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Date: 12/15/2006 12:57:11 PM
Subject: draft response.

Wayne.

Attached are draft changes made in response to your last review of the lease addition. *These pages do not include deficiencies to the PHC or Appendix 7J.* Those will be addressed by Alan Mayo in his updated report.

Also the updated archeology report is not included. I can email a copy to anybody that needs it, but I think most of them already have hard copies.

I will be dropping of hard copies of these to Dale on Monday as discussed with Joe.

Please remember, these are draft pages.

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could increase mortality and reduce reproductive success temporarily, but the effect would be temporary because of the continued survival of the breeding population in contiguous areas and to the high densities of these species.

Birds. ~~Only one species found in the vicinity of the mine permit area is on the endangered species list: The peregrine falcon is not known to nest within the permit area.~~Several sensitive species may be present. The Golden Eagle is found on escarpments in and around the permit boundary which is a USFS Management Indicator Species.

Potential impact on bird species would be escarpment failure and loss of riparian habitats. No loss of riparian habitat is expected. Escarpment failure and protection of escarpments and riparian areas inside the affected area are discussed in Appendix 5C.~~limited to the proposed new construction areas. Impacts, however, should be minor since the areas involved are small and since equivalent habitat is readily available close by~~. (See Raptor Survey UDWR -- Appendix 3-I).

~~Prior to construction of surface facilities, Co-Op will work with the UDWR in developing a mitigation plan for potential impacts to raptor nest utilization in the vicinity of Wild Horse Ridge.~~

Amphibians. The three amphibians occurring in the permit area occupy similar habitats throughout the region and are unlikely to be affected in any major way by planned activities.

Reptiles. Reptiles found in the permit area are located in many other similar habitats and their populations will not be seriously impacted by planned activities. UDWR personnel will be notified if any denning sites are discovered during mining or construction.

Aquatic Wildlife. Since there are no high quality streams in the surface operation areas, little impact to aquatic wildlife is expected. Huntington Creek, the closest high quality stream to the permit boundary, is located a considerable distance from the surface operation, 1.5 miles. This high quality fishery is protected through Co-Op's Sediment Control Structures (R645-301-742.300).

Lease Areas

In most areas above mining no substantial impact is expected due to the depth of cover.

The possible impacts to the areas of high value is the formation of subsidence cracks. If this happens it will be mitigated as described in R645-301-358.

Another area of concern is along the escarpments. The primary concern is loss of raptor nest due to escarpment failure. Other concerns are impacts to sensitive plants, sedimentation, other wildlife, and visuals. These impacts will be mitigated as described in R645-301-358. Escarpment failure and the impacts are discussed in more detail in Appendix 5C and in Section 9 (PHC) of Appendix 7J.

Mitigating Measures to be Employed to Protect Fish and Wildlife

Maximum effort will be made to minimize habitat disturbance and loss. Surface activity will be minimal. Construction will be scheduled to minimize conflict with deer and elk use periods.

The disturbed areas will be reseeded within the next growing season and the resulting seral succession will actually benefit deer and elk. Habitat loss due to construction in limited to the size of the disturbed area and will be small. All water in the permit area is perennial, but of poor quality. Any water sources necessary to wildlife will be provided. in addition, riparian habitat will be enhanced. Structures that pose a barrier of hazard will be provided with passageways, buffers, fences, or other necessary protection, as directed by UDWR (Appendix 3-J). Co-Op is committed to reclaim all disturbed land and remove all support facilities in accordance with R645-301-540 upon completion of mining to prevent damage to fish, wildlife and related environmental values.

The applicant will inform employees of the vulnerability of local wildlife and will admonish them to avoid all harassment or unnecessary activity. In addition the training film offered by the UDWR "Coal Mining and Wildlife" will be shown annually to all employees.

In addition, Co-Op has agreed that in the event that escarpment failure due to subsidence impacts any raptor nests within the permit area, that Co-Op will notify UDWR and the U.S. Fish and Wildlife Service and take whatever action is recommended in order to mitigate such loss. ~~At this time no raptor nest are at risk due to their absence from all areas of potential impact. Raptor nests will be safeguarded from subsidence by maintaining a min of a 100' barrier to the outcrop.~~

C. W. Mining will develop a raptor mitigation by July 1, 2007 for all areas where nest may potentially be impacted. Based on preliminary meetings the plan will be as follows. By July 1, 2007 site specific evaluations will be done by qualified personnel and several mitigation methods will be developed for each site based on various timing and mining scenarios. One year prior to undermining a specific nest an application for a take permit will be submitted outlining the various mitigation methods that have been previously determined. Three months prior to undermining the nest, at which time the exact timing and methods will be know, the specific mitigation that correlates to the timing and method will be selected and implemented. All regulating and concerned agency will be involved at each step.

UDWR authorities will be consulted, in the event a need for pesticides becomes necessary to control rodents or insects during reclamation. No control measures will be used without prior approval by all parties concerned.

In order to mitigate a possible impact to a red tail hawk nest during the WHR construction DWR required C.W. Mining Company performed a Raptor prey base study in 2005. The results of this study are included in Appendix 3N.

~~will require some mitigation for the loss of Big Game Habitat and for the potential loss of raptor nesting during the construction and operation of the facilities. C. W. Mining Company is working with the Division of Wildlife Resources to develop a raptor prey base study and will complete the study in the summer of 2003 for mitigation.~~

In the event that a crack forms that interferes with any migratory paths, C.W. Mining will seal the cracks in a method acceptable to the land owner.

