## Alternative Water Supply Information

In the event Valley Camp's water monitoring program determines the impact of mining has caused a significant measurable decrease, or interruption of flow to the water supply within the mine plan area, Valley Camp has nearby water rights available that could be developed to replace existing sources, if necessary.

These water rights include: Clear Creek Springs (0.5 CFS), Clear Creek Mine Tunnel No. 3 (0.446 CFS), Utah No. 1 Mine (0.15 CFS), O'Connor Mines (0.047 CFS and 0.030 CFS), the Belina Mine well (7.7 acre-feet/yr.), and stockwater rights on Boardinghouse and Finn Creeks (unspecified amounts). The free flow sources mentioned above, that are not being utilized by Valley Camp, are in fact, presently benefiting the water users downstream from the point source.

Inserted to hold true page numbers.

# HYDROLOGY UPDATE

Prepared for

VALLEY CAMP COAL COMPANY OF UTAH

By

VAUGHN HANSEN ASSOCIATES, INC.

September, 1983

# HYDROLOGY UPDATE

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Appendix B also contains maps:

A5-0072: Cross Section Location Map.

D5-0087: North South Cross Section, Connelville Block.

D5-0088: East West Cross Section, Connelville Block.

# INTRODUCTION

During 1979, Vaughn Hansen Associates conducted a hydrologic inventory and baseline study for the coal lease area controlled by Valley Camp of Utah, Incorporated. Information was obtained for this study from field investigations on the Valley Camp lease and adjoining areas (both on the surface and underground), from technical literature concerning the hydrology and geology of the area, and from other mines in the region mining in the same Blackhawk Formation. Based on information available at that time, a consistent pattern regarding the geology and its effects on groundwater appeared to be emerging. This pattern was described by a report submitted by Vaughn Hansen Associates to Valley Camp in January of 1980. Valley Camp submitted information from this report, as well as copies of the report to OSM as part of their mine plan for the Belina No. 1 and No. 2 mines.

When Valley Camp recently received a draft copy of OSM review comments, they contacted Vaughn Hansen Associates and requested that as thorough a hydrology-related response be prepared as the limited time permitted. A subsidence survey has been completed since the request was made. Meetings have been held with key mine personnel to glean information and experience which has accumulated in the 3 1/2 years since the earlier report was submitted. Time has been spent in the mine observing current conditions and talking to section supervisors. All water quantity

and quality data have been tabulated and will be included in Appendix A of this update.

The additional information recently obtained has shown that the cause and effect relations discussed in the January 1980 report were correct, but that predictions of hydrologic impacts of mining should be modified and expanded to account for anomalous conditions discovered within the Valley Camp lease area. The purpose of this report is to describe the present conditions, and in light of these facts, to make appropriate responses to comments raised by OSM concerning the hydrologic effects, impacts, and mitigations for the Belina mines.

# GROUNDWATER HYDROLOGY

Several physical variables have an effect on the hydrologic response of a given area. Among these are geology, soils, climate, and vegetation. New information has been accumulated concerning the geology within the Valley Camp lease area, particularly as it affects the occurrence and conveyance of groundwater. An overview of the geology is given here as an aid in understanding the hydrologic system of the Valley Camp lease area and adjacent land. Individual points will be re-emphasized and strengthened, as necessary, in subsequent sections of this report as the data are presented and interpreted.

## Geology

The Valley Camp lease area lies in the northern end of the Wasatch Plateau, on the west flank of the Clear Creek Anticline (Doelling, 1972). The dip of the strata is generally towards the west, ranging from about four to eight percent (two to five degrees).

With the exception of local alluvial deposits, all of the units exposed on and immediately adjacent to the Valley Camp lease area are Cretaceous members of the Mesaverde Formation. Figure 1 shows a typical stratigraphic section developed for the Valley Camp lease area. Plate 1 shows the geologic formations on the surface of the Valley Camp lease and surrounding areas

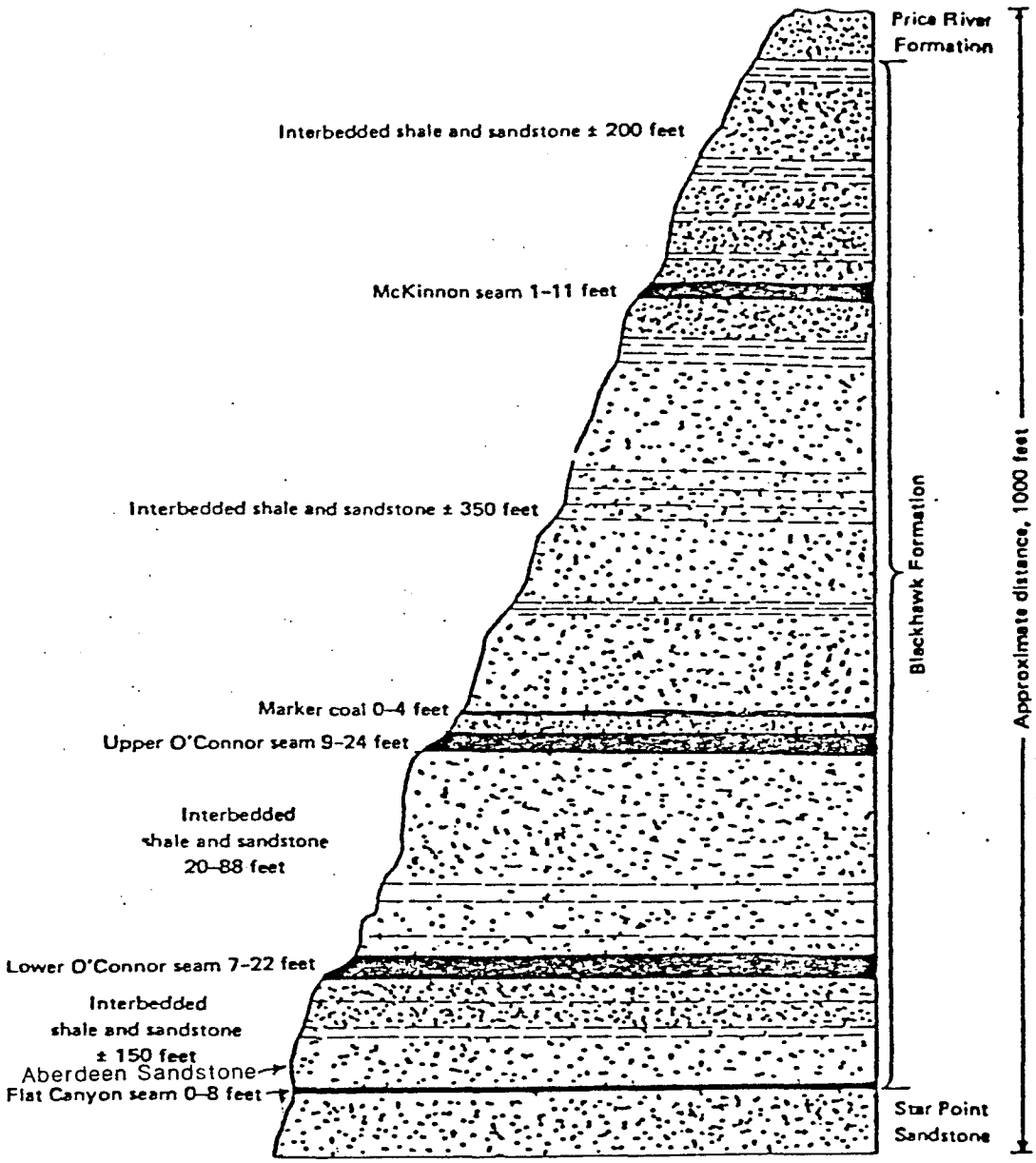


Figure 1. Localized statigraphic column from the Valley Camp lease area.

as well as known or expected fault locations and the location of a major dike through the area. Appendix B contains two cross-sections of the stratigraphy through the Valley Camp lease area. The Star Point Sandstone, which extends slightly onto the lease area on the surface in the east canyons, is about 1000 feet thick beneath the Valley Camp lease area and nearly devoid of shale (Doelling, 1972). This yellow-gray (salt and pepper) beach sandstone is massive and medium-grained (Spieker, 1931). As will be subsequently discussed, except where fractured, aquifer testing has shown the Star Point Sandstone to be extremely tight, yielding water in quantities of less than 5 to 10 gpm.

Seepage studies performed by Vaughn Hansen Associates (Vaughn Hansen Associates, 1980) and reported in the original mine permit application as well as those reported by Waddell et al. (1983) indicate that water discharges from the Star Point Sandstone along Eccles Creek. Both studies also indicated that much of the seepage is probably fault related. Waddell et al. (1983) also conclude that "the base flow of the stream in Eccles Canyon is derived principally from South Fork and seepage from the Star Point Sandstone".

Immediately overlying the Star Point Sandstone is the Blackhawk Formation, an interbedded formation of sandstone and shales which is Utah's chief coal producer (Stokes, 1964). The sands in this member are fine- to medium-grained and cemented by either

calcite or silica with some iron discoloration. They are more irregular than the sandstones of the Star Point, tending to be local in extent and having locally high clay contents (Spieker, 1931; Doelling, 1972). The Aberdeen sandstone is a coarse-grained, light-colored sand with a thickness of 20 to 80 feet, which can be traced throughout the region (Spieker, 1931). The generally discontinuous nature of the Blackhawk sands and their apparent low specific yield (Cordova, 1964) indicate that the water yielding capabilities of the Blackhawk are only locally important.

Spieker (1931) has identified three types of shale in the Blackhawk Formation, all continental in origin--a common clay shale which is soft and granular, a carbonaceous shale, and a smoke-gray shale usually associated with the coal. As was the case with the sandstones, the shales are irregularly bedded (Spieker, 1931). The abundance of shale in the Blackhawk acts as an effective barrier to the downward movement of water within the formation, greatly reducing its overall vertical permeability and the amount of water which percolates through the formation to lower units. Water which reaches the Blackhawk, therefore, percolates downward until it meets a shale layer, which causes horizontal movement to the surface or another "drain" (i.e. sandstone finger) within the formation.

The dominant fault trends in the Valley Camp lease area are northeast-southwest with a lesser orthogonal east-west system.

The faults within the Blackhawk Formation occur basically as zones (Doelling, 1972). Both major faults in the property area are downdropped to the west and tend to die out to the north (U.S. Geological Survey, 1979). The Connelville Fault forms the western boundary of the lease area with a drop which varies from 190 feet at the western-central lease boundary to 75 feet near Eccles Canyon (U.S. Geological Survey, 1979). The other major fault in the area, the O'Conner Fault, extends through the center of the lease area and has a drop of about 350 feet (U.S. Geological Survey, 1979). The Pleasant Valley Fault is another major north-south fault which lies about a mile east of the lease area in Pleasant Valley.

The progression of mining within the Belina mines has shown that some anomalous geologic conditions exist within the Valley Camp lease area. As mining proceeded from the portals in Whiskey Canyon toward the South Fork of Eccles Creek, faulting was encountered to the east of the mapped location of the main Connelville Fault. Subsequent VLF (very low frequency) investigations on the surface conducted by Vaughn Hansen Associates indicated that a series of smaller step faults exist parallel to, and east of, the main Connelville Fault. Other additional faulting in the lease area has been encountered that was not previously mapped. Faults now known to exist within the permit area are shown on Plate 1 and on Figure 1a.

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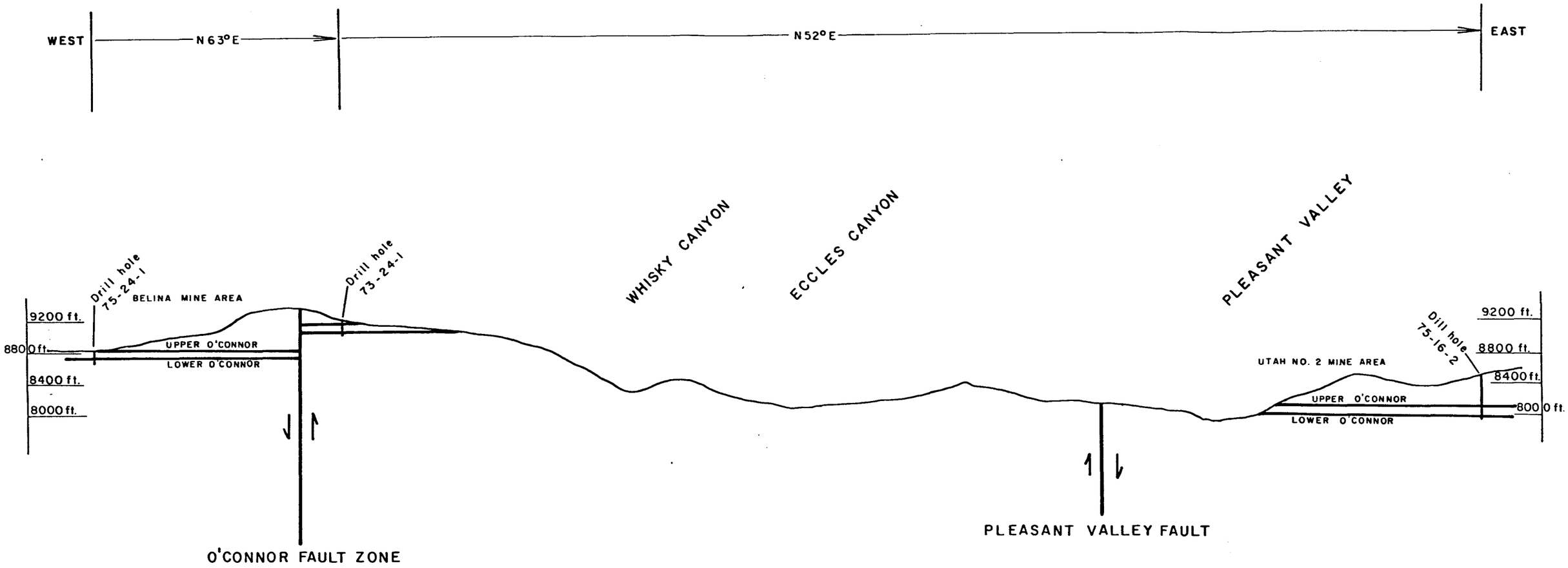


| | |
|---|---|
| DRAWN BY: KCF | **VALLEY CAMP OF UTAH, INC.** |
| DATE: 9/13/83 | **SCOFIELD ROUTE** |
| CHECKED BY: | **HELPER, UTAH 84526** |
| DATE: | |
| APPROVAL: | TITLE: CROSS SECTION – BELINA AREA TO UTAH NO. 2 AREA |
| APPROVAL: | |
| APPROVAL: | SCALE: 1" = 1300' / DRAWING NO. 85-0011 |

Figure 12

Mining within the Blackhawk Formation has shown that faults may, but do not necessarily, provide conduits or a "plumbing system" for transporting groundwater. Investigations have shown that large volumes of water are not produced from faults unless a tension crack associated with a fault has provided an open channel that can drain adjacent sandstone and readily convey water into the mine. Wells drilled into the Blackhawk and Star Point formations produce very little water (usually less than 5 gpm) unless a water conducting fracture(s) is encountered. Consequently, the culinary water supplies for both the Belina mines and the adjacent Skyline Mine are obtained from wells drilled into faults in the Star Point Formation. Early culinary wells drilled for the Skyline Mine produce less than 10 gpm. Only when a well was drilled into the Connelville Fault zone was an adequate water supply developed. The culinary water supply well for the Belina mines was drilled into the O'Connor Fault, from which it derives a moderate flow (maximum rate - 65 gpm). These results are consistent with the observation of Price and Waddell (1973) that faulting within the Star Point Sandstone increases its water yielding capacity due to the creation of secondary permeability. In the Blackhawk Formation there may be some tendency for fractures to seal because of the high clay content, thus reducing the ability of the faults to carry water.

