area, and especially to the Town of Scofield including:

- A temporary increase in the local workforce of approximately 20 to 50 contractor employees during the 1 year mine construction and development phase
- Increased short-term demands on temporary housing, schools, utilities, and health and social services
- A potential long-term increase in overall employment of approximately 50 to 100 employees
- Increased long-term demand for housing, schools, utilities, health and social services, and retail goods and services
- Increases in traffic levels on Utah Highway 96, and on US Highway 6 and 50 in the Price Canyon area between Price and Scofield junction.

The potential socio-economic impacts will be mitigated to a degree by the fact that the mine will be phased in over a 1 to 3 year period. Temporary construction is projected to be completed by local companies in the Price and Scofield areas, and thus will not likely have a significant impact. Since the mine production is planned to be in the range of 300,000 to 800,000 tons per year, and the workforce requirements are relative low, no significant socio-economic impacts are expected. As has been experienced in Carbon and Emery Counties, mining employment tends to fluctuate with the price of coal, and due to mine reserves depletion and other factors. At any given time, up to hundreds of coal miners can lose their jobs instantaneously, creating a glut of employees. Availability of employees to fill the needs of CR is not expected to be a problem, with many trained and miners living in the Price area and likely will not have a significant impact on Carbon County or Scofield Town. The Town of Scofield is likely to experience a boon with the mine, which will provide valuable income for a town that has experienced severe ups and downs in its' economy. Given these considerations, no significant long-term mining related socio-economic impacts are anticipated. Anticipated increases in traffic levels are well within the design capacities for the effected roadways and traffic impacts will be mitigated to some extent by an organized program to encourage employee carpooling and by multiple shift operations.

R645-301-112 Identification of Interests

112.100 Statement of Corporation

Western Reserve Coal Company, Incorporated is the managing member of WRCCLLC which is the managing member of Carbon Resources LLC. Carbon Resources LLC prepared this Mining and Reclamation Permit application for the Kinney No. 2 Mine, a proposed new underground mine complex. This permit application has been developed to effect full compliance with applicable permitting requirements under the State of Utah Coal Mining Rules and is being submitted for review and approval of the mining and reclamation plans contained herein by the Utah Division of Oil, Gas and Mining (UDOGM), and other jurisdictional agencies. CR operates under corporate registration with the Utah Division of Commerce Entity Number 7201220-0161, active as of 12/01/2008, renewed on ~~4/05/2010~~01/24/2011. A copy of the Utah Department of Commerce, Business Search results is included in Exhibit 4, Other Permits verifying that CR is currently registered.

112.200 Name and Address of Operator

This application for a Mining and Reclamation Permit for the Kinney No. 2 Mine is submitted by Carbon Resources, LLC (CR) as the permit applicant. The following is the business address, phone number, and employer identification numbers and Tax ID No. for Carbon Resources LLC., WRCC LLC, and Western Reserve Coal Company, Inc., WRCC, Inc.

Carbon Resources, LLC
P.O. Box 954
Sandia Park, New Mexico 87047
Phone: (505) 980-1841
Tax ID No. 20-3819816

WRCC, LLC
P.O. Box 954
Sandia Park, New Mexico 87047
Phone: (505) 980-1841
Tax ID No. 75-3214834

Western Reserve Coal Company, Inc.
P.O. Box 954
Sandia Park, New Mexico 87047
Phone: (505) 980-1841
Tax ID No. 20-2319361

Correspondence regarding the Kinney No. 2 Mine Permit and related operations should be directed to:

Carbon Resources, LLC
P.O. Box 954
Sandia Park, New Mexico 87047

Attention: Clay Wisdom

CR, as the mine operator, will be responsible for payment of the Abandoned Mine Land Reclamation Fee. CR's Resident Agent is:

Ronald C. Barker
2870 S. State Street
Salt Lake City, UT 84225-3624
(801) 486-9636

112.320 Name of Operated Coal Mines

The proposed **Kinney No. 2 Mine** will be operated by Carbon Resources, LLC (CR). CR's offices are currently located at P.O. Box 954, Sandia Park, New Mexico 87047. Upon start of operations, temporary office space will be located in Scofield, with permanent offices to be located at the mine site.

The Kinney No. 2 Mine permit area encompasses a block of approximately 448.14 acres. Of this surface acreage, 15.33 acres are owned in fee by Carbon Resources, the remaining 432.84 acres are owned by Evangelos George Telonis, ETAL., of this, 22.8 acres are held by Carbon Resources as a long term lease agreement with from George Telonis, ETAL.

The area of surface disturbance is confined within the 38.13 acres (combined Fee and Leased) owned or controlled by Carbon Resources. Only 27.6 acres of the 38.13 acres will be disturbed for surface facilities. The coal to be mined lies beneath the George Telonis, ETAL. fee surface land and is owned by Carbon County which in turn has leased it to Western Reserve Coal Company Inc, Managing Member of Carbon Resources.

112.420 Control Relationship to Applicant

The Kinney No. 2 Mine permit surface area encompasses a block of approximately 448.14 acres. Of this surface acreage, 15.33 acres are owned in fee by Carbon Resources, the remaining 432.84 acres are owned by Evangelos George Telonis, ETAL., of this, 22.8 acres are held by Carbon Resources as a~~n~~ ~~Easement~~ Lease from George Telonis, ETAL.

The area of surface disturbance is confined within the 38.1 acres (combined Fee and ~~Easement~~Lease) owned or controlled by Carbon Resources, of which only 27.6 acres are planned to be disturbed by mining operations. The coal to be mined lies beneath the George Telonis, ETAL. Fee surface land and is owned by Carbon County which in turn has leased it to Western Reserve Coal, Inc,

Lands adjoining the permit boundary are owned by private owners, and the Utah Department of Transportation.

112.500 – 600 Owners of Surface and Minerals

The legal and equitable owners of record of surface lands associated with those areas to be mined by underground coal mining activities or of surface lands to be affected by surface operations and facilities incidental thereto (lands within the permit area) are shown on the Regional Surface Ownership Map, Map 11, and are listed below:

Carbon Resources, LLC
P.O. Box 954
Sandia Park, New Mexico 87047

Evangelos George Telonis Trust
c/o Nick Sampinos
190 North Carbon Ave.
Price, Utah 84501

In addition to the designated owners of lands within the permit area identified above, the owners of record of all surface areas contiguous to the permit area are shown on the Regional Surface Ownership Map 11, and are listed below:

Evangelos George Telonis Trust
c/o Nick Sampinos
190 North Carbon Ave.
Price, Utah 84501

Hilda M. Hammond
2912 Redwood Ave.
Costa Mesa California 92626-3719

Utahna Pace Jones, Trust
HC 35 Box 510
Helper, Utah 84526-0000

LH2 Enterprises, Inc.
6338 South Happiness Circle
West Jordan, Utah 84084-0000

Utah Department of Transportation
4501 South 2700 West
Salt Lake City, Utah 84114-1200

The legal and equitable owners of record of the coal to be mined within the permit area are

The Kinney No. 2 Mine permit surface area encompasses a block of approximately 448.14 acres. Of this surface acreage, 15.33 acres are owned in fee by Carbon Resources, the remaining 432.5 acres are owned by Evangelos George Telonis, ETAL., of this, 22.8 acres are held by Carbon Resources as an EasementLease from George Telonis, ETAL.

The area of surface disturbance is confined within the 38.1 acres (combined Fee and EasementLease) owned or controlled by Carbon Resources, of which only 27.6 acres are planned to be disturbed by mining operations. The coal to be mined lies beneath the George Telonis, ETAL. Fee surface land and is owned by Carbon County which in turn has leased it to Western Reserve Coal, Inc,

Lands adjoining the permit boundary are owned by private owners, and the Utah Department of Transportation. CR controls a coal lease from Carbon County as shown on Map 12, Regional Coal Ownership Map, a portion of which lies within the permit boundary included in this application. This County lease also extends east and south of the permit boundary as shown on Map 12, Regional Coal Ownership Map, and it is the intent of CR to ultimately modify this permit to include this lease.

Table 24, Pertinent Acreages, Land Ownership & Control includes land ownership with the acreages of those lands.

Table 24 Pertinent Acreages, Land Ownership & Control

AREA	ACRES	OWNER
Permit Area	15.33	Fee
Permit Area Leased Private	22.8	E.G. Telonis et. al.
Right to Mine	410.01	E.G. Telonis et. al.
Total Permit Area	448.14	See above
Disturbed Area	27.6	Fee and E.G. Telonis et.al.
U.S. Government	0	U.S. Government
Utah State Government	0	Utah State Government
Local Governments	0	Local Governments
Other Private Land	0	Other Private Land

R645-301-113 Violation Information

The Kinney No. 2 Mine will be a new operation, therefore, no notices of violation (NOV), cessation orders (CO), or air or water quality violation notices have been issued in conjunction with this operation.

113.110 Revocation of Federal or State Permits

Neither the applicant, affiliate nor persons controlled by or under common control with the applicant has had a Federal or State mining permit suspended or revoked in the five (5) years previous to the date of this application. Likewise, no mining bond or similar security deposited in lieu of bond has been forfeited by any affiliated entities or persons.

Topsoil Temporary Storage Design, Map 41, Volume A Fill Design, Map 42, Volume B Topsoil Pile Design, Map 43, West Side Topsoil Piles Design, and Map 44, Volume C Topsoil Pile Design.

12. The small amount of previously disturbed topsoil beneath the temporary A-horizon topsoil pile will next be placed onto the large capacity bathhouse parking lot topsoil pile Volume D.
13. The approximately 12,000 cubic yards of "RECLAIMED COAL", buried on the old Columbine Mine surface pads Map 45, Reclaimed Coal thickness – with embedded table, will next be scraped together and transported to the Savage/Arch wash plant on Ridge Road south of Price UT, or alternatively to Coval Engineered Fuels, Wellington, UT. Written expressions of interest from both companies can be found in, Exhibit 3 Confidential Information. There are two tables embedded in Map 45, Reclaimed Coal Thickness – with embedded table, one displays the available analysis of this coal and the second summarizes the volume of this reclaimed coal.
14. Stabilize topsoil stockpiles by reseeding, mulching, and erosion controls.
15. Completion of the cut and fills needed to site the surface infrastructure.

232.200 Insufficient Topsoil

Given the lack of available natural soils and CR's resultant plans to recover disturbed soils for use as soil material, CR is relying primarily on the baseline soil sampling information presented in Exhibit 6, Soils Survey Information, to establish the relative suitability of disturbed soils as the best material available in the proposed disturbance area to support revegetation efforts. Based on the available soils sampling and testing information, which included undisturbed and disturbed soil, the following summarizes the overall suitability of disturbed soils and topsoil as soil material based on the UDOGM Topsoil/Overburden Guidelines:

As documented in the soils report in Exhibit 6 the results of the soil sample analyses and the field survey of the soils resources, the salvageable soils within the 27.6 acres for the proposed mine facilities are adequate for use as plant growth material. The pre-SMCRA disturbed soil materials are an equivalent vegetative growth media in this area based on the UDOGM suitability criteria. The only parameters of concern relative to suitability of the soils are water holding capacity of soils containing greater than 50% rock content, slope gradients of over 30% affecting use of soil salvage machinery, soil materials with sandy textures, and an accurate determination of the quantity of coal found within the mixture of alternative reclamation materials in disturbed land Map Units DA and DB. While these may be considered limiting factors under the UDOGM Guidelines and may in fact limit maximum vegetation potentials, they do not appear to have had a significant adverse impact on vegetation establishment in the area nor on the natural reinvasion of previously disturbed areas which have not been intentionally revegetated by the Utah AML Program. The available soil materials have been mixed by historic mining activities and by reclamation work completed by the Utah AML Program. This mixing has not greatly affected the ability of the materials to support vegetation, and there is little reason to doubt the same effect for final reclamation of the Kinney No. 2 Mine. The available soil materials will be salvaged, stockpiled, and used for final reclamation.

While it is documented in Exhibit 6, Soil Survey Report, based on available sampling and testing data, that the disturbed soils are suitable as soil material and that they represent the best available material to support revegetation efforts, CR plans to sample these materials prior revegetation as described in R645-301-200, Soil Replacement Plans.

their being ranked as high-priority if utilized during the breeding period though such use is not expected.

The mine plan area provides substantial potential habitat for a variety of raptor species including the: turkey vulture, golden eagle, bald eagle, osprey, prairie falcon, peregrine falcon, American kestrel, northern goshawk, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, Swainson's hawk, rough-legged hawk, ferruginous hawk, northern harrier, barn owl, great-horned owl, northern pygmy owl, long-eared owl, burrowing owl and northern saw-whet owl. Many of these species are of high federal interest pursuant to 43 CFR, 3461.1 (n-1), and all are considered of high interest to the State of Utah. There is some potential, though minimal, for incidental use of the permit area by bald eagles, which is considered a sensitive species in Utah. High-priority and/or critical habitat for certain raptor species exists within the permit area during the nesting/breeding period (February - July). For these species, construction activities within one-half mile of a nest site during the species specific ing/breeding period should be avoided.

Because certain raptor species may be sensitive to disturbance during their active nesting periods, surveys of those portions of the permit area where surface disturbance has or is anticipated to occur have been implemented intermittently during the period from 2005 through 2007. As a result of these efforts several nest sites have been located in and near the permit area. Locations for these sites are provided on Map 2, Raptor Map. A table on the map shows the determination of species for each nest, and nesting activity if known. As indicted on Map 2, one nest (No 1541) was observed south of the proposed disturbed area in the southwest quarter of 33, T12S, R7E. This nest was categorized during the 2005 helicopter survey as being either goshawk or red-tailed hawk. As discussed further in this Chapter, goshawks prefer conifer stands for nesting and therefore nest No. 1541 is more likely a red-tailed hawk nest. No nesting activity was observed at this nest site during the 2007 nesting period.

~~Carbon Resources in conjunction with the DWR and UDOGM will conduct two raptor surveys, on in mid-March, 2001 and one in mid-April, 2011 to ascertain the status of nest 1541 prior to initiating any mining activity at the mine site. If the nest is actively being used by raptors, CR will limit any mining activities within one half mile of the nest from March 15, 2011 through August 15, 2011. CR will consult with the U.S. fish and Wildlife Service and the DWR and the UDOGM biologists if the nest is not occupied prior to initiating mining activities. If the nest site is actively used during this time and the young birds fledge prior to August 15, CR will consult with the agencies listed above as to whether CR can begin activities at the mine site.~~

Carbon Resources has entered into consultation with the US Fish and Wildlife Service , the Utah Division of Wildlife Resources and the UDOGM regarding nest No. 1541.

Carbon Resources has made application to the US Fish and Wildlife Service, for permission to conduct nesting deterrent actions at nest No. 1541 for the 2011 nesting season only. A copy of the application can be found in Exhibit 4, Other Permits. The UDOGM is a consulting agency along with the Utah Division of Wildlife Resources. Any mitigation plans will be approved by the US Fish and Wildlife Service, the Utah Division of Wildlife Resources and the UDOGM. Approval from the US Fish and Wildlife Service was received on April 26, 2011. In the approval letter, the USFWS made their approval contingent on approval from the Utah Department of Natural Resources (later qualified by phone conversation to be the Utah Division of Wildlife Resources). Verbal approval was given by Leroy Mead of the UDWR and later confirmed by email dated

April 28, 2011. Copies of the USFWS approval and UDWR email approval are included in Exhibit 4, Other Permits.

Because the construction season at the mine site elevation is very short, and because nesting activity would delay start of construction until fledgelings leave the nest, Carbon Resources LLC petitioned the US Fish and Wildlife Service, for permission to conduct nesting deterrent actions to discourage the birds from nesting within a one-half mile buffer prior to the start of mining activity during the 2011 nesting season. It is believed that the birds will use other sites for nesting. There is ample opportunity for nesting in the general area. This will allow Carbon Resources LLC to start construction activities during the middle of the nesting season and reduce (or eliminate) the risk that the birds would abandon eggs or young at the nest.

After construction has started or at the end of the 2011 nesting season, Carbon Resources, LLC will remove the nest deterrents. It is our experience that Red-tailed Hawks are very adaptable to mining operations. For example, a pair of Red-tailed Hawks successfully nested for several years at the Star Point Mine in Carbon County, Utah within 30 feet of the main access road to the mine, and within 40 feet of an overland conveyor belt which ran for approximately 20 hours per day.

Deterrent Plan

The deterrent plan includes two components:

1. Preventing, or discouraging the birds from using this particular nest by placing one or more orange construction cones in the nest as long as no eggs are present. Carbon Resources LLC will obtain a Letter of Authorization from the U.S. Fish and Wildlife Services' Migratory Bird Permits office in Lakewood, Colorado before placing nest deterrents. If placing a construction cone is not possible, Carbon Resources will consult with the USFW Service and the Utah Division of Wildlife Resources to find another, non-destructive, method of deterrent.
2. If the birds decide to build another nest within the restricted one half mile zone placing orange construction cones (or other methods as above) in those nests also as long as no eggs are present.

The construction cone/s will be placed by using a long ladder, by climbing the tree, or other methods as needed. Every effort will be taken to avoid disturbing the nest.

Upon completion of the 2011 nesting season, the construction cone/s, or other deterrent methods will be removed so the birds will have use of the nest/s again.

Monitoring Plan

1. Monitoring nest #1541 and the area within the restricted one half mile zone for raptor activity during the 2011 nesting season from mid-March to mid-August (details to follow).

Monitoring will be conducted by observing any visible raptor activity in the nest #1541 area as well as observing activity in the general area that may indicate the raptors start constructing another nest. Observations will be conducted from Highway 96 at the entrance to the mine site using spotting scopes and binoculars or from the closest pad on the hillside across from the nest. Observations will be made from first light until 3 hours after daylight once per week from April 1, through May, 2011. After May, monitoring will be conducted every two weeks. This schedule is based on preliminary discussions with Nathan Darnall of the USFW Service and may be adjusted as necessary. Further monitoring may be necessary and will be determined in consultation with the agencies.

The observers will have a digital camera with a telephoto lens to take photos if possible of raptors in the area.

The observers will also have raptor identification guide books at their disposal to help identify raptors.
A detailed record will be made during each monitoring session, including date, times, raptors observed, species, details of their movements, observers' name, and photographs taken. A report of weekly monitoring will be e-mailed to the U.S. Fish and Wildlife Service in Utah after each survey. A summary report will be provided to UDOGM at the end of the nesting season.

Mitigation Plan

1. Cooperating in a mitigation plan yet to be determined in conjunction with the USFW Service and the Utah Division of Wildlife Resources. The mitigation plan will be limited to $3,000, and will not be necessary if no deterrent methods are taken by Carbon Resources.

Schedule

Nesting activities can begin as early as March by Red-tailed Hawks, and April for Goshawks, however due to heavy snow cover this year no activity was observed during the first visit to the nest site by Mr. Greg Hunt of Carbon Resources LLC on March 3. During the first formal monitoring session conducted on March 30, 2011, no bird activity at the nest site was observed.

Future Mining Operations

Construction of the mine facilities and operation of the mine will proceed as planned and detailed in the Utah Division if Oil, Gas and Mining, Mining and Reclamation Plan. We believe that Red-tailed Hawks are particularly adaptable (refer to example given above) to disturbance by mining operations. It is very possible that the subject nest will be used in the future while mining activities are ongoing. Carbon Resources is committed to operating in an environmentally responsible manner. We commit to monitoring the subject nest in the future to document activity at the nest.

Noise will inevitably result from the mining operation, however, we believe noise levels will be acceptable. It should be noted that the town of Scofield is located only 1500 feet from the subject nest, as well as Utah Highway 96, which has a rather high volume of truck traffic.

Construction activities at the mine site will include earth moving and typical construction of buildings, conveyor belts, mine openings and associated mine facilities. Normal construction equipment will be used such as dozers, scrapers, track hoes, and cranes. Blasting may be necessary, but we believe it will be very minimal, if necessary at all. Avoidance

Carbon Resources has a raptor proof power pole design included in the Utah Division of Oil, Gas and Mining, Mining and Reclamation Plan. Every effort will be made to minimize any risks to raptors in the area of the mine. Employees at the mine will be instructed to avoid harassment of all wildlife and particularly raptors.

For more information about raptor species of special status including the ferruginous hawk, bald eagle and northern goshawks, refer to Table 2A.

The long-billed curlew is listed by the UDWR as a species of concern, and is rare to the Wasatch Plateau. This species has a strong affinity for riparian and shoreline areas. For more information about this species, refer to Table 2A.

where necessary to control fugitive dust, and enclosed draw points and BACT dust controls on coal reclaim systems.

The conveyor system will be covered to minimize exposure and dispersion of coal fines during transport; all transfer points will be partially or fully enclosed and will incorporate BACT emission controls. Small amounts of coal dust or fines may escape from the conveyor system and minor spillage may occur in the area immediately adjacent to the conveyor. The Kinney No. 2 Mine has received Approval Order DAQE-AN0141180001-08 from the Utah Department of Environmental Quality to operate the Kinney No. 2 Mine and thus meets all applicable air regulations.

Mine water supply requirements for sanitary use, surface dust control, fire fighting reserve, and operational mine water amounting to 30.7 acre feet per year depleted from the Colorado river system, from 61.4 acre feet per year diverted from the Colorado River System. Depletion allowance for mining use at Scofield is 50% per personal communication with Mark Stiltson, UT Division of Water Rights. This water will be obtained primarily from the town of Scofield, and secondarily from water encountered in the mine. Depletion from collected water encountered during mining would remove a negligible amount of water from the system. For this reason, it is anticipated that the incremental mining related withdrawals will have no measurable effect relative to potential downstream surface water depletion in the Price River or Green River drainages.

A Section 7 consultation process under applicable USFWS regulations will be conducted as part of the inter-agency review of the UDOGM permit application. In the unlikely event that consultation results in a determination that the proposed water use represents a new depletion, a biological assessment of potential effects on endangered fish species and associated critical habitat designations in the Green and Colorado Rivers would be completed. Three fishes that are on Utah's Sensitive Species List (roundtail chub, leatherside chub, and flannelmouth sucker) for which the Price River may provide potential habitat would also be included in any biological assessment. However, since the mine area is a tributary to Mud Creek and then Scofield Reservoir, no incremental impact can be experienced in the Price, Green, and Colorado Rivers, because of the water retention in Scofield Reservoir. There are no T&E species in Mud Creek or Scofield Reservoir.

Measures to Stabilize and Minimize Erosion from Mine Disturbance Areas

All construction and operation activities will require the application of drainage and sediment control measures to minimize erosion, control surface runoff, and limit additional contributions of suspended solids to Mud Creek and Scofield Reservoir. Specific proposed drainage and sediment control methods and practices are discussed in detail in R645-301-731 , "Hydrologic Resource Protection". Temporary controls for construction activities will include the use of protective berms, silt fences, sediment traps, straw bales, and other suitable control measures. It should be noted that the designed operational drainage and sediment control systems and structures will be established prior to most surface disturbance and construction activities. These systems and structures will include diversions to route drainage from undisturbed areas around disturbance areas, collection ditches to intercept and route disturbed area drainage to the sedimentation pond, culverts, and sediment traps, , which will retain disturbed area runoff allowing settlement of suspended solids prior to discharge to area drainages. Drainage and sediment control structures will be operated and maintained until effective revegetation has occurred and surface drainage quality is restored to a condition comparable to baseline conditions. To assure the continuing effectiveness of the drainage and sediment control measures, water quality monitoring will be conducted during active operations, site reclamation, or utilize portions of the permit area at various times of the year. High priority habitat areas and golden eagle or certain other raptor nesting sites may require special protection in compliance with applicable State and Federal laws and regulations. Generally, the basic biological resource protection measures which will be implemented in conjunction with the mining and related activities will provide the necessary level of protection to achieve full compliance.

Below is a description of some ~~of the~~ additional protection and enhancement ~~conservation and mitigation~~ plans for the wildlife species that have been described as occupying crucial or substantial habitat within and adjacent to the Kinney No. 2 permit area. Biologists representing Carbon Resources (Patrick Collins, Mt. Nebo Scientific), USFWS and/or DWR will conduct a site visit in the 2011 field season to verify assumptions regarding the wildlife species and habitats described below for current statuses, conditions and other potential wildlife occupants in the project area.

Black Bear

Substantial year-long habitat for black bear (*Ursus americanus*) has been mapped within and adjacent to the permit area. Additionally, critical year-long habitat has been designated within the project area by the UDWR database (Map 2A).

Understanding black bear biology, habitat and food requirements along with being cognizant of problems that may occur with their interactions with humans will be instrumental for construction and operation of the Kinney No. 2 Mine. The black bear is considered to be an omnivore and, depending on the season, food sources can be as diverse as grasses, forbs, insects, fruits, berries, carrion, aspen buds, pine seeds, acorns, rodents and new-born deer.

The proposed new Kenny No. 2 Mine will disturb very little land that has not already been disturbed by previous mining or other activities. Even though the previous disturbed area is shown to be substantial year-long habitat for black bear, the habitat is marginal at best. The area within the permit that has been outlined as critical year-long habitat has, for the most part, not been disturbed previously nor will it be disturbed by the current mine operation plan. Therefore, habitat protection of the critical area will be to disturb very little of it. ~~Mitigation~~ Enhancement measures will be employed to restore those areas that have previously been disturbed and are currently planned for new disturbance to habitat that existed prior to disturbance. Plant species used for revegetation will include native grasses and forbs as well as woody species that provide hard and fleshy fruits to augment food source for the black bear.

Blue Grouse

Year-long crucial habitat for blue grouse (*Dendragapus obscures*) has also been mapped within and adjacent to the project area (Map 2B). Blue grouse are native to Utah and prefer stands of aspen and conifer for their habitat. Very few conifer stands are present in the permit area, but aspens are common. Winters are often spent in upper elevations in conifer stands, whereas in spring and summer they spend more time at lower elevations in meadows, brushlands and open timber stands for mating.

Mating of blue grouse in Utah occurs in April and nesting is in May and June. Food sources range from herbaceous vegetation, seeds, berries, buds and insects in the summertime to needles and buds of conifers in the winter.

The entire region including the permit area has been mapped as year-long habitat for this species. Most of the proposed new mine has already been disturbed by previous mining or other activities. Final revegetation will then enhance habitat for blue grouse by restoring native

R645-301-411 Environmental Description

411.100 Pre-Mining Land Use Information

Land uses and capabilities in the permit and adjacent areas have been determined through historical records and evaluation of baseline soils, vegetation, wildlife, and hydrology information.

411.110 Use of Land Existing at Time of Filing

Mapping of Land Use Information

Information presented on the Regional Land Use & Zoning Map (Map 4) includes, and the Previous Mining Activities Map, (Map 5), includes:

- Current land use designations and areas
- Locations of identified cultural, historic, and paleontological resource values
- Boundaries of any public parks, or units of the National System of Trails or Wild and scenic Rivers System
- Any cemetery located within 100' of the permit area
- Locations of existing and historic mining related surface disturbance. and mine structures and facilities, and location and extent of known underground mine workings
- Legislated Zoning designations of the permit and adjacent areas.
- Proposed Kinney No. 2 Mine disturbance footprint.

Information presented on the Previous Mining Activity Map (Map 5) includes:

- The location and extent of historic mine workings in the proposed Kinney No. 2 Mine permit area.

Consistent with applicable provisions of R645-301-512, information on previous mining activities has been prepared under the direction of, and certified by a qualified, registered professional engineer or land surveyor with assistance frorm experts in the related field.

Existing Land Uses

Land uses in the permit area at the time of filing consist of the following:

- Wildlife Habitat – The area is used by wildlife as discussed in Chapter 3.
- Grazing – The property owner utilizes the area for grazing.
- Dispersed Recreation – The property owner utilizes the area for dispersed recreation, mainly hunting during the regular Utah hunting seasons.
- Scofield Commercial Zone – Includes only the land within the Carbon Resources property lying within Scofield Town boundaries. This area was rezoned by Scofield Town in January, 2008. This zoning designation allows coal mining operations. Language from the Zoning Ordinance is included later in this chapter.

- ~~Carbon County Mountain Range Zone – Includes the land leased by CR from E.G. Telonis lying east of the Carbon Resources property lying within Carbon County. This area was rezoned by Carbon County in October, 2007 in an effort to allow mining of the coal leases belonging to Carbon County, and held by Carbon Resources.~~

Land uses in the permit area at the time of filing this application are shown in Table 3, Historic Land Use, Land Use During Mining Operation and Post Mining Land Use. The land uses will not change from existing uses, they will be exactly the same during mining and for post mining. Zoning Ordinances in the Carbon County Water Shed Zone, Mountain Range Zone and in the Scofield Town Commercial Zones have been established by the County and Town under authority of Utah State Law Title 17, Chapter 27a. This State Law gives authority to local authorities to establish land uses. In addition, wildlife use lands as they will according to the resources available to them.

TABLE 3
HISTORIC LAND USE, LAND USE DURING MINING OPERATION AND POST MINE LAND USE
LAND USES PROPOSED FOR POST MINING ARE THE SAME AS PRE-MINING

Land Uses	**Water Shed Zone** *No Kinney No 2 Mine Facilities in this zone	**Mountain Range Zone** *Kinney No 2 Mine Facilities in this zone	**Scofield Commercial Zone** *Kinney No. 2 Mine Facilities in this zone
Wildlife Habitat	X[1]	X[1]	X Historic,Mining,PMLU
Grazing	X[1]	X[1]	X Historic,Mining,PMLU
Recreation	X[1]	X[1]	X Historic,Mining,PMLU
Mineral Extraction	X[1]	X[1]	X Historic
Ranching	X[1]	X[1]	X Historic
Mining	X[1]	X[1]	X Historic
Water Shed	X[1]	X[1]	
Railroads	X[1]	X[1]	X[2]
Heavy Equipment Storage			X[2]
Loading & Storage of Minerals		X[1]	X[2]
Heavy Equipment Repair			X[2]
Storage Warehouse		X[1]	X[2]
Welding, Metal Fabrication & Machine Shop		X[1]	X[2]
General Business or Professional Offices			X[2]
Electrical Utilities	X[1]	X[1]	X[2]

1. ***Carbon County Zoning Ordinance 4.2.16 Water Shed Zone*** states. "The WS Water Shed Zone (formerly CE-1 Zone) covers the canyons, mountains, and other lands above 7,000 feet in elevation, and of environmental concern in the County. Because of limitations imposed by topography, climate, soil conditions and other natural features, use of the land within this zone has been limited primarily to livestock grazing and related uses, wildlife habitat, certain outdoor recreation activities and facilities, and limited mineral extraction."

   "The land within this zone has functioned historically as part of the watershed for a majority of the irrigation, culinary, and industrial water supply for the Price River Valley and East Carbon City area. It is also recognized that the landscape is constantly changing due to natural occurrences such as fire, flood, insect infestations and landslides. Human activities such as logging, grazing, hunting, camping and other uses affect the landscape, and are accepted as normal in this zone. Experience has shown this watershed area to be fragile; its confirmed function as a water source is of critical importance to the County."

Carbon County Zoning Ordinance 4.2.17 Mountain Range Zone states."Historically, lands within this zone have been used for livestock grazing, ranching, mining, logging, and other productive uses. These lands also function as a part of the watershed that supplies nearly all the irrigation and culinary water for the Price River Valley and East Carbon City areas."

"Because of a combination of factors, including accessibility from existing roads, railroads, availability of water, suitable topographical, soil and vegetative conditions, and aesthetic attractions, the territory included within this zone is capable of accommodating irrigated agricultural and certain mining, recreational and summer housing developments without due adverse effect on the quality of the watershed, provided that such developments are constructed and maintained under regulated conditions."

2. The Scofield Town zoning ordinance language is not as detailed as the Carbon County zoning language, and does not discuss historic land uses. No mention is made of use of the subject land for grazing, recreation or wildlife habitat. From observation by the author, wildlife utilize the area, the area has been used for recreation (campsites on flatter areas are evident), and grazing has been done evidenced by sheep observed and tracks and droppings observed. The zoning ordinance allows 134 separate land uses in this zone as shown on Table 2 of the ordinance. Zoning ordinances specifically include these land uses.

   Only the land uses pertinent to the Kinney No. 2 Mine are listed here.

411.120 Capability of Land to Support a Variety of Uses

Land Use Capability and Condition

The primary constraints relative to the condition and capability of lands within the permit and adjacent areas to support various land uses are the rugged terrain of the area, high elevation, short spring and summer seasons, and long winters. The rugged natural topography of the area may generally be characterized as a small, high elevation valley, with high plateaus to the east and west, narrow ridgelines cut by deep drainages with steep, narrow drainage valleys over most of the proposed permit and adjacent area. The area is semi-arid with mean annual precipitation of only 14.56 (Scofield Dam) inches. Most of the precipitation occurs as either snowfall during the winter months or as brief high-intensity thunderstorms during late summer and early fall. Generally, mining and other development in the area has been limited to valley bottoms and the adjacent lower valley slopes with little or no significant development of high plateau and steep ridge and valley areas. In recent years, summer home construction has become a major development on the ridges west and north of Scofield Reservoir.

Upper plateaus on the east and west of the permit area receive slightly greater amounts of precipitation and because they are typically higher in elevation. Access problems due to the rugged surrounding terrain and harsh climatic conditions during portions of the year have limited both disturbance and use of these areas. The land east of the mine site is private property and has historically been heavily used for sheep and cattle grazing. Generally, potential land uses for the high plateaus in this area are limited by topography and resource constraints to wildlife habitat, low intensity grazing, recreational uses, and scattered timber production. The mining and related activities will not directly affect upper plateau areas since no surface disturbance is proposed or anticipated in these areas.

Land use capability and condition for the permit area is a direct reflection of the rugged terrain. Because the rugged natural terrain makes access and development so difficult and most of the

Land use capability and condition for the permit area is a direct reflection of the rugged terrain. Because the rugged natural terrain makes access and development so difficult and most of the area remains in a natural, undisturbed condition, except for cattle and sheep grazing as mentioned previously. The potential for alternative land uses in these areas is also affected by shallow, poorly developed soils with low water holding capacity and high erosion potential, and by a general lack of adequate surface or ground water resources. The mining and related activities will not directly affect steep ridge and valley areas since no surface disturbance is proposed or anticipated in these areas.

Most existing and historical development in the general area has occurred in the valley bottoms and adjacent lower valley slopes. These areas offer the benefits of practical access, proximity to surface water sources, and more extensive and fertile soil resources. Extensive historical mining and related activities have occurred in the Pleasant Valley within the permit area. Generally these activities have resulted in extensive surface disturbance and alteration of natural conditions in the effected areas. Specifically, within the proposed disturbed area historic mining has affected approximately 74% of the area. Existing and potential uses in the valley bottom areas include mining, transportation, wildlife habitat, low intensity grazing, and undeveloped and developed recreational uses, as well as development of private property in and around the Town of Scofield. While areas do exist outside of the permit boundary where valley bottom soil resources are adequate to support limited agricultural activities, these areas are limited to the final reclamation is designed to restore disturbed areas to a safe, stable condition and to reestablish the productivity of the land consistent with the postmining land uses(s) of wildlife, grazing and recreation. The proposed postmining land uses of wildlife habitat, water shed, and commercial use reflects the predisturbance use of this and adjacent areas, existing land use plans and policies, the desires of affected surface landowners, and practical constraints relative to land use capability and condition. Specific land use considerations and constraints are discussed in R645-301-400, Land Use Information. The Kinney No. 2 Mine reclamation plan has been designed to successfully meet these objectives and will result in effective temporary stabilization, and a postmining configuration which blends with the surrounding terrain and provides environmental values consistent with or superior to those which existed prior to mining.

The Kinney No. 2 Mine reclamation plan has been developed utilizing available information on the existing environmental resources as described in R645-301-200, 300, 400600, and 700, Environmental Information. In addition, CR has incorporated both available information on current successful reclamation technology and practices and their extensive operating experience in the area. While the plans presented in this permit represent what CR feels to be the most effective reclamation practices for this site, it is important to note that successful reclamation must be a dynamic process, incorporating new information to optimize overall effectiveness. In order to meet the reclamation objectives these plans may be modified as appropriate to reflect changing conditions, revised regulatory requirements, advances in reclamation technology, and the results on ongoing research and experience relative to the long-term effectiveness of various reclamation practices. Any future plan modifications will be submitted as permit modifications through the normal regulatory process. Reclamation will involve a logical sequence of activities designed to achieve the overall reclamation objectives in an organized progressive manner. The following represent the general steps for reclamation of any mine or mine related surface disturbance areas:

- Facility Demolition and Removal
- Stabilization and Sealing of Mine Openings
- Disposal of Non-Coal Wastes, and Mine Waste Materials
- Removal and temporary storage of topsoil/substitute materials from long term storage (necessary because of segregation of better quality topsoil on top of substitute topsoil materials in stockpile)
- Backfilling and Grading to Establish the Final Design Configuration
- Drainage Reestablishment
- Road Removal
- Soil/Substitute Replacement
- Revegetation
- Post-Reclamation Management, Maintenance, and Monitoring
- Removal and Reclamation of Sedimentation Ponds and Associated Structures
- These activities are discussed in detail in the following sections.

412.100 Post-Mining Land Use Plan

The postmining land use for the mine area is the same as the current land uses, which are Mountain Range, Water Shed, Wildlife Habitat and Commercial within the Scofield Town boundary as well as those uses shown in Table 3 presented previously in this chapter as per the legislated zoning ordinances Beyond the general reclamation objectives of restoring disturbed areas to a safe, stable condition and reestablishing the productivity of the land consistent with the postmining land use(s), this reclamation plan is designed to achieve the following specific operational and environmental objectives:

- Removal of Mining Related Structures and Facilities
- Eliminate Potential Hazards

projected mine life. In the unlikely event that temporary cessation of operations becomes necessary, the mine surface facilities would be secured to minimize potential public health and safety hazards and to prevent or minimize potential related adverse impacts on the environment. Specifically, entrances to the mine, mine facilities, and loadout facilities would be barricaded and locked, buildings, equipment, fuel storage facilities and other support facilities would be locked and the site would be put on extended maintenance and care status until operations could be reactivated or a decision is made to permanently close the operation. In order to prevent unauthorized access to underground mine workings during any period of temporary cessation, mine openings including the mine portals and ventilation shaft will be secured by locked barricades. Dependent on the anticipated period of temporary closure, access to mine portals would be restricted by either temporary concrete block walls or fabricated locking metal gates. Maintenance and care status would involve the use of mine or contract security personnel to control site access, regularly inspect the site to identify any hazardous conditions, and conduct routine maintenance and repair to prevent significant deterioration or damage to the existing structures and facilities.

If temporary cessation of mining and/or reclamation operations for a period of 30 days or more becomes necessary, CR will submit a notice of intention to UDOGM. The notice will include a statement of the exact number of acres which have been disturbed prior to cessation, the nature and extent of any reclamation completed, and any reclamation, environmental monitoring, water treatment, or other activities which will continue during the period of temporary cessation. Monitoring will include taking one composite sample of the temporary waste coal processing wasterock storage pile for each 5,000 tons in the pile, should there be coal processing waste rock in the temporary pile at time of cessation. The sample(s) will be analyzed for parameters listed on Tables 3 and 7 in the UDOGM January 2008 "Guidelines for Management of Topsoil and Overburden".

The mine site provides access to private property to the north and east, therefore, the private property owners involved will have keys to the site gates to access their property during any cessation period, and during the reclamation bond period. Roads have been designed into the reclamation plan for post mining land use to allow the private property owners access.

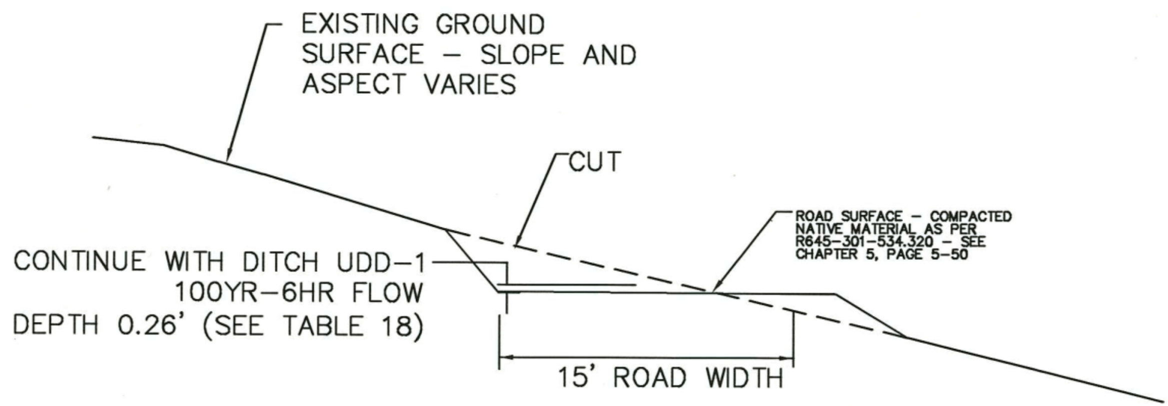
R645-301-520 Operation Plan

In developing the engineering designs and operating plans for the mining and related operations, CR has reviewed and evaluated all existing available information on site geology, coal occurrence and characteristics, and environmental resource values. This information along with sound engineering principals has been combined to develop designs and plans which will provide for safe, efficient, and effective mining operations while minimizing potential related environmental impacts and effecting full compliance with all applicable regulatory requirements. The following sections describe the specific design methods, operating measures, and associated control and mitigation practices which will be utilized to accomplish these objectives.

521.100 Cross Sections and Maps

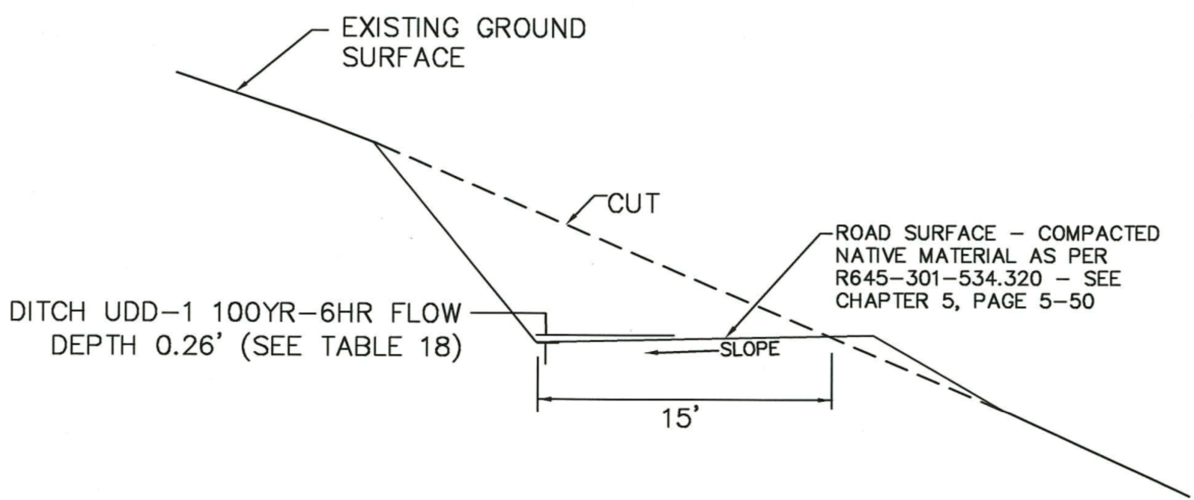
Maps presenting all of the information required by R645-521.100 are included in this permit document, including Maps 1 through end of maps. Each chapter of this document refers to particular maps that present and represent information required. A complete list of maps can be found as the List of Maps at the beginning of the document. Map scales have been chosen to represent the information contained on each map and according to R645-301-141.

In order to assure that designed structures are constructed according to the design plans and to



NOTE: WATER BARS TO BE PLACED AT GRADE CHANGES AND/OR AT 300' SPACING OR PER US FOREST SERVICES STDS, WHICHEVER IS LESS

PRIMARY ROAD P8
NTS



PRIMARY ROAD P9
DITCH UDD-1
NTS

PROFESSIONAL ENGINEER
No. 171930-2202
DAVID E. HANSEN
STATE OF UTAH

THESE ROAD CONFIGURATION SECTIONS ARE BASED ON THE GEOTECHNICAL INVESTIGATION RECOMMENDATIONS FOR CUT & FILL SLOPES, AND ON STANDARD ROAD DESIGN CRITERIA.

HANSEN ALLEN & LUCE inc — CONSULTANTS ENGINEERS, Salt Lake City Utah	PRIMARY ROADS P8 & P9 CONFIGURATION	FIGURE 25A

The other stockpile areas near Culvert CP-2 will be small and will use silt fencing to control erosion (see Map 24). A single silt fence is planned for the entire perimeter of each stockpile. If installed silt fencing is shown to be inadequate to contain erosion, then additional silt fencing will be installed at even contours up the slope of the stockpile.

Main Access Road - Primary Road P1 – The short section of the access road approximately 115 feet long from it's intersection with Highway 96 eastward to a cattle guard cannot be routed to the Sedimentation Pond 1. Runoff from this small road section will be controlled through small ditches and sediment traps located on each side of the road as shown on Map 24. Drainage and Sediment Control Plan. A silt fence, or straw bale outlet from the sediment trap will catch any overflow from the trap prior to discharge into the highway side ditches.

526.400 Air Pollution Control Facilities

N/A – Applies to Surface Coal Mining Only

R645-201-527 Transportation Facilities

Roads

In conjunction with the proposed mining and related operations CR will construct, operate and maintain a number of new roads and will operate and maintain several existing roads. Both new and existing roads will be utilized to access existing and proposed facilities and for transportation of personnel, equipment, and supplies. All roads are classified as primary roads. The primary road classification includes any road used for transporting coal or spoil, roads which are used frequently for periods exceeding 6 months, and roads which will be retained to support the post mining land use. All roads will be utilized on a frequent, long-term basis to support the proposed mining and related operations. Proposed roads which will be used in conjunction with the proposed mining and related operations include the following:

Proposed Roads in Kinney No. 2 Mine Facilities Area

PR-1 Primary mine access road for the proposed surface facilities area
PR-2 Primary mine access road to Mine Office Pad
PR-3 Primary mine access road to the Portal Pad
PR-4 Primary mine access road to the Storage Area Pad
PR-5 Primary mine access road to the Loadout Pad
PR-6 Primary mine access road to Sedimentation Pond No. 1
PR-7 Primary mine access road to the North Access Road
PR-8 Primary access road through site for post mining land use
PR-9 Primary access road to top of mountain for post mining land use

~~All p~~Proposed roads are shown on, Map 13, Mine Surface Facilities Map, and Map 29 A, Post Mining Topography. Road profiles can be seen on Maps 20 through 22, Mine Road Profiles.

Design and Construction - All roads have been or will be located and constructed to the extent operationally feasible in the most stable areas available and outside of the channel of intermittent or perennial streams. Road design and construction plans will prevent damage to public or private property; minimize the potential for downstream flooding or sedimentation; reflect consideration of the size of vehicles which will be using the road, traffic volume, and normal speeds; and to the extent possible, using the best technology currently available, minimize adverse impacts on fish, wildlife and related environmental values.

All roads have been designed to provide for effective drainage, long-term stability, and safe vehicle operations under varying weather conditions. Design and construction of all primary roads will be certified by a qualified Registered Professional Engineer as meeting these criteria. All roads except Primary Roads P8 and P9 will meet MSHA safety requirements including either a berm or guard rail on the outside edges where the slope is downward.

Design and construction practices for specific roads will be dependent primarily on site conditions and the nature and frequency of anticipated use. The primary mine access road (PR-1) will provide access to the mine surface facilities and will be utilized for transportation of personnel, equipment, coal, and supplies. Because it will handle a relatively heavy traffic volume and must provide safe operating conditions year-round, Road PR-1 will be a paved asphalt road with all-weather travel surface from Highway 96 to the Shop-warehouse building. Primary Road P2 will also be paved to the Mine Office building; in addition, the Mine Office Pad will be paved. The other primary roads except roads P8 and P9 will also be utilized on a year-round basis but the associated traffic levels will be significantly lower so these roads have been designed and will be constructed with an adequate compacted road base and gravel or similar durable granular surfacing. Primary Roads P9 is required for private property access, with no daily mining activity use, only occasional use for water monitoring and subsidence monitoring during the summer and fall by light vehicles and will have surfacing equal to the existing access road being replaced (R645-301-534.320). Road P8 is only a post mining land use road to provide access to private property north and east of the mine site, it to will have surfacing equal to the pre-mining access road being replaced (R645-301-534.320).

Road construction will involve cut and fill earthwork operations using tractor scrapers, tracked dozers, and motor graders. No potential acid or toxic-forming materials will be utilized in road construction or as road surfacing materials. Cut and fill slopes will be established at maximum grades up to 0.8H:1V, with the steepest grades in rock dependent on the characteristics of the rock in conjunction with the geotechnical recommendations found in Exhibit 14, Geotechnical Investigations. Typical road construction practices, road configuration, and dimensions are illustrated by Figure 25, Typical Primary Road Configuration and Figure 25, Primary Roads P8 & P9 Cinfiguration. Road gradients will vary from flat to a maximum of approximately 14.5% percent for the main roads and any required road embankments will be constructed and compacted in a controlled manner to provide a minimum static factor of safety of 1.3. Only one road (P6), which accesses Sediment Pond 1 has a gradient above 14.5%, at 18.8%. This road will be used on a limited basis to access and clean out the sediment pone. All road cut and fill slopes will be revegetated as soon as reasonably practical following construction using the temporary revegetation seed mixture to stabilize the slopes and minimize erosion potential. Road surfaces will be graded or owned to prevent accumulations of water on the road surface and adequately sized ditches and culverts will be installed and maintained to effectively carry road and other disturbed area drainage. Adequate cover will be provided over all culvert crossings to prevent damage or collapse of the culverts and culverts have been designed and will be installed to prevent plugging, erosion at the culvert inlet or outlet, and any drainage over the road surface. The locations of all proposed ditches are shown on Map 24, Drainage and Sediment Control Plan Map, and ditch designs are included in R645-301-730, and in Exhibit 16, Runoff Control Design Details.

Operation and Maintenance - Operation and maintenance procedures for all mine roads are designed to provide a smooth operating surface, assure safety, and minimize dust emissions. Road maintenance will involve periodic grading to provide a smooth surface, remove rocks or debris, and maintain effective drainage; repair and resurfacing as necessary; inspection, clean-out, and repair of ditches and drainage structures; and watering or application of surfactants to control dust during dry periods. Generally, speeds on roads and in active operating areas will be limited to 15 miles per hour by posted speed limits both as a safety consideration and to minimize dust emissions from unpaved roads. In the unlikely event that any road is damaged by a catastrophic event such as an earthquake or flood, CR will make appropriate repairs as soon as reasonably practicable and will limit the use of the road or provide an alternate access if unsafe conditions exist.

Description of Individual Structures - The following sections provide more detailed information for specific roads and associated structures:

Primary Road P1 will receive the most traffic, therefore it will be paved. From Highway 96 to the cattle guard as shown on Map 13, Surface Facilities Map, and on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas, the road will be crowned in the center with drainage flowing to the sides in both directions. The purpose of the cattle guard is not to control cattle, but to provide a drainage trench to catch runoff containing fines from the road, preventing them from being washed downgradient on the road and bypassing Sedimentation Pond 1. Below the cattle guard, drainage from the road will flow to sediment traps on both sides of the road as shown on Map 24, Drainage and Sediment Control Plan – disturbed Drainage Areas. For the remainder of Primary Road P1, the design will be as shown on Figure 25, Typical Primary Road Configurations for sloping terrain and level terrain.

All other roads will be constructed as shown on Figure 25, Typical Primary Road Configurations, and Figure 25A, Primary Roads P8 & P9 Configuration for sloping terrain and level terrain.

R645-301-528 Handling and Disposal of Coal, Overburden Excess Spoil, and Coal Mine Waste

528.100 Coal Removal, Handling, Storage, Cleaning and Transportation Areas and Structures

The proposed underground mining and related activities will require limited surface support facilities. The facilities to be utilized in conjunction with the proposed operations will include new facilities to be constructed in the proposed Kinney No. 2 Mine surface facilities area. These facilities will provide the necessary infrastructure for effective management and handling of personnel, equipment, materials and supplies, and both coal and mine development waste rock materials, and will include a number of structures specifically designed to control or mitigate potential mining related impacts.

Construction of required surface structures and facilities has previously been discussed in R645-301-520, General Description of Mine Plans, Mining Methods, and Related Design Requirements. The surface structures and facilities will be operated, maintained, and ultimately reclaimed in a manner that prevents or controls erosion and siltation, water pollution, and damage to public or private property; and to the extent possible using the best technology currently available, minimizes damage to fish, wildlife, and related environmental values, and minimizes additional contributions of suspended solids to streamflow or runoff outside the permit area. Any contributions of suspended solids from mine disturbance areas will not exceed applicable effluent limitations under Utah or Federal law.

Required surface facilities are shown and identified on Map 13, Surface Facilities Map, and include the following:

- Conveyor SB-1
- Conveyor Transfer Tower
- Conveyor SB-2
- Non-Spec Coal Pile & Stacking Tube
- Conveyor SB-3
- Spec Coal Pile & Stacking Tube

- Conveyor SB-4
- Screening & Crushing Building
- Sediment Pond Road – Primary P6
- Truck Loadout Building
- Lodout Road – Primary P5
- Storage Sheds – 5 each
- Shop – Warehouse
- Fueling Facility
- Main Access Road – Primary P1
- Office Road – Primary P2
- Portal Access Road Primary P3
- Storage Area Access Road P4
- Mine Office – BathhouseBathouse
- Topsoil StockpileStockplie
- Water Tank
- Electrical Substation
- Sedimentation Pond
- North Access Road – Primary P7
- Explosives Magazine
- Explosives Cap Magazine
- Development Waste Temporary Storage Area
- Primary Road P8 access road through site for post mining land use
- Primary Road P9 access road to private property east of mine site
-

The following sections describe design and construction details and operation and maintenance plans for the identified structures.

Coal Handling Systems and Facilities

The coal handling system will consist of both the underground coal haulage system and the surface coal handling components which will transfer the coal from the mine to the truck loadout. Components of the surface portion of the coal handling system are shown on Map 13, Surface Facilities Map and include the following:

- Conveyor SB-1
- Conveyor Transfer Tower
- Conveyor SB-2
- Off-SpecNon-Spec Coal Pile & Stacking Tube
- Conveyor SB-3
- Spec Coal Pile & Stacking Tube
- Conveyor SB-4
- Screening & crushing Building
- Sediment Pond Road – Primary P6
- Truck Loadout Building
- Coal ProcessingDevelopment Waste Temporary Storage Area

Design - The coal handling system has been designed using the best current technology and accepted engineering practices to provide the coal and undergroundmine development wasterock carrying capacity to readily handle the maximum projected mine production volumes with sufficient excess carrying capacity to handle potential surges in system feed rates. System design also provides the storage capacity to address any normal fluctuations in coal production, shipping schedules, or market demand and reflects the design and construction considerations necessary to minimize potential adverse environmental impacts, including but not limited to minimizing erosion and additional contributions of sediment to surface runoff.

The Surface Coal Haulage System which consists of:

The MB-1 conveyor discharge onto the tail loading section of SB-1 located in the transfer tower. MB-1 will be elevated to accommodate mine vehicle and equjipment traffic to pass beneath it

528.200 Overburden

See discussion below under 528.321.

528.301 Excess Spoil

See discussion below under 528.321.

528.320 Coal Mine Waste

Three classes or categories of material will be brought out of the mine either on beltline or with buggy that could end up being classified as a form of coal mine waste. One; rock with no coal (from overcast construction and fault crossings), two; a mixture of coal and rock (from out of seam dilution, or similar), three; dirty coal (high ash, or high sulfur coal from parts of the deposit that may be inherently dirty). These three categories of material will generally be handled differently, depending on the volume of coal mine waste (material) at a given time and volume of coal mine waste relative to clean coal production.

No coal preparation plant (washing plant) is planned for the Kinney No. 2 Mine, and therefore there will be only incidental "coal processing waste" generated. This is due to a specific interpretation of the Utah Coal Mining Rules (R645-100) where stacking, crushing, screening, and general mechanical separation by handling of coal may intentionally or inadvertently produce coal processing waste. All materials falling into this category (which will generally be from class two or three from the paragraph above which includes coal contaminated with out of seam dilution, and low quality coal) will be first stacked on the off-spec coal pile. Material from this pile will then, either be blended into the saleable coal product stream, or if the volume of coal processing waste or low quality coal is too great to blend into the salable coal product, will then be hauled to the 3,900 ton coal processing waste temporary storage pile shown as no. ~~7~~38 on Map 13 and on Figure 41. When sufficient volume of coal processing waste is accumulated on this temporary pad it will then be sold, as "distressed coal," to the Arch Coal Washing Facility on Ridge Road south of Price, UT. In either scenario coal processing waste will be sold and removed from the property with it's final fate being either burned at a power plant or deposited in an approved refuse facility after being washed at a coal preparation plant.

~~See discussion below under 528.321.~~

~~528.321 Return of Coal Processing Waste to Abandoned Underground Mines~~

~~Development rock from underground mining operations activities may be temporarily stockpiled in the portal area and will be periodically loaded into rear dump trucks and hauled to temporary stockpile areas until it can be returned to the mine, where it will be placed in areas specifically designated for this purpose.~~

~~Mine development waste consisting of a mixture of rock and coal materials will be temporarily stored at an area on the loadout pad as shown on Map 13, Surface Facilities Map. This material is not coal processing waste since no coal preparation plant is planned, however this material may not be saleable as regular coal product due to a high content of rock. The area designated is capable of containing approximately 3,900 tons of material. This material will be sold as a low quality coal product to local coal preparation facilities, or will be deposited in other facilities permitted by the UDOGM.~~

~~Development Waste Temporary Storage Area (~~

In the case of "underground development waste" (generally material from class one in the frequently for periods exceeding 6 months, and roads which will be retained to support the post mining land use. All roads will be utilized on a frequent, long-term basis to support the proposed mining and related operations. Proposed roads which will be used in conjunction with the proposed mining and related operations include the following:

Proposed Roads in Kinney No. 2 Mine Facilities Area

PR-1 Primary mine access road for the proposed surface facilities area
PR-2 Primary mine access road to Mine Office Pad
PR-3 Primary mine access road to the Portal Pad
PR-4 Primary mine access road to the Storage Area Pad
PR-5 Primary mine access road to the Loadout Pad
PR-6 Primary mine access road to Sedimentation Pond No. 1
PR-7 Primary mine access road to the North Access Road
P8 Primary access road through site for post mining land use
P9 Primary access road to top of mountain for post mining land use

All proposed roads are shown on, Map 13, Surface Facilities Map and Map 29A for post mining land use roads P8 and P9 Road profiles can be seen on Maps 20 through 22, Mine Surface Facilities Road Profiles.