SUBSIDENCE CONTROL AND MONITORING PLAN

SUBSIDENCE

Subsidence can normally be expected to occur over areas where second mining has taken place ~~(pillaring)~~. See R645-301-523 for mining operation. Based on the geologic interruptions within a mine, subsidence becomes very difficult to predict, due to the variable nature of the mining panels. However, Figure 5C-1 will give an estimate of the maximum subsidence from room and pillar mining that may be expected in mine studied in the Western U.S. Maximum subsidence for an average room and pillar panel in the Bear Canyon Mine has been estimated from Figure 5C-1, using the criteria shown in Table 5C-1. For longwall panels, due to their ability to uniformly remove the coal, subsidence predictions are more accurate and there is less surface impacts. An analysis of subsidence effects from longwall mining specific to the Bear Canyon Mine reserves in the Tank seam and Hiawatha seam is included as Attachment 3. Attachment 3 mentions additional reserves, these reserves are located in the Blind Canyon. The cumulative affects of subsidence, based on Attachment 3 for the Tank and Hiawatha seams, and Attachment 1 for the Blind Canyon seam, is shown on Plate 5-3. Subsidence has been estimated based on the number of seams mined in the area and assuming the worst case scenario for mine layout and barrier pillar sizing.

For all subsidence calculations, and in determining the affected area an angle of draw of 22.5E was used. Past experience in this area shows no indication that subsidence would be this drastic, historically mines in the area have experienced an angle of draw of approximately 15E. Based on 18 years of subsidence evaluation at the Deer Creek Mine it was determined that 15E was an acceptable angle of draw. Their evaluations showed that only one area reported an angle of draw varying from <0E to 28E all other areas varied from <0E to 22E, with the <0E to 15E range being quite common. Due to the fact that the Bear Canyon mines are located across the canyon from the Deer Creek mines, and that all of the variables that exist with in the Deer Creek mines exist in the Bear Canyon mines similar results are expected. The maximum angle of draw of 25E to 30E quoted in Attachment 3 is the maximum angle of draw reported by the USBM study, for

two seam extraction between faulted areas, and is not edas being higher than average. Based on existing data from the Deer Creek mines and the Bear Canyon mines the 22.5E being used will project subsidence outside of the actual affected area, and is acceptable.

Additionally no actual subsidence has been noted from areas pillared by room and pillar method in the Bear Canyon #1 Mine as much as 40 years ago, and the subsidence monitoring network initiated in 1987, has shown only minor (0.47 ft max 1992) variations in elevation. Based on this, little, if any, detectable subsidence is expected to become apparent when mining under these depths. Some minor fracturing and an escarpment rock fall have been noted in the adjacent Trail Canyon Mine area, and although these are assumed to be mine-related, they occurred in areas of relatively low cover and unknown outcrop protection. Only minor fracturing has been noted in relation to the Bear Canyon Mine (see Plate 5-3). Based on this and on the environmental friendly design and mining methods being used, few surface fractures are anticipated. The main affect will be a uniform lowering in elevation.

Attachment 2 contains an evaluation of the escarpment stability for the Bear Canyon Mine Area. This report divided the Castlegate sandstone into 158 cells approximately 200 ft. wide. Full extraction mining has taken place under cells 104-111 and no escarpment failure was noticed. These cells were rated as stable in the report. Additionally full extraction mining has taken place under cells 21-34 and only one escarpment failure was noticed. This came from cell 32 which is rated as having a high instability factor. C. W. Mining personal only noticed one large rock fall accompanied by smaller gravel sized rocks and dust, once the initial rock hit the slope below the escarpment. All raptor nests are located in cells rated as stable except nest 920 inside cell 4 which has an instability rating of medium. Based on this, few impacts are expected to raptor nests. However a mitigation plan will be developed for all nest located inside the potential subsidence area as described on page 3-68.

Table 5C-1 Estimated Maximum Subsidence

Coal Seam	Fee and Fed Lease U-024318	Federal Lease U-024316 and U-46484	Federal Lease U-020668 and U-38727	Fee and Federal Lease U-61049	Federal Lease U-61048
BLIND CANYON SEAM					
Panel Width	600 ft.	Mining Questionable	650 ft.	Not Minable	Not Minable
Average Depth	800 ft.		1200 ft		
Width/Depth Ratio	0.75		0.54		
Seam Thickness	9 ft.		9 ft.		
Maximum Calculated Subsidence	5.4 ft.		3.2 ft.		
HIAWATHA SEAM					
Panel Width	600 ft.	Mining Questionable	Not Minable	650 ft.	650 ft.
Average Depth	860 ft.			1600 ft.	1600 ft.
Width/Depth Ratio	0.75			0.40	0.40
Seam Thickness	5 ft.			14 ft.	14 ft.
Maximum Calculated Subsidence	3.2 ft.			5 ft.	5 ft.
TANK SEAM					
Panel Width	650 ft.	650 ft.	650 ~~650~~ ft.	650 ft.	Not Minable
Average Depth	560 ft.	1,400 ft.	1,400 ~~950~~ ft.	1,400 ft.	
Width/Depth Ratio	1.16	0.46	0.46 ~~0.68~~	0.17	
Seam Thickness	8 ft.	7 ft.	7.5 ft	7.5ft.	
Maximum Calculated Subsidence	5.5 ft.	4.5~~1.9~~ ft.	4.5~~4.1~~ ft.	4.5 ft.	
Total Calculated Subsidence	**14.1 ft.**	**4.5~~1.9~~ ft.**	**7.7 ~~7.3~~ ft.**	**10 ft.**	**5 ft**

exist with less then 900 feet of overburden between the resource and the coal, the resource will be outside of the affected area. Based on the mining handbook[1] and past history, 900 feet of overburden is sufficient to prevent adverse affects to the resource. ([1] Lowrie, Raymond L., ed. 2002 "SME Mining Reference Handbook" pp. 256)