Rolling of the formations within the Valley Camp lease

area has been observed within the mine. Rolling of a formation causes tension stresses to develop in places which may also result in tension cracks which collect and convey water within the formation.

The combined effect of both the unusual amount of faulting and rolling in the formations containing coal seams has created a secondary permeability through fractures. This relatively well-developed "plumbing system" (when compared to most areas in the Blackhawk) is the major cause for more groundwater than anticipated flowing into the Belina mine.

A major east-west dike has been encountered crossing the Valley Camp lease area in the Boardinghouse Canyon area. The dike is visible in Pleasant Valley and Boardinghouse Creek Canyon, has been encountered in the Belina Mine, and was apparently encountered in an exploratory drill hole in the Skyline Mine lease area. Where encountered in the Belina No. 1 Mine the dike is about 230 feet thick. It is felt that the dike was formed after faulting occurred in the lease area.

The dike was essentially dry, and it is felt that the dike may be a partial barrier to any north-flowing water in the regional aquifer. Essentially no water was encounted on the north contact of the dike, and only dripping occurs from the south contact zone. As shown by the water table contour map contained in

the original mine permit application, the hydraulic gradient across the dike is low (i.e. the direction of the dike is generally east-west as is the general direction of groundwater flow). Consequently, there is more tendency for groundwater flow to move along the dike than to back up behind the dike. When the mine crossed the dike, it could have entered a portion of the regional aquifer that had not been previously affected by any Belina mine dewatering because of the dike barrier. If this supposition is correct, the interception of groundwater on the south side of the dike in the mine (which is subsequently discharged into Whiskey Canyon), will probably result in a reduction of discharge from water table springs on the south side of the dike such as those in lower Boardinghouse Canyon. This is why flow monitoring in Boardinghouse Canyon takes on increased importance. However it should be noted that Valley Camp holds the water right to the main springs in Boardinghouse Canyon as well as stream flow rights and has made this water supply available to the town of Clear Creek. Since the direction of groundwater movement on the north side of the dike is primarily to the South Fork of Eccles Creek and to Whiskey Creek which flow into Eccles Creek and since water from the mine is discharged back into the Eccles Creek drainage, the primary impact of intercepting the regional water table in the mine on the north side of the dike will be to change the point and timing of discharge from the groundwater system to Eccles Creek. The location of the high-elevation perched springs appear unrelated to the dike.

Conditions in the Belina Mine

The facts gleaned during a meeting with mine personnel to summarize current conditions in the mine and a subsequent tour of the mine are reflected throughout this update report. However, the following synopsis is included for purposes of clarity.

As reported elsewhere, the flows into the mine this spring were approximately 400 gpm, but by late summer flows had diminished significantly. For example, the 1st right section at approximately 4,000 N and 11,000 W was estimated in late spring to be yielding 50 to 75 gpm, mainly from a fault along the east side. This section is now discharging approximately 10 gpm. Along the eastern fault (thought to be the O'Conner Fault) less than 1 gpm was issuing from the fault at each drift. In some areas, no water was present. Where water was present, most appeared to be flowing from the lower portion of the contact zone, but did not appear to be coming from the floor even though management had stated that in the spring water appeared to be issuing mainly from the floor. Where water was present, the roof near the fault was damp.

At the dike, only drippers were observed on the south side. Drippers on the north side of the dike when the dike was first encountered had ceased to flow. No water was discharging from the dike. Beyond the dike in south mains about 250 gpm was

flowing this spring from both roof and floor of a 1,000 foot fault and roll area running approximately north-south. In September, most water was coming from the floor and the flow had reduced to approximately 10 gpm. The fault and roll have resulted in excessive fracturing and more than normal leakage.

In the western portion of the mine, a series of step faults have been encountered east of the Connelville fault. A roll was also encounted which together with the step faulting has resulted in excessive fracturing of the formation. The overburden was shallower and significant subsidence occurred where pillars were pulled. In the spring, flows into the mine from this western portion were estimated to exceed 200 gpm. Most of the water came from the roof. Most of this area is now inaccessible, but the rate of accumulation of water has reduced significantly.

Rolls produce tension cracks which yield more water than faults. These rolls also result in less roof stability. Adjacent to the Connelville fault and adjacent to the O'Conner fault in the zones where step faulting has occurred, the formation often has been warped downward causing additional fracturing which yields more water than would normally occur. Water issuing from the floor was more prevalent on the east side than on the west side of the mine.

As indicated above, some water is entering the mine through

the floor. It is not expected that this floor water is significantly dewatering either the Aberdeen Sandstone of the Blackhawk Formation or the underlying Star Point Formation. The underlying sandstones of the Blackhawk Formation may be outcropping near Whiskey Gulch and the East Fork of Eccles Creek and be recharging from intermittent flow in these stream beds. It is possible, but not expected, that faults in the Aberdeen and Star Point formations serve as conduits conveying the majority of the water issuing from the floor. Flows into the mine diminish significantly during the summer months, whereas Waddell et al. (1983) report that springs issuing from the Star Point regional aquifer have fairly small seasonal fluctuations. This seasonal fluctuation seems to be an indication that the source of flows into the Belina mines is not primarily from the Star Point Sandstone, since flows issuing from the floor of the mine appear to have nearly as much seasonal fluctuation as flows issuing from the roof. This reasoning is probably also true of the Aberdeen Sandstone. The reason for this observed fact may be that the Belina No. 1 Mine in which the large majority of the water has been encountered is about 80 feet above the Aberdeen Sandstone. Both the Star Point and the Aberdeen sandstones appear to be continuous over the lease area except where major faulting displacements may cause discontinuities. Wells drilled in the Star Point Sandstone within the Valley Camp and Skyline Mine lease areas have in every case shown the Star Point and Aberdeen Sandstones to be extremely poor aquifers except where faulted.

Whether or not flow issuing from the floor of the mine is directly Star Point related, any lowering of the regional water table even within the Blackhawk Formation will probably reduce the potentiometric heads within the Star Point aquifer and reduce flows accordingly from springs supplied by the regional aquifer as will be discussed later in this report.

Well logs of Skyline Mine holes and the proposed Scofield Mine in Winter Quarters Canyon should be available in the permit applications for the respective mines. The well and completion logs of Well W19-1, the Alpine School District well, and the well at the abandoned Utah No. 2 Mine are contained in Appendix C.

Aquifer Characteristics

Drawdown and recovery tests were conducted for Coastal States Energy Company at two different depths in a test well located in Eccles Canyon about 4000 feet from the northwest boundary of the Valley Camp lease area. Because of the proximity of the well to the lease area and since the well penetrates geologic formations which extend through the Valley Camp lease area, it is felt that results of aquifer testing conducted by Coastal States are indicative of aquifer characteristics in the Valley Camp lease area. Permission has been granted by Coastal States Energy Company for inclusion of their test results

in this report.

Each test consisted of approximately 65 minutes of drawdown testing and an equal period of recovery testing. It would have been better if the tests were conducted for a longer period of time. However, the effect of too short a test is to overestimate the transmissivity estimated from the test. In these tests, the estimated transmissivity was so low that longer testing did not seem justified. Water was discharged from the well using a bailer. Data were analyzed over a reasonably straight-line portion of the semilog time-drawdown (or time-residual drawdown)curve using the Jacob equation (U.S. Bureau of Reclamation, 1977), which states that

$$T = \frac{2.303\ Q}{4\pi\ \partial s/\partial(\log\ t)} \qquad (1)$$

where T is the transmissivity, Q is the flow rate from the well during the drawdown test, s is the drawdown, and t is the time since pumping began. In the case of a recovery test, s becomes s' (the residual drawdown or difference between the measured head and the head prior to the start of pumping) and the time term becomes t/t', where t' is time since pumping ceased (U.S. Bureau of Reclamation, 1977). For a particular distance, Equation 1 is the equation of a straight-line plot of s versus log t (or s' versus log t/t'). For one log cycle, $\partial$log t (or $\partial$log t/t') is equal to one. With this in mind, and converting to the gallon-day-foot system of units, Equation 1 can be written

as

$$T = \frac{264\ Q}{\Delta s} \qquad (2)$$

where T is the transmissivity, in gallons per day per foot; Q is the constant discharge rate, in gallons per minute; and $\Delta s$ is the drawdown difference per log cycle of time, in feet. The recovery test equation substitutes s' for s.

Tests were run in the open hole at depths of 200 feet (within the coal zone of the Blackhawk Formation, above the Aberdeen Sandstone) and 300 feet (at the bottom of the Blackhawk Formation, below the Aberdeen Sandstone). Data are plotted in figures 2 and 3. At the 200 foot depth, transmissivities of 21.0 and 16.6 gallons per day per foot were calculated for the drawdown and recovery tests, respectively. Transmissivities of only 16.3 and 17.9 gallons per day per foot were calculated for the respective drawdown and recovery tests at the 300 foot depth.

Two observations can be made regarding the test results. First, the low transmissivities and discharge rates indicate that the Blackhawk Formation is, at best, a poor aquifer. Water is yielded from low porosity, discontinuous, localized sandstone lenses which prohibit large scale development.

The second observation is that no significant differences

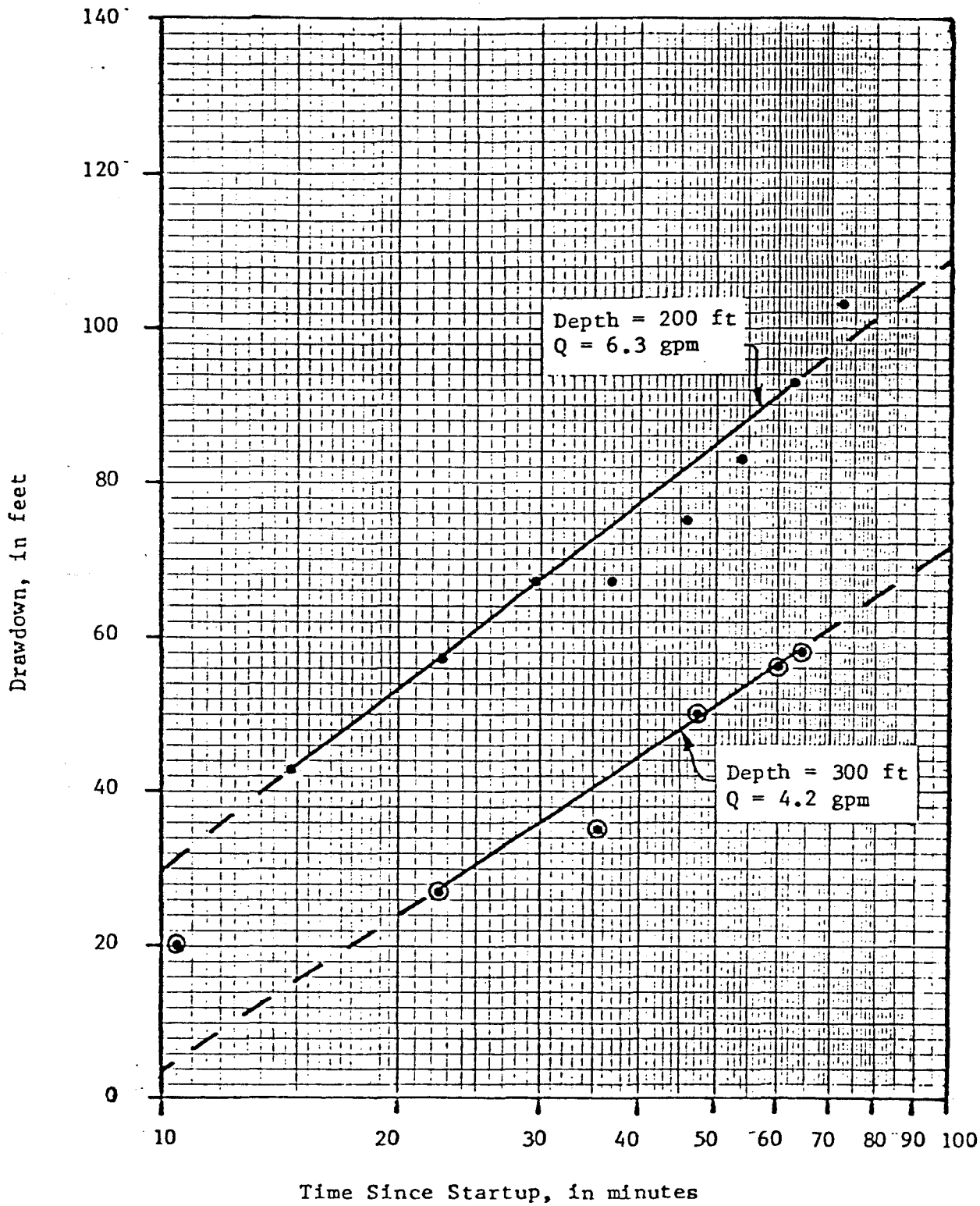


Figure 2. Results of drawdown tests at portal area test well at hole depths of 200 and 300 feet.

