1	5,904,000	1,743,197,220	18.1	5,350
2/18/2003	24	4,100	9.1	5,904,000	1,749,101,220	18.1	5,369
2/19/2003	24	4,100	9.1	5,904,000	1,755,005,220	18.1	5,387
2/20/2003	24	4,100	9.1	5,904,000	1,760,909,220	18.1	5,405
2/21/2003	24	4,100	9.1	5,904,000	1,766,813,220	18.1	5,423
2/22/2003	24	4,100	9.1	5,904,000	1,772,717,220	18.1	5,441
2/23/2003	24	4,100	9.1	5,904,000	1,778,621,220	18.1	5,459
2/24/2003	24	4,000	8.9	5,760,000	1,784,381,220	17.7	5,477
2/25/2003	24	4,000	8.9	5,760,000	1,790,141,220	17.7	5,495
2/26/2003	24	4,000	8.9	5,760,000	1,795,901,220	17.7	5,512
2/27/2003	24	4,000	8.9	5,760,000	1,801,661,220	17.7	5,530
2/28/2003	24	4,000	8.9	5,760,000	1,807,421,220	17.7	5,548
3/1/2003	24	4,000	8.9	5,760,000	1,813,181,220	17.7	5,565
3/2/2003	24	4,000	8.9	5,760,000	1,818,941,220	17.7	5,583
3/3/2003	24	4,000	8.9	5,760,000	1,824,701,220	17.7	5,601
3/4/2003	24	4,000	8.9	5,760,000	1,830,461,220	17.7	5,618
3/5/2003	24	4,000	8.9	5,760,000	1,836,221,220	17.7	5,636
3/6/2003	24	4,000	8.9	5,760,000	1,841,981,220	17.7	5,654
3/7/2003	24	3,900	8.7	5,616,000	1,847,597,220	17.2	5,671
3/8/2003	24	3,900	8.7	5,616,000	1,853,213,220	17.2	5,688
3/9/2003	24	3,900	8.7	5,616,000	1,858,829,220	17.2	5,705
3/10/2003	24	3,900	8.7	5,616,000	1,864,445,220	17.2	5,723
3/11/2003	24	3,900	8.7	5,616,000	1,870,061,220	17.2	5,740
3/12/2003	24	3,900	8.7	5,616,000	1,875,677,220	17.2	5,757
3/13/2003	24	3,900	8.7	5,616,000	1,881,293,220	17.2	5,774
3/14/2003	24	3,900	8.7	5,616,000	1,886,909,220	17.2	5,792
3/15/2003	24	3,900	8.7	5,616,000	1,892,525,220	17.2	5,809
3/16/2003	24	3,900	8.7	5,616,000	1,898,141,220	17.2	5,826
3/17/2003	24	3,900	8.7	5,616,000	1,903,757,220	17.2	5,843
3/18/2003	24	3,900	8.7	5,616,000	1,909,373,220	17.2	5,860
3/19/2003	24	3,900	8.7	5,616,000	1,914,989,220	17.2	5,878
3/20/2003	24	3,900	8.7	5,616,000	1,920,605,220	17.2	5,895

Water Discharged to Electric Lake

Storage capacity of Electric Lake = 31,500 ac-ft

JC-1 / JC-2 Operation

Day	Hrs	GPM	CFS	Daily Gallons	Cumulative Gallons	Daily Acre-Feet	Cumulative Acre-Feet
3/21/2003	24	3,900	8.7	5,616,000	1,926,221,220	17.2	5,912
3/22/2003	24	3,900	8.7	5,616,000	1,931,837,220	17.2	5,929
3/23/2003	24	3,900	8.7	5,616,000	1,937,453,220	17.2	5,947
3/24/2003	21	3,900	8.7	4,914,000	1,942,367,220	15.1	5,962
3/25/2003	24	3,900	8.7	5,616,000	1,947,983,220	17.2	5,979
3/26/2003	24	3,900	8.7	5,616,000	1,953,599,220	17.2	5,996
3/27/2003	24	3,900	8.7	5,616,000	1,959,215,220	17.2	6,013
3/28/2003	24	3,900	8.7	5,616,000	1,964,831,220	17.2	6,031
3/29/2003	24	3,900	8.7	5,616,000	1,970,447,220	17.2	6,048
3/30/2003	24	3,900	8.7	5,616,000	1,976,063,220	17.2	6,065
3/31/2003	24	3,900	8.7	5,616,000	1,981,679,220	17.2	6,082