Additionally in the areas where perennial streams exist above the affected area C. W. Mining will increase the monitoring of these areas to a weekly basis one month prior to mining in the area. This weekly monitoring will continue until one month after mining has left the area. Monitoring will then be reduced to once a month for an additional 6 months at which time it will resume its normal schedule. This increased monitoring will include the sites FC-2, FC-3, FC-4, FC-5, and SCC-2 for the right fork of Fish Creek, and FC-1, FC-6, SBC-18, SBC-16, SBC-16A, SBC-16B, SBC-20, and SBC-21 for the left fork of Fish Creek.

This monitoring will take place as each panel passes under the area. During the monitoring weekly reports will be sent to the Division via email.

In potential escarpment failure areas containing raptor nests C. W. Mining will develop a mitigation plan by July 1, 2007 as described on page 3-68. The plan will be included in Appendix 3L once it is complete.

A discharge line was installed in 1991 to the approved discharge point located above the scale house (Plate 7-1C). A totalizing flow meter is installed to monitor flows. Flows are logged and reported to the Utah Division of Water Quality with the monthly Discharge Monitoring Reports (DMR). Copies of these reports will be included in the quarterly Water Monitoring Reports.

On March 30, 1989, the State of Utah, Department of Health, stated that "a permit is not required" for overflow from the Bear Canyon culinary system (Appendix 7-B). The culinary overflow is piped into culvert C-8U (Plate 7-1C).

Expected mine water is further discussed in the Probable Hydrologic Consequence Determination (PHC), Appendix 7-J. Currently, no water is discharged from the Tank Seam due to the lack of mine water inflow. Similar conditions are expected in both Seams within Wild Horse Ridge.

Ground Water Site Selection

C. W. Mining has selected sites that have been developed for beneficial use, are the primary source of surface water systems, or contain large flows, for monitoring. The parameters tested for and the schedule followed are the ones determined to be adequate based on the study found in Appendix 7J. Three years of baseline data will be collected which exceeds the minimum required by law. The Division recommend list for baseline parameters will be followed which exceeds the minimum required by law. Additionally every five years baseline parameters will be collected. The rest of the time filed readings will be collected which includes flow data and enough parameters to determine an impact. These sites are listed in Table 7-14.

Effects of Mining on Surface Water

The operation of Bear Canyon Mine by C. W. Mining is expected to have only a very minimal effect on surface water on the area. The quality of Bear Creek before passing through the mine plan area is poor. Generally, as the excess mine water is discharged into Bear Creek; the surface water quality is improved significantly after passing through the mine site. The potential impacts to surface waters are discussed in Appendix 7-J, section 9.1.2. The greatest potential impact of mining operations is probably an increase in sediment loading to Bear Creek. Controls and diversion structures have been constructed to prevent sediment-laden water from disturbed area from mixing with local surface water, to minimize the mining impacts on the receiving stream waters.

Surface Water Site Selection

All perennial streams inside the permit area start within the permit area. Because of this the major groundwater sources feeding them are monitored. Surface monitoring sites have been selected at all major confluences and at other points of interest. Additionally sites were selected in all perennial streams as close as possible, based on accessiblity, to the edge of the permit boundary to detect any of site impacts. The parameters tested for and the schedule followed are the ones determined to be adequate based on the study found in Appendix 7J. Three years of baseline data will be collected which exceeds the minimum required by law. The Division recommend list for baseline parameters will be followed which exceeds the minimum required by law. Additionally every five years baseline parameters will be collected. The rest of the time filed readings will be collected which includes flow data and enough parameters to determine an impact. These sites are listed in Table 7-14.

724.300 Geologic Information

Geologic information for use in determining the probable hydrologic consequence of mining operations upon the quality and quantity of surface and ground water, whether reclamation can be accomplished, and whether the proposed operations have been designed to prevent material damage to the hydrologic balance outside the permit area is discussed in detail in Chapter 6 Geology (R645-301-624) and under numerous headings in this chapter.