Design and Construction - All roads have been or will be located and constructed to the extent operationally feasible in the most stable areas available and outside of the channel of intermittent or perennial streams. Road design and construction plans will prevent damage to public or private property; minimize the potential for downstream flooding or sedimentation; reflect consideration of the size of vehicles which will be using the road, traffic volume, and normal speeds; and to the extent possible, using the best technology currently available, minimize adverse impacts on fish, wildlife and related environmental values.

All roads have been designed to provide for effective drainage, long-term stability, and safe vehicle operations under varying weather conditions. Design and construction of all primary roads will be certified by a qualified Registered Professional Engineer as meeting these criteria. All roads will meet MSHA safety requirements except roads P8 and P9 as discussed previously including either a berm or guard rail on the outside edges where the slope is downward. Roads P8 and P9 will not be used by mining equipment therefore they are not required to meet MSHA standards.

Design and construction practices for specific roads will be dependent primarily on site conditions and the nature and frequency of anticipated use. The primary mine access road (PR-1) will provide access to the mine surface facilities and will be utilized for transportation of personnel, equipment, coal, and supplies. Because it will handle a relatively heavy traffic volume and must provide safe operating conditions year-round, Road PR-1 will be a paved asphalt road with all-weather travel surface from Highway 96 to the Shop-warehouse building. Primary Road P2 will also be paved to the Mine Office building; in addition, the Mine Office Pad will be paved. The other primary roads except roads P8 and P9 will also be utilized on a year-round basis but the associated traffic levels will be significantly lower so these roads have been designed and will be constructed with an adequate compacted road base and gravel or similar durable granular surfacing. Roads P8 and P9 are required for private property access, with no mining equipment use. Road P9 will be used occasionally for water monitoring and subsidence monitoring during the summer and fall by light vehicles and will have surfacing equal to the existing access road being replaced (R645-301-534.320). Road P8 is a post mining land use road to provide access to private property north and east of the mine site, it to will have surfacing equal to the pre-mining access road being replaced (R645-301-534.320).

Road construction will involve cut and fill earthwork operations using tractor scapers, trackhoes, tracked dozers, and motor graders. No potential acid or toxic-forming materials will be utilized in road construction or as road surfacing materials. Cut and fill slopes will be established at maximum grades up to 0.8H:1V, with the steepest grades in rock dependent on the characteristics of the rock in conjunction with the geotechnical recommendations found in Exhibit 14, Geotechnical Investigations. Typical road construction practices, road configuration, and dimensions are illustrated by Figure 25, Typical Primary Road Configuration, and Figure 25A, Primary Roads P8 & P9 Configuration. Road gradients will vary from flat to a maximum of approximately 14.5% percent for the main roads and any required road embankments will be constructed and compacted in a controlled manner to provide a minimum static factor of safety of 1.3. Only one road (P6), which accesses Sediment Pond 1 has a gradient above 14.5%, at 18.8%. This road will be used on a limited basis to access and clean out the sediment pone. All road cut and fill slopes will be revegetated as soon as reasonably practical following construction using the temporary revegetation seed mixture to stabilize the slopes and minimize erosion potential. Road surfaces will be graded or crowned to prevent accumulations of water on the road surface and adequately sized ditches and culverts will be installed and maintained to effectively carry road and other disturbed area drainage. Road P9 will be constructed similar to the road it replaces with an inward slope to provide for Ditch UDD-1 as shown in the ditch design Table 18, Ditch Design Details and on Figure 25A, Primary Roads P8 & P9 Configuration. Road P8 will be a post mining land use road with drainage controlled by extending ditch UDD-1 design sizing along it's width, and also by constructing water bars, or cross drains at a spacing of 300 feet, or as recommended by criteria set forth in the US Forest Service document, Water/Road Interaction: Introduction to Surface Cross Drains, publication No. 7700 – Transportation Systems, 2500 – Watershed and Air Management, September 1998, 9877 1806 – SDTDC, found at http//www.stream.fs.fed.us/water-road/w-r-pdf/crossdrains.pdf. Water bars, or cross drains will be used for drainage control at short spaced intervals, therefore the roadside ditch sized to UDD-1 standards will be significantly over sized, however, it is felt that this is the best approach since the road will be for post mining land use. Adequate cover will be provided over all culvert crossings to prevent damage or collapse of the culverts and culverts have been designed and will be installed to prevent plugging, erosion at the culvert inlet or outlet, and any drainage over the road surface. The locations of all proposed ditches are shown on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas Map, and ditch designs are included in R645-301-730, and in Exhibit 16, Runoff Control Design Details.

Operation and Maintenance - Operation and maintenance procedures for all mine roads are designed to provide a smooth operating surface, assure safety, and minimize dust emissions. Road maintenance will involve periodic grading to provide a smooth surface, remove rocks or debris, and maintain effective drainage; repair and resurfacing as necessary; inspection, clean-out, and repair of ditches and drainage structures; and watering or application of surfactants to control dust during dry periods. Generally, speeds on roads and in active operating areas will be limited to 15 miles per hour by posted speed limits both as a safety consideration and to minimize dust emissions from unpaved roads. In the unlikely event that any road is damaged by a catastrophic event such as an earthquake or flood, CR will make appropriate repairs as soon as reasonably practicable and will limit the use of the road or provide an alternate access if unsafe conditions exist.

Description of Individual Structures - The following sections provide more detailed information for specific roads and associated structures:

Primary Road P1 will receive the most traffic, therefore it will be paved. The road will be crowned in the center with drainage flowing to the sides in both directions. The purpose of the cattle guard is not to control cattle, but to provide a drainage trench to catch runoff containing fines from the road, preventing them from being washed downgradient on the road and bypassing

Sedimentation Pond 1. Below the cattle guard, drainage from the road will flow to ditches and sediment traps on both sides of the road as shown on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas. For the remainder of Primary Road P1, the design will be as shown on Figure 25, Typical Primary Road Configurations for sloping terrain and level terrain.

All other roads will be constructed as shown on Figure 25, Typical Primary Road Configurations for sloping terrain and level terrain, and Figure 25A, Primary Roads P8 & P9 Configuration for roads P8 and P9.

534.130 Static Safety Factor for Roads

The Geotechnical Investigation, dated November 26, 2007 states on page 17 of 17,

"It is anticipated that fill slopes will be created with on-site materials. If this material is placed and compacted in accordance with recommendations provided in Section IV, fill slopes as steep as 1.5H:1V will have a factor of safety of at least 1.3 if constructed of the native clayey soils. Fill slopes shown on Sections A-A, B-B, and F-F will likely be constructed of this clayey on-site fill. Test pits in the vicinity of the fill areas shown on Sections C-C, D-D, and E-E encountered significant amounts of medium-dense silty sand. Fill slopes as steep as 1.8H:1V constructed of this silty sand material have a computed factor of safety of at least 1.3. Plots of stability analyses for typical fill slopes are included in the appendix."

mining and related activities. Reclamation of mine surface facilities areas following completion of mining will be initiated as soon as operationally feasible after mining ceases and no later than the next normal field season (typically May through October). It is anticipated that final reclamation would be completed within 24 months from the time the last coal is either produced or shipped from the property, whichever is later. Figure 36, Reclamation Timetable - Mine Facilities Area, outlines the specific sequence and anticipated timing of final site reclamation activities.

From a hydrologic standpoint reclamation must be completed in phases which include initial, interim and final reclamation. Initial reclamation will include the removal of all temporary surface runoff control facilities as illustrated on Map 24, with the exception of the following specific structures which will be utilized and or removed during interim and final reclamation.

Interim Reclamation

- Ditches UDD-1 & UDD-2 Remain
- Ditches DE-3 and DE-4 Remain
- CulvertDitch UDC-2 Remains
- Culvert CP-2 Remains
- Sediment Pond 1 Remains
- Sediment Pond 1 Access Road Remains
- ~~Post Mining Land Use Road Remains as access for private property owners~~
- Road P9 adjacent to Ditch UDD-1 remains as it belongs to private property owner E.G Telonis ETAL
- Road P8 and Ditch UDD-1 remains as it belongs to the private property owners E.G. Telonis ETAL, and to the Jones family property north of the mine site.
- Re-establish the irrigation ditch

Final Reclamation

- Remove Ditches DE-3 and DE-4
- Remove Sediment Pond 1
- Remove Sediment Pond 1 Access Road
- Ditch UDD-1 Remains
- Ditch UDD-2 Remains
- CulvertDitch UDC-2 Remains
- Culvert CP-2 Remains
- Riprap Energy Dissipation Fan Remains
- ~~Post Mining Land Use Roads Remain as access to private property north and east~~
- Road P9 ~~adjacent to~~ and Ditch UDD-1 remains as it belongs to private property E.G. Telonis ETAL
- Road P8 and Ditch UDD-1 remains as it belongs to the private property owners E.G. Telonis ETAL, and to the Jones family property north of the mine site.

Final reclamation will involve removal of all mine related structures and facilities, closure and sealing of portals and mine openings, disposal of waste materials, backfilling and grading, drainage reestablishment, road removal, removal of Sediment Pond 1, placement of soil or substitute materials, revegetation, and soil stabilization. Roads P8 and Ditch UDD-1 will be constructed during reclamation to provide access to private property as discussed previously. Road P9 will remain as during mining to provide access to private property east of the mine site as discussed previously. Generally, soil/substitute replacement and revegetation efforts will be coordinated so that soil materials are revegetated as soon as practically possible following placement.

Following final reclamation of mine facilities areas, the facilities to remain for post_mining land use include the roads P8 and P9, ditches and culverts shown on Map 29A,29, Postmining Topography. and Interim Drainage Control Map. Interim drainage and sediment controls during the post-reclamation liability period will include alternative sediment control methods as the primary means of controlling erosion and sediment contributions. The Postmining Topography and Interim Drainage Control Map (Map 29), shows the drainage and sediment control features which will be retained during the reclamation liability period. Components of the interim drainage and sediment control plan are identified and discussed in detail in R645-301-730,

Chapter 7

R645-301-700 Hydrology

Kinney No 2 Mine

Revised 5-9-2011

Table of Contents

R645-301-710 General Contents 1

R645-301-712 Certification 2

R645-301-721 General Requirements 2

R645-301-722 Cross Sections and Maps 9

301-722.400 Water Wells In The Permit and Adjacent Area 9

R645-301-723 Sampling and Analysis 10

R645-301-724.100 Ground Water Information 13

Ground Water Environment 15

Ground Water Aquifers 16

Alluvial/Colluvial Aquifer System 16

Perched Ground Water System 17

Stored Mine Water System 18

Regional Aquifer System 19

Ground Water Occurrence 21

Ground Water Quality 24

Ground Water Rights and Use 35

Ground Water/Surface Water Interactions 35

Ground Water Summary 37

R645-301-724.200 Surface Water Information 37

Surface Water Environment 37

Drainages and Surface Water Bodies 38

Drainages 38

Surface Water Bodies 39

Perennial Streams 40

Ephemeral Drainages 40

Drainages and Surface Water Bodies 41

Surface Water Occurrence 41

Surface Water Quality 51

General Water Quality Characteristics 51

Temporal and Spatial Water Quality Characteristics 52
Surface Water Rights and Use 53
Surface Water/Ground Water Interactions 54
The Major Perennial Streams 73
R645-301-724.320 Reclamation & Prevention Material Damage 73
R645-301-724.400 Climatological Information 75
Temperature 76
Wind 77
R645-301-724.700 Including R645-302-320 Alluvial Valley Floors 77
R645-302-320 & 321 Alluvial Valley Floors Determination 77
R645-301-725 Baseline Cumulative Impact Area Information 77
R645-301-726 Modeling 79
R645-301-727 Alternative Water Source Information 80
R645-301-728 Probable Hydrologic Consequences Determination 80
Ground Water Baseline Conditions 80
Surface Water Baseline Conditions 81
Stream Flows and Surface Water Quality 82
Ground Water Occurrence, Movement, Discharge, and Quality 83
Potential for Adverse Impacts 83
Ground Water Impacts 83
Ground Water Consequences 85
Surface Water Impacts 87
Surface Water Consequences 88
R645-301-729 Cumulative Hydrologic Impact Assessment 93
R645-301-730 Operation Plan 93
R645-301-728.320 Presence of Acid or Toxic Forming Materials 94
Contamination, Diminution, or Interruption of Ground or Surface Water Sources with Current Beneficial Use Within the Permit and Adjacent Areas 95
R645-301-731 Hydrologic-Balance Protection 95
Components of the Hydrologic Protection Plans 95
R645-301-731.110 Ground Water Protection 96
Underground Coal Removal 97

Surface Placement of Coal, Mine Waste 98
Retention of Drainage in Sedimentation Pond Structures 99
R645-301-731.120 Surface Water Protection 100
Mapping of Hydrologic Resource Protection Information 100
Removal of Vegetation and Soil Materials from Disturbance Areas 101
Surface Placement of Coal, Mine Waste 103
Discharge of Mine Water to Surface Drainages 104
Mine Water Supply Withdrawals 107
Coal Preparation Activities 107
Operation of Drainage and Sediment Control Structures 107
R645-301-731.200 Water Monitoring 108
R645-301-731.300 Acid and Toxic Forming Materials 111
R645-731.500 Discharges 111
R645-301-731.600 Stream Buffer Zones 111
R645-301-731.700 Cross Sections and Maps 111
R645-301-731.800 Water Rights and Replacement 111
R645-301-732 Sediment Control Measures 112
Runoff Calculations 115
Discharge Rate Calculations 115
Volume Calculations 115
Climatological Information 115
Modeling Methodology 116
R645-301-733 Impoundments 117
Operation and Maintenance 118
R645-301-735 Disposal of Excess Spoil 119
R645-301-736 Coal Mine Waste & Underground Development Waste 119
Underground Development Waste 119
Please refer to a full treatment of this topic in Chapter 5 under R645-301-526 Mine Facilities – Mine Development Waste. 119
R645-301-737 Noncoal Mine Waste 119
R645-301-738 Temporary Casing and Sealing of Wells 121
R645-301-740 Design Criteria and Plans 121

R645-301-742 Sediment Control Measures 121
R645-301-742.200 Siltation Structures 122
R645-301-742.220 Sedimentation Ponds 123
R645-301-742.300 Diversions 124
Collection Ditches and Associated Structures 125
R645-301-742.400 Road Drainage 126
R645-301-743 Impoundments 127
R645-301-744 Discharge Structures 127
R645-301-745 Disposal of Excess Spoil 128
R645-301-746 Coal Mine Waste 129
R645-301-738 Temporary Casing and Sealing of Wells 129
R645-301-747 Disposal of Noncoal Mine Waste 129
Noncoal Waste Disposal 129
R645-301-748 Casing and Sealing of Wells 130
R645-301-750 Performance Standards 130
R645-301-751 Water Quality Standards and Effluent Limitations 130
R645-301-760 Reclamation 132
R645-301-761 General Requirements 132
R645-301-762 Roads 136
R645-301-763 Siltation Structures 136
R645-301-764 Structure Removal 137
R645-301-765 Permanent Casing and Sealing of Wells 138
References 138

R645-301-710 General Contents

This section describes the hydrologic conditions and resources within the permit and adjacent areas that could potentially be affected or impacted by the mining and reclamation activities. Information in this section was developed following applicable regulatory guidelines (R645-301-700) for coal mine permitting in the State of Utah.

Hydrologic conditions in the permit and adjacent areas have been characterized in this section using information from ongoing baseline characterization and monitoring. activities. This hydrology description represents a consolidation of monitoring data specific to the Kinney No. 2 Mine permit area (Exhibit 9, Seep and Spring Survey, Exhibit 10, Surface and Ground Water Field Measurements, Exhibit 11, Monitor Well Completion Details, Exhibit 12, Surface and Ground Water Quality Data; Spread sheet prints, and Lab Analyses, Exhibit 20, Ephemeral Drainage Determination).Lab Analyses). Ongoing baseline monitoring activities are as specified herein, and within R645-301-724 and R645-301-724.100.

This hydrology description represents a consolidation of regional information and recent monitoring data specific to the Kinney No. 2 Mine permit area. Ongoing baseline monitoring activities to be a part of the Baseline Hydrology Monitoring Plan for the Kinney No. 2 Mine are discussed briefly below. The purpose of the plan is to collect and evaluate baseline hydrologic data specific to the Kinney No. 2 Mine. Data collected under the plan is used to characterize existing surface water and ground water in the area and evaluate potential impacts to these resources from mining and reclamation activities. The monitoring plan consists of a comprehensive seep and spring survey completed by Rock Logic Consulting, LLC of Cedaredge, Colorado in 2006 Exhibit 9, Seep and Spring Survey. The survey resulted in the identification of 25 spring/seep locations. Unfortunately several nomenclature issues have occurred relative to seeps and springs, wherein springs and seeps were originally given one name during One of the spring and seeps noted in their report was identified as Miller Spring. Map 7 showing the regional hydrology refers to this as Eagle Spring. For clarity, both referenced names are shown on Map 7. Also as a point of clarification, Eagle Pond 1 as defined in the Seep and Spring survey then later, during collection of baseline data from those locations, the names were inadvertently changed introducing some confusion when reviewing the data.is referenced herein and shown on Map 7 as Aspen Spring. In addition to the seep and spring survey, well drilling, testing, and monitoring has been completed on 11 wells to evaluate geohydrologic conditions including the occurrence of ground water and hydraulic characteristics of the aquifers. Additional baseline data have been collected fromPerennial surface water sources found within or adjacent to the two perennial streams near themine permit area (, include Mud Creek, and Miller Canyon),Canyon, and from nearby Scofield Reservoir. Nomenclature problems also plague data collected from streams, the groundwater wells and Scofield Reservoir. Clarification of the nomenclature confusion is found below under General Requirements and on Map 7, Regional Hydrology where the preferred name and the AKA's are also shown.

References to design criteria methods used throughout Chapter 7 of the MRP include:

Curve Number Methodology

Sec 732	Discharge Rate Calculation
Sec 732	Volume Calculation
Sec 732	Modeling Methodology

Ditch Design

Sec 742.300	Collection Ditches and Associated Structures
Sec 724.400	Road Drainages

Pond Design

Sec 742.220	Sedimentation Ponds
Sec 728	Surface Water Consequences
Sec 731.110	Retention of Drainage in Sedimentation Pond Structures
Sec 732	Table 16 – Design Rainfall Events

Reclamation

Sec 760	This section discusses reclamation activities based on the criteria set in Sections 728 through 742.220

R645-301-712 Certification

All cross sections, maps and plans required by R645-301-722 as appropriate, and R645-301-731.700 have been prepared and certified according to R645-301-512.

R645-301-721 General Requirements

This permit application document includes a description of the existing, premining hydrologic resources within the proposed permit and adjacent areas that may be affected or impacted by the proposed coal mining and reclamation operation.

All surface and well monitoring stations utilized for baseline monitoring for the Kinney No. 2 Mine permit area are listed in Table, 6 Kinney # 2 Mine Baseline Monitoring Stations. Operational monitoring stations are shown in Table 7, Kinney No. 2 Mine Operational Monitoring Stations. Surface and ground water monitoring locations are shown on Map 7, Regional Hydrology, and Map 28, Surface and Ground Water Monitoring Sites. During the preparation of the mine permit application it was discovered that some monitoring stations had inadvertently been given different names during data collection. Attempts have been made to rectify this situation including the identification of a preferred monitoring station name. However, the following clarification is provided in the event that old references are located within the permit or its appendices.

Preferred ~~Station~~ Name	AKA's (Alternate Documented Names)
CR-06-03-ABV	CR-06-03
Eagle Spring	Miller Spring, Eagle Springs
Miller Outlet	Eagle Outlet, Eagle Outlook
Mud Creek	Muddy Creek
Res-1	Scofield Res. 1
Sulfur Spring	Sulfur Springs, Sulfer Spring, Sulfer Springs
Aspen Spring	Eagle Pond 1

Eagle Seep 1 Eagle Spring 1
Eagle Seep 1A Eagle Spring 1A

Baseline hydrologic monitoring has beenwill be performed for the Kinney No. 2 Mine permit area at the following frequency:

Springs – R645-301-724.100 requires minimum baseline monitoring of TDS or Specific Conductance, pH, total iron and manganese, and approximate rate of discharge or usage. Springs and seeps identified in Table 6 have beenor will be monitored for several yearsa two year period to establish baseline conditions for aqueous parameters according to the schedule provided in Table 20, Hydrologic Monitoring Schedule.

Certain springs and seeps identified in the Seep and Spring Survey (Exhibit 9) were not chosen for monitoring stations for the following reasons. Eagle Springs 1, 1A, 2, and Eagle Seep 3, and Eagle Pond 2 are all located along a 1,290 ft. stretch of Upper Eagle Canyon and apparently are all issuing from the fault related perched aquifer system there. Angle Spring was chosen to monitor the fault related perched aquifer in Eagles Canyon and was monitored for one year (Sept. 05 – Sept. 06). When access to Angle Spring was prohibited, Aspen Spring (named Eagle Pond 1 in the Spring and Seep Survey) was chosen to replace Angle Spring and continue the monitoring of the fault related perched aquifer in Eagles Canyon. Aspen Spring has been visited in the field eight times, five of those visits yielded data which was collected from June 2008 through Sept 2010 (Table 6 and Exhibit 10).

Monitoring of Aspen Spring, as with all other ground and surface water monitor stations, was interrupted during 2009 due to lack of funding. It is noted that, in general, patterns established in the data prior to the 2009 hiatus continue with no substantive deviation in data collected after monitoring was resumed. This suggests the hiatus served only to spread the data collection over more years which provides additional confidence in the patterns observed.

Stream Stations - R645-301-724.200 requires minimum baseline monitoring of Total Suspended Solids, TDS or Specific Conductance, pH, total iron and manganese, and the rate of discharge or usage. Flow and field water quality parameters have been measured on a monthly basis for two years then on a quarterly basis for the Miller Outlet and Mud Creek surface stations, and for the Scofield "Res-1" site during periods wherein access is not limited due to ice. All stream stations have been monitored for a two year period to establish baseline conditions for aqueous parameters according to the schedule provided in 20, Hydrologic Monitoring Schedule. Flow measurements for Miller Outlet (aka Miller Creek in Miller Canyon) and Sulfur Spring were calculated via the following method. Both water sources flow beneath Highway 96 through culverts who's diameter and length have been measured. At each field outing the depth of water passing through each culvert is measured and a stick is dropped into the flow at one end of the culvert and timed as it passes through the culvert. These data have been used to calculate flow volumes presented on Figure 17, Field Data and Exhibit 10, Field Measurements Surface and Ground Water.. Flow volume for Mud Creek is obtained via internet from the USGS real-time monitoring station at the mouth of Winter Quarters Canyon and the Scofield Reservoir Pool Elevation is measured in the field on the staff gauge near the dam and via the internet from the Bureau of Reclamation real-time measuring station also located at the Scofield Dam. Estimates of flow from the springs also utilize standard field techniques. All field data can be found on Figure 17, Field Data and Exhibit 10, Field Measurements Surface and Ground Water.

Monitoring Wells - R645-301-724.100 requires minimum baseline monitoring of TDS or Specific Conductance, pH, total iron and manganese, the rate of discharge or usage (if applicable) and depth to water. Wells shown on- Map 28, Surface and Ground Water Monitoring Sites, have or will be sampled on a monthly basis for a one year period, through each of the four seasons (when the well is accessible, and when sufficient water exists to extract a sample) to establish baseline conditions for aqueous parameters according to the schedule provided in Table 20, Hydrologic Monitoring Schedule. Five of the eleven monitor wells are DRY thus providing zero-point data as described below.

Additional confusion in baseline data has occurred by a combination of errors in elevations posted on monitor well completion detail diagrams (Exhibit 11) which carried over to the field data summaries (Exhibit 10), and mislabeling water levels inside of the blank (sump) beneath each monitor well screened intervals as SWL (Static Water Level) when in fact they were simply water levels measured in the stagnante remnant drilling water captured inside the blanks.

In the case of monitor well CR-06-01BLW, a combination of unfortunate circumstances created the "false positive water levels" recorded in this well and have created confusion about the static water level there. This well is completed with 4" fiberglass well tubing and has a custom made reducer connecting the 2" stainless steel well screen and blank assembly to the 4" fiberglass. This custom made reducer has a "lip" at the bottom of the 4" fiberglass (Exhibit 11). Unfortunately the well deviates from vertical within the bottom 50 feet causing a water level probe, when suspended on a cable from the surface like a plumb bob, to strike the lip of the reducer instead of entering into the 2" well screen. These two factors when combined with a third, that is , moisture condensation on the inside wall of the well tubing, caused the water level probe to encounter the condensed moisture at the lip of the reduces and give "false positive" water levels for this hole. This information has been verified by lowering a color, LED lighted, borehole camera into the hole and producing a digital video, recording the absence of water within the well screen and showing water only within the blank, over 10 feet beneath the "false positive" readings recorded. This proves that this is a dry monitor well and that the groundwater level is in excess of 165 feet below the Hiawatha Coal Seam at this point within the permit boundary.

Monitor Wells CR-06-01 and CR-06-01-BLW (a double completion in the same hole) has an additional confusing issue. That is, the Completion Diagram showing both wells has what has now been determined to be a systematic elevation bust of approximately 2.9 feet. The well screens and blank assemblies are shown approximately 2.9 feet higher in the hole than they actually are. The actual footage has been verified by sounding with a water level indicator (sounder) to determine total depth of the blank in each hole.

With the elevations in Exhibits 10 and 11 now corrected, water levels measured in well CR-06-01 no longer appear below the bottom of the blank. In well CR-06-01-BLW the corrected elevations show that all of what was perceived to be Static water level measurements are actually encounters with moisture at the lip of the reducer in a well that deviates from vertical as explained above.

To resolve another confusion in what appeared to be a SWL (Static Water Level), Carbon Resources mounted a snowy expedition to access CR-06-02 and measured total depth of blank with water level indicator (sounder) and used a down-hole video camera to record the absence of water within the screened interval of this well. The result is that several errors in elevation (vertical position of the well screen and blank assembly) were discovered in Exhibits 10 and 11. The elevation busts in the Monitor Well Completion Diagram CR-06-02 created the mistaken impression of there being a static water level in this well. The screened interval depth was determined to be 422.7 to 432.7 instead of 427.0 to 437.0 therefore all of the measured water levels were actually measured from within the blank and not within the well screen. This has been corrected on the completion diagram (Exhibit 11) and on Exhibit 10.

Even without the recently collected direct evidence for the elevation busts in the old versions of Exhibits 10 and 11, very strong circumstantial evidence for the absence of a static water level in CR-06-02 exists. That is, with the exception of two apparent "outlier" measurements (5-25-2006 and 9-7-2006) the balance of all water level measurements in this well shown, within the noise of measurement accuracy, a rather steady decrease in measured water level through time. This is consistent with slow evaporation of the water captured in the blank. Even without the bust corrected, water levels were shown to be within the blank for the past year and a half. With the bust corrected there are no levels within the well screen.

Another line of circumstantial evidence, and the most difficult one to refute, is the upper limit of a static water level (piezometric surface) in well CR-06-01-BLW which shows the upper limit of possible regional water level at 7,690, (or 7,709.9 if one does not believe the false positive water levels) which is 211.6 ft. (or 191.7 ft. if one does not believe the false positive measurements) lower than the supposed water level in CR-06-02. These wells are separated horizontally by only 1,200 feet. There are no major faults between them that could cause major partitioning, as evidenced by mining that has taken place beneath both wells and in the intervening space that encountered no major faulting. Given this circumstantial evidence it is virtually impossible to make a case for there being a static water level in the well screen of Monitor Well CR-06-02. With the newly acquired data the absence of a static water level in CR-06-02 is now proven.

Owing to the fact that all the Monitor Wells at the Kinney # 2 Mine are completed with well screens having "blanks," with their bottoms capped forming a tall thin cup, attached to the bottom of each well screen, all of the Dry Monitor Wells show a "water level" within the blanks. This is the natural result of the drilling and completion process where drilling fluids, that were injected into the wallrock of the drill hole during the drilling process, accumulates at the bottom of the each hole and is not evacuated from the hole by the drilling process. When sand is placed around the well screen with a tremmie tube, the sand fills the bottom of the hole and displaces the water accumulated there, pushing it upwards and inside of the blank where it remains and becomes stagnante water. The video of CR-06-01-BLW clearly shows this stagnant water and a well screen that is pristine except for the spider webs.

Water levels reported on Exhibits 10 and 11 were erroneously labeled as SWL"static water level" even when most of the water levels were simply stagnante water trapped inside of the blank. This was done because prepares of this MRP are hapless dolts. The term static water level has been replaced with "water level" on all Exhibits 10 and 11 and Figure 17.

Monitor Wells CR-10-11 and CR-10-12 were completed at the request of UDOGM to be added as operational-phase down-gradient augmentation to the nine (9) existing baseline ground water monitor well completions. The two new wells were completed in July of 2011 and have been monitored monthly, to date accumulating eight months of monitoring data. Table 6, Exhibits 10, and 12 have been updated to include these data.

Table 6 Kinney #2 Baseline Monitoring Stations

Location	Type	May-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb 06	Mar-06	Apr-06	May-06	Jun-06	Jul 06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Nov-07	Mar-08	Jun-08	Aug-08	Oct-08	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-11	Dec-10	Jan-11	Feb 11
CR-06-01	Well								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X			X			X		
CR-06-01-BLW	Well								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X			X			X		
CR-06-02	Well								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X			X			X		
CR-06-02-ABV	Well								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X			X			X		
CR-06-03-ABV*	Well																																						
CR-06-05-A	Well														X	X		X	X	X	X	X	X					X	X	X	X			X			X		
CR-06-09	Well																																						
CR-06-09-ABV	Well																																						
CR-06-09-BLW	Well																																						
CR-10-11	Well																																						
CR-10-12	Well																																						
Angle Spring	Spring																																						
Aspen Spring	Spring																										S										S		S
Eagle Spring (1)	Spring		X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	S		X	X	X			X			S		
Miller Outlet (2)	Surf				S	S	S	S	S								S	S	S	S																	S		S
Mud Creek (3)	Surf																																						
Res–1 (4)	Surf																S	S	S	S																	S		S
Sulfur Spring (5)	Spring																																						
Jones Draw	Ephemeral								X		X					X							X								X	X		X	X				
Kinney Draw	Ephemeral								X		X					X							X								X	X		X	X				
Coulumbine Draw	Ephemeral								X		X					X							X								X	X		X	X				

* Data for CR-06-03-ABV taken on5-25-06 were mislabeled CR-06-03, the ABV suffix was inadvertently omitted.

1 – Some data herein may also refer to this sources as Miller Spring

2 – Some data herein may also refer to this source as Eagle Outlet or Eagle Outlook

3 – Some data herein may also refer to this source as Muddy Creek`

4 – Some data herein may also refer to this source as Scofield Res-1

5 – Some data herein may also refer to this source as Sulfur Springs, Sulfer Spring, or Sulfer Springs

Water Quality Data Available X = Field Visit but Dry , S = Field Visit but frozen and snow covered

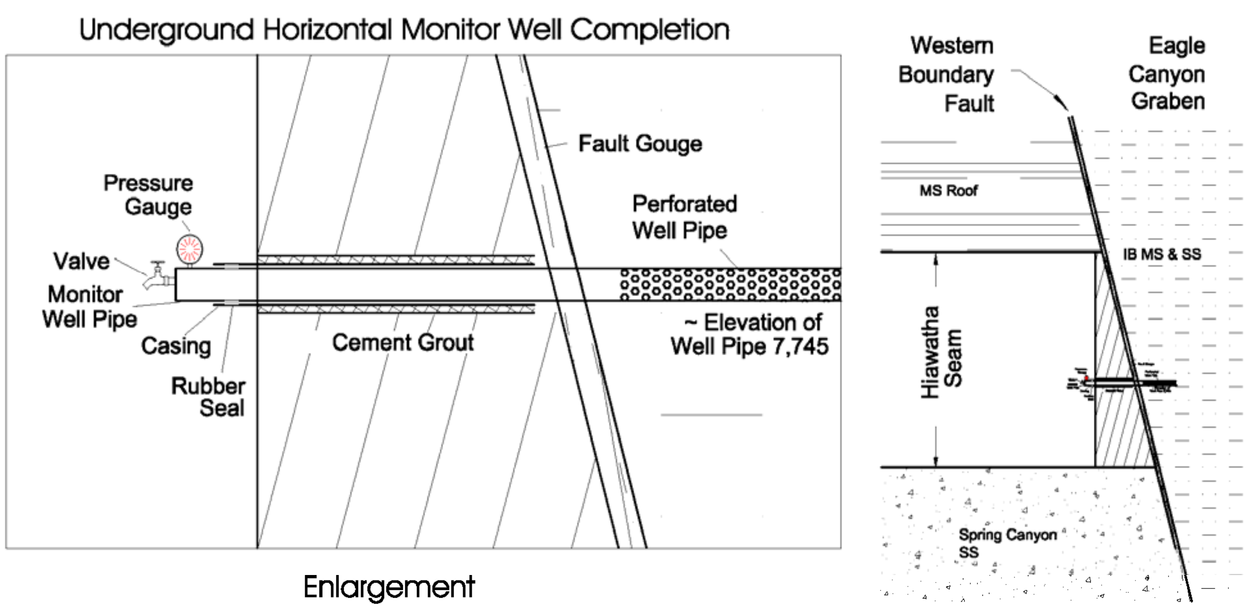
Water Level Data Available, X = Dry Hole

Water Level and Quality Data Available

NOTE: Seeps, Springs, and Monitor Wells listed on this Table 6 are depicted on Map 7 (Regional Hydrology). Data generated from site visits are listed on Exhibit 10, Figures 16,17,18, and 19. Ephemeral Drainage Data are not all shown due to space constraints; see Exhibit 20 for full data.

As a result of CR-06-03-ABV being decommissioned only six months of groundwater data were collected from within the Eagles Canyon Graben. Carbon Resources commits to replace CR-06-03-ABV with an in-mine monitor well. As mining extends eastward to the Western Boundary Fault of the Eagles Canyon Graben Carbon Resources will complete an in-mine monitoring well to monitor ground water inside of the Eagles Canyon Graben. Due to the differential in water level within the Eagles Canyon Graben and immediately west of this Graben, a monitor well will consist of piercing the gouge zone of the graben and installing a grouted-in differential pressure gauge and valve to monitor the water level and quality within the Eagles Canyon Graben, Figure 15.

Figure 15. Underground Horizontal Monitor Well Completion



Monitor well completed by drilling a horizontal hole from the mine workings through the gouge of the "western boundary fault" and completing the monitor well by grouting casing and monitor well pipe, sealing off water from inside of the Eagle Canyon Graben.

1- Drill Casing Hole w/o piercing gouge
2- Install Casing & Grout in place
3- Drill monitor pipe hole, piercing the gouge zone, and install monitor pipe pushing through "rubber seal" to seal monitor pipe against grouted casing.

Table 7 - Kinney Mine Operational Monitoring Stations

Location	Type	Water Level or Flow	Field Parameters	Laboratory Analytical Parameters
* CR-06-01	Well	X	X	X
* CR-06-01-BLW	Well	X	X	X
* CR-06-02	Well	X	X	X
* CR-06-02-ABV	Well	X	X	X
* CR-06-05-A	Well	X	X	X
CR-06-09-ABV	Well	X	X	X
CR-06-09-BLW	Well	X	X	X
CR-10-11	Well	X	X	X
CR-10-12	Well	X	X	X
Angle Spring	Spring	X	X	X
Aspen Spring/Pond	Spring/Pond	X	X	X
Eagle Spring 2 & Pond 2	Spring/Pond	X	X	X
Eagle Seep 1	Seep	X	X	X
Eagle Seep 1A	Seep	X	X	X
Eagle Seep 3	Seep	X	X	X
Eagle Spring (1)	Spring	X	X	X
Miller Outlet (2)	Surface	X	X	X
Mud Creek (3)	Surface	X	X	X
Res–1 (4)	Surface	X	X	X
Sulfur Spring (5)	Spring	X	X	X
* Jones Draw	Ephemeral	X	X	X
* Kinney Draw	Ephemeral	X	X	X
* Columbine Draw	Ephemeral	X	X	X
* These Monitor Wells and Ephememeral Drainages are considered to be Dry, however, monitoring will continue and presence of water will allow collection and reporting of data				
1 – Some baseline data herein may also refer to this sources as Miller Spring				
2 – Some baseline data herein may also refer to this source as Eagle Outlet or Eagle Outlook				
3 – Some baseline data herein may also refer to this source as Muddy Creek`				
4 – Some baseline data herein may also refer to this source as Scofield Res-1				
5 – Some baseline data herein may also refer to this source as Sulfur Springs, Sulfer Spring, or Sulfer Springs				
NOTE: Seeps, Springs, and Monitor Wells listed on this Table 7 are depicted on Map 7 (Regional Hydrology). Baseline Data generated from site visits are listed on Exhibit 10, (Field Parameter Measurements) Figures 16,17,18, and 19. Complete Laboratory Analysis Data can be found in Exhibit 12 (Water Quality Data). Baseline and Operational Laboratory Paramaters are located on Table 20 Hydrologic Monitoring Schedule.				

Data obtained from the baseline monitoring plan characterizes current surface and ground water flows, water quality conditions, and any seasonal variations in these characteristics. Approximately fourtwo years of baseline data are available from the surface monitoring locations and Aapproximately one year of groundwater baseline hydrologic data is now available for most stations for UDOGM's technical adequacy review of this permit application. Adequate baseline data have been collected, per discussions with UDOGM personnel, and CR has now moved into quarterly sampling. The "two down peizometric slope" monitor wells CR-10-11 and CR-10-12 were added to the group of groundwater monitor wells at the request of the Division.

Per UDOGM request Carbon Resources commits to add additional water monitoring stations in Long Canyon to collect the appropriate data to support an expansion of the MRP eastward from the present permit boundary. These data points will be determined and added to the MRP in the field season of 2011.

R645-301-722 Cross Sections and Maps

Hydrologic information is presented in various locations within the permit including:

• Other Permits	Exhibit 4
• Springs and seeps	Exhibit 9 (Map 10)
• Field Measurements , Surface and Groundwater	Exhibit 10
• Monitor Well Completion Details	Exhibit 11
• Surface and Groundwater Quality Data	Exhibit 12
• Water Quality Rights	Exhibit 13
• Runoff Control	Exhibit 16
• CHIA (UDOGM)	Exhibit 17

• Surface water bodies	Map 7
• Boreholes and test wells	Map 7
• X-Section A–A'	Map 7A
• X-Section –C-C'	Map 7B
• Faults and other geologic structures affecting hydrology	Map 8
• Ground Water Level Data	Map 9
• Regional Water Quality	Map 10
• Surface Facilities	Map13
• Drainage and Sediment Pond Controls, Undisturbed Area	Map 23
• Drainage and Sediment Pond Control, Disturbed Area	Map 24
• Sediment Pond 1	Map 25
• Runoff Control	Map 27
• Surface and ground water monitoring locations	Map 28

301-722.400 Water Wells In The Permit and Adjacent Area

Four
Three water wells exist within 1 mile of the permit boundary as shown on Map 30, Ground Water, Water Rights as follows:

Water Right No.

91-3401 – No depth information is available in the Utah Division of Water Rights information.
91-3402 – No depth information is available in the Utah Division of Water Rights information.
91-4889 – The well is listed as 6", with a depth of 100-500 feet.
A34946(91-5106) – The well is listed as 6" and depth of 100-500 feet.

These water wells are addressed in response to R645-301-724.100 to follow.

R645-301-723 Sampling and Analysis

All water quality samples have been and will continue to be analyzed according to the most current copy of the Standard Methods for the Examination of Water and Wastewater, a joint publication of the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation.

*Table 20 Hydrologic Monitoring Schedule

Field Measurements	Reported As	Baseline		Operational & Post-Mining	
		Surf	GW	Surf	GW
Water Level or Flow	Depth, Flow				
pH	Std Units				
Specific Conductivity	umhos/cm @ 25 °C				
Temperature	°C				

Laboratory Measurements	Reported As	Baseline		Operational & Post-Mining	
		Surf	GW	Surf	GW
Total Dissolved Solids	mg/l				
Total Suspended Solids	mg/l				
Total Hardness ($CaCO_3$)	mg/l				
Total Alkalinity	mg/l				
Acidity	mg/l				
Aluminum (Dissolved)	mg/l				
Arsenic (Dissolved)	mg/l				
Boron (Dissolved)	mg/l				
Carbonate	mg/l				
Bicarbonate	mg/l				
Cadmium (Dissolved)	mg/l				
Calcium (Dissolved)	mg/l				
Chloride	mg/l				
Copper (Dissolved)	mg/l				
Iron (Dissolved)	mg/l				
Iron (Total)	mg/l				
Lead (Dissolved)	mg/l				
Magnesium (Dissolved)	mg/l				
Manganese (Dissolved)	mg/l				
Manganese (Total)	mg/l				
Molybdenum (Dissolved)	mg/l				
Ammonia	mg/l				
Nitrates	mg/l				
Nitrites	mg/l				
Potassium (Dissolved)	mg/l				
Phosphate (Ortho)	mg/l				
Selenium (Dissolved)	mg/l				
Sodium (Dissolved)	mg/l				
Sulfate	mg/l				
Zinc	mg/l				
Oil & Grease					
Settleable Solids	UPDES				
Cations	meq/l				
Anions	meq/l				

Data submittals will be made to UDOGM on the following Basis:

Quarterly – Lab water quality results will be submitted within 90 days of the end of the quarter.

Annually – Hydrologic review and summary of data will be submitted on or before June 1st.

Figure 14 Ariel View of Permit Area

The topography and general hydrogeology of the mine permit area is typical of central Utah mountain areas, containing both valley and mountain segments. The direct permit area lies within a north south trending mountain range traversed by small east to west drainages as shown in Figure 14, Arial View of Permit Area. The figure, looking to the north-east shows the general topographic nature of the area, Scofield Reservoir to the north, the town of Scofield in the bottom central portions, the railroad which goes through the town of Scofield then bends to the east, then crosses and parallels the highway as it continues northward, a private mountain access road that zigzagszig-zags up the mountain side within the southern portions of the permit area, and an un-named ephemeral drainage lying just south of the mountain access road. In general, the permit area includes the area north of the un-named ephemeral drainage, south of the point where the railroad crosses the highway, and within 1,500 feet east of Utah highway 96.

The relatively dry climate and limited up-gradient drainage area limit local ground water recharge and surface water runoff. The majority of seeps and springs identified within the general area were found within the north-south trending drainages lying to the east and south of the permit area including Long Canyon, Merrill Canyon, Eagle Canyon, and UP Canyon, Exhibit 9, Seep and Spring Survey.Canyon.

Semi-arid climatic conditions and precipitation patterns result in a high loss of moisture to runoff, evaporation, and sublimation reducing the amount of water available for recharge or stream flow. Recharge to underlying units is also limited by flat lying units. Downward movement of recharge through the stratigraphic sequence to underlying units is limited by low vertical permeabilities of the units (which are often fine-grained, well cemented, or massive), the presence of relatively impermeableimpermeability shale units acting as confining layers. Downward movement of recharge is predominately accomplished within the breccia zones of the faults, predominately the N-S faults.

As noted below in (R645-301-724.100) and on Table 6 and in Exhibit 11 , static water levels that may be interpreted as representing a regional water table have been encountered in only four of the eleven monitor wells (CR-06-03ABV, CR-06-09, CR-10-11, and CR-10-12). Data from these monitor wells together with data from the two perennial streams (Mud Creek & Miller Creek) and from Scofield Reservoir, have been interpreted to indicate a regional ground water table with a piezometric surface dipping westward indicating an east to west flow of groundwater in the regional water table. This interpretation suggests groundwater is not entirely partitioned by the N-S faults or Stratigraphy, therefore flowing across strata and some faults in a westerly direction. As noted elsewhere in this chapter, drilling of one or more additional ground water monitor wells will be required to confirm this interpretation and or supplant it with the alternate interpretation of a North North-Eastely ground water flow in the regional groundwater table following stratigraphic units down the regional dip.

As a result of these controls, ground water has only been noted to occur in limited quantities during well drilling activities. Shallow ground water is present however in the alluvial/colluvial deposits associated with Pleasant Valley located west of the mine site. Very limited ground water is expected to be encountered during mining operations.

The coal mining operations planned for the site will include mine portals, office and maintenance facilities, coal handling,processing, storage, and loadout facilities, roads, and runoff control facilities. The facilities will be constructed on a series of pads interconnected by roads. Runoff control facilities will consist of a series of ditches, culverts, and a single flow/sediment pond located at the extreme north end of the disturbed area.

Five alternate sediment control areas are planned for the mining operation. The first and main area is a topsoil stockpile area planned to be located east of and adjacent to highway 96, and immediately south of the main entrance and access road. This alternate sediment control area will utilize a downhill berm, small drainage channel, and silt fencing and/or straw bales to control sediment runoff. The second and third areas involve small overland flow zones immediately adjacent to the entrance off Highway 96. These small areas will discharge into small sediment traps. The fourth and fifth areas involve additional soil stockpile areas located just north and south of culvert CP-2 within the small triangular permit area west of Highway 96. Details regarding the runoff control plan are provided on Map 24 and within R645-301-731 – 738.

R645-301-724.100 Ground Water Information

Ground water occurrence in the permit and adjacent areas has been quantified by the completion of a seep and spring survey, exploratory well drilling geologic analysis of potential water-bearing strata, the identification of potential ground water storage in underground mines,

and the analysis of water quality and quantity characteristics and by completing a total of eleven groundwater monitor wells located in eight different locations in and around the permit area, and from surface water conditions known to exist within Long Canyon, Miller Canyon, Mud Creek, and Scofield Reservoir. Locations of monitor wells are shown on Map 7, Regional Hydrology. Wells CR-06-01,CR-06,01, CR-06-02, CR-06-05A and CR-06-09 all penetrate and are screened within the Hiawatha coal seam. Wells CR-06-02-ABV, CR-06-03-ABV, and CR-06-09-ABV are all screened into potential water bearing zones (perched sands)aquifers) above the Hiawatha coal seam, while wells CR-06-01-BLW and CR-06-09-BLW are completed in zones below the Hiawatha
seam. Monitor wells CR-10-11 and CR-10-12 are completed into the regional water table within the pleasant valley graben and as a result are completed far above the Hiawatha Coal Seam because the Seam has been dropped down approximately 600 feet inside of the graben. To maintain nomenclature these two monitor wells should have been given the ABV suffix but were not. Completion details for all monitoring wells are included within Exhibit 11, Monitor Well Completion Details.

It will be noted that a concerted effort was made to complete some of the wells a significant depth beneath the seam to be mined (Hiawatha). As can be seen by on the completion diagram for Monitor Well CR-06-01-BLW, the top of the ten foot well screen is one hundred fifty four (154) feet below the base of the Hiawatha Seam.

Field data collected from the monitoring wells areis included within Exhibit 10, Surface and Ground Water Field Measurements, Figure 17, and as shown on Table 6, Kinney #2 Mine Baseline Monitoring Stations. FfiveStations, four of the eleven monitor wells are "dry". Comparing the Ground Water Field Measurements with the Monitor Well Completion Diagrams reveals that all the water levels recorded in these fivefour dry holes are within the ten foot blank below the base of the screened interval in each of these fivefour wells as discussed above..

Raw data, referred to above, have been reviewed to develop interpretations and reach the conclusions presented in this section.
As previously noted, only limited ground water exists within the permit and adjacent areas; it is mostly limited to the underlying regional water table, and in alluvial/colluvial deposits that form shallow unconfined water table aquifers associated with small area drainages.drainages, Some water may also be found within localized perched ground water systems within the stratigraphic sequence, and small vertical aquifers adjacent to faults, and as stored water in adjacent abandoned underground mine workings. These ground water occurrences, especially within the proposed permit area are not significant as water supplies due to the limited regional continuity of the associated units, low overall permeabilities, limited recharge and, in the case of the water table aquifer, relative depth and lack of confinement. Surface water sources, dominated by Mud Creek, provide a much more consistent and reliable water supply source.

While some ground water recharge undoubtedly occurs within the permit and adjacent areas, recharge is limited both by the factors noted above and by the low overall permeability of the stratigraphic sequence which effectively limits significant vertical ground water movement.

The exception to this generality is some of the N-S faults which are suspected of providing vertical conduits for recharge. On a regional basis, recharge is believed to occur through isolated outcrop areas where permeable units are exposed to direct precipitation.

Consistent with applicable provisions of R645-301-512, hydrologic information has been prepared under the direction of, and certified by a qualified registered professional engineer or land surveyor with assistance from experts in the related fields. To aid in the following discussion, Map 8, Works-Wells-Springs-Faults has been created to assist in showing the inter-relationships between important geologic and man-made features.

The regulatory definition for "Renewable Resource Lands" includes geographic areas which are important in supporting and maintaining water supplies and areas which contribute significantly to agricultural production. The water supply component of this definition specifically includes those areas containing ground water aquifers and associated recharge areas.

While there are known, but limited, ground water occurrences within the permit and adjacent areas, none of the identified aquifers are important water supply sources. In general, the sparse vegetation, geologic stratification, and semi-arid climate combine to limit ground water infiltration, with either runoff or evaporation/transpiration accounting for most of the precipitation received. Based on this and test drilling data, we conclude that the area does not provide significant recharge to any regional ground water aquifer. The most important local feature is the areas importance as a watershed for local surface drainages. There are no known significant historical nor recent agricultural activity within the permit or adjacent areas and the USDA-SCS has issued a negative determination for prime farmlands for the area as discussed and documented in R645-301-211, 222, and 223, Prime Farmlands.

Ground Water Environment

The geology of the permit and adjacent areas is described in detail in R645-301-610 - 627, however, the regional hydrostratigraphy of the area is reflective of the following primary formations, listed and described in order beginning with the lowermost stratigraphic unit of interest:

> **Mancos Shale** - A massive grey marine shale. Commonly fine grained, the Mancos Shale is generally interbedded with fine to medium-grained sandstones. While the shale members are characterized by relatively low permeability, any ground water percolating through the more permeable interbedded sandstones may come in contact with associated evaporites such as gypsum resulting in rapid degradation of water quality. The Mancos Shale is laterally continuous in the proposed permit area.
>
> **Blackhawk Formation** - The principal coal-bearing formation of the Mesa Verde Group, the Blackhawk Formation, is a sequence of alternating sandstone, mudstone, and coal. The coal seams of greatest economic importance occur within the lower portions of the formation. The sandstones are fine to medium-grained and are typically well cemented resulting in relatively low permeabilities. The shale units are similar in character to the Mancos Shale and are relatively tight, acting as aquitards to limit vertical ground water movement.
>
> In ascending order, major units of the Blackhawk Formation include the Panther sandstone, Flat Canyon coal seam, Storres sandstone, Lower UP coal seam, Columbine coal seam, Spring Canyon sandstone, Hiawatha coal seam, McKinnon coal seam, and Haley Coal Seam
>
> **Castle Gate Sandstone** - A fine to medium-grained, argillaceous to slightly calcareous massive sandstone. The Castle Gate Sandstone grades to shale both along its basal contact with the Blackhawk Formation and, in many locations, near the top of the unit. Due to its massive occurrence and strong cementation, it is highly resistant to weathering forming prominent cliffs throughout the region, and exhibits relatively low

permeability. The thickness of this unit typically ranges from 100 to 500 feet.

Price River Formation - Medium-grained sandstone and shaley sandstone grading to a grey to green shale. The Price River Formation is generally characterized by low primary permeability with some localized increases in permeability due to extensive fracturing.

North Horn Formation - A series of shales, sandstones, conglomerates, and freshwater limestone deposits, which throughout the region can be 2,400 feet thick, and laterally discontinuous in rugged topography. The shales are relatively tight, functioning as aquitards to minimize downward ground water movement.

Although ground water can occur in all of the major stratigraphic units identified, all are considered poor to moderate aquifers. Ground water yields are limited within the proposed permit area by small recharge basins, the semi-arid climate of the region which limits recharge to the units, low permeabilities, and the lack of regional lateral continuity resulting from dissection by deep drainage valleys. While many of the minor stratigraphic units (such as sandstones and coal seams) are capable of storing and transmitting ground water, regional ground water transmission capabilities are limited by the relatively thin and laterally discontinuous nature of these semi-permeable units.

Ground Water Aquifers

Ground water aquifers within the proposed lease and adjacent areas have been characterized on the basis of information obtained from field investigations, well drilling, and ongoing monitoring activities. These activities include borehole drilling and well installation, geologic and geophysical logging, observations of the occurrence of water during exploration drilling, aquifer testing, routine water level monitoring, and routine ground water quality analyses. Ground water occurrence and movement in the proposed permit boundary and adjacent areas can best be characterized by describing the four primary aquifer systems identified through field investigations and monitoring activities to date.

The four aquifer systems include the:

- Alluvial/Colluvial Surficial Aquifer System
- Perched / Isolated Ground Water Systems
  Includes narrow vertical systems within breccia zones of some faults.
- Regional Ground Water System
- Stored Mine Water System

These aquifer systems are individually described below.

Alluvial/Colluvial Aquifer System

The alluvial/colluvial aquifer system consists of shallow ground water contained in limited alluvial/colluvial deposits associated with area surface drainages. In the smaller drainages, these alluvial/colluvial deposits are very narrow and may store and transmit relatively minor amounts of ground water. The only alluvial/colluvial aquifers of any significance occur along the channels of the perennial drainages of Mud Creek and Miller

Creek downstream of the permit area and are generally confined to the active stream channel, immediately adjacent areas, and any hydrologicaly connected inactive or abandoned channel segments.

The alluvial/colluvial aquifer system in the area appears to be closely tied to the surface water system with ground water recharge occurring during periods of high flow and ground water discharge occurring near Scofield Reservoir on a relatively continuous basis but becoming more pronounced during periods of low flow when stream levels may drop below the existing potentiometric surface of the alluvial/colluvial aquifer. Some lateral discharge from the shallow ground water aquifer to Mud Creek may also occur from side channel tributaries during late season low flow periods. The regional aquifer system may also be a source of recharge to the alluvial/colluvial system in the lower reaches of Mud and Miller Creeks.

Perched Ground Water System

Perched ground water in the permit area can occur within limited semi-permeable strata-bound units within the Blackhawk Formation. Typically, perched ground water systems consist of isolated lithologic members which have sufficient permeability to store and transmit ground water and are connected to a natural source of recharge.

Perched ground water occurrence are typically ribbon shaped sand-rich fluvial paleo-channels that are enclosed in an envelope of rather impervious mudstone and siltstone. These channels become water bearing in two ways. one; much of the water in perched systems is connate as determined from isotope age dating ~~data~~ of water from these ribbon channels from other mines throughout the Eastern Wasatch.~~.~~ Two; because these channels have extremely long lateral extent along~~ he~~ their axis they either daylight as an outcrop in a recharge zone or "sub-crop" against a fault and receive recharge from water that is moving downward within the breccia zone of the fault when structural dip of the fault block in which they reside is favorable.

A second group of perched aquifers consist of coal seams. Coal seams have inherently low permeability and transmissivity but possess rather large secondary permeability and transmissivity due to cleating. The coal seams are also enclosed, generally, by~~with~~ rather impervious mudstone and siltstone but unlike the narrow sinuous shapes of paleo-channels, coal seams have large areal extent. The same two basic recharge mechanisms apply to coal seams as apply to channels.

A third group of perched aquifers are the narrow vertical aquifers adjacent to faults. These small volume perched aquifers appear to be responsible for many of the springs located within and near the permit boundary and indeed within the Eastern Wasatch Plateau Region. The springs in Eagle Canyon, Angle, and Aspen show strong evidence for being fed by a fault controlled perched aquifer. They both occur above the regional water table and both display very high quality water, (low TDS and dissolved elements etc.) both have short flow periods each year. Flowing in the early spring and drying up, or reducing in flow significantly in mid-summer to early fall on a yearly basis.

The thickness of strata-bound perched (unconfined) aquifers vary significantly, corresponding to the thickness of the sandstone or other water-bearing units. Many of the perched aquifers in the upper portion of the stratigraphic section are limited in areal extent by the numerous large and small surface drainages which dissect the area and truncate the relatively flat-lying sedimentary units.

The small aquifers in the perched ground water system are recharged almost exclusively by direct precipitation and near-surface ground water infiltration. Principal recharge areas for the perched ground water system include formation outcrops in basins where runoff or snowfall accumulations provide supplemental recharge. The combination of steep terrain and relatively low permeabilities typical of the region, limit infiltration to less than 5 percent of annual precipitation (Price and Arrow, 1974; USGS, 1979), and the limited areal extent of the water-bearing strata result in low discharge rates from the perched ground water system.

Discharge from the perched ground water system occurs primarily in the form of seeps and springs at sandstone-shale interfaces where the water-bearing strata outcrop. Limited discharge from the perched ground water system to the regional ground water system may also occur due to fracture or fault related secondary permeability. It is possible that vertical losses may be occurring locally within faulted and fractured units.

A comprehensive spring and seep inventory of the permit and adjacent areas, conducted in June 2006, identified 6 active seeps and 27 active springs. The locations of known springs and seeps are shown within the report included as Exhibit 9, Seep and Spring Survey. As can be seen in Table 9, Seep and Spring Flow Summary, discharges were reported to typically vary from small or negligible seeps to approximately 10 GPM. Isolated flows in two springs have flows recorded up to 15 to 20 GPM, and one spring (Sulfur spring) has flows up to 80 GPM. As is typical of the intermountain region, discharges from the perched ground water system, which feed local seeps and springs, will exhibit significant seasonal variation with maximum discharge following spring snowmelt followed by a decline in discharge with many springs and seeps drying up during late summer and early fall. This is shown in the data collected as part of the baseline monitoring. Springs and seeps are discussed further in R645-301-724, Surface Water Information. Of the springs identified in the survey, Eagle (AKA Miller), Sulfur, ~~and~~ Angle, and Aspen (AKA Eagle Pond 1), are included within the ground water monitoring program, data for which is included within Exhibit 10, Surface and Ground Water Field Measurements. As can be seen from the data, Eagle spring only flows during the April-May time period in response to spring snowmelt events. Sulfur Spring flows year round with the highest flows occurring in the fall and winter periods. During the period of measurement, Angle Spring was found to flow between 0.25 and 1.25 GPM, the highest flows occurring during the spring~~print~~ and early summer of 2006. Angle Spring has not been measured since September of 2006 due to access issues discussed previously.