		Scofield Reservoir Storage Capacity 73,600 ac-ft					Electric Lake Storage Capacity 31,500 ac-ft						
		ECCLES CREEK					**ELECTRIC LAKE**					**Discharge to Both Drainages**	
		Discharge to Eccles			Cumulative		Discharge to Electric Lake			Cumulative		Cumulative	
Month	Days	GPM	CFS	MGD	Gallons	Ac-Ft	GPM	CFS	MGD	Gallons	Ac-Ft	Gallons	Acre-Feet
Jan-99	31	340	0.8	0.49	15,190,000	47						15,190,000	47
Feb-99	28	229	0.5	0.33	24,430,000	75						24,430,000	75
Mar-99	31	465	1.0	0.67	45,200,000	139						45,200,000	139
Apr-99	30	215	0.5	0.31	54,500,000	167						54,500,000	167
May-99	31	278	0.6	0.40	66,900,000	205						66,900,000	205
Jun-99	30	188	0.4	0.27	75,000,000	230						75,000,000	230
Jul-99	31	181	0.4	0.26	83,060,000	255						83,060,000	255
Aug-99	31	229	0.5	0.33	93,290,000	286						93,290,000	286
Sep-99	30	139	0.3	0.20	99,290,000	305						99,290,000	305
Oct-99	31	243	0.5	0.35	110,140,000	338						110,140,000	338
Nov-99	30	514	1.1	0.74	132,340,000	406						132,340,000	406
Dec-99	31	90	0.2	0.13	136,370,000	419						136,370,000	419
Jan-00	31	722	1.6	1.04	168,610,000	517						168,610,000	517
Feb-00	29	681	1.5	0.98	197,030,000	605						197,030,000	605
Mar-00	31	993	2.2	1.43	241,360,000	741						241,360,000	741
Apr-00	30	1,354	3.0	1.95	299,860,000	920						299,860,000	920
May-00	31	1,181	2.6	1.70	352,560,000	1,082						352,560,000	1,082
Jun-00	30	1,000	2.2	1.44	395,760,000	1,215						395,760,000	1,215
Jul-00	31	1,236	2.8	1.78	450,940,000	1,384						450,940,000	1,384
Aug-00	31	993	2.2	1.43	495,270,000	1,520						495,270,000	1,520
Sep-00	30	1,361	3.0	1.96	554,070,000	1,700						554,070,000	1,700
Oct-00	31	2,354	5.2	3.39	659,160,000	2,023						659,160,000	2,023
Nov-00	30	1,688	3.8	2.43	732,060,000	2,247						732,060,000	2,247
Dec-00	31	2,201	4.9	3.17	830,330,000	2,548						830,330,000	2,548
Jan-01	31	2,569	5.7	3.70	945,030,000	2,900						945,030,000	2,900
Feb-01	28	2,500	5.6	3.60	1,045,830,000	3,210						1,045,830,000	3,210
Mar-01	31	3,542	7.9	5.10	1,203,930,000	3,695						1,203,930,000	3,695
Apr-01	30	4,028	9.0	5.80	1,377,930,000	4,229						1,377,930,000	4,229
May-01	31	3,542	7.9	5.10	1,536,030,000	4,714						1,536,030,000	4,714
Jun-01	30	2,986	6.7	4.30	1,665,030,000	5,110						1,665,030,000	5,110
Jul-01	31	4,514	10.1	6.50	1,866,530,000	5,728						1,866,530,000	5,728
Aug-01	31	4,514	10.1	6.50	2,068,030,000	6,347						2,068,030,000	6,347
Sep-01	30	7,795	17.4	11.23	2,404,786,960	7,380	969	2.2	1.40	41,860,500	128	2,446,647,460	7,508
Oct-01	31	9,000	20.1	12.96	2,806,546,960	8,613	2,136	4.8	3.08	137,198,100	421	2,943,745,060	9,034
Nov-01	30	8,907	19.8	12.83	3,191,314,960	9,794	1,509	3.4	2.17	202,406,100	621	3,393,721,060	10,415
Dec-01	31	7,911	17.6	11.39	3,544,460,560	10,878	1,270	2.8	1.83	259,106,100	795	3,803,566,660	11,673

		Scofield Reservoir Storage Capacity 73,600 ac-ft					Electric Lake Storage Capacity 31,500 ac-ft						
		ECCLES CREEK					**ELECTRIC LAKE**					**Discharge to Both Drainages**	
		Discharge to Eccles			Cumulative		Discharge to Electric Lake			Cumulative		Cumulative	
Month	Days	GPM	CFS	MGD	Gallons	Ac-Ft	GPM	CFS	MGD	Gallons	Ac-Ft	Gallons	Acre-Feet
Jan-02	31	7,297	16.3	10.51	3,870,198,640	11,877	2,250	5.0	3.24	359,546,100	1,103	4,229,744,740	12,981
Feb-02	28	7,012	15.6	10.10	4,152,926,800	12,745	2,250	5.0	3.24	450,266,100	1,382	4,603,192,900	14,127
Mar-02	31	7,196	16.0	10.36	4,474,142,800	13,731	2,044	4.6	2.94	541,526,100	1,662	5,015,668,900	15,393
Apr-02	30	8,200	18.3	11.81	4,828,382,800	14,818	2,250	5.0	3.24	638,726,100	1,960	5,467,108,900	16,778
May-02	31	7,740	17.2	11.15	5,173,896,400	15,878	2,145	4.8	3.09	734,468,100	2,254	5,908,364,500	18,132
Jun-02	30	8,188	18.2	11.79	5,527,605,040	16,964	2,080	4.6	3.00	824,324,100	2,530	6,351,929,140	19,493
Jul-02	31	8,927	19.9	12.85	5,926,103,440	18,187	2,080	4.6	3.00	917,175,300	2,815	6,843,278,740	21,001
Aug-02	31	8,773	19.5	12.63	6,317,748,880	19,388	1,183	2.6	1.70	970,001,220	2,977	7,287,750,100	22,365
Sep-02	30	9,282	20.7	13.37	6,718,735,600	20,619	2,100	4.7	3.02	1,060,721,220	3,255	7,779,456,820	23,874
Oct-02	31	7,023	15.6	10.11	7,032,262,480	21,581	2,382	5.3	3.43	1,167,065,220	3,582	8,199,327,700	25,163
Nov-02	30	9,846	21.9	14.18	7,457,606,800	22,887	2,540	5.7	3.66	1,276,781,220	3,918	8,734,388,020	26,805
Dec-02	31	9,652	21.5	13.90	7,888,459,120	24,209	4,100	9.1	5.90	1,459,805,220	4,480	9,348,264,340	28,689
Jan-03	31	9,231	20.6	13.29	8,300,520,880	25,473	4,100	9.1	5.90	1,642,829,220	5,042	9,943,350,100	30,515
Feb-03	28	10,216	22.8	14.71	8,712,434,320	26,737	4,539	10.1	6.54	1,825,853,220	5,603	10,538,287,540	32,341
Mar-03	31	9,224	20.6	13.28	9,124,199,440	28,001	4,100	9.1	5.90	2,008,877,220	6,165	11,133,076,660	34,166

Table 1 Water levels in monitoring wells in the Skyline Mine area.