Table 7-12 Ground Water Sampling

	Baseline Monitoring	Operational Monitoring	Post-mining Monitoring
Type of Sampling site	Springs, In-Mine Flows, Boreholes, Observation Wells	Springs, In-Mine Flows, Boreholes, Observation Wells	Springs, Observation Wells, Mine discharge points
Field Measurements and Parameters (Table 7.1-7)	Water levels and/or flow and water quality	Water levels and/or flow and water quality	Water levels and/or flow and water quality
Sample Frequency Each site	Quarterly Adequate to describe seasonal variation. Monthly, recommended for more accurate description of seasonal variation.	Quarterly samples springs and wells; In-mine flows at initial interception, quarterly after 1st 30 days until diminished. From sumps and/or mine discharge points quarterly or as required by UPDES.	Quarterly based on potential impact; or once per annum (spring sampling at low flow).
Sampling Duration	Four ~~Two~~ years (~~one complete year of data before submission of PAP~~ Prior to mining in the area).	Every year until two years after surface reclamation activities have ceased.	Until termination of bonding.
Type of Data Collected and Reported	Wells and Boreholes: Water quality, water level of flow logs, collar elevation; ground elevations ; screened interval; formation where completed; depth. Springs: Water quality, location, and flow.	Wells and boreholes: Water quality, water level or flow. Springs: Flow and water quality with one sample taken at low flow.	Wells and Boreholes: Water quality, water level or flow. Springs: Flow, water quality with one sample taken at low flow. Phase I: Whether pollution of surface and subsurface water is occurring, the probability of future occurrence, and estimated cost of abatement. Phase II: After revegetation has been established and contributing suspended solids to streamflow or runoff outside the permit area is not excess of the requirements set by UCA 40-10-17(j) of the Act and by R645-301-751. Phase III: Until reclamation requirements of the Act and the permit are fully met.
Comments	Springs and seeps should be measured from source at high and low flow periods.	During the year preceding re-permitting. Springs, one water quality sample at low flow for baseline parameters. Other sites, one sample for baseline parameter.	

Table 7-14 Water Monitoring Matrix: Operational Phase of Mining

Location	Jan	Feb	Mar	Apr	May	June	July	Aug[3]	Sept	Oct	Nov	Dec
Streams												
BC-1 (Upper Bear Creek)		oper			oper	field	field	oper.	field	oper		
BC-2 (Lower Bear Creek)		oper			oper	field	field	oper.	field	oper		
BC-3 (Lower Rt Fork Bear Creek)		oper			oper	field	field	oper.	field	oper		
BC-4 (Upper Rt Fk. Bear Creek)		oper			oper.	field	field	oper.	field	oper		
CK-1 (Upper Cedar Creek)		oper			oper.	field	field	oper.	field	oper		
CK-2 (Lower Cedar Creek)		oper			oper.	field	field	oper.	field	oper		
MH-1 (Lower McCadden Hollow Creek)					field [5]		field	field		field		
MH-2 (Upper McCadden Hollow Creek)					field [5]		field	field		field		
FC-1 (Lower Left Fork Fish Creek)[7]					field [5]		field	field		field		
FC-2 (Lower Right Fork Fish Creek)[7]					field [5]		field	field		field		
FC-3 (Right Fork Fish Creek Property Line)[7]					field [5]		field	field		field		
FC-4 (Upper Right Fork Fish Creek)[7]					field [5]		field	field		field		
FC-5 (Mud Spring)[7]					field [5]		field	field		field		
FC-6 (Upper Left Fork Fish Creek)[7]					field [5]		field	field		field		
FC-7 (Water Right Upper LF FC)					field [5]		field	field		field		
FC-8 (Water Right Upper LF FC)					field [5]		field	field		field		
Springs												
SBC-3 (Creek Well)		oper			oper			oper.		oper		
SBC-4 (Big Bear Springs)[4]		oper			oper			oper.		oper		
SBC-5 (Birch Spring)[4]		oper			oper.			oper.		oper		
SBC-9A (Hiawatha Seam)		oper			oper			oper		oper		
SBC-12 (16-7-13-1)					field. [5]		field	field		field		
SBC-14 (WHR-6)		oper			oper.			oper.		oper		
SBC-15 (WHR-5)					field [5]		field	field		field		
SBC-16 (WHR-4)[6,7]					field [5]		field	field		field		
SBC-16A [7]					field [5]		field	field		field		
SBC-16B [7]					field [5]		field	field		field		
SBC-17 (16-7-24-4)		oper			oper.			oper.		oper		
SBC-18 (WHR-2) [7]					field [5]		field	field		field		
SBC-20 (16-8-16-4)[7]					field [5]		field	field		field		
SBC-21 (16-8-18-1)[7]					field [5]		field	field		field		
SBC-22 (Stockwater Trough)					field [5]		field	field		field		
SCC-1 (16-8-20-1					field [5]		field	field		field		
SCC-2 (16-8-15-5)[7]					field [5]		field	field		field		
SCC-3 (Mohrland Portal)					field [5]		field	field		field		
SCC-5 (16-8-7-3)					field [5]		field	field		field		
SMH-1 (FBC-6)					field. [5]		field	field		field		
SMH-2 (FBC-5)					field [5]		field	field		field		
SMH-3 (FBC-13)					field. [5]		field	field		field		
SMH-4 (FBC-4)					field [5]		field	field		field		
SMH-5 (Stockwater Trough)					field [5]		field	field		field		
Wells												
SDH-2 (Well, Sec. 11, T16S, R7E)					level [5]		level	level	level	level		
SDH-3 (Well, Sec. 10, T16S, R7E)					level [5]		level	level	level	level		
MW-114 (Well, Sec 18, T16S, R8E)					level [5]		level	level	level	level		
MW-117 (Well, Sec 12, T16S, R8E)					level [5]		level	level	level	level		

Notes:
1. See Tables 7-13 and 7-17 for listing of water quality monitoring parameters.
2. oper. = operational base = baseline
3. Baseline parameters taken in August of year 5 prior to each permit renewal.
4. SBC-4 and SBC-5 shall also be tested for oil and grease.
5. First sample to be taken in May or June, when Gentry Mountain is accessible.
6. A comment will be made regarding the level of the pond feeding the spring
7. Weekly monitoring to begin one month prior to mining in area and continue until one month after. Monthly monitoring will then be done for an additional six months.