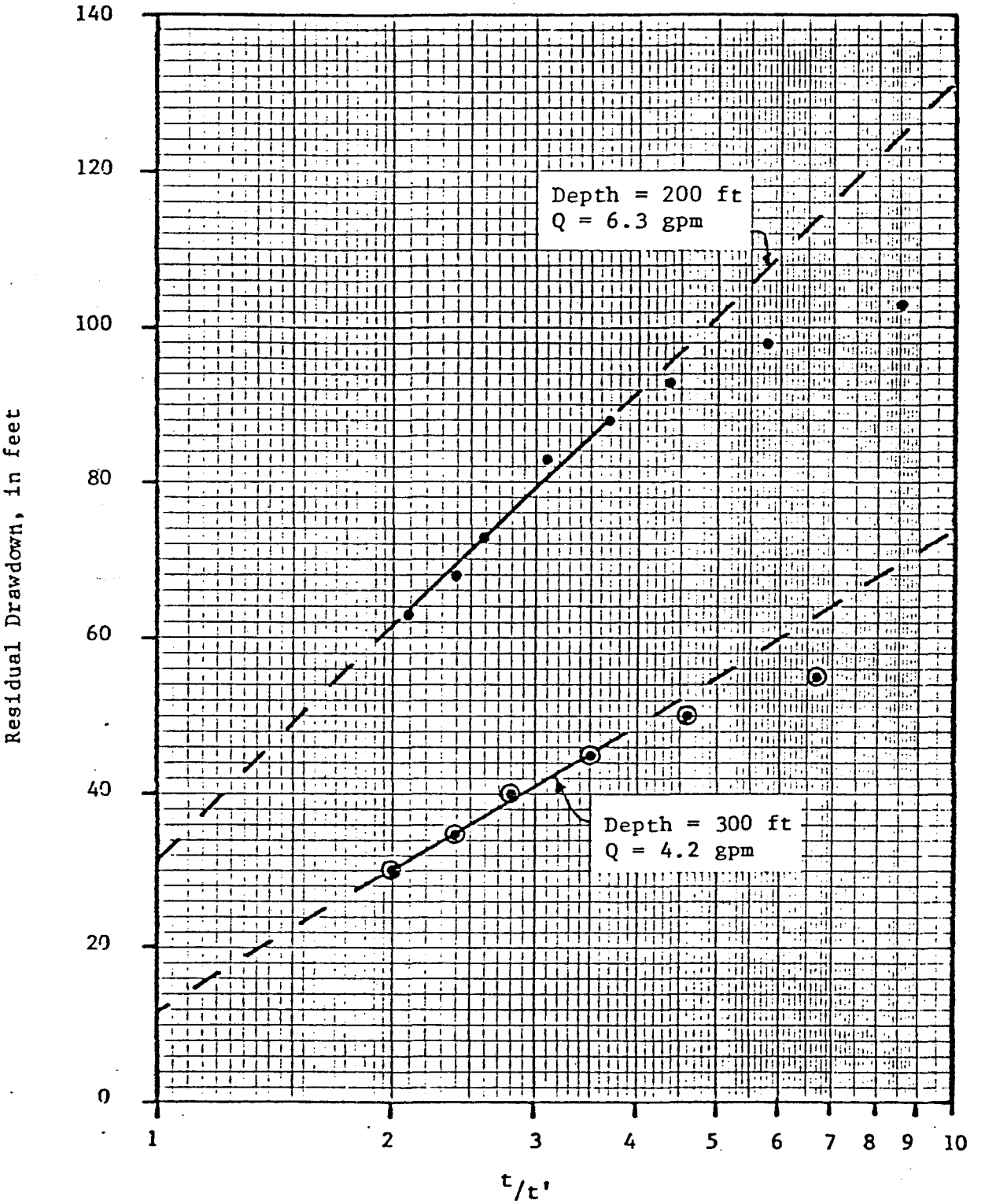


Figure 3. Results of recovery tests at portal area test well at hole depths of 200 and 300 feet.

exist between the aquifer properties of the coal bearing zone of Blackhawk and those of the Aberdeen Sandstone. Thus, the Aberdeen cannot be considered a major water-bearing zone.

Continued drilling and aquifer testing at this same site have shown the Star Point Sandstone to be an extremely poor aquifer. A pumping and recovery test was conducted in the late fall of 1979 which indicated that the Star Point Formation was contributing little or no flow. The pumping rate began at 20 gallons per minute and gradually decreased until the flow was only about 6 gallons per minute. The water throughout the test was very turbid which indicated the water was most likely coming from coal zones in the Blackhawk Formation. Observations in the mine indicate that water comes primary from fractured sandstone and not from coal veins.

A pumping test conducted at W19-1 (near the Belina No. 1 Mine) showed that a limited water supply is available from the Star Point in fractured areas. This well is located near or in the O'Connor fault. After the first fifteen minutes of pumping, flow had stabilized at 23 gallons per minute. Such rapid stabilization indicates that water is not flowing through porous media, but is reaching the well through underground conduits or fissures. The water from this test was relatively clean.

Pumping and recovery tests in the Star Point Sandstone

were conducted in Winter Quarters Canyon, about three miles north of the Valley Camp lease area. These tests showed that the Star Point Sandstone is very tight and produces very little water, unless fractures are encountered.

# HYDROLOGIC MONITORING PLAN

Hydrologic monitoring has been conducted at both groundwater and surface water stations to aid in documenting any hydrologic effects that may occur as the result of mining within the Valley Camp lease area. Data have been, and will continue to be collected from springs, streams, mine discharge, and the water supply well located near the Belina mines. New groundwater stations will now be added to the monitoring stations. The groundwater monitoring plan followed for the past 3 years is outlined herein. The surface water monitoring plan modified to include the additional monitoring sites requested by OSM is also described for completeness.

## Groundwater Monitoring

Groundwater usage in the area is associated almost entirely with springs. Thus, because of the desire to monitor impacts on groundwater use, the monitoring of springs in the area takes on added importance. As discussed in the Vaughn Hansen Associates (1980) report, the high-elevation, small springs issuing from the sides of fairly steep slopes are drains for localized, perched aquifers. In such conditions, underground mining is unlikely to have any effect on the flow from the spring unless subsidence disturbs the perched condition, Danielson et al. (1981).

Because of the possible effect that subsidence may have on these perched aquifers, and the unlikely chance of any effect

by mining when subsidence does not disturb the perched system, it is deemed important to obtain a least one year of baseline data prior to the time when subsidence may occur within the recharge area of each typical spring selected for monitoring. Consequently, a plan has been developed to ensure that the baseline data is obtained before any consequences from mining can occur. Plate 2 shows the location of all proposed groundwater monitoring stations. Also contained on Plate 2 and in Table 1 is a schedule of when monitoring will begin for springs issuing from the perched aquifer system based upon the projected extent of mining activities. It is proposed that the projected mining schedule be evaluated each year before the July monitoring is undertaken. If it is expected that the mine workings may enter any areas listed in Table 1 (or the similar table on Plate 2) within 18 months, then monitoring of the associated spring will begin and will continue for the life of the mine. This plan will ensure that at least one year of baseline data will be obtained from springs before effects of mining could be expected. It should be pointed out that baseline data has already been obtained from most of the springs. Stations monitoring the regional aquifer, even if far removed from mine workings, will be monitored for the life of the mine.

Water rights currently exist for springs S31-1, S31-5, and S31-11. These springs have been added to the monitoring program to help ensure the protection of these rights. Springs

Table 1. Schedule for start of monitoring of groundwater monitoring stations*

| Groundwater Monitoring Station | Monitoring to Begin When Mining Proceeds Into Section Specified Below.* |
|---|---|
| VC-001 | Currently being monitored (Belina Mine Discharge) |
| S-1 | |
| S6-3 | Upon entering Section 1 or Section 6 |
| S7-11 | Upon entering Section 7 |
| W19-1 | Currently being monitored |
| S24-12 | Currently being monitored |
| S25-2 | Currently being monitored |
| S25-6 | Currently being monitored |
| S25-13 | Currently being monitored |
| S31-1 | Upon entering E 1/2 of SE 1/4 Sec. 36 or SW 1/4 Sec. 31 or SW 1/4 of NE 1/4 Sec. 36 or SW 1/4 of NW 1/4 Sec. 31 |
| S31-5 | Same as S31-1 |
| S31-11 | Upon entering SW 1/4 Sec. 31 or E 1/2 of SE 1/4 Sec. 36 |
| S31-13 | Upon entering E 1/2 of SE 1/4 Sec. 36 or SW 1/4 Sec. 31 or SW 1/4 of NW 1/4 Sec. 31 |
| S32-3 | Currently being monitored |
| S36-3 | Upon entering SE 1/4 Sec. 36 or SW 1/4 or SW 1/4 Sec. 31 |
| S36-17 | Currently being monitored |
| S36-19 | Upon entering SW 1/4 Sec. 36 or W 1/2 of SE 1/4 Sec. 36 or SE 1/4 of NW 1/4 Sec. 36 or SW 1/4 of NE 1/4 Sec. 36 |
| S36-23 | Currently being monitored |

* Determined by a 35° angle of draw.

S6-3, S25-2, S25-6, and S36-3 have been added to the monitoring program because they are representative of the larger springs in the lease area. The spring near the mouth of Boardinghouse Creek, S32-3, has been added to help evaluate mining impacts to the quantity and quality of discharge from the regional aquifer system in the Star Point Formation.

Most of the groundwater monitoring stations are inaccessible during most of the year. However, as pointed out by Waddel et al. (1983) the best time for monitoring these springs is during the autumn base-flow period. Groundwater monitoring will occur in July and September of each year. At the previously proposed groundwater monitoring stations (except for the Belina Mine discharge which will be discussed later), as well as the newly proposed station in lower Boardinghouse Canyon (S32-3), the September samples will be analyzed for the parameters shown in Table 2. For the July monitoring, all groundwater samples will be analyzed for the parameters in the abbreviated schedule of Table 3. The remainder of the newly added stations (S6-3, S25-6, S31-1, S31-5, S31-11, and S36-11) will be monitored for flow, specific conductance, pH, and temperature only.

Monitoring of mine discharge is in compliance with an existing NPDES discharge permit. The monitoring frequency and the monitored parameters are shown in Table 4. A totalizing flow meter will be added to better monitor the discharge.

Table 2. Comprehensive Water Quality Analytical Schedule

## Field Measurements

Flow
pH
Water Temperature
Air Temperature
Specific Conductance at 25°C.

## Laboratory Measurements

Suspended Solids(1)
Total Combustible Solids(1)(2)
Total Dissolved Solids
Total Hardness
Alkalinity
Aluminum, Total
Arsenic, Total
Barium, Total
Boron, Total
Carbonate
Bicarbonate
Cadmium, Total
Calcium
Chloride
Chromium, Total
Copper, Total
Fluoride
Iron, Total
Lead, Total
Magnesium
Manganese, Total
Mercury, Total
Molybdenum, Total
Nickel, Total
Ammonia
Nitrate
Nitrite
Potassium
Total Phosphate(1)
Dissolved Phosphate(3)
Selenium, Total
Sodium
Sulfate
Sulfide
Zinc, Total

Note:

(1) Surface water only
(2) Only if visible coal fines, oil or grease
(3) Groundwater only

Table 3. Abbreviated Water Quality Analytical Schedule

**Field Measurements**

Flow
pH
Specific Conductance at 25°C.
Water Temperature
Air Temperature

**Laboratory Measurements**

| | |
|---|---|
| Ammonia | Total Phosphate(1) |
| Bicarbonate | Dissolved Phosphate(2) |
| Calcium | Potassium |
| Chloride | Sodium |
| Iron, Total | Sulfate |
| Magnesium | Suspended Solids(1) |
| Manganese, Total | Total Dissolved Solids |

Note:

(1) Surface water only
(2) Groundwater only

Table 4. Monitoring Schedule for Valley Camp Mine Discharge*

| Parameter | Monitoring Requirements Measurement Frequency | Sample Type |
|---|---|---|
| Flow | Two per month | Measured |
| Total Suspended Solids | Two per month | Grab |
| Total Iron | Two per month | Grab |
| Total Dissolved Solids | Two per month | Grab |
| Oil & Grease | Two per month | Grab |
| pH | Two per month | Grab |

* or as required by current NPDES permit

Water quality data will be submitted to the Utah Division of Oil, Gas, and Mining. Such reports will normally be submitted within 60 to 90 days after sampling, depending upon the speed of laboratory analyses.

Surface Water Monitoring

As shown in Plate 2, surface water monitoring stations will include stations VC-1, VC-2, VC-4, VC-5, VC-10, VC-11, VC-12, VC-13, and VC-14. Stations VC-1, VC-2, VC-4, VC-5, VC-10, and VC-14 will be maintained to provide continued monitoring of the impact of operations in the Belina mines and the loadout facility in Pleasant Valley Canyon. Stations VC-11, VC-12, and VC-13 will be monitored to measure impacts on Boardinghouse, Finn, and Long Creeks, respectively. Plate 2 shows the location of each of these stations. Samples will be collected annually during the third quarter from all stations shown on Plate 2 and analyzed according to the schedule given in Table 2.

In addition to the annual comprehensive samples, the surface water stations will be sampled each quarter on a continuing basis according to the abbreviated schedule given in Table 3. Excellent baseline data have been collected on streams surrounding and draining the Valley Camp lease area since January of 1976. Information gained from this data indicates that the proposed sampling frequency will be sufficient.

The derivation of Table 3 was based on the need to clarify background conditions and future impacts. Because of the inherently high chemical quality of waters in the Valley Camp lease area, as determined by the baseline study, suspended solids has been included in the abbreviated schedule as the single most important impact indicator. Ammonia and phosphate are included because of the high background concentrations found previously. Total dissolved solids, specific conductance, temperature, and the major cations and anions are included as indexes of major change.

Surface water monitoring will continue according to the abbreviated water quality schedule through the mining and reclamation operations. Post-mining data collection will continue biannually (spring and fall) at each of the stations until the reclamation effort is deemed successful by the regulatory authority. The fall sample will continue to be analyzed according to Table 2 through the post-mining period.

Water quality data collected from surface water monitoring stations will be submitted to the Utah Division of Oil, Gas, and Mining. Such reports will normally be submitted within 60 to 90 days of the end of each quarter, depending upon the speed of the laboratory analyses.