W79-26-1

Date	Depth	Elevation
8/15/1982	58.30	8963.50
7/15/1983	52.20	8969.60
8/15/1983	52.50	8969.30
9/15/1983	52.80	8969.00
10/15/1983	52.20	8969.60
6/15/1984	51.60	8970.20
8/15/1984	51.20	8970.60
6/15/1985	51.20	8970.60
7/15/1985	51.00	8970.80
8/15/1985	50.90	8970.90
9/15/1985	50.70	8971.10
6/15/1986	50.70	8971.10
8/15/1986	50.80	8971.00
10/15/1986	50.90	8970.90
6/15/1987	51.90	8969.90
8/15/1987	52.30	8969.50
10/15/1987	52.80	8969.00
7/15/1988	52.10	8969.70
10/15/1988	50.40	8971.40
8/15/1989	47.00	8974.80
10/15/1989	45.30	8976.50
6/15/1990	50.80	8971.00
8/15/1990	51.20	8970.60
10/15/1990	51.00	8970.80
6/15/1991	52.80	8969.00
9/15/1991	52.10	8969.70
10/15/1991	52.80	8969.00
6/15/1992	52.80	8969.00
9/15/1992	54.40	8967.40
10/15/1992	57.50	8964.30
6/15/1993	58.20	8963.60
9/15/1993	59.80	8962.00
10/15/1993	61.60	8960.20
6/15/1994	67.80	8954.00
9/15/1994	68.60	8953.20
10/15/1994	68.50	8953.30
7/15/1995	67.90	8953.90
9/5/1995	68.50	8953.30
11/15/1995	68.70	8953.10
6/15/1996	69.00	8952.80
6/19/1997	118.50	8903.30
8/13/1997	118.44	8903.36
10/12/1997	118.44	8903.36
6/15/1998	70.30	8951.50
8/13/1998	71.00	8950.80
10/17/1998	118.90	8902.90
7/5/1999	71.90	8949.90
9/19/1999	81.20	8940.60
10/6/1999	91.80	8930.00
6/20/2000	131.70	8890.10
8/7/2000	129.00	8892.80
10/9/2000	136.70	8885.10
6/19/2001	89.00	8932.80
9/3/2001	93.10	8928.70
10/25/2001	95.50	8926.30
6/19/2002	97.60	8924.20
9/15/2002	99.78	8922.02
11/14/2002	100.02	8921.78

W79-35-1A

Date	Depth	Elevation
7/15/1982	177.50	8551.40
8/15/1982	179.00	8549.90
7/15/1983	171.50	8557.40
8/15/1983	171.70	8557.20
9/15/1983	171.20	8557.70
10/15/1983	172.40	8556.50
6/15/1984	182.20	8546.70
8/15/1984	183.70	8545.20
6/15/1985	188.30	8540.60
7/15/1985	187.20	8541.70
8/15/1985	186.20	8542.70
9/15/1985	186.70	8542.20
6/15/1986	193.70	8535.20
8/15/1986	190.70	8538.20
10/15/1986	192.20	8536.70
6/15/1987	204.80	8524.10
8/15/1987	203.60	8525.30
10/15/1987	205.40	8523.50
7/15/1988	206.20	8522.70
10/15/1988	205.30	8523.60
8/15/1989	207.60	8521.30
10/15/1989	214.60	8514.30
6/15/1990	222.90	8506.00
8/15/1990	214.70	8514.20
10/15/1990	221.20	8507.70
6/15/1991	223.40	8505.50
9/15/1991	228.00	8500.90
10/15/1991	229.40	8499.50
6/15/1992	236.50	8492.40
9/15/1992	238.20	8490.70
10/15/1992	243.30	8485.60
6/15/1993	246.70	8482.20
9/15/1993	239.90	8489.00
10/15/1993	237.20	8491.70
6/15/1994	239.70	8489.20
9/15/1994	241.50	8487.40
10/15/1994	244.70	8484.20
7/15/1995	230.20	8498.70
9/5/1995	232.40	8496.50
11/15/1995	235.20	8493.70
6/19/1997	244.20	8484.70
8/15/1997	238.50	8490.40
10/9/1997	237.70	8491.20
6/15/1998	245.40	8483.50
8/13/1998	240.70	8488.20
10/17/1998	239.00	8489.90
7/5/1999	312.20	8416.70
8/19/1999	317.30	8411.60
10/6/1999	322.30	8406.60
6/20/2000	317.30	8411.60
8/7/2000	363.00	8365.90
10/9/2000	374.00	8354.90
6/19/2001	484.90	8244.00
9/3/2001	493.30	8235.60
10/25/2001	505.5	8223.4
4/15/2002	528.75	8200.15
6/19/2002	533.71	8195.19
9/2/2002	535.9	8193
11/14/2002	538.97	8189.93
3/10/2003	554.45	8174.45