Table 7-14A Surface Water Monitoring Matrix: Baseline Collection

Site Name	Site Description	Baseline Monitoring Start Date
BC-1	Upper Bear Creek	September 2, 1980
BC-2	Lower Bear Creek	September 2, 1980
BC-3	Lower Right Fork Bear Creek	January 5, 1987
BC-4	Upper Right Fork Bear Creek	February 29, 2000
CK-1	Upper Cedar Creek	June 9, 1994
CK-2	Lower Cedar Creek	June 9, 1994
MH-1	Lower McCadden Hallow Creek	July 31, 1991
MH-2	Upper McCadden Hallow Creek	May, 2007
FC-1	Lower Left Fork Fish Creek	June 9, 1994
FC-2	Lower Right Fork fish Creek	July 31, 1991
FC-3	Right Fork Fish Creek Property	May, 2007
FC-4	Upper Right Fork Fish Creek	May, 2007
FC-5	Right Fork Fish Creek Below Mud	May, 2007
FC-6	Upper Left Fork Fish Creek	May, 2007
FC-7	Water Right Upper LF Fish Creek	May, 2007
FC-8	Water Right Upper LF Fish Creek	May, 2007

Notes: 1. See Tables 7-13 and 7-17 for listing of water quality monitoring parameters.
2. See Table 7-14 for specific months that the sites will be monitored in.

Table 7-14B Ground Water Monitoring Matrix: Baseline Collection

Site Name	Site Description	Baseline Monitoring Start Date
SBC-3	Bear Creek Well	January 5, 1987
SBC-4	Big Bear Spring	January 5, 1987
SBC-5	Birch Spring	July 24, 1986
SBC-9A	Bear Canyon #1 Mine Portal	September 25, 2002
SBC-12	16-7-16-1	June 8, 1994
SBC-14	WHR-6	October 26, 1993
SBC-15	WHR-5	October 27, 1992
SBC-16	WHR-4	March 22, 1993
SBC-16A		May, 2007
SBC-16B		May, 2007
SBC-17	16-7-24-4	May 22, 2000
SBC-18	WHR-2	March 22, 1993
SBC-20	16-8-16-4	June 8, 1994
SBC-21	16-8-18-1	June 8, 1994
SBC-22	Stock Watering Trough	May, 2007
SCC-1	16-8-20-1	June 8, 1994
SCC-1	16-8-15-5	June 8, 1994
SCC-3	Mohrland Portal	January 19, 1979
SCC-5	16-8-7-3	June 8, 1994
SMH-1	FBC-6	October 13, 1992
SMH-2	FBC-5	October 13, 1992
SMH-3	FBC-13	August 29, 1993
SMH-4	FBC-4	October 13, 1992
SMH-5	Stock Watering Trough	May, 2007

Notes: 1. See Tables 7-13 and 7-17 for listing of water quality monitoring parameters.
2. See Table 7-14 for specific months that the sites will be monitored in.

Additional Monitor Wells. A minimum of one additional drillhole will be installed in the northern portion of the Wild Horse Ridge area, shown as DH-5 on Plate 5-1C. If necessary, additional wells may be installed following the installation and evaluation of DH-5 in order to adequately characterize the groundwater aquifers of the lower Blackhawk and upper Star point formations. DH-5 and any additional drillholes will be tested using the same methodology, which was used in the previous in-mine wells, described in Appendix 7-N. The holes will then be completed as monitor wells in the same manner as described in Appendix 7-N.

Springs above the mine have also been selected based on the conclusion of Appendix 7J and 2006 field investigations that included regulating agencies and interested parties. Because these springs are above the coal seam water quality impacts are not a major concern, however flow quantity impacts are. Sites were selected because they were either major contributors to surface water systems, or they were springs that have been developed for beneficial use or have water rights on them. The major contributo rs to surface water systems are SMH-3, SMH-4, SBC-12, SBC-18, SBC-20, SBC-21, SCC-1, SCC-3, and SCC-5. Perennial portions of the streams feed by sites SCC-5, SCC-2, SBC-16, SBC-16A, SBC-16B, SBC-20, and SBC-21 will be undermined. Because of this these sites will be monitored for flow weekly starting one month prior to undermining and continuing until one month after undermining at which time they will be monitored monthly for six months before retu ring back to their normal monitoring shcedule. The actual start time will be determined based on continual underground surveying that is required by MSHA. During the monitoring weekly reports will be sent to the Division via email. The ground water sites selected because they were developed or had water rights are SMH-1, SMH-2, SMH-5, SBC-15, SBC-16, SBC-16A, SBC-16B, and SBC-22.

Measuring the flow from springs and seeps is almost always difficult because flows tend to be dispersed and rarely concentrate into well-defined channels amenable to discharge measurement.
The most accurate method of measuring small discharges, and the method that will be used, is by observing the time required to fill a container of known capacity, or the time required to partly fill a calibrated container. The basic equipment is a stopwatch and a calibrated container.