## HYDROLOGIC IMPACT OF MINING ACTIVITIES

As has been noted previously in this report, the Valley Camp lease area is covered almost entirely by the Blackhawk Formation. This formation consists of interbedded layers of sandstone and shale separated by various mineable and nonmineable coal seams. The sandstone beds are generally massive while the shale layers are bentonitic, tending to swell when wet and decomposing into a semi-impervious clay. Investigations at springs and streams in the lease area have indicated that the shale layers impede downward percolation of water through the Blackhawk. Danielson et al. (1981) observed that the downward movement of water is impeded by shale layers in the Blackhawk which carry the water to a discharge point where the shale layers outcrop. The fact that most springs are on fairly steep hillsides and not in channel bottoms where a regional aquifer would tend to discharge provides additional evidence that the springs in the upper elevations of the Blackhawk Formation (such as those within the Valley Camp lease area) are draining perched aquifers. These springs tend to receive water from localized rather than regional sources. Of the 74 springs identified on the Valley Camp lease area, only three are covered with water rights (listed use is stockwater). Stockwater rights also exist on Boardinghouse, Finn, and along creeks within the lease area (Vaughn Hansen Associates, 1980).

In determining the magnitude of the effects of mining on areal hydrology, it is important to recognize the uses of the hydrologic resources. Within the Valley Camp lease area, the principal use of the hydrologic resources is for watering livestock and wildlife. The area has numerous springs, seeps, and several streams. Disturbing some of these does not necessarily cause any hardship on livestock or wildlife because of the numerous water sources (depending of course on the magnitude of disturbances and the number of sources affected).

Subsidence Effects

Ground surveys have been conducted annually in late summer to determine and document the surface evidences and effects of subsidence. Consistent with expectations, no surface effects of subsidence have been found above areas where pillars have not been pulled. Also as expected, where the overburden above the mined coal seam is greater than about 350 to 400 feet, no surface evidences of subsidence (such as surface cracking) have been noted.

In the summer survey of 1982 some subsidence cracking was documented on the sidehill east of the South Fork of Eccles Creek. In one location a hole had developed down the hill from a small spring (Spring S25-11). The flow of about 1.5 gallons per minute (gpm) from the spring disappeared into the hole. In the 1983 summer survey, subsidence effects were observed

to have increased in the South Fork area, and subsidence had also appeared in Whiskey Canyon directly south of the Belina No. 1 portal area. Cracks have appeared and some sink holes have developed. One of these sink holes is in the bottom of the intermittent stream channel in Whiskey Canyon. No surface evidences of subsidence were observed in the August 1983 survey in areas having more than about 350 feet of overburden above the mined coal seam, or where pillars have not been pulled. Plate 3 shows the location and description of subsidence evidences noted in the August, 1983 subsidence survey.

There are two apparent reasons that subsidence effects have been more significant in the Valley Camp lease area than above other mines in the Blackhawk Formation. The first reason is that other mines have generally had more overburden than the Belina Mine. Greater overburden thicknesses generally do not permit the development of cracks, holes, or other noticeable surface effects of subsidence. The other reason is that mining within the Valley Camp lease area has shown the area to contain more faults than exist in other surrounding mines. Faults reduce the ability of a formation to withstand stresses caused by extracting a coal seam and subsequent subsidence. Consequently, in faulted areas subsidence effects are likely to transmit further vertically.

After studying hydrologic impacts of coal mines in the

Blackhawk Formation of the Wasatch Plateau, Danielson et al. (1981) concluded:

> Where subsidence has not been extensive and where water-bearing zones that overlie the Star Point-Blackhawk aquifer are perched, it is unlikely that mine dewatering induces greater recharge to the ground-water system. Neither is it likely under these conditions that the flow of springs that issue from the perched zones or the rate of natural downward leakage into the Star Point-Blackhawk aquifer are affected by mine dewatering. However, natural recharge and discharge relationships can change if hydraulic connection between the perched zones and the Star Point-Blackhawk aquifer is increased by fracturing due to subsidence.

Accordingly, no noticeable changes in the high-elevation, perched springs are expected within the portions of the Valley Camp lease area where the pillars are not pulled or where the overburden is greater than about 350 to 400 feet. However, in the remaining areas, as has been recently documented, subsidence can extend to the surface and alter the recharge-runoff characteristics of the area. Perched aquifers in these zones may be partially or wholly drained. This may increase the recharge to the regional aquifer, increase the water made in the mine, and/or change the point of discharge of a spring. It is expected that the shale and clay layers will have a tendency to seal cracks that develop, thus reducing the long-term hydrologic impacts of subsidence.

Subsidence impacts on perched springs within the Valley Camp lease area are not expected to significantly reduce base flows in the perennial streams in the area because of the large number of the springs (not all will be affected similarly) and

because of the small flow of the high elevation perched springs. As an illustration of this point, a worst-case assumption was made that mining activities within the Valley Camp lease area totally dried up every spring located in the Boardinghouse drainage that is within the Valley Camp lease area (an unrealistic assumption since most of these springs are at very high elevations where subsidence is not likely to affect the spring discharges). In the early summer of 1979, 13 springs with a combined flow of about 0.087 cfs (39 gpm) were identified in this area. The average June flow of Boardinghouse Creek (measured above the major springs near the mouth of the canyon) from 1980 through 1983 has been about 6.2 cfs. Obviously the perched springs on upper Boardinghouse Creek compose a very small portion (1.4 percent) of the flows in the snowmelt season. The average flow of Boardinghouse Creek for the same period in August has been about 1.5 cfs -- still much more than flows of the 13 identified springs (the August combined flows of these 13 springs were not measured, but would be much less than 0.087 cfs). The purpose of this example is not to quantify the effect of mining on flow in the perennial streams, but merely to illustrate that even with an unrealistic worst case, drying up small perched springs will not decrease the base flows of the perennial streams significantly.

If subsidence causes any of the small perched aquifers to drain into the mine (as it probably will at certain locations),

the water will either contribute to the regional aquifer recharge (and thus eventually result in an increased discharge from the aquifer at some location), or will increase the amount of water that will be discharged from the mine by way of Whiskey Gulch into Eccles Creek.

Areas where the mine will have less than 400 feet of overburden are outlined on Plate 4. These areas are where surface subsidence effects are most likely to develop.

Subsidence may increase the discharge of suspended sediment in adjacent streams. Subsided areas may tend to erode more than unsubsided areas until the areas are weathered and revegetated. This will not occur in streambeds of perennial streams, since they will be protected from subsidence as described subsequently in this report.

Subsidence may change the water quality in area streams. Snowmelt and a surface runoff from rainstorms is typically of very good quality, e.g. concentrations of total dissolved solids (TDS) may be less than 100 milligrams per liter (mg/l). The portion of this runoff that is intercepted by subsidence cracks will develop increased concentrations of some water quality parameters (such as TDS). The flow-weighted average TDS concentrations of the discharge from the Belina No. 1 Mine during the 1980 water year was about 325 mg/l. The large majority

of water being made in the mine does not come from subsided areas. However, if it is assumed that one-fourth of the 1980 discharge from the mine comes from surface water intercepted by subsided areas and that the TDS of these intercepted surface waters increased from 100 mg/l to 325 mg/l, then the increase of TDS load to Eccles Creek would be about 2.5 tons. This is about 0.3 percent of the approximately 835 tons of TDS load in Eccles Creek during water year 1980. More water is now being discharged from the Belina No. 1 Mine than in 1980. However, it may be unrealistic to assume that surface water leaking through subsidence cracks reaches the same TDS level as water which has been in storage for years. The purpose of this illustration is not to provide and exact quantification of the effect, but to demonstrate that the impact will probably be minimal.

One additional effect of subsidence will be that flow from springs unaffected by subsidence may flow into subsided areas. In such cases the springs will still provide a water supply for wildlife and vegetation above the subsided areas.

As has been stated, subsidence is expected to have hydrologic impacts in areas where pillars are pulled from mine workings and the overburden is less than about 350 or 400 feet thick. Perennial streams (i.e. South Fork of Eccles Creek, Whiskey Gulch, Boardinghouse Creek, Finn Creek, and Long Creek) will be protected by leaving pillars beneath the perennial portions

of these streams (see Plate 4). Pillars will not be pulled where any perennial stream is located within the area included within the angle of draw of the mine. The currently proposed angle of draw for these buffer zones is 35 degrees from vertical. However, the angle of draw in the Blackhawk Formation is likely considerably less than 35 degrees. When documentation of the actual angle of draw can be obtained, a request will be made to reduce the size of the buffer zones accordingly.

Plate 3 will be updated annually by a late summer, visual inspection of potential subsidence areas above the Belina mines. Updated versions of this plate along with a report describing the observed subsidence effects will be submitted annually to the Utah Division of Oil, Gas, and Mining. As stated in the mine permit application, aerial photogrammetric surveys will also be conducted annually as an aid in determining and monitoring the effects of subsidence.

Mine Dewatering Effects

More water has been encountered inside the Belina No. 1 Mine than was initially anticipated. Significant sources of mine water have generally been associated with faults or rolls in the formations. However, consistent with initial projections, some faults have been essentially dry. The existence of more faulting than was originally expected is one apparent cause of the relatively high amount of water that has been encountered.

The unusually high amounts of precipitation and runoff in 1982 and particularly 1983, and the effects of more surface subsidence than initially expected have also contributed to the increased amount of water in the mine.

Water is usually made at the face of the mine workings. Hansen (1979) reports that mines in the Wasatch Plateau coal field generally yield less than 10 gallons per minute per active face, with drifts drying approximately 500 feet up-dip from the face. Once a section dries up, leaks reappear only very occasionally in the future. This condition has been observed locally in the Belina mines with the exception that dry conditions generally develop within 200 feet of the face. Apparently, only a zone of saturated sandstone immediately adjacent to the mine face is dewatered by the drift.

Water made within the mine (except for water intercepted by subsidence cracks) is not expected to have any relation with the perched, undisturbed aquifers. Mine water is either stored within the mine, evaporated, hauled out as moisture on the coal, hauled out as culinary wastewater, or discharged into Whiskey Gulch. The exact quantity of water evaporated and pumped out of the mine via the fan is not known. Data are not available to make such a calculation. However, as reported in the technical review comments from OSM, 19 million gallons (equivalent to only 36 gpm) of water are evaporated annually within the Utah

Power and Light Company Wilberg Mine. This estimate is based on an air flow in the Wilberg Mine of 570,000 cfm, with air entering the mine at 45 percent humidity and exiting at 98 percent humidity. Due to the difference in climatic factors between the Wilberg and Valley Camp mines, it is assumed the air entering the Belina Mine No. 1 will be greater than 45 percent humidity. Therefore, there will be less potential for moisture pickup through the Belina Mine than in the Wilberg Mine. The air flow through the Belina Mine is 250,000 cfm, approximately 44 percent of the air flow in the Wilberg Mine. Applying the ratio of air flow between the Wilberg and Belina mines, and considering the humidity comparison made above, it is estimated that the water loss due to evaporation in the Belina Mine will be less than 16 gpm. The amount of water hauled away as culinary wastewater is equivalent to an annual average flow of about 1.4 gpm. About 16 pounds of water are added to each ton of coal shipped from the mine. At the eventual maximum production rate of 2,016,000 tons per year (only about 750,000 tons were shipped in 1982), this amounts to an equivalent flow of about 7.4 gpm.

Flow measurements have been made of the mine water discharge from the Belina No. 1 Mine at two-week intervals since 1977 (there has been no discharge from the Belina No. 2 Mine). The average monthly discharges over this six-year period and for water year 1983 are shown in Table 5. Discharges during 1983 have been significantly higher than the six-year average. There

Table 5. Average discharge from the Belina No. 1 Mine

Average Flow in Gallons Per Minute

| Period | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1983 water year | 2 | 36 | 36 | 27 | 27 | E31 | 36 | 360 | 405 | 300 | 63 | E45 | E114 |
| 1978 through 1983 average | 37 | 29 | 29 | 20 | 7 | 8* | 18 | 89 | 133 | 96 | 28 | 49* | 45* |

E estimated
* 1983 value is estimated

are three known factors for this increase. First, 1983 has been an extremely high water year with flows at record historical levels on many streams in the area. Second, the mine workings have expanded and greater flows can be expected with expanded workings. Third, surface subsidence effects have increased, particularly in 1982 and 1983. These surface disturbances undoubtedly intercept surface flows or disrupt small perched aquifers and provide access of the intercepted water into the mines.

As can be seen from Table 5, mine discharge reached a recorded peak of about 405 gpm on June 21, 1983. By August 25, 1983 the discharge had dropped to about 60 gpm. The average discharge for the 1983 water year (ending September 30, 1983) is expected to be about 100 gpm while the six-year average discharge has been about 43 gpm. As a result of these discharges Whiskey Gulch is now being categorized by DOGM as a perennial stream. During the three-year period when the U.S. Geological Survey has published flow records for Eccles Creek (water years 1980 through 1982), the Belina Mine discharge has accounted for about 2.2 percent of the flow of Eccles Creek and about 0.7 percent of the flow of Mud Creek below Winter Quarter Canyon.

As pointed out by Waddell et al. (1983), mining activities may have the effect of redistributing the flow along a stream. For example, flow discharged from the Belina mines would probably reach Mud Creek eventually if the mines did not exist, but would

be added at different discharge points (such as seepage zones in Eccles or Mud creeks). Intercepting water in the mine probably has the effect of increasing the base flows in Whiskey Gulch, Eccles Creek, and Mud Creek during the mining period. When the mining operation ends, base flows may be reduced slightly until mine cavities are filled. However, as pointed out, the magnitude of the increase or decrease of baseflows has been, and is expected to be, quite small when compared to the flow of the principal receiving streams. Water which is discharged from the mine would normally have traveled to an outlet some distance from the lease area and represents only a small fraction of the water flowing from the watershed.

A probable beneficial effect of mine dewatering that may partially or completely offset the slight negative effect on water quality previously described as a result of subsidence was noted by Vaughn Hansen Associates (1980). Because the Belina mines act as interceptor drains, the ground water that is brought to the surface has a lower dissolved solids content than would have existed if the water were to continue its downward movement through shale layers, dissolving increased amounts of salt with distance (Southeatern Utah Association of Governments, 1977; Hansen, 1979). In this regard, Valley Camp mines will have a slightly beneficial impact on the chemical quality of water in the area streams because the small amount of water which is brought to the surface will dissolve fewer constituents in

the stream channel than it would have with increased contact time in the shale layers of the Blackhawk.