W79-35-1B

Date	Depth	Elevation
7/15/1982	154.70	8572.20
8/15/1982	150.40	8576.50
7/15/1983	141.70	8585.20
8/15/1983	139.60	8587.30
9/15/1983	136.80	8590.10
10/15/1983	135.90	8591.00
6/15/1984	147.40	8579.50
8/15/1984	143.80	8583.10
6/15/1985	140.10	8586.80
7/15/1985	139.10	8587.80
8/15/1985	137.10	8589.80
9/15/1985	137.30	8589.60
6/15/1986	142.30	8584.60
8/15/1986	142.40	8584.50
10/15/1986	139.70	8587.20
6/15/1987	145.60	8581.30
8/15/1987	144.30	8582.60
10/15/1987	143.80	8583.10
7/15/1988	139.80	8587.10
10/15/1988	135.40	8591.50
8/15/1989	141.80	8585.10
10/15/1989	142.60	8584.30
6/15/1990	141.80	8585.10
8/15/1990	157.50	8569.40
10/15/1990	163.00	8563.90
6/15/1991	158.80	8568.10
9/15/1991	151.60	8575.30
10/15/1991	151.00	8575.90
6/15/1992	155.30	8571.60
9/15/1992	159.00	8567.90
10/15/1992	161.90	8565.00
6/15/1993	169.60	8557.30
9/15/1993	168.50	8558.40
10/15/1993	166.40	8560.50
6/15/1994	176.10	8550.80
9/15/1994	177.80	8549.10
10/15/1994	178.20	8548.70
7/15/1995	170.60	8556.30
9/5/1995	171.10	8555.80
11/15/1995	179.00	8547.90
6/15/1996	173.00	8553.90
6/19/1997	170.10	8556.80
8/15/1997	169.80	8557.10
10/9/1997	169.40	8557.50
6/15/1998	169.60	8557.30
8/13/1998	169.60	8557.30
10/17/1998	169.00	8557.90
7/5/1999	169.40	8557.50
8/19/1999	169.10	8557.80
10/6/1999	169.90	8557.00
6/20/2000	169.10	8557.80
8/7/2000	170.00	8556.90
10/9/2000	169.50	8557.40
6/19/2001	171.80	8555.10
9/3/2001	170.90	8556.00
10/25/2001	170.70	8556.20
4/15/2002	169.75	8557.15
6/19/2002	171.25	8555.65
9/2/2002	171.73	8555.17
11/14/2002	171.05	8555.85
1/16/2003	172.11	8554.79
2/1/2003	173.81	8553.09
3/9/2002	176.91	8549.99

W79-10-1

Date	Depth	Elevation
6/15/1996	480.30	8902.50
9/11/1996	482.19	8900.61
6/23/1997	477.20	8905.60
8/15/1997	480.70	8902.10
10/9/1997	491.10	8891.70
6/22/1998	476.30	8906.50
8/22/1998	476.20	8906.60
10/17/1998	476.00	8906.80
6/29/1999	475.30	8907.50
8/17/1999	475.10	8907.70
8/7/2000	473.70	8909.10
10/2/2000	472.80	8910.00
6/18/2001	470.7	8912.1
9/3/2001	359.7	9023.1
10/23/2001	357.1	9025.7
6/17/2002	348.2	9034.6
9/2/2002	366.7	9016.1
10/16/2002	370.95	9011.85

W79-14-2A

Date	Depth	Elevation
9/5/1995	78.70	8973.00
6/15/1996	76.90	8974.80
9/12/1996	75.66	8976.04
6/27/1997	59.06	8992.64
8/15/1997	71.90	8979.80
10/12/1997	77.30	8974.40
6/22/1998	58.20	8993.50
8/22/1998	86.40	8965.30
10/17/1998	85.90	8965.80
7/6/1999	84.70	8967.00
8/19/1999	84.30	8967.40
10/12/1999	88.60	8963.10
6/27/2000	86.20	8965.50
8/8/2000	86.90	8964.80
10/2/2000	87	8964.7
6/18/2001	85.3	8966.4
9/5/2001	85.9	8965.8
10/8/2001	87.5	8964.2
6/18/2002	86.5	8965.2
9/9/2002	86.5	8965.2
11/5/2002	87.6	8964.1

99-21-1

Date	Depth	Elevation
12/9/1999	926.50	8419.50
6/26/2000	927.00	8419.00
1/29/2001	990.00	8356.00
6/18/2001	990.7	8355.3
9/3/2001	996.8	8349.2
10/8/2001	996.1	8349.9
4/15/2002	1005.79	8340.21
6/12/2002	1010.3	8335.7
9/24/2002	1026.74	8319.26
11/14/2002	1029.04	8316.96

99-28-1

Date	Depth	Elevation
12/9/1999	841.00	8510.00
6/26/2000	843.70	8507.30
11/8/2000	860.10	8490.90
1/29/2001	899	8452
6/18/2001	902.3	8448.7
9/3/2001	908.7	8442.3
10/8/2001	911.7	8439.3
6/12/2002	926.25	8424.75
9/24/2002	973.7	8377.3
11/5/2002	978.73	8372.27

20-4-1

Date	Depth	Elevation
1/29/2001	315.00	8559.00
6/18/2001	317.4	8556.6
9/3/2001	326.33	8547.67
10/8/2001	332.1	8541.9
1/3/2002	346.5	8527.5
6/12/2002	370.5	8503.5
9/10/2002	383.27	8490.73
11/5/2002	389.75	8484.25

20-4-2

Date	Depth	Elevation
1/29/2001	1022.00	8532.00
6/18/2001	1026.5	8527.5
9/3/2001	1040	8514
10/8/2001	1056.9	8497.1
4/16/2002	1101.5	8452.54
6/13/2002	1111	8443.05
9/27/2002	1133.5	8420.53
10/16/2002	1134	8420

W2-1

Date	Depth	Elevation
12/3/1999	720.00	8551.40
6/26/2000	722.20	8549.20
11/8/2000	756.20	8515.20
6/18/2001	768.90	8502.50
9/5/2001	800.1	8471.3
9/10/2001	808.4	8463
9/14/2001	807.7	8463.7
9/20/2001	819.4	8452
10/23/2001	837.5	8433.9
6/19/2002	893.55	8377.85
9/2/2002	907.02	8364.38
11/5/2002	910.83	8360.57