Purchased pre-calibrated containers may be used or containers will be calibrated by either adding known volumes of water by increments and measuring the depth of water in the container, or by weighing the container with varying amounts of water in it, noting the depth in the container, and using the formula: $V = (W2-W1)/w$; where: V = volume of water in the container, W2 = weight of container with water, W1 = weight of empty container, and w = unit weight of water.

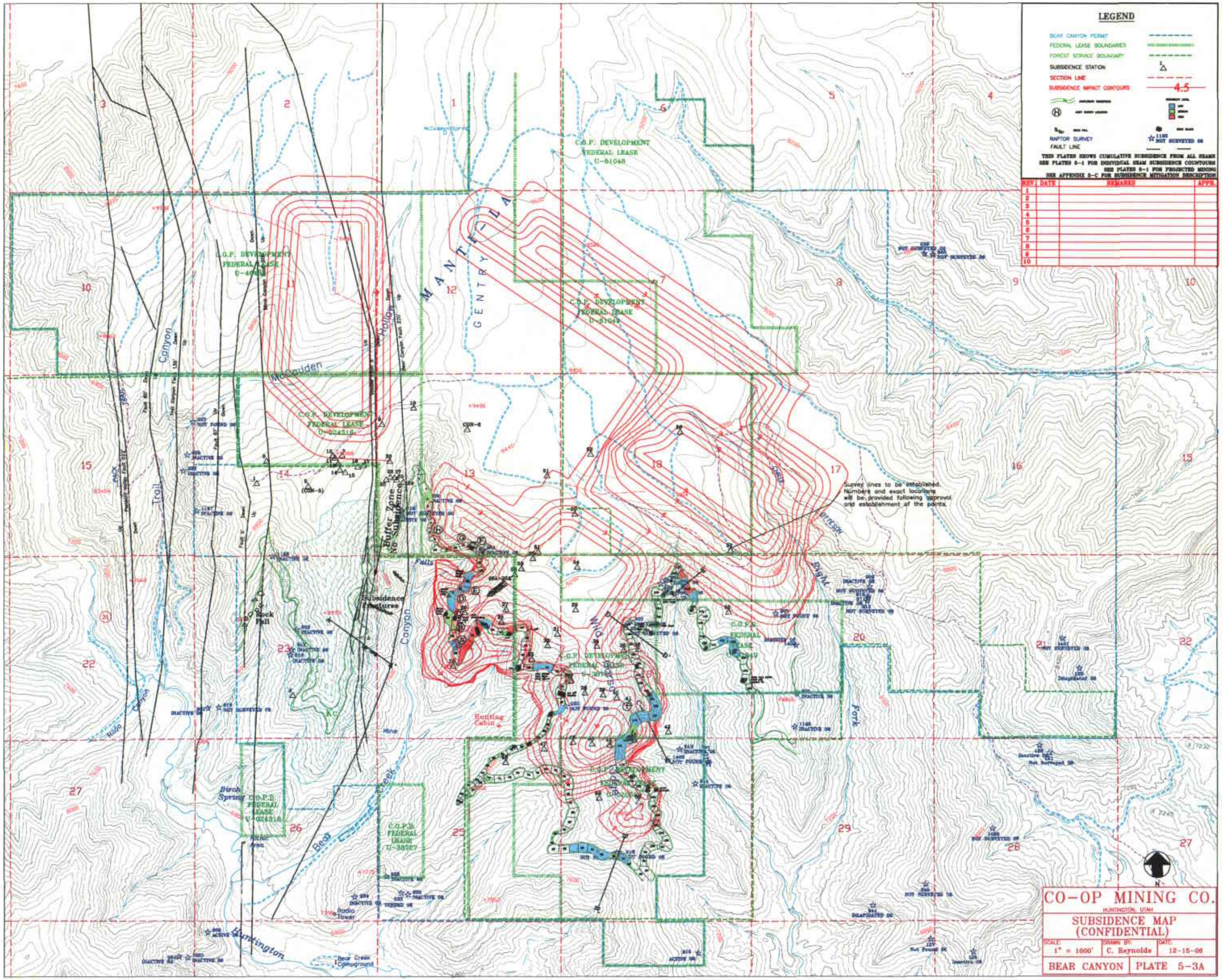
The basic field procedure will consists of interrupting the flow and collecting the water. Temporary earth dams may be constructed to divert the water through a small diameter pipe for capture. Or it may be possible to place a trough or half of a stove pipe against the spring or seep to carry the water to the calibrated container. Cloths, clay, or other materials will be used to temporarily seal cracks and force the water to go into the calibra ted container. Where flows come out of the ground in a number of distinct sources or if they are scattered over a broad area, the results of several different measurements will be added together.