Stored Mine Water System

Historic coal mining in the area has resulted in well documented underground mine workings. In those areas where the mine workings are below the local ground water table or where subsidence has resulted in fractures connecting to the perched ground water system to a portion of an old mine that lies upon an aquitard, mine inflows may have resulted in the gradual accumulation of stored ground water in the underground workings. Mining planned for this permit will include the extraction of coal from seams overlying abandoned workings, and thus are not anticipated to have any potential impact on the underlying ground water systems resulting from mining activities including subsidence.

The total volume of ground water storage in the old mine workings is unknown since abandoned mine workings in the area have been sealed. Any water accumulations however (if they exist) would occur within down-dip workings. To the applicants knowledge, there are no known mine water discharges reported from old workings. This of course is expected because the regional dip is down to the North East away from the coal seam outcrops along the Eastern side of Pleasant Valley.

Regional Aquifer System

~~-~~The regional aquifer consists of a water table, an aquifer in which all units below the normal water table have sufficient permeability to contain and transmit ground water to some degree. The peizometric surface of the regional aquifer system includes the deeper portions of the Blackhawk Formation and extends into the underlying Star Point and Mancos Formations.~~ as shown on~~ Map 7, Regional Hydrology, depicts the present understanding of a piezometric surface inclined westward to Scofield Reservoir. Map 7A, W-E X Section A-A', and Map 7B, N-S X Section C-C" also display the piezometric surface and include it's relationship to the coal seams in the lower Blackhawk Formation.~~.~~ Because the lower portion of the Blackhawk Formation is the

primary coal-bearing sequence in the area, the regional aquifer system is the only ground water system which could be directly affected by the mining operations in areas where elevation of the Seam to be mined is below the regional groundwater table.~~.~~

The permit and adjacent areas display classic Basin & Range Style structural geology. With multiple north-south trending fault systems which have ~~-~~created a series of local horsts and grabens. These geologic mountain / valley sections dominate the local geomorphology and ~~-~~to varying degrees create ~~I~~blocks and impediments (partitions) to the horizontal movement of ground water, and limit the ability of water to move freely within a consistent and homogeneous aquifer system. Notwistanding the interference to free movement of groundwater~~-~~, there does appear to be a regional ground water aquifer that appears to show~~shows~~ east to west movement towards Mud Creek and Scofield Reservoir. For a number of reasons, including the fact that the impervious ~~impervious~~ portions of the faults do not extend over great distances N-S thus allowing ground water to flow around the ends of these "short faults." It is expected these faults create local irregularities in the regional peizometric surface but do not compartmentalize the regional aquifer to an extreme~~great~~ extent.

Information characterizing the ground water flow regime and hydraulic parameters of the regional aquifer comes from eleven wells located in eight different locations in and around the permit area, and from surface water conditions known to exist within Long Canyon, Miller Canyon, Mud Creek, and Scofield Reservoir. The locations of all wells shown on Map 7, Regional Hydrology. Wells CR-06-01,~~CR-06,01,~~ CR-06-02, CR-06-05A and CR-06-09 all penetrate and are screened within the Hiawatha coal seam. Wells CR-06-02-ABV, CR-06-03-ABV, and CR-06-09-ABV all penetrate and are screened into potential water bearing zones above the Hiawatha coal seam, while wells CR-06-01-BLW and CR-06-09-BLW penetrate and are completed in zones below the Hiawatha seam. Well completion details for all monitoring wells are included within Exhibit 11, Monitor Well Completion Details. Field data collected for the monitoring wells is included within Exhibit 10, Surface and Ground Water Field Measurements.

Recharge to the local and regional aquifer systems appears to occur primarily in higher elevation areas where limited outcrop zones are exposed to direct precipitation and near-surface infiltration. This recharge mechanism is, however, limited by steep slopes and relatively small outcrop exposure areas. Similarly, recharge from vertical ground water movement through the overlying sediments is believed to be relatively minor due to the presence of mixed overlying low permeability units. Some recharge of the regional aquifer system may occur where the associated formations are exposed in deep drainage canyons and as a result come into direct contact with either surface drainages or the associated alluvial/colluvial aquifer system, such as Long Canyon, Miller Canyon, and Jump Creek.

A review of available data that provides three dimensional geometry of groundwater occurrences or potential representations of a regional piezometric surface (Scofield Reservoir, perennial reaches of Mud and Miller Creeks, static water levels measured in CR-06-03-ABV, CR-06-09, CR-10-11, CR-10-12, and the absence of a static water level in CR-06-01-BLW, and CR-06-05A) may be interpreted in one of two ways. The preferred interpretation is~~has lead to the conclusion~~ that a regional aquifer system does underlie the Kinney Mine permit area and, due to the universal influence of gravity on groundwater causing it to flow down-gradient, and assuming the absence of thick large scale sedimentary units (except the Mancos Shale) that could be true tight aquacludes in the sedimentary strata involved, flows in a general east to west direction toward Mud Creek and Scofield Reservoir. The alternative interpretation of the data suggests ground water may be confined by a combination of stratigraphic aquacludes and fault gouge causing groundwater to flow in a generally northward northeasterly direction (down dip), both within the Pleasant Valley Graben and the Eagles Canyon and Long Canyon Grabens. A minimum on one additional monitor well in the area south and perhaps east of CR-06-09 will be required to determine which interpretation is correct.

~~-~~During the early stages of review it was felt that there was a general lack of data to document the presence of the regional system. It ~~Further data review however has revealed that there is additional boundary data that~~ was later recognized that perennial reaches of the two creeks and Scofield Reservoir as a baseline could be used to assist in modeling the regional groundwater system.~~overlooked during the preliminary evaluation.~~

As documented by the Seep and Spring Survey included as Exhibit 9, there are many seeps and springs located within Long Canyon, Miller Canyon, and UP Canyon. The report documents in excess of 8 springs and 3 seeps in Long Canyon, 2 springs and 3 seeps in Eagle Canyon, and 1 spring in UP Canyon, and acknowledging~~Canyon. Acknowledging~~ that each of these water sources is a surface manifestation of local ground water.

High elevation seeps and springs within Long Canyon were not used as potential ground water points since some of these features are ephemeral in nature. The portions of Long and Miller Canyon however near and downstream of their confluence is perennial, indicative of continued year round connection with the water table. Points along these perennial stream sections were used in the development of the regional water table surface projection. On the downstream side, Mud Creek and Scofield Reservoir also become additional points of contact defining the western boundary of the regional aquifer.

Evaluating these combined well and surface data points using a triangular extrapolation program has resulted in the development of the projected regional ground water table as shown on Map 7. Note that the piezometric contours coincide with perennial portions (lower reaches) of Long Canyon and Miller Creek on the north -and northeast, and the surface waters of Mud Creek and Scofield Reservoir on the west. The resulting contours show that flow is generally to the west-northwest. Refer to R645-301-726 Modeling, below for more detail.

Seasonal variation of the regional water table is believed to be small as characterized by the general lack of change in well and surface data. Specifically water level data from monitored wells has shown very little to no variation over the period of measurement. Connecting data with the changing surface of Mud Creek 2,000 feet to the west by 3 feet would have virtually no impact on the regional water table within the mine permit area. In fact, when considering the basic hydrogeologic principals of the shallow valley aquifer, it is unlikely that any significant change would be noted in the regional ground water aquifer along the valley margin due to changes in Mud Creek flows.

Through reservoir operations water levels within Scofield reservoir located 1 mile to the north and northwest may change by several feet. It is believed however that these changes would have the greatest impact in the areas immediately adjacent to the shoreline, but have relatively small impact on the regional water table to the east.

In a similar fashion, seasonal variation within the northern areas of Long Canyon and Miller Creek are also believed to be small. Although there is annual variation in perennial flow within the Canyons, water is present throughout the year thus maintaining constant data points. Seasonal recharge to the regional water table is expected to result in a corresponding delayed seasonal fluctuation in the water table, especially to the east in the area of Long and Miler Canyons east of the permit area. Little change will be noted along the west and northern boundaries due to the relatively fixed surface water reference points. Considering the above factors one is lead to the conclusion that with relatively stable water table conditions on the west, north, and northeast, that seasonal variations in the regional water table~~ variations~~ are small.

Within and down the peizometric slope of the permit area, potential impacts to the regional aquifer system due to mining are believed to be small to non-existent. Although there is some potential to drain overlying small perched and isolated water bearing zones, there are no plans to discharge the water to the surface environment. The limited amount of water anticipated to be encountered within the mine will be diverted to sumps within the~~abandoned~~ mine workings~~areas~~ where it will create a storage pool, which over time will contribute to the regional system via horizontal and downward leakage to adjacent units.

Ground Water Occurrence

The evaluation of the occurrence and movement of ground water is based on ground water characteristics and site-specific information obtained during drilling, testing, and monitoring of wells and springs within the permit area.

It has been observed through data collected that there is a mix of local water resources. Areas to be mined have been shown to have limited water resources through exploratory drilling, while surrounding areas east of planned mining show the presence of more significant seeps and springs, all of which are influenced by local confining geologic strata. The most significant, yet least preferable water source within the general area is Sulfur Spring, located adjacent to Highway 96 along the western slope of the permit area. Although this spring flows year round at an approximate 80 GPM, it's water quality is relatively poor, having a strong sulfur smell. Flows from this spring are not used directly, but cross the highway and enter the Scofield Reservoir flood plain.

Table 9. Seep and Spring Flow Summary

Spring	Location	Est. Flow (GPM)
Sulfur Spring	Adjacent to Highway 96	80 – Yr Round
Miller Spring (AKA Eagle Spring)	1 ¼ mile north of Sulfur Spring, east of Highway 96	1
UP Spring	South Fork, UP Canyon	Seep
Angle Spring	Eagle Canyon	0.5 – Yr Round
Eagle Seep 1 (AKA Eagle Spring 1)	Eagle Canyon	< 0.5
Eagle Seep 1A (AKA Eagle Spring 1A)		< 0.5
Eagle Pond 1 (AKA Aspen Spring)		Seep under pond-
Eagle Seep 3 (AK Eagle Spring 3)	~~Eagle Canyon~~	Estimated to be a maximum of 5
Eagle Spring 2/Eagle Pond 2		<0.5
Eagle Seep 3		< 0.5
Long Canyon Seep 1 & 2	Long Canyon	Seep
Long Canyon Seep 3		
Long Canyon Spring 1		10
Long Canyon Spring 2		0.5
Long Canyon Spring 3		3
Long Canyon Spring 4		< 0.5
Long Canyon Spring 5 & 5A		5
Long Canyon Spring 6		10
Long Canyon Spring 7		7
Long Canyon Spring 8		20
Merrill Spring 1	Merrill Canyon	10
Luis Spring	(Tributary to Long Canyon)	10 - 15
Guzman Spring		0.5
Merrill Spring 2		10
Merrill Spring 4		5
Merrill Springs 5 & 5A		10
Merrill Spring 6		< 1
JC Spring 1	Jump Creek	10
JC Spring 2		5
JC Spring 3		< 1
JC Spring 4		< 1
JC Spring 5		< 1

Foot Note:
Eagle Pond 1 is shown on the Seep and Spring Survey Map, between Eagle Seep 1A and Eagle Seep 2, but the flow was not measured due~~e~~ to lack of opportunity to do so. The spring feeds a small pond and ~~the pond~~ either seeps into ~~surrounding~~ upgradient soil with no distinct outlet or discharges to the pond from beneath the water surface or a combination of both. Eagle Pond 1 was later renamed Aspen Spring and was picked up as a monitoring station. As a result ~~i~~It has never been possible to measure flow from this spring.

As documented within the 2006 Seep and Spring Survey, discussed earlier, no other springs of significance are found along the western slopes, either north or south of the permit area. Flows within Eagle Canyon, the next north-south trending drainage east of the mine portals haves limited flows. Aspen Spring, as described in the footnote for Table 9, does not have a measured flow. Based on a water balance of the spring/pond an estimate, as allowed by rule 724.100, has been prepared to provide a maximum value to cover the anticipated flows from this source. Exhibit 10 presents these estimate calculations together with a Rock Logic memo reviewing Aspen Spring Field Data. All other seeps/springs in the canyon flow at, all less than ½ GPM each. Based on these flows and estimates, the total flow from Eagle Canyon springs and seeps has a maximum flow of 7.5 gpm. Not until Long Canyon, located 1 ½ miles east of the mine portals, does one encounter flows of any significance. The 2006 Seep and Spring discussed three seeps with only minor flows, and springs with flows ranging between 0.5 and 20 GPM. Combined, flows from these 9 springs at the time of the field investigation averaged 6.8 GPM and totaled 61 GPM.

Seeps and springs located within Jump Creek and Merrill Canyon, located 2 ½ miles east of the mine portals were also relatively significant. Of the 11 springs identified, three had minor flows of less than 1 GPM, four had flows of 5gpm, three of 10 GPM, and one of between 10 and 15 GPM.

On a regional basis, ground water occurrence and movement are believed to be stratigraphic and structurally controlled. Faulting is believed to have impact on ground water movement as is the layered geologic strata. At times, shales in or adjacent to fractured or faulted zones will swell, acting as an aquitard thus limiting vertical ground water movement via the fault, and horizontal movement through the fault. Folding is also limited to low-gradient regional features which may influence the overall direction and rate of regional ground water movement but have limited localized influence.

Although there have been eleven monitoring wells constructed, there use is limited to determine local and regional ground water flow directions due to the presence of many interrupting faults that form localized horst, and graben systems. Generally speaking, it is believed that the general ground water flow direction is to the west-northwest as shown on Map 7, Regional Hydrology. Information that is available to characterize the occurrence and movement of ground water within the permit area comes from the installation, testing, and routine monitoring of the wells installed and used within the Baseline Hydrologic Monitoring Plan, from seeps and springs, and from surface sources including Mud Creek and Scofield Reservoir as discussed above. Two cross-sections of the regional water table were prepared based on information provided on Map 7. The east-west section (A-A') is shown taken through the center of the permit area is shown on Map 7A. The north-south section (C-C') taken through the western portions of the permit area near the mine portals is shown on Map 7B.

Map 7A shows the connection of the regional water table with Mud Creek and Scofield Reservoir on the left with an upward gradient to the east beneath Long Canyon that is expected to continue upward to at least Jump Creek. The regional water table shown is based on a triangular interpolation model using fixed data points at the wells and surface water features. Note through a comparison of Maps 7A and 7B with Map 7 that the piezometric surface appears to not match up directly with wells shown; this is because those having water level data are out of the line of the cross-section. Some wells however are shown in the cross-sections for general reference.

Data showing available water level elevations for all monitoring wells are provided in Exhibit 10, Surface and Ground Water Field Measurements. Data plots and graphs are provided in R645-301-724.

Ground Water Quality

Although water quality data has been collected from surface water and spring/seep sources, ground water quality from wells is limited to three wells, CR-06-03ABV, CR-10-11 and CR-10-12, as shown in Exhibit 10, Surface and Ground Water Field Measurements. Well water quality data is limited by the general lack of water encountered within the wells subsequent to drilling. As discussed previously, water levels within the majority of the wells remains within the lowermost blank casing section indicative of dry holes. Field water quality data collected from well CR-06-03ABV show that the well has moderately variable pH, Dissolved Oxygen, Specific Conductivity and Temperature ranges of 6.87-7.28, 1.1-5.7, 245-689, and 20.7-28.3 respectively. A complete set of field and laboratory water quality data is provided in Exhibit 10, Surface and Ground Water Field Measurements and Exhibit 12, Surface and Ground Water Quality Data, respectively. A summary of water quality data is provided in Table 10, Surface and Ground Water Quality Summary.

A plot of major anions and cations for base water quality data collected during the summer of 2006 (shown on Map 10, Regional Water Quality), shows that although the waters are generally of calcium bicarbonate type, there are some distinct variations between sources as shown on Map 10, Regional Water Quality. Waters from Angle and Sulfur Springs, and from well CR-06-03ABV show a strongly calcium bicarbonate type water. Miller Outlet, Mud Creek, and Res-1 also show calcium bicarbonate type waters, but with slightly lesser contents than Angle and Sulfur springs and Well CR-06-03 ABV. Mud Creek also appears to show stronger content of sodium potassium, magnesium, and sulfate than other samples, most likely the result of upstream mine discharges. The real water quality anomaly lies with Eagle spring which shows a sodium - calcium bicarbonate type water, but at much higher quality than other sources. From the data shown it can be concluded that a clear distinction lies between the water type of Eagle Spring and all other local waters tested. The data also shows a clear distinction between ground waters and surface waters, ground waters having higher calcium and bicarbonate contents than surface waters.

Basic anion-cation data and total dissolved solids for Eagle Spring shows a significantly higher water quality than other local sources. Average TDS of Eagle Spring is 152 for the documented period of record whereas Angle, Aspen and Sulfur Springs have TDS values of 303 and 366 mg/l respectively.

The average TDS of well CR-06-03 ABV is calculated to be 401 mg/l and surface sources including Miller Outlet, Mud Creek and RES-1 are 299, 470 and 322 mg/l respectively. It is interesting to note that local general surface water quality is quite good, Mud Creek having the poorest water quality of the samples taken. Again, the degradation of water quality in Mud Creek is believed to be the result of upstream mine discharges.

Table 10. Surface and Ground Water Quality Summary

Table 10. Surface and Ground Water Quality Summary				
Eagle Spring thru	6/16/2008			
Analyte	Count	Max	Min	Avg
Acidity	4	24.00	0.00	10.50
Alkalinity,(As CaCO3)	4	64.00	34.00	45.00
Aluminum	4	3.90	0.94	1.89
Ammonia (as N)	4	0.09	0.07	0.08
Arsenic	4	0.01	0.00	0.00
Bicarbonate (As CaCO3)	4	64.00	34.00	45.00
Boron	4	0.08	0.00	0.02
Cadmium	4	0.00	0.00	0.00
Calcium	4	15.00	11.00	13.00
Carbonate (As CaCO3)	4	0.00	0.00	0.00
Chloride	4	5.00	3.80	4.63
Conductivity	0	na	na	na
Copper	4	0.01	0.01	0.01
Hardness (as CaCO3)	4	55.00	28.00	43.00
Iron - Diss	3	1.10	0.75	0.93
Iron - Total	3	2.70	1.10	2.00
Lead	4	0.00	0.00	0.00
Magnesium	4	3.50	2.70	3.05
Manganese - Diss	3	0.02	0.00	0.01
Manganese - Total	3	0.02	0.01	0.01
Molybdenum	4	0.00	0.00	0.00
Nitrate (as N)	3	0.10	0.00	0.04
Nitrite (as N)	3	0.04	0.01	0.02
Oil & Grease	4	5.40	3.30	3.85
pH @ 25° C	0	na	na	na
Phosphate, ortho (as P)	4	0.13	0.06	0.09
Potassium	4	4.50	1.10	2.15
Selenium	4	0.00	0.00	0.00
Settleable Solids	1	0.00	0.00	0.00
Sodium	4	25.00	4.40	13.85
Sulfate	4	6.20	4.80	5.73
TDS	4	200.00	120.00	152.50
TSS	4	36.00	8.00	22.50
Zinc	4	0.03	0.02	0.03

Table 10. Surface and Ground Water Quality Summary

Angle Spring thru 9/27/2006

Analyte	Count	Max	Min	Avg
Acidity	12	0.00	0.00	0.00
Alkalinity,(As CaCO3)	12	320.00	290.00	299.17
Aluminum	12	0.00	0.00	0.00
Ammonia (as N)	12	0.17	0.00	0.01
Arsenic	12	0.01	0.00	0.00
Bicarbonate (As CaCO3)	13	320.00	0.00	276.92
Boron	13	0.00	0.00	0.00
Cadmium	13	0.09	0.00	0.01
Calcium	13	100.00	90.00	97.31
Carbonate (As CaCO3)	13	0.00	0.00	0.00
Chloride	13	67.00	20.00	26.23
Conductivity	1	670.00	670.00	670.00
Copper	13	0.02	0.00	0.00
Hardness (as CaCO3)	13	340.00	220.00	318.46
Iron - Diss	12	0.00	0.00	0.00
Iron - Total	12	0.00	0.00	0.00
Lead	13	0.00	0.00	0.00
Magnesium	13	20.00	17.00	18.54
Manganese - Diss	12	0.01	0.00	0.00
Manganese - Total	12	0.00	0.00	0.00
Molybdenum	13	0.00	0.00	0.00
Nitrate (as N)	12	1.10	0.92	0.99
Nitrite (as N)	12	0.10	0.00	0.01
Oil & Grease	13	5.50	0.00	3.24
pH @ 25° C	2	7.71	7.04	7.38
Phosphate, ortho (as P)	13	0.04	0.00	0.00
Potassium	13	1.90	0.00	1.32
Selenium	13	0.05	0.00	0.01
Settleable Solids	0	na	na	na
Sodium	13	21.00	8.70	10.54
Sulfate	13	19.00	0.00	14.92
TDS	12	400.00	190.00	300.00
TSS	13	0.00	0.00	0.00
Zinc	13	0.11	0.00	0.03

Table 10. Surface and Ground Water Quality Summary

Aspen Spring thru 9/28/2010

Analyte	Count	Max	Min	Avg
Acidity	6	0.00	0.00	0.00
Alkalinity,(As CaCO3)	4	280.00	75.00	188.75
Aluminum	6	0.00	0.00	0.00
Ammonia (as N)	6	1.63	0.00	0.33
Arsenic	6	0.00	0.00	0.00
Bicarbonate (As CaCO3)	6	280.00	71.00	170.83
Boron	6	0.00	0.00	0.00
Cadmium	6	0.00	0.00	0.00
Calcium	6	92.00	20.00	52.02
Carbonate (As CaCO3)	6	0.00	0.00	0.00
Chloride	6	36.10	5.80	22.48
Conductivity	0	na	na	na
Copper	6	0.00	0.00	0.00
Hardness (as CaCO3)	6	290.00	70.00	174.67
Iron - Diss	4	1.50	0.00	0.43
Iron - Total	8	25.80	0.21	5.28
Lead	6	0.00	0.00	0.00
Magnesium	6	15.00	4.70	10.78
Manganese - Diss	4	0.75	0.00	0.21
Manganese - Total	8	0.90	0.01	0.33
Molybdenum	6	0.00	0.00	0.00
Nitrate (as N)	6	0.36	0.00	0.06
Nitrite (as N)	6	0.06	0.00	0.02
Oil & Grease	6	6.40	0.00	3.12
pH @ 25° C	1	7.71	7.71	7.71
Phosphate, ortho (as P)	3	0.00	0.00	0.00
Potassium	6	24.10	3.20	11.72
Selenium	6	0.00	0.00	0.00
Settleable Solids	6	1.50	0.00	0.25
Sodium	6	27.00	5.80	14.75
Sulfate	6	29.10	1.70	10.48
TDS	6	370.00	120.00	278.67
TSS	6	344.00	13.00	77.17
Zinc	6	0.02	0.00	0.01

Table 10. Surface and Ground Water Quality Summary				
Sulfur Spring thru	12/1/2010			
Analyte	Count	Max	Min	Avg
Acidity	30	80.00	0.00	2.67
Alkalinity,(As CaCO3)	27	380.00	290.00	342.59
Aluminum	30	0.00	0.00	0.00
Ammonia (as N)	30	0.44	0.00	0.09
Arsenic	30	0.00	0.00	0.00
Bicarbonate (As CaCO3)	30	380.00	290.00	342.70
Boron	31	0.07	0.00	0.00
Cadmium	31	0.00	0.00	0.00
Calcium	31	95.00	82.00	89.05
Carbonate (As CaCO3)	31	10.00	0.00	0.32
Chloride	31	9.30	5.10	6.54
Conductivity	1	710.00	710.00	710.00
Copper	31	0.01	0.00	0.00
Hardness (as CaCO3)	31	390.00	210.00	365.29
Iron - Diss	28	0.15	0.00	0.01
Iron - Total	34	0.30	0.00	0.01
Lead	31	0.01	0.00	0.00
Magnesium	31	38.00	31.00	35.72
Manganese - Diss	28	0.16	0.00	0.04
Manganese - Total	34	0.17	0.03	0.03
Molybdenum	31	0.00	0.00	0.00
Nitrate (as N)	30	0.02	0.00	0.00
Nitrite (as N)	30	0.10	0.00	0.00
Oil & Grease	31	540.00	0.00	20.73
pH @ 25° C	2	7.38	7.30	7.34
Phosphate, ortho (as P)	27	0.02	0.00	0.00
Potassium	31	5.90	4.20	4.88
Selenium	31	0.01	0.00	0.00
Settleable Solids	11	0.00	0.00	0.00
Sodium	31	19.00	7.40	9.27
Sulfate	31	47.00	29.00	43.87
TDS	30	440.00	230.00	365.07
TSS	31	17.00	0.00	1.84
Zinc	31	0.12	0.00	0.01

Table 10. Surface and Ground Water Quality Summary				
Mud Creek thru		12/1/2010		
Analyte	Count	Max	Min	Avg
Acidity	31	68.00	0.00	2.19
Alkalinity,(As CaCO3)	28	300.00	160.00	237.86
Aluminum	31	0.00	0.00	0.00
Ammonia (as N)	31	0.57	0.00	0.03
Arsenic	31	0.00	0.00	0.00
Bicarbonate (As CaCO3)	31	280.00	150.00	228.65
Boron	32	0.10	0.00	0.00
Cadmium	32	0.05	0.00	0.00
Calcium	32	100.00	48.00	72.44
Carbonate (As CaCO3)	32	55.00	0.00	7.31
Chloride	32	63.00	6.90	20.21
Conductivity	1	1000.00	1000.00	1000.00
Copper	32	0.01	0.00	0.00
Hardness (as CaCO3)	32	490.00	120.00	340.81
Iron - Diss	29	0.07	0.00	0.00
Iron - Total	35	2.70	0.00	0.60
Lead	32	0.00	0.00	0.00
Magnesium	32	59.00	14.00	38.88
Manganese - Diss	29	0.09	0.00	0.02
Manganese - Total	35	0.15	0.01	0.04
Molybdenum	32	0.00	0.00	0.00
Nitrate (as N)	31	1.50	0.00	0.31
Nitrite (as N)	31	0.02	0.00	0.00
Oil & Grease	32	360.00	0.00	14.09
pH @ 25° C	2	8.49	8.18	8.34
Phosphate, ortho (as P)	28	0.07	0.00	0.00
Potassium	32	9.70	1.90	6.44
Selenium	32	0.03	0.00	0.00
Settleable Solids	12	0.20	0.00	0.06
Sodium	32	57.00	18.00	38.63
Sulfate	32	290.00	38.00	147.13
TDS	31	720.00	230.00	458.45
TSS	32	320.00	4.00	43.16
Zinc	32	0.16	0.00	0.01

Table 10. Surface and Ground Water Quality Summary				
Miller Outlet thru	12/1/2010			
Analyte	Count	Max	Min	Avg
Acidity	30	86.00	0.00	2.87
Alkalinity,(As CaCO3)	27	300.00	210.00	251.11
Aluminum	30	0.24	0.00	0.01
Ammonia (as N)	30	0.16	0.00	0.05
Arsenic	30	0.00	0.00	0.00
Bicarbonate (As CaCO3)	31	300.00	200.00	245.32
Boron	31	0.03	0.00	0.00
Cadmium	31	0.05	0.00	0.00
Calcium	31	100.00	63.00	80.93
Carbonate (As CaCO3)	31	21.00	0.00	3.13
Chloride	31	39.00	8.10	11.15
Conductivity	1	550.00	550.00	550.00
Copper	31	0.01	0.00	0.00
Hardness (as CaCO3)	31	330.00	180.00	269.55
Iron - Diss	28	1.30	0.00	0.05
Iron - Total	34	6.50	0.00	2.22
Lead	31	0.00	0.00	0.00
Magnesium	31	20.00	14.00	16.64
Manganese - Diss	28	0.15	0.00	0.03
Manganese - Total	34	0.34	0.00	0.13
Molybdenum	31	0.00	0.00	0.00
Nitrate (as N)	30	0.92	0.00	0.31
Nitrite (as N)	30	0.04	0.00	0.01
Oil & Grease	31	460.00	0.00	18.01
pH @ 25° C	2	8.29	8.10	8.20
Phosphate, ortho (as P)	27	0.13	0.00	0.03
Potassium	31	2.80	1.10	2.04
Selenium	31	0.03	0.00	0.00
Settleable Solids	11	0.50	0.00	0.13
Sodium	31	19.00	5.40	9.28
Sulfate	31	48.00	19.00	25.63
TDS	30	620.00	200.00	298.73
TSS	31	430.00	18.00	121.97
Zinc	31	0.09	0.00	0.01

Table 10. Surface and Ground Water Quality Summary				
RES-1 thru 9/28/2010				
Analyte	Count	Max	Min	Avg
Acidity	18	0.00	0.00	0.00
Alkalinity,(As CaCO3)	16	330.00	120.00	207.50
Aluminum	18	0.00	0.00	0.00
Ammonia (as N)	18	0.20	0.00	0.07
Arsenic	18	0.00	0.00	0.00
Bicarbonate (As CaCO3)	18	330.00	0.00	187.50
Boron	18	0.00	0.00	0.00
Cadmium	18	0.00	0.00	0.00
Calcium	18	81.00	21.00	54.04
Carbonate (As CaCO3)	18	140.00	0.00	27.33
Chloride	18	86.00	3.60	28.69
Conductivity	0	na	na	na
Copper	18	0.01	0.00	0.00
Hardness (as CaCO3)	18	430.00	130.00	262.22
Iron - Diss	16	0.15	0.00	0.03
Iron - Total	20	10.00	0.00	1.60
Lead	18	0.00	0.00	0.00
Magnesium	18	75.50	14.00	30.75
Manganese - Diss	16	0.47	0.00	0.11
Manganese - Total	20	1.10	0.01	0.24
Molybdenum	18	0.00	0.00	0.00
Nitrate (as N)	18	0.37	0.00	0.07
Nitrite (as N)	18	0.04	0.00	0.00
Oil & Grease	18	340.00	0.00	21.00
pH @ 25° C	1	8.50	8.50	8.50
Phosphate, ortho (as P)	15	0.12	0.00	0.03
Potassium	18	15.00	1.30	4.86
Selenium	18	0.01	0.00	0.00
Settleable Solids	11	5.50	0.00	1.32
Sodium	18	42.00	8.30	24.01
Sulfate	18	140.00	11.60	60.20
TDS	18	620.00	96.00	335.78
TSS	18	1600.00	11.00	179.33
Zinc	18	0.04	0.00	0.01

CR-06-03 ABV thru 8/21/2006				
Analyte	Count	Max	Min	Avg
Acidity	6	0.00	0.00	0.00
Alkalinity,(As CaCO3)	6	410.00	370.00	385.00
Aluminum	6	0.12	0.00	0.02
Ammonia (as N)	6	0.00	0.00	0.00
Arsenic	6	0.04	0.03	0.03
Bicarbonate (As CaCO3)	6	410.00	370.00	385.00
Boron	7	0.00	0.00	0.00
Cadmium	7	0.00	0.00	0.00
Calcium	7	130.00	110.00	120.00
Carbonate (As CaCO3)	7	0.00	0.00	0.00
Chloride	7	63.00	17.00	27.00
Conductivity	1	800.00	800.00	800.00
Copper	7	0.07	0.00	0.01
Hardness (as CaCO3)	7	460.00	280.00	412.86
Iron - Diss	7	0.05	0.00	0.01
Iron - Total	7	4.30	0.31	1.17
Lead	7	0.00	0.00	0.00
Magnesium	7	31.00	28.00	29.71
Manganese - Diss	7	0.10	0.02	0.05
Manganese - Total	7	0.15	0.02	0.06
Molybdenum	7	0.00	0.00	0.00
Nitrate (as N)	6	0.09	0.00	0.04
Nitrite (as N)	6	0.03	0.00	0.01
Oil & Grease	0	na	na	na
pH @ 25° C	1	7.14	7.14	7.14
Phosphate, ortho (as P)	7	0.07	0.00	0.02
Potassium	7	2.50	1.40	2.07
Selenium	7	0.00	0.00	0.00
Settleable Solids	0	na	na	na
Sodium	7	25.00	8.70	14.70
Sulfate	7	50.00	31.00	38.57
TDS	7	460.00	350.00	398.57
TSS	0	na	na	na
Zinc	7	2.80	0.23	0.70

Table 10. Surface and Ground Water Quality Summary				
CR-10-11 thru	1/22/2011			
Analyte	Count	Max	Min	Avg
Acidity	7	50.00	0.00	16.86
Alkalinity,(As CaCO3)	0	na	na	na
Aluminum	7	0.00	0.00	0.00
Ammonia (as N)	7	0.06	0.00	0.01
Arsenic	7	0.00	0.00	0.00
Bicarbonate (As CaCO3)	7	235.00	212.00	220.57
Boron	7	0.00	0.00	0.00
Cadmium	7	0.00	0.00	0.00
Calcium	7	82.40	69.10	78.97
Carbonate (As CaCO3)	7	0.00	0.00	0.00
Chloride	7	20.80	14.20	15.34
Conductivity	0	na	na	na
Copper	7	0.00	0.00	0.00
Hardness (as CaCO3)	7	257.00	223.00	247.29
Iron - Diss	7	0.00	0.00	0.00
Iron - Total	7	22.70	0.12	4.39
Lead	7	0.00	0.00	0.00
Magnesium	7	13.00	11.00	12.19
Manganese - Diss	7	0.02	0.00	0.00
Manganese - Total	7	0.44	0.00	0.08
Molybdenum	7	0.00	0.00	0.00
Nitrate (as N)	7	2.68	2.36	2.55
Nitrite (as N)	7	0.37	0.00	0.07
Oil & Grease	1	0.00	0.00	0.00
pH @ 25° C	0	na	na	na
Phosphate, ortho (as P)	0	na	na	na
Potassium	7	1.47	0.00	1.09
Selenium	7	0.00	0.00	0.00
Settleable Solids	1	6.50	6.50	6.50
Sodium	7	11.50	10.20	11.04
Sulfate	7	11700.00	26.70	1695.46
TDS	7	470.00	280.00	318.29
TSS	1	2690.00	2690.00	2690.00
Zinc	7	0.14	0.00	0.04

Table 10. Surface and Ground Water Quality Summary				
CR-10-12 thru	1/22/2011			
Analyte	Count	Max	Min	Avg
Acidity	7	0.00	0.00	0.00
Alkalinity,(As CaCO3)	0	na	na	na
Aluminum	7	0.32	0.00	0.05
Ammonia (as N)	7	0.00	0.00	0.00
Arsenic	7	0.00	0.00	0.00
Bicarbonate (As CaCO3)	7	186.00	173.00	177.43
Boron	7	0.00	0.00	0.00
Cadmium	7	0.00	0.00	0.00
Calcium	7	99.90	66.20	77.49
Carbonate (As CaCO3)	7	0.00	0.00	0.00
Chloride	7	27.20	17.90	20.24
Conductivity	0	na	na	na
Copper	7	0.00	0.00	0.00
Hardness (as CaCO3)	7	286.00	191.00	222.29
Iron - Diss	7	0.17	0.00	0.02
Iron - Total	7	135.00	0.39	48.01
Lead	7	0.01	0.00	0.00
Magnesium	7	8.96	6.10	6.99
Manganese - Diss	7	0.09	0.00	0.02
Manganese - Total	7	2.65	0.01	0.83
Molybdenum	7	0.00	0.00	0.00
Nitrate (as N)	7	6.70	0.68	4.90
Nitrite (as N)	7	0.18	0.01	0.05
Oil & Grease	1	0.00	0.00	0.00
pH @ 25° C	0	na	na	na
Phosphate, ortho (as P)	0	na	na	na
Potassium	7	1.21	1.01	1.10
Selenium	7	0.00	0.00	0.00
Settleable Solids	1	0.00	0.00	0.00
Sodium	7	25.70	16.00	21.41
Sulfate	7	11500.00	36.70	1680.60
TDS	7	620.00	264.00	416.00
TSS	1	95.00	95.00	95.00
Zinc	7	0.12	0.00	0.02

Ground Water Rights and Use

Ground water rights within a- 2 mile radius of the central mine area are shown on Map 30, Ground Water Right Locations, and listed in Table 11, Ground Water Rights. None of the ground water rights identified are believed to be potentially impacted by the mining operation for the reasons discussed below.

The closest ground water rights to the mining operation are located approximately ¼ mile to the southwest, and are associated with a change application (a34946-right 91-5106) for a well, diverting water for use at a home. This water right is limited to 1.0 acre-foot of water. The next closest water rights to the mining operation are located approximately ½ mile to the southwest, and are associated with a small domestic single family dwellings. Water rights 91-3401 and 91-3402 (included within Exhibit 13, Water Rights) are supplemental rights to each other with a total domestic and stock watering withdrawal limit of 0.73 acre-feet. Exchange application E1912 exchanges surface water flows for ground water flows tributary to Scofield Reservoir and is limited to a 1.0 acre-foot withdrawal for domestic purposes. These water rights are all located within valley alluvium, and lie within an unconfined ground water aquifer zone fed by local surface sources, and geologically below the elevation of the coal seams to be mined. With dry conditions encountered during exploration and the fact that geologic strata dip to the north-east, there is little to no potential for mining activities to affect these water rights.

Water rights west of Mud Creek follow a similar impact potential since they are 1) hydrologicaly disconnected from surface sources, and 2) geologically disconnected from the coal seam and overlying strata.

Water rights 91-4891 and exchange application rights E1934 (see Exhibit 13, Water Rights), are located over 2 miles to the north near the mouth of Miller Canyon, are domestic and irrigation ground water rights that have either been changed or exchanged from surface water sources. The volume of water allowed to be diverted under the rights are 2.0 and 20.0 acre-feet respectively. No impact to these water rights is anticipated since 1) the ground water would be withdrawn adjacent to Scofield Reservoir at relatively shallow depths, 2) the rights are located north of planned mined areas, 3) the coal seams to be mined are relatively dry and are located hydrologicaly above the water right areas.

Ground Water/Surface Water Interactions

Ground water/surface water interactions in the permit area are controlled by sStratigraphy, lithology, localized topography, and climatic conditions, which affect recharge, subsurface flow paths and direction, and discharge areas.

In many cases, shallow perched ground water discharges as springs or seeps to the small tributary surface drainages both from outcrop exposures on exposed slopes above the drainages and from stratigraphic exposures within the drainage channels. Discharge of perched ground water to the surface drainage system occurs most frequently where flat lying, relatively low permeable, and consequent low infiltration stratigraphic units are found.

Table 11. Ground Water Rights

Table 11. Ground Water Rights

WRNUM	CHEXNUM	TYPE	STATUS	PRIORITY	USES	CFS	ACFT	LOCATION	OWNER	SOURCE
91-3401		Underground	DIL	18950000	DS	0.011	0.000	N625 E710 S4 32 12S 7E SL	WAINO E. BURTON	Underground Water Well
91-3402		Underground	DIL	18950000	DS	0.011	0.000	N570 E690 S4 32 12S 7E SL	WAINO E. BURTON	Underground Water Well
91-5160	a34946	Underground	APPLAPP	20081016	DIS	0.000	1.000	S1235 W1351 E4 32 12S 7E SL	BOYD L. PETERSON AND PEGGY PETERSON TRU:	Underground Water Well
91-4889	E1912	Underground	APPLAPP	19810611	D	0.000	1.000	N2145 W1350 E4 05 13S 7E SL	JIM NICOLODEMOS	Scofield Reservoir
91-4891	E1934	Underground	APPLAPP	19810629	O	0.000	20.000	N1320 0 S4 21 12S 7E SL	UCO INCORPORATED	Scofield Reservoir
91-4891	E1934	Underground	APPLAPP	19810629	O	0.000	20.000	N1771 E210 S4 21 12S 7E SL	UCO INCORPORATED	Scofield Reservoir
91-4891	E1934	Underground	APPLAPP	19810629	O	0.000	20.000	N2220 E420 S4 21 12S 7E SL	UCO INCORPORATED	Scofield Reservoir
91-4891	E1934	Underground	APPLAPP	19810629	O	0.000	20.000	N2640 E630 S4 21 12S 7E SL	UCO INCORPORATED	Scofield Reservoir
91-5165	A34604	Underground	APD	20080701	O	0.000	1.000	N1347 W995 S4 05 13S 7E SL	ROBERT & HELEN RADAKOVICH MARITAL/FAM. 1	Scofield Reservoir
91-4909	E2567	Underground	SUPP	19871013	O	0.000	30.000	S1056 W1451 N4 S05 13S 7E SL	SCOFIELD TOWN	Scofield Reservoir

Significant alluvial/colluvial deposits, particularly in the flatter reaches of area drainages, form localized ground water storage systems which may or may not be laterally continuous along the length of the drainage depending on localized conditions. During periods of high runoff, the alluvial/colluvial deposits are recharged. As surface flows recede, limited stored ground water may discharge to the surface system extending the period of active surface flow. Residual ground water storage in the alluvial/colluvial system may be retained, may serve as a source of recharge to more permeable exposed bedrock units, or may be depleted through normal evapo-transpiration during extended dry periods.

Ground Water Summary

Ground water resources in the permit and adjacent areas are limited in both extent and quantity. Ground water occurrences are limited to: shallow alluvial/colluvial valley-fill deposits in local drainages; perched ground water in thin, laterally discontinuous geologic units and in narrow near vertical aquifers adjacent to faults; ground water accumulated over time in lower underground mine workings; and, the regional aquifer consisting of deeper units in the Blackhawk Formation extending into the underlying Star Point and Mancos Formations.

Ground water movement is limited by low transmissivities, the general lack of significant secondary permeabilities except in limited areas along faults, and limited recharge in outcrop zones. It is likely that ground water has gradually accumulated over time in the down-dip workings of abandoned and sealed mines underlying the Hiawatha Coal seam, resulting in potentially significant volumes of water. Mine inflows are minimal.

R645-301-724.200 Surface Water Information

Surface water in the permit and adjacent areas is limited to Scofield Reservoir, perennial flows within Mud Creek, Miller and Long Canyon, and ephemeral flows from various side tributaries. Flows have been quantified by analysis of water quality and quantity characteristics, historic flow and quality data for Mud Creek, Miller Canyon (Miller Outlet), Scofield Reservoir, Angle Spring, Eagle Spring, Sulfur Spring, and Aspen Spring. Some flow data is available for seeps and springs identified in the Seep and Spring survey completed in 2006. The evaluation of surface water involved the collection of surface water data in the permit and adjacent areas and an assessment of regional hydrologic information from adjacent areas. Raw data have been reduced by standard scientific methods to develop interpretations and reach conclusions presented in this section.

Surface Water Environment

As discussed in the ground water section (R645-301-724), both surface and ground water hydrologic features and regimes within the permit and adjacent areas are reflective of and strongly influenced by geologic structure, stratigraphy, lithology, and localized topography and climatic conditions. Map 7, Regional Hydrology and Map 10, Regional Water Quality display surface topography and watersheds in the permit area.

The climate in the proposed lease area and adjacent areas is arid to semi-arid. Table 13, Summary of Temperature Data, Table 14, Summary of Precipitation Data – Scofield Dam, and Table 15, Summary of Wind Data – Price, Utah provide data believed to be representative to the mine site. Wind data provided was the closest found to the project site.

According to the data, the area has an average annual precipitation of 14.56 inches. Average monthly precipitation ranges from 0.90 inches in June to 1.65 inches in January. Most of the precipitation falling as snowfall occurs during November, December, January, February, March and April, although it often falls in October and May, and sometimes in June. Like many areas within the State, precipitation falling as rainfall, commonly occurs in response to high-intensity short-duration storms of limited aerial extent (Butler and Marsell, 1972).

Temperatures in the proposed permit area are seasonal, with the high mean monthly temperature occurring in July and the low mean monthly temperature occurring in February. Evaporation and infiltration rates in the proposed lease and adjacent areas vary with vegetation, soil type, and time of year. The average annual potential evaporation in central Utah is 40 inches per year (Geraghty, et al., 1973).

The permit area is located near the north end of the Wasatch Plateau, which is an uplifted N-S elongated geomorphic feature extending over more than 60 miles in Central Utah. The Wasatch Plateau forms the transition zone between the Basin and Range and Colorado Plateau Structural Provinces. The Uintah Basin structural element also affects this northern end of the Wasatch Plateau, causing the northward "regional dip" of the beds in the area.
Generally, the topography in the area is fairly mountainous with shallow narrow valleys and side channel tributaries. The mountainous terrain combined with climate influence the surface drainage configuration and flow characteristics. Most drainage channels contain no flowing water except during snowmelt and/or precipitation events. Rapid runoff from snowmelt and thunderstorm precipitation often cause relatively brief, high velocity flows in the smaller drainages, and significant flow variation in the larger drainages.

Velocities in Mud Creek measured since May of 2005 have varied between 11.0 and 131.1 CFS. Measured stream flows in Miller Canyon to the north range from 0.0 during winter months when the stream is frozen to 1.21 CFS which occurred on April 26, 2005.

Drainages and Surface Water Bodies

Drainages

~~-~~The permit and adjacent areas fall within the upper Price River drainage basin. Miller Canyon and Mud Creek are the major perennial streams in the area adjacent to the mine site. These water sources are tributary to Scofield Reservoir, which is the source of headwaters for Price River. Minor perennial streams drain watersheds adjacent to the proposed permit area including several small ~~intermittent and~~ ephemeral tributaries are located within and adjacent to the permit area, including UP Canyon to the south and Eagle Canyon to the north. The majority of the smaller drainages exhibit an ephemeral flow pattern with sustained flows only in

Table 13. Summary of Temperature Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Station - Clear Creek #1													
Record Mean:	23.5	22.5	28.5	34.5	44.1	52.0	60.0	56.4	49.3	35.8	28.6	20.8	n/a
Record Max:	55.4	59.0	62.6	68.0	77.0	82.4	89.6	86.0	78.8	73.4	64.4	53.6	n/a
Record Min:	-11.2	-5.8	-18.4	-2.2	-11.2	19.4	24.8	19.4	17.6	5.0	-4.0	-22.0	n/a
Station - Scofield Dam													
Avg Max (F):	27.4	31.9	38.1	48.2	59.4	70.2	77.7	75.4	67.3	56.1	39.9	30.4	51.8
Avg Min. (F):	-1.4	0.6	11.9	21.9	31.0	38.0	44.4	42.9	34.9	26.1	15.8	3.4	22.5

response to spring snowmelt and major thunderstorms Exhibit, 20 Ephemeral Drainage Determination. All or portions of the following named drainages fall within a two-mile radius of the permit area. Drainage west of Pleasant Valley as well as Mud Creek are hydraulically disconnected to potential impacts from potential mining activities.

Perennial	Ephemeral
Drainages East of Pleasant Valley	
Mud Creek	Eagle Canyon
Miller / Long Canyon	UP Canyon
Drainage West of Pleasant Valley	
Bear Canyon Creek	Number Four Gulch
Fish Creek	Tucker Canyon
Green Canyon	Woods Canyon
Winter Quarters Canyon	Winter Quarters

General basin characteristics are rolling uplands and open parks above the Price River Canyon, with vegetation communities of sagebrush/grasslands and mixed coniferous/aspen forests.

Mud Creek where it enters Scofield Reservoir drains an area of approximately 42 square miles. The headwaters lie approximately 9 miles south of the proposed lease area. Elevations range from approximately 10,394 feet to 7,612 feet at its confluence with Scofield Reservoir. Mud Creek, having a length of 11.2 miles is the only major tributary to Scofield Reservoir within the vicinity of the proposed permit area.

The general local basin topography can be characterized as moderately steep mountain lands with narrow valleys having a mixed vegetation consisting of pinion, quaking aspen, and sagebrush vegetative mixes. Stream flow from local ~~intermittent/~~ephemeral drainages is commonly very low.

Surface Water Bodies

Scofield Reservoir, a man-made reservoirs is not located within the permit area, but is located a short distance to the north west. Several very small stock-watering ponds and beaver dams were however, identified in the Seep and Spring Survey, basically located within the small canyon drainages to the east, including Eagle and Long Canyons. As is typical of the region, stock ponds are commonly associated with local springs.

The sedimentation structure planned for the Kinney No. 2 Mine surface facility will exist solely for the containment and retention of disturbed area runoff to allow for settling of suspended solids prior to release and discharge to natural drainages. The active sedimentation pond will be monitored on a regular basis to verify compliance with all applicable regulatory provisions and effluent discharge limitations. Because the sediment pond will be utilized solely for temporary retention of stormwater runoff, no water rights or beneficial uses are associated with it. Water rights associated with springs and/or stock ponds are provided in Exhibit 13, Water Rights.

Perennial Streams

~~–~~As previously described under the sub-heading "Drainages", the perennial streams in the permit and adjacent areas include Mud Creek, and Long/Miller Canyons. All other area drainages are characterized by ~~intermittent or~~ ephemeral flow patterns. In the vicinity of the permit area, the floodplain areas of the perennial streams have experienced only limited disturbance. Disturbance along Mud Creek is mostly confined to areas through the Town of Scofield, and very minor disturbance in grazing areas along the creek. Flood plain disturbance within Long and Miller Canyons appears to be basically limited to small road and ranch property zones within the lower reaches of Miller Canyon, and stock watering ponds within the reaches of Long Canyon.

Based on available information, some floodplain areas in the immediate vicinity and downstream of Scofield, Utah have a limited history of irrigation or farming. These small areas bordering Mud Creek are shown on aerial photography easily visible on aerial photography to be west of the proposed permit area and Highway 96. Small irrigated areas are also visible on photography in the vicinity of the ranch house located within Miller Canyon downstream of the confluence of Miller and Long Canyons.

According to the Utah Division of Water Quality, surface water sources including Mud Creek and Scofield Reservoir have stream classifications of 1C, 2B, 3A and 4 in the areas adjacent to the proposed lease area. Definitions of each classification are:

- 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- 2B – Protected for secondary contact recreation such as boating, wading, or similar uses.
- 3A – Protected for cold water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
- 4 – Protected for agricultural uses including irrigation of crops and stock watering.

These drainage classifications indicate that the Scofield Reservoir and associated tributaries are designated for culinary use when treated, recreation, as cold water non-game fish habitat, and irrigation and stock watering with no associated natural resource waters restrictions other than applicable effluent standards for discharges.

Ephemeral Drainages

Four Ephemeral Drainages are found to cross from, East to West, portions of the Permit Boundary. Three additional Ephemeral Drainages are found in near proximity to the Permit Boundary. Five of the Seven Ephemeral Drainages are shown as no-name drainages on the USGS Scofield Quadrangle Map but~~and~~ are here given names for utility in referencing. These new names appear on nearly all of the Exhibits within this Permit Application that have a topographic base map; Figure 2, Drill Hole Locations w/ Hiawatha Outcrop, in Chapter 6 is a good example. New names for the drainages, derived from the old mine portals located in them are, from North to South, Monay Draw, Blue Seal Draw, Kinney Draw, Columbine Draw, and Jones Draw. Monay and Blue Seal Draws are located North of the Permit Boundary with the other three lying within the Permit Boundary. The other two Ephemeral Drainages are named on the USGS Scofield Quadrangle as Eagle Canyon and UP Canyon. Eagle Canon is the northern-most of the seven drainages and UP Canyon is the southern-most of the seven with the five newly named Drainages positioned between. the two others. UP Canyon is South of the Permit Boundary and does not cross the Boundary at any part, while Eagles Canyon exits the mountain front North of the Permit Boundary, however, Eagles Canyon bends sharply southward and crosses a portion of the Permit Boundary on its East Side.

Baseline Surface Water Data were NOT collected from these Seven Drainages simply because there was NO WATER to collect. As part of an "Ephemeral Drainage Determination" Carbon Resources documented the absence of flowing water on 22 separate days spread over four years, and on one occasion photographedwith photographs the absence of water in the four drainages that cross the Permit Boundary (Eagle Canyon, Kinney Draw, Columbine Draw, and Jones Draw). These photos together with an in-depth analyses of the drainages 3D geometry, geomorphic character, alluvial and vegetative material, and notably their position elevated above relative to the water table is contained in Exhibit 20, Ephemeral Drainage Determination.

Drainages and Surface Water Bodies

Surface Water Occurrence

Significant runoff characteristics relative to both definition of baseline condition and evaluation of any potential mining related impacts include, peak flow rate, low flow rate, mean annual discharge rate, and any seasonal variations in flow. These runoff parameters will be defined through baseline monitoring for individual drainages at approved monitoring stations.

Mean annual discharge for Mud Creek, as measured from 1978-2007 at USGS station 09310700, Mid CRK BL WINTER QUARTERSCYN @ SCOFIELD, UT, is 16.9 CFS (12,260 ac-ft/yr). This station is located on Mud Creek just south of the town of Scofield, Utah and approximately 0.75 miles southwest of the proposed mine portals. A plot of USGS data is shown in Figure 16 Mud Creek Flows.

No historic monitoring information is available for the named and unnamed minor area drainages, most of which are dry over much of the year. In May 2005, in conjunction with development of the Kinney No. 2 Mine Project, Carbon Resources (CR) began monitoring Scofield Reservoir, Mud Creek, and Miller Canyon, the three major surface water sources in the mine vicinity. Ongoing monitoring will supplement existing data and provide a basis for definition of existing hydrologic baseline conditions. Surface water monitoring locations are shown on Map 10, Regional Water Quality. The water level in Scofield Reservoir can be seen in Figure 17 below.the table above. It should be noted that the Bureau Of Reclamation records the lake level in North American Vertical Datum of 1929 (NAVD 29) elevations. The Top of Active Storage (7617.5 ft) shown in the table above is a NAVD 29 elevation. The elevations shown on the Y line of the graph are in North American Vertical Datum 1988 (NAVD 88), which is the datum used by the Kinney No. 2 Mine. The NAVD 88 use is mandated by Utah State Law for new projects such as the Kinney No. 2 Mine.

Figure 16 Mud Creek Flows

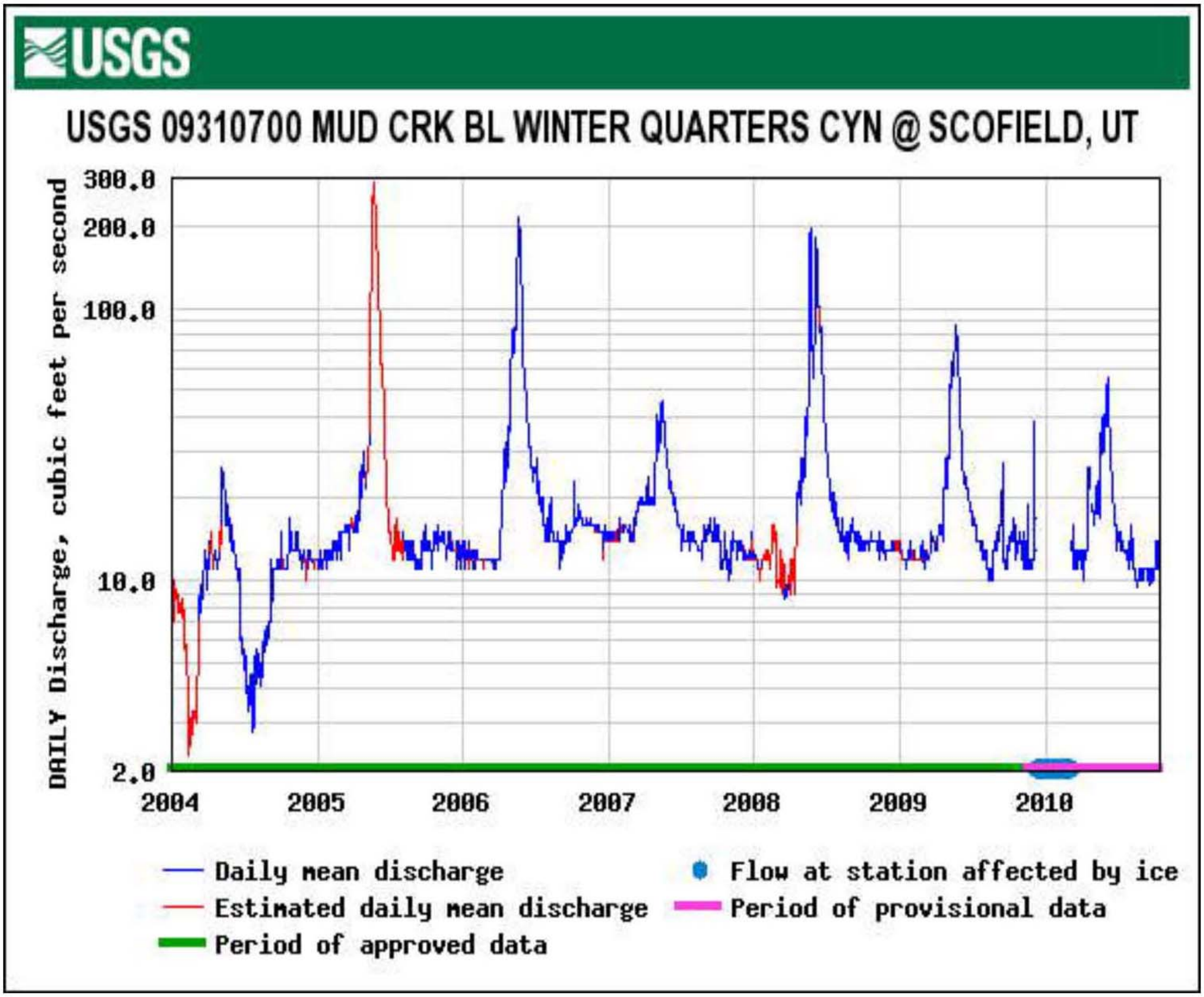


Figure 17. Field Data

FIGURE 17. FIELD DATA

Carbon Resources LLC

Kinney II Baseline Water Sampling
Surface Water Field Measurements

Mud Creek *

Updated: February 2011

Elevation: **~7,685**

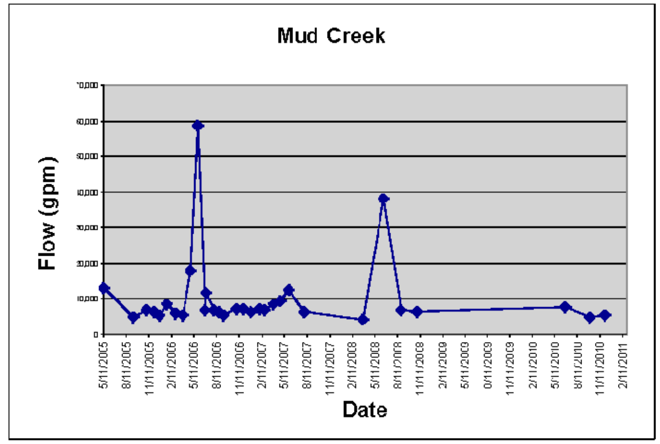
Date	Estimated ** Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/11/2005	13,015	8.31	7.4	694	10.0
9/6/2005	4,937	8.51	5.4	655	17.7
10/31/2005	6,732	6.68	6.4	759	10.7
11/29/2005	6,283	6.94	7.2	758	5.6
12/22/2005	5,386	6.67	6.2	520	13.6
1/22/2006	8,527	8.63	4.1	568	7.6
2/26/2006	5,834	9.0	3.6	501	19.3
3/27/2006	5,386	**8.18**		**1000**	~2
4/26/2006	17,952	8.3	5	394	18.5
5/25/2006	58,797	8.45	4.4	324	26.5
6/29/2006	11,670		6.2	581	28.5
7/31/2006	6,732	8.4	4.8	471	26.9
8/20/2006	6,284	8.38	5.1	188	27.7
9/7/2006	5,386		6.1	564	14.3
10/30/2006	7,181	7.94	6.9	424	17.3
11/27/2006	7,181	7.76	6	463	12.0
12/26/2006	6,284	8.08	7.3	571	13.1
1/31/2007	7,181	7.4	5.5	834	12.4
2/19/2007	6,732	8.3	6.8	476	12.4
3/29/2007	8,528	8.33	7.9	555	13.4
4/25/2007	9,425	8.29	7.8	546	25.0
5/29/2007	12,567	8.51	7.9	481	20.7
6/25/2006	6,733	8.65	5.7	742	27.7
7/30/2007	6,284	8.58	5.3	532	25.5
3/25/2008	4,129	7.8	5.0	633	17.5
6/16/2008	38,151	8.93	4.7	355	23.8
8/26/2008	6,732	8.31	3.9	651	28.6
10/29/2008	6,284	8.93	11.4	667	15.9
6/23/2010	7,630	9.29	3.4	289	24.6
9/28/2010	4,937	8.90		732	11.4
12/1/2010	5,386	7.62		741	6.8
2/24/2011		7.84		744	4.8

NOTE: Bolded values measured in March 2006 were analyzed at the laboratory. Specific conductivity values were actually measured as conductivity.