Site	Date	δ^2H (‰)	$\delta^{18}O$ (‰)	$\delta^{34}S$ (‰)	$\delta^{13}C$ (‰)	^{14}C (pmC)	Tritium (TU)	Mean residence time
M1-WM-E2-XC44	5/8/1996						0.28	
Skyline Mine Fault inflows								
14LHGE1C35 Roof	3/22/1999	-133.77	-17.91	+20.25	-10.3	10.85	-0.01	13300
14LHGE1C35 Floor	3/22/1999	-130.88	-17.87	+18.9	-9.7	9.63	0.11	14400
14LHGE1C37 Rib Water	4/12/1999	-132.28	-17.75	+18.6	-9.9	6.91	0.02	16700
5LTGE1C39	12/17/1998			+20.6	-9.8	19.05	-0.06	8000
M1SSM E1 C102	12/17/1998			+14.3	-10.6	13.26	0.06	11000
16LE2XC11.5	12/15/1999	-125.52	-18.09		-10.7	17.25	0.12	9500
14LE1XC36	12/15/1999	-122.87	-18.03		-10.1	17.66	0.02	9200
14LHGE1C23 RD	3/22/1999	-130.95	-17.45					
WME2C73 RD	3/22/1999	-136.7	-18.02					
14LHGE1C35	9/22/2000				-10.2	12.98	-0.02	11500
E6XC22 West Submains	9/22/2000				-10.3	21.15	0	7400
16LXC12	4/18/2001				-9.9	16.02	-0.02	9250
14LE1XC36	4/18/2001				-10.3	18.65	0.12	8500
9LE3XC40 Borehole	4/19/2001				-11.2	23.53	0.06	7250
Diagonal Submains E3XC12	4/19/2001				-10.3	23.98	0.05	6250
8LE3XC62 Borehole	4/18/2001				-11.9	29.11	0.78	6000
8L Bleeder XC51 Borehole	4/18/2001				-12.3	13.66	0.51	12500
8LE2XC62 Borehole (uncased)	4/18/2001				-11.9	8.15	0.06	16500
Diagonal Fault	4/10/2002	-131.32	-17.88		-10.3	11.91	0.01	12100
11L Headgate E1 XC62	4/10/2002	-129.54	-17.54		-10.5	25.57	0.31	5900
East Submains E3 XC14 Fault	4/10/2002	-129.32	-17.59		-10.3	17.36	0.88	9000
11L Headgate E1 XC39 Fault	4/10/2002	-132.14	-17.85		-10.9	2.29	0.01	25800
11L Headgate XC54	4/25/2002	-131.43	-17.72		-10.1	7.26	0.06	16300
11th Left Longwall Face	10/5/2002				-10.2	11.18	0.23	12,750
11 Left Tailgate Bleeder Roof Drip					-10.8	29.12	0.69	
11 Left Tailgate Bleeder Roof Drip					-10.7	26.15	0.71	
12 Left A Borehole #2 of 5					-10.8	10.97	0.13	
12 Left A Borehole #2 of 5					-10.3	8.23	0.15	
9L Borehole XC59	4/10/2002	-130.45	-17.56		-10.4	16.91	0.16	9300
9L Horizontal Borehole	7/2/2002	-129.98	-17.53		-10.1	15.6	0.17	9700
9L Horizontal Borehole	8/15/2002						0.86	
9L Horizontal Borehole	8/28/2002	-129.16	-17.6				0.8	
9L Horizontal Borehole	9/23/2002						0.24	
9L Horizontal Borehole	9/28/2002						0.3	
East Submains E1 XC5 Fault	4/10/2002	-130.6	-17.62		-10.7	15.17	0.01	10200
East Submains E1 XC5 Fault	8/1/2002	-130.26	-17.76				0.09	
East Submains E1 XC5 Fault	8/15/2002						0.08	
East Submains E1 XC5 Fault	8/28/2002	-130.21	-17.43				0.07	
East Submains E1 XC5 Fault	9/23/2002						0.17	
East Submains E1 XC5 Fault	9/28/2002				-10	6.28	0.11	17500
East Submains E1 XC5 Fault	12/13/2002				-10.7	16.73		
East Submains E1 XC5 Fault	2/13/2003				-10.4	14.88	0.16	
10L Sump	7/2/2002	-128.03	-17.26		-10.4	24.2	1.31	6300
10L Sump	7/16/2002	-127.81	-17.24				1.19	
10L Sump (alternate)	8/1/2002	-128.65	-17.33				1.16	
10L Sump	8/15/2002						1.18	
10L Sump	8/28/2002	-128.64	-17.55				1.17	
10L Sump (alternate)	9/13/2002						1.18	
10L Sump	9/23/2002						1.46	
10L Entry 1	9/28/2002				-10.4	21.78	1.39	
Mine Dewatering Wells								
JC-1	9/25/2001	-128.4	-17.4		-11.8	30.4	0.2	
JC-1	9/26/2001	-128.41	-17.5		-11.8	30.42	0.24	4600
JC-1	10/3/2001	-129	-17.8				0.2	
JC-1	5/24/2002						1.04	
JC-1	5/24/2002						1.00	
JC-1	6/4/2002						0.96	
JC-1	6/19/2002						1.11	
JC-1	6/28/2002						1.18	
JC-1	7/16/2002	-127.91	-17.3				1.00	
JC-1	8/1/2002	-127.96	-17.15				1.05	
JC-1	9/13/2002						1.25	
JC-1	9/24/2002						1.5	
JC-1	9/28/2002						1.43	
JC-1	10/14/2002						1.82	
JC-1	10/14/2002						2.22	
JC-1	10/14/2002						1.55	
JC-1	10/15/2002						1.71	
JC-1	10/17/2002						1.76	
JC-1	10/21/2002						1.44	
JC-1	10/29/2002						2.06	
JC-1	12/6/2002						1.87	
JC-1 (pipe outlet @ Huntington Ck)	12/20/2002						1.94	
JC-1	1/7/2002				-11	27.58	1.83	
JC-1 (pipe outlet @ Huntington Ck)	1/14/2002						1.77	
JC-1	1/31/2002						1.8	
JC-1	2/15/2002						Pending	
JC-1	2/28/2002						1.71	
Electric Lake								
Upper Electric Lake	9/26/2001	-119.19	-16.07		-8.3	72.44	12.6	modern
Upper Electric Lake (with coal)	9/26/2001	-120.36	-15.92		-8.7	82.44		modern
E. Lake-1 Mid Lake	5/24/2002						7.67	
E.Lake-2 North End	5/24/2002						8.52	
North End Shallow Elect.	7/11/2002						8.66	
North End Shallow Elect.	7/26/2002							
North End Deep Elect.	7/11/2002						8.66	
South End Shallow Elect.	7/11/2002						8.69	
South End Shallow Elect.	7/26/2002							
South End Deep Elect.	7/11/2002						8.89	
Electric Lake at outlet	9/26/2001	-110	-14.43					
EL-1	9/25/2001	-119.2	-16.1		-8.3	72.4	13	
EL-B-5	10/2/2001	-109	-14.8					
EL-C-55	10/2/2001	-109	-14.8		-9.2	82.2	12	