Although suspended sediment and oil and grease may increase at the mine mouth, these constituents will be removed in keeping with regulatory requirements prior to potential discharge into adjacent streams.

Because of the high alkalinity and low acidity concentrations in the area (differing normally by one or two orders of magnitude), acid drainage problems should not occur as a result of mining. This is fortified by the fact that coal in the area has a low sulphur content (U.S. Geological Survey, 1979).

Mine dewatering may divert some water from the Huntington Creek Drainage into the Mud Creek Drainage. However, the coal seam is down-dipped towards Huntington Creek. As areas are mined and abandoned on the west side of the lease area, they could collect water which was encountered in the mines in the Mud Creek drainage. Consequently, it is uncertain which basin may be benefited at the expense of the other. In either case, the effect is expected to be small (less than 1 percent) and unnoticable in the baseflows of either Huntington Creek or Mud Creek.

There has been some concern expressed concerning the fact

that flows from a spring on the west side of Pleasant Valley Canyon near the Utah No. 2 Mine diminished greatly several years ago. Investigation of this matter has shown that this occurred during the 1977 drought. Gooseberry Creek, a nearby gaged stream, had only 19 percent of its 44-year average during the 1977 water year. Low or no spring flows during such a period should be expected. The spring in question is now flowing at a high rate (corresponding to the high flow characteristics of 1983). The spring is located on the opposite side of Mud Creek from the Utah No. 2 Mine. It is not felt that the Utah No. 2 Mine had any significant impacts on the flow of the spring.

Impacts to Water Rights

As pointed out previously, groundwater intercepted in the mine and discharged in Whiskey Gulch will have the effect of redistributing flows within the hydrologic system, thereby potentially impacting both surface and groundwater rights within and adjacent to the permit area. According to the groundwater contour map, south of the dike the direction of groundwater flow is to the east, toward Mud Creek upstream from its junction with Eccles Creek. Mine water is discharged into Whiskey Gulch which flows back through Eccles Creek to Mud Creek. Although the ultimate flow in Mud Creek may not be diminished, the discharge point for the groundwater has been altered thereby potentially affecting water rights on Mud Creek and tributaries upstream from its confluence with Eccles Creek. Since the dike serves

as a partial barrier to groundwater flow, groundwater intercepted on the south side of the dike and subsequently discharged into Whiskey Gulch will result in a reduction of water table seepage along perennial streams or from water table springs on the south side of the dike. Likewise on the north side of the dike, water intercepted in the mine will result in a redistribution of flows on Eccles Creek, potentially affecting both surface and groundwater rights along Eccles Creek. However, even if the entire mine water discharge is attributed as impact to Mud Creek, and/or Eccles Creek, it has been shown that impact resulting from this redistribution of flows on Mud Creek or Eccles Creek would be less than 1 percent or 2.2 percent respectively.

It is anticipated that Mud Creek on the east and Huntington Creek on the west will serve as recharge boundaries to drawdown created by the mine. Therefore, potential impacts to the water rights from drawdown in the groundwater system should be confined within the boundaries.

Impacts to water rights associated with the perched aquifer system could occur as a result of subsidence. As indicated previously, in areas where overburden is less than 350 to 400 feet, subsidence cracking can extend to the surface, altering recharge runoff characteristics of the area and partially or wholly draining perched aquifer systems if such are intercepted by the cracking.

Although it is impossible to predict the exact effects of subsidence on existing rights, an examination of the location of existing rights relative to potential subsidence impacts will help identify to which rights impacts can be anticipated. The location of surface and groundwater rights within and adjacent to the mine plan area are illustrated on Plates 5 and 6, respectively.

Impacts to surface water rights from subsidence are anticipated only in that runoff-recharge characteristics may be altered in areas where subsidence cracking will extend to the surface. These potential areas were identified on Plate 4 where overburden is less than 350 to 400 feet. Impacts to the creek-bed itself from subsidence where surface water rights are located is not anticipated since all surface water rights within the permit area are located along streams classified as perennial by DOGM, and since perennial streams will be protected from subsidence by not pulling the pillars beneath them.

Of the groundwater rights within the permit area potentially affected by subsidence, 4 rights (91-3595, 91-1058, 91-3596, and 91-1691) are associated with wells and only 3 rights (91-1643, 91-3499, and 91-3500) are associated with springs. All four wells are owned by Valley Camp, therefore any impact to these wells will result in impacts to themselves. All three springs are located in zones having less than 300 feet of overburden,

and therefore could potentially be affected by subsidence. All three springs have been added to the monitoring plan to determine impacts if such should occur.

As indicated above, drawdown in the regional water table from the mine may result in the diminuation of flows in water table springs and perennial streams receiving seepage from the regional water table. Surface water rights potentially affected along perennial streams are illustrated on Plate 6. Also as indicated above, this effect to flow to any one stream is anticipated to be small. Of these surface water rights potentially affected it should be pointed out that Valley Camp holds surface water rights 91-3587 and 91-3588 on Boardinghouse and Finn canyons and spring right 91-3586 in lower Boardinghouse which can serve as mitigation to impacts on these streams. Eccles Creek below Whiskey Creek is receiving additional flows due to mine water discharge in Whiskey Canyon. All of these perennial streams are currently monitored as part of the monitoring program to verify the effect of mining on these streams.

Wells (91-1114 and 91-1560) located along Eccles Creek potentially affected by drawdown from the mine are owned by Coastal States Coal Company. Two points should be made regarding effects to these water rights. First, Coastal States which boarders Valley Camp to the west and which extends northward across Eccles Creek could have just as much effect on their

own wells as Valley Camp. It would be difficult to differentiate impacts. Second, as far as mitigation, Utah Water law grants a right to extract a quantity of water from a well but does not guarantee pressure. Therefore, should the water table be lowered by another user such as Valley Camp, it is Coastal States responsibility to deepen their wells, not Valley Camp's responsibility. Such has been proven in the courts.

## ALTERNATIVE WATER SUPPLIES AND HYDROLOGIC MITIGATING FACTORS

Although, impacts from the mine are not anticipated to significantly diminish the flows associated with any particular water right, the monitoring plan has been formulated to observe and aid in predicting such effects and should such an impact occur one of the following alternative means of water supply would be used by Valley Camp to replace an interrupted supply of any legal owner of such rights.

1. Private contractors living within the district could be retained to haul water to specific locations from applicant owned sources within Pleasant Valley.
2. The affected water right could be purchased by Valley Camp.
3. Valley Camp has four wells within the mine plan area which could be utilized to supply supplemental amounts of water for both private or industrial use.
4. Valley Camp could effect an additional exchange of right between Scofield Reservoir water and one of the other 71 springs found within or adjacent to the lease area for which valid rights do not now exist.

As indicated above, Valley Camp of Utah, Incorporated owns several water rights on or in the vicinity of the lease area. In fact, most of the more significant water rights in the area are owned by Valley Camp. The Vaughn Hansen Associates (1980) report contains a list of water rights in the area. The rights listed as owned by the North American Coal Company are now owned

10 January 1984

UMC 817.53 and 817.54 WATER RIGHTS AND REPLACEMENT

The applicant has identified and evaluated the probable impact of mining operations on existing ground water and surface water rights. The applicant must provide a commitment that any interference with existing water rights will be compensated. They must also describe, in detail, how this will be accomplished. A specific plan to provide replacement water for those springs that the applicant predicts will be affected by future subsidence must also be provided (see Volume VI, pages 24 to 30 and Plate 4 of the permit application). These springs include 91-1643 and 91-3499. Therefore, the following commitments and information must be provided.

* The applicant has verbally committed (December 1, 1983, meeting in Denver) to using their available water rights to replace water sources potentially affected by the Belina Mines Complex. In addition, the applicant must present a plan to replace water for springs 91-1643, 91-3499 and 91-3500. Both of these commitments should be submitted in writing and incorporated into the PAP.

COMMENTS

Page No. 41 of Appendix N, Volume VI, has been revised to reflect additional commitments pertaining to this section. The attached page Nos. 41 and 42 are to be inserted into Appendix N of Volume VI.

ALTERNATIVE WATER SUPPLIES AND HYDROLOGIC MITIGATING FACTORS

Although impacts from mining are not anticipated to significantly diminish or terminate the flows associated with any particular spring or water right, provisions for mitigation of such impacts are provided for. A monitoring plan has been formulated to observe and provide conditional data of these water sources and associated wetlands or wildlife habitat, as mining progresses.

In the event that such interruption or cessation should occur to a perennial spring or one with existing water rights, one of the following alternative means of re-establishing an equal amount of flow in the same general area would be used by Valley Camp. Temporary water supply services, if required, would remain in effect until such time as near original flow returns, thus maintaining the companion wetlands to near disturbed status.

If the springs previously identified on page 38 are permanently lost, Valley Camp will compensate the legal owner of such water rights by utilization of any of the following means, excepting No. 1:

1. Private contractors living within the district could be retained to haul water to specific locations from applicant-owned sources within Pleasant Valley.

2. The affected water right could be purchased by Valley Camp.

3. Valley Camp has four wells within the mine plan area which could be utilized to supply supplemental amounts of water for both private or industrial use.

4. Valley Camp could effect an additional exchange of right between Scofield Reservoir water and one of the other 71 springs found within or adjacent to the lease area for which valid rights do not now exist.

5. Relocate and develop new discharge point in the same general area of lost service.

As indicated above, Valley Camp of Utah, Inc. owns several water rights on or in the vicinity of the lease area. In fact, most of the more significant water rights in the area are owned by Valley Camp. The Vaughn Hansen Associates (1980) report contains a list of water rights in the area. The rights listed as owned by the North American Coal Company

are now owned by Valley Camp. The larger rights include: Clear Creek Springs (0.5 cfs), Clear Creek Mine Tunnel No. 3 (0.446 cfs), Utah No. 1 Mine (0.15 cfs), O'Connor Mine (0.047 cfs and 0.030 cfs), the Belina Mine Well (7.7 acre-feet per year), and stockwater rights on Boardinghouse and Finn Creeks (unspecified amounts). Valley Camp has also transferred 15 acre-feet per year of water rights to the Town of Scofield. If mining activities within the Valley Camp lease area do result in noticeable diminuation of base flows in streams or springs, it is expected that this diminuation would be much less than the rights owned by Valley Camp. These supplies can be used to provide recompense to any damaged user. Meanwhile, downstream users are benefitting from the portion of these rights not currently utilized by Valley Camp.

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## SUMMARY AND CONCLUSIONS

1. The recent update of information and data since the mine plan was submitted January 1980 has permitted a better quantification of probable impacts.

2. The additional information recently obtained has shown that the cause and effect relationships discussed in the January 1980 report were correct, but that predictions of hydrologic impacts of mining should be modified and expanded to account for anomalous conditions discovered within the Valley Camp lease area.

3. Excessive fractures, faults and rolls with significant subsidence occur within the mined area resulting in more groundwater impacts than were initially anticipated.

4. Approximately 400 gpm was flowing into the mine in the spring of 1983 following an abnormally heavy snow pack and significant subsidence. By fall of 1983 the flow had dimished to approximately 40 gpm.

5. The 230-foot thick east-west dike encountered in the mine is relatively impermeable and may form a partial barrier

to transverse water movement. However, regional ground contours are nearly perpendicular to the dike.

6. Groundwater intercepted by the mine south of the dike and discharged into the Eccles drainage will reduce somewhat the flow into Boardinghouse Canyon. Hence the main spring in Boardinghouse will be monitored to determine the impact. Valley Camp owns the water right on this Boardinghouse spring.

7. Most flow into the mine fluctuates seasonally indicating that water entering the mine is primarily coming through the Blackhawk, not through the underlying Aberdeen and Star Point sandstones.

8. The sandstones are tightly cemented, with low transmissivities. Most water entering the mine comes through fractures in the sandstones.

9. Water flowing from springs in the Blackhawk is perched above the regional water table.

10. Rolls in the coal bearing formations have produced tension cracks which serve as conduits to drain adjacent sandstones, and thereby yield more water and create more roof instability than do faults.

11. Closely spaced step faults also have caused excessive fracturing, rolls, drippers, and roof instability.

12. Additional surface and groundwater monitoring stations have been added as requested by OSM. These additions include the main Boardinghouse spring, the three springs with water rights, and representative larger springs in the Blackhawk Formation.

13. The principal use of the hydrologic resource is for watering livestock and wildlife. Since numerous springs and streams exist on the lease, disturbance of some springs does not necessarily cause any hardship on livestock or wildlife.

14. Surface cracks from subsidence have occurred when pillars have been pulled where overburden is less than 350 to 400 feet. Some surface and perched flow has been intercepted by subsidence cracks, and water flow into the mine has increased accordingly.

15. The six-year average discharge from the mine has been 43 gpm, but the average flow during the 1983 water year is expected to be about 100 gpm due to more subsidence cracking, extended mining into faulted and rolled formations, and a record high precipitation.

16. Subsidence impacts and expanded mining are not expected to measurably alter flows in perennial streams. An unrealistic worst case assumption yielded only a one percent change.

17. Surface water entering the mine through subsidence cracks will increase in TDS somewhat. When this intercepted water is pumped into Eccles Creek, the TDS impact will be less than 0.3 percent.

18. Perennial streams will be protected from subsidence by leaving pillars within the angle of draw.

19. Belina Mine discharge has averaged 2 percent of the flow in Eccles Creek and 0.7 percent of the flow in Mud Creek.

20. Mine dewatering may divert some water from the Huntington Creek drainage. However, after mining some additional water may be diverted into the Huntington Creek drainage through the abandoned mine workings. The net effect is uncertain and is expected to be less than one percent.

21. The potential exists for existing water rights in streams, wells, and springs to be affected, since flows may be reduced by subsidence and mine interception of groundwater. Monitoring has been increased to document any changes in flow. Valley Camp holds extensive water rights which would be transferred

to mitigate any confirmed adverse impacts to water rights which Utah State water law protects.