*The sample collected at Mud Creek in May 2005 was mislabled "Muddy Creek" and analyltic data are labled accordingly. Data labled Mud Creek & Muddy Creek represent samples collected at the same location.

** Flow Data From USGS 09310700 MUD CRK BL WINTER QUARTERS CYN @ SCOFIELD, UT From Web Site; http://waterdata.usgs.gov/nwis/dv/?site_no=09310700&agency_cd=USGS&referred_module=sw

Red Values are SUSPECT



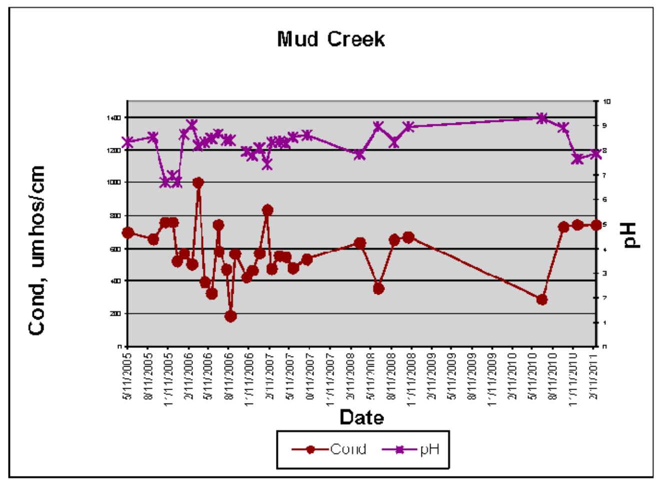


FIGURE 17. FIELD DATA

Carbon Resources LLC

Kinney II Baseline Water Sampling

Surface Water Field Measurements

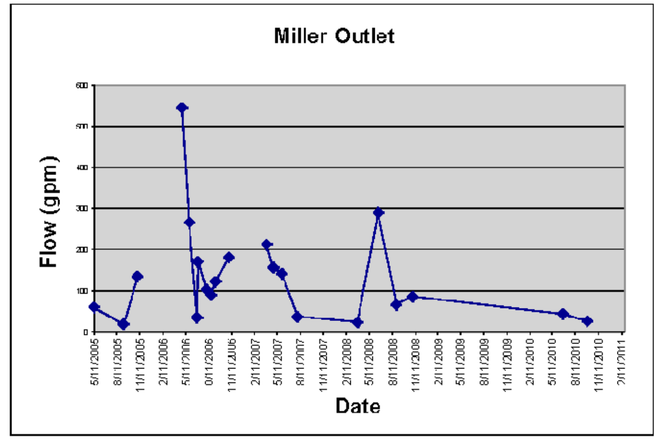
Miller Outlet *

Elevation: **~7,632**

Updated: February 2011

Date	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/11/2005	59	8.09	6.9	474	10.4
9/6/2005	18	8.04	4.6	433	13.1
10/31/2005	134	6.89	7.2	440	4.8
11/28/2005		5.65	8.0	556	1.7
12/22/2005		6.06	6.8	435	4.2
1/22/2006		6.04	7.1	440	1.2
2/26/2006			4.6	320	14.0
3/27/2006		**8.1**		**550**	~1
4/26/2006	545	8.01	3.6	369	19.2
5/25/2006	266	8.53	4.0	408	30.2
6/29/2006	171	8.57	4.2	415	28.6
7/31/2006	103	8.41	4.4	326	27.6
8/20/2006	89	8.6	4.6	110	27.7
9/7/2006	122		7.4	375	13.0
10/30/2006	182	8.33	8.5	285	13.0
11/27/2006		8	5.1	327	10.0
12/26/2006		8.06	7.2	428	8.4
1/31/2007		8.01	5.3	387	8.6
2/19/2007		8.12	7.0	354	8.0
3/29/2007	212	8.7	9.9	440	13.3
4/25/2007	156	8.54	6.7	436	23.4
5/29/2007	142	8.42	7.9	417	22.9
6/25/2006	35	8.06	4.7	508	31.0
7/30/2007	36	8.45	4.9	362	27.7
3/25/2008	23	7.8	5.0	633	17.5
6/16/2008	289	8.7		377	30.4
8/26/2008	66	8.26	3.9	456	29.6
10/29/2008	85	8.41	9.6	434	12.3
6/23/2010	43	12	22.9	283	16.5
9/28/2010	25	8.7		480	12.5
12/1/2010		7.5		617	0.1
2/24/2011					

NOTE: Bolded values measured in March 2006 were analyzed at the laboratory. Specific conductivity values were actually measured as conductivity. No flow indicates "frozen" conditions.
*Miller Outlet was initiallly misnamed "Eagle Outlet" and was once misnamed "Eagle Outlook". Samples collected from may 2005 to may 2006 were mislabled "Eagle Outlet" or "Eagle Outlook" and analyltic data are labled accordingly. From June 2006 to present the data are labled as Miller Outlet. Data labled Miller Outlet, Eagle Outlet, & Eagle Outlook represent samples collected at the same location.
Red Values are SUSPECT



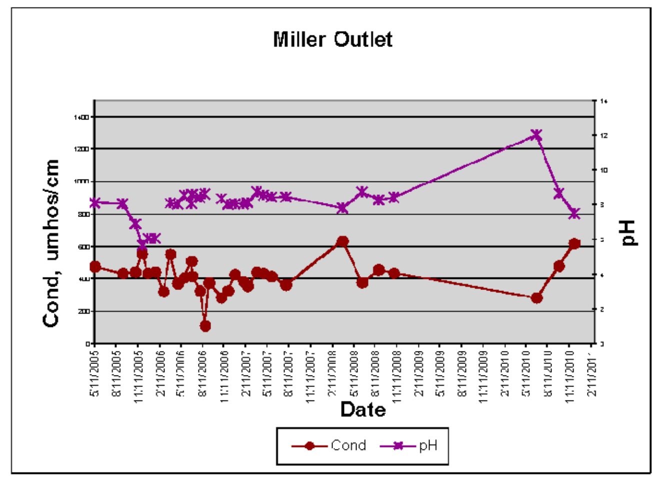


FIGURE 17. FIELD DATA

Updated: February 2011

Carbon Resources LLC

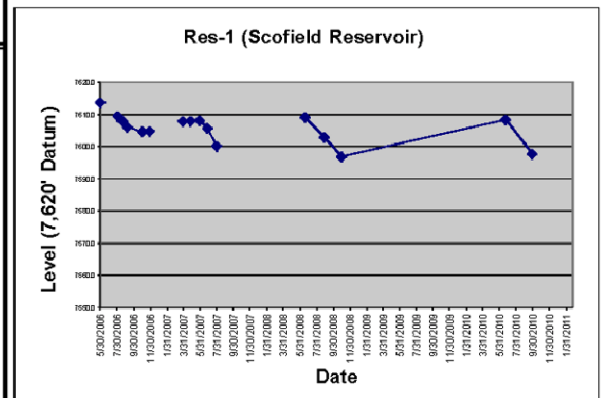
Kinney II Baseline Water Sampling
Surface Water Field Measurements
Res-1 (Scofield Reservoir) *

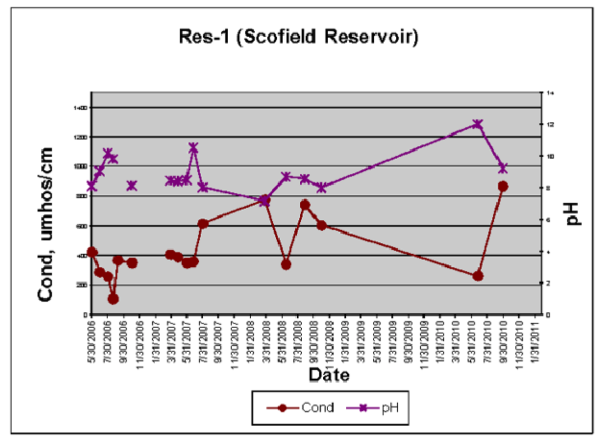
Elevation: **~7,620** Revised Feb. 2011

Date	Water Level (feet)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/30/2006	13.5	8.09	5.6	424	20.6
6/29/2006		9.03	10	287	31.9
7/31/2006	9.4	10.16	9.1	257	29.8
8/20/2006	7.7	9.82	9	108	35.7
9/7/2006	6.0	lab	5.2	365	15.5
10/30/2006	4.5	8.13	6.7	351	18.2
11/27/2006	frozen				
12/26/2006	frozen				
1/31/2007	frozen				
2/19/2007	frozen				
3/29/2007	7.8	8.43	9.7	408	14.9
4/25/2007	7.8	8.39	7.8	390	23.4
5/29/2007	8.1	8.48	8	350	24.9
6/25/2006	5.6	10.52	7.3	360	36.1
7/30/2007	0.1	8.02	5.9	616	28.0
3/25/2008		7.14	5.3	775	12.7
6/16/2008	9.1	8.69	4.6	341	31.4
8/26/2008	2.9	8.54	7.5	743	32.1
10/29/2008	96.8	7.98	7.6	605	17.0
6/23/2010	8.2	*12*	*38.2*	261	18.7
9/28/2010	97.7	9.22		867	23.1
12/1/2010	frozen				
2/24/2011	frozen				

*The samples collected at Res-1 in June, July, & Aug 2006 were mislabeled "Scofield Res. 1" and analytic data are labeled accordingly. Data labeled Res-1 & Scofield Res. 1 represent samples collected at the same location.

Italicized Values are SUSPECT





Carbon Resources LLC

Kinney II Baseline Water Sampling

Surface Water Field Measurements

FIGURE 17. FIELD DATA

Elevation:

Updated: February 2011

Eagles Canyon
Monay Draw
Blue Seal Draw
Kinney Draw
Columbine Draw
Jones Draw
UP Canyon

Ben Grimes visited Scofield on each of the days listed and observed an absence of rain and an absence of running water in the seven ephemeral drainages within and adjacent to the Kinney # 2 Permit Boundary.

Date	Water Level (feet)
5/26/2006	DRY
10/16/2006	DRY
10/27/2006	DRY
5/8/2007	DRY
9/20/2007	DRY
9/21/2007	DRY
10/27/2007	DRY
9/22/2009	DRY
9/23/2009	DRY
9/29/2009	DRY
9/30/2009	DRY
10/1/2009	DRY
4/26/2010	DRY
4/27/2010	DRY
7/3/2010	DRY
8/19/2010	DRY
9/7/2010	DRY
9/14/2010	DRY
9/16/2010	DRY
9/30/2010	DRY
10/20/2010	DRY

Carbon Resources LLC

Kinney II Baseline Water Sampling

Ground Water Field Measurements

FIGURE 17. FIELD DATA

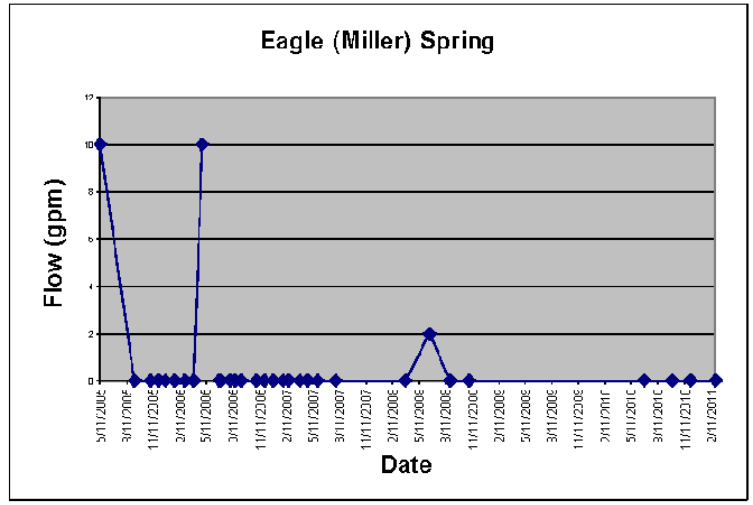
Eagle Spring * (Miller Spring)

Elevation: ~7,700

Updated: February 2011

Date		Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/11/2005	<	10	7.35	6	98.9	18.0
9/6/2005		dried up				
10/31/2005		dried up				
11/28/2005		dried up				
12/22/2005		dried up				
1/22/2006		dried up				
2/26/2006		dried up				
3/27/2006		dried up				
4/26/2006	<	10	7.2	4.7	41.8	21.0
5/25/2006			8.18	5.9	83.7	28.9
6/29/2006		dried up				
7/31/2006		dried up				
8/20/2006		dried up				
9/7/2006		dried up				
10/30/2006		dried up				
11/27/2006		dried up				
12/26/2006		dried up				
1/31/2007		dried up				
2/19/2007		dried up				
3/29/2007		dried up				
4/25/2007		dried up				
5/29/2007		dried up				
6/25/2006		dried up				
7/30/2007		dried up				
3/25/2008		snow				
6/16/2008		2	7.31	5	44.1	23.5
8/26/2008		dried up				
10/29/2008		dried up				
6/23/2010		dried up				
9/28/2010		dried up				
12/1/2010		snow				
2/24/2011		snow				

*The sample collected at Eagle Spring in May 2005 was mislabled "Eagle Springs" and analyltic data are labled accordingly. Data labled Eagle Spring & Eagle Springs represent samples collected at the same location.
This same spring was later mislabled Miller Spring



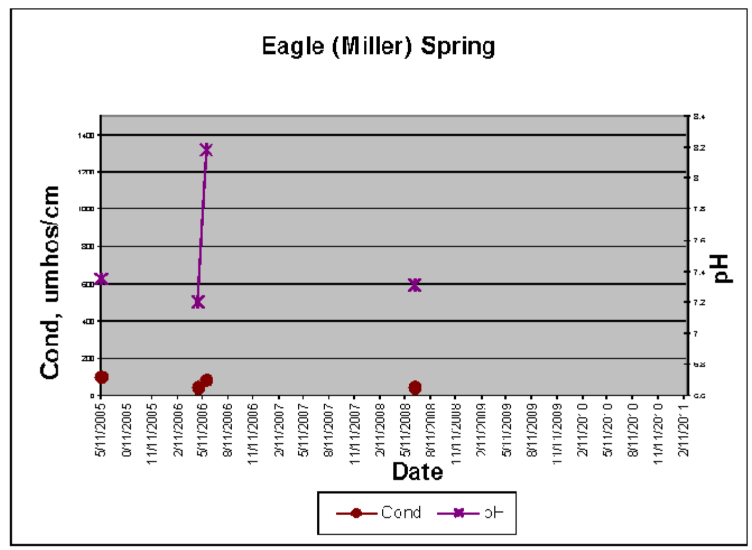


FIGURE 17. FIELD DATA

Carbon Resources LLC

Kinney II Baseline Water Sampling

Ground Water Field Measurements

Angle Spring

Elevation: **~7,940**

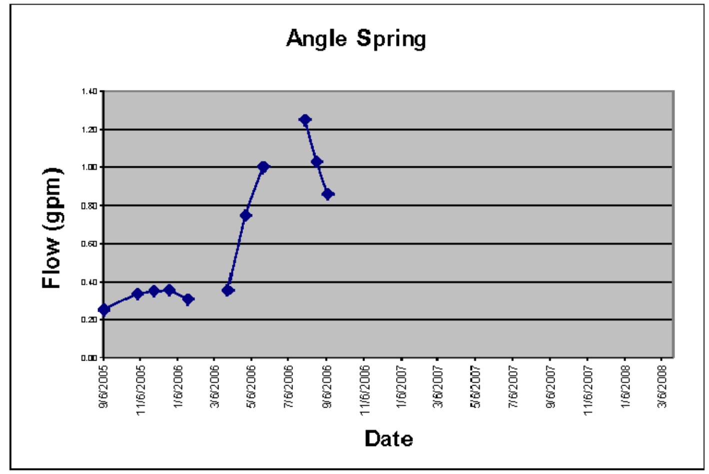
Updated: February 2011

Date	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
9/6/2005	0.25	7.35	3.7	358	22.0
10/31/2005	0.33	6.01	4.7	519	10.6
11/28/2005	0.35	6.46	4.7	428	22.2
12/22/2005	0.35	5.23	3.9	512	11.6
1/22/2006	0.31	4.36	8.4	469	8.9
2/26/2006		8.28	4.7	385	14.7
3/27/2006	0.35	**7.04**		**670**	~10
4/26/2006	0.75	7.28	5.1	361	18.0
5/25/2006	1.00	5.96	3.8	492	20.5
6/29/2006		7.5	6.3	522	20.9
7/31/2006	1.25	7.24	3.7	410	29.9
8/20/2006	1.03	7.26	3.5	156	22.3
9/7/2006	0.86		4	387	18.5
10/30/2006					
11/27/2006					
12/26/2006					
1/31/2007					
2/19/2007					
3/29/2007					
4/25/2007					
5/29/2007					
6/25/2006					
7/30/2007					
3/25/2008					

ACCESS DEINIED

NOTE: Bolded values measured in March 2006 were analyzed at the laboratory. Specific conductivity values were actually measured as conductivity.

Blank in Estimated Flow column indicates that the flow was "Not Measured"



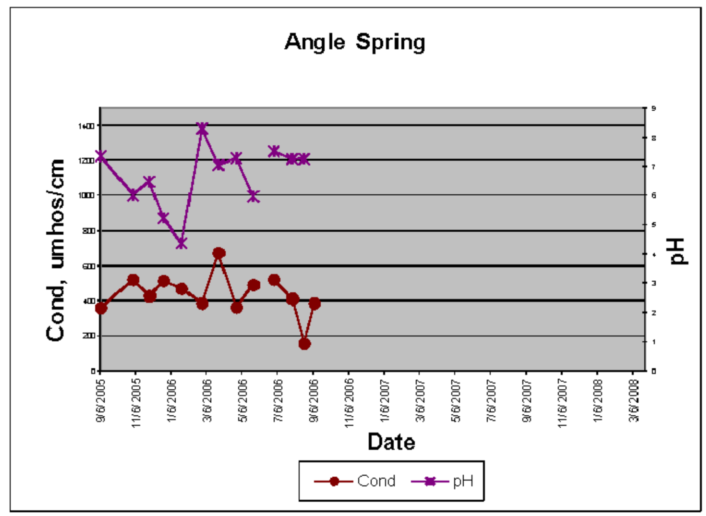


FIGURE 17. FIELD DATA

Carbon Resources LLC

Kinney II Baseline Water Sampling

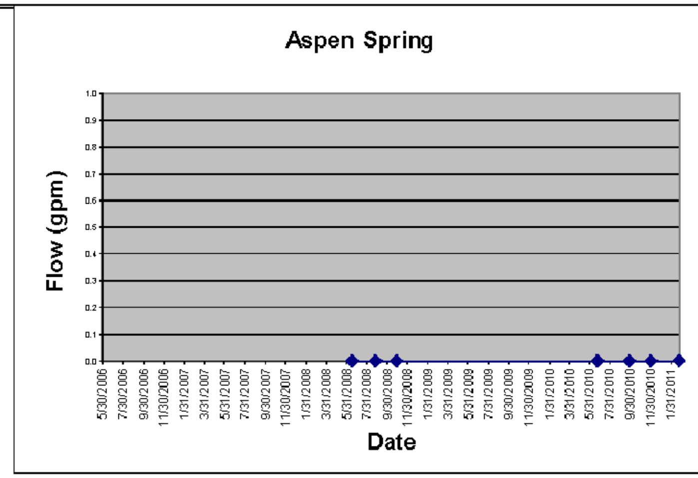
Ground Water Field Measurements

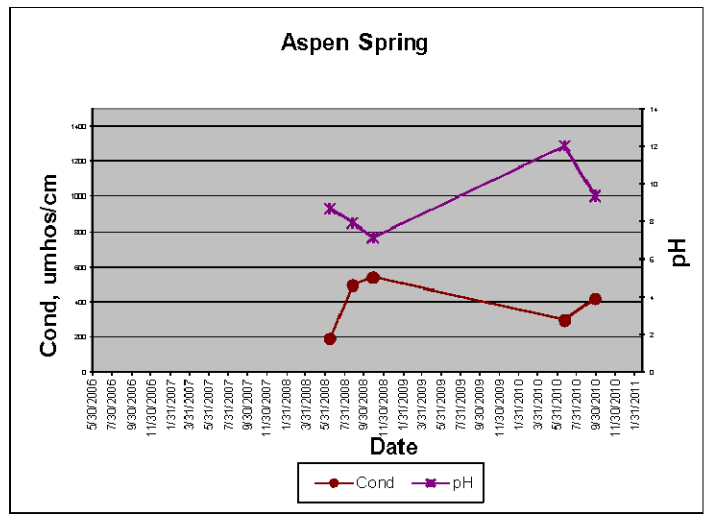
Aspen Spring

Elevation:

Updated: February 2011

Date	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/30/2006					
6/29/2006					
7/31/2006					
8/20/2006					
9/7/2006					
10/30/2006					
11/27/2006					
12/26/2006					
1/31/2007					
2/19/2007					
3/29/2007					
4/25/2007					
5/29/2007					
6/25/2006					
7/30/2007					
3/25/2008					
6/16/2008	not meas	8.69	2.2	190	29.8
8/26/2008	not meas	7.91	4	496	32.8
10/29/2008	trickle	7.14	3.7	541	5.7
6/23/2010	not meas	12	20.4	295	24.6
9/28/2010	not meas	9.33		419	14.6
12/1/2010	snow				
2/24/2011	snow				





*The samples collected at Res-1 in June, July, & Aug 2006 were mislabled "Scofield Res. 1" and analytic data are labled accordingly. Data labled Res-1 & Scofield Res. 1 represent samples collected at the same location.

Red Values are SUSPECT

FIGURE 17. FIELD DATA

Carbon Resources LLC

Kinney II Baseline Water Sampling

Ground Water Field Measurements

Sulfur Spring *

Elevation: **~7,670**

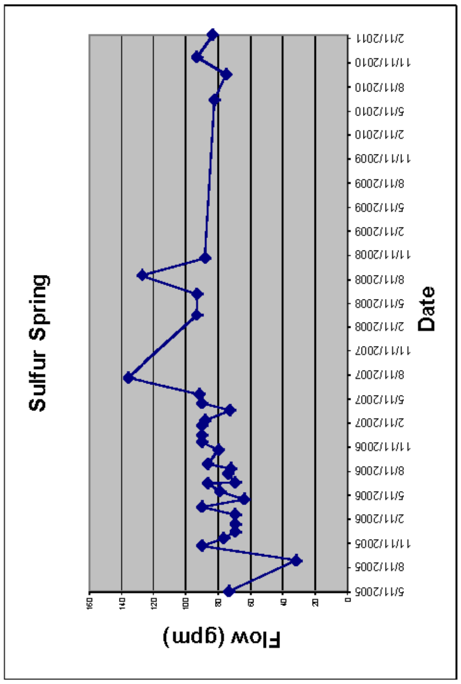
Updated: February 2011

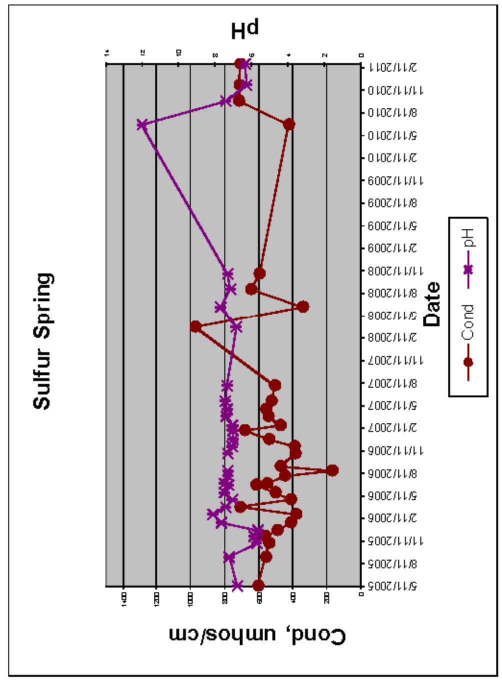
Date	Estimated Flow (gpm)	pH	Dissolved Oxygen (ppm)	Specific Conductivity (Us)	Temp (C)
5/11/2005	73	6.76	0.7	603	13.6
9/6/2005	32	7.2	2.4	559	15.9
10/31/2005	90	5.69	2.6	541	13.2
11/28/2005	76	5.85	3.9	561	11.9
12/22/2005	69	5.64	3.5	490	17.4
1/22/2006	69	7.64	1.3	410	14.7
2/26/2006	69	8.08	4.3	383	23.9
3/27/2006	90	**7.38**		**710**	~14
4/26/2006	64	7.03	1.2	413	23.4
5/25/2006	79	7.46	2.4	503	28.2
6/29/2006	69	7.45	2.9	550	25.1
7/31/2006	74	7.27	2.0	446	24.1
8/20/2006	72	7.29	2.3	169	24.1
9/7/2006	86		2.2	473	22.0
10/30/2006	80	7.27	4.0	384	22.2
11/27/2006	90	7.02	1.8	389	20.0
12/26/2006	90	7.00	3.0	538	20.0
1/31/2007	90	7.01	5.1	682	17.4
2/19/2007	88	7.03	4.1	473	21.5
3/29/2007	72	7.39	4.4	544	21.7
4/25/2007	90	7.33	7.0	557	23.4
5/29/2007	91	7.41	5.5	523	22.8
6/25/2006	86	7.25	2.4	615	27.5
7/30/2007	136	7.33	4.0	507	22.7
3/25/2008	93	6.81	2.2	973	21.9
6/16/2008	93	7.68	1.9	341	31.4
8/26/2008	127	7.14	2.5	646	27.5
10/29/2008	88	7.28	4.4	595	17.1
6/23/2010	82	12.00	14.6	423	17.4
9/28/2010	75	7.4		715	14.8
12/1/2010	93	6.3		714	13.8
2/24/2011	83	6.3		710	13.7

NOTE: Bolded values measured in March 2006 were analyzed at the laboratory. Specific conductivity values were actually measured as conductivity.

*Samples collected at Sulfur Spring have occasionaly been mislabled "Sulfur Springs", "Sulfer Spring", & "Sulfer Springs". From May 2005 to Nov 2006 sample names varied. From Dec 06 to present, samples have been labled Sulfur Spring. Analytic data are Labled accordingly. Data labled Sulfur Spring, Sulfur Springs, Sulfer Spring, & Sulfer Springs represent samples collected at the same location.

Red Values are SUSPECT





The available data indicate the surface hydrology is typical of high-mountain headwater watersheds with a pronounced seasonal variation in the flow regime. Stream flow in Mud Creek, Miller Canyon, and Long Canyon typically peaks with snowmelt in late spring/early summer. Unnamed drainages also have a potential for snowmelt runoff, especially during the spring period when rapid increases in air temperatures are experienced. Low flows in perennial streams occur during late fall and winter months. Field data collected from Miller Canyon (named Miller Outlet in the data)are shown along with other surface and spring data in Figure 17

Field Data. During the "non frozen" period of record, high and low flows of 545 GPM (1.21 CFS) and 18 GPM (0.04 CFS) were recorded at the Miller Outlet station.

The Mud Creek data shows, and the Miller Outlet data suggest that flows within local drainages also respond to local precipitation events. Rapid runoff resulting from short-duration high-intensity precipitation events will cause relatively brief, high velocity flows. Most of the local ~~intermittent/~~ephemeral drainage channels contain flowing water only during rapid snowmelt or precipitation events.~~-~~ The steep slopes and numerous deep, narrow, drainages contribute to a storm-event driven flow regime. Many of the ephemeral drainages have thick vegetative covered bottoms which cause water to seep into the soil and prevent water from open flow altogether.

Surface Water Quality

The water monitoring program initiated in 2005 under the Utah coal program and Carbon Resource's ongoing monitoring activities provide relevant water quality information for the permit area. Generally, the objectives of surface water quality monitoring have included; 1) Definition of baseline water quality conditions; 2) Identification of any seasonal variations in water quality and correlation to flow levels; and 3) Identification of any mining related changes in surface water quality. Water monitoring activities for surface drainages have typically included measurement of flow and field parameters (temperature, pH, electrical conductivity, and dissolved oxygen) and collection of water samples for laboratory analyses.

Both field activities and laboratory analyses have been conducted according to standard protocol as defined by applicable regulations, guidelines, and technical standards. Water~~standards, and water~~ samples have been analyzed for specific parameters as defined by the regulatory authority. Water quality analysis and testing requirements are reflected in Table 20, Hydrologic Monitoring Schedule.

General Water Quality Characteristics

The chemical characteristics of surface water, based on major ion chemistry, are displayed on Map 10, Regional Water Quality. Surface waters are generally of a calcium-bicarbonate chemical type, although Mud creek shows higher portions of sodium, potassium, and sulfate than does Scofield Reservoir or Miller Outlet. Angle Spring, Sulfur spring, and well CR-06-03-ABV are also found to typically be of a calcium-bicarbonate type, and to have higher concentrations than surface water sources. However, Eagle Spring, is very different than other local sources having very low concentrations of basic anions-cations and being of a higher quality.

Surface water quality is summarized in Table 10, Surface and Ground Water Quality Summary, and in Exhibit 10, Surface and Ground Water Field Measurements. The following discussions summarize important information relative to existing surface water conditions in the proposed permit area.

pH – As shown in Table 10, measured pH values range from 7.04 to 8.5 for samples collected. The low pH values noted were collected from Sulfur and Angle Springs. With the exception of these two springs, pH levels generally indicate a neutral to moderately alkaline condition. High pH values are relatively common in the arid western United States and are reflective of the geochemistry of the dominant stratigraphic units. It is believed that mining will show no impact on local pH data due to hydrologic considerations discussed within this permit.

Sulfate – A natural sulfur spring is located near the north end of the permit area adjacent to Highway 96. However, average sulfate levels of 44 in this spring are not significantly higher than those found within well CR-06-03- or Miller Outlet that average 38, 26 respectively. Scofield Reservoir and Mud Creek with average values of 63 and 169 respectively are clearly distinct from other samples taken and are likely impacted by upstream sources. High Mud Creek sulfate values appear to be diluted by Scofield Reservoir.

Total Dissolved Solids – With one exception, observed high TDS values are relatively consistent within the samples taken, ranging between 96 mg/l in Scofield Reservoir to 720 mg/l in Mud Creek. Eagle spring appears to have a distinctly different water source with an average recorded TDS of 152 mg/l than Angle, Aspen and Sulfur Springs which have respective averages of 304, 266, and 366 mg/l.

Total Suspended Solids - Given the topography and climate of the area, moderately high TSS values may normally be expected during spring runoff and following major thunderstorms. Steep natural slopes and channel gradients combined with short duration, high-intensity flows resulting from snowmelt and major thunderstorms can result in significant surface erosion and sediment transport. TSS variations at the sample points indicates site specific conditions which contribute to erosion and soil movement. Springs generally show very low TSS values as would be anticipated, whereas surface sources are shown to have significant variation. Low values for Miller Outlet, Mud Creek and Res-1 were found to be 18, 4 and 11 mg/l respectively, whereas high values for the three sources were 430, 320, and 1,600 mg/l respectively. These high values likely result from short duration, high-intensity rainfall events, or possibly wind/wave action in the case of Scofield Reservoir.

Temporal and Spatial Water Quality Characteristics

Figure 18, Basic Water Quality, plots pH, Conductivity, TDS and Sulfate data over time for each monitored station. The plots help identify the presence, or lack of, annual cycles or trends. Observations made from the data plots follows:

Miller Outlet	Some slight drop in TDS appears to be present during the May-June time frame, with a corresponding increase in TSS as would be expected for a surface water source. It is also noted that there appears to be annual increases in Iron and Manganese during high TSS events.
Eagle Spring	Insufficient data available for analysis
Sulfur Spring	TDS appears to show a possible annual low during the February-March time frame with peak TSS values occurring during May and June. Trends are not readily apparent for Iron and Manganese. These trends are masked however by larger fluctuations which are believed to be climatically induced.
Angle Spring	No annual or seasonal cycle identified.
Aspen Spring	Insufficient data available for analysis.
Mud Creek	A slight decrease in TDS appears to exist in the May- June period of each year with highest values occurring during the winter months of November through January. TSS, Iron and Sulfate values appear to be

Res-1 the highest in the May-June time frame and lowest in the winter period. Although a complete record of data is not available for this site during winter months, TDS appears to reach annual lows during the May-June time frame with similarly corresponding peaks in TSS. No consistent trend is noted for Iron and Manganese.

Surface water quality variation plots versus flow for pH, Conductivity, TDS and Sulfate are shown for sampled locations on Figure 19, Water Quality vs. Flow. A unilateral clear and distinct pattern showing variation in quality versus flow in all stations is not apparent. A review of the figures does show what we believe to be improved water quality with increasing flow or storage volume for both Mud Creek and Scofield Reservoir for Conductivity, TDS and Sulfate. Decreased values for Conductivity and TDS may also be indicating some possible water quality improvement with increasing flow for Miller Outlet and Angle Spring although the trends are not as apparent. These water quality improvements with increased flow or volume are believed to result from high flow dilution of existing water quality bases.

As discussed earlier, water quality parameters are relatively consistent for the sites monitored with two basic exceptions, Eagle Spring which has very good water quality, and Mud Creek which has significantly higher values of TDS and Sulfate than other surface or spring sources. Surface waters associated with Miller Outlet for example have TDS and Sulfate values that are on the order of 200 - 620 mg/l and 19 - 48 mg/l respectively. Mud Creek TDS and Sulfate values generally range between 230 – 720 mg/l and 38 – 290 mg/l respectively, as approximate 15% increase over Miller Outlet for TDS, and a 250 to 600% increase for Sulfate.

Surface Water Rights and Use

Surface water rights within a- 2 mile radius of the central mine area are included in Exhibit 13, Water Rights Information. The water rights are shown on Map 31, Surface Water Right Locations, and listed in Table 12, Surface Water Rights. Water right 91-3588 is a stream right on Finn Creek from approximately six miles south of the Kinney~~kInney~~ No. 2 Mine to a location as shown on Map 31 in Section 33. This water right is obviously located incorrectly in the Utah division of Water Rights records since Finn Creek ends approximately six miles south of the Kinney No. 2 Mine. This right may exist on Clear Creek (Mud Creek), which lies one half mile west of the Kinney No. 2 Mine site. Water right 91-4026, located in the eastern half of Section 33 is a stock watering right on an unnamed spring for a water amount of 10.76 Acre Feet. No ELU's (Equivalent Livestock Units) are listed in the water rights information. The period of use is listed as 05/01 to 11/30 of each year. Since no subsidence is anticipated as addressed in Chapter 5, there will be no impact to this spring. There are no other surface water sources or water rights directly above, or within any projected subsidence zone above the mine workings. Since the mine is projected to be dry, and is not anticipated to have a mine discharge, there are no anticipated additive effects upon the local surface waters. In a similar manner, no impacts are believed possible to surface waters located within or west of Pleasant Valley and Mud Creek since surface drainages are discontinuous east and west of the valley.

Table 12. Surface Water Rights

WRNUM	TYPE	STATUS	PRIORITY	CFS	ACFT	LOCATION	OWNER	SOURCE
91-1396	Point to Point	DIL	19020000	0.000	0.000	N660 W660 S4 34 12S 7E SL	CLARENCE ANDERSON	Hopkins Creek
91-1475	Point to Point	DIL	19020000	0.000	0.000	N660 W660 E4 27 12S 7E SL	CLARENCE ANDERSON	Hopkins Creek
91-3011	Point to Point	DIL	18690000	0.000	0.000	N660 W660 E4 05 13S 7E SL	FRED AND SHELIA JENSEN	Winter Quarters Creek
91-3514	Surface	DIL	18690000	0.011	0.000	S660 W660 E4 21 12S 7E SL	MILTON E JACOB	Unnamed Spring
91-352	Point to Point	DIL	18600000	0.000	0.000	N660 E1980 W4 03 13S 7E SL	CLARENCE ANDERSON	Hopkins Creek
91-3644	Point to Point	DIL	18690000	0.000	0.000	N660 E660 S4 05 13S 7E SL	CARBON CO. REC. TRANS. SPECIAL SERVICE D	Clear Creek
91-3645	Point to Point	DIL	18690000	0.000	0.000	S660 W1980 E4 05 13S 7E SL	FRED AND SHELIA JENSEN	Clear Creek
91-3648	Point to Point	DILWUC	1869	0.000	0.000	S660 W1980 E4 32 12S 7E SL	BILL B. AND UTAHNA PACE JONES	Clear Creek
91-4026	Surface	PAC	1869	0.000	0.000	S660 W1980 E4 33 12S 7E SL	GEORGE TELONIS	Unnamed Spring
91-4107	Surface	PAC	1869	0.011	0.000	S660 E660 N4 27 12S 7E SL	MILTON E JACOB	Unnamed Spring
91-3011	Point to Point	DIL	18690000	0.000	0.000	S1980 E660 E4 05 13S 7E SL	FRED AND SHELIA JENSEN	Winter Quarters Creek
91-3513	Point to Point	DIL	18690000	0.000	0.000	S660 E660 N4 26 12S 7E SL	MILTON E JACOB	Unnamed Stream
91-3588	Point to Point	DIL	18690000	0.000	0.000	S660 E660 E4 32 13S 7E SL	CLEAR CREEK HOME ASSOCIATION	Finn Canyon Creek
91-3655	Point to Point	DILWUC	1869	0.000	4.200	S1980 E660 W4 32 12S 7E SL	BILL & UTAHNA JONES FAMILY TRUST	Woods Canyon Creek
91-5069	Point to Point	DIL	18690000	0.000	1.400	S1980 E660 W4 32 12S 7E SL	RUDMAN LAND & LIVESTOCK L.L.C.	Woods Canyon Creek
91-640	Point to Point	DIL	18600000	0.000	0.000	N660 E660 E4 35 12S 7E SL	CLARENCE ANDERSON	Left hand Fork of Hopkins Creek
91-2978	Surface	DEC	18740000	0.683	0.000	N310 E510 S4 05 13S 7E SL	CARBON CO. REC. TRANS. SPECIAL SERVICE D	Clear Creek
91-2979	Surface	DEC	18740000	0.453	0.000	N310 E510 S4 05 13S 7E SL	FRED AND SHELIA JENSEN	Clear Creek
91-2980	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	FRANK T. JR. & PAMELA G. HELSTEN	Clear Creek
91-2981	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	ORSON MARSING	Clear Creek
91-2982	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	LILLIE PEARSON	Clear Creek
91-2983	Surface	DEC WUC	1874	0.100	0.000	N310 E510 S4 05 13S 7E SL	THOMAS BIGGS	Clear Creek
91-2984	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	WAINO E. BURTON	Clear Creek
91-2985	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	PHYLLIS M. CONOVER	Clear Creek
91-2986	Surface	DEC	18740000	0.015	0.000	N310 E510 S4 05 13S 7E SL	JAMES P. LEVANGER	Clear Creek
91-2987	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	LEAH B. JOHNSON	Clear Creek
91-2988	Surface	DEC	18740000	0.000	0.000	N310 E510 S4 05 13S 7E SL	NOLAN G. AND LARUE H DAVIS	Clear Creek
91-2989	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	TOWN OF SCOFIELD	Clear Creek
91-2990	Surface	DEC	18740000	1.166	0.000	N310 E510 S4 05 13S 7E SL	DELLA L. MADSEN	Clear Creek
91-2991	Surface	DEC WUC	1874	0.000	0.000	N310 E510 S4 05 13S 7E SL	JOHN B. JONES	Clear Creek
91-2992	Surface	DEC WUC	1874	4.580	0.000	S120 W2230 E4 32 12S 7E SL	BILL B. AND UTAHNA PACE JONES	Clear Creek
91-2993	Surface	DEC WUC	1874	4.580	0.000	S1200 E800 N4 32 12S 7E SL	BILL B. AND UTAHNA PACE JONES	Clear Creek
91-3008	Surface	DEC	18740000	0.693	0.000	N700 W1400 E4 05 13S 7E SL	FRED AND SHELIA JENSEN	Winter Quarters Creek
91-3622	Surface	DEC WUC	1874	0.016	0.000	N310 E510 S4 05 13S 7E SL	MAE NICOLODEMAS	Clear Creek
91-4195	Surface	DEC	18740000	0.100	0.000	N310 E510 S4 05 13S 7E SL	SCOFIELD TOWN	Mud Creek & Green Canyon Spring
91-2495	Point to Point	DIL	1869	0.000	72.000	S1980 E660 N4 S31 12S 7E SL	MATTIE B. CORNABY FAMILY TRUST	Woods Canyon Creek
91-3516	Point to Point	DIL	1869	0.000	0.000	S660 W660 NE S27 12S 7E SL	MILTON E. JACOB FAMILY TRUST	Hopkins Creek
91-3910	Surface	DIL	1869	0.000	0.000	S660 E660 N4 S29 12S 7E SL	REED & LEON GUNDERSON	Scofield Reservoir
91-3911	Surface	DIL	1869	0.000	0.000	S660 E1980 N4 S29 12S 7E SL	DELLA L. AND MADSEN	Scofield Reservoir
91-3642	Surface	DIL	1902	0.011	0.000	S660 W660 E4 S30 12 7E SL	BILL & UTAHNA JONES FAMILY TRUST	Unnamed Spring
91-3658	Surface	DIL	1902	0.000	0.000	S660 W660 NE S31 12S 7E SL	BILL & UTAHNA JONES FAMILY TRUST	Unnamed Stream
a15120	Surface	DEC	1989	0.500	0.000	S1160 W580 N4 S32 12S 7E SL	GLADYS P. BUTLER	Woods Canyon Creek
91-2994	Surface	DEC	1874	0.012	0.000	S1410 W350 N4 S32 12S 7E SL	BILL & UTAHNA JONES FAMILY TRUST	Woods Canyon Creek
91-3004	Surface	DIL	1874	0.433	0.000	N660 E660 N4 S32 12S 7E	LOUISE M. & HELEN L. WATTS	Woods Canyon Creek
91-2496	Surface	DIL	1902	0.000	0.000	N1160 E460 SW S32 12S 7E SL	MATTIE B. CORNABY FAMILY TRUST	Unnamed Stream
91-1403	Surface	DIL	1860	0.150	0.000	S1980 E660 N4 S3 13S 7E SL	CLARENCE ANDERSON	Unnamed Spring
91-354	Surface	DEC	1903	0.019	0.000	N388 E437 W4 S5 13S 7E SL	PIONEER DITCH CO #1	Two Springs Tributary
91-2975	Surface	DEC	1874	0.011	0.000	N420 W80 S4 S5 13S 7E SL	CARBON CO. REC. TRANS. SPECIAL SERVICE D	Unnamed Spring
91-2976	Surface	DEC	1874	0.011	0.000	N100 W10 S4 S5 13S 7E SL	CARBON CO. REC. TRANS. SPECIAL SERVICE D	Unnamed Spring
91-462	Point to Point	DIL	1860	0.000	0.000	N660 E660 W4 S6 13S 7E SL	EUREKA ENERGY	Winter Quarters Creek
91-201	Surface	AP	1953	0.068	0.000	S660 E660 NW S9 13S 7E SL	ALBERT B. & APRIL S. CORNABY	Unnamed Spring
91-4027	Surface	PAC	1869	0.011	0.000	N660 E660 W4 S4 13S 7E SL	GEORGE TELONIS	Unnamed Spring
91-3601	Surface	DIL	1869	0.000	0.000	N660 E660 W4 S9 13S 7E SL	DELLA L. MADSEN	Unnamed Spring
91-1412	Surface	DIL	1860	0.000	0.000	N660 E660 SW S11 13S 7E SL	HELPER STATE BANK	Right Fork Jump Creek
91-4143	Surface	PAC	1869	0.011	0.000	S660 W1980 E4 S9 13S 7E SL	GEORGE TELONIS	Unnamed Spring
91-2048	Point to Point	DIL	1869	0.000	0.000	S1980 E669 W4 S8 13S 7E SL	CARBON CO. REC. TRANS. SPECIAL SERVICE D	Pleasant Creek
91-3640	Point to Point	DIL	1869	0.000	0.000	N660 W660 S4 S10 13S 7E SL	GEORGE TELONIS	Hopkins Creek
91-2288	Surface	DIL	1869	0.011	0.000	S660 W1980 E4 S 31 T12S R7E	MATTIE B. CORNABY FAMILY TRUST	Unnamed Spring
91-2146	Point to Point	DIL	1869	0.000	0.000	N660 E660 W4 S5 T13S R7E	MATTIE B. CORNABY FAMILY TRUST	Winter Quarters Creek
91-483	Surface	DEC	1874	0.443	0.000	N700 W1400 E4 S6 T13S R7E	MATTIE B. CORNABY FAMILY TRUST	Winter Quarters Creek
91-3405	Surface	Dec	1874	0.500	0.000	N540 W1610 E4 S31 T12S R7E	MATTIE B. CORNABY FAMILY TRUST	Woods Canyon Creek

Surface Water/Ground Water Interactions

With the exception of the lowermost portions of Mud Creek, which is a gaining system due to sub-flow from the associated alluvial/colluvial deposits and contributions from tributary drainages, most of the drainages in the permit areas are believed to be losing systems.

Due to the geologic complexity of the area and significant local variations in topography, geology, and associated recharge conditions, any given drainage may exhibit gaining or losing characteristics over various portions of its drainage length. Recent monitoring indicates that most, if not all, of the surface water discharge from springs and seeps in the upper portions of the smaller drainages is lost to localized ground water storage, ground water recharge, and/or evapo-transpiration resulting in a net surface flow loss over the drainage length.

Discharge to the area stream systems occurs from the alluvial/colluvial aquifer system and from springs and seeps in the upper reaches of the drainages. Alluvial/colluvial deposits are recharged during periods of high stream runoff and later discharge stored water to the stream systems, extending the period of active stream flow. Springs and seeps contribute flow to local tributaries on a seasonal basis or intermittently in delayed response to local recharge.