* Likely analytical error, samples analyzed using less accurate direct counting technique, verified on subsequent resampling at 3-07D

Table 2 Isotopic compositions of groundwaters and surface waters in the Skyline Mine area.

Site	Date	δ^2H (‰)	$\delta^{18}O$ (‰)	$\delta^{34}S$ (‰)	$\delta^{13}C$ (‰)	^{14}C (pmC)	Tritium (TU)	Mean residence time
Creeks								
CS-9	10/17/1995						21.8	
CS-10	5/22/1996						15.8	
C-1	10/1/1997	-124.37	-16.28					
C-1	7/1/1998	-124.94	-16.31					
C-2	10/1/1997	-16.06	-123.8					
C-2	7/1/1998	-119.38	-15.76					
C-3	10/1/1997	-16.73	-127.22					
C-3	7/1/1998	-124.99	-16.52					
C-4	10/1/1997	-16.17	-124.05					
C-4	7/1/1998	-124.32	-16.19					
C-5	10/1/1997	-16.47	-124.13					
C-5	7/1/1998	-122.77	-16.12					
Springs, Flat Canyon Tract								
2-413	10/8/1997	-128.79	-17.31		-13.8	95.71	14.9	modern
2-413	7/22/1998	-129.94	-16.98		-12.4	91.68	15	modern
7-242	10/9/1997	-120.81	-16.28		-13.1	73.52	10.5	modern
7-242	7/1/1998	-122.86	-16.46					
29-138	10/8/1997	-127.06	-16.85		-12.3	88.58	12.9	modern
29-138	7/21/1998	-125.02	-16.25		-13.5	90.96	14	modern
8-253	10/9/1997	-129.7	-17.31		-16.0	84.39	29.7	modern
8-253	7/21/1998	-133.51	-17.32		-16.1	79.06	30	modern
32-279	10/9/1997	-127.42	-17.23		-12.3	68.62	14	modern
32-279	7/21/1998	-125.03	-16.86		-12.5	71.67	15	modern
MST-3	9/11/1997	-127.6	-17.03				13.1	modern
MST-3	7/21/1998	-125.61	-16.25		-12.1	71.35	10.3	modern
MSS-1	10/1/1997	-128.7	-17.08					
MST-1	10/1/1997	-125.87	-16.71					
MST-1	7/1/1998	-124.13	-16.24					
MST-2	10/1/1997	-128.82	-17.18					
MST-2	7/1/1998	-125.33	-16.36					
19-175	10/1/1997	-131.33	-17.55					
19-175	7/1/1998	-130.21	-17.11					
21-222	10/1/1997	-126.24	-16.91					
21-222	7/1/1998	-128.24	-16.82					
28-110	10/1/1997	-127.17	-16.92					
28-110	7/1/1998	-128.78	-17.13					
29-133	10/1/1997	-128.04	-17.07					
29-133	7/1/1998	-124.32	-16.53					
3-290	10/1/1997	-130.31	-17.25					
3-290	7/1/1998	-128.56	-16.82					
31-181	10/1/1997	-126.66	-16.99					
32-183	10/1/1997	-127.65	-16.88					
32-183	7/1/1998	-125.25	-16.46					
32-276	10/1/1997	-125.8	-16.99					
32-277	10/1/1997	-124.03	-16.84					
32-277	7/1/1998	-127.41	-16.61					
33-268	10/1/1997	-129.24	-17.31					
33-271	10/1/1997	-128.49	-17.18					
33-271	7/1/1998	-125.19	-16.53					
33-273	10/1/1997	-129.28	-17.49					
33-273	7/1/1998	-126.51	-17.16					
4-173	10/1/1997	-131.37	-17.53					
4-173	7/1/1998	-125.84	-16.99					
4-429	10/1/1997	-126.13	-16.99					
5-231	10/1/1997	-124.35	-17.01					
5-231	7/1/1998	-126.69	-16.71					
5-238	10/1/1997	-123.75	-16.75					
Springs, Winter Quarters Area								
WQ1-39	6/6/1996			+12.1	-15.0		12	
WQ2-15	6/5/1996			+8.5	-12.45			
WQ3-6	6/5/1996			+5.7	-12.4	87.36	13.9	modern
WQ3-26	6/5/1996			+8.1	-14.6	107.14	11.1	modern
WQ3-41	6/6/1996			+13.5	-12.0	100.4	18.4	modern
WQ3-43	6/6/1996			+10.4	-12.7		15.1	
WQ4-12	6/5/1996			+11.3	-13.7	82.78	10.6	modern
Springs, Existing Permit Area								
S13-2	10/17/1995			+10.4	-12.0	80.12	18.8	modern
S14-4	10/17/1995			+14.75	-13.1			
S15-3	10/18/1995			+16.5	-13.2	62.4	17.1	modern
S22-11	10/18/1995			+5.1	-13.3	75.49	21.6	modern
S22-5	10/18/1995			+10.6	-12.1			
S26-13	10/17/1995			+8.9				
S34-12	10/18/1995			+9.1	-13.0	78.26	20.4	modern
S35-8	10/18/1995			+12.9	-10.8			
S36-12	10/17/1995			+10.6	-13.3	85.16	18.1	modern
Fault Related Systems								
S17-2	10/17/1995			-1.5	-10.5	39.56	1.61	3,000 mixed w/modern
S17-2	5/22/1996						1.73	
Green Canyon Spring	7/23/1996			-0.7	-12.5	18.29	0.21	9500
Alpine Well	7/23/1996			+12.7	-14.7	7.06	-0.02	17000
G-37	7/23/1996			+19.45	-12.3	20.99	0.05	8500
Skyline Mine Blackhawk Formation perched Groundwater Systems								
1-01D	10/6/1993			6.7	-8.4			
1-02D	10/6/1993			6.2	-2.1			
1-05D	5/8/1996						0.3	
1-11D	10/6/1993			17.2	-10.3			
1-12D	10/6/1993			16.6	-9.4			
1-14D	5/8/1996			13.9	-8.7	21.4	0	
1-01S	10/6/1993				-13.8	5.6	0	
1-02S	10/6/1993			19.3	-11.1			
3-01D	10/6/1993			8.9	-8.6			
3-04D	10/6/1993				-9.5			
3-05D	10/6/1993				-1.5			
3-06D	10/6/1993				-7.3			
3-07D	10/6/1993			19.4	-10.8	14.1	6.7	
3-07D	5/8/1996						0.1	
3-08D	5/8/1996			14.8	-10.9	41.5	0.3	
3-02S	10/6/1993			16.8	-10			
Roof Drip 1-03D	10/6/1993			+16.35	-10.7	15.4	5.6*	10500
Roof Drip 1-05D	5/8/1996						0.28	
M1-9L-E1-XC31.5 (Roof Drip 1-14D)	5/8/1996			+13.9	-8.7	21.36	0.16	7500
M1-9L-E2-XC23.5 (Roof Drip 1-15D)	5/8/1996			+15.5	-10.3	28.65	0.16	5500
Floor Water 1-01S	10/6/1993				-13.8	5.6	0	18500
Roof Drip 3-07D	10/6/1993			+19.4	-10.8	14.1	6.7*	10500
M3-WM-E1-XC85.5 (Roof Drip 3-07D)	5/8/1996						0.12	
M3-1L-TG_XC27 (Roof Drip 3-08D)	5/8/1996			+14.8	-10.9	41.5	0.26	2500