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# APPENDIX A

# SURFACE AND GROUND WATER QUALITY DATA

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-001
Location Belina Mine Discharge

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°C) | TEMPERATURE WATER (°C) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | BOD (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOLS (MG/L) | NITROGEN AMMONIA as N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$-P (MG/L) | PHOSPHATE ORTHO as $PO_4$-P (MG/L) | SULFATE as $SO_4$ (MG/L) | HYDROXIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µMHOS) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BI-CARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pCi/L) | BETA RADIO-ACTIVITY (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 16:21 | 0.14 | -2 | 5 | 7.4 | 79.0 | <2.0 | | | 16.0 | | | 1.20 | | | | | | | | | | | | 14.0 | | 365 | | | 450 | | | | 250 | | 4.0 | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:25 | 0.07 | -2 | 4 | | 27.0 | <2.0 | | | 8.5 | | | 1.00 | | | | | | | | | | | | 30.0 | | 315 | | | | | | | 540 | | <0.1 | | |
| [illegible] | [illegible] | [illegible] | -2 | 3 | 7.7 | | | | | | | | | | | | | | | | | | | | 5.0 | | 320 | | | 276 | | | | 230 | | 8.0 | | |
| [illegible] | [illegible] | [illegible] | 5 | 3 | 7.8 | 12.0 | <2.0 | | | 22.0 | | | 0.10 | | | | | | | | | | | | 54.0 | | 320 | | | 560 | | | | 118 | | 6.0 | | |
| [illegible] | 14:18 | 0.07 | 6 | 5 | 8.0 | | | | | | | | | | | | | | | | | | | | 3.0 | | 330 | | | 480 | | | | 320 | | 12.0 | | |
| [illegible] | 15:30 | 0.06 | | | 8.0 | 77.0 | <2 | | | 40.0 | | | <1.0 | | | | | | | | | | | | 154 | | 295 | | | 450 | | | | 212 | | 10.0 | | |
| [illegible] | | Pond | | | 7.4 | 230 | <2 | | | 76.0 | | | 10.1 | | | | | | | | | | | | | | 370 | | | | | | | 120 | | 3.74 | | |
| [illegible] | | Pond | | | 7.7 | 330 | <2 | | | 64.0 | | | 9.3 | | | | | | | | | | | | | | 350 | | | | | | | 108 | | 1.87 | | |
| [illegible] | | Pond | | | 7.8 | 170 | <2 | | | 61.0 | | | 3.2 | | | | | | | | | | | | | | 405 | | | | | | | 126 | | 1.87 | | |
| 5/13/81 | 16:30 | Pond | 15 | 19 | | | | | | | | | | | | | | | | | | | | | 27.0 | | 293 | | | | | | | 190 | | <0.01 | | |
| 5/21/81 | 15:30 | 0.06 | | | | 23.0 | <2 | | | 16.0 | | | 0.20 | | | | | | | | | | | | 10.0 | | 330 | | | | | | | 208 | | 32.00 | | |
| [illegible] | [illegible] | Pond | 26 | 21 | 7.4 | | | | | | | | | | | | | | | | | | | | 33.0 | | 415 | | | 530 | | | | 134 | | <0.1 | | |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 7.1 | | | | | | | | 16.0 | | | | | | | | | | | | 12.0 | | 120 | | | 400 | | | | 172 | | 3.20 | | |
| [illegible] | 16:00 | 0.04 | | | 8.1 | 4.0 | 2.0 | | | 5.3 | | | <0.01 | | | | | | | | | | | | 10.0 | | 480 | | | 750 | | | | 194 | | <0.01 | | |
| 7/22/81 | 14:50 | 0.02 | 17 | 12 | 8.0 | | | | | | | | | | | | | | | | | | | | 1.0 | | 380 | | | 540 | | | | 198 | | <0.01 | | |
| [illegible] | [illegible] | | | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | 20 | 20 | 8.4 | | | | | | | | | | | | | | | | | | | | 2.0 | | 350 | | | 445 | | | | [illegible] | | [illegible] | | |
| [illegible] | 14:45 | 0.12 | 14 | 12 | 7.0 | | | | | | | | 1.80 | | | | | | | | | | | | 35.0 | | 345 | | | 355 | | | | 164 | | [illegible] | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | FERROMANGAN TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | | | | | | | | | | 0.180 | | | 0.022 | | | | | <0.001 | | | | | | | | | Grab Samples |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | 0.120 | | | 0.020 | | | | | 0.001 | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | 0.050 | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | 3.540 | | | | | | | | 0.002 | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | 0.147 | | | | | | | | | | | | | | | | | Grab Sample | |
| [illegible] | | | | | | | | | | | | | | | | | 0.600 | | | 0.090 | | | | | 0.002 | | | | | | | | | | |
| 4/7/81 | | | | | | | | | | | | | | | | 1.060 | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | 0.430 | | | | | | | | | | | | | | | | | | | |
| 4/30/81 | | | | | | | | | | | | | | | | 1.100 | | | | | | | | | | | | | | | | | | | |
| 5/13/81 | | | | | | | | | | | | | | | | | 3.450 | | | | | | | | | | | | | | | | | Grab | |
| [illegible] | | | | | | | | | | | | | | | | | 0.170 | | | | | | | | <0.001 | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | [illegible] | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | [illegible] | | | | | | | | 0.002 | | | | | | | | | | |
| 7/22/81 | | | | | | | | | | | | | | | | | 0.250 | | | | | | | | 0.001 | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | 0.166 | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | [illegible] | | | | | | | | 0.004 | | | | | | | | | | |
| 10/9/81 | | | | | | | | | | | | | | | | | 0.150 | | | | | | | | [illegible] | | | | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-001
Location Rolina Mine Discharge

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROGEN SULFIDE as H2S MG/L | FLUORIDE as MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µMHOS/CM | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BICARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY PCI/L | BETA RADIO-ACTIVITY PCI/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7-23-81 | 14:21 | 0.02 | 18 | 12 | 8.0 | | | | | | | | | | | | | | | | | | | | 1.0 | | 376 | | | 382 | | | | 174 | | <0.01 | | |
| 10-14-81 | 14:25 | 0.03 | 1 | 4 | 8.0 | 700 | 5 | | | 2.4 | | | 78.60 | | | | | | | | | | | | 16.0 | | 330 | | | 500 | | | | 147.[illegible] | | <0.01 | | |
| 11-18-81 | 4:30 | 0.02 | 13 | 5 | 8.1 | | | | | | | | | | | | | | | | | | | | 4.0 | | 325 | | | 526 | | | | 155.50 | | <0.01 | | |
| 11-11-81 | 13:23 | 0.003 | 4 | 4 | 7.5 | | | | | | | | 1.40 | | | | | | | | | | | | 5.0 | | 370 | | | 320 | | | | 182.46 | | <0.01 | | |
| 11-25-81 | 13:00 | 0.004 | -3 | 2 | 7.2 | | | | | | | | | | | | | | | | | | | | 1.0 | | 335 | | | 340 | | | | 194.30 | | <0.01 | | |
| 12-9-81 | 16:50 | 0.002 | 4 | 1 | | | | | | | | | 0.20 | | | | | | | | | | | | 23.0 | | 385 | | | 260 | | | | 168.80 | | 8.00 | | |
| 12-23-81 | 13:28 | 0.004 | -10 | 1 | 7.7 | | | | | | | | | | | | | | | | | | | | 3.0 | | 375 | | | 305 | | | | 183.65 | | 2.00 | | |
| 1-13-82 | 13:00 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-27-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-10-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | 13:10 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-10-82 | 15:00 | 0.07 | 3 | 1 | 7.5 | 2.0 | <2.0 | | | 1.5 | | | <1.0 | | | | | | | | | | | | 2.0 | | 500 | | | 729 | | | | 196.40 | | 4.00 | | |
| 3-24-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | 14:00 | 0.04 | 11 | 3 | 7.7 | 7.0 | <2.0 | | | 6.8 | | | <1.0 | | | | | | | | | 51.0 | | | 2.0 | | 340 | | | 510 | | | | 124.10 | | 6.00 | | |
| 4-28-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-12-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-26-81 | 14:30 | 0.21 | 19 | 6 | 7.1 | | | | | | | | <1.0 | | | | | | | | | | | | 1.0 | | 610 | | | 659 | | | | 142.90 | | 10.00 | | |
| 6-9-82 | 14:00 | 0.1 | 15 | 11 | 7.4 | | | | | | | | <1.0 | | | | | | | | | | | | 44.00 | | 490 | | | 448 | | | | 248.50 | | 8.00 | | |
| 6-23-82 | 15:20 | 0.33 | | | 7.7 | | | | | | | | | | | | | | | | | | | | 217 | | 415 | | | 640 | | | | 40.50 | | 4.00 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS MG/L | GERMANIUM TOTAL MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7-23-81 | | | | | | | | | | | | | | | | | 0.188 | | | | | | | | | | | | | | | | | | |
| 7-14-81 | | | | | | | | | | | | | | | | | 0.210 | | | | | | | | <0.001 | | | | | | | | | | |
| 11-11-81 | | | | | | | | | | | | | | | | | 0.166 | | | | | | | | | | | | | | | | | | |
| 11-25-81 | | | | | | | | | | | | | | | | | 0.195 | | | | | | | | <0.001 | | | | | | | | | | |
| 12-9-81 | | | | | | | | | | | | | | | | | 0.155 | | | | | | | | | | | | | | | | | | Grab Sample |
| 12-23-81 | | | | | | | | | | | | | | | | | 0.120 | | | | | | | | 0.002 | | | | | | | | | | |
| 1-13-82 | | | | | | | | | | | | | | | | | 0.130 | | | | | | | | | | | | | | | | | | Grab Sample |
| 1-27-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 2-10-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 3-10-82 | | | | | | | | | | | | | | | | | 0.050 | | | | | | | | <0.001 | | | | | | | | | | Grab Sample |
| 3-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 4-14-82 | | | | | | | | | | | | | | | | | 0.117 | | | | | | | | <0.001 | | | | | | | | | | Grab Sample |
| 4-28-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 5-12-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Trevor Whiteside |
| 5-26-82 | | | | | | | | | | | | | | | | | 0.120 | | | | | | | | <0.001 | | | | | | | | | | |
| 6-9-82 | | | | | | | | | | | | | | | | | 0.070 | | | | | | | | <0.001 | | | | | | | | | | |
| 6-23-82 | | | | | | | | | | | | | | | | | 2.550 | | | | | | | | | | | | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-001
Location Belina Mine Discharge

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. MG/L | B.O.D. MG/L | T.O.C. MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | CHLORIDE as Cl MG/L | FLUORIDE as F MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SUSPENDED SOLIDS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SUSPENDED SOLIDS MG/L | SPECIFIC CONDUCTANCE µmhos/cm | TURBIDITY FTU | CARBONATE ALK as CO3 MG/L | BICARBONATE ALK as HCO3 MG/L | TOTAL ALK as CaCO3 MG/L | TOTAL HARDNESS as CaCO3 MG/L | ACIDITY as CaCO3 MG/L | ALPHA RADIO ACTIVITY pc/L | BETA RADIO ACTIVITY pc/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7-14-82 | 14:30 | 0.5 | 24 | 14 | 7.5 | 49.0 | 48.0 | | | 47.0 | | | 2.0 | | | | | | | | | | | | 50.0 | | 430 | | 530 | | | | 260.30 | | 7.00 | | |
| 7-29-82 | 14:40 | 0.02 | 22 | 14 | 7.8 | | | | | | | | | | | | | | | | | | | | 1.0 | | 422 | | 581 | | | | 216.70 | | 3.00 | | |
| 8-11-82 | 16:13 | 0.02 | 14 | 11 | 8.0 | | | | | | | | 0.8 | | | | | | | | | | | | 5.0 | | 480 | | 571 | | | | 248.50 | | 2.00 | | |
| 8-25-82 | 14:25 | 0.02 | | | 7.9 | | | | | | | | | | | | | | | | | | | | 1.0 | | 418 | | 640 | | | | 181.30 | | <0.01 | | |
| 9-8-82 | 14:55 | 0.16 | 22 | 9 | 8.1 | | | | | | | | 0.4 | | | | | | | | | | | | 23.0 | | 362 | | 577 | | | | 238.50 | | 1.00 | | |
| 9-22-82 | 14:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-13-82 | 14:50 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02-24 | 11:48 | 0.01 | 1 | 2 | 7.7 | | | | | | | | <0.1 | | | | | | | | | | | | 460 | <0.1 | 382 | | 820 | | | | | | | | |
| 11-10-82 | 14:00 | -0- | Inaccessible | | | Road Closed | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-24-82 | | 0.16 | | | 7.9 | | | | | | | | <0.1 | | | | | | | | | | | | 48.0 | | 610 | | | | | | | | | | |
| 12-8-82 | | | | | 7.9 | | | | | | | | <0.1 | | | | | | | | | | | | 1.0 | | 462 | | 700 | | | | | | | | |
| 12-21-82 | 12:35 | 0.08 | 4 | 3 | 8.1 | | | | | | | | <0.1 | | | | | | | | | | | | <0.1 | | 432 | | | | | | | | | | |
| 1-27-83 | | 0.06 | | | 7.10 | | | | | | | | <0.1 | | | | | | | | | | | | 56.0 | | 468 | | | | | | | | | | |
| 2-21-83 | 12:55 | 0.06 | 6 | 3 | 7.5 | | | | | | | | 0.2 | | | | | | | | | | | | 47.0 | | 402 | | | | | | | | | | |
| 2-25-83 | | | | | 7.5 | | | | | | | | | | | | | | | | | | | | 42.0 | | 448 | | | | | | | | | | |
| 3-15-83 | | | | | 7.2 | | | | | | | | 0.8 | | | | | | | | | | | | 7.0 | | 348 | | | | | | | | | | |
| 4-13-83 | | | | | 7.3 | | | | | | | | <0.2 | | | | | | | | | | | | 22.0 | | 378 | | | | | | | | | | |
| 4-21-83 | 11:43 | 0.08 | | | 8.1 | | | | | | | | <0.2 | | | | | | | | | | | | 58.0 | | 356 | | 445 | | | | | | | | |
| 4-21-83 | | | | | 7.60 | | | | | | | | 2.00 | | | | | | | | | | | | 53.0 | | 260 | | | | | | | | | | |
| 5-25-83 | | | | | 7.80 | | | | | | | | 0.4 | | | | | | | | | | | | 106 | | 248 | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEXavalent CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as SiO2 MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7-14-82 | | | | | | | | | | | | | | | | | 0.820 | | | | | | | | <0.001 | | | | | | | | | | |
| 7-28-82 | | | | | | | | | | | | | | | | | 0.050 | | | | | | | | | | | | | | | | | | |
| 8-11-82 | | | | | | | | | | | | | | | | | 0.918 | | | | | | | | 0.004 | | | | | | | | | | Grab Sample |
| 8-25-82 | | | | | | | | | | | | | | | | | 0.010 | | | | | | | | | | | | | | | | | | |
| 9-8-82 | | | | | | | | | | | | | | | | | 0.914 | | | | | | | | 0.005 | | | | | | | | | | Grab Sample |
| 9-22-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Pond under Repair |
| 10-13-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Pond under Repair |
| 11-27-82 | | | | | | | | | | | | | | | | | 0.018 | | | | | | | | | | | | | | | | | | Below lower pond |
| 11-10-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-24-82 | | | | | | | | | | | | | | | | | 1.17 | | | | | | | | | | | | | | | | | | Collected by Valley Corp. ~~Lower Pond~~ |
| 12-8-82 | | | | | | | | | | | | | | | | | 0.070 | | | | | | | | | | | | | | | | | | Collected by Valley Corp |
| 12-21-82 | | | | | | | | | | | | | | | | | 0.270 | | | | | | | | | | | | | | | | | | |
| 1-27-83 | | | | | | | | | | | | | | | | | 0.280 | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | | | | | | | | | | | | | | | 3.660 | | | | | | | | | | | | | | | | | | |
| 2-25-83 | | | | | | | | | | | | | | | | | 0.310 | | | | | | | | | | | | | | | | | | |
| 3-15-83 | | | | | | | | | | | | | | | | | 0.360 | | | | | | | | | | | | | | | | | | |
| 4-13-83 | | | | | | | | | | | | | | | | | 0.380 | | | | | | | | | | | | | | | | | | |
| 4-21-83 | | | | | | | | | | | | | | | | | 2.670 | | | | | | | | | | | | | | | | | | Thawing - Storm Runoff |
| 4-27-83 | | | | | | | | | | | | | | | | | 0.200 | | | | | | | | | | | | | | | | | | |
| 5-25-83 | | | | | | | | | | | | | | | | | 3.150 | | | | | | | | | | | | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-001
Location Belina Mine Discharge