Figure 18. Basic Water Quality

Figure 18. Basic Water Quality

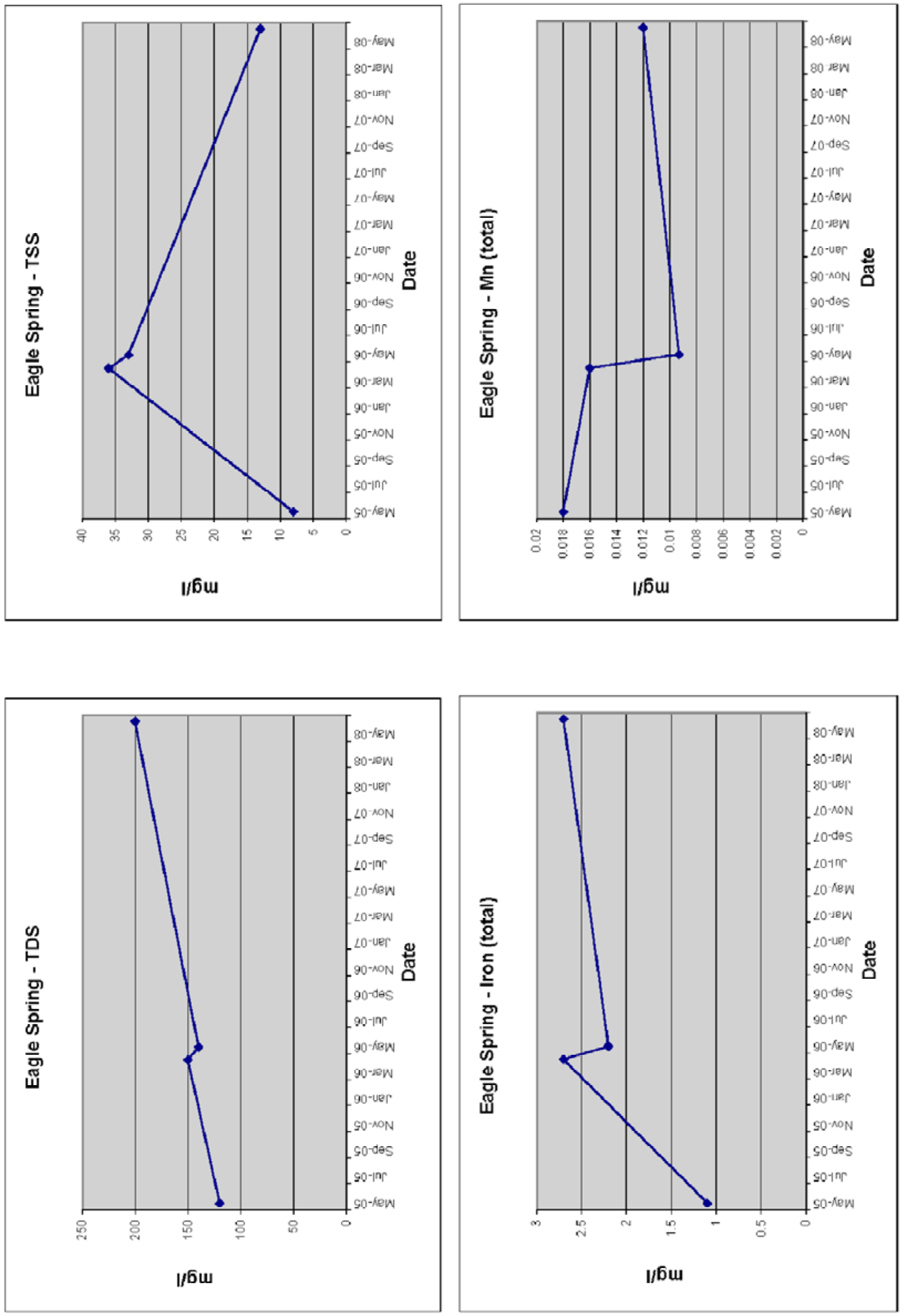


Figure 18. Basic Water Quality

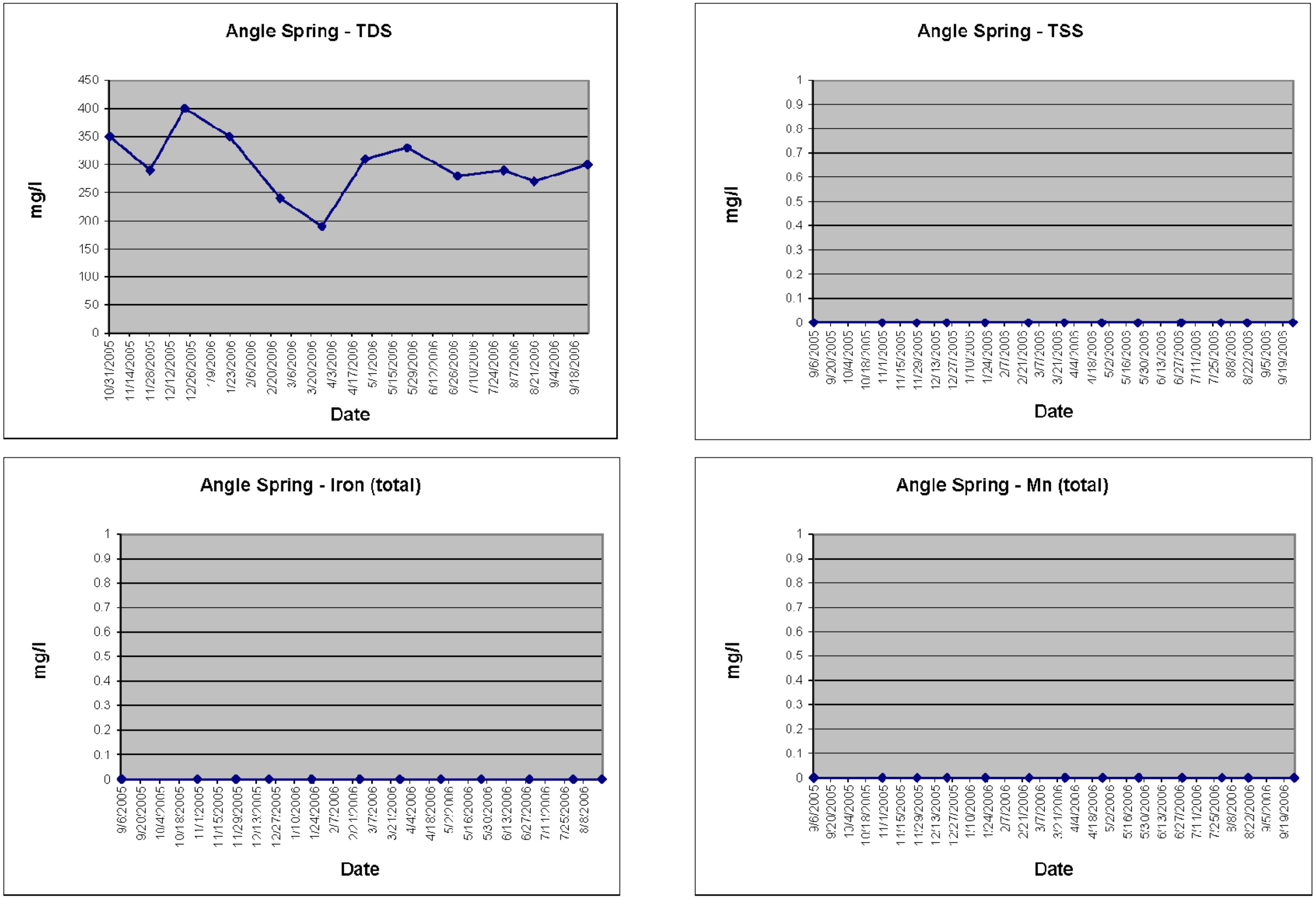


Figure 18. Basic Water Quality

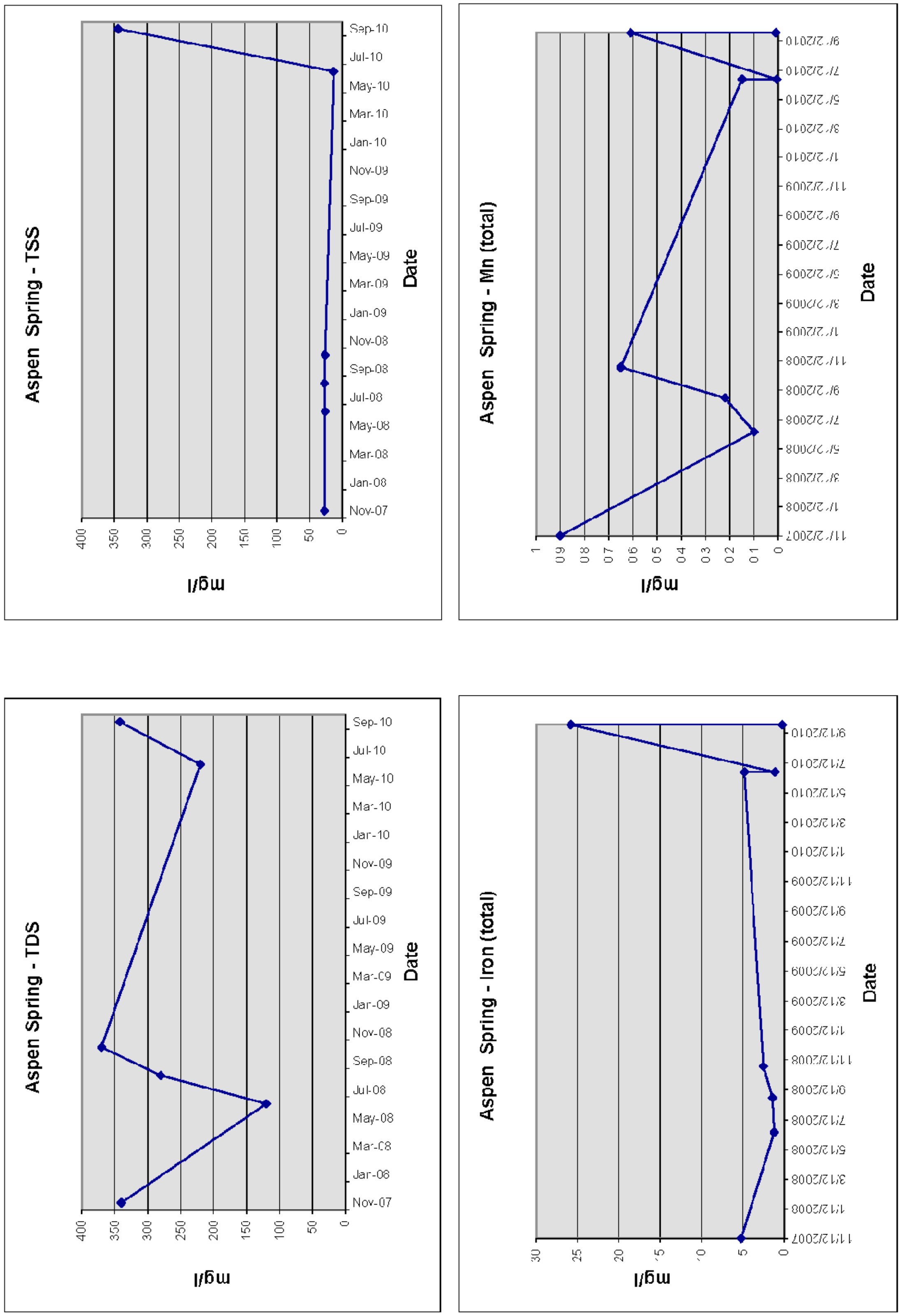


Figure 18. Basic Water Quality

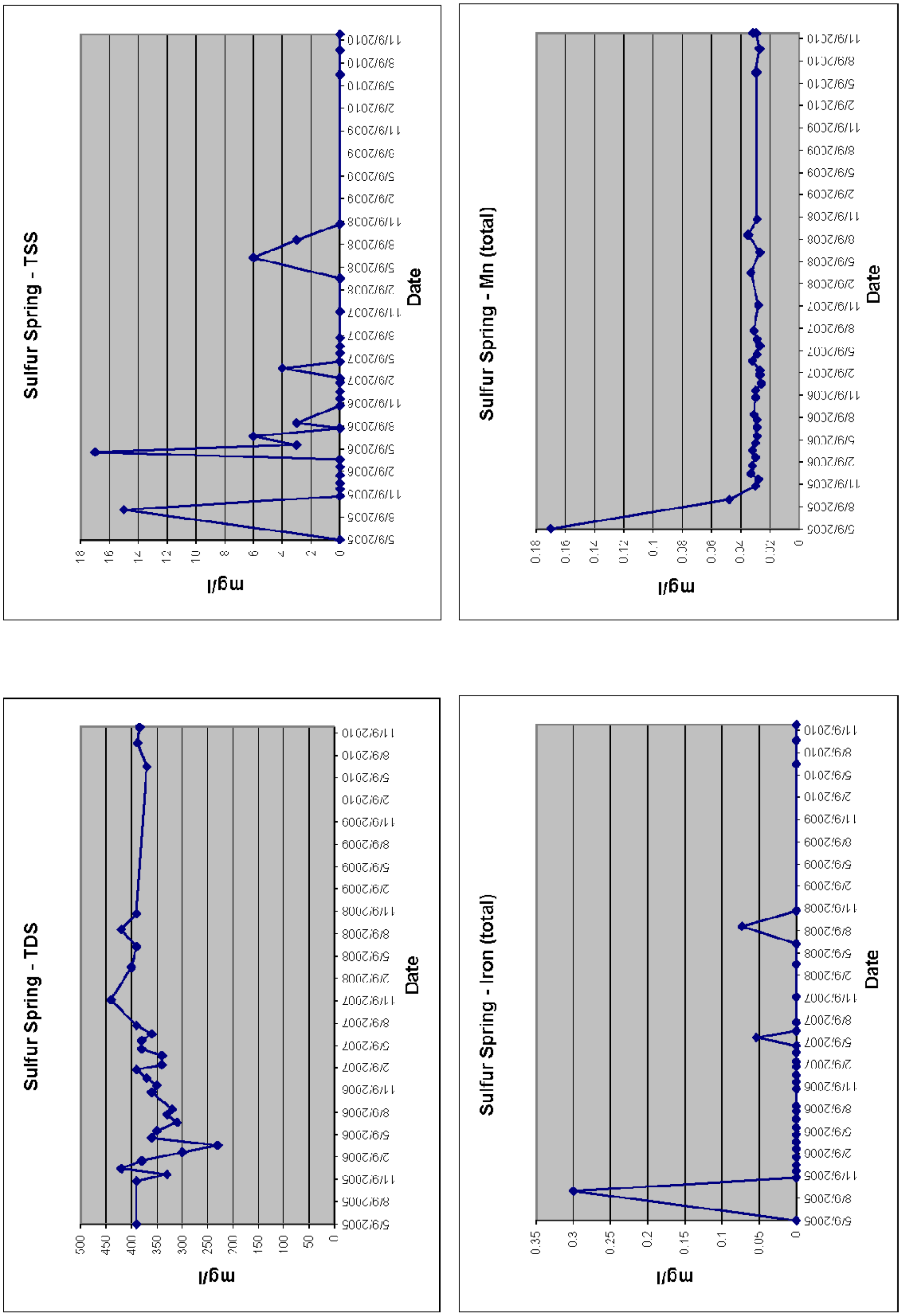


Figure 18. Basic Water Quality

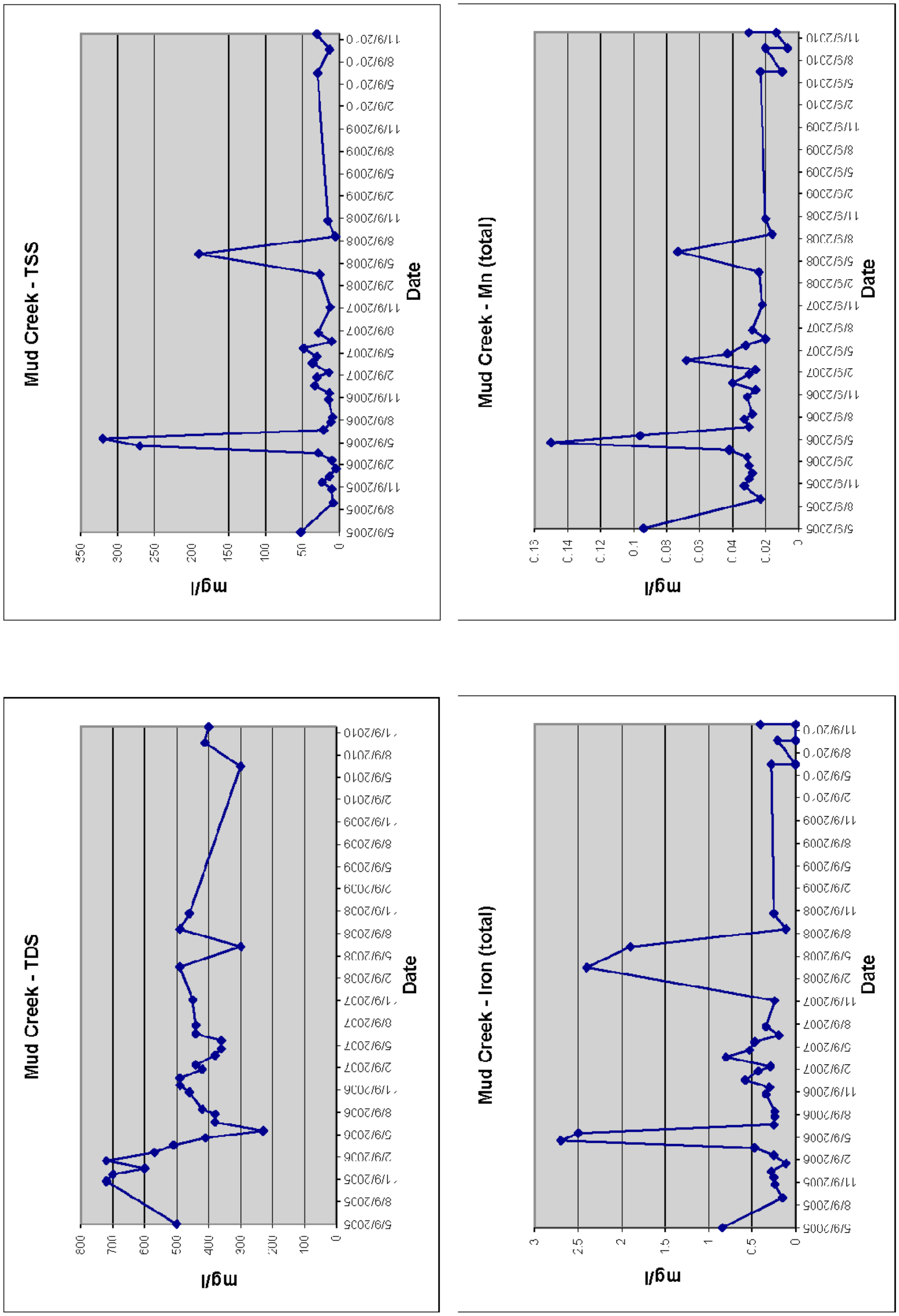


Figure 18. Basic Water Quality

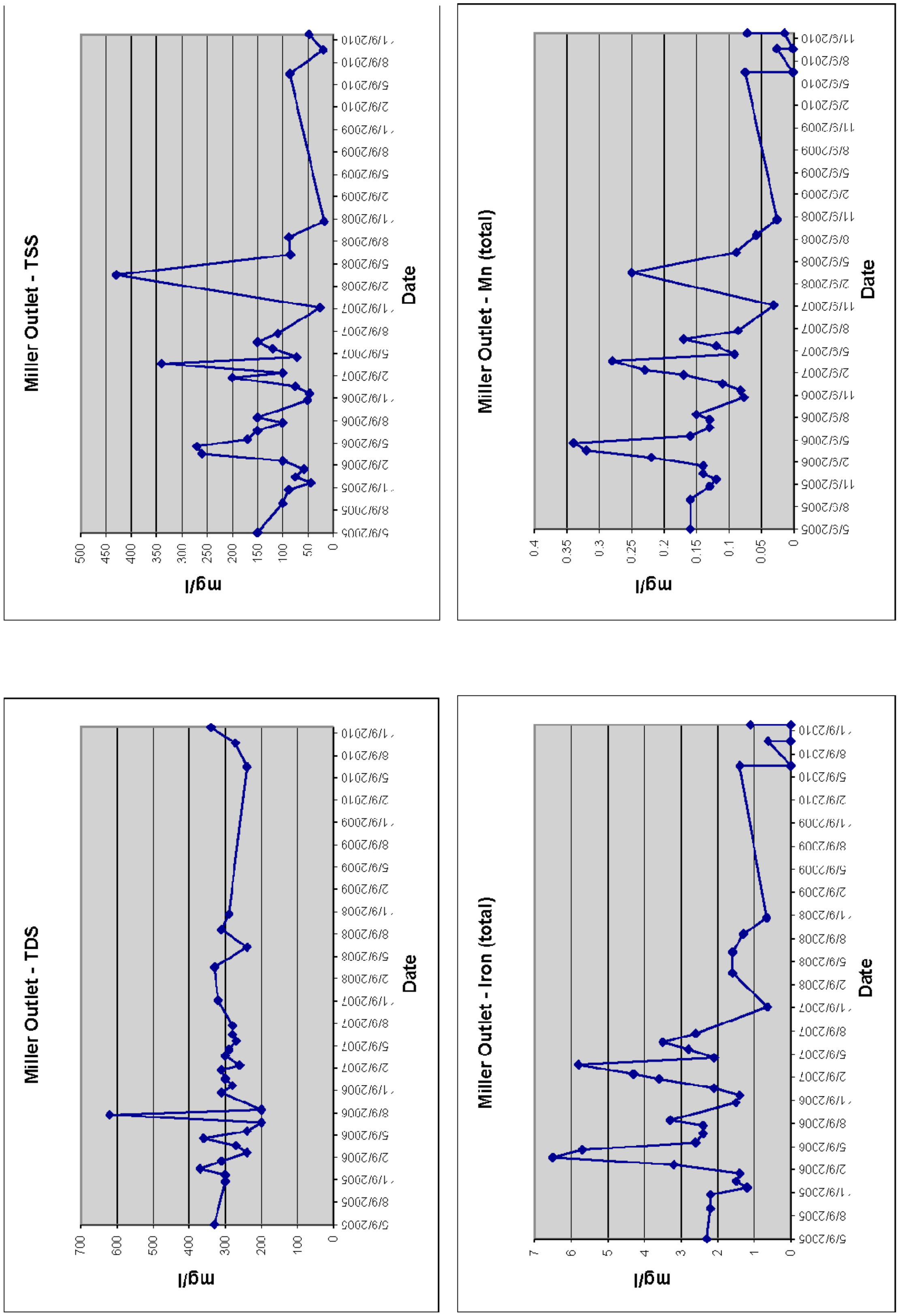


Figure 18. Basic Water Quality

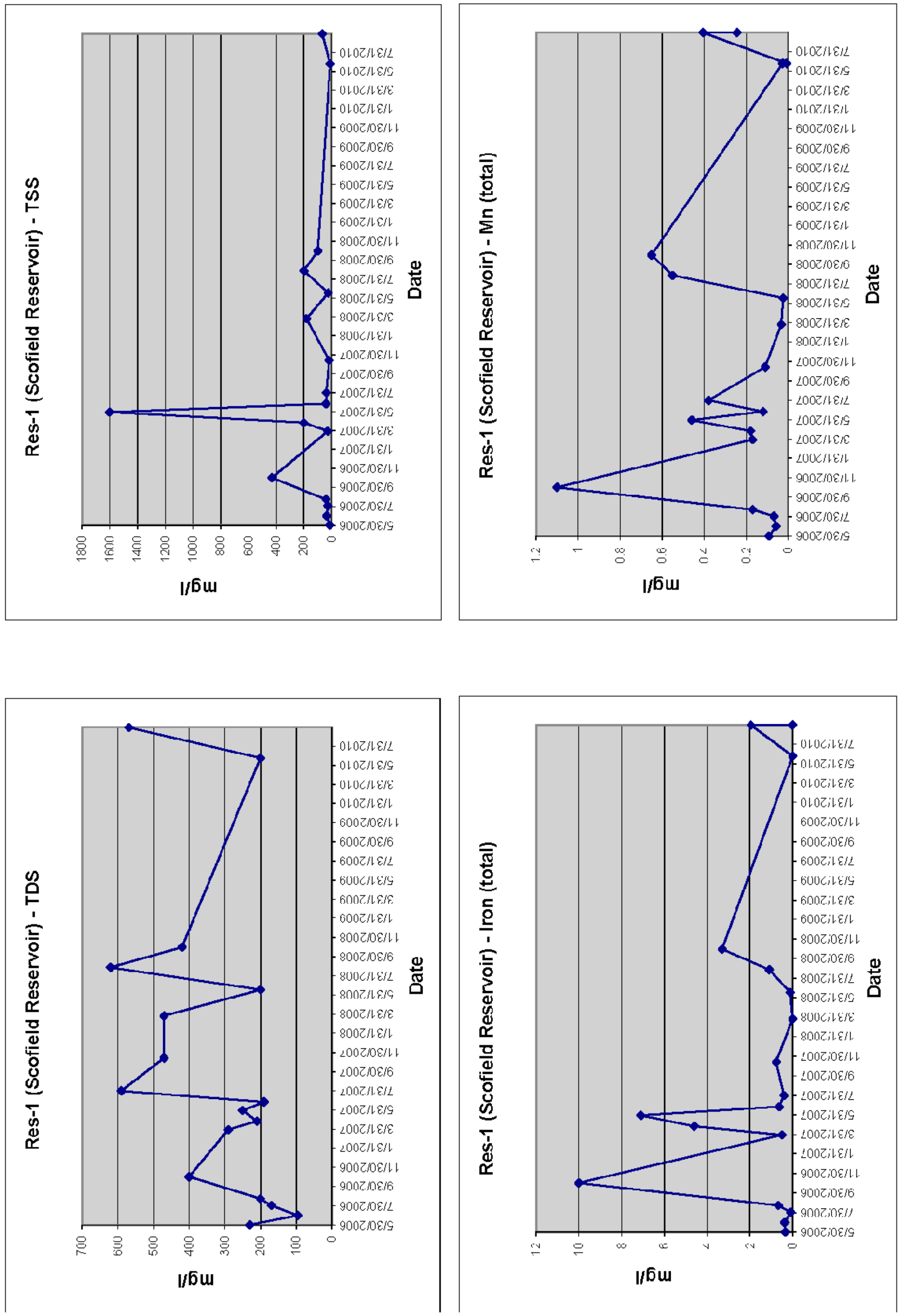
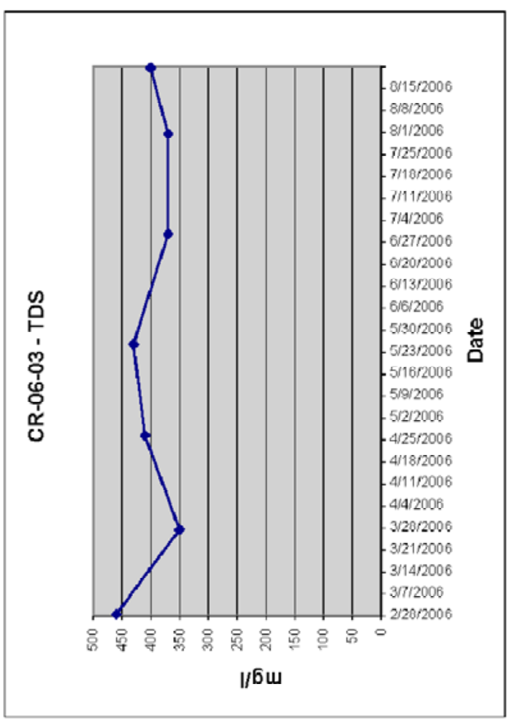
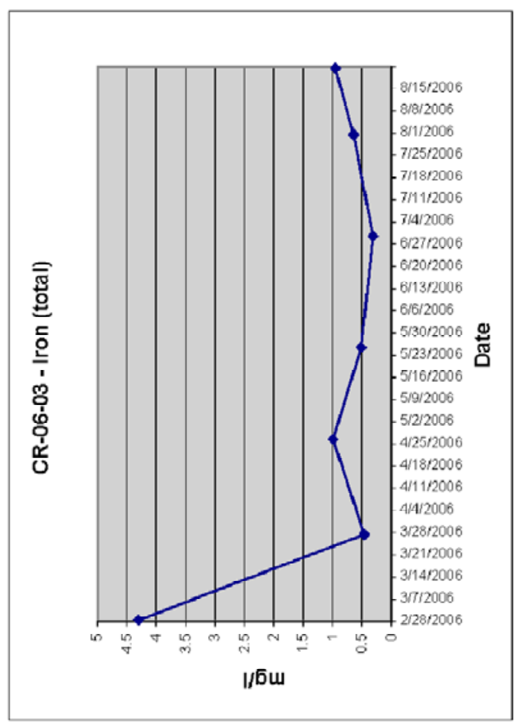


Figure 18. Basic Water Quality





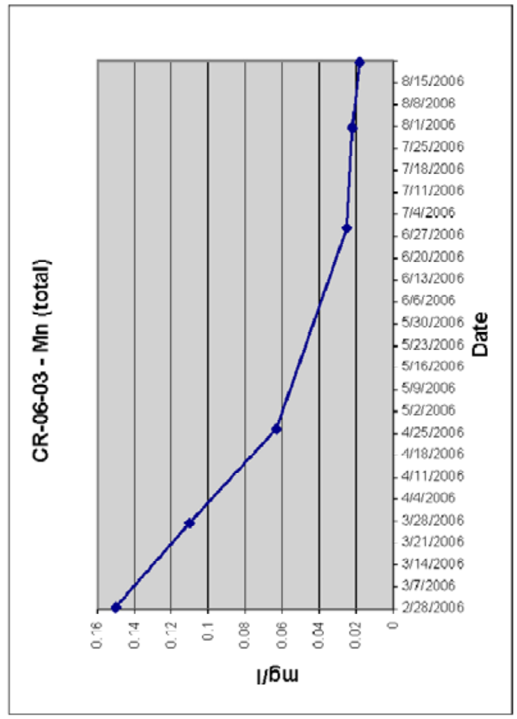


Figure 18. Basic Water Quality

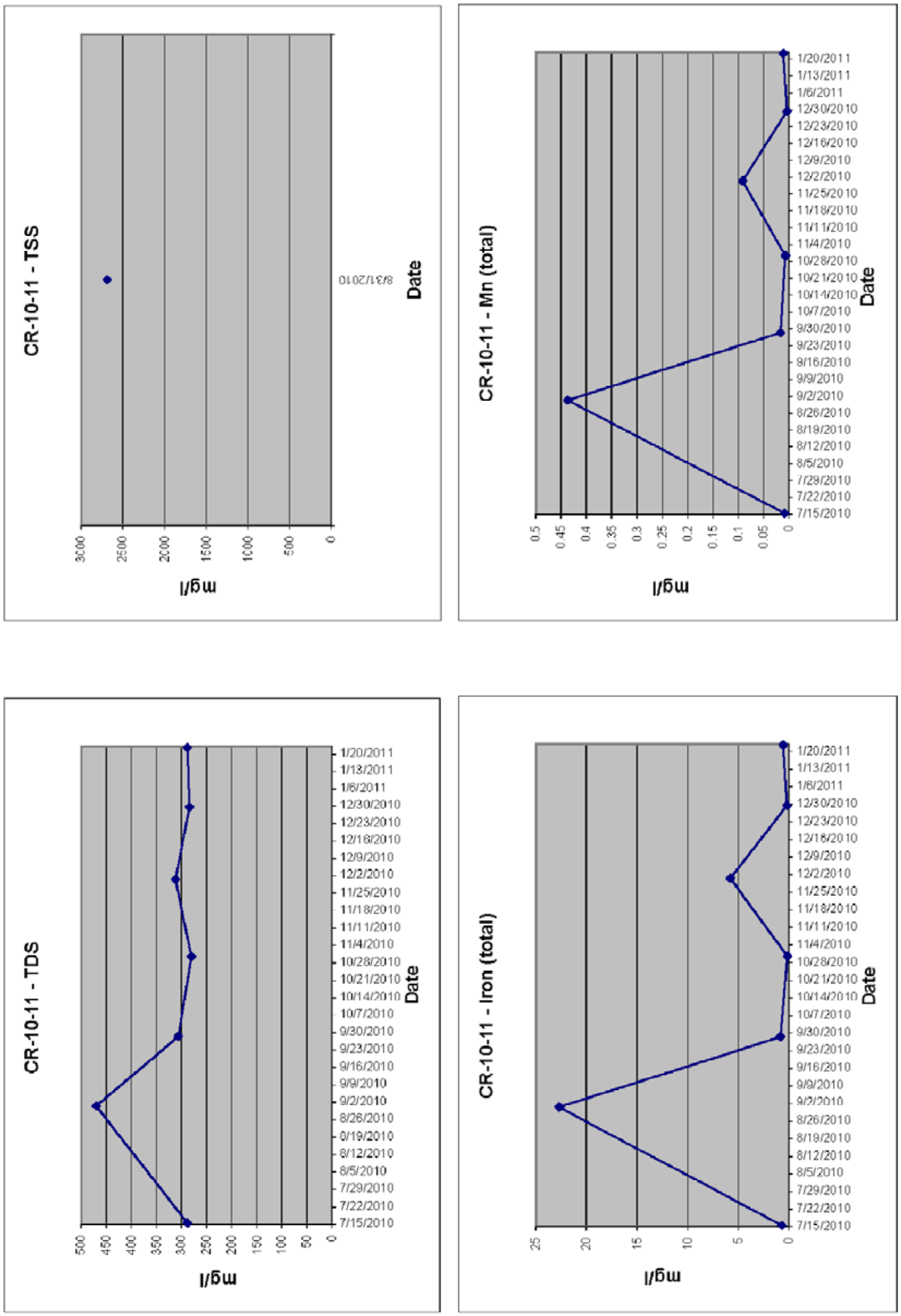


Figure 18. Basic Water Quality

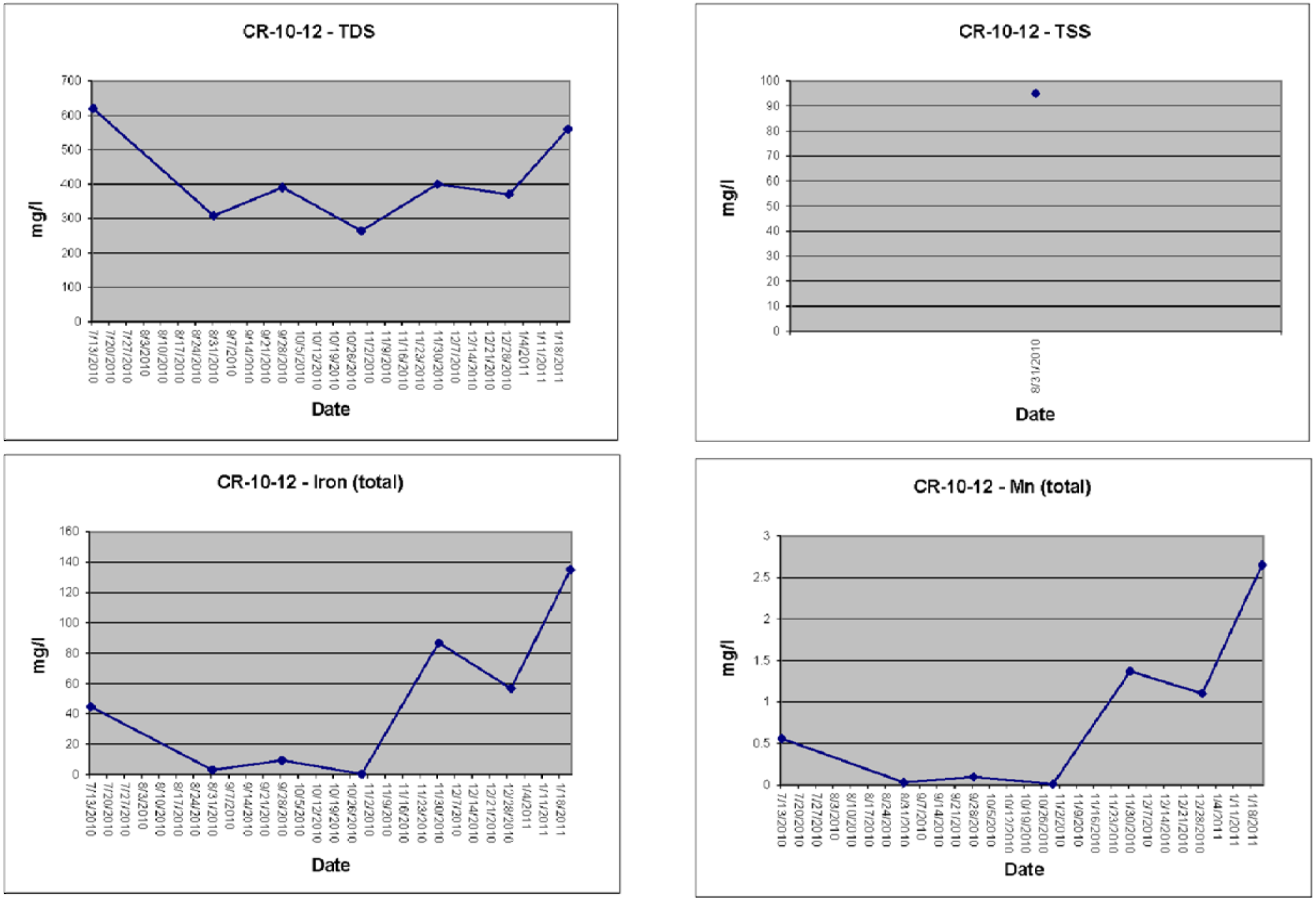
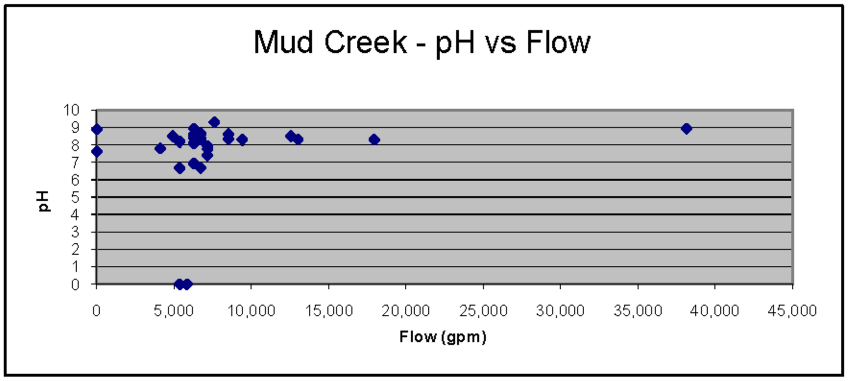
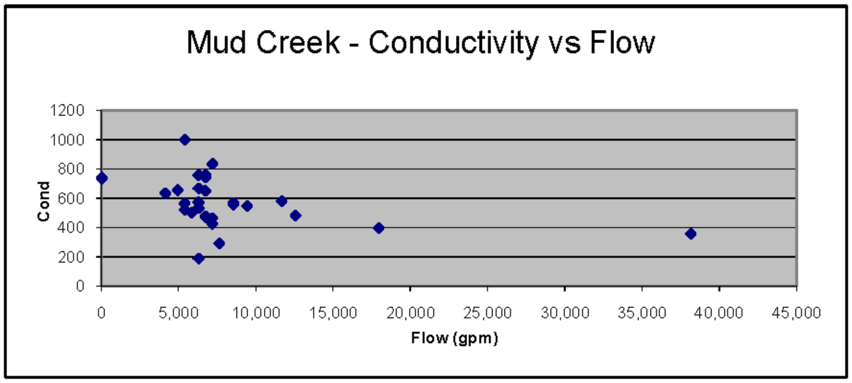
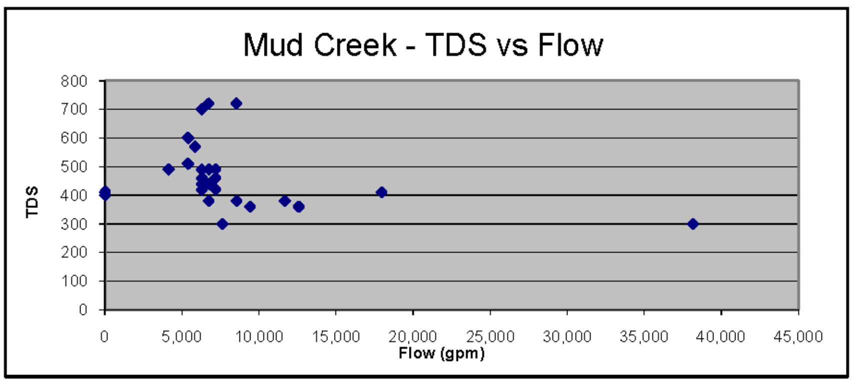


Figure 19. Water Quality VS Flow







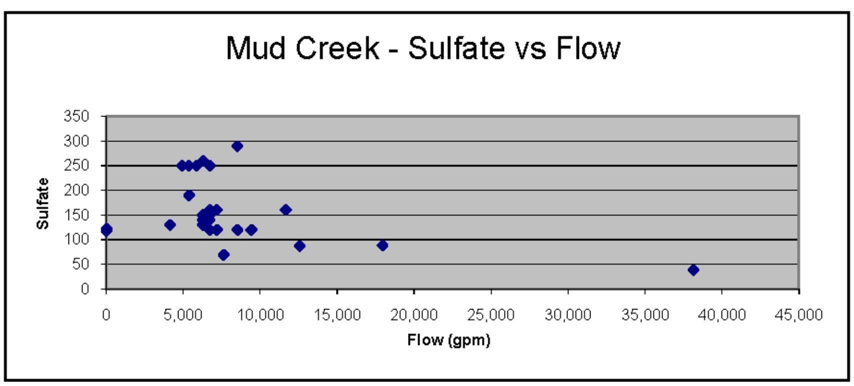
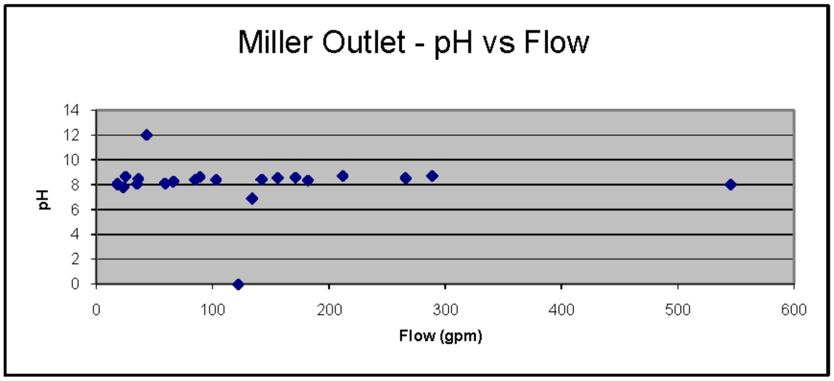
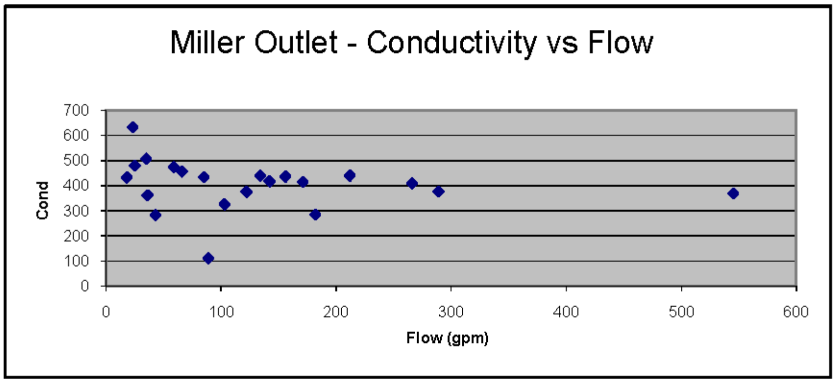
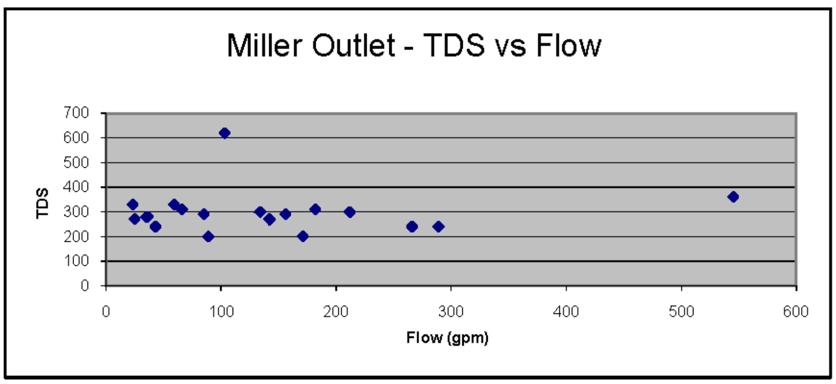


Figure 19 (Continued)







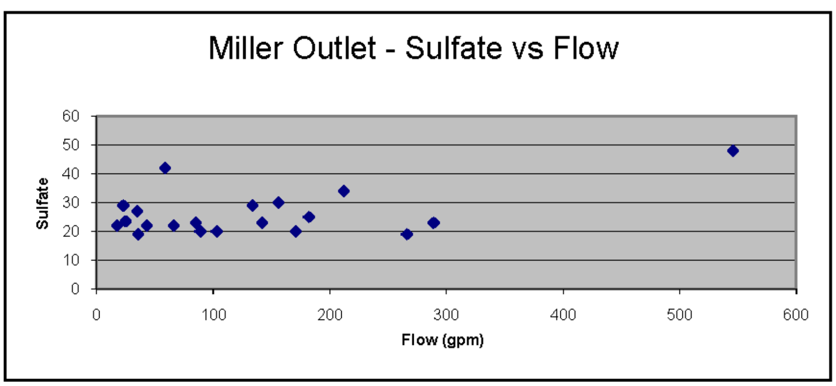
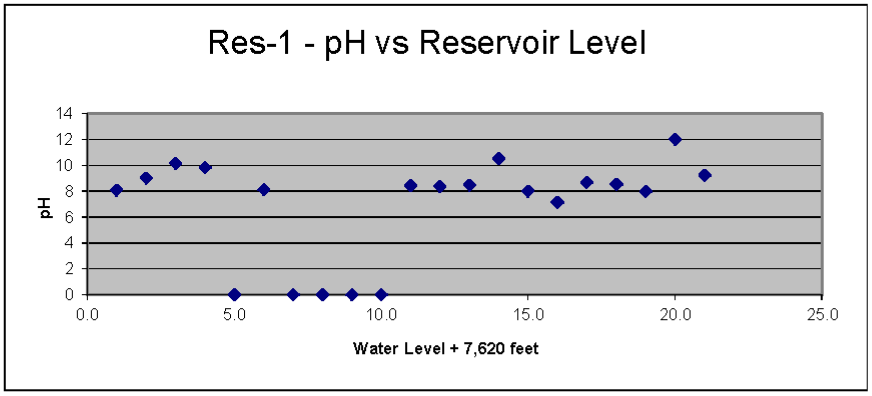
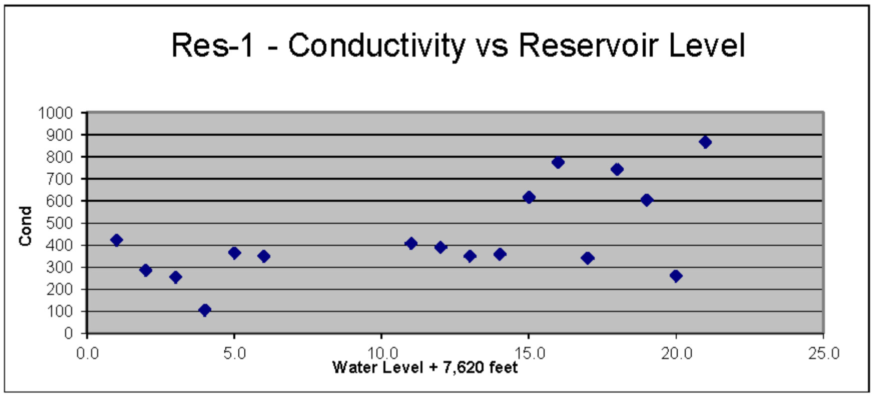
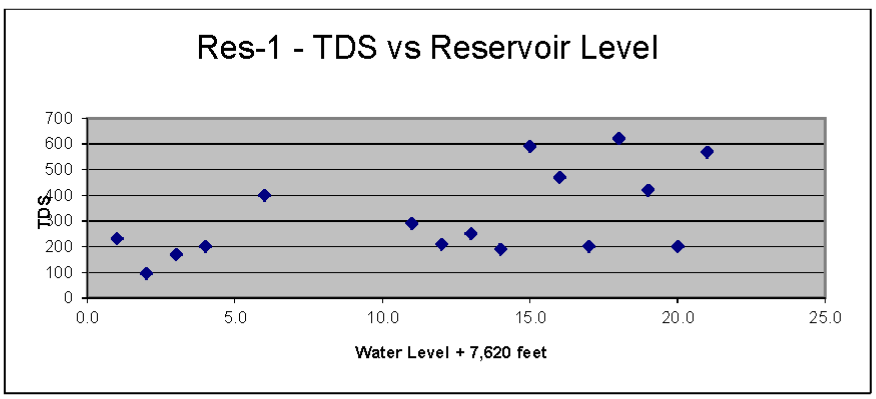


Figure 19 (Continued)







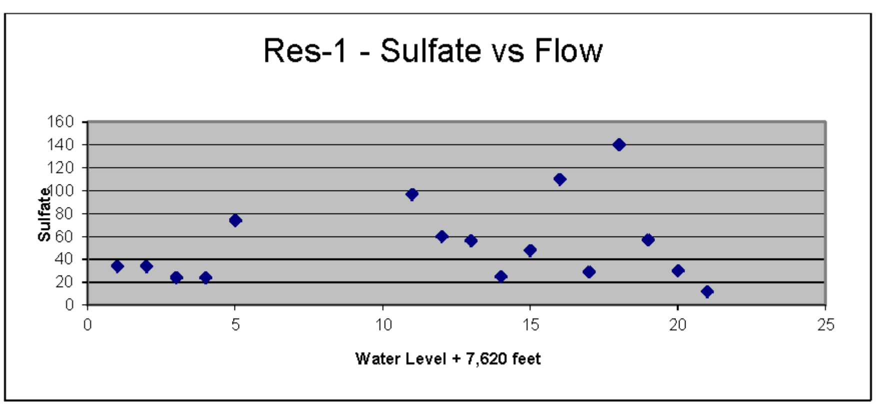
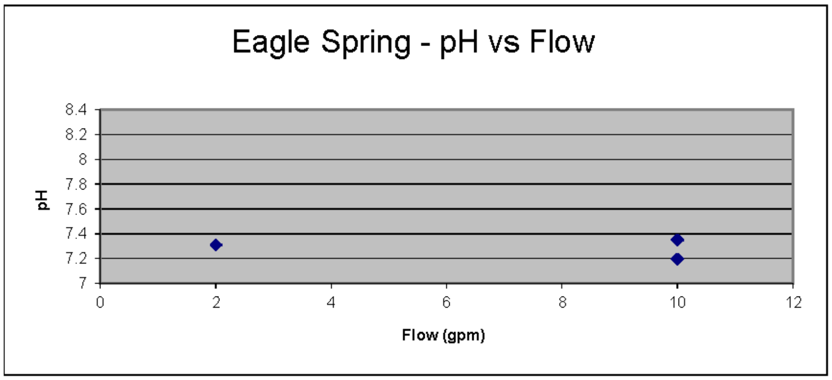
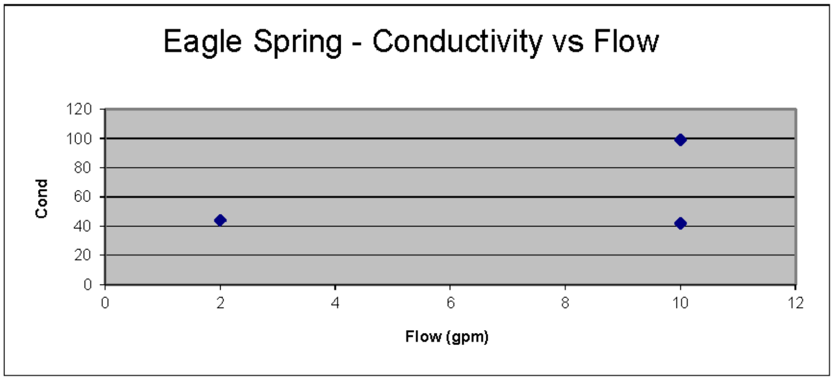
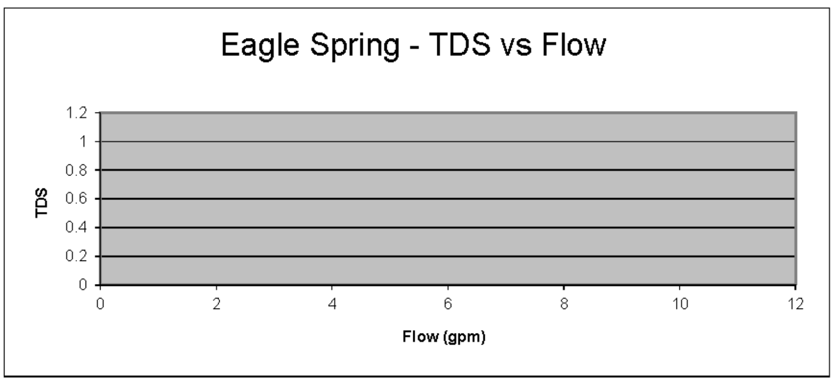


Figure 19 (Continued)







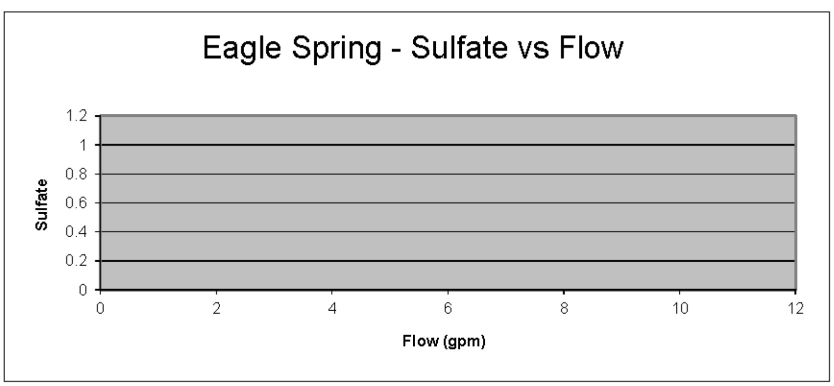
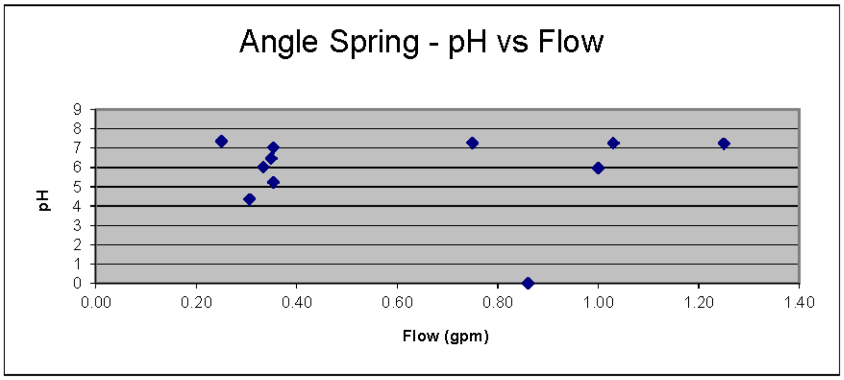
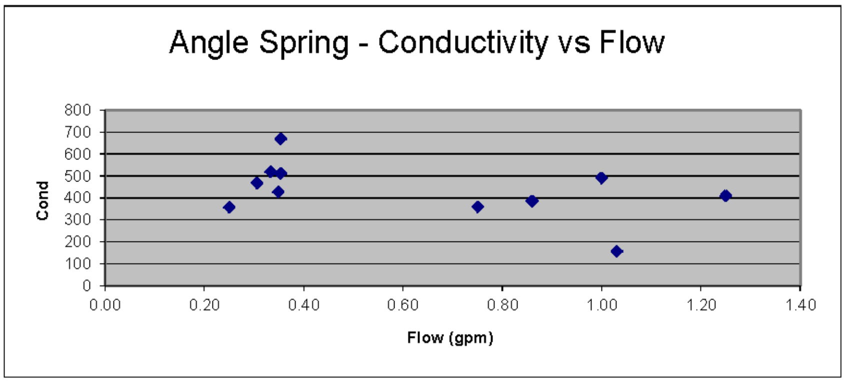
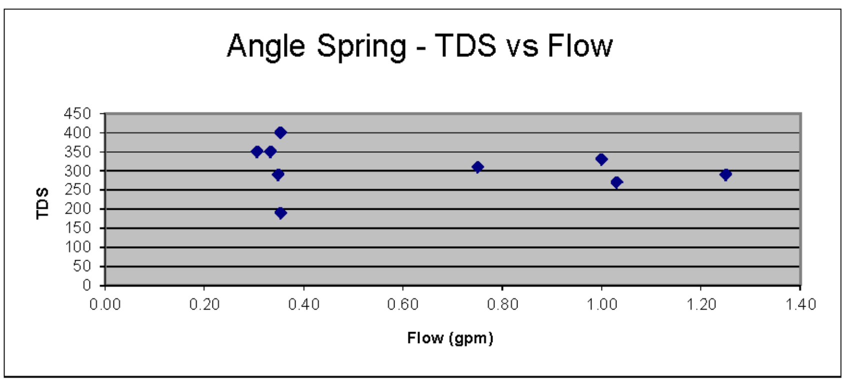


Figure 19 (Continued)







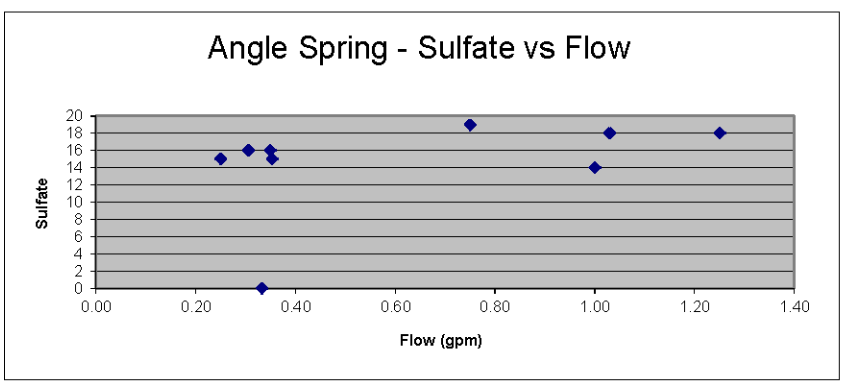
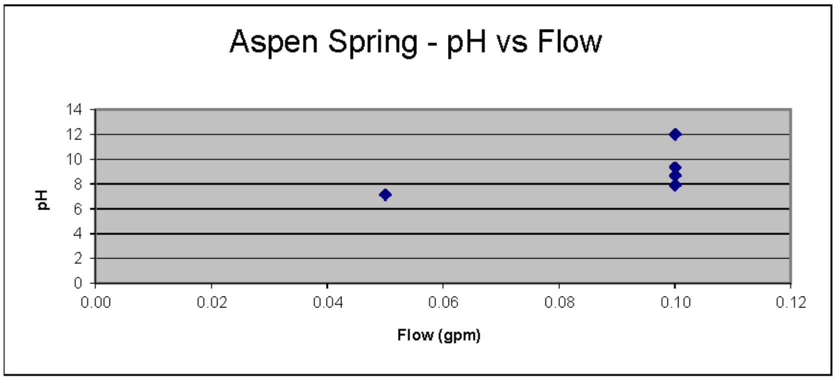
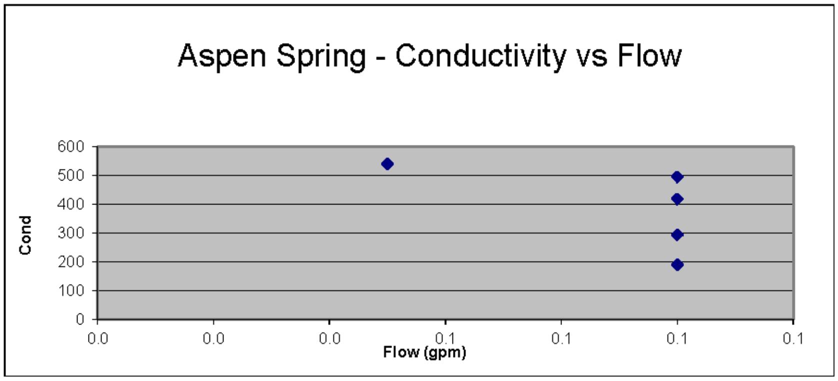
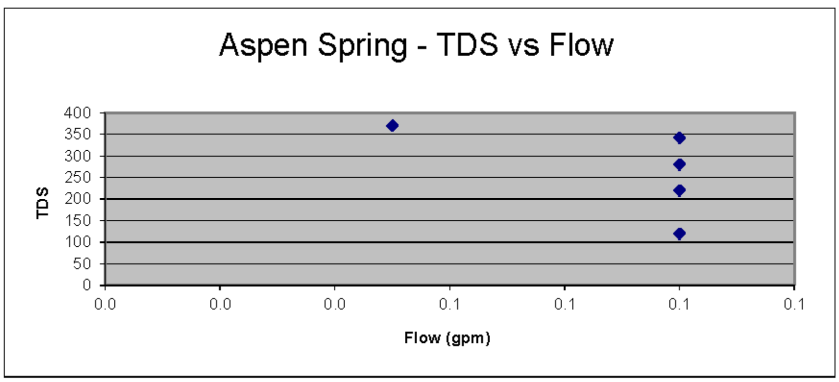


Figure 19 (Continued)







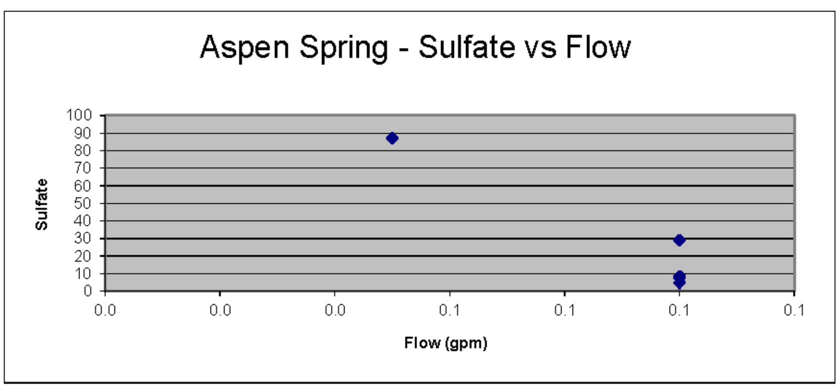
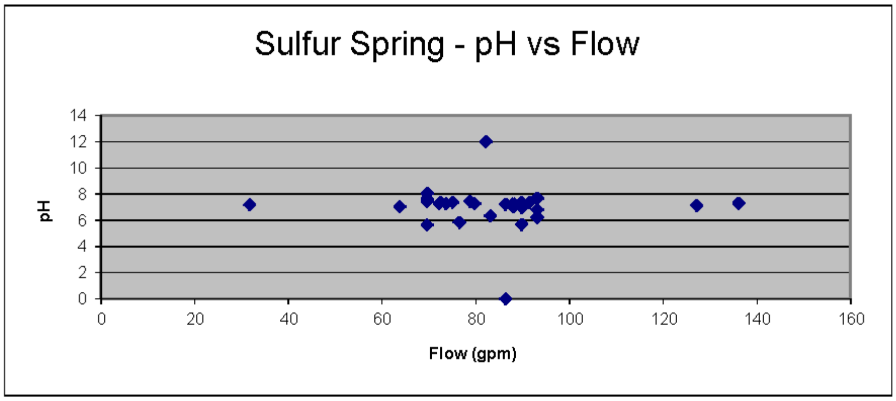
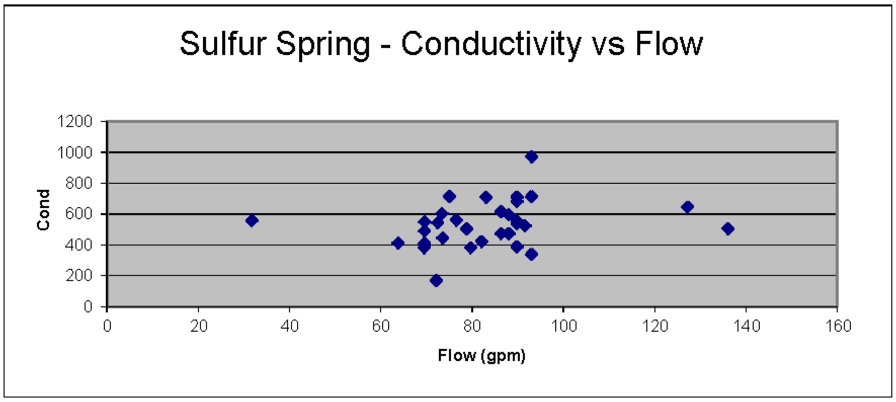
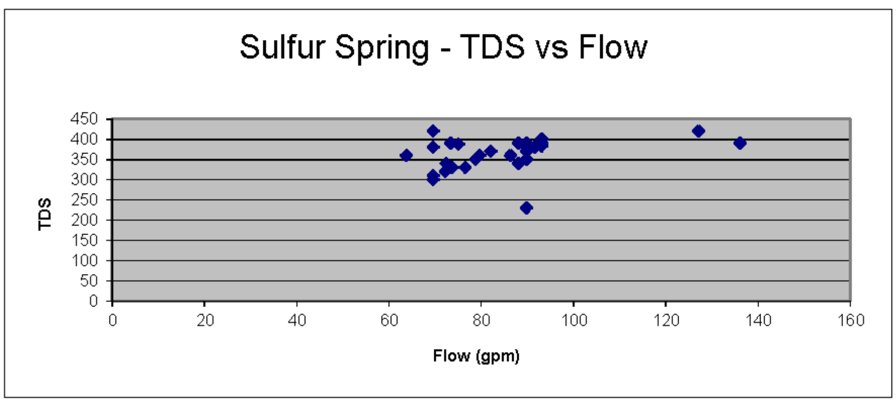
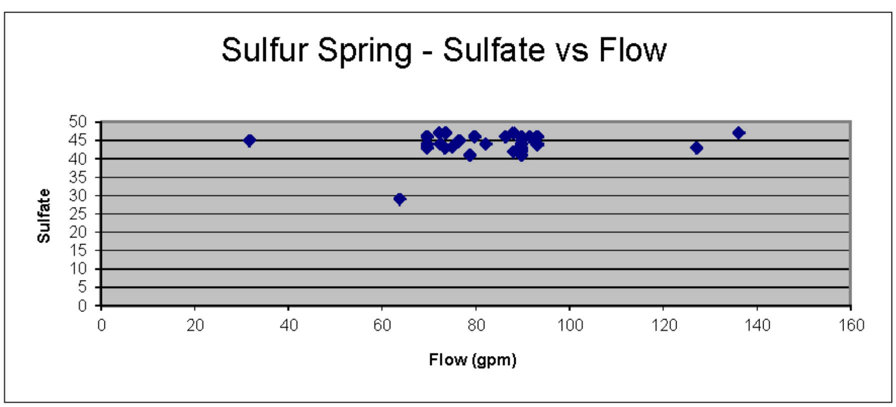


Figure 19 (Continued)









Surface Water Summary

Other than Mud Creek and Scofield Reservoir, surface water resources in the area adjacent to the proposed permit are limited. The principle perennial streams located within or adjacent to the permit area boundary include: 1) Mud Creek, the dominant drainage, and 2) Miller Canyon, both of which drain directly into Scofield Reservoir. Mud Creek drains areas not tributary to lands included within the permit area. Miller Canyon drains tributaries overlying future mining zones within Long Canyon. Limited ~~intermittent and~~ ephemeral channels also drain the area, many of which normally exhibit short term continuous flow in response to spring snowmelt and/or high intensity thunderstorms.