GEOCHRON LABORATORIES

a division of Krueger Enterprises, Inc.

711 Concord Avenue ✦ Cambridge, Massachusetts 02138-1002 ✦ USA
t (617) 876-3691 *f* (617) 661-0148 www.geochronlabs.com

RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-30057**	Date Received:	02/06/2003
Your Reference:	Chris Hansen, Canyon Fuel Company	Date Reported:	02/25/2003
Submitted by:	Mr. Erik C. Petersen Petersen Hydrologic 2695 N. 600 E. Lehi, Utah 84043		

Sample Name: **11 Left Tailgate Bleeder 1 Notch 13 Dec 2002**

AGE = **29.12 ± 1.82 % of the modern (1950) ^{14}C activity**

Description: Sample of barium carbonate

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. ^{13}C analysis was made from a small portion of the same evolved gas.

Comments:

$\delta^{13}C_{PDB}$ = **-10.8 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

GEOCHRON LABORATORIES
a division of Krueger Enterprises, Inc.

711 Concord Avenue ✦ Cambridge, Massachusetts 02138-1002 ✦ USA
t (617) 876-3691 *f* (617) 661-0148 www.geochronlabs.com

RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-30056**	Date Received:	02/06/2003
Your Reference:	Chris Hansen, Canyon Fuel Company	Date Reported:	02/25/2003

Submitted by: Mr. Erik C. Petersen
Petersen Hydrologic
2695 N. 600 E.
Lehi, Utah 84043

Sample Name: **East Submains E1 XC5 13 Dec 2002**

AGE = **16.73 ± 1.70 % of the modern (1950) ^{14}C activity**

Description: Sample of barium carbonate

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. ^{13}C analysis was made from a small portion of the same evolved gas.

Comments:

$\delta^{13}C_{PDB}$ = **-10.7 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

GEOCHRON LABORATORIES

a division of Krueger Enterprises, Inc.

711 Concord Avenue ✦ Cambridge, Massachusetts 02138-1002 ✦ USA
t (617) 876-3691 *f* (617) 661-0148 www.geochronlabs.com

RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-30055**	Date Received:	02/06/2003
Your Reference:	Chris Hansen, Canyon Fuel Company	Date Reported:	02/25/2003

Submitted by: Mr. Erik C. Petersen
Petersen Hydrologic
2695 N. 600 E.
Lehi, Utah 84043

Sample Name: **12 Left A Borehole 13 Dec 2002**

AGE = **10.97 ± 1.64 % of the modern (1950) ^{14}C activity**

Description: Sample of barium carbonate

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. ^{13}C analysis was made from a small portion of the same evolved gas.