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | HYDROXIDE as OH | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK. as $CO_3$ | BI-CARBONATE ALK as $HCO_3$ | TOTAL ALK as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | ML/L | MG/L | MG/L | MG/L | µMHOS/CM | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 6-1-83 | | | | | 7.80 | | | | | | | | <0.1 | | | | | | | | | | | | 56.0 | | 532 | | | | | | | | | | | | |
| 6-8-83 | | | | | 7.80 | | | | | | | | <0.1 | | | | | | | | | | | | 77.0 | | 528 | | | | | | | | | | | | |
| 6-9-83 | | | | | 8.00 | | | | | | | | <0.1 | | | | | | | | | | | | 44.0 | | 504 | | | | | | | | | | | | |
| 6-21-83 | 15:50 | 0.9 | 20 | 12 | 7.3 | | | | | | | | <0.1 | | | | | | | | | | | | 123 | | 836 | | | 523 | | | | | | | | | |
| 8-25-83 | 14:10 | 0.14 | 19 | 16 | 7.4 | | | | | | | | <0.1 | | | | | | | | | | | | 85.0 | | 832 | | | 605 | | | | | | | | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEX as CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 6-1-83 | | | | | | | | | | | | | | | | | 2.350 | | | | | | | | | | | | | | | | | |
| 6-8-83 | | | | | | | | | | | | | | | | | 1.750 | | | | | | | | | | | | | | | | | |
| 6-9-83 | | | | | | | | | | | | | | | | | 1.650 | | | | | | | | | | | | | | | | | |
| 6-21-83 | | | | | | | | | | | | | | | | | 1.650 | | | | | | | | | | | | | | | | | |
| 8-25-83 | | | | | | | | | | | | | | | | | 1.590 | | | | | | | | | | | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-1
Location [illegible] #2

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°F) | TEMPERATURE WATER (°F) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | B.O.D. (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as NH3-N (MG/L) | NITROGEN NITRATE as NO3-N (MG/L) | NITROGEN NITRITE as NO2-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as PO4-P (MG/L) | PHOSPHATE ORTHO as PO4-P (MG/L) | SULFATE as SO4 (MG/L) | CHLORIDE as Cl (MG/L) | FLUORIDE as F (MG/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SUSPENDED SOLIDS (MG/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µmhos) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BICARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK. as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO ACTIVITY (PC/L) | BETA RADIO ACTIVITY (PC/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | 6 | 3 | 5 | 7.5 | | | | 4.8 | | 3.0 | 10.15 | <1.0 | | 0.15 | 0.02 | <0.01 | 0.65 | | 0.042 | 0.016 | 43.0 | 70.01 | | 12.0 | <0.1 | 440 | | | 5.3 | 1.50 | <0.01 | [illegible] | 244 | [illegible] | | | |
| [illegible] | [illegible] | 2.4 | 21 | 12 | 7.6 | | | | 10.0 | | 8.0 | 5.8 | <1.0 | 0.007 | 0.75 | 0.01 | | 0.90 | | 0.025 | 0.010 | 22.0 | <0.01 | | 22.0 | 0.4 | 320 | | | 450 | 7.50 | <0.01 | 313.6 | 262 | 258 | | 2 | 6 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 110 | 120 | | | | 3.0 | | <1.0 | 0.00 | | 0.70 | <0.01 | 0.10 | | | | 32.0 | | | 12.3 | | 210 | | | 525 | | | 125.2 | | | | | |
| [illegible] | [illegible] | 3 | 27 | 15 | 7.3 | | | | | | | 7.5 | 1.3 | 0.008 | | | | | | | | 31.5 | | | 2.0 | | 255 | | | 390 | | | 253.7 | | | | | |
| 10/25/[illegible] | 10:50 | 4.7 | 5 | 3 | 7.5 | | | | | | | 11.0 | 1.6 | 0.028 | | | | | | | | 38.0 | | | 4.0 | | 275 | | | 540 | | | 275.2 | | | | | |
| [illegible] | [illegible] | 2.9 | -17 | 0 | [illegible] | | | | | | | 10.4 | 1.1 | [illegible] | | | | | | | | 41.0 | | | 16.0 | | 316 | | | | | | [illegible] | | | | | |
| [illegible] | [illegible] | 5.7 | -7 | 0.2 | 7.8 | | | | | | | 10.0 | 1.2 | <0.001 | | 0.10 | | | | | 0.155 | 45.0 | | | 51.0 | | 370 | | | 490 | | | [illegible] | 236 | | | | |
| [illegible] | [illegible] | [illegible] | 13 | 6.5 | [illegible] | | | | | | | 10.0 | 1.4 | 0.002 | | 0.11 | | | | | 0.19 | 38.0 | | | 111 | | 315 | | | 480 | | | [illegible] | 237 | | | | |
| [illegible] | [illegible] | [illegible] | [illegible] | 4 | [illegible] | | | | | | | 10.0 | 2.2 | <0.001 | | 0.24 | | | | | 0.015 | 19.0 | | | 19.0 | | 219 | | | 375 | | | [illegible] | 190 | | 10.0 | | |
| [illegible] | [illegible] | 4.1 | 11 | 8.0 | 7.0 | | | | | | | 7.0 | <1.0 | 0.005 | | 0.04 | | | | | 0.120 | 52.0 | | | 27.0 | | 300 | | | 510 | | | [illegible] | 228 | | 5.0 | | |
| [illegible] | [illegible] | 2.7 | -1 | 1 | 7.9 | | | | | | | 7.0 | <1.0 | <0.001 | | <0.01 | | | | | 0.090 | 50.0 | | | 22.0 | | 510 | | | 550 | | | [illegible] | 220 | | 14.0 | | |
| 2/23/[illegible] | 13:30 | 16.6 | 3 | 0.5 | 8.7 | | | | | | | 10.0 | 13.80 | 0.024 | | 0.15 | | | | 0.320 | 0.080 | 370 | | | 102 | | 730 | | | 560 | | | 305 | 250 | | 8.0 | | |
| 4/21/[illegible] | 10:15 | 25.6 | 10 | 3 | 8.9 | | | | | | | 9.2 | | 0.010 | <0.01 | | | | | 0.400 | | 31.0 | | | 500 | | 238 | | | 425 | | | [illegible] | | | | | |
| [illegible] | [illegible] | 21.9 | [illegible] | 5 | [illegible] | | | | | | | [illegible] | | <0.005 | <0.01 | | | | | 0.135 | | 45.0 | | | 79.0 | | 204 | | | 320 | | | 163.7 | | | | | |
| [illegible] | [illegible] | 4.7 | 15 | 13 | 7.7 | | | | | | | 7.4 | <0.01 | <0.001 | <0.01 | <0.01 | | | | 0.080 | <0.010 | 30.0 | | | 29.0 | | 319 | | | 480 | | | [illegible] | [illegible] | | 21.0 | | |
| 10/14/[illegible] | 14:23 | 4.7 | 5 | 4 | 8.1 | | | | | | | | | <0.001 | 0.25 | | | | | 0.060 | | 30.0 | | | 4.0 | | 305 | | | 490 | | | 317.20 | | | | | |
| 12/10/80 | 15:40 | 7.1 | -3 | 1 | 7.6 | | | | | | | | | 0.007 | <0.01 | | | | | 0.040 | | 33.0 | | | 20.0 | | 320 | | | 490 | | | 334.28 | | | | | |
| [illegible] | 13:30 | 4.2 | 8 | 4 | 8.1 | | | | | | | | 1.20 | 0.012 | <0.01 | 0.07 | | | | 0.020 | | 9.0 | | | 17.0 | | 250 | | | 300 | | | [illegible] | 242 | | <0.1 | | |
| [illegible] | [illegible] | 2.4 | 5 | 5 | 8.1 | | | | | | | | | <0.001 | 0.12 | | | | | 0.028 | | 32.0 | | | 57.0 | | 300 | | | 232 | | | [illegible] | | | | | |
| [illegible] | [illegible] | 3.4 | 17 | 11 | 7.4 | | | | | | | | | [illegible] | <0.01 | | | | | 0.000 | | [illegible] | | | 13.0 | | 271 | | | 350 | | | [illegible] | 226 | | 12.0 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX. as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | FERROMANGAN TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 0.021 | | <0.001 | 0.006 | | <0.001 | <0.001 | 65.6 | 4.0 | <0.001 | | 0.013 | | 0.17 | | | 0.201 | <0.001 | 28.32 | 0.014 | <0.002 | | 0.002 | 2.53 | <0.001 | | <0.001 | 5.33 | 0.013 | | | | | |
| [illegible] | 0.009 | <0.001 | <0.001 | 0.056 | <0.001 | 0.017 | <0.001 | 69.0 | 10.0 | <0.001 | <0.001 | 0.015 | <0.01 | 0.27 | <0.001 | | 0.146 | <0.001 | 28.32 | 0.047 | <0.002 | <0.001 | <0.001 | 2.30 | <0.001 | 5.6 | <0.001 | 5.66 | 0.013 | <0.001 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 48.8 | 10.0 | [illegible] | | [illegible] | | 0.14 | | | 0.097 | <0.001 | 11.52 | 0.049 | <0.0002 | | | 1.155 | <0.001 | 3.6 | <0.001 | 12.0 | 0.007 | | | | | |
| [illegible] | | | 0.004 | | | | <0.001 | 59.6 | 10.0 | <0.001 | | 0.004 | | 0.15 | | | 0.237 | <0.001 | 24.5 | 0.025 | <0.0002 | | | 2.09 | <0.001 | | <0.001 | 4.14 | 0.010 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 74.4 | 8.0 | <0.001 | | 0.015 | | 0.16 | | | 0.170 | <0.001 | 24.0 | 0.030 | <0.0002 | | | 2.450 | <0.001 | | | 4.00 | 0.007 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 74.0 | [illegible] | <0.001 | | 0.010 | | 0.16 | | | 0.137 | <0.001 | 24.4 | [illegible] | [illegible] | | | 2.215 | <0.001 | | | 6.5 | 0.004 | | | | | |
| [illegible] | | | <0.001 | | | | [illegible] | [illegible] | [illegible] | <0.001 | | 0.002 | | [illegible] | | | 0.416 | <0.001 | 24.48 | 0.098 | <0.0002 | | | 2.001 | <0.001 | | <0.001 | 10.2 | 0.008 | | | | | |
| [illegible] | | | [illegible] | | | | [illegible] | [illegible] | [illegible] | <0.001 | | [illegible] | | 0.16 | | | 3.423 | 0.002 | [illegible] | 0.142 | [illegible] | | | 2.918 | <0.001 | | <0.001 | [illegible] | 0.012 | | | | | |
| [illegible] | | | [illegible] | | | | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] | | [illegible] | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | | [illegible] | [illegible] | [illegible] | | | | | |
| [illegible] | | | [illegible] | | | | [illegible] | [illegible] | [illegible] | | | [illegible] | | 0.25 | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | | [illegible] | [illegible] | [illegible] | | | | | |
| [illegible] | | | [illegible] | [illegible] | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] | | 0.17 | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | | [illegible] | [illegible] | [illegible] | | | | | |
| [illegible] | | | <0.001 | 0.090 | | 0.115 | <0.001 | 60.20 | 20.0 | <0.001 | | 0.010 | | 0.16 | | | 3.590 | 0.002 | 12.0 | 0.130 | <0.0002 | | | 2.26 | <0.001 | | <0.001 | 7.20 | 0.010 | | | | | |
| [illegible] | | | | | | | | [illegible] | 2.0 | | | | | | | | 2.116 | | 14.40 | 0.150 | | | | 2.50 | | | | 3.20 | | | | | | Filing |
| [illegible] | | | | | | | | 40.0 | [illegible] | | | | | | | | 0.45 | | 14.88 | 0.00 | | | | 0.39 | | | | 0.70 | | | | | | |
| [illegible] | | | <0.001 | [illegible] | | <0.001 | <0.001 | [illegible] | [illegible] | <0.001 | | <0.001 | | 0.16 | | <0.001 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | | <0.001 | [illegible] | [illegible] | | | | | |
| [illegible] | | | | | | | | [illegible] | 3.9 | | | | | | | | 0.613 | | 21.60 | 0.012 | | | | 2.31 | | | | 22.00 | | | | | | |
| 12/10/[illegible] | | | | | | | | 72.00 | 5.65 | | | | | | | | 0.250 | | 13.24 | 0.060 | | | | 2.27 | | | | 5.65 | | | | | | |
| [illegible] | | | 0.001 | 0.053 | | 0.130 | 0.002 | 74.40 | 10.0 | <0.001 | | <0.001 | | 0.17 | | | [illegible] | [illegible] | [illegible] | 0.010 | <0.0002 | | | 2.27 | 0.001 | | <0.001 | 1.30 | 0.015 | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | [illegible] | 0.012 | | | | 1.50 | | | | 1.80 | | | | | | |
| 1.24.7 | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | [illegible] | [illegible] | | | | 2.04 | | | | [illegible] | | | | | | |