The Major Perennial Streams

Major perennial streams within 5 miles radius of the permit area include the Price River and Fish Creek, Mud Creek, Miller Canyon. Smaller drainages in the area exhibit an ~~intermittent or~~ ephemeral flow regime with sustained flows occurring only in response to spring snowmelt and high intensity thunderstorms. These drainages do not contribute significant quantities, or yields of stream flow to the Price River, except during high-intensity short-duration storm-generated events, and possibly during snowmelt runoff.

Presently, beneficial surface water use in the area includes domestic water supply, secondary recreations uses, cold water fame fish and aquatic life, and agriculture. As discussed in R645-301-724.200, Drainages and Surface Water Bodies, streams are classified as either 1C, "protected for domestic purposes with prior treatment by complete treatment processes", 3A, "protected for cold water species of fish and other cold water aquatic life", or 3C, "protected for non-game fish, and other aquatic life". 1C, Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water, 2B, Protected for secondary contact recreation such as boating, wading, or similar uses, 3A, Protected for cold water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain, and 4, Protected for agricultural uses including irrigation of crops and stock watering.

Although water quality is relatively consistent for monitored sources, some variation is noted to exist as a result of the composition of contributing water, and the flow regime, especially within Mud Creek where the source includes disturbed upstream areas. Overall, surface water conditions are typical of arid regions of the western United States and seasonal or storm-event peak flows tend to dilute geochemical constituent concentrations. However, during low-flow periods, constituent concentrations of surface waters tend to increase. For those constituents that appear to show elevated levels, it is reasonable to assume the elevated levels are a result of natural sources and the processes of weathering, oxidation, erosion, evaporative concentration and sediment transport.

R645-301-724.320 Reclamation & Prevention Material Damage

Reclamation as required by the R645 rules can be accomplished and the mining operation has been designed to prevent material damage to the hydrologic balance outside of the permit area.

Carbon Resources' planned mining and related activities have the potential to generate temporary impacts to surface water resources. These impacts will typically be localized, being confined to those segments of area drainages directly impacted by mining activities

In general, hydrologic consequences to surface water resources resulting from CR's mining operations will be limited by the relatively small surface disturbance area, and will be effectively mitigated by operation of the drainage and sediment control system and ultimate reclamation of mine disturbance areas.

Proposed new mining related surface disturbance will be limited to the mine facilities areas and will involve removal of vegetation and soil materials and grading of disturbance areas for specific mining related uses. These disturbance activities will reduce infiltration potential and evapotranspiration due to elimination of vegetation and will increase surface runoff and erosion potential. In order to effectively control erosion and increased runoff from disturbance areas, CR will divert runoff from undisturbed upgradient areas around the area of mining disturbance, grade disturbance areas to minimize runoff and erosion, and collect runoff as close as possible to its source and route it to the sedimentation pond for retention and settlement of suspended solids prior to discharge to natural drainages. CR will control and mitigate potential increased runoff from surface disturbance areas using a number of commonly accepted surface management and drainage control practices. Specifically, disturbed areas will be graded to minimize runoff and to the extent operationally feasible surface flow velocities will be controlled through the use of appropriate surfacing materials and runoff will be collected as close to disturbance source areas as possible to minimize erosion and increased sediment loading.

In addition to specific drainage control practices, CR will effectively minimize the area of surface disturbance by keeping all surface facilities within a relatively limited area. Provisions for minimizing mine related surface disturbance are detailed in Chapters 5 and 7. Increases in runoff from disturbance areas may result in a very minor increase in stream flow for the receiving drainage, however, any increase will not be significant given the very limited area of surface disturbance relative to total drainage basin areas for the potentially effected drainage. Potential flow increases will also be mitigated by operation of the sedimentation pond which will retain disturbed area runoff providing a buffering effect.

On completion of mining operations, disturbed areas will be reclaimed. Reclamation will involve backfilling and grading, reestablishment of natural drainage patterns, soil replacement, and revegetation. It is anticipated that reclamation will effectively restore infiltration and runoff patterns to approximate the baseline conditions currently existing for the surface disturbance areas.

The sediment pond has been designed such that discharge structures are above the design sediment level and any runoff accumulations in the pond below this discharge elevation will be retained in the pond as dead storage (note that dead storage will not affect pond capacity since the design sediment storage capacity is being utilized for dead storage). The design sediment storage volume available for temporary runoff storage represents a negligible amount relative to area stream discharge volumes and so does not constitute a significant potential flow reduction.

Changes in Surface Water Chemistry –
Exposure of surficial materials by mining related surface disturbance and contact of disturbed area runoff with these materials, infiltration and drainage from coal and operations areas may result in very minor changes in runoff water chemistry. CR's proposed surface drainage and sediment control measures, specifically limitations on total surface disturbance and collection of disturbed areas runoff as close as reasonably feasible to the disturbance source area, will be effective in limiting runoff exposure to surficial materials and consequent leaching. While minor changes in runoff water chemistry may occur as a result of mining and related operations, limited surface disturbance areas and corresponding limited disturbed area runoff volumes will

minimize any potential for significant changes in water chemistry for the receiving drainage since disturbed area runoff flows will be buffered by significantly greater volumes of normal runoff from other drainage basin areas.

Potential temporary reduction of Mud Creek Flows during mine operations –
Since the mine operations area is relatively small, there will be very little impact to Mud Creek. Runoff flows from the mine site will be effectively contained in the sediment pond and released in a slow fashion to allow for deposition of suspended solids resulting from storm runoff. There will be only a minor delay in runoff due to the slow release of runoff water reaching Mud Creek. This delay will result in very minor impacts.

Reclamation impacts
Reclamation of the mine site will be accomplished as soon after mining as possible. The sediment pond will be left in place after the first phase of reclamation to contain the majority of runoff from the reclaimed area. Only the area south of the main access road will not flow to the sediment pond after the first phase of reclamation. Runoff from this area will be controlled with alternative sediment controls. The sediment pond and alternative sediment controls will remain in place until vegetation has been established and the area stabilized. When the area has been stabilized and is worthy of Phase II bond release, the sediment pond will be reclaimed. At that point the area will be reclaimed to the pre-mining condition. Reclamation can be accomplished and the operation has been designed to minimize impacts to the surrounding area, and to the hydrologic balance outside of the permit area. Refer to Chapter 5 and Chapter 7 for details of the operational designs that accomplish these goals.

R645-301-724.400 Climatological Information

The climate of the permit area is semi-arid with natural variations in climatic conditions due to the size of the area, rugged terrain, and significant elevation differences. Temperatures in the area reflect a typical seasonal pattern with gradual warming beginning in late March, high seasonal temperatures in July and August, a gradual cooling beginning in late August to early September, and seasonal lows in late December through mid-February. Due to fast moving storm fronts, wide temperature variances can occur over relatively short periods of time. More specific data relating to precipitation, temperature and wind speed and direction is provided in R645-301-724.410 – 420.

The general mine permit and surrounding area is characteristic of rugged terrain with significant elevation differences result in some natural variation in climatic conditions. Generally, temperatures are lower on the exposed high plateaus and upper slopes when compared with lower slope and valley areas. Temperature differences are usually pronounced between upper slopes with southern exposures, and deep valleys which can trap and hold cold air masses due to inversions during the winter. Local variations in precipitation amounts may be pronounced dependent on topography, exposure, and the direction of prevailing winds. Exposure may result in higher wind velocities on plateau and ridgeline areas when compared with more sheltered slope, basin, and valley areas, although natural down-valley airflow patterns can result in localized high winds in certain valley areas.

The closest SNOTEL meteorological reporting stations were identified as Clear Creek #1, Clear Creek #2, Scofield Dam, and Price, Utah. The Clear Creek and Scofield Dam sites provided temperature, precipitation and snowfall data, and the Price, Utah site provided wind direction data. Climatic characterization of the permit area is based on historical climate data from these stations and general regional climatic information. Generally, the climate of the Project area is temperate with summer high temperatures in the range from 75° to 80°F (24° to 27°C) and winter lows from 0° to -5°F (-17° to -21°C). Annual average precipitation in the area is on the order of 14.6 inches.

The summer high temperature recorded at the Clear Creek #1 SNOTEL site between 1989 and 2006 was 90°F (32°C). The winter low during the same time period was -22°F (-30°C). Monthly mean, maximum and minimum data are shown in Table 13, Summary of Temperature Data.

Temperature

Temperatures in the area normally reflect a typical seasonal pattern with gradual warming beginning in mid to late-March, high seasonal temperatures in July and early August, a gradual cooling beginning in late August to early September, and seasonal lows in late-December through mid-February. Although recorded high and low temperatures of 90°F (32°C) and -22°F (-30°C) were recorded at the Clear Creek #1 station, the average high and low temperatures for the area are believed to be on the order of 77.7°F (25.4°C) and -1.4°F (-18.6°C) respectively as shown for the Scofield Dam station. The average frost-free period in this area ranges from approximately 60 to 120 days dependent primarily on elevation and exposure. Due to fast-moving storm fronts, wide temperature variances can occur over a relative short period of time. A summary of SNOTEL climatic data is provided in Table 13, Summary of Temperature Data.

Precipitation

Given a low average annual precipitation of only 14.56 inches, the permit area is classified as semi-arid. The majority of the precipitation received in the area occurs as snowfall during the months of December, January, February, and March. Rainfall typically occurs in the form of brief, high-intensity thunderstorms with most thunderstorm activity occurring during late summer and early fall, peaking in August. Monthly average precipitation ranges from 0.90 inches (June) to 1.65 inches (January) and the high average monthly snowfall is 26.2 inches (December). Average monthly precipitation and snowfall for the SNOTEL site located at Scofield Dam are summarized by Table 14, Summary of Precipitation Data. While a significant portion of the annual precipitation is captured in Scofield Reservoir (located immediately downstream and to the north of the permit area), some water is lost to evapotranspiration, sublimation, and local ground water recharge.

Table 14. Summary of Precipitation Data – Scofield Dam

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg Precipitation (in)	1.65	1.47	1.29	0.95	1.04	0.90	1.09	1.41	1.18	1.18	1.12	1.27	14.56
Avg Snowfall (in)	26.2	21.8	20.1	8.4	2.0	0.1	0.0	0.0	0.3	3.5	13.5	19.8	115.8
Avg Snow Depth (in)	18	20	14	3	0	0	0	0	0	0	3	9	6

Wind

Data is provided in Table 15, Summary of Wind Data - Price, Utah, for the closest wind SNOTEL monitoring site located near Price, Utah. As can be seen in the data, wind speeds average 6.8 mph with average highs and lows of 8.5 and 5.1 mph occurring in April and January respectively. For this station winds are generally out of the north.

Table 15. Summary of Wind Data - Price, Utah

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Avg Wind Speed (mph)	5.1	5.8	7.9	8.5	8.4	8.2	7.0	6.6	6.9	6.7	5.8	5.2	6.8
Avg Wind Direction	N	N	N	N	N	N	N	N	N	N	N	N	N

General regional information taken from the Willow Creek permit indicates that prevailing winds are from the west and northwest with average wind velocities generally not exceeding 20 miles per hour. During the winter the prevailing wind direction can shift for extended periods, blowing predominantly from the northeast.

Locally, surface air movements are strongly affected by natural drainage patterns and daily temperature variations. As local air masses cool at night, the denser, cool air flows down valleys and other natural drainage channels. Generally, the winds associated with this downslope movement are low to moderate, however, if the drainage alignment is the same as the prevailing wind direction or if the natural topography tends to concentrate natural air movement, moderate to strong downslope winds and high-intensity gusts may result. As natural warming occurs during the morning and early afternoon, warm air masses begin to move up-valley. Differential heating and upper level winds tend to have a greater impact on the upward air movements resulting in greater mixing and instability with resultant variable winds and greater potential for gusty conditions.

R645-301-724.700 Including R645-302-320 Alluvial Valley Floors

R645-302-320 & 321 Alluvial Valley Floors Determination

Refer to Chapter 9, Special Categories for a discussion on AVF's.

R645-301-725 Baseline Cumulative Impact Area Information

In order to evaluate the potential cumulative hydrologic impacts which could result from the proposed mining activities in combination with other unrelated activities, it is necessary to define a cumulative impact area and identify other activities which may contribute to any cumulative impacts within that area.

Generally, the surface disturbance associated with the mining operations will involve such a small area (Portal Block Permit Boundary) that the overall impact on surface water resources will be negligible. Any potential surface water impacts which may result from mining and related activities will also be effectively mitigated by a comprehensive drainage and sediment control plan and controlled discharge under specific effluent limitations and permit requirements of the mine UPDES Permit. Similarly, potential mining related ground water impacts will inherently be minimized by limited ground water occurrence and low overall permeabilities. While both mining related surface and ground water impacts are expected to be minimal, a complete evaluation of potential hydrologic impacts must consider the larger area over which any mine related impacts could combine with other unrelated environmental impacts to produce a cumulative adverse impact.

For potential ground water impacts, the cumulative impact area includes the permit area along with any upgradient areas which could be impacted by mining related drawdown and downgradient areas which could be impacted by any mining related changes in ground water flow volumes or ground water quality. Given the characteristic low permeability of the geologic sequence, the limited volume and flow of ground water, and the consistently flat dip of the geologic units to the northeast, the ground water cumulative impact area can reasonably be defined by Mud Creek on the west, Miller Canyon to the north, Long Canyon to the east, and the headwaters of UP Canyon on the south. Other activities which could result in possible contributing ground water impacts within this area are believed to be limited to contributions from existing abandoned underground mine workings.

Any drawdown of perched aquifers would occur either immediately above the underground mine workings or within the limits of subsidence, both of which are believed to be encompassed within the permit area boundary. Given the unconfined nature, overall low permeability, and limited storage and flow volume of the regional aquifer within mined zones, potential mining related drawdown is expected to be negligible. Interruption of groundwater flows should be minimal to non-existent based on the general lack of water encountered during exploratory activities associated with this mine permit. No known potential upgradient effects are projected for the direct permit area since 1) bedrock dips to the east-northeast with no upgradient source beyond the surface mine facilities themselves, and 2) potential mine impacted surface waters associated with Mud Creek flow west of the permit area and will bypass the mine without direct contact or impact.

Any potential downgradient mining related ground water impacts would be most pronounced within and immediately adjacent to the actual area of underground mining disturbance with these impacts becoming less pronounced with increasing distance from the impact source due to the effects of ground water contributions from adjacent areas and consequent mixing, dispersion, and dilution. The area which would be affected by the mining activities is relatively small when compared with the overall regional ground water basin and low permeability combined with relatively flat gradients will effectively limit downgradient ground water movement. Water quality should not be affected as a result of mine development because the existing stored mine water as well as water which will accumulate in new mine workings is regional groundwater. Potential downgradient mining related ground water impacts would, therefore, be confined to a relatively limited downgradient area which is expected to fall within the cumulative impact area as defined above.

R645-301-726 Modeling

Modeling techniques used for this permit application were used based on ground and surface water sampling data.

Modeling of the probable regional groundwater table was accomplished utilizing the available groundwater data that include SWL's from CR-06-09, CR-06-03ABV, CR-10-11, CR-10-12 and the limiting data provided by the elevation of screened intervals in the dry monitor wells CR-06-01BLW, and CR-06-05A. Additional data was gleaned from the 3D position of the perennial reaches of Mud Creek and Miller Creek, together with the baseline water level provided by Scofield Reservoir. It was assumed that the perennial reaches must be receiving flow from the regional water table.

Piezometric surface modeling was accomplished with SUERVCAD software using the triangulation interpellator and a 500 ft. grid size. This large grid size was required to span the large distances between data points which produced a very smooth surface (Following the rule of the larger the gaps the smoother the maps.) Using the perennial reaches of the two streams as primary data, the first pass surface from those data fit the SWL's from the monitor wells rather nicely. However, it did not account for the obvious warps in the surface created by the partitioning effect of the gouge in the major faults. In an attempt to construct a rough approximation of the complexity introduced by faulting, the model had to be made in two parts. One; east of the west boundary fault of the Eagles Canyon Graben, and Two; west of that same fault. This allowed accommodation of the upper elevation limits provide by CR-06-01 BLW and CR-06-05A west of this fault. Synthetic data had to be created in the form of 3D lines to force the model to butt against the fault in an appropriate manner rather than create a bulls eye at the two dry monitor wells. The approximation worked reasonably well but, accommodating all of the available data and modeling the partition formed by the western boundary fault of the Eagles Canyon Graben. Clearly this model is a crude approximation of the real piezometric surface may be an apparent coincidental fit when in fact the piezometric surface is actually more strongly partitioned than the model shows. Of course there are other faults as large as the Western Boundary of the Eagles Canyon Graben that should have similar effect on the model. Data are simply insufficient to detect those nuances.

This model requires that only certain large faults have sufficient gouge to partition the peizometric surface and that others leak ground water allowing it to flow from high gradient, near Long Canyon recharge area to Scofield Reservoir. The model also requires that there are no stratigraphic units in the local packet that are capable of acting as true aquacludes, but only aquitards.

The only other obvious competing model of groundwater flow would be a flow to the North North-East down the regional dip. This model would require that several stratigraphic units in the local packet must act as aquacludes, and the groundwater to flow beneath higher elevations that might be recharge area. This model would also require a complicate, thus far unknown, mechanism to account for the perennial reach of Miller Creek. It is difficult to visualize how a North East dipping confined water table could provide enough recharge to the perennial reach of Miller Creek to account for the flow. As additional monitor wells are completed, particularly south and east of monitor well CR-06-09, the model will become much better understood.

R645-301-727 Alternative Water Source Information

The surface mining activities are not expected to cause proximate contamination, diminution or interruption of any underground or surface source of water. As discussed previously, mining operations are not expected to have any significant adverse impacts on the prevailing hydrologic balance, existing water resource or water rights. Furthermore, the potential impacts of mining on ground water systems (dewatering of accumulated water, solute leaching, and solute transport) will not result in any measurable effect on surface water or ground water rights nor will the potential impacts of mining on surface water systems (increased runoff, erosion and sediment load, salt loading and changes in ion balance) cause measurable injury to surface water rights. In the unlikely event that proximate contamination, diminution, or interruption does occur, CR will acquire or purchase surface and or ground water rights or supplies from local sources including Scofield Reservoir to replace impacted water rights.

R645-301-728 Probable Hydrologic Consequences Determination

In order to assess the probable hydrologic consequences of the planned mining and related activities CR has reviewed and evaluated all available information on baseline hydrologic conditions as presented and described in R645-301-711 - 727, Hydrologic Information, in order to accurately characterize the existing surface and ground water environments. Within the context of the existing hydrologic conditions, CR then considered potential hydrologic impacts, both positive and negative, which could occur as a result of the planned mining and related activities based on the operation and reclamation plans presented in R645-301-230 – 252, 330, -358, Operating Plans and Design Criteria, and R645-301-323– 400, 327, 240 – 244, 341, 342, 352, 353, 356, 357, 358, 511, 512, 515, 541, 542, 553, 760 - 765, Reclamation Plans. Both direct and indirect mining related impacts were identified and evaluated and the effectiveness of operational protection and control measures and reclamation activities in mitigating potential impacts were considered in the assessment of probable hydrologic impacts. The following sections present summary descriptions of the probable hydrologic consequences of the planned Kinney mining and related activities.

~~**Summary of Baseline Conditions**~~

Detailed discussion of surface and ground water occurrence, quality, use, and relationships is presented in R645-301-710, 721, 724 - 728, Hydrologic Information. The following briefly summarize general surface and ground water conditions as a reference for the discussions of probable hydrologic consequences which follow in the subsequent sections.

Ground Water Baseline Conditions

Ground water resources in the permit and adjacent areas are limited in both extent and quantity. Ground water occurrences are limited to; 1) Shallow alluvial/colluvial valley fill deposits in valley areas west of the mine and in area drainages overlying mining zones east of the surface disturbance area; 2) Potential perched ground water occurring in thin laterally discontinuous sedimentary units in the Blackhawk Formation, and adjacent to faults 3) Ground water which has accumulated over time in existing underground mine workings; and 4) a regional water table aquifer occurring in the deeper portions of the Blackhawk Formation and extending into the underlying Star Point and Mancos Formations.

Ground water movement is limited by generally low transmissivities, the lack of significant secondary permeability, and limited recharge due to arid conditions, limited outcrop exposures, and relatively mountainous terrain. While volumes of water may have accumulated over time in abandoned underground mine workings, mine inflow rates are expected to be relatively low.

Only limited ground water quality data is available due to the general dry nature of the explored geologic units. Three of the four groundwater monitor wells completed in the Hiawatha Seam, the seam to be mined, are dry and one of the two groundwater monitor wells completed below the seam to be mined (CR-06-01BLW) is dry demonstrating that the Hiawatha Seam is over 150 feet above the regional groundwater table in the permit area Table 6, Kinney #2 Mine Baseline Monitoring Stations. Data from Sulfur Spring, Angle Spring and Well CR-06-03-ABV show similar calcium bicarbonate water qualities (see Map 10, Regional Water Quality), a moderately alkaline pH, and moderate to low TDS concentrations. Ground water use is limited to isolated use of perched ground water issuing from springs or seeps for stock watering.

Surface Water Baseline Conditions

Other than Mud Creek and Scofield Reservoir, surface water resources in the permit and adjacent areas are limited. The principal perennial drainages located adjacent to the permit area include; 1) Mud Creek, the principal drainage in this area and Miller Canyon, both tributary to Scofield Reservoir. Some ~~intermittent and~~ ephemeral drainages occur within the permit area, most if not all of which normally exhibit flow only in response to spring snowmelt and high intensity thunderstorms.

Surface water quality is typical of mountainous regions of the western United States exhibiting chemical characteristics including calcium bicarbonate types with neutral to moderately alkaline pH, and moderate to moderately high TDS and TSS values. Quality of Mud Creek does not fit this profile well and It is believed that water quality within Mud Creek is influenced by surface mine operations and mine discharges within Eccles Canyon (Map-10). Seasonal flow increases or peak flow resulting from storm events tend to dilute geochemical constituents concentrations while during low flow periods these concentrations tend to increase. Surface water uses in the general area are mostly used for agricultural and recreational use, however surface waters are also used downstream for culinary and industrial purposes. All surface water use is outside the permit area boundaries except for water right 91-4026 located at the extreme eastern edge of the permit area. This right is a pond with associated spring source and is used for domestic stock watering during the limited summer and fall seasons.~~.~~ More information on surface water resources is presented in R645-301-724 - 728, Surface Water Information.

Given the general absence of both aquifers within the permit or adjacent areas which can be characterized as significant water supplies and significant recharge areas, the potential for adverse water supply impacts due to mining related subsidence is negligible. Mining may result in drainage of small perched ground water occurrences and localized increases in mine water storage, however, the depth of mining, limited coal seam thickness and specific mine design which calls for first mining only provides effective protection for area drainages and associated alluvial/colluvial aquifer systems.

The hydrogeologic characteristics of the coal-bearing Blackhawk and overlying formations will effectively limit the extent of impacts to the hydrologic system as a result of new mining. Therefore, impacts from the mines will be of local, as opposed to regional, significance. Potential impacts to the hydrologic resources are discussed further below.

Mining activities may result in the following potential localized, temporary effects on the surface and ground water environments:

Stream Flows and Surface Water Quality

–Mine related surface development will result in removal of vegetation and soils, grading, paving and other surface alterations which may increase surface runoff and sediment transport from the disturbed areas. During construction, development, and active operations, runoff and sediment will be controlled through the use of temporary diversion and collection ditches, berms, sedimentation ponds, and appropriate alternative sediment control measures. Increased runoff amounts will be buffered to some extent by temporary containment in sedimentation ponds but some minor temporary increases in discharge to stream reaches downgradient of surface disturbance areas is anticipated. Following completion of active operations, surface disturbance areas will be reclaimed with the objective of reestablishing baseline drainage conditions. Runoff and sediment control structures will remain in place until this objective is achieved.

The only site available for construction of the required mine facilities is a very limited area adjacent to and east of Highway 96. As a component of the overall mine development plan, CR proposes to convey one short segment of "Jones Draw "an"an ephemeral drainage near the south end of the mine site beneath the mine surface facilities via the construction of a bypass culvert. The diversion will protect natural drainage flows upstream of the disturbed area, thus preventing or minimizing potential runoff degradation. Upon mine abandonment, the culvert will be removed, the area regraded, and the stream channel restored as closely as possible to current conditions within the constraints of site conditions and practical construction capabilities.

With the exception of the temporary conveyance of the "Jones Draw" channel discussed above, underground mining activities are not expected to result in any impact on the alluvial/colluvial aquifer system. Recharge areas for the alluvial/colluvial system will not be affected, and CR plans to avoid full extraction under any of the local drainages. Underground mine development and mining operations may intercept perched aquifers, but are not expected to intersect the regional ground water system. Resulting impacts on stream flow are not anticipated since flow contributions from the perched ground water systems represent only very small flow potentials.

Surface runoff from mining related disturbance areas has the potential to impact surface water quality. As noted in the preceding section, surface runoff and associated sediment loading will be effectively addressed through operation of engineered drainage and sedimentation control structures and site reclamation. During active mining operations, the limited underground mine drainage encountered will be controlled using sumps at the face, transfer pumps and pipelines wherein the water will be pumped to a section sump where the water will be allowed to settle and it will either percolate back into the groundwater system or be reused for dust suppression. The surface discharge of mine water is not anticipated.

Given that the proposed mine workings will be down-dip from the mine portals, any upgradient workings will drain to the lower workings. History has also shown that there has been no direct surface discharge from inactive mine workings locally. Given the anticipated mining depth and configuration of the proposed mine workings, it is anticipated that the ultimate equilibrium water level in the mine workings (if any) will be below any potential mine discharge point.

There have been some indications in other local and regional mines that the interception and accumulation of ground water in underground mine workings limits percolation of the water through the underlying sediments, preventing further contact with underlying shales and resultant increases in TDS. Given this consideration, mine water accumulations and any associated lateral ground water movements through the geologic sequence to a surface discharge point may actually result in an overall enhancement of downgradient water quality. Since the coal seams dip to the northeast and become increasingly deep with no outcrops on the east side of the mining area, there is little or no potential for mine water to impact water users.

Ground Water Occurrence, Movement, Discharge, and Quality

Underground mine development and operations, and related surface disturbances are not expected to significantly impact ground water recharge areas given the limited extent of anticipated surface disturbance. There is also little to no potential for minor, localized, mining-related impacts on the alluvial/colluvial ground water system (as discussed previously), localized impacts on the perched ground water system, increases in the amount and areal extent of stored ground water, and limited short-term impacts on the regional ground water system.

Mine development entries may intercept limited water-bearing members of the perched ground water system. These activities could increase vertical permeability and result in localized drainage of perched ground water resources. However, given the limited thickness and areal extent, storage capacity, and transmissivity of most of the perched ground water occurrences, direct mining-related impacts resulting from interception by development or mine workings are anticipated to be very localized with relatively low flow rates and total flow volumes. Similarly, loss of ground water from the perched ground water system due to rock fracturing would be a localized phenomenon.

Development of mine workings and subsequent coal removal is not expected to directly impact the regional ground water system~~ since a consistent water system has not been identified~~. If ~~a~~ the regional system is ~~however~~ encountered during mining, the void spaces and resultant mine inflows created would provide for the accumulation of storage of ground water. Impacts on the regional ground water system in this case would be expected to include a localized, temporary, depression of the potentiometric surface and localized reduction of ground water volumes and flow rates in effected portions of the regional aquifer zone as the mine workings are flooded to the level of the regional piezometric surface. As noted in the previous section, ground water accumulations are not expected to result in direct mine water discharges. Instead, under such conditions, gradual accumulations of ground water would reach an equilibrium point with the regional ground water system with no significant long-term effects.

The primary potential mining-related impact relative to ground water quality would be an increased oxidation potential in the void spaces resulting from mine development and coal extraction.

Potential for Adverse Impacts

Ground Water Impacts

Unlike many local mines, ground exploration in and around the proposed Kinney No. 2 Mine has encountered only limited amounts of water, indicating the presence of very limited ground water resources. Although some limited water was reported during drilling, it appears that all but three of the wells drilled within the proposed Portal Block permit boundary are dry. This conclusion was reached based on the observation that the reported water levels within many of the wells remained below the top of the lowermost blank section following bailing. The lack of water level change since that time has shown that there have been no inflows into most of the wells, thus indicating that wells CR-06-01 CR-06-01-BLW, CR-06-02, CR-06-02-ABV, and CR-06-05A are dry. Table 8, Well Conditions as of December 6/23/2010 and February 2011 (CR-10-11 & 12) March 2011 (CR-06-02),, has been inserted to show the location of the water level in each well in reference to the bottom of the lowermost screen. The locations of these wells are shown on Map 7, Regional Hydrology.

Data within Table 8 also show that only minor water level variations have been noted for well CR-06-09-BLW for water that was encountered within zones below the coal seam. Mining is not anticipated to impact any water or aquifer zone below the coal seam.

Five wells (CR-06-03-ABV, CR-06-09, and CR-06-09ABV, CR-10-11, CR-10-12) show the presence of water above the Hiawatha Coal Seam. The first of these wells is located within the Eagle Canyon drainage, and was abandoned due to property and easement restrictions. The CR-06-09 wells are located along the ridgeline between Eagle and Long Canyons. It will be noted that CR-06-03-ABV encountered water above the Hiawatha Coal Seam only because this hole is located in the Eagle Canyon Graben which dropped the Hiawatha Seam below the regional water table. CR-06-09 lies nearly a half mile NE of the permit boundary and in an area where the elevation of the Hiawatha Seam is lower than the elevation of the peizometric surface Map 7, Regional Hydrology. Similar to CR-06-03AVB, monitor wells CR-10-11 and CR-10-12 are completed above the Hiawatha Seam because the Hiawatha Seam has been dropped down nearly 600 feet by faulting. Water encountered within the mine is expected to be limited to the draining of localized perched zones.

It is fully anticipated that mining operations will have little if any impacts on the ground water hydrologic balance. This conclusion is reached based on the fact that limited ground water was encountered during drilling and that a significant number of the wells are dry. The area appears to be strongly influenced by localized confining layers that have the ability to create perched aquifers which overly the regional ground water aquifer shown on Map 7.

It is unlikely that the limited water encountered within well drilling operations is sufficient to provide any significant source for the local seeps and springs identified in the survey completed by Rock Logic, Consulting, LLC in 2006.

NotingFurther evaluation also shows that Monitor Wells with the exception of Sulphur Spring, seeps and springs located along the western facing slope of the mine permit area are all located south of the mine permit area and are at elevations of 8,000 feet msl or higher. Water measured on May 29, 2007 within wells CR-06-01, CR-06-01 BLW, and CR-06-02 are dry and that the base of the well screen in the lowermost of these holes, CR-06-01-BLW is 7,697.1 feet msl thus providing an upper bracket of during and after drilling has noted at a maximum water elevation that, with the exception of Sulfur Spring, is greater than 200of 7898 feet msl, over 100 feet below the lowermost spring elevation (Angle Spring ~7,940 ft msl) in near enough proximity to be affected.. The fact that well levels are so much lower than the springs, that the wells are dry, and that the springs are located inapproximately ¾ mile south of the Eagle Canyon Graben where no mining is planned permit area supports the "no impact" by mining conclusion.

The majority of water resources including seeps, springs and ponds noted within the seep and spring survey are located east of the permit area within Long Canyon and its tributaries. Three small seeps, one small spring, and two ponds are located within the eastern portion of the permit area are located within Eagle Canyon. A review of the mine portal elevation and the location of these springs indicates that there will be in excess of 500' of cover over mine workings, and hence there will be little potential for spring disturbance. As indicated earlier, mine workings dip to the east, increasing cover as the mine advances. As such, mine workings will have even less potential to impact surface water resources further east in Long or Miller Canyons.

It is further anticipated that no impact to the local surface or ground water systems west of the mine will occur due to 1) the general lack of water encountered during drilling and 2) the fact that the regional ground water aquifer is located beneath the majority of all proposed mine workings..

Surface and ground water hydrologic systems may potentially be impacted by mining, processing, and related operations. These impacts are not expected to be significant, will not affect either surface or groundwater users, and are expected to be localized and temporary in nature. Operational mitigation measures and reclamation of disturbance areas will result in effective restoration of surface and ground water conditions similar to those existing prior to initiation of the Kinney mining and related disturbance.

Ground Water Consequences

CR's planned mining, processing, and related activities have the potential to cause localized and temporary impacts to ground water. These potential, although likely limited ground water hydrologic consequences include:

- Alterations of local ground water flow patterns
- Drainage of seeps/springs (If this occurs it is likely to be temporary)
- Alterations of recharge/storage/discharge relationships
- Localized increases in concentrations of TDS and certain individual chemical constituents

Mining related probable hydrologic consequences for ground water resources in the Kinney Mine permit area will be limited by the lack of significant ground water recharge in the area, the general lack of ground water identified during exploratory drilling, the presence of low permeability geologic strata between the coal seams to be mined and the ground surface, the general lack of significant regional ground water movement, and very limited beneficial ground water use in the permit and adjacent areas. Probable ground water consequences are discussed in the following sections.

Based on known and projected hydrogeology, there appears to little potential for encountering significant volumes of in-mine water. Because in-mine waters are anticipated to be small, the mining operation anticipates using said water for dust suppression without mine discharge. However, to plan for a contingency of larger flows, the following potential alternatives will be reviewed and evaluated. The most appropriate method will then be proposed to the regulatory agencies for review and approval.

Discharge to Abandoned Mine Workings. Plans and permits would be filed to the regulatory agencies for approval to discharge encountered in-mine waters to remote or abandoned mine workings. This might involve the drilling of a conveyance system from new mine workings to remote or abandoned workings, or the connection of said workings through conventional mining methods.

Shallow or Deep Well Injection, Shallow or Deep Well Injection alternatives for the disposal of in-mine waters will be considered, but is not anticipated to be a selected alternative due to time required for investigations and regulatory constraints.

Treatment and Discharge to Mud Creek. The option to treat and discharge waters to Mud Creek will be considered. If chosen, plans and permits will be coordinated with the appropriate regulators before implementation.

Discharge to Holding/Evaporation Ponds. Discharge to surface holding and evaporation ponds will be considered, but is believed to be a non-viable alternative due to climatic conditions at the mine site, and the likely required size of said pond.. If chosen, however, plans and permits will be coordinated with the appropriate regulators before implementation.

Alterations to Ground Water Flow Patterns - Although mining is not expected to enter a regional aquifer system, alterations of ground water flow patterns will occur as a result of underground mining excavation and consequent drainage of localized perched aquifer systems resulting from subsidence fracturing. Mining operations therefore have the potential to induce ground water flow into the underground workings as the hydrologic system adjusts to mining. A shift in ground water flows toward the mine workings will occur when perched aquifers are intercepted, thus altering existing ground water storage and flow patterns. This may result in partial or full drainage of the perched aquifers and may affect the discharge of springs and seeps. Impacts on perched aquifers and associated springs and seeps due to secondary subsidence effects are not expected to be significant since only very limited ground water was encountered during exploratory drilling, and the perched aquifers are believed to be very limited in aerial extent. Captured flows will thereafter flow down dip within the mine, and serve as a source of recharge within mined sections to the adjacent environment.

Upon completion of operations and final mine reclamation and closure, it is expected that the underground workings may partially fill with water encountered during mining, resulting in the re-establishment of a stable and ongoing hydrologic environment. No significant changes (if any) in the regional potentiometric surface are expected to occur since the regional ground water aquifer is believed to be below target mining zones. Reductions in the quantity and availability of ground water as a result of alterations to the ground water flow patterns are expected to represent only a minor percentage of total ground water flows within the region or basin and will be limited in areal extent.

In addition, reductions in groundwater flows are not expected to adversely impact ground water users since, as is shown on Map 30, Ground Water Right Locations, there are no ground water rights shown in the vicinity of the mine permit area. Primary beneficial ground water uses in the vicinity of the permit area are all concentrated along the south eastern shoreline of Scofield Reservoir, and likely take water from the shallow ground water - surface water interface adjacent to the reservoir. With stratigraphic units dipping to the east, these locations are effectively hydraulically isolated from potential mining impacts. Potential impacts to springs and seeps discharging from the perched aquifer system are discussed below.

Drainage of Seeps and Springs - Kinney No. 2 Mine mining activities may result in some drainage and dewatering of overlying perched ground water aquifers as a result of vertical seepage through mining related fractures. Consequently, springs and seeps discharging from the stratigraphic units containing the perched ground water may be effected. CR will attempt to minimize fracturing to the extent possible while maximizing recovery of available coal resources. Fracturing will be controlled through the maintenance of barrier pillars, limiting extraction to first or development mining, and proper mining and roof control design and operations practices. Effective control of fracturing will limit stress on the overlying strata and the consequent potential for drainage through fractures. Additional discussion of potential mining effects is presented in R645-301-522, 523, and 525, General Description of Mine Plans, Mining Methods, and Related Design Requirements, under the subheading of Subsidence Control.

If discharge from seeps or springs is documented to decrease below historic conditions as a result of mining related activities, CR will mitigate these impacts through the purchase of and subsequent augmentation of effected water rights, monetary compensation, development of alternative watering facilities such as guzzlers, or other appropriate mitigation measures.

Alterations to Recharge/Storage/Discharge Relationships - CR's planned mining, processing, and related activities are not expected to have any significant long-term effect on recharge, storage, or discharge relationships. As described in R645-301-710, Hydrology Information, recharge within the ground water basin occurs primarily as a result of direct precipitation and infiltration. CR's operations are both limited in areal extent and are not located within any major recharge area, nor are mining operations expected to interfere with existing stored mine water in adjacent abandoned mines. Upon completion of operations and mine reclamation and closure, ground water will accumulate in the mine workings, thereby increasing localized ground water storage. Discharge relationships are also expected to be minimally effected with some temporary reduction in downgradient ground water flows during filling of the underground mine workings and re-establishment of a hydrologic balance, as well as localized alterations in ground water flow patterns. The quantity of ground water discharge which will be effected is a relatively small percentage of the total volume within the ground water basin.

Increases in Chemical Constituents - As ground water encounters freshly exposed subsurface materials in the mine, oxidation and weathering will cause changes in ground water chemistry including increases in TDS and the concentrations of individual chemical constituents. Over time these increases will stabilize and start to decrease as available soluble chemical constituents are depleted and chemical concentrations in the mine water and the exposed rock reach equilibrium. Any filling of the mine workings by perched ground water would also have a beneficial water quality effect, displacing oxygen and reducing the oxidation potential in any flooded abandoned workings.

As described in R645-301-710 - 724, Hydrology Information, ground water in both the Kinney Mine permit and adjacent areas is a calcium bicarbonate chemical type. Increases in both sodium and sulfate may occur within the mine, although they are not expected to change the ground water type. While various chemical constituents of the ground water may increase as a result of mining, these increases will not affect ~~effect~~ ground water use. Due to the limited volume of ground water drainage relative to total flows within the ground water basin, minor changes in ground water chemistry and levels of certain constituents are not expected to significantly effect overall ground water quality.

Surface Water Impacts

The proposed Kinney No. 2 Mine and related surface facilities are confined to a very small area or footprint. The surface facilities plan has been developed to consolidate the disturbed surface area into as small a space as possible, utilizing a series of pads to contain needed infrastructure. Impacts are limited to:

- Control of runoff and erosion within the disturbed permit area. When it occurs, historical runoff is generally noted as either sheet flow or small concentrated flow within ephemeral channels. Because of decreased vegetation which results in higher runoffs, it is anticipated that total runoff volume will increase slightly from historic conditions. Operational runoff will be contained and controlled via a series of ditches, culverts, a sedimentation pond, and alternate sediment control methods. In general, it is anticipated that better runoff controls, resulting in less sediment leaving the site, will exist during mining than pre mining.

- Surface water from undisturbed areas historically ran downhill to the highway, then flowed parallel to the highway until culvert(s) were encountered wherein the water could cross the highway and continue its path toward Scofield Reservoir. Runoff during operational mining will work in very much the same way with only minor exceptions. First, runoff from areas immediately above the permit area will be diverted by a non-mine access road and two undisturbed area drainage ditches (UDD-1 and UDD-2) which will parallel the eastern permit boundary. Water collected by UDD-1 will flow to the north until it joins UDD-2 which directs water from the north. Water from both undisturbed drainage ditches are then combined and conveyed via culvert UDC-2 through the mine area and discharged to an inlet of an existing highway culvert. From there, undisturbed drainage water is combined with pond discharge water, and conveyed via an existing 36" culvert (CP2) beneath the highway before continuing toward Scofield Reservoir.

- The last minor change involves the construction of an undisturbed area bypass culvert UDC-1 which will convey potential runoff from upland areas, beneath surface mine facilities and the highway, into the Scofield Reservoir drainage system west of the highway.

- Water quality impacts are projected to be similar to other local mine working operations. Historical runoff, and hence quality impacts has been sporadic as evidenced by limited and weathered upland channels. In similar nature, it is anticipated that impacts to water quality will be minor, and limited to major runoff events wherein runoff is sufficient to result in a water discharge from the sedimentation pond. Discharges during these potential extreme events are expected to be in compliance with regulations thus resulting in minimal, if any, negative water quality impact due to mining.

Surface Water Consequences

CR's planned mining and related activities have the potential to generate temporary impacts to surface water resources. These impacts will typically be localized, being confined to those segments of area drainages directly impacted by mining activities, although in some cases impacts may have the potential to also effect downstream drainage areas. The primary mining related activities which may specifically impact surface water resources include:

- Temporary increases in runoff from surface disturbance areas

- Minor reductions in surface flows and alteration of surface flow patterns due to operation of the sedimentation structure

- Changes in surface water chemistry

- Increases in the levels of TDS, TSS, and certain individual chemical constituents

In general, probable hydrologic consequences for surface water resources resulting from CR's mining operations will be limited by the relatively small surface disturbance area near the town of Scofield, and will be effectively mitigated by operation of the drainage and sediment control system and ultimate reclamation of mine disturbance areas. R645-301-521, Affected Areas and Timing of Disturbance, describes the extent of proposed mining related surface disturbance. Probable surface water impacts and their significance relative to the hydrologic system are discussed in the following sections.

Temporary Increases in Runoff from Surface Disturbance Areas - Proposed new mining related surface disturbance will be limited to the mine facilities areas and will involve removal of vegetation and soil/substitute materials and grading of disturbance areas for specific mining related uses. These disturbance activities will reduce infiltration potential and evapotranspiration due to elimination of vegetation and will increase surface runoff and erosion potential. In order to effectively control erosion and increased runoff from disturbance areas, CR will divert runoff from undisturbed upgradient areas around the area of mining disturbance, grade disturbance areas to minimize runoff and erosion, and collect runoff as close as possible to its source and route it to a sedimentation pond for retention and settlement of suspended solids prior to discharge to natural drainages. CR will control and mitigate potential increased runoff from surface disturbance areas using a number of commonly accepted surface management and drainage control practices. Specifically, disturbed areas will be graded to minimize runoff and to the extent operationally feasible surface flow velocities will be controlled through the use of appropriate surfacing materials and runoff will be collected as close to disturbance source areas as possible to minimize erosion and increased sediment loading.

In addition to specific drainage control practices, CR will effectively minimize the area of surface disturbance by keeping all surface facilities within a relatively limited area. Provisions for minimizing mine related surface disturbance are detailed in R645-301-521, Affected Areas and Timing of Disturbance. Increases in runoff from disturbance areas may result in minor increases in stream flows for the receiving drainages, however, any increases will not be significant given the very limited area of surface disturbance relative to total drainage basin areas for the potentially effected drainages. Potential flow increases will also be partially mitigated by operation of the sedimentation pond which will retain disturbed area runoff providing some buffering effect.

As documented in R645-301-731 and on Figure 35, Pond 1 Stage-Volume Curve, total runoff volume for the 10-year, 24-hour storm event for mine facilities disturbance areas is approximately 2.03 acre feet (3.15 acre-foot – 1.12 acre-feet sediment storage). Comparing this runoff volume with a calculated total average annual runoff volume of 6,500 acre feet for the receiving drainage of Mud Creek, it is evident that total runoff from the disturbed area, even under storm conditions, constitutes a relatively small portion of total watershed runoff.

On completion of mining operations, disturbed areas will be reclaimed. Reclamation will involve backfilling and grading, re-establishment of natural drainage patterns, soil/substitute replacement, and re-vegetation. It is anticipated that reclamation will effectively restore infiltration and runoff patterns to approximate the baseline conditions currently existing for the surface disturbance areas.

Minor Reductions in Surface Flows and Alteration of Surface Flow Patterns Due to Operation of the Sedimentation Structure - Although sedimentation ponds are integral to mitigating mining related impacts on the surface hydrologic system, operation of sedimentation ponds tends to reduce discharge flow volumes and extend the period of effective flow for runoff from both snowmelt and thunderstorm events. In effect, sedimentation ponds function as limited capacity flood control structures reducing the effective discharge rate for large volume flows through temporary storage and flow routing. The sedimentation pond is designed to gradually release impounded runoff following required retention for sediment control. Given provisions for retention and gradual discharge of retained storm flows, most of the runoff is returned to the surface drainage system with only a short lag time corresponding to the design retention time for the pond.

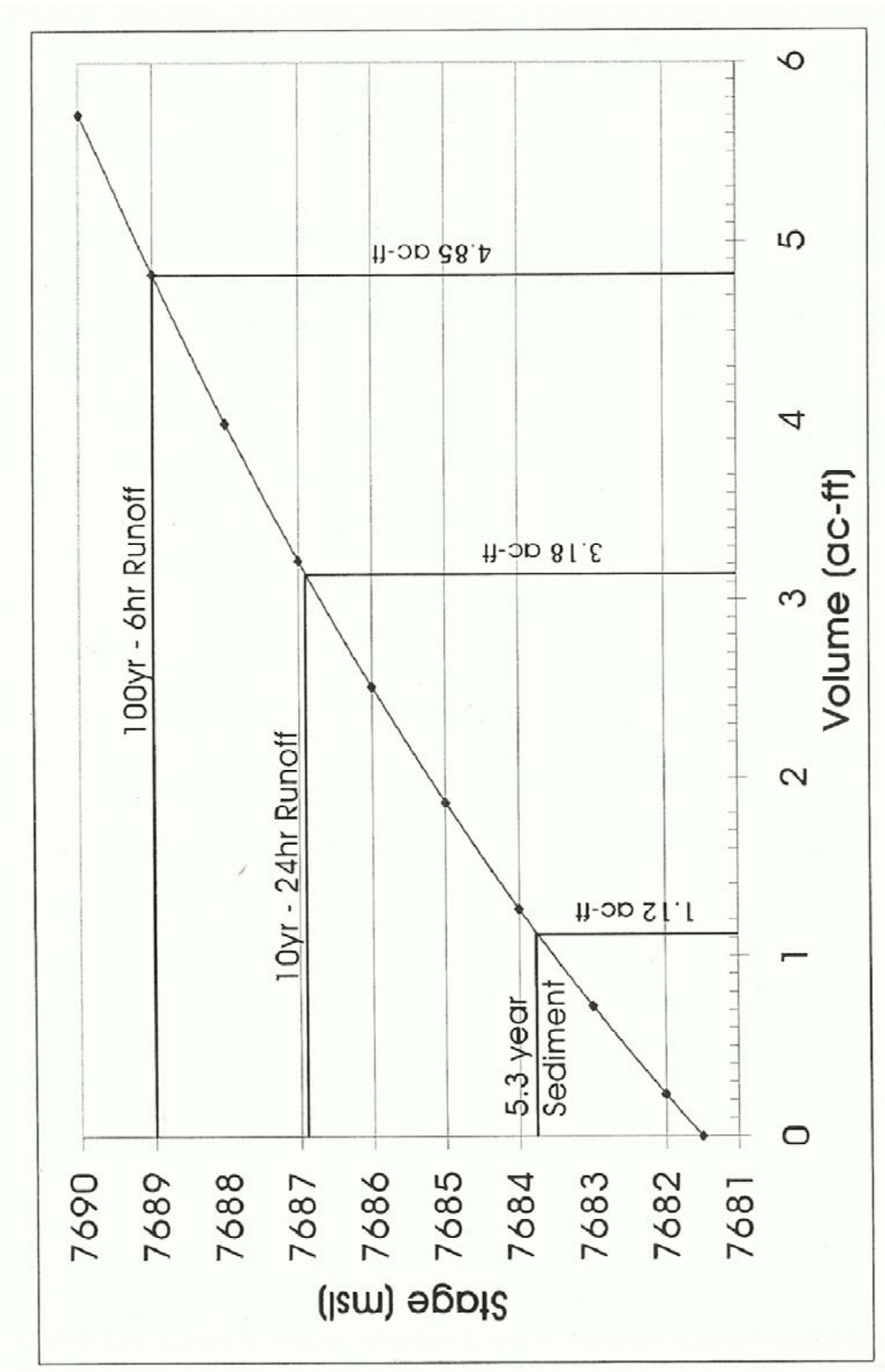
Operation of the drainage and sediment control network, and specifically the sedimentation pond that retain runoff from disturbance areas, has the potential to alter flow patterns in receiving drainages. Because the Kinney Mine operations are located in a relatively arid climate, runoff contributions to most of the drainages occur only as a result of snowmelt and large storm events. As previously noted, the retained runoff volume for the sedimentation pond represents a relatively small percentage of normal flow volumes for the receiving drainage, and should not adversely impact flow volumes even during low flow periods. Additionally, operation of the sedimentation structure will not result in significant discharge delays since the maximum design detention time is only 24 hours for the design storm runoff volume and discharge will be occurring continuously once the pond level reaches the discharge orifices.
The pond has been designed such that discharge structure is above the design sediment level and any runoff accumulations in the pond below this discharge elevation will be retained in the pond as dead storage (note that dead storage will not effect pond capacity since the design sediment storage capacity is being utilized for dead storage). Similar to the pond capacity comparison discussed previously, the design sediment storage volume available for temporary runoff storage represents a negligible amount relative to area stream discharge volumes and so does not constitute a significant potential flow reduction.

Changes in Surface Water Chemistry - Exposure of surficial materials by mining related surface disturbance and contact of disturbed area runoff with these materials may result in changes in runoff water chemistry. Surface water in the mine area is almost exclusively a calcium bicarbonate type. The most probable potential change in runoff water chemistry would be a shift from a strong calcium bicarbonate type toward a sodium sulfate type due to the weathering and leaching of exposed surface coal materials.

CR's proposed surface drainage and sediment control measures, specific limitations on total surface disturbance, and the collection of disturbed areas runoff as close as reasonably feasible to the disturbance source area, will be effective in limiting runoff exposure to surficial materials and consequent leaching. The fact that none of the materials which will be exposed, including overburden, soils, coal refuse, and mine waste materials, have been conclusively documented to be potentially acid or toxic forming is an important factor which will also limit the potential for any significant changes in surface water chemistry. While minor changes in runoff water chemistry may occur as a result of mining and related operations, limited surface disturbance areas and corresponding limited disturbed area runoff volumes will minimize any potential for significant changes in water chemistry for the receiving drainages since disturbed area runoff flows will be buffered by significantly greater volumes of normal runoff from adjacent drainage basin areas.

Increases in the Levels of TDS, TSS, and Individual Chemical Constituents - Similar to the potential mining related impacts discussed above relative to surface water chemistry, contact between disturbed area runoff and surficial materials exposed to weathering and oxidation, may result in increases in TDS and individual chemical constituents in surface runoff flows. In addition, one of the natural consequences of surface disturbance and the minor erosion which results will be increases in sediment loading and TSS levels for the disturbed area runoff. Surface water in the mine area is generally neutral to moderately alkaline with low to moderate levels of TDS, TSS, sulfate, iron, and phenols. Mining and related activities will probably not result in any significant change in surface water pH although TDS, TSS, and sulfate levels may increase slightly in the disturbed area runoff. The same considerations and mitigation measures previously discussed for potential changes in surface water chemistry are also applicable for potential increases in TDS and individual chemical constituents. Potential increases in TSS levels will be effectively addressed on a short-term basis by establishment and operation of the drainage and sediment control system and compliance under the required UPDES permits with applicable monitoring requirements and discharge effluent limitations. Reclamation and restoration of effective surface drainage conditions will address all potential mining and related surface water impacts over the long-term.

Figure 35. Kinney Mine Sedimentation Pond 1 Stage-Volume Curve



R645-301-729 Cumulative Hydrologic Impact Assessment

Ground water impacts resulting from the planned mining and related activities will be minimal due to limited ground water occurrence, low overall permeabilities and consequent limitations on the effective area of influence, and the lack of beneficial ground water use in the area. Similarly, surface disturbance associated with the Kinney mining and related operations will involve such a small area that potential mining related surface water impacts will be negligible. Any potential surface water impacts will be effectively mitigated through effective control of mine water supply withdrawals, operation of a comprehensive drainage and sediment control system, compliance with applicable monitoring requirements and discharge effluent standards under the required UPDES permits, and reclamation of surface disturbance areas and restoration of surface drainage characteristics. In order to fully evaluate potential hydrologic impacts, the cumulative impact of any mining related ground or surface water impacts when combined with potential impacts resulting from other development or land use activities must be considered. Utilizing the information presented in this mining and reclamation plan submittal along with other available information for the general mine area, UDOGM will complete a Cumulative Hydrologic Impact Assessment (CHIA), which on completion will be inserted in Exhibit 17, From UDOGM.

A cumulative impact area for evaluation of potential cumulative ground water impacts will include the permit area along with any upgradient areas which could be impacted by mining related drawdown and downgradient areas which could be impacted by any mining related changes in ground water flow or quality. Given the characteristic low permeability of the geologic sequence, the limited volume and flow of ground water, and the downward dip of the geologic units to the north-east, the ground water cumulative impact area can be defined by the surface disturbance area associated with the mine on the west, UP canyon on the south, Miller Canyon on the north, and Eagle Canyon on the east. Beyond that distance, we believe impacts would be undeterminable. Other activities which could result in possible contributing ground water impacts within this area are believed to be limited to possible contributions from existing abandoned underground mine working in the area.

A cumulative impact area for evaluation of potential cumulative surface water impacts will include the permit and adjacent areas and downstream waters which could be impacted by mining related changes in surface water flows or quality. Given these constraints and the nature of general surface drainage patterns in the area, the surface water cumulative impact area can be defined as a boundary extending on the west from Scofield Reservoir to Eagle Canyon on the east, and from UP canyon on the south to Miller Canyon on the north. There are a number of activities within the cumulative impact area which could result in potential contributing surface water impacts including public access to wildlife and fishing areas, community impacts from the Town of Scofield, private cattle operations and recreation within Eagle, Miller, and other tributary canyons, railroad operations that run along the western border of the permit area, surface runoff contributions from U.S. Highway 96, and mine discharge and surface runoff from historical mining operations in the area.

R645-301-730 Operation Plan

This section describes plans for protection of hydrologic resources, including surface and ground water quantity and quality, and recharge, storage, and discharge relationships, for the permit and adjacent areas that could potentially be affected or impacted by the proposed mining and reclamation activities. Information in this section was developed in accordance with applicable regulatory requirements (R645-301-700) for coal mine permitting in the State of Utah.

Mining and related activities may result in temporary changes in runoff and infiltration characteristics for surface disturbance areas; additional contributions of sediment to surface runoff; ground water drainage to and storage in underground mine workings; some dewatering of perched aquifers and localized dewatering of the regional water table aquifer due to direct mining and indirect subsidence related effects; minor modification of infiltration and recharge characteristics in subsidence areas; and limited localized changes in surface and ground water chemistry and quality. Based on available information, the potential mining related impacts will be localized, temporary, and will not involve any significant long-term adverse impacts. The hydrologic control and mitigation measures proposed in conjunction with mining and related activities should effectively mitigate any potential adverse hydrologic impacts.

As described in R645-301-710 - 724, Hydrologic Information, Carbon Resources (CR) both researched the extensive existing information on the hydrologic environment of permit and adjacent areas and collected additional supplemental hydrologic information in order to accurately characterize existing conditions and develop an overall understanding of hydrologic systems and relationships. The hydrologic protection plans have been developed with consideration of the resource values and relationships described in R645-301-710 - 724 and CR plans for mining and related activities, as outlined in R645-301-201 - 203, 225, 231, 240 – 244, 312 – 358, 421 – 422, 515, 521 – 537, 632, 642, 700, 760 – 765. Operating Plans and Design Criteria. The plans, therefore, reflect site-specific conditions and the nature and extent of anticipated mining related impacts in order to assure effective compliance with the following applicable regulatory requirements and consistency with overall environmental objectives:

- Minimize disturbances to the hydrologic balance
- Prevent material damage outside of the permit area
- Support the approved post-mining land use(s)
- Comply with applicable provisions of the Clean Water Act
- Meet applicable Federal and State water quality regulations

Detailed discussions of specific potential impacts and proposed control and mitigation measures are presented in the following sections.

R645-301-728.320 Presence of Acid or Toxic Forming Materials

This issue is dealt with in Chapter 6, R645-301-624.

R645-301-731.400 Transfer of Wells

Before bond release, exploration holes or monitoring wells will be sealed in a safe and environmentally sound manner as discussed in response to R645-301-738, and 765 in the document. If any well is proposed to be transferred to any other person or entity, CR will seek approval of the Division prior to any transfer. Any transfer will comply with all Utah and local laws, and CR will be responsible for the wells until bond release in accordance with R645-301-529, 551, 631, 738, and 765.