Comments:

$\delta^{13}C_{PDB}$ = **-10.8 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

GEOCHRON LABORATORIES

a division of Krueger Enterprises, Inc.

711 Concord Avenue ✦ Cambridge, Massachusetts 02138-1002 ✦ USA
t (617) 876-3691 *f* (617) 661-0148 www.geochronlabs.com

RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-30054**	Date Received:	02/06/2003
Your Reference:	Chris Hansen, Canyon Fuel Company	Date Reported:	02/25/2003

Submitted by: Mr. Erik C. Petersen
Petersen Hydrologic
2695 N. 600 E.
Lehi, Utah 84043

Sample Name: **JC-1 Outlet at Huntington Creek 7 Jan 2003**

AGE = **27.58 ± 1.87 % of the modern (1950) ^{14}C activity**

Description: Sample of barium carbonate

Pretreatment: The barium salt precipitate was rapidly vacuum filtered and immediately hydrolyzed, under vacuum, to recover carbon dioxide from the barium carbonates for the analysis. ^{13}C analysis was made from a small portion of the same evolved gas.

Comments:

$\delta^{13}C_{PDB}$ = **-11.0 ‰**

Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

Client: PETERSON HYDROLOGIC-UTAH POWER
Recvd : 03/01/17
Job# : 1708
Final : 03/02/16

Purchase Order: 3000015409
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.; Lehi, UT 84043
Results to Petersen -(UTAH POWER)

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN- JC-1	1708.01	030114	1000	255	1.77	0.09
PETERSEN-JC-1 OUT HUNT. CREEK	1708.02	021220	1000	274	1.94	0.09
PETERSEN-JC-1 OUT HUNT. CREEK	1708.03	030107	1000	275	1.85 r	0.14

r: RERUN in progress

Client: PETERSON HYDROLOGIC-UTAH POWER
Recvd : 02/12/16
Job# : 1699
Final : 03/02/16

Purchase Order: 3000015409
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.; Lehi, UT 84043
Results to Petersen -(UTAH POWER)

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
UTAH POWER-JC-1 14	1699.01	021002	1000	275	2.22	0.10
UTAH POWER-JC-1 21	1699.02	021021	1000	275	1.44*	0.09
UTAH POWER-JC-1 29	1699.03	021029	1000	275	2.06	0.09
UTAH POWER-JC-1 05	1699.04	021202	1000	275	1.87	0.09

* Average of duplicate runs

Client: PETERSEN HYDROLOGIC-SKYLINE
Recvd : 03/03/05
Job# : 1728
Final : 03/03/25 SKYLINE MINE FAULT INVESTIGATION 2003

Purchase Order: Bill to: C. Hansen
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.
Lehi, UT 84043

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN-JC-1		1728.01	030228	1000	275	1.71	0.09

Client: PETERSON HYDROLOGIC-SKYLINE
Recvd : 03/02/20
Job# : 1724
Final : 03/03/25 SKYLINE MINE

Purchase Order: Bill to: C. Hansen
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.
Lehi, UT 84043

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN-11 LEFT BLEEDER	1724.01	030213	1000	251	0.71 r	0.09
PETERSEN-E SUBMAINS E1 XC5 FLT.	1724.02	030213	1000	275	0.16*r	0.09
PETERSEN-12 LEFT A BOREHOLE 2	1724.03	030313	1000	275	0.15*r	0.09
PETERSEN-10 LEFT ENTRY 1	1724.04	020928	500	250	1.57*	0.09

* Average of duplicate runs

r RERUN in progress

Client: PETERSEN HYDROLOGIC-UTAH POWER
Recvd : 03/02/06
Job# : 1720
Final : 03/03/25 Skyline Mine

Purchase Order: 3000015409
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.; Lehi, UT 84043
Results to Petersen -(UTAH POWER)

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN-JC-1	1720.01	030131	1000	275	1.80	0.09

Client: PETERSEN HYDROLOGIC-SKYLINE
Recvd : 02/10/07
Job# : 1673
Final : 03/03/24 LABORATORY RERUNS SKYLINE MINE, 2002

Purchase Order: Bill to: C. Hansen
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.
Lehi, UT 84043

Cust LABEL INFO		JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
SKYLINE-10 Left Entry 1	ORIG	1673.01	020928	1000	275	2.14	0.09
SKYLINE-10 Left Entry 1	RERUN	1673.01	020928	1000	275	1.36	0.09
SKYLINE-10 Left Entry 1	RERUN	1673.01	020928	1000	242	1.42	0.09

The ORIGINAL value was a little high as confirmed by two separate reruns.
Please replace ORIGINAL with RERUN average of 1.39 TU.

Client: PETERSEN HYDROLOGIC-SKYLINE
Recvd : 03/01/17
Job# : 1709
Final : 03/03/24 LABORATORY RERUN SKYLINE MINE, 2002

Purchase Order: Bill to: C. Hansen
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.
Lehi, UT 84043

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN-11 L TAIL BLEEDER 1 N	1709.07	021213	1000	275	0.69*	0.09

* RERUN agreed with ORIGINAL. Above value is average of duplicate runs

Client: PETERSEN HYDROLOGIC-UTAH POWER
Recvd : 03/01/17
Job# : 1708
Final : 03/03/24 LABORATORY RERUN

Purchase Order: 3000015409
Contact: E. Petersen, 801/766-4006
2695 N. 600 E.; Lehi, UT 84043
Results to Petersen -(UTAH POWER)

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
PETERSEN-JC-1 OUT HUNT. CREEK	1708.03	030107	1000	275	1.83*	0.09

* RERUN agreed with ORIGINAL. Above value is average of duplicate runs.