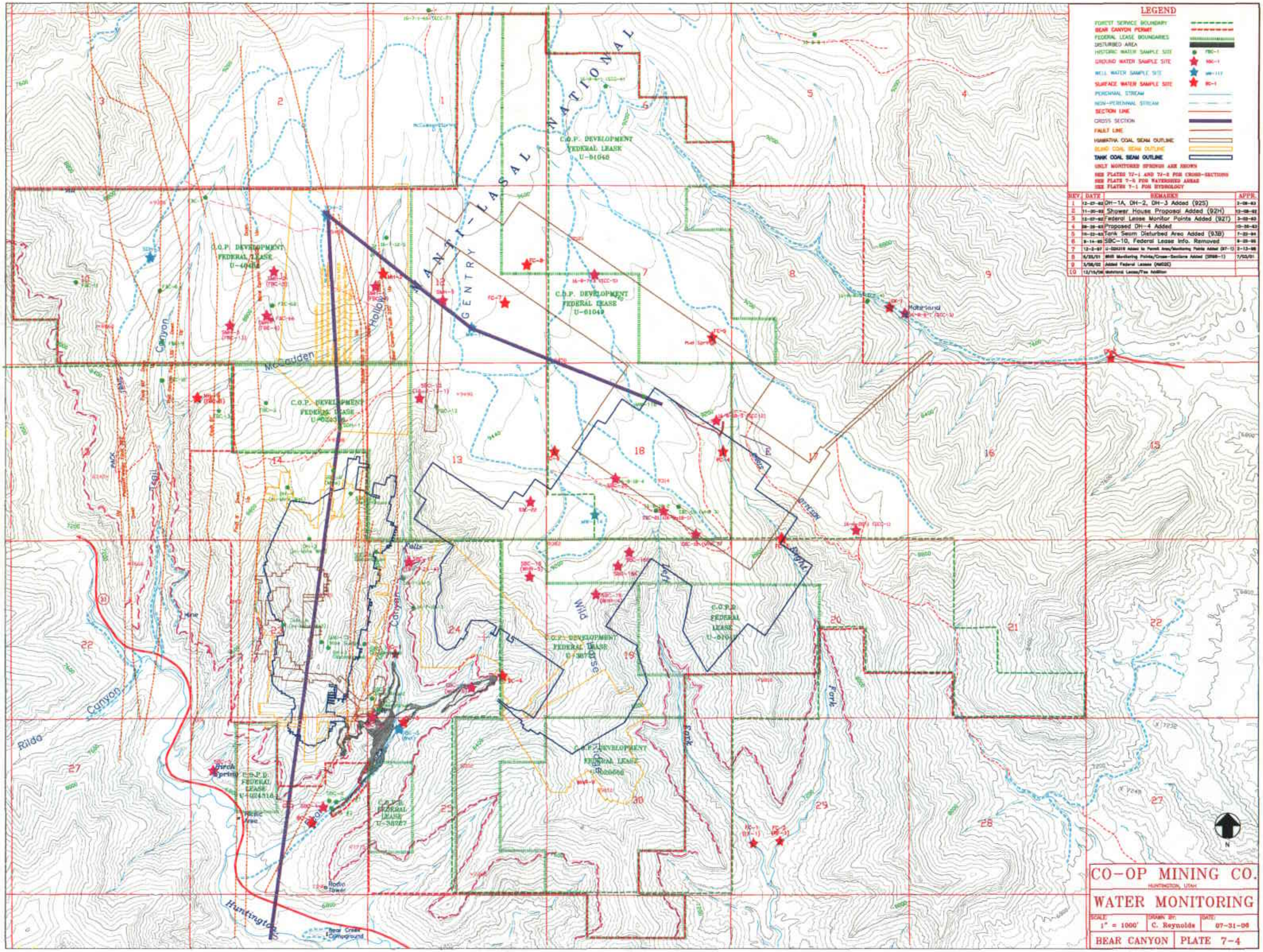
Table 7-16 Surface Water Sampling

	Baseline Monitoring	Operational Monitoring	Post-mining Monitoring
Type of Sampling Site	Surface Water Bodies.	Surface Water Bodies.	Surface Water Bodies.
Field Measurements and Parameters (Table 7.1-7)	Performed during water level/flow measurements.	Performed during water level/flow measurements.	Performed during water level/flow measurements.
Sample Frequency	Quarterly for lakes, reservoirs and impoundments (water level and quality); monthly flow measurements and quarterly water quality measurements (one sample at low flow and high flow each) for perennial streams. Monthly flow and water quality measurements during period of flow for intermittent streams. Sampling for ephemeral streams determined at pre-design conference.	Quarterly for lakes, reservoirs and impoundments (water level and quality); monthly flow measurements and quarterly water quality measurements (one sample at low flow and high flow each) for perennial streams. Monthly flow and water quality measurements during period of flow for intermittent streams. Sampling for ephemeral streams determined at pre-design conference.	Two per annum for perennial streams (high & low flow); two per annum during snowmelt and rainfall for intermittent streams.
Sampling Duration	~~Two~~ Four years (~~one complete year of data before submission of PAP~~Prior to mining in the area).	Every year until two years after surface reclamation activities have ceased.	Every year until termination of bonding.
Type of Data Collected and Reported	Flow and/or water levels and water quality.	Flow and/or water levels and water quality.	Flow and/or water levels and water quality per operational parameters.
Comments	All field measurements should be performed concurrently with water level/flow measurements.	All field measurements should be performed concurrently with water level/flow measurements.	All field measurements should be performed concurrently with water level/flow measurements.
Additional Comments		For every fifth year preceding re-permitting, one sample at low flow and high flow each should be taken for baseline water quality parameters. The construction monitoring program will be conducted on a site-specific basis in addition to the operational monitoring.	

shown on Plate 7-4. The relationship between the water monitoring points and the names identified on figure 7-0 is outlined below.