Contamination, Diminution, or Interruption of Ground or Surface Water Sources with Current Beneficial Use Within the Permit and Adjacent Areas

Within the Kinney Mine area, only the off-site alluvial/colluvial aquifer system and the perched aquifer systems yield adequate quantities of ground water of suitable quality for beneficial use, and use within the permit area is limited to small scale seasonal stock watering. As discussed in R645-301-710 - 724, Hydrology Description, under the subheading Water Rights and Replacement, and in R645-301-728.310, Potential for Adverse Affects, CR's mining and related operations are not expected to adversely impact any surface or ground water rights. Consequently, there is no need to explicitly address provisions for replacement of impacted water rights at this time. In the unlikely event, however, that proximate contamination, diminution, or interruption does occur, CR will mitigate these impacts through the purchase and augmentation of effected water rights, monetary compensation, development of alternative watering facilities such as guzzlers, or other appropriate mitigation measures. The amount of water owned by CR (two shares of Scofield reservoir water rights)is believed adequate to mitigate any potential impacts to beneficial water use as a result of potential consequences to the hydrologic balance. The primary postmining land use in the mine, loadout, and adjacent areas will be wildlife habitat, requiring minimal supporting water requirements, consistent with existing demands. The discussions presented in R645-301-710 - 724, Hydrology Information, indicate that while surface and ground water resources are limited in areas affected by the Kinney Mine operations, they will be adequate in terms of both quantity and quality to support the proposed postmining use.

R645-301-731 Hydrologic-Balance Protection

Components of the Hydrologic Protection Plans

The hydrologic protection plans outline specific measures for the Kinney Mine that will be taken to:

- Avoid acid or toxic drainage
- Prevent additional contributions of suspended solids to area drainages
- Control runoff and erosion
- Protect or replace affected water rights
- Restore approximate pre-mining recharge capabilities

Specific prevention, control, and mitigation measures will include limiting the area of surface disturbance; construction, operation, and maintenance of an effective drainage and sediment control system; controlled collection, storage, use, and recycling of mine drainage; and effective reclamation of surface disturbance areas and restoration of surface drainage patterns. In addition to descriptions of specific hydrologic control and mitigation measures, compliance with specific applicable design standards and requirements are addressed, and potential adverse hydrologic consequences specific to the site are identified in the Probable Hydrologic Consequences (PHC) determination prepared under R645-301-728.

In order to minimize potential mining related impacts to existing hydrologic systems in the permit and adjacent areas, CR has incorporated specific monitoring, operational, and mitigation measures into the mining and reclamation plans for the Kinney Mine. These measures are based on historic and baseline monitoring information for the site, modeling of hydrologic systems, the experience of similar mining operations in controlling hydrologic impacts, applicable regulatory requirements, and the results of ongoing monitoring programs. Historic and baseline monitoring data have been used to characterize current hydrologic conditions as described in R645-301-710 - 724, Hydrologic Information. During the operation of the mine, monitoring will be performed to determine if any mining-related impacts to the hydrologic balance have occurred and remedial actions taken, if necessary. Measures that may be taken to remediate any mining-related impacts to the hydrologic balance are addressed in the hydrologic restoration plans presented in R645-301-700 - 765, Hydrologic Resource Restoration.

Operational plans for the Kinney mine include standard hydrologic controls and mitigation measures that are designed to prevent significant changes in the quantity and quality of surface and ground water resources, preserve existing hydrologic functions, comply with regulatory requirements, and limit adverse impacts to surface water or ground water users. These measures include:

- Limiting surface disturbance areas
- Proper design, construction, and grading of facilities areas and roads
- Construction of drainage and sediment control structures to divert undisturbed runoff around disturbance areas, collect and route disturbed area runoff to sedimentation ponds to allow settlement of suspended solids, and provide any treatment which may be necessary to meet applicable discharge effluent limitations
- Interim re-vegetation of disturbed cut and fill slopes not used for operations and re-vegetation of topsoil stockpiles, pond outslopes, alternate sediment control areas, and other unused areas.
- Utilization of localized erosion control measures, as appropriate, in any areas having high erosion potential
- Initiation of reclamation operations as soon as practical following completion of mining
- Effective reclamation to minimize gradients, re-establish surface drainage patterns, restore pre-mining runoff and infiltration characteristics, and establish an effective and self-sustaining vegetative cover.
- Post-reclamation land use management

CR has incorporated specific control and mitigation measures in mining, processing, and reclamation plans in order to prevent any significant impacts on surface or ground water quantity and quality. All mining related activities including soil/substitute removal, mine development, coal recovery, mine sealing, backfilling and grading, soil/substitute replacement, and re-vegetation are designed and sequenced to minimize disturbance and progress in a logical manner towards effective restoration of disturbed areas to a condition and configuration consistent with conditions which existed prior to development of the Kinney Mine and applicable regulatory provisions for remining of previously disturbed areas. The following sections discuss the details of the various components of the hydrologic protection plan.

R645-301-731.110 Ground Water Protection

CR has incorporated specific control and mitigation measures in the proposed mining, processing, and reclamation plans to effectively prevent or minimize significant mining related impacts on groundwater quantity, quality, and recharge, storage and discharge relationships. Ground water systems will be protected by limiting surface disturbance and mining related subsidence both of which can alter runoff and infiltration characteristics; controlling mine drainage and recycling any significant mine inflow volumes in the operational mine water system; handling earth materials, mine drainage, and runoff in a manner that minimizes acidic, toxic, or other harmful infiltrations to groundwater; and managing excavations and other disturbances to prevent or control discharge of pollutants to the ground water system.

CR's mining operations and related activities have the potential to effect ground water quantity through limited inflows to the mine workings from the subsidence of local perched aquifer systems, and the alteration of surface infiltration characteristics. Mining within a regional aquifer is not anticipated. Although believed to be minor (due to the general lack of water identified within the planned mining area) mining and related operations may also effect ground water quality by modifying ground water chemistry, altering pH, and increasing concentrations of TDS and specific chemical constituents. Specific activities which may potentially impact ground water quantity and quality include the following:

- Underground coal removal
- Retention of drainage in sedimentation pond structures

Operational measures that will be implemented to mitigate these impacts are discussed below.

Underground Coal Removal

CR's planned underground mining operations may result in passive drainage requiring handling of mine inflows from proposed mine workings. Potential ground water inflow sources include the stratigraphic units directly disturbed by mining, and the overlying perched aquifer system due to downward leakage through fractures. According to information available, historic mining operations located within the general Kinney mine permit area did not encounter significant quantities of water, and it is anticipated that mine inflows may be limited. Any significant mine inflows encountered will be collected and routed to either abandoned (inactive) mining areas or temporary underground storage areas for recycling to the operational mine water system. As mining proceeds, any significant disturbance has the potential of fracturing the natural seals supporting local perched aquifers, resulting in the localized release of perched water. Following the cessation of mining, mine inflows and outflows will stabilize as water collects within down gradient abandoned mine sections.

Specific mine design and operation including layout and sizing of mine openings based on retention of barrier pillars and first mining only, with no pillar extraction, is projected to prevent subsidence. Mine design and operational control measures, when combined with mining depth should eliminate fracture propagation at or near the ground surface in areas overlying the underground workings, effectively prevent the drainage of perched aquifers and alteration of surface infiltration characteristics.

Underground mining operations will expose coal, floor, and roof materials to oxidation and increased leaching as mining is completed and working areas are abandoned. Natural caving will also expose substantial quantities of broken coal and roof material to oxidation, and although not anticipated, by the leaching of local groundwater. It is anticipated that pH may increase slightly and the local ground water chemistry may evolve toward a sodium sulfate water type with increases in TDS and certain mineral constituents including iron and manganese. A similar evolution appears to have occurred within Mud Creek as upstream mining and transport has advanced. In order to effectively prevent or mitigate these impacts, underground mining operations will be limited to development and disturbance of the minimum area necessary to provide for effective coal extraction. CR will also keep all development (except ramping and overcasts) in the minable coal seams to the extent operationally practical. While there will undoubtedly be some impacts on localized ground water quality, these impacts will generally be confined to the mine and immediately adjacent areas by the relatively low flows and volumes of water historically encountered as we as due to the low permeability of the geologic units and the limited hydrologic connection with other more permeable units.

Minor changes in ground water quality will not affect any ground water users since all existing ground water use in the immediate area is limited to units which are stratigraphically above the interval to be mined, and since no mine water discharge is anticipated following the closure and sealing of the mine. It should be noted that anticipated changes in ground water quality are anticipated to be relatively small and localized, and not so significant as to preclude beneficial use of affected ground water resources. This contention is supported by historic monitoring data for other Central Utah mines which receive some mine water drainage from old mine workings while showing no significant adverse long-term effects.

Surface Placement of Coal, Mine Waste

Surface placement of coal has the potential to affect ground water quantity and quality as a result of increased runoff from the associated disturbance areas and from the subsurface infiltration and leaching of the stockpiled materials. The great majority of leachate from the stockpile will be conveyed via the surface water runoff control system to the sediment pond located at the downstream end of the disturbed mine area.

Coal mine rock from fault crossings will be placed in developed entries and cross cuts specifically designated for that purpose. There is no mine rock anticipated to be placed on the surface other than that which comes out with the coal stream and will be shipped as part of the coal product. No wash plant is planned and therefore no coal refuse will be generated as part of the mining operation. However, per the Divisions Request a "Small Mine Development Rock Waste Pile" as shown on Map 13 (Surface Facilities) has been designed to accommodate the possibility that a small amount of rock waste may be generated during development and make it to the surface coal handling facilities. This "Small Mine Development Rock Waste Pile" will be drained to the sediment pond.

Analyses of both actual existing and potential future coal materials, including incidental roof and floor rock, are described in R645-301-623 - 627, Coal and Overburden/Interburden Characteristics. Based on analyses of coal, roof, and floor samples, in a washability study, overall sulfur content is moderate to low with organic sulfur as the dominant form. Buffering capacity is relatively high due to the presence of significant quantities of calcium carbonate. Consequently, the overall acid-producing potential from this mine is low. Similarly, chemical analyses indicate low concentrations of most potentially toxic components, including a low alkalinity potential.

Available analysis results for existing surficial mine waste and stockpiles, which have been in place a number of years and have had ample opportunity to weather and oxidize, offers an expanded and probably more accurate perspective of potential water quality impacts than chemical analysis results for fresh coal, roof, and floor samples. The weathered reclaimed coal samples show no significant acid. alkaline, or toxicity potentials. Leaching of mine waste and coal refuse materials has the potential to cause a shift in the ground water chemical type towards a sodium sulfate water type and may also cause minor increases (quantify) in concentrations of iron, manganese, and TDS.

With reference to the potential impacts of surface coal placement on ground water quantity and quality, similar considerations apply to coal stockpiling in the mine, process, and loadout areas. Stockpile areas will be constructed to provide effective drainage of both runoff from stockpile surfaces and infiltration through coal stockpiles. Runoff from stockpile areas will be collected and routed to nearby sedimentation ponds. CR will also limit stockpiled coal inventory for operational and environmental reasons.

Limited inventory results in rapid stockpile turnover, which minimizes the potential for weathering or leaching of coal materials.

Retention of Drainage in Sedimentation Pond Structures

CR will utilize a single sedimentation pond and associated drainage structures to intercept and route runoff from disturbed areas, retain runoff for sediment control, and to control discharges to stream drainages. Map 23, Drainage and Sediment Control Plan – Undisturbed Drainage Areas, Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas, and Map 25, Sedimentation Pond 1 – Section and Details, provide information related to the identification and control of surface water runoff. The regional drainage basins identify those undisturbed areas not tributary to the mining operation and their discharge locations. The drainage and sediment control plan provides specific ditch, culvert, erosion control, and pond design information and locations used to controls runoff within the active surface mining area. Operation of the sedimentation pond has some limited potential to affect both ground water quantity and quality by altering the timing and volume of discharge flows, providing additional recharge to alluvial/colluvial ground water systems, causing changes in water chemistry, increasing TDS levels, decreasing TSS levels and increasing the concentrations of specific mineral components.

Disturbed area runoff flowing into the sedimentation pond will be retained to allow suspended sediment to settle out prior to discharge to the downstream natural drainage. During the time that water is retained in the sedimentation structure, some evaporation will occur, resulting in reduction of overall water volume and inherently increasing concentrations of TDS and individual chemical constituents. Since the proposed sedimentation pond is located in lowland areas, any infiltration losses through the bottom of the ponds will have similar effects on surface discharge volumes and chemical characteristics. Any changes in surface water quality or chemistry have the potential to effect groundwater resources since surface flows are a component of the limited down-gradient groundwater recharge.

Effects of evaporation will be minimized by limiting detention time in the sedimentation structure to that interval required for effective reduction of suspended solids. Because runoff typically occurs only in response to snowmelt and major storm events, evaporation will be further limited by cold temperature during spring when the majority of snowmelt occurs. Pond design, as outlined in Exhibit 16, Runoff Control Design Details, provide for both minimal detention times and effective pond routing so any delay in discharge to the receiving drainages will be limited to the maximum detention time of 24 hours. With pond routing, discharge will occur continuously once the water reaches the discharge orifice and 25-Year overflow discharge elevation so effects on downstream flows will likewise be minimal.

Infiltration will similarly be limited by minimal detention times, by compaction of the pond base during construction, and accumulations of fine suspended solids which tend to further limit overall base permeability. In addition, the pond bottom will be covered by a reinforced concrete floor as shown on Map 25 to allow equipment to clean the pond without bogging down in the base materials. Both TSS, and TDS and various chemical constituents tend to accumulate in the sediment in the bottom of sedimentation ponds due to natural settling and chemical precipitation. Regular periodic removal of sediment accumulations from the sedimentation ponds will eliminate a significant source of concentrated TDS and other constituents, minimizing TDS and chemical buildup. CR will monitor sedimentation pond discharge in order to detect any significant changes in surface water quality. If significant changes are noted, CR may, with consultation from the UDOGM, develop and implement appropriate water treatment plans.

Upon completion of mining, all mine disturbance areas will be reclaimed. Reclamation and establishment of effective vegetative cover will minimize disturbed area runoff to the sedimentation pond, limiting potential effects of surface leaching and evaporation. Reclamation will also result in restoration of natural drainage and direct discharge to the receiving drainages once the sedimentation pond is removed at the end of the extended liability period. Given this consideration, any potential ground water impacts will be both limited in scope and of a temporary nature.

R645-301-731.120 Surface Water Protection

As a surface water reservoir located adjacent to the mine surface disturbance area, special protection measures will be required relative to Scofield Reservoir to prevent or mitigate potential adverse impacts on associated hydrologic, aquatic, fisheries, and riparian habitat and resource values. It is important to note that Mud Creek, the major perennial surface water drainage, does not come into direct contact with any portion of the mine permit area. Surface runoff from mined or disturbed areas are not directly tributary to Mud Creek, but are tributary to Scofield Reservoir. The existing Scofield Reservoir and the associated environmental conditions and values reflect the effects of the previous historic disturbance.

Specific protection measures to be implemented for Scofield Reservoir within and adjacent to the surface facilities area will include establishment and maintenance of runoff control ditches and culverts, grading of surface disturbed areas, the installation of erosion protection in appropriate ditches and hillslopes, and the construction of a runoff control sedimentation pond. Scofield Reservoir will be protected from direct or indirect mining construction, operation, and maintenance or impacts via an effective drainage and sediment control system.

Mapping of Hydrologic Resource Protection Information

Information presented on mapping included within this permit addresses hydrologic protection issues including:

- Receiving surface water drainages
- Diversion, collection, treatment, storage, and discharge facilities and structures

- Water monitoring locations and elevations
- The proposed sedimentation pond impoundment and coal processing waste embankments
- Cross-sections for sedimentation ponds, impoundments, and coal processing waste embankments

CR has incorporated specific control and mitigation measures in the proposed mining, processing, and reclamation plans to effectively prevent or minimize significant mining related impacts on surface water quantity and quality. Surface water systems will be protected by limiting surface disturbance; controlling surface runoff and erosion; handling earth materials, any ground water discharges, and runoff in a manner that minimizes the formation of acidic or toxic drainage, prevents additional contributions of suspended solids to stream flow outside of the permit area, and otherwise prevents pollution of surface water. Surface water treatment facilities needed to protect surface water are not anticipated.

CR's mining operations and related activities have the potential to effect surface water quantity through modification of surface runoff characteristics and increased sediment contributions from surface disturbance areas; consumptive use of surface water for mining and processing operations; and discharge of sediment and other potential pollutants from mining related surface activities. Mining and related operations may also effect surface water quality by modifying surface water chemistry, altering pH, and increasing concentrations of TSS, TDS, and specific chemical constituents. Specific activities which may potentially impact surface water quantity and quality include the following:

- Removal of vegetation and soil materials from disturbance areas
- Surface placement of coal
- Mine water supply withdrawals
- Operation of drainage and sediment control structures

Operational measures that will be implemented to mitigate these impacts are discussed below.

Removal of Vegetation and Soil Materials from Disturbance Areas

In order to conserve available soil resources, vegetation and soil materials will be removed from all mine facilities areas prior to disturbance. While beneficial in terms of soil conservation and provision of a suitable growth medium to support final reclamation and revegetation efforts, this practice exposes underlying materials to potential erosion and loss, can increase suspended sediment levels in the runoff water, and may increase sediment contributions to area drainages. To maintain effective surface drainage, mitigate erosion, prevent loss of surficial materials, and minimize additional contributions of suspended solids to area drainages CR will route undisturbed drainage around disturbance areas, grade and stabilize disturbed areas to provide for effective drainage control, establish a drainage and sediment control network to collect and retain runoff from disturbed areas, reclaim disturbance areas as soon as operationally practical, and utilize other specific localized drainage and erosion control methods as necessary. These activities are discussed further in the following sections.

In conjunction with mine development, facility installation, and ongoing coal refuse placement, CR will grade, stabilize, and maintain all disturbed areas to provide for effective drainage and minimize potential erosion. Where appropriate, CR will utilize localized grading and stabilization measures to effectively control and route drainage and minimize flow velocities. Examples would include graveled surfaces and the yard area drainage system in the mine facilities area;

temporary sumps and ditches in active coal refuse placement areas; and the placement of drainage control berms which will isolate disturbed area drainage in the Kinney Mine loadout area.

Localized drainage control and grading measures will be supplemented by CR's drainage and sediment control network. This network consists of diversion ditches which route undisturbed runoff around or through disturbance areas, collection ditches which intercept disturbed area runoff and route it to the sedimentation pond, the sedimentation pond, and associated discharge structures. Design information and calculations are provided in Map 23, Drainage and Sediment Control Plan Map – Undisturbed Drainage Areas, Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas, Map 25, Sedimentation Pond 1 – Section and Details, and by Exhibit 16, Runoff Control Design Details. Design details regarding runoff hydrology, ditches, culverts, energy dissipation, and the sedimentation pond are included within Exhibit 16, Runoff Control Design Details. The drainage and sedimentation control network will collect and retain disturbed area runoff allowing settlement of suspended solids and any necessary treatment prior to release to natural drainages. The sedimentation pond will be operated under applicable provisions of CR's UPDES discharge permit. Compliance with the terms of these permits will assure that downstream water quality impacts are minimized.

Basic components of the drainage and sediment control plan follow:

- Undisturbed area runoff within the main drainage channel located toward the south end of the operation area will be conveyed beneath the mine surface facilities and across Highway 96 via culvert UDC-1.

- Undisturbed area runoff control ditches (UDD-1 and UDD-2) located along the eastern edge of the disturbed area is part of a property access road constructed for the property owner. A check of the road cross section shows that discharges from the up-gradient undisturbed area can be safely conveyed to a culvert (UDC-2) that conveys the undisturbed area runoff beneath the mine site to an existing 36" culvert located beneath Highway 96. Water conveyed beneath Highway 96 is then discharged onto an energy dissipation pad before continuing toward Scofield Reservoir.

- A series of operation pads and runoff control ditches and culverts. In general terms, storm water tributary to each operation pad is controlled and directed to the back of the pad, then conveyed toward a runoff ditch or culvert which in turn conveys the water to a downstream pad, ditch, or culvert. Specifics related to each runoff segment and any variances follow. A visual reference for the runoff system described is shown on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas.

- Portal Pad (Pad A) runoff flows to ditch DA-1, to the Coal Pile Pad (Pad B). Water enters culvert CB-1, goes beneath the coal stockpile, then enters a junction box connected to culvert CB-2. Culvert CB-2 discharges to ditch DC-2, to ditch DC-3, joins with ditch DC-4, is conveyed under the adjacent property owner access road via culvert CC-1, to ditch DC-5, then goes into Pond 1 via ditch DC-6.

- Storage Pad (Pad D) runoff combines with road ditch DD-1 and road ditch DD-2, goes through culvert CD-1, to ditch DD-3, joins with Pad D runoff, enters culvert CD-2 to Pad E and ditch DE-1, joins with road ditch DE-2, enters culvert CE-1, then enters Pond 1 via ditch DE-4.

- Office Pad (Pad F) drainage enters ditch DF-3 where it joins with road ditch DF-1 before entering culvert CF-1, joins with road ditches DF-2, goes to ditch DF-4, joins with road drainage and road ditch DF-5 via the cattle guard, goes to ditch DE-3, joins with culvert CE-1, then enters Pond 1 via ditch DE-4.

- Surface runoff flows from the small area between ditch DE-3 and the highway along the north side of the main access road P1, flows in ditch ALT C-1 into the sediment trap and then north, in the existing highway ditch. Runoff from the small area along the south side of the main access road below Pad F flows in ditch ALT B-1 into the sediment trap and then south in the existing highway ditch. This flow combines with additional flows from the topsoil stockpile area (conveyed in ditches ALT A-1 and ALT A-2 along the berm and passing through a silt fence) which are conveyed across the highway through an existing culvert.

- Topsoil stockpile areas (west of the Sediment Pond No. 1 on the west side of the highway) drainage is not enough to require ditches. Silt Fences will be installed around these stockpile areas.

- Irrigation bypass culvert IBC-1 will be installed under the topsoil stockpile area located between the highway and Pad F. The downstream culvert that historically conveyed the corresponding irrigation and runoff flows across the highway, is a 24-inch diameter pipe. The new irrigation culvert IBC-1 was conservatively designed to be a 30-inch diameter pipe. The capacity of the new 30-inch diameter culvert IBC-1 was verified for both inlet and barrel control conditions, to be greater than the capacity of the existing 24-inch diameter pipe downstream.

- Ditch and culvert design details including design criteria, flows and other appropriate information is provided in Table 18, Ditch Design Details and Table 19, Culvert Design Details. Figure 35, Pond 1 Stage-Volume Curve provides data regarding pond volume. Map 24, Drainage and Sediment Control Plan – Undisturbed Drainage Areas and Map 26, Drainage and Sediment Control Plan – Disturbed Drainage Sub Basins, have been prepared to show runoff drainage areas represented in Table 19, Culvert Design Details.

All areas disturbed by mining and related operations will be reclaimed as soon as operationally practical following completion of mining. Reclamation will involve removal of mine structures and facilities, backfilling and regrading disturbance areas, replacement of soil and substitute materials, and revegetation. These activities are designed to re-establish drainage patterns similar to those which existed prior to development of the Kinney Mine and develop a self-sustaining vegetative community. As a result of effective reclamation, infiltration and runoff relationships will be restored, limiting the time interval over which water quality impacts may occur. Where appropriate, CR will utilize drainage control measures to prevent or mitigate potential impacts from ongoing operations. Such measures may include use of surface binders and dust suppressions agents on haulage roads, soil/substitute stockpiles, and in active working areas the placement of straw bales, sediment fence, erosion netting, mulch berms, stilling basins, sumps and other small structures to control and route drainage, limit surface erosion, minimize flow velocities, and reduce suspended sediment levels.

Surface Placement of Coal, Mine Waste

Surface placement of coal, mine waste, may effect surface water quantity and quality in several ways. Surface runoff from the related disturbance areas may increase resulting in increased erosion and sediment loss, and surface flows may infiltrate through stockpiled materials generating leachate with both sediment laden runoff and leachate potentially discharging to surface drainages. Although believed to be of minimal impact, Leachate not collected by an underdrain system may impact ground water, which may later discharge to the sedimentation pond or to the alluvial/colluvial aquifer.

Coal stockpile areas will be constructed to provide effective drainage of both runoff from stockpile surfaces and infiltration through coal stockpiles. Designed ditches will collect and route runoff from coal stockpile areas to the sedimentation pond. The locations of the designed ditches and sedimentation pond on disturbed mine areas are shown on Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas, Map 25, Sedimentation Pond 1 – Section and Details, and detailed design calculations are presented in Exhibit 16, Runoff Control Design Details. CR will also limit stockpiled coal inventory for operational and environmental reasons. Limited inventory results in rapid stockpile turnover, which minimizes the potential for weathering or leaching of coal materials.

Operation of the sedimentation pond for the coal stockpile area under CR's UPDES permits will assure compliance with applicable water quality regulations and effectively mitigate any potential surface water quality impacts.

Coal stockpile areas will be reclaimed as soon as operationally practical after they are no longer required to support ongoing mining and related operations. The initial step in reclamation of coal stockpile areas will involve removal of stockpiled coal materials and any associated structures. Subsequent reclamation of the coal stockpile area will involve removal, re-grading of the disturbance areas to the final design configuration, replacement of soil and substitute materials, and re-vegetation. These activities are designed to establish effective surface drainage, stabilize the affected areas, and develop a self-sustaining vegetative community.

Discharge of Mine Water to Surface Drainages

No surface discharge of mine water is anticipated. Direct and/or indirect drainage from any perched aquifers intercepted by fractures may serve as potential sources of ground water inflow to the Kinney Mine workings. In order to facilitate ongoing mining operations and assure safe operating conditions, CR will collect any significant mine inflows and transfer the resulting mine drainage to either abandoned mining areas or temporary underground storage areas. If sufficient quantities of mine drainage are available, stored mine drainage will be utilized to supplement the operational mine water supply. Plans for handling mine drainage are described in R645-301-521 - 531, General Description of Mine Plans, Mining Methods, and Related Design Requirements.

Table 18. Ditch Design Detail

TABLE 18 - Ditch Design Details

Drainage Ditch	10yr-6hr Design Flow (cfs)	Side Slope m1 (H:1)	Side Slope m2 (H:1)	Ditch Slope Max (%)	Ditch Slope Min (%)	Manning's n	Max Velocity (fps)	Flow Depth (ft)	Freeboard (ft)	Minimum Ditch Depth[1] (ft)	Bottom Width (ft)	Top Width (ft)	Riprap D_{50}[2] (inches)	Grout (yes/no)
DA-1	0.6	2	2	14.0	5.0	0.02	6.64	0.32	0.48	0.8	0.0	3.2	0.25	Yes
DC-1	1.0	2	2	0.5	0.5	0.02	1.90	0.32	0.48	0.8	1.0	4.2	n/a	No
DC-2	2.9	2	2	15.0	0.6	0.02	8.68	0.52	0.48	1.0	1.0	5.0	0.25	Yes
DC-3	2.9	2	2	0.8	0.8	0.02	3.05	0.48	0.52	1.0	1.0	5.0	n/a	No
DC-4	1.0	2	2	9.3	9.3	0.02	5.86	0.29	0.51	0.8	0.0	3.2	0.25	Yes
DC-5	2.9	2	2	0.8	0.8	0.02	3.01	0.49	0.51	1.0	1.0	5.0	0.25	Yes
DC-6	3.5	2	2	12.3	12.3	0.02	8.88	0.44	0.46	0.9	0.0	3.6	0.25	Yes
DD-1	0.2	2	2	3.8	3.8	0.02	2.8	0.19	0.51	0.7	0.0	2.8	n/a	No
DD-2	0.2	2	2	13.0	13.0	0.02	4.44	0.15	0.55	0.7	0.0	2.8	0.25	Yes
DD-3	0.3	2	2	3.8	3.8	0.02	3.10	0.22	0.48	0.7	0.0	2.8	n/a	No
DE-1	0.6	2	2	0.9	0.9	0.02	2.15	0.37	0.53	0.9	0.0	3.6	n/a	No
DE-2	0.2	2	2	2.0	2.0	0.02	2.18	0.21	0.49	0.7	0.0	2.8	n/a	No
DE-3	4.1	2	2	1.0	1.0	0.02	2.55	0.53	0.47	1.0	2.0	6.0	n/a	No
DE-4	4.2	2	2	1.0	1.0	0.02	2.57	0.53	0.47	1.0	2.0	6.0	n/a	No
DF-1	0.4	2	2	14.3	3.3	0.02	5.47	0.25	0.55	0.8	0.0	3.2	0.25	Yes
DF-2	0.4	2	2	6.1	6.1	0.02	3.97	0.22	0.48	0.7	0.0	2.8	n/a	No
DF-3	1.3	2	2	10.0	10.0	0.02	6.42	0.32	0.48	0.8	0.0	3.2	0.25	Yes
DF-4	1.7	2	2	5.7	5.7	0.02	5.56	0.39	0.51	0.9	0.0	3.6	0.25	Yes
DF-5	1.7	2	2	5.7	5.7	0.02	5.56	0.39	0.51	0.9	0.0	3.6	0.25	Yes
ALT A-1	0.4	2	2	4.7	4.7	0.02	3.60	0.24	0.56	0.8	0.0	3.0	n/a	No
ALT A-2	0.4	2	2	4.7	4.7	0.02	3.60	0.24	0.56	0.8	0.0	3.0	n/a	No
ALT B-1	0.2	2	2	14.3	5.3	0.02	4.60	0.18	0.52	0.7	0.0	2.7	0.25	Yes
ALT C-1	0.2	2	2	14.3	5.3	0.02	4.60	0.18	0.52	0.7	0.0	2.7	0.25	Yes
UDD-1	9.4[3]	50	4	7.0	7.0	0.02	5.18	0.26	0.00	0.26	0.0	15.0	n/a	n/a
UDD-2	9.4[3]	50	4	7.0	7.0	0.02	5.18	0.26	0.00	0.26	0.0	15.0	n/a	n/a

1 - Includes 0.5 foot freeboard.
2 - Maximum riprap size is 1.5 times D_{50}. All Riprap to be installed over 1.0 foot Type II Granular Filter.
3 - 100 Year, 6 Hour runoff.

TABLE 19. – Culvert Design Details

Culvert	Tributary Sub-Basins[1]	Area (acre)	Weighted CN	Peak Flow (CFS)	Total Design Flow (CFS)	Diameter (in)
CB-1	A1	4.09	83	0.9	2.0	18
	B1	3.50	86	1.1		
CB-2	A1	4.09	83	0.9	2.0	18
	B1	3.50	86	1.1		
CC-1	A1	4.09	83	0.9	2.9	18
	B1	3.50	86	1.1		
	C1	4.18	84	1.0		
CD-1	D2	1.97	79	0.2	0.4	18
	D3	1.34	80	0.2		
CD-2	D1	2.79	81	0.3	0.6	18
	D2	1.97	79	0.2		
	D3	1.34	80	0.2		
CE-1	D1	2.79	81	0.3	2.4	18
	D2	1.97	79	0.2		
	D3	1.34	80	0.2		
	E1	4.44	88	1.6		
	E2	1.68	82	0.2		
CF-1	F1	3.72	87	1.3	1.7	18
	F2	1.27	85	0.4		
UDC-1	UDC-1	99.37	75	14.3	14.3	30
UDC-2	UDD-1, UDD-2	64.96	75	9.4	9.4	24
CP-1	Pond 1 100 Yr, 6 Hr Discharge			22.5	22.5	24
CP-2	UDD-1, UDD-2	64.96	75	9.4	33.8	42
	Pond 1 100 Yr, 6 Hr Discharge			22.5		
	G1	4.56	78	1.9		
IBC-1[2]	N/A	N/A	N/A	N/A	10.4	30

1 - See Map 23, Drainage and Sediment Control Plan – Undisturbed Drainage Areas, and Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Sub Basins.

2 - Conservatively designed according to the capacity of the existing 24-inch diameter pipe crossing the highway and checked to verify adequacy under both inlet and barrel control conditions (see calculations in Exhibit 16 – Ditches and Culverts)

Based on preliminary estimates of anticipated mine inflow volumes and mine water use requirements, it is anticipated that all mine inflows can be either recycled through the operational mine water system or stored underground. The previous discussion in R645-301-731.110 - 112, Ground Water Protection Measures, indicated that based on available sampling data mine water, no mine water discharges are expected. If it becomes necessary to discharge any excess mine drainage to the surface, a revision to the mine permit will be made and coordinated with the Division.

Mine Water Supply Withdrawals

-Mining, related coal processing operations, and support activities will require a consistent water supply with adequate capacity to meet all operational mine water supply requirements. Potable and sanitary water requirements will be provided through a water supply connection to the existing Scofield Town water system located adjacent to the mine site. Mine water requirements will be supplied from Scofield Town via Mud Creek, and from possible water sources encountered during mining, which are anticipated to be small.

Recycling of in-mine drainage to supplement the operational mine water system will help reduce water supply requirements. Dependent on the actual rate of mine inflows, mine drainage could provide the water required for dust control applications in the underground operations. CR plans to construct a surface mine water storage tank and may be able to develop additional mine water storage capacity in inactive areas of the underground mine workings. This storage capacity may be utilized to good advantage during seasonal low flow periods to limit required stream withdrawals. CR's existing water rights provide additional water supply capacity beyond that acquired from Scofield Town.

Coal Preparation Activities

-No coal preparation activities are planned, only inadvertent, per narrow interpretation of the regulations, during stacking, transferring and loading coal.~~planned.~~

Operation of Drainage and Sediment Control Structures

-The Kinney Mine drainage and sediment control network is designed to function as the primary mitigation system to prevent significant impacts on surface water quality. Operation of the sedimentation pond may, however, result in some delay in water discharge to the receiving drainages potentially altering discharge volume and consequently streamflow entering Scofield Reservoir, and may increase concentrations of TDS and other constituents in the runoff retained in the pond due to evaporation. Both delays in discharge and potential evaporative effects and related mitigation considerations were previously discussed in R645-301-731.110 - 1124.7.2.1, Ground Water Protection Measures. Significant overall increases in TDS and other chemical constituents for the receiving drainages are not expected because runoff volumes from disturbed areas will be limited by upstream diversion of undisturbed drainage, surface disturbance areas will be of limited size, and reclamation of disturbance areas will be occurring. CR will monitor all discharges from the sedimentation structure to ensure compliance with UPDES requirements. If problems are noted with TDS or any other discharge constituent, CR will coordinate with the regulatory agency regarding acceptable solutions to effectively control and mitigate the problems.

Mine disturbance areas will be reclaimed on completion of mining or when they are no longer required to support ongoing mining and related operations. Reclamation, re-establishment of vegetative cover, and restoration of effective surface drainage will minimize disturbed area runoff to the sedimentation pond, limiting the potential effects of surface leaching and evaporation. Restoration of natural drainage and direct discharge to the receiving drainages once the sedimentation pond is removed at the end of the extended liability period will effectively eliminate any potential surface water impacts related to the sedimentation pond.

R645-301-731.200 Water Monitoring

CR currently maintains, and will continue, a program to monitor surface and groundwater quality and quantity for the duration of the proposed mining, processing, and reclamation operations. The Hydrologic Monitoring Plan consists of monitoring stations identified in Table 6, Kinney Mine Baseline Monitoring Stations, and Table 7, Kinney Mine Operational Monitoring Stations, according to the parameter sampling schedule shown in Table 20, Hydrologic Monitoring Schedule. Baseline monitoring has been conducted on a monthly basis and quarterly basis.

Operational monitoring is planned to be conducted on a quarterly basis as follows.

Samples will be collected quarterly for parameters shown in Table 20, Hydrologic Monitoring Schedule, for all surface and ground water stations when the sites are accessible. At some sampling sites, winter conditions may create inaccessible or unsafe conditions. To help ensure as complete a data set as possible, first and fourth quarter samples will be collected during the time periods wherein there is the greatest likelihood of collecting a valid sample. This is believed to be in March and October respectively. Second and third quarter samples will be collected at a convenient time for the mine operator within the respective quarter.

As discussed in Section R645-301-731.800 of this MRP, some concerns as to the estimates of water rights replacement flow rates will be addressed by additional verification through monthly monitoring of flows for the springs and seeps in the area of Eagle Canyon. This effort will be coordinated with the Division Staff to ensure that the data collected will meet the concerns. These sites will include Eagle Seep 1, Eagle Seep 1a, Eagle Seep 3, Eagle Spring 2, Eagle Pond 2, and Aspen Spring (Eagle Pond 1). A minimum of 12 months, excepting months when sources are frozen over and not accessible, of verification data will be collected to more precisely determine the true volume of water needed for replacement. Additionally, CR agrees to monitor these sites for 2 additional years on a quarterly basis to allow the average flows to be determined to account for wet and dry years. During this period, each of the spring/seep sites will be checked and a flow determination made. For the Aspen Spring site, efforts will be made to work with the land owner to see if there would be a way to modify/adjust the site to allow collection of water flow measurements. If not, then a staff gauge will be installed to record the level of the pond and this data along with a stage-capacity curve for the pond will be used to generate an estimate flow. Additionally, to add to the water quality database for potential future expansion plans, CR will collect water quality data for any water sources where sufficient flow is available on a quarterly basis for the first 12 months.

The monitoring program thus instated serves as an integral part of CR's efforts to protect the hydrologic balance by providing an accurate and timely method of identifying and quantifying any possible concerns with respect to surface and ground water resources. The monitoring network is shown on Map 28, Surface and Ground Water Monitoring Sites. Table 6, Kinney # 2 Mine Baseline Monitoring Stations, and Table 7, Kinney # 2 Mine Operational Monitoring Stations, when combined with Map 28, summarizes the type and location of monitoring sites. The frequency, density and accuracy of monitoring will allow CR to evaluate and determine the success of mine plans, drainage and sediment control facilities, and reclamation for the purpose of minimizing disturbance to the hydrologic balance. The monitoring data and resulting evaluations will be used to identify any potential problems and develop necessary mitigation measures.

Hydrologic information submitted in R645-301-711- 727 of this permit application includes an identification of surface drainages and general flow characteristics, modeling of corresponding peak flows and annual runoff volumes, identification of ground water aquifers, and a general description of aquifer characteristics including ground water levels, movements, and recharge/discharge/storage characteristics.

The Hydrologic Monitoring Plan for the Kinney Mine provides for a frequency and distribution of both baseline and operational monitoring data collection adequate to identify and document baseline conditions and trends and fluctuations in the quantity and quality of surface water, the level and quality of ground water, and the overall effects of mining and reclamation activities on the hydrologic balance. As shown on Table 20, Hydrologic Monitoring Schedule, water quality parameters include field measurements for water level or flow, pH, specific conductance, dissolved oxygen, and temperature. Laboratory measurements include a significant list covering general water quality characteristics such as TDS, nutrients, major ions, and trace metals. Both surface and ground water quality samples will be collected, labeled and transported to a qualified analytical laboratory for analyses. Proper sample collection, preservation, handling, and storage methods will be utilized at all times to preserve the integrity of the samples and ensure validity of the analytical results.

The ongoing monitoring network consists of 10 ground water wells, some having the capability of sampling from above, within or below the mined coal seam, 3 springs, and 3 surface or stream locations. Data from one additional well (CR-06-03-ABV) was drilled as part of the mine water monitoring program and was sampled between April and September 2006. However, due to legal issues related to the well it was abandoned and is not part of the ongoing water monitoring program. In a similar fashion, monitoring from Angle Springs has been terminated due to access limitations. Each of the historic and current sampling locations are identified on Table, 6 Kinney No. 2 Mine Baseline Monitoring Stations, and on Map 28, Surface and Ground Water Monitoring Sites. The spring/seep locations and monitoring wells will be used to evaluate the occurrence of ground water and the hydraulic characteristics of the aquifers. The surface water monitoring sites will be used to evaluate the quality and quantity of surface water.

Baseline and operational monitoring will be performed for the Kinney Mine at the following frequency:

> **Spring -** Discharge measurements, field water quality parameters, and laboratory samples were collected for Angle, Eagle and Sulfur Springs starting in May 2005 and for Aspen Spring in November 2007. Baseline data having been collected. These springs will now be monitored for operational mining parameters.
>
> **Stream Stations** - Flow and field water quality parameters were measured on Mud Creek and Miller Outlet from May 2005 through February 24, 2011. Pool elevation~~June 2010. Flow~~ and field water quality parameters were measured for Scofield Reservoir beginning in June 2006 through February 24, 2011.~~.~~ Operational monitoring can now continue.
>
> **Monitoring Wells** - Groundwater level measurements~~, field water quality parameters, and laboratory samples~~ were taken, following well installation,~~ and development~~ for dry wells CR-06-01, CR-06-01BLW,~~ and~~ CR-06-02, and CR-06-02ABV beginning in March 2006. Baseline monitoring of~~sampling for~~ well CR-06-05 began in September 2006 and continued through May 2007 after which time operational monitoring began. Data for this site is available through December~~June~~ 2010. Baseline sampling of different zones within well CR-06-09 began as early as August 2006, with all three zones being monitored~~sampled~~ simultaneously beginning in October 2006. Measurements from ~~Samples for~~ this site area also available from~~for~~ June 2008 through December~~June~~ 2010. Operational monitoring began for well CR-06-09 in July 2007. Per the Divisions request, two additional monitor wells were completed in 2010; CR-10-11 and CR-10-12. Both of

these wells have been sampled eight times beginningtwice once in July and once in August 2010 through February 2011.. They will be picked up as part of the operational quarterly sampling program.

In the event any of the groundwater monitor wells that have been shown to be dry should be found to contain a static water level, sampling of that well will commence.

Within the constraints of the physical limits to do so, groundwater samples will be taken from all the monitor wells having a static water level within the system of monitor wells in preparation for the next revision of the MRP. During the 2011 field season, the ability to sample the wells not currently sampled will be determined. Those that, it physically possible to sample, will be added to the operational sampling plan.

All water monitoring analysis results will be recorded, reviewed to identify potential problems or trends, and filed at the mine so as to be available for future inspection and review. In addition, and following initiating of development activities, CR will file copies of both field data and laboratory analysis sheets on a quarterly basis with the UDOGM. At the end of each annual year, CR will also tabulate all water monitoring data for the year, review the data with respect to changes in surface and groundwater hydrology systems, and provide a summary Annual Hydrology Report in compliance with the UDOGM schedule. CR will continue to collect and evaluate hydrologic monitoring data during the operations and reclamation phases. If the additional data resulting from ongoing hydrologic monitoring indicates that any significant changes in general baseline characterizations are appropriate or that any assumptions or projections used to evaluate potential impacts are not accurate, CR will review potential changes with UDOGM and modify any sections of the mining and reclamation permit application as appropriate to reflect necessary adjustments.changes.

Following baseline monitoring, operational monitoring will be conducted for each sample location quarterly in accordance with the requirements of R645-301-731-212 and R645-301-731-223. In general, samples will be collected four times a year with one sample being taken within each quarter period. Ideally the samples will be taken in February, May, August and November. However, sample dates may be shifted one month earlier or later depending upon weather and environmental conditions. If the analysis of any surface water or groundwater sample indicates noncompliance with the permit conditions, then CR shall promptly notify the Division and immediately implement expanded monitoring for the site in question. Expanded monitoring will include a single sample for the noncompliant parameter to be taken within 15 days of learning of the noncompliant event. The new sample will then be evaluated to determine the magnitude and seriousness of the event, and with the Division, determine whether additional sampling is warranted. If monthly monitoring is warranted, sampling of the parameter will continue until the cause is identified and rectified, appropriate action is taken to the satisfaction of the Division, or the cause is determined to be non-mine related.

Carbon resources has appliedwill file for, and received ameet any provisions of UPDES permit which may be found in Exhibit 4, Other Permits.(s). In addition, CR will prepare and submit quarterly UPDES compliance reports to the UDOGM and UDWQ in compliance with Part 4.05.13 (2) (ii) (b). If non-compliance with a UPDES permit effluent limitation does occur, CR will forward the analytical results concurrently with the written notification of non-compliance.

CR will continue surface and ground water monitoring activities after completion of reclamation operations to document restoration of pre-mining hydrologic characteristics. All surface and groundwater monitoring installations and associated structures and equipment will be properly installed, maintained, and operated to assure the accuracy and consistency of monitoring data. Surface water monitoring will be discontinued when untreated surface runoff meets applicable effluent limitations and the UDOGM approves removal of drainage and sediment control structures. Groundwater monitoring wells will be abandoned and removed in accordance with UDOGM guidelines following UDOGM approval to discontinue groundwater monitoring.

R645-301-731.300 Acid and Toxic Forming Materials

This topic is dealt is addressed in R645-301-624.

R645-731.500 Discharges

The Kinney mine workings will progress down dip from the outcrop area and mine drainage will be controlled during active operations so there is little or no potential for direct gravity discharge of water from the mine. The minor amounts of water encountered within the mine will be controlled underground and pumped, if necessary, to mined out areas. Upon completion of mining and related activities in-mine drainage control operations will cease and portions of the mine workings (especially the mine workings furthest down dip) may either partially or gradually fill as ground water inflows discharge to the mined-out areas. No post cessation flow is anticipated and CR will seal and backfill the mine portals. Sealing practices are discussed in R645-301-542.300 – 800 & 550 – 553.900 and 560, Reclamation Practices, and R645-301-764 - 765, Casing and Sealing of Wells and Mine Openings.

There are no plans to develop, divert, or discharge any surface water into any underground mine in conjunction with ongoing mining and reclamation operations at the Kinney Mine.

Possible alternatives for the disposal of any in-mine water encountered are 1) discharge the water into remote or abandoned mine workings, 2) request a new NPDES discharge permit for surface discharge, 3) construct shallow or deep injection wells, 4) treat and discharge the water into Mud Creek, and 5) evaporate through new ponds. The feasibility and cost associated with these alternative will be investigated in the unlikely event that mine discharges are required.

All temporary and permanent diversions within the Kinney mine and loadout areas have been designed and will be constructed to maintain effective flow under all anticipated conditions. Upon completion of mining and related activities, mine openings will be sealed and backfilled to further preclude any potential ground water discharge or surface water inflows in mine portal areas or boreholes.

R645-301-731.600 Stream Buffer Zones

No streams requiring a buffer zone are located within the immediate or adjacent surface disturbed areas.

R645-301-731.700 Cross Sections and Maps

Hydrologic information is presented in various locations within the permit including:

R645-301-731.800 Water Rights and Replacement

As discussed in R645-301-727, Potential Impacts on Surface and Ground Water Sources, CR's mining and related operations are not expected to adversely impact any surface or ground water sources or water rights. Consequently, there is no need to explicitly address provisions for replacement of impacted water rights at this time. In the unlikely event however, that proximate contamination, diminution, or interruption does occur and can be documented as resulting from the Kinney mining and related operations, CR will mitigate the associated water rights impacts through discussion and development of a cooperative agreement with any effected water rights holder. Potential mitigation options may include but will not be limited to replacement or augmentation of effected water rights, monetary compensation, development of alternative watering facilities such as guzzlers.

Carbon Resources is the owner of two shares of Scofield Reservoir water and is reserving this water right as potential mitigation for any claim against CR relative to depletion of water due to evaporation of that small amount of water, contributed to from water encountered underground, that is carried out of the mine as a wet coating on coal transported out of the mine.

Per discussion with Mark Stiltson, Division of Water Rights, two shares of Scofield Water (which is Two Acre Feet of Scofield Reservoir water) is ample water rights to cover the extremely minor amount of water that may be depleted due to being transferred out of the mine as wetting on coal.

Some concerns regarding the volume of water replacement rates were raised by the Division for the area of Eagle Canyon. As allowed under the coal rules, some groundwater rates can be estimated if not directly measurable. This was done in the case of Aspen Spring (aka, Eagle Pond 1). Therefore, until the verification period is completed and accepted by the Division, if the springs in the graben area are affected by mining, CR commits to replace the estimate quantity of Aspen Spring and the total of the flow measurements for the other springs in the graben area. Based on the maximum estimate of flow for Aspen Spring which is 5.0 gpm. Therefore a total for the five seeps and springs in upper Eagle Canyon ~~Table 9, this~~ is ~~a total of~~ ~~7.5~~25 gpm. Once the verification is completed, CR will adjust the commitment to the flow values verified.

The primary postmining land use in the mine, loadout, and adjacent areas will be undeveloped wildlife habitat, dispersed recreation and grazing requiring minimal supporting water requirements. The discussions presented in R645-301-711 – 727, Hydrology Information, indicate that while surface and ground water resources are limited in those areas to be affected by the Kinney Mine operations, they will be adequate in terms of both quantity and quality to support the designated postmining land use. Given the proposed postmining use, CR currently has no plans to transfer any exploration boreholes or monitoring wells for subsequent use as water wells for the current mine plan. It is however anticipated that new ground water monitoring wells will be constructed to define subsurface conditions east of the current mine plan area in the future. Details regarding this need will be coordinated with DOGM in advance of any action.

R645-301-732 Sediment Control Measures

Sediment control measures for the Kinney Mine operations have been designed to meet or exceed all applicable State effluent limitations under the provisions of the required UPDES discharge permit. Primary long-term sediment control measures include re-grading and re-vegetating mine disturbance areas to control runoff and siltation and increase infiltration, and use of localized sediment control measures including mulching, erosion netting, sediment fences, check dams, sediment traps, straw bales and other means as appropriate. Short-term operational sediment control measures include the use of localized sediment control measures as noted above, construction of collection and diversion ditches where necessary to intercept and route runoff flows, and the use of a sedimentation pond to retain runoff and allow suspended solids to settle out prior to discharge to natural drainages. Major sediment control structures for the Kinney Mine are shown on Map 24, Drainage and Sediment Control Plan Map – Undisturbed Drainage Areas, and Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas. The runoff control pond is shown on Map 25, Sedimentation Pond 1 – Section and Details. These facilities have been designed utilizing the best technology currently available and will result in effective compliance with both the requirements of Kinney Mine's UPDES permit and all other applicable regulatory requirements.

One new sedimentation pond will provide effective sediment control for the Kinney mine facilities area. This pond is located in the northern end of the surface disturbed area east of and adjacent to Highway 96. This sedimentation pond is located as close as possible to the contributing disturbed areas and is not located within the floodplains of any perennial streams.

Complete detailed plans, calculations, and design specifications for sedimentation ponds are presented in Exhibit 16, Runoff Control Design Details. This design documentation include discussion of design methodology and assumptions, descriptions of specific drainage and sediment control structures or types of structures, hydrologic and hydraulic design calculations, and design specifications for all structures. In addition to compliance with applicable design standards and requirements under the Utah Coal Mining Regulations, the Kinney Mine sedimentation pond will be constructed, operated, and maintained to effect compliance with applicable UPDES discharge effluent standards. The pond has been designed to provide a minimum detention time of 24 hours, and longer if necessary, to meet applicable effluent limitations with respect to TSS and is sized to control pond discharge rates so that adequate detention times are maintained.

The proposed sedimentation pond has been designed to provide adequate storage for anticipated sediment accumulations from contributing drainage areas. Sediment storage calculations are conservative, reflecting the maximum anticipated disturbance acreage for each drainage area over the mine life. In addition to designing for adequate sediment storage capacity, CR will monitor the sediment level in the sedimentation pond, and as necessary to maintain adequate storage capacity, will remove accumulated sediment and dispose of it ~~within abandoned mine sections~~ at Utah State approved disposal sites such as ECDC in East Carbon, Utah or another facility. Sediment removal volumes will be minimal and should not have any significant effect on refuse stockpile stability, overall volume, or overall storage issues within the mine. It is anticipated that sediment removal will be only be required on an occasional basis.

As sediment removal becomes necessary, CR, in order to facilitate removal, minimize the potential for additional contributions of sediment to downstream waters, and prevent any potential adverse impacts on coal refuse stockpile stability, will schedule sediment removal during the portion of the year when the sedimentation pond iss ~~are~~ normally dry. Any water retained in the ponds at this time will be utilized for mine dust control application and pond surfaces will be allowed to dry out prior to initiation of equipment operations and sediment removal. If runoff occurs during pond cleanout, sediment removal operations will be temporarily suspended until any accumulated water can be discharged and effective operating conditions for sediment removal reestablished as described in R645-301-522, 523.100 – 220, 524.100 – 800, & 525.100 – 300, General description of Mine Plans, Mining Methods, and Related Design Requirements.

The sedimentation pond, unless otherwise required by Federal or State law, will be completely removed and effected area reclaimed upon completion of mining and related activities and restoration of contributing drainage areas. Restoration criteria include a re-vegetation success determination as described by R645-301-341.250, 300, 353.100 – 300, 356.100 – 400, & 357.100 - 300, Re-vegetation Success - Criteria and Evaluation Methods, and effective restoration of drainage characteristics such that the quality of untreated runoff from reclaimed areas is approximately equal to the quality of receiving drainages before the initiation of any mining activity as established by baseline water quality data.

Sedimentation pond reclamation will involve removal of any man-made discharge structures, removal and disposal of any riprap and bedding materials which will not be utilized in conjunction with re-establishment of postmining drainages, grading of embankment fill into pond basin areas, and re-grading associated disturbance areas to blend with surrounding reclaimed and undisturbed terrain. Replacement of soil/substitute materials and re-vegetation as described in R645-301-542.300 – 800, 500 – 553.900, & 560, Reclamation Practices, will complete pond reclamation.

As previously discussed in the introduction to this section, operational plans for the Kinney Mine include standard hydrologic controls and mitigation measures that are designed to prevent significant changes in the quantity and quality of surface and ground water resources, preserve existing hydrologic functions, comply with regulatory requirements, and limit adverse impacts to surface water or ground water users. These measures include:

- Limiting surface disturbance areas
- Proper design, construction, and grading of facilities areas and roads
- Construction, operation, and maintenance of drainage and sediment control structures to divert undisturbed runoff around disturbance areas, collect and route disturbed area runoff to sedimentation ponds to allow settlement of suspended solids, and facilitate any treatment which may be necessary
- Utilization of localized erosion control measures in any areas having high erosion potential
- Initiation of reclamation operations as soon as practical following completion of mining or when the associated facilities are no longer required to support ongoing mining and related operations
- Effective reclamation to minimize gradients, re-establish surface drainage patterns, restore pre-mining runoff and infiltration characteristics, and establish an effective and self-sustaining vegetative cover
- Post-reclamation land use management

During active operations, the designed drainage and sediment control system along with appropriate surface grading and stabilization measures will be the primary mechanism used to provide effective erosion and sediment control. A detailed discussion of this system was provided in R645-301-731.120 – 122, Surface Water Protection Measures. The locations and configuration of disturbed area drainage and sediment control structures are shown on Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas, and design information and calculations are provided in Exhibit 16, Runoff Control Design Details. Because of limited surface disturbance area available for the Kinney Mine, the surface facilities have been laid out in a series of elevated pads as shown on the map.

Following completion of mining operations reclamation of surface disturbance areas, restoration of effective drainage, and revegetation as described in R645-301-511.300, 541.100 – 400, 553.500

– 524, & 553.600 - 653, Reclamation of Mining Disturbance, will be the primary means of establishing both effective short and long-term erosion and sediment control.

This section presents the climatological information and methodology used in performing a hydrologic analysis to determine runoff volumes and peak runoff discharges which were used in designing the sediment pond, drainage ditches, conveyance/by-pass culverts, and reclamation channel.

Runoff Calculations

Discharge Rate Calculations

There are no- streams that traverse the permit area. Three perennial streams however are located within ¾ to 2 1/5 miles which are tributary to Scofield Reservoir. Mud Creek is the largest and is located within the central valley area west of the proposed permit area and Long and Miller Canyons are located ¾ and 2 1/3 miles to the east. Long Canyon many not actually be perennial but intermittent. More field work will determine this. Smaller local drainages exhibit inintermittent flow in response to spring snowmelt and high intensity thunderstorms. These drainages do not contribute significant quantities, or yields of stream flow to Mud Creek or Scofield Reservoir.

The USGS monitors stream flow in the area at the Mud Creek below Winter Quarters Canyon @ Scofield (USGS Station 09310700). This monitoring station is immediately downstream of the confluence of Winter Quarters Canyon and Mud Creek.

Mud Creek is the only perennial stream potentially directly tributary to the mine permit area. It is however more likely that permit area discharges will enter Scofield Reservoir directly and will not enter Mud Creek itself. Long and Miller Canyons enter Scofield Reservoir approximately 1.6 miles north of the mine site.

Flows within Miller Canyon, to which Long Canyon is tributary, and from Sulphur Spring are measured in the field utilizing flow area and velocity calculations.

All other surface water discharge rates used for ditches, culverts and the pond are calculated using standard runoff prediction modeling which utilizes the SCS Curve Number method.

Volume Calculations

Surface water volume determinations used within in the permit area for the design of the sediment pond utilizes the SCS Curve Number procedure mentioned above for flow calculations, and is reported in ac-ft/year.

Climatological Information

Precipitation depths were obtained from the Point Precipitation Frequency Estimates from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 found on the NOAA website (http://hdsc.nws.noaa.gov/hdsc/pfds).http://hdsc.nws.noaa.gov/hdsc/pfds). This site calculates rainfall depths at various durations and return frequencies for a given location and elevation. Estimates are based on annual precipitation data from over 300 stations in Utah and over 2,000 stations in the semiarid southwest. The design rainstorm depths were taken from the NOAA website at a location approximately near the center of the proposed mine site. The design rainfall depths used in the hydrologic analysis are shown in Table 16, Design Rainfall Depths.

TABLE 16. – DESIGN RAINFALL DEPTHS

LOCATION	RETURN PERIOD	RAINFALL DEPTH (INCHES) BY DURATION	
		6-HOUR	24-HOUR
Kinney Mine	10-Year	1.28	1.92
	100-Year	2.08	2.73

Modeling Methodology

Jones Draw (southern-most) and Columbine Draw (next north of Jones Draw)There are the southern two of the three ephemeral drainages that cross thelocated at the north and south ends of the mine permit boundary.area with no perennial drainages. These two drainages currently are conveyed under Highway 96. The south drainage (Jones Draw) will be conveyed by way of culvert UDC-1 through the mining area and under Highway 96. The northern drainage (Columbine Draw) will also be culverted to bypass the proposed roads and ditches without effecting the mine permit area via culvert UDC-2. Storm drainage runoff from the remaining permit area, with exception of a small area south of the main mine access road and east of Highway 96, will be captured and conveyed to a sediment pond by way a drainage collection system consisting of a series of ditches and culverts. Runoff from the small area south of the entrance will be managed using alternate sediment control methods with revegetation and silt fencing and/or straw bales. The runoff conveyance plan is shown in Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas.

In order to design the collection system ditches and culverts, hydrographs and peak runoff flows were determined. The hydrology for the mine permit area was modeled with Hydrologic Modeling Software (HEC-HMS) 3.1.0 developed by the Army Corps of Engineers using the Soil Conservation Service (SCS) curve number loss method and the SCS unit hydrograph transform method. The SCS Type II rainfall distribution was used in analyzing the storm drainage runoff which was developed by the Natural Resources Conservation Service (NRCS) for 24 hour rainfall events. A modified SCS Type II 6-hour distribution was also developed by the Soil Conservation Service and is provided in the SCS National Engineering Handbook-4 (NEH-4).