F. S. Name	Monitoring Name	Location
LF Fish Cr 3	SBC-16	Inside subsidence zone
LF Fish Cr 2	SBC-16A	Inside subsidence zone
LF Fish Cr 1	SBC-16B	Inside subsidence zone
RF Fish Cr	SBC-18	Inside subsidence zone
Wild Horse Ridge	SBC-22	Inside subsidence zone
Wild Horse Boundary	none (Inspected with FC-6)	Outside subsidence zone
E McCadden	none (Inspected with FC-6)	Outside subsidence zone
Salt Shack	none (Inspected with FC-6)	Outside subsidence zone
S McCadden Trough	SMH-3	Outside subsidence zone
McCadden Rdg Trough	SMH-2	Inside subsidence zone
Upper Bear Can Trough	SMH-5	Outside subsidence zone
COOP Bdry South East	none (Inspected with FC-7)	Outside subsidence zone
COOP Bdry South Mid	none (Inspected with FC-7)	Outside subsidence zone
COOP Bdry South West	none (Inspected with FC-7)	Outside subsidence zone
COOP Bdry North	none (Inspected with FC-8)	Inside subsidence zone
McCadden Hollow	none (Inspected with SMH-4)	Inside subsidence zone
Gentry Mt Pond	none	Outside permit area
Sawmill Pond	none	Outside permit area
Sawmill Trough	none	Outside permit area
Head McCadden Trough	none	Outside permit area
Upper Trail Can	none	Outside permit area
Trail Can Trough	FBC-1	Outside subsidence zone
Trail Canyon	none	Outside subsidence zone
South Trail Can Spg	FBC-8	Outside subsidence zone


LEGEND
BEAR CANYON PERMIT
FEDERAL LEASE BOUNDARIES
FOREST SERVICE BOUNDARY
SUBSIDENCE STATION
SECTION LINE
SUBSIDENCE IMPACT CONTOURS
4.5
RAPTOR SURVEY
FAULT LINE
NOT SURVEYED 06
THIS PLATES SHOWS CUMULATIVE SUBSIDENCE FROM ALL SEAMS
SEE PLATES 5-1 FOR INDIVIDUAL SEAM SUBSIDENCE COUNTOURS
SEE PLATES 5-1 FOR PROJECTED MINING
SEE APPENDIX 5-C FOR SUBSIDENCE MITIGATION DESCRIPTION
REV. DATE REMARKS APPR.
C.O.P. DEVELOPMENT FEDERAL LEASE U-61048
C.O.P. DEVELOPMENT FEDERAL LEASE U-61049
C.O.P. DEVELOPMENT FEDERAL LEASE U-024316
C.O.P.D. FEDERAL LEASE U-024316
C.O.P.D. FEDERAL LEASE U-38727
MANTI-LA
GENTRY
McCadden
Canyon
Trail
Hollow
Buffer Zone No Subsidence
Subsidence Fractures
Rock Fall
Falls
Wild Horse
Right Fork
Hunting Cabin
Birch Spring
Picnic Area
Radio Tower
Bear Creek
Bear Creek Campground
Huntington
Survey lines to be established. Numbers and exact locations will be provided following approval and establishment of the points.
CO-OP MINING CO.
HUNTINGTON, UTAH
SUBSIDENCE MAP (CONFIDENTIAL)
SCALE: 1" = 1000'
DRAWN BY: C. Reynolds
DATE: 12-15-06
BEAR CANYON
PLATE 5-3A



LEGEND
FOREST SERVICE BOUNDARY
BEAR CANYON PERMIT
FEDERAL LEASE BOUNDARIES
DISTURBED AREA
HISTORIC WATER SAMPLE SITE
GROUND WATER SAMPLE SITE
WELL WATER SAMPLE SITE
SURFACE WATER SAMPLE SITE
PERENNIAL STREAM
NON-PERENNIAL STREAM
SECTION LINE
CROSS SECTION
FAULT LINE
HIAWATHA COAL SEAM OUTLINE
TANK COAL SEAM OUTLINE
ONLY MONITORED SPRINGS ARE SHOWN
SEE PLATE 7-5 FOR WATERSHED AREAS
REV. DATE REMARKS APPR.
OH-1A, OH-2, OH-3 Added (92S)
Shower House Proposal Added (92H)
Federal Lease Monitor Points Added (92T)
Proposed OH-4 Added
Tank Seam Disturbed Area Added (93B)
SBC-10, Federal Lease Info. Removed
C.O.P. DEVELOPMENT FEDERAL LEASE U-61048
C.O.P. DEVELOPMENT FEDERAL LEASE U-61049
C.O.P. DEVELOPMENT FEDERAL LEASE
C.O.P.D. FEDERAL LEASE
MANTI-LASAL NATIONAL
GENTRY
McCadden
Hollow
Canyon
Wild Horse
Left Fork
Right Fork
Huntington
Rilda Canyon
Tie Fork
Birch Spring
Radio Tower
Bear Creek Campground
CO-OP MINING CO.
HUNTINGTON, UTAH
WATER MONITORING
SCALE: 1" = 1000'
DRAWN BY: C. Reynolds
DATE: 07-31-06
BEAR CANYON
PLATE 7-4