Drainage basins (also referred to as watersheds or catchments) were delineated in AutoCAD using existing and proposed elevation contour data and the location of proposed pads and storm drainage facilities. A drainage basin is an area where all rainfall or snowmelt runoff within it will collect to a common point. Each drainage basin includes one or a combination of the following three land types: hard surface pad area revegetated graded area, and natural undisturbed area.

Each basin was assigned an SCS (Soil Conservation Service) curve number. The curve number is a function of vegetative cover, hydrologic soil groups, and Antecedent Moisture Conditions (AMC). Curve numbers range from 0 to 100. Areas with high runoff rates have high curve numbers. Areas that are more pervious have lower curve numbers. Area-weighted curve numbers for each drainage basin were estimated by delineating the area of the three land types within each drainage basin and using curve numbers for the three land types obtained from the SCS NEH-4 which are 90 for the hard surface pads (C soil, hard surface, AMCII), 82 for the revegetated graded area (C soil, 10% ground cover density, AMCII condition), and 75 for the natural undisturbed area (C soil, 20% ground cover density, AMCII condition).

Drainage basins were modeled in HEC-HMS using the SCS unit hydrograph transform method which requires a lag time t_L for each basin. Lag time is described as the time from the center of mass of rainfall excess to the peak of the runoff hydrograph. According to the SCS, the watershed lag time is equal to 0.6* t_c (Time of concentration). The time of concentration t_c, (not is defined as the time required for flow from the hydraulically most remote point in a basin to reach the basin outlet. Times of concentration and lag times were calculated for each basin within the mine permit area using the method described in SCS Technical Report55 (TR-55) which takes into account sheet flow travel time, shallow concentrated flow travel time, and channel flow travel time. A lag time for the mountain watershed tributary to UDC-1 was estimated using the method described in the publication by M.J. Simas and R.H. Hawkins called "Lag time characteristics for small watersheds in the U.S." which takes into account width, slope, and curve number of the mountain drainage basin.

R645-301-733 Impoundments

CR does not propose any permanent impoundments within the mine or loadout areas. Upon restoration of disturbed areas, the sedimentation pond will be removed and associated disturbance areas reclaimed. In addition, all reclaimed areas will be re-graded to re-establish natural drainage patterns and eliminate any significant depressions which could impound water.

As described and referenced in R645-301-526.100 – 300, 527.100 – 250, 528.100 – 322, & 529.100 - 400, Mine Structures and Facilities, all impoundments will be designed and constructed with stable perimeter side-slopes, inlets, the tops of pond embankments, and embankment outslopes will be protected against erosion by vegetation or riprap as necessary. With the exception of downstream embankment slopes, all embankment areas will drain to the impoundment basins providing inherent sediment control. Runoff from downstream embankment slopes will be effectively limited by the semi-arid climate, minimal slope angles, and re-vegetation so that no additional sediment control will be necessary.

CR has developed a pond maintenance program designed to assure continued safe and effective operation of the Sediment Detention pond and surface water control system. The sedimentation pond will be inspected at regular intervals during construction and on completion of construction by a professional engineer or specialist experienced in impoundment construction. An impoundment inspection report certified by a Registered Professional Engineer will be provided to UDOGM promptly following each inspection. The report will verify construction in accordance with design plans and will note and discuss any apparent instability, structural weakness, or other hazardous conditions. A copy of the report will be retained on file at the mine site for inspection by authorized agency representatives.

Operation and Maintenance

–Operation and maintenance of drainage and sedimentation control structures will involve periodic inspection of all ditches and culverts, quarterly inspection and annual certification of the impoundment and related structures, ongoing discharge monitoring for the impoundment, and any necessary maintenance or repair of problems noted during the inspections.

CR's ditch inspection and maintenance procedures will focus on identification and repair of any significant ditch erosion, removal of any trash or debris from ditches, and maintenance of an adequate cross-sectional flow area, regardless of actual ditch configuration, to pass the design flows. In practice this will mean that CR will not modify, recut, or clean out a ditch simply because the physical ditch dimensions are not the same as the original design or originally constructed configuration so long as the actual ditch configuration is adequate to pass the design flow. Since the ditches and culverts have been designed to a larger runoff event than is required by UDOGM regulations, there is excess capacity in the ditches and culverts. This approach allows for some siltation, and erosion without affecting the capacity of the ditches and culverts to carry the regulatory required flow. Culvert maintenance will involve removal of trash or debris from culvert inlets and any upgradient debris fences, repair of any significant erosion at culvert inlets, outlets, or of the cover material, and repair or replacement of any damaged culverts.

Sedimentation pond maintenance and operation procedures will include ongoing sampling and discharge monitoring under applicable provisions of a UDWQ permit; quarterly inspections of pond embankments, impoundment areas, discharge structures, and inlet/outlet structures and areas and reporting; notification of any hazardous conditions and development of emergency remedial control measures; maintenance or repair of any problems noted during the inspections; and the periodic removal of accumulated sediment. The sedimentation pond has been designed and will be operated and maintained to effectively retain storm runoff to allow settlement of suspended solids prior to discharge. Control of potential water quality impacts from pond discharge is monitored through compliance with applicable effluent standards under a UDWQ discharge permit. Effluent sampling and reporting will occur as outlined in R645-301-731.200 - 225, Water Monitoring Plan, and under the provisions of the UPDES permit in Exhibit 4, Other Permits, UPDES Permit.

The sedimentation pond will be inspected quarterly by a qualified person for any indication of structural weakness or other hazardous condition, instability, and any erosion or other problems; the depth and elevation of any impounded water will be measured; based on the depth measurements storage capacity will be estimated; and any required structural monitoring will be performed. Copies of the quarterly inspection reports discussing each of the noted inspection categories and verifying that the pond has been constructed and maintained as designed will be prepared, certified by a qualified Registered Professional Engineer, and submitted promptly to UDOGM. Copies of the inspection reports will also be maintained on file at the minesite. Any minor problems noted during the inspection will be addressed in a timely manner. This may involve repair of any minor localized erosion, clean-out or minor repair of discharge structures, reseeding of embankment slopes, mowing weeds which may interfere with pond inspection, or other minor maintenance and repair as necessary. If the inspection identifies any structural weakness or other conditions which could pose a hazard to the public, the person who conducted the inspection will notify UDOGM promptly of the hazardous condition and any emergency procedures which may be appropriate to protect the public and address the hazardous condition. In consultation with and with approval from UDOGM, appropriate remedial measures will be implemented as soon as is reasonably practicable to address any hazardous condition.

CR has no plans for future construction of any additional ponds beyond that addressed in this mining and reclamation plan submittal. If changes in mine plans or effected areas dictate the necessity for additional sedimentation control structures, CR will evaluate requirements, complete the necessary designs, and submit the designs as technical revisions to the approved permit for UDOGM review and approval prior to initiating any construction work.

R645-301-735 Disposal of Excess Spoil

As described in R645-301-521, 522, 523.100 – 220, 524.100 – 800 & 525.100 - 300, Engineering Designs and Operating Plans, mining and related operations will not result in the generation of any excess spoil and, in fact, reclamation activities will be limited to backfilling and re-contouring utilizing the limited spoil materials available on the site. Plans for handling and disposal of non-coal wastes are presented in R645-301-526.100 – 300, 527.100 – 250, 528.100 – 322, & 529.100 - 400, Mine Structures and Facilities, under the subheading of Noncoal Waste Disposal. The specific handling and disposal methods described in the referenced permit sections will effectively protect ground and surface water resources by minimizing the potential for pollution or contamination from placement and handling of waste materials generated by mining and related operations.

R645-301-736 Coal Mine Waste & Underground Development Waste
Underground

~~Mine~~ Development Waste~~Rock~~

Please refer to a full treatment of this topic in Chapter 5 under **R645-301-526 Mine Facilities – Mine Development Waste.**

R645-301-737 Noncoal Mine Waste

~~Mine development, ongoing mining operations, and ancillary operations such as development of overcasts for mine ventilation and coal haulage will result in production of mine development rock including carbonaceous shale, weathered coal, floor clay, and parting material. Where it is operationally feasible to separate these material from the coal during development and mining, the mine development rock will be removed and handled separately from the coal. Where separation is not operationally feasible, mine development rock will be handled with the coal and will be removed in the surface facilities, separated from the coal product and temporarily stockpiled until it can be returned to the mine as discussed previously.~~

~~Generally, the same mining equipment and haulage systems used for coal production will be used to remove and handle mine development rock. Continuous miners, electric shuttle cars, and LHD scoops may be used to load and haul mine waste to the mine conveyor system. Normally mine development rock haulage will occur on a scheduled rock handling shift when the conveyor belt system will be cleared of coal. Typically, any development rock produced~~

~~during periods other than on a scheduled development rock handling shift will be temporarily stockpiled in an inactive area underground for later handling and haulage from the mine. Once the mine rock is placed on a belt at the loading point, it will be transferred to the main haulage belt running from the mine. From the main haulage belt, the mine rock will transfer to the surface coal haulage system which will carry the rock to the primary usher building.~~

~~The surface coal haulage system has been designed to facilitate mine development rock handling in two ways:~~
~~One; The stacking tube at the off spec coal stockpile can be emptied by a direct feed chute in its base allowing rock to bypass the coal stockpile and feed directly to Conveyor SB-3. In the primary crusher building a flop-gate and diversion chute will allow mine development rock to bypass the primary crusher and feed directly to the truck loadout where it can be transported to a segregated location on the off speck coal pile prior to returning the rock to the mine.~~
~~Two; Development rock may simply be dumped onto the off spec coal pile, via the flop gate atop the stacking tube, if circumstances are favorable. That is, if there is sufficient rock volume to warrant temporarily converting the entire off spec coal pile to a temporary development rock storage pile prior to returning the rock to the mine.~~

~~R645-301-737 Noncoal Mine Waste~~

Plans for handling and disposal of non-coal wastes are presented in Chapter 5, Engineering Design and Operations Plans Noncoal Waste Disposal, and to follow. The specific handling and disposal methods described in the referenced permit sections will effectively protect ground and surface water resources by minimizing the potential for pollution or contamination from placement and handling of waste materials generated by mining and related operations.

Noncoal Waste Disposal

Noncoal wastes generated in conjunction with mining and related activities will including but not limited to used oil and lubricants, garbage, paper waste, machinery parts, tires, cable, wood waste, and other miscellaneous debris. All smaller noncoal solid wastes will be collected and stored in dumpsters or similar closed containers. Larger solid waste materials including such items as used equipment, machinery parts, tires, and cable will be temporarily stored in designated sap yards located in areas as shown on Map 13, Surface Facilities Map. Dumpsters will be located primarily near buildings during mine operations, however, during construction they may be located throughout the disturbed area. Used oil will be handled according to Utah State and EPA requirements. Any waste other used oil and lubricants and any used oil not meeting the applicable EPA requirements will be collected and stored in either closed drums or in the waste oil storage tank located in the maintenance shop building. Temporary storage areas for used oil and lubricants will provide full containment to prevent accidental release of petroleum products to the surface drainage system.

CR does not currently plan or anticipate that any materials classified as "hazardous waste" will be utilized or generated in conjunction with the proposed mining and related operations. In the unlikely event that hazardous materials storage or disposal become necessary, CR will comply with all applicable storage, labeling, and documentation requirements, and disposal will occur off-site at a licensed hazardous waste disposal facility.

A contract disposal service will regularly collect and haul the noncoal solid wastes from the dumpsters to the permitted Carbon County municipal landfill, or to the East Carbon Development Corporation (ECDC) facility. Dependent on the market for sap materials, the larger noncoal solid waste and sap will be collected periodically either by a salvage contractor for salvage and recycling or by a contract disposal firm which will haul these material off-site and dispose of it in a suitable disposal site. Any used oil, lubricants, or other potentially combustible materials will be collected and either recycled or disposed of by a licensed disposal contractor in accordance with all applicable Utah and EPA regulations. No noncoal wastes will be disposed of on site during active operations.

R645-301-738 Temporary Casing and Sealing of Wells

All exploration boreholes and any boreholes which have been converted to monitoring wells following completion of drilling within the Kinney Mine permit area will be plugged and sealed during mining reclamation. In the case of the boreholes, plugging and sealing will occur as soon as drilling, sampling, and logging operations are completed. In the case of monitoring wells, the wells will be plugged and sealed when no longer needed for ongoing ground water monitoring. Standardized procedures for plugging and sealing are detailed in R645-301-631 – 631.200, & 641, Casing and Sealing Exploration Holes and Boreholes. Measures to plug and seal boreholes and water monitoring wells will minimize the potential for mixing of surface and ground water sources and will also limit the potential for communication and mixing between various but locally limited ground water aquifers.

R645-301-740 Design Criteria and Plans

This section presents detailed information on the design standards and requirements which have been or will be utilized in the design, construction, operation, maintenance, and reclamation of drainage and sediment control structures and facilities for disturbed and undisturbed areas. Forward references to methods and calculations used in design criteria are:

Curve Number Methodology	
Sec 732	Discharge Rate Calculation
Sec 732	Volume Calculation
Sec 732	Modeling Methodology
Ditch Design	
Sec 742.300	Collection Ditches and Associated Structures
Sec 724.400	Road Drainages
Pond Design	
Sec 742.220	Sedimentation Ponds
Sec 728	Surface Water Consequences
Sec 731.110	Retention of Drainage in Sedimentation Pond Structures
Sec 732	Table 16 – Design Rainfall Events
Reclamation	
Sec 760	This section discusses reclamation activities based on the criteria set in Sections 728 through 742.220

R645-301-742 Sediment Control Measures

CR has designed and will construct, operate, and maintain drainage and sediment control structures to minimize erosion, control surface runoff, and prevent, to the extent possible, increased contributions of suspended solids to area drainages. By effectively accomplishing these objectives CR will also affecteffect full compliance with all applicable discharge effluent limitations under any required UPDES discharge permit(s). Discussions of drainage and sediment control practices are presented in R645-301-521, General Description of Mine Construction and Development Activities and in R645-301-526.100 – 300, 527.100 – 250, 528.100 – 322, and 529.100 - 400, Mine Structures and Facilities, under the subheading of Drainage and Sediment Control Structures. In addition, a description of design methodology and all design calculations for drainage and sediment control structures to be constructed in the mine facilities area are presented in Exhibit 16, Runoff Control Design Details.

During construction, active mining operations, and reclamation, drainage from all disturbance areas will be effectively controlled by the drainage and sediment control network. To the extent reasonably feasible, runoff from undisturbed areas will be diverted and routed around the effected areas, and all disturbed area runoff will be intercepted and routed to a sedimentation pond except for the small area south of the main mine access road where alternate sediment control measures will be utilized. Operation of the drainage and sediment control network will effectively control disturbed area runoff and retain sediment from disturbed area runoff within mine disturbance areas. In addition to the engineered drainage and sediment control structures site specific drainage control and surface stabilization measures will be utilized on an as needed basis. These may include the use of temporary berms, straw bales, mulch, sediment traps, vegetative filters, silt fence, and other appropriate drainage localized drainage and sediment control measures.

Upon completion of mining and related activities, all disturbance areas will be reclaimed, with reclamation activities designed to restore drainage conditions and land use capabilities comparable to those existing prior to the Kinney mining related disturbance. Disturbance areas will be backfilled where necessary and re-graded to establish an undulating configuration with relatively short gradual slopes which will blend with surrounding undisturbed terrain. Re-graded surfaces will be left in a roughened condition to limit runoff and provide for an effective bond between the re-graded materials and subsequently placed topsoil. Reclamation will be completed by replacing available topsoil resources and re-vegetating disturbance areas to establish an effective vegetative cover which will control runoff, erosion, and provide effective habitat and grazing/forage values for wildlife and domestic livestock.

R645-301-742.200 Siltation Structures

The purpose of siltation structures is to prevent additional contributions of suspended solids from disturbed area watersheds to receiving drainages. Consistent with applicable regulatory requirements, siltation structures should represent the best control technology currently available and are intended to be constructed prior to initiation of any mining related disturbance within the contributing watershed. As described in R645-301-522, 523.100 – 220, 524.100 – 800, & 525.100 - 300, General Description of Mine Construction and Development Activities, CR will construct required drainage and sediment control structures as one of the initial development activities prior to other construction related surface disturbance. Generally, the downstream sedimentation pond will be utilized as the primary siltation structure and the design criteria and other requirements for the sedimentation pond will therefore be applicable as described in the following section. In the following case where routing of disturbed area drainage to the sedimentation pond is not practical, siltation structures will consist of appropriate alternative sediment control measures:

Outslope of Office Pad (Pad F) and the Topsoil Stockpile (see Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas) - Siltation control for the outslope of Pad F and areas adjacent to the mine entrance will be achieved through the use of silt traps, vegetative matting and perimeter silt fencing which will intercept and contain runoff sediment. If vegetative matting and perimeter silt fencing prove inadequate to control erosional runoff, straw bales and/or additional silt fencing will be placed on contours to further control local silt movement.

Silt control for the alternate sediment control area west of Highway 96 (see Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas) will be achieved through the use of vegetative matting and perimeter silt fencing which will intercept and contain runoff sediment. If vegetative matting and perimeter silt fencing prove inadequate to control erosional runoff, straw bales and/or additional silt fencing will be placed on contours to further control local silt movement.

Sediment traps will be used on both sides of the mine entrance off of Highway 96 to control runoff from the small area between the cattle guard and Highway 96 (see Map 24).

R645-301-742.220 Sedimentation Ponds

One sedimentation pond will provide effective sediment control for the Kinney mine facilities disturbance areas. This pond is located near the north end of the mine facilities Loadout Pad (Pad C) as shown on Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas and is located as close as possible to the contributing disturbance area(s). The proposed sedimentation pond is not located within the floodplain of any perennial streams as documented by the classification of streams within the permit areas described in detail in R645-301-711, 720, 722, 724726, & 727, Hydrology Information.

The sedimentation pond has been designed to be constructed to provide adequate storage for anticipated sediment contributions from contributing drainage areas. Sediment storage calculations reflect the maximum anticipated disturbance acreage for each drainage area over the mine life. The design also reflects a basin capacity sufficient to retain the flood routed volume equal to the runoff resulting from a 10-year, 24-hour storm event. Design calculations are presented and design methodology for the sedimentation pond are discussed in Exhibit 16, Runoff Control Design Details. Generally, mining and related activities will result in the direct hydrologic impacts associated with initial site disturbance and facility construction but will not result in significant further changes in hydrologic conditions for disturbed area drainages. Runoff from undisturbed areas will be diverted around or under disturbance areas and is not considered in sedimentation pond design.

The pond has been designed to provide a minimum detention time of 24 hours, and longer if necessary, to meet applicable effluent limitations with respect to TSS. Pond outlet structures are sized to control pond discharge rates so that adequate detention times are maintained. Inflow to the sedimentation pond will be routed through the pond and discharged through the outlet structure. The principal/emergency spillway structure is designed to pass the peak flows resulting from a 100-year, 6-hour storm event.

The discharge structure for the sedimentation pond is sized based upon calculated flows for the design storm events. Invert elevations for principal spillways are set above design sediment levels and the pond is designed with adequate freeboard consistent with applicable regulatory requirements. CR has designed the sedimentation pond to minimize the potential for short circuiting, and constructed it so that the primary outlet structure is located as far as possible from pond inlets. The pond outlet structure is also specifically designed to insure adequate retention time, prevent short circuiting, and minimize erosion with vegetation or riprap lined spillway and discharge channels as appropriate based on discharge flow velocities.

Pond design for the Kinney mine facilities have been developed under the supervision of a qualified Registered Professional Engineer. Consistent with applicable regulatory requirements, construction of the pond will be certified by a Registered Professional Engineer. Pond certifications for the new pond will be included as an appendix to Exhibit 16, Runoff Control Design Details.

Pond construction will also be consistent with applicable regulatory construction requirements. Foundation areas will be cleared, soil and incorporated vegetative materials removed, and foundation areas graded prior to embankment construction. Embankments will be constructed of materials specifically selected to exclude vegetation, roots, frozen soil, coal or other unsuitable materials. The selected embankment fill materials will then placed and compacted in a controlled manner in thin horizontally continuous lifts. As previously noted, embankments will be designed and constructed to provide a minimum of one (1) foot of freeboard between the emergency spillway design flow level and the top of the embankment. Actual embankment construction height (except for excavated portions) will be increased by approximately 5 percent to allow for any potential settlement, and upstream and downstream embankment slopes will be established at slopes no greater than 2H:1V. Upon completion of construction, all embankment slopes as well as exposed basin areas will be graded, scarified and seeded to stabilize the slopes, prevent erosion, and establish an effective vegetative cover.

The sedimentation pond will be completely removed and effected areas reclaimed upon completion of mining and related activities and restoration of contributing drainage areas. Pond reclamation will occur following a determination by UDOGM of re-vegetation success and hydrologic restoration. Sedimentation pond reclamation will involve removal of any man-made discharge structures, removal and disposal of any riprap and bedding materials which will not be utilized in conjunction with re-establishment of post-mining drainages, grading of embankment fill into pond basin areas, and re-grading associated disturbance areas to blend with surrounding reclaimed and undisturbed terrain. Replacement of soil/substitute materials and re-vegetation will complete pond reclamation.

As shown in Figure 35, Pond 1 Stage-Volume Curve, the sedimentation pond has an embankment height and storage volume of 8 feet and 4.82 acre-feet respectively, and therefore does not fall within the jurisdiction of the State Engineer requiring additional regulatory submittals. Pond 1 is therefore designated an MSHA pond and will be inspected on a quarterly basis at a minimum for structural weakness, erosion and other hazardous conditions. Consistent with applicable regulations, UDOGM will be notified of any hazardous conditions. Should any such conditions be identified, remedial measures will be initiated and appropriate modifications will be completed in a timely manner.

R645-301-742.300 Diversions

Surface facilities diversions will be constructed to intercept and divert surface runoff flows from undisturbed upgradient areas around the mine surface facilities areas. Diversion of undisturbed drainage will minimize additional sediment contributions, prevent impacts from the undisturbed drainage on mine disturbance areas, and limit requirements for retention and treatment of surface runoff to disturbed area drainage flows. All temporary diversions related to the mine facilities area are shown on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Areas. The permanent re-establishment of the ephemeral drainage through the disturbed mining area is shown on Map 29, Mine Surface Facilities Area - Postmining Topography. Design calculations for temporary and permanent diversions are provided in Exhibit 16, Runoff Control Design Details.

Diversion structures utilized in conjunction with the Kinney Mining and related operations will include both temporary diversions to control undisturbed runoff during active mining and reclamation operations and the permanent diversions which will be constructed in order to restore effective surface drainage following completion of ongoing mining and related operations.

In an effort to restore the natural environment to pre-mining conditions To provide for effective transmission of runoff flow through the reclamation process, culvert UDC-1 reclaimed culverted channel USC-1, side-slopes will be removed and the topography restored to the extent possible to pre-mining conditions. Slopes and contours will be re-establishedgraded to blend with both upstream and downstream topography to channel segments and the overall diversion channel gradient will approximate the natural gradientsstream gradient. The original and post-mining alignments of the channel UDC-1 are similar in nature in both the horizontal as shown onwell as the vertical directions. As can be seen in Map 29, Mine Surface Facilities Area – Post Mining Topography.Topography, the reclaimed channel is in reality short, and thus has little potential for significant alignment variation. Given the local conditions noted,relatively arid climate of this area and ephemeral nature of channel UDC-1, aquatic habitat values are non-existent.

The original and post-mining alignments of the irrigation ditch are similar. As can be seen on Map 29, Mine Surface Facilities Area – Post Mining Topography, the south end of the irrigation ditch is fixed, and must match the alignment of the existing ditch to the south. The north end is fixed by the drainage culvert underneath Highway 96. The ditch must therefore be reclaimed using a uniform gradient between the two points, with a bottom width and side slope configuration that matches those conditions found in the natural ditch south of the disturbed area.

Collection Ditches and Associated Structures

Collection ditches for disturbance areas associated with the proposed Kinney Mine surface facilities diversions will be established to collect and route disturbed area runoff flows to a designed sedimentation pond. The locations of disturbed area collection ditches in the mine facilities areas are shown on Map 24, Drainage and Sediment Control Plan – Disturbed Drainage Area and corresponding design calculations are provided in Exhibit 16, Runoff Control Design Details.

All temporary runoff ditches have been conservatively sized to carry the peak runoff flows from the 25-year, 6-hour storm event. Ditches UDD-1 and UDD-2 are upgradient undisturbed area ditches which will remain following reclamation. These two ditches were designed using the 100-year, 6-hour storm event. In order to assure effective collection and routing of disturbed drainage flows and minimize both erosion and sedimentation, required culverts have been sized to safely pass the peak flow from the contributing inlet ditches with a significant factor of safety and culvert inlets, outlets, diversion channels, and those areas where one or more channels intersect have been designed and will be constructed using properly sized and placed riprap or other erosion control materials, as required. Specific information on culvert design and erosion protection measures is also provided in Exhibit 16, Runoff Control Design Details.

Temporary diversion ditches in disturbed areas are designed to safely pass the peak discharge from the 10-year, 6-hour storm event. All diversions have been designed and will be constructed to remain stable under design flow conditions. Calculated flow velocities based on channel configuration, slope and flow volume have been utilized as the basis for design of either vegetative channel linings or specification of riprap and bedding materials to assure channel stability. Locations of all temporary diversions are shown on Map 23, Drainage and Sediment Control Plan Map – Undisturbed Drainage Areas , and on Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas. Design calculations for the mine facilities area are included and design methodologies discussed in Exhibit 16, Runoff Control Design Details.

Upon completion of mining and related activities all temporary diversions will be removed (with the exception of ditches DE-~~2~~3, and DE-~~3~~4) and the effected lands reclaimed when no longer required for sediment control. Ditches UDD-1 and UDD-2 remain as permanent structures. Ditches DE-~~2~~3 and DE-~~3~~4 will remain to divert and control runoff and from the reclaimed areas into the sediment pond. Ditches D~~e~~E-~~2~~3 and DE-~~3~~4 will be reclaimed along with the sediment pond. When it occurs, reclamation will consist of full or partial filling of the diversion ditches with material from adjacent areas consistent with the design post mining drainage configuration, grading to blend ditch areas with surrounding terrain, replacement of available soil/substitute materials, and reseeding.

None of the planned diversions will drain into underground mines. The potential for subsidence will generally be limited and is not expected to impact surface structures. Because of location, there is no potential for drainage from Mud Creek to enter underground workings. In addition, upon completion of mining and related activities, CR will seal and backfill the mine portals and other mine openings to prevent any significant exchange between surface and ground water systems. Details of portal sealing are discussed in R645-301-541.100 – 400, & 542.200, Reclamation Plan, under the subheading of Stabilization and Sealing of Mine Openings.

R645-301-742.400 Road Drainage

All roads have been designed to be constructed, operated, and maintained to provide for effective control of drainage from road surfaces, associated cuts and fills, and other related areas. Road construction in perennial and ephemeral~~intermittent~~ streams has been avoided except where a road crossing for UDC-1 was necessary, and road alignments and designs minimize the potential for downstream sedimentation or flooding and uncontrolled drainage over the road surface.

Road designs incorporate grading or crowning to promote effective drainage off the road surface, road surfaces will generally be protected from erosion and damage by appropriate surfacing materials and regular maintenance, roadside ditches have been designed to effectively collect and convey runoff from road areas, and culverts are provided where appropriate to convey drainage flows under or around designed roads. All road ditches and culvert structures have been designed to pass the flows from the 10-year, 6-hour storm event. Road culverts have been located and sized to avoid plugging or collapse and culvert installations will incorporate inlet and outlet protection and trash racks as appropriate to minimize both plugging and erosion. Roads, ditches, and associated culverts are shown on Map 24, Drainage and Sediment Control Plan Map – Disturbed Drainage Areas.

Flows from the 100 year, 6 hour storm were used to check the design capacity of undisturbed area drainage road ditches UDD-1 and UDD-2. In fact, the design is slightly conservative for UDD-1 since the area used also includes that area tributary to UDD-2. In a similar fashion, the design for UDD-2 is conservative since it also includes flows from the area tributary to UDD-1. Details regarding ditch design are provided within R645-301-731.110 - 112.

R645-301-743 Impoundments

The sedimentation pond described in the preceding section is the only impoundment which will be utilized for drainage and sediment control purposes in conjunction with the Kinney mining and related operations. Applicable regulatory requirements for impoundments essentially duplicate the specified requirements for sedimentation ponds addressed above. Given limited pond size and capacity, the minimum design freeboard of 1 foot is more than adequate to resist overtopping of the embankment due to wave action or sudden increases in inflow.

To insure that the designed storm water storage capacity is maintained, a staff gage will be installed in the sediment pond with the sediment cleanout level clearly marked so it can be visually monitored. Marks will be made on the staff gage at elevations of 7683.80 (5.3 year sediment level), and at each 0.5 foot level below the 5.3 year sediment level. This will allow mine operators to visually monitor the sediment level and plan for sediment cleanout.

R645-301-744 Discharge Structures

Flow rates and velocities for temporary diversion ditches and discharge calculations for the sedimentation pond outlet are presented in Exhibit 16, Runoff Control Design Details. Where specific constraints imposed by the natural terrain result in steeper gradients, flows may exceed five feet per second and placement of riprap and bedding material may be necessary to limit flow velocities, assure channel stability, and prevent any significant erosion. Design calculations include information on riprap sizing where required and the descriptive text in Exhibit 16, Runoff Control Design Details addresses standard procedures to be utilized in placing and securing riprap and bedding materials, and can be seen on Map 27, Runoff Control Details.

Generally, discharge structures have been designed at minimum gradients to limit discharge flow energy. Any potential for erosion at the outflow of discharge structures will be effectively controlled by placement of riprap and bedding materials in an apron configuration at the outflow. Generally, once the initial discharge energy is dissipated in these apron areas, erosion from the discharge flow will not be a problem since most receiving drainages have established a stable bed configuration and most drainages are effectively armored by exposed cobble and gravel materials. Because of limited space, grouted riprap has been utilized where hydraulic calculations show the need for ditch erosion control. Riprap aprons have also been utilized to dissipate energy as undisturbed area flows exit culverts west of Highway 96. Use and placement of riprap and bedding materials as designed herein should provide adequate channel protection and erosion control.

Other than the sedimentation pond and alternative sediment control measures discussed in the preceding sections, no additional treatment facilities will be necessary or will be utilized to provide effective drainage and sediment control and meet applicable discharge effluent limitations.

Runoff from the Kinney No. 2 Mine area to be disturbed flows to 4 existing culverts beneath UDOT Highway 96, one culvert is located at the south end of the permit area adjacent to the proposed topsoil stockpile, a second culvert is located near the existing gravel road accessing the proposed mine site, a third culvert is located near the north end of the proposed permit area adjacent to the proposed sediment pond, the fourth culvert is located well north of the proposed permit area. The vast majority of runoff water flows to the second and third culverts mentioned above. The vast majority of runoff from the mining disturbed area will report to the sediment pond, with a discharge point at the west side of Highway 96. The first three culverts discussed above can be seen on Map 24, Drainage and Sediment Control Plan Disturbed Drainage Areas Map.

Of the two existing culverts carrying the vast majority of the pre-mine runoff, the third culvert mentioned above will be replaced with culvert No. CP-2 during reconstruction of Highway 96 for turning lanes into the mine site. This culvert will receive discharge from the sediment pond. Pre-mining runoff reports to this culvert so no significant increase in flows will be experienced, and in fact, since the sediment pond will collect sediments from the runoff water and act as a regulating pond for storm events there should be no adverse affects from the pond discharge. There is little evidence of flows through this culvert in recent years. An energy dissipation fan structure will be constructed to prevent erosion at the end of Culvert No. CP-2 as shown on Map 24, and detailed in Exhibit 16, Runoff Control Design Details.

The sediment pond is an incised pond. In the event of the pond over-topping due to an extreme runoff event, or plugging of the primary and emergency spillways, water would flow overland to the UDOT Highway 96 rode-side ditch and flow through Culvert CP-2.

R645-301-745 Disposal of Excess Spoil

As described in R645-301-521, 523.100 – 220, 524.100 – 800, & 525.100 - 300, Engineering Designs and Operating Plans, mining and related operations will not result in the generation of any excess spoil and, in fact, reclamation activities will be limited to backfilling and re-contouring utilizing the limited spoil materials available on the site. Plans for handling and disposal of non-coal wastes are presented in R645-301-526.100 – 300, 527.100 – 250, 528.100 – 322, & 529.100 -

400, Mine Structures and Facilities, under the subheading of Noncoal Waste Disposal. The specific handling and disposal methods described in the referenced permit sections will effectively protect ground and surface water resources by minimizing the potential for pollution or contamination from placement and handling of waste materials generated by mining and related operations.

R645-301-746 Coal Mine Waste

Please refer to a full treatment~~Plans for handling and disposal~~ of this topic~~non-coal wastes are presented~~ in Chapter 5 under R645-301-526 Mine Facilities – Mine Development Waste.~~,~~ ~~Engineering~~ Design and Operations Plans for handling Non-coal ~~Noncoal~~ Waste Disposal, are ~~and to follow. The specific handling and disposal methods~~ described underR645-301-747 Disposal of Noncoal Mine Waste, below and~~in the referenced permit sections~~ will effectively protect ground and surface water resources by minimizing the potential for pollution or contamination from placement and handling of waste materials generated by mining and related operations.

R645-301-738 Temporary Casing and Sealing of Wells

All exploration boreholes and any boreholes which have been converted to monitoring wells following completion of drilling within the Kinney Mine permit area will be plugged and sealed during mining reclamation. In the case of the boreholes, plugging and sealing will occur as soon as drilling, sampling, and logging operations are completed. In the case of monitoring wells, the wells will be plugged and sealed when no longer needed for ongoing ground water monitoring. Standardized procedures for plugging and sealing are detailed in R645-301-631 – 631.200, & 641, Casing and Sealing Exploration Holes and Boreholes. Measures to plug and seal boreholes and water monitoring wells will minimize the potential for mixing of surface and ground water sources and will also limit the potential for communication and mixing between various but locally limited ground water aquifers.

R645-301-747 Disposal of Noncoal Mine Waste

Noncoal Waste Disposal

Noncoal wastes generated in conjunction with mining and related activities will including but not limited to used oil and lubricants, garbage, paper waste, machinery parts, tires, cable, wood waste, and other miscellaneous debris. All smaller noncoal solid wastes will be collected and stored in dumpsters or similar closed containers. Larger solid waste materials including such items as used equipment, machinery parts, tires, and cable will be temporarily stored in designated sap yards located in areas as shown on Map 13, Surface Facilities Map. Dumpsters will be located primarily near buildings during mine operations, however, during construction they may be located throughout the disturbed area. Used oil will be handled according to Utah State and EPA requirements. Any waste other used oil and lubricants and any used oil not meeting the applicable EPA requirements will be collected and stored in either closed drums or in the waste oil storage tank located in the maintenance shop building. Temporary storage areas for used oil and lubricants will provide full containment to prevent accidental release of petroleum products to the surface drainage system.

CR does not currently plan or anticipate that any materials classified as "hazardous waste" will be utilized or generated in conjunction with the proposed mining and related operations. In the unlikely event that hazardous materials storage or disposal become necessary, CR will comply with all applicable storage, labeling, and documentation requirements, and disposal will occur off-site at a licensed hazardous waste disposal facility.

A contract disposal service will regularly collect and haul the noncoal solid wastes from the dumpsters to the permitted Carbon County municipal landfill, or to the East Carbon Development Corporation (ECDC) facility. Dependent on the market for sap materials, the larger noncoal solid waste and sap will be collected periodically either by a salvage contractor for salvage and recycling or by a contract disposal firm which will haul these material off-site and dispose of it in a suitable disposal site. Any used oil, lubricants, or other potentially combustible materials will be collected and either recycled or disposed of by a licensed disposal contractor in accordance with all applicable Utah and EPA regulations. No noncoal wastes will be disposed of on site during active operations.

R645-301-748 Casing and Sealing of Wells

All exploration drillholes established by CR within the Kinney Mine permit area will either be completed as monitoring wells or sealed following completion of drilling, sampling, and logging. Well completion methods are described in R645-201 – 225, 323.200, 325, 202-235, & 236, Completion as Ground Water Monitoring Wells, and in Figure 21, Typical Well Completion Diagram. Similar to exploration drillholes, monitoring wells will be plugged and sealed when they are no longer needed for ongoing ground water monitoring activities. Standardized procedures for plugging and sealing are detailed in R645-301-631 – 631.200, & 641, Casing and Sealing Exploration Holes and Boreholes. Measures to plug and seal boreholes and water monitoring wells will minimize the potential for mixing of surface and ground water sources and will also limit the potential for communication and mixing between various ground water aquifers.

R645-301-750 Performance Standards

R645-301-751 Water Quality Standards and Effluent Limitations

Discharges of water from areas disturbed by coal mining and reclamation activities will be in compliance with all applicable Utah and Federal water quality laws and regulations.

Additionally, discharges will comply with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency as set forth in 40 CFR Part 434.

Water quality standards and effluent limitations for discharges from the Kinney Mine permit area will be regulated by the UDWQ under the terms of UPDES discharge permit(s) for the Kinney Mine. As part of the mine permitting process, CR has obtained a discharge permit from the UDWQ. A copy of the UPDES Permit can be found in Exhibit 4, Other Permits. Compliance with applicable UPDES effluent limitations will involve diversion of runoff from undisturbed areas around areas effected by mining operations, collection of disturbed area runoff which will be routed through the sedimentation pond prior to discharge, other localized drainage and sediment control measures, reclamation practices designed to effectively restore effected areas, and implementation of a comprehensive ongoing discharge monitoring program to verify compliance.

Drainage from mine and loadout areas, after retention in the sedimentation pond, is not anticipated to exceed applicable effluent limitations or any other Federal or State water quality limitations or standards. No acid or toxic mine drainage is anticipated from surface runoff and no mine drainage discharge is anticipated.

R645-301-752 Sediment Control Measures

Refer to responses to: R645-301-732, Sediment Control Measures;~~Measeures;~~ R645-301-742.200, Siltation Structures; R645-301-742.300, Diversions; and R645-301-742.400 Road Drainage.

R645-301-753 Impoundments and Discharge Structures

Refer to responses to: R645-732, Sediment Control Measures; R-645-301-742, Sediment Control Measures;~~Measuers;~~ and R645-301-743, Impoundments.

R645-301-754 Disposal of Excess Spoil, Coal Mine Waste and Noncoal Mine Waste

Refer to responses to: R645-301-735, Disposal of Excess Spoil; R645-301-736, Coal Mine and Underground Development Waste; R645-301-737, Noncoal Mine Waste; R645-301-742.300, Diversions; and R645-301-747, Disposal of Noncoal Waste.

R645-301-755 Casing and Sealing of Wells

Generally, a determination will be made either prior to or during completion of any exploration holes or boreholes of whether or not the hole(s) will be utilized for ground water monitoring purposes. If the hole is to be utilized for monitoring it will be cased, completed, and developed as a monitoring well consistent with Figure 21, Typical Well Completion Diagram, and as described in R645-301-201 – 225, 323.200, 325, 202-235, & 236, Completion as Ground Water Monitoring Wells. If the hole(s) is not to be utilized as a monitoring well or when an existing well is no longer required for ongoing monitoring, it will be sealed by filling the borehole or casing with cement to form a plug from the bottom of the hole to at least 20 feet above any zone of completion or water-bearing zone; filling the remainder of the hole to within 20 feet of the ground surface; and filling the remainder of the hole to the ground surface with cement to form a surface plug. A steel fence post will be placed in the center of the surface plug before the cement sets-up to provide a permanent marker for the hole location.

R645-301-760 Reclamation

This section describes the plan for restoration of hydrologic resources in the permit and adjacent areas that could potentially be affected or impacted by the mining and reclamation activities. Information in this section was developed in accordance with applicable regulatory guidelines (R645-301-700) for coal mine permitting in the State of Utah.

Before abandoning the Kinney No. 2 Mine area or seeking final bond release, CR will remove and reclaim temporary structures and take appropriate actions to assure that any permanent sedimentation ponds, diversions, impoundments, and treatment facilities meet applicable regulatory requirements.

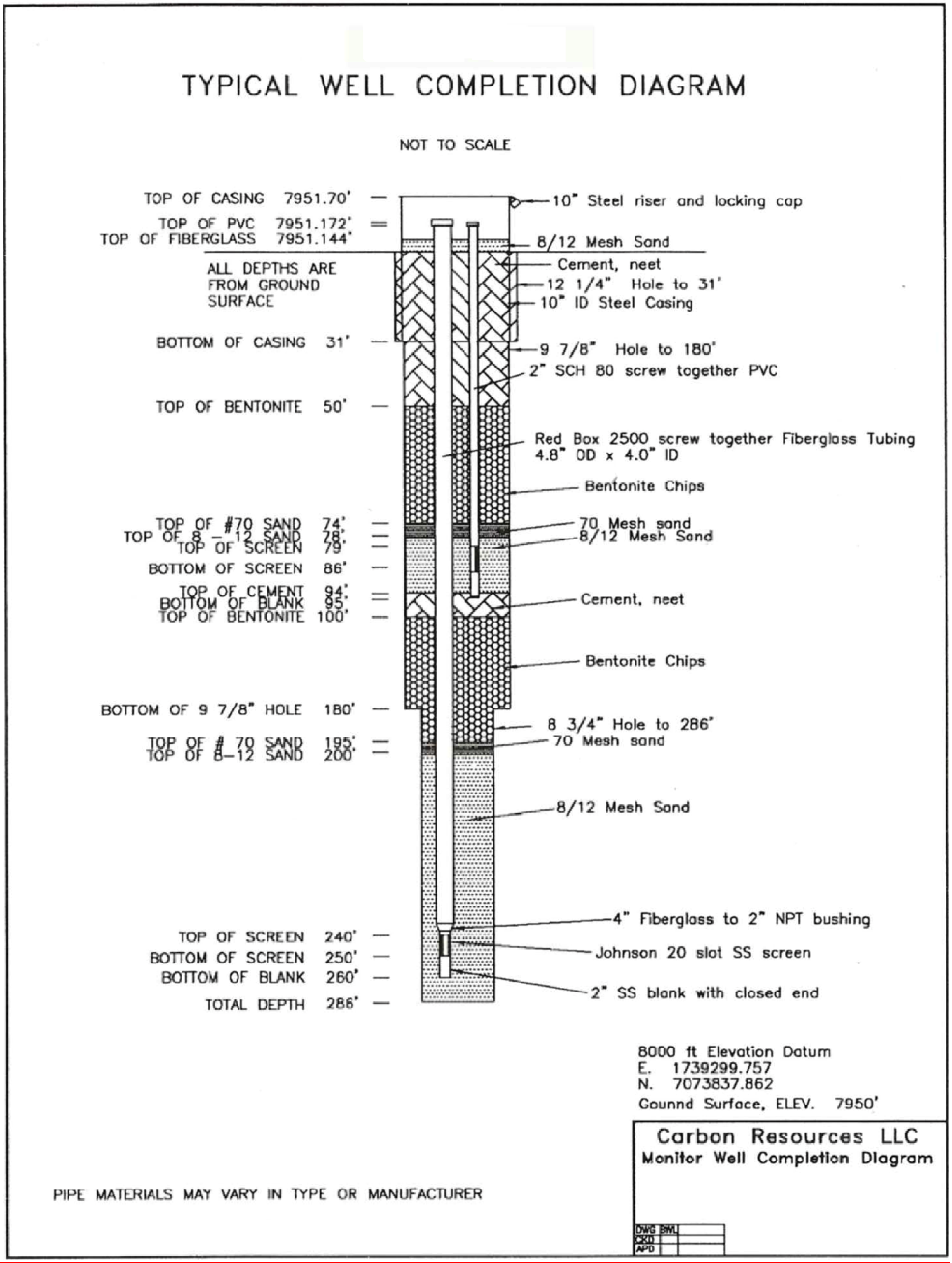
All areas disturbed by mining and related operations will be reclaimed as soon as operationally practical following completion of mining. CR has incorporated specific control and mitigation measures in mining, processing, and reclamation plans in order to prevent any significant impacts on surface or ground water quality. All mining related activities including soil/substitute removal, mine development, coal recovery, mine sealing, backfilling and grading, topsoiling, and revegetation are designed and sequenced to minimize disturbance and progress in a logical manner towards effective restoration of disturbed areas to pre-disturbance conditions. Reclamation will involve backfilling and regrading disturbance areas, re-establishment of drainage patterns similar to those existing in the premining environment, replacement of soil or substitute materials, and revegetation, and development of a self-sustaining vegetative community. As a result of effective reclamation, infiltration and runoff relationships will be restored, limiting the time interval over which water quality impacts may occur.

R645-301-761 General Requirements

In conjunction with reclamation of all areas disturbed by mining and related activities, CR will reestablish an effective post mining drainage configuration as shown on the Mine Facilities Area Post Mining Topography & Interim Drainage Control Map, (Map 29). Permanent runoff control structures remaining following reclamation include ditches UDD-1, UDD-2, culverts UDC-2 and CP-2 and the reconstructed irrigation ditch. Post mining drainages have been designed in compliance with requirements for permanent diversions and provide drainage distribution and density characteristics similar to the pre-disturbance environment. Anticipated runoff characteristics and site geomorphic considerations have been incorporated in post mining drainage designs to assure long-termlong-tern stability, minimize erosion, and prevent significant additional contributions of suspended solids to area drainages. CR will continue to operate and maintain sedimentation ponds and associated drainage structures until contributing drainage areas are effectively restored through application of the reclamation practices. Effective restoration will include a determination of re-vegetation success and restoration of surface

drainage characteristics such that contributions of suspended solids from untreated disturbed area runoff are within applicable water quality limitations.

Figure 21



TYPICAL WELL COMPLETION DIAGRAM
NOT TO SCALE
TOP OF CASING 7951.70'
TOP OF PVC 7951.172'
TOP OF FIBERGLASS 7951.144'
ALL DEPTHS ARE FROM GROUND SURFACE
BOTTOM OF CASING 31'
TOP OF BENTONITE 50'
TOP OF #70 SAND 74'
TOP OF 8-12 SAND 78'
TOP OF SCREEN 79'
BOTTOM OF SCREEN 86'
TOP OF CEMENT 94'
BOTTOM OF BLANK 95'
TOP OF BENTONITE 100'
BOTTOM OF 9 7/8" HOLE 180'
TOP OF # 70 SAND 195'
TOP OF 8-12 SAND 200'
TOP OF SCREEN 240'
BOTTOM OF SCREEN 250'
BOTTOM OF BLANK 260'
TOTAL DEPTH 286'
10" Steel riser and locking cap
8/12 Mesh Sand
Cement, neet
12 1/4" Hole to 31'
10" ID Steel Casing
9 7/8" Hole to 180'
2" SCH 80 screw together PVC
Red Box 2500 screw together Fiberglass Tubing 4.8" OD x 4.0" ID
Bentonite Chips
70 Mesh sand
8/12 Mesh Sand
Cement, neet
Bentonite Chips
8 3/4" Hole to 286'
70 Mesh sand
8/12 Mesh Sand
4" Fiberglass to 2" NPT bushing
Johnson 20 slot SS screen
2" SS blank with closed end
8000 ft Elevation Datum
E. 1739299.757
N. 7073837.862
Gounnd Surface, ELEV. 7950'
Carbon Resources LLC
Monitor Well Completion Diagram
PIPE MATERIALS MAY VARY IN TYPE OR MANUFACTURER
DWG BWL
CKD
APD

Table 8. Well Conditions as of December 2010

Well	Bottom of Screen	Water Level	Depth Relative to Screen Bottom	Status
CR-06-01	7865.2	7853.8	-7.7	Dry
CR-06-01-BLW	7701.1	7697.1	-4.5	False Positive Water Levels, But Hole is Dry.
CR-06-02	7901.6	7898.5	-7.1	Dry
CR-06-02-ABV	8039.8	8036.0	-1.2	Dry
CR-06-03-ABV*	7646.0	7798.2	152.2	Reclaimed Per UDOGM Directive
CR-06-05A	7747.9	7741.1	-4.1	Dry
CR-06-09-BLW	7802.9	7851.9	51.0	Water level has varied by only 2.8 feet over period of record
CR-06-09	7841.8	7860.7	20.5	Water level has varied by only 1.5 feet over period of record
CR-06-09-ABV	7945.3	7977.2	31. 9	Water level has varied by 5 feet over period of record, and is falling.
CR-10-11	7586.51	7647.2	63.2	Artesian, Level varied by 2.2 feet over period of record.
CR-10-12	7611.23	7650.7	42.0	Artesian, Level varied by 2.5 feet over period of record.

* - Last reading taken on 9/7/2006 due to a property owner access dispute.

All of the monitor wells were professionally completed using either fiberglass or PVC as non-corrosive well tubing with stainless steel slotted well screens and a ten foot stainless steel closed bottom "blank" beneath each well screen. Washed round silica sand was tremmied into position around the screen/blank assembly (Figure 21 & Exhibit 11). Water level in each well was measured and recorded through the baseline period. Field visit to each well is demonstrated by the date and water level noted in the field notes (Figure 17 & Exhibit 10). Confusion is caused by the fact that the ten foot "blanks" capture and hold water even in a dry hole because there is always some drilling water remaining in the formation immediately following the drilling process that is captured by the blank. The water levels shown in all of the "dry holes" are below the well screens, but within the blanks which contain only remnant water from the drilling process, and therefore do not represent a groundwater level and consequently are dry holes.

CR-06-01-BLW is completed with 4" fiberglass well tubing and a custom made reducer connecting the 2" stainless steel well screen and blank assembly to the 4" fiberglass. The inside of this reducer is not tapered but has a "lip" at the bottom of the 4" fiberglass. Unfortunately, the well deviates from vertical causing the water level probe to strike the lip of the reducer instead of entering into the 2" well screen. These two factors when combined with a third, that is , moisture condensation in the well tubing, caused the water level probe to encounter the moisture at, and in some cases above the lip by scraping sided of the casing, and gave "false positive" water levels for this hole. This information has been verified by lowering a color, led lighted, borehole camera into the hole that produced a digital video.

R645-301-762 Roads

Roads that will not be retained for use under an approved postmining land use will be reclaimed immediately after they no longer needed for coal mining and reclamation activities. Reclamation of roads will include reshaping of all cut and fill slopes to be compatible with post-mining land use and to compliment the drainage pattern of the surrounding terrain.

R645-301-763 Siltation Structures

As a component of the planned reclamation activities CR will implement an interim runoff control plan wherein the majority of temporary operational drainage structures will be removed. Interim structures (including the sediment pond) will remain throughout the re-vegetation of the mine site after which time they too will be removed and the area re-vegetated. The only structures which will remain following final reclamation will be those identified as permanent ditches and culverts (and related riprap energy dissipation aprons). Details of the interim drainage control plan addressing the period between site reclamation and final bond release are discussed in R645-301-542.100, & 500, and illustrated by the Mine Surface Facilities Area – Post Mining Topography & Interim Drainage Control Map, (Map 29).

When no longer required for sediment control, all temporary diversions and associated structures will be removed and the affected lands reclaimed, with the exception of permanent diversion ditches UDD-1,UDD-2, UDC-2, culvert CP-2, and the associated energy dissipation riprap shown on Map 29. The irrigation ditch shown at the southern end of Map 29 will also be re-established. The Post Mining Land Use road will also remain to allow private property access following mining. Reclamation will consist of filling of the diversion ditches with material from adjacent areas consistent with the design postmining drainage configuration, grading to blend ditch areas with surrounding terrain, replacement of available soil and reseeding.

Sedimentation pond reclamation will involve removal of any man-made discharge structures, removal and disposal of any riprap, concrete, and bedding materials which will not be utilized in conjunction with reestablishment of post-mining drainages, grading of embankment fill into pond basin area, and regrading associated disturbance areas to blend with the surrounding terrain. Replacement of soil and revegetation as described in R645-301-240, 241, 250, 242.100, 242.100 – 310, 243, & 244.100 - 320, Reclamation Plan, will complete pond reclamation. Upon restoration of disturbed areas, all sedimentation ponds and water storage and treatment impoundments will be removed and associated disturbance areas reclaimed. In addition, all reclaimed areas will be regraded to reestablish natural drainage patterns and eliminate any significant depressions which could impound water.

Postmining drainages and temporary ditches will route any disturbed area runoff to the sedimentation pond or through alternative sediment controls as shown on Map 29 through the post-reclamation period to the point of bond release. Runoff from the area south of the site access road cannot flow to the sedimentation pond and therefore will be controlled by alternative sediment control measures as shown on Map 29, Mine Facilities Area Post Mining Topography & Interim Drainage Control Map. Following determination of reclamation success, sedimentation ponds and temporary diversion ditches will be reclaimed and postmining drainages will be connected to existing natural drainages. Where postmining drainages intersect existing natural drainages, the transition channel will be constructed to provide a smooth transition of both channel configuration and flow. Siltation structures will be maintained until removal is authorized by UDOGM and the disturbed area has been stabilized and revegetated. Structures will not be removed within two years after the last augmented seeding.

R645-301-764 Structure Removal

As an underground mining operation, surface disturbance associated with CR's mining activities will be minimal relative to the overall permit area. However, where disturbance does occur, CR will reclaim disturbed areas using reclamation practices that restore normal infiltration and runoff characteristics to conditions that are comparable to premining conditions. This will be done as soon as operationally feasible following completion of mining and related activities.

Reclamation will involve backfilling and grading to stabilize the slopes, reestablishment of natural drainage patterns, topsoil replacement, and revegetation. CR has also designed the postmining topography and associated backfilling and grading plans to effectively utilize available materials and minimize disturbance of adjacent areas.

Permanent postmining drainages have been located and designed to generally duplicate premining drainage patterns and densities and to effectively convey surface drainage flows. Postmining drainage patterns and designs are illustrated by the Mine Surface Facilities Area – Post Mining Topography & Interim Drainage Control Map, (Map 29) and Exhibit 16 Runoff Control Design Details.

Disturbance areas will be backfilled where necessary and regraded to establish a stable undulating configuration with relatively short gradual slopes which will blend with surrounding undisturbed terrain. Regraded surfaces will be left in a roughened condition to limit runoff and provide for an effective bond between the regraded materials and subsequently placed topsoil. Soil replacement and reseeding will be scheduled to minimize the period of time during which soil materials will be exposed without a protective vegetative cover.

Reclamation will be completed by replacing available soil resources and revegetating disturbance areas to establish an effective vegetative cover which will control runoff, erosion, and provide effective habitat and grazing/forage values for wildlife.

Under applicable regulatory provisions, one of the conditions for final bond release is documentation of restoration of premining drainage conditions. CR will develop and provide this documentation to UDOGM using one of two methods or by a combination of the two; 1) Comparisons of post-reclamation water monitoring data with premining baseline data and applicable effluent standards; 2) Runoff and sedimentation modeling utilizing measured reclamation cover values to determine runoff curves and sediment contributions and comparison with model results developed using baseline cover values.

R645-301-765 Permanent Casing and Sealing of Wells

References

All exploration drillholes completed by CR within the Kinney No. 2 Mine permit area will either be completed as monitoring wells or sealed following completion of drilling, sampling, and logging. Generally, a determination will be made either prior to or during completion of any exploration holes or boreholes of whether or not the hole(s) will be utilized for ground water monitoring purposes. If the hole is to be utilized for monitoring it will be cased, completed, and developed as a monitoring well consistent with Figure 21, Typical Well Completion Diagram. If the hole(s) is not to be utilized as a monitoring well or when an existing well is no longer required for ongoing monitoring, it will be sealed by filling the borehole or casing with cement to form a plug from the bottom of the hole to at least 20 feet above any zone of completion or water-bearing zone; filling the remainder of the hole to within 20 feet of the ground surface with bentonite; and filling the remainder of the hole to the ground surface with cement to form a surface plug. A steel fence post will be placed in the center of the surface plug before the cement sets-up to provide a permanent marker for the hole location.

CR does not intend to transfer title of any monitoring wells to a second party following the cessation of mining and reclamation activities.

e shows that the main limitiation is risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry."

The Capability Classification for Soil Map Unit 109 is VIw (page 78), which as can be seen on page 93 of the Soil Survey exhibits "…severe limitations that make them generally unsuitable for cultivation." And the subclass is w, meaning, "…that water in or on the soil interferes with plant growth or cultivation…."

Productivity

On page 94 of the Soil Survey, Total production is defined as "… the amount of vegetation that can be expected to grow annually on well managed land that is supporting the natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. … It is expressed in pounds per acre of air-dry vegetation for favourable, normal, and unfavourable years. In favorable years, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavourable year, growing conditions are well below average, generally because of low available soil moisture."

On Table 4, Rangeland and Woodland Understory Productivity and Characteristic Plant Communities, Soil Unit 109 is listed as producing 3,500 pounds per acre, dry weight in a favorable year, with 3,000 pounds per acre in a normal year and 2,500 pounds per acre in an unfavourable year.

As explained on page 94 (see above) the productivity is stated to be "…on well managed land that is supporting the natural plant community." ~~Although no species identification has been conducted on the 8.69 acres, it is evident from casual observation that grasses make up the predominant vegetation community, either native, or planted many years ago.~~ Some shrubby species are present in the area that likely have been introduced with irrigation water, or have blown in or have been introduced by other natural processes. Whether the area has been well managed is debatable. Casual observations made over the past 25 years indicates that marginal management has been done in the area, with marginal effort to rotate grazing allotments, and irregular flood irrigation having been done. As can be seen on Map 32 an irrigation ditch called the East Branch Ditch terminates in the 8.69 acre area, and as stated before in this discussion, the Mayor of Scofield, Mike Erkkila stated that this ditch has not been used for approximately 25 years, and in fact the diversion has not been maintained, thus making the ditch unusable. According to Mayor Erkkila, a farmer attempted to run irrigation water down this ditch last year (2009) and could not get water to the fields due to poor maintenance.

Therefore, productivity of the 8.69 acre area could be expected to be approximately what the SCS Soils Survey shows on Table 4 (as stated above) at best, and at worst, much less. Since the SCS considers the production estimates to be from "well managed" land, and since the land within the 8.69 acres is not well managed as exemplified by the fact that the irrigation ditch has not been used in the past 25 years, it is likely that productivity from this soil unit is much less than the SCS estimates.