8-1-70

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station YC-1
Location Yuba Creek below Hill's mine #2

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROGEN ION MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos/cm | TURBIDITY FTU | CARBONATE ALK as $CO_3$ MG/L | BICARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-26-81 | 09:41 | 5 | 16 | 11 | 7.16 | | | | | | | | 4.00 | <0.001 | <0.01 | <0.01 | | | | 0.250 | 0.100 | 33.0 | | | 6.0 | | 292 | | | 498 | | | [illegible] | 220 | | | 6.0 | | |
| 10-14-81 | 09:43 | 5.2 | 3 | 1 | 6.7 | | | | | | | | | <0.001 | 0.25 | | | | | 0.220 | | 36.0 | | | 55.0 | | 328 | | | 500 | | | 333.0 | | | | | | |
| 12-23-81 | 11:32 | | -10 | 1 | 7.2 | | | | | | | | | <0.001 | 2.35 | | | | | 0.520 | | 69.0 | | | 22.0 | | 415 | | | 345 | | | 366.50 | 300.37 | | | | | |
| 2-24-82 | 12:05 | | -2 | 0 | 8.0 | | | | | | | | | 0.361 | 1.15 | | | | | 0.600 | | 80.0 | | | 309 | | 422 | | | 650 | | | 372.40 | 268.20 | | | | | |
| 4-14-82 | 13:04 | | 12 | 9 | 7.6 | | | | | | | | | 0.026 | 0.06 | | | | | 0.470 | | 50.0 | | | 204 | | 358 | | | 604 | | | 312.20 | 253.90 | | | | | |
| 6-9-82 | 10:18 | 6.8 | 10 | 7 | 7.9 | | | | | | | | | <0.001 | 0.41 | | | | | 0.060 | | 7.5 | | | 90 | | 192 | | | 283 | | | 246.43 | 177.40 | | | | | |
| 8-11-82 | 13:35 | 23 | 15 | 14 | 8.5 | | | | | | | | | <0.001 | 0.10 | | | | | 1.230 | | 4.2 | | | 64.0 | | 275 | | | 381 | | | 221.90 | 186.90 | | | | | |
| 10-13-82 | 16:25 | 6.2 | 10 | 8 | 8.0 | | | | | | | | 0.8 | <0.001 | 0.04 | 0.07 | | | | 0.130 | 0.090 | 24.0 | | | 78.0 | | 305 | | | 553 | | | 322.40 | 264.80 | | | <0.01 | | |
| 12-21-82 | 14:45 | | 5 | 1 | 8.2 | | | | | | | | | <0.001 | 0.27 | | | | | 0.110 | | 39.0 | | | 21.0 | | 358 | | | 482 | | | 347.10 | | | | | | |
| 2-21-83 | 15:30 | 8.2 | | 2 | | | | | | | | | | 0.013 | 0.03 | | | | | 0.470 | | 42.0 | | | 265 | | 345 | | | 485 | | | 316.70 | | | | | | |
| 4-21-83 | 12:51 | 8.5 | 7 | 6 | 8.2 | | | | | | | | | <0.001 | 0.28 | | | | | 0.15 | | 45.0 | | | 114 | | 365 | | | 512 | | | 300.00 | | | | | | |
| 6-21-83 | 16:45 | | 23 | 14 | 7.9 | | | | | | | | | <0.001 | <0.01 | | | | | 0.240 | | 36.0 | | | 217 | | 256 | | | 262 | | | 183 | | | | | | |
| 8-24-83 | 17:20 | 20.4 | 12 | 12 | 7.4 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 1.25 | | 35 | | | 150 | | 234 | | | 480 | | | 253.70 | 208 | | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | FERROMANGANESE TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-26-81 | | | 0.002 | 0.050 | | 0.040 | <0.001 | 64.80 | 13.60 | <0.001 | | 0.020 | | 0.19 | | 0.020 | 0.330 | <0.001 | 21.60 | 0.050 | <0.0002 | | | 2.65 | 0.005 | | <0.001 | 12.50 | 0.020 | | | | | |
| 10-14-81 | | | | | | | | 75.20 | 8.10 | | | | | | | | 0.395 | | 23.52 | 0.044 | | | | 2.50 | | | | 13.00 | | | | | | |
| 12-23-81 | | | | | | | | 93.50 | 12.80 | | | | | | | | 0.387 | | 31.50 | 0.036 | | | | 2.30 | | | | 12.60 | | | | | | |
| 2-24-82 | | | | | | | | 97.00 | 34.70 | | | | | | | | 7.660 | | 27.50 | 0.330 | | | | 2.53 | | | | 18.30 | | | | | | |
| 4-14-82 | | | | | | | | 85.00 | 25.30 | | | | | | | | 3.900 | | 25.50 | 0.230 | | | | 2.43 | | | | 12.5 | | | | | | |
| 6-9-82 | | | | | | | | 55.00 | 7.50 | | | | | | | 0.450 | 7.510 | | 12.60 | 0.150 | | | | 0.99 | | | | 3.2 | | | | | | |
| 8-11-82 | | | | | | | | 54.40 | 55.00 | | | | | | | | 7.250 | | 18.72 | 2.000 | | | | 0.90 | | | | 22.0 | | | | | | Storm Runoff |
| 10-13-82 | | | <0.001 | 0.055 | | 0.100 | <0.001 | 44.80 | 11.70 | <0.001 | | 0.020 | | 0.16 | | 0.885 | 1.750 | <0.001 | 44.16 | 0.100 | <0.0002 | | | 2.15 | 0.007 | | 0.001 | 6.4 | 0.025 | | | | | |
| 12-21-82 | | | | | | | | 82.40 | 11.50 | | | | | | | | 0.440 | | 20.16 | 0.090 | | | | 2.14 | | | | 22.0 | | | | | | |
| 2-21-83 | | | | | | | | 76.00 | 15.80 | | | | | | | | 3.800 | | 24.96 | 0.195 | | | | 2.24 | | | | 13.0 | | | | | | |
| 4-21-83 | | | | | | | | 77.60 | 35.20 | | | | | | | | 1.800 | | 23.04 | 0.160 | | | | 2.48 | | | | 20.0 | | | | | | |
| 6-21-83 | | | | | | | | 48.00 | 8.00 | | | | | | | | 3.400 | | 10.56 | 0.127 | | | | 1.21 | | | | 14.3 | | | | | | |
| 8-24-83 | | | <0.001 | 0.850 | | 0.050 | <0.001 | 46.00 | 7.2 | <0.001 | | 0.003 | | 0.14 | | 0.850 | 2.980 | <0.001 | 9.98 | 0.130 | <0.0002 | | | 1.3 | <0.001 | | <0.001 | 41.9 | 0.019 | | | | | |

A 1-78

**VAUGHN HANSEN ASSOCIATES**
**Consultants / Engineers**

# WATER QUALITY DATA

**Station** VC-2
**Location** Mud Creek above Mine
mine #2

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°C) | TEMPERATURE WATER (°C) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | C.O.D. (MG/L) | B.O.D. (MG/L) | T.O.C. (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as $NH_3$-N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$-P (MG/L) | PHOSPHATE ORTHO as $PO_4$-P (MG/L) | SULFATE as $SO_4$ (MG/L) | HYDROXIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL RETURNABLE SOLIDS (MG/L) | SOLIDS T.D.S. (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µmhos) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BI-CARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK. as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pc/L) | BETA RADIO-ACTIVITY (pc/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 9:00 | 3.5 | -1 | 2 | 7.6 | | | | 4.5 | | 4.0 | 9.75 | <1.0 | | 0.13 | 0.03 | <0.01 | 0.20 | | 0.062 | 0.051 | 52.0 | <0.01 | | 8.0 | <0.1 | 450 | | | 470 | 1.50 | <0.01 | 271.7 | 244 | 280 | | | |
| [illegible] | 11:30 | 2.3 | 21 | 12 | 7.6 | | | | 4.0 | | 3.5 | 7.1 | <1.0 | <0.001 | 0.13 | 0.61 | | 0.40 | | 0.025 | 0.011 | 28.3 | <0.01 | | 3.0 | 0.2 | 280 | | | 425 | 3.50 | <0.01 | 202.5 | 240 | 271. | | 0 | 0 |
| [illegible] | 5:45 | 16 | 24 | 16 | [illegible] | 220 | <20 | | | 11.0 | 11.0 | [illegible] | [illegible] | 0.508 | | 0.20 | <0.01 | 0.20 | | | | 760 | | | 2.2 | | 2110 | | | 225 | | | 207.4 | | | | | |
| 8-22-73 | 12:50 | 1.5 | 26 | 12 | 8.0 | | | | | | | 8.6 | 1.5 | 0.002 | | | | | | | | 31.0 | | | 16.0 | | 260 | | | 375 | | | 270.8 | | | | | |
| 10-25-73 | 11:00 | 3.2 | 3 | 3 | 7.2 | | | | | | | 10.0 | 2.0 | 0.004 | | | | | | | | 39.0 | | | 5.0 | | 298 | | | | | | 277.6 | | | | | |
| [illegible] | 10:00 | 5.7 | -11 | 0 | 7.92 | | | | | | | 11.1 | 1.2 | 0.002 | | | | | | | | 48.0 | | | 22.0 | | 228 | | | 500 | | | 329.4 | | | | | |
| 2-28-74 | 11:30 | 5.1 | -6 | 0.7 | 7.7 | | | | | | | 9.6 | <1.0 | <0.001 | | 0.12 | | | | | 0.016 | 40.0 | | | 55.0 | | 316 | | | 490 | | | 324.5 | 266 | | | | |
| [illegible] | 11:20 | 12 | 9 | 6.5 | 7.73 | | | | | | | 9.1 | <1.0 | 0.010 | | 0.20 | | | | | 0.08 | 41.0 | | | 54.0 | | 318 | | | 490 | | | 292.8 | 258 | | | | |
| [illegible] | [illegible] | 2.6 | 14 | 4.7 | 8.9 | | | | | | | 15 | 5.3 | <0.001 | | 0.28 | | | | | [illegible] | 14.8 | | | 14.0 | | 209 | | | 358 | | | [illegible] | 184 | | 10.0 | | |
| [illegible] | [illegible] | 2.4 | 12 | 6 | 8.1 | | | | | | | 7.3 | <1.0 | 0.003 | | <0.01 | | | | | [illegible] | 44.1 | | | 84.0 | | 310 | | | 510 | | | [illegible] | 244 | | 10.0 | | |
| [illegible] | [illegible] | 5.0 | 2 | 1 | 7.8 | | | | | | | [illegible] | <1.0 | <0.001 | | <0.01 | | | | | [illegible] | 43.0 | | | 40.0 | | 312 | | | 550 | | | [illegible] | 228 | | 12.0 | | |
| 2-27-78 | 14:05 | 10.7 | 6 | 0.5 | 9.2 | | | | | | | 10.1 | 12.8 | 0.006 | | 0.14 | | | | 0.316 | 0.120 | 380 | | | 139 | | 728 | | | 515 | | | 280.66 | 230 | | 12.0 | | |
| 4-27-78 | 10:55 | 25.5 | 9.0 | 3.0 | 8.75 | | | | | | | 9.0 | | 0.018 | <0.01 | | | | | 0.300 | | 19.5 | | | 500 | | 229 | | | 410 | | | 229.2 | | | | | |
| 6-5-78 | [illegible] | 31 | 11 | 5 | 7.6 | | | | | | | 7.3 | | 0.014 | <0.01 | | | | | 0.40 | | <3.0 | | | 76.0 | | 172 | | | 270 | | | 214.72 | | | | | |
| 7-25-78 | [illegible] | [illegible] | 15 | 12 | 8.7 | | | | | | | [illegible] | 5.00 | 0.150 | 0.01 | <0.01 | | | | 0.240 | <0.010 | 20.0 | | | 28.0 | | 290 | | | 450 | | | 302.98 | 254 | | 10.0 | | |
| 8-7-80 | 10:42 | 4.7 | 16 | 5 | 8.9 | | | | | | | | | <0.001 | <0.01 | | | | | 0.080 | | 30.0 | | | 1.0 | | 310 | | | 480 | | | 331.34 | | | | | |
| 11-10-80 | 15:25 | 11 | 0 | 1 | 7.16 | | | | | | | | | 0.019 | <0.01 | | | | | 0.040 | | 34.5 | | | 18.0 | | 332 | | | 500 | | | 348.92 | | | | | |
| [illegible] | 14:10 | 4.4 | 11 | 4 | 8.0 | | | | | | | | 1.60 | <0.002 | <0.01 | 0.04 | | | | 0.021 | | 48.0 | | | 12.0 | | 280 | | | 430 | | | 258.64 | 212 | | <0.1 | | |
| 4-8-81 | 11:40 | 2.4 | 6 | 4 | 8.1 | | | | | | | | | <0.001 | 0.15 | | | | | 0.020 | | 50.0 | | | 27.0 | | 350 | | | 319 | | | [illegible] | | | | | |
| [illegible] | [illegible] | 6.4 | 13 | 12 | 7.9 | | | | | | | | | 0.001 | 0.10 | | | | | 0.200 | | 48.5 | | | 11.0 | | 278 | | | 255 | | | [illegible] | 222 | | <0.1 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | GERMANIUM TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-17-72 | 1.008 | | <0.001 | 0.005 | | <0.001 | <0.001 | 68.0 | 4.0 | <0.001 | | 0.002 | | 0.16 | | | 1.223 | <0.001 | 26.40 | 0.017 | <0.0002 | | <0.001 | 2.18 | <0.001 | 5.4 | <0.001 | 3.63 | 0.017 | | | | | Smoking |
| 6-26-72 | 0.008 | <0.001 | <0.001 | 0.018 | <0.001 | 0.005 | <0.001 | 67.2 | 12.0 | <0.001 | <0.001 | 0.007 | <0.01 | 0.20 | <0.001 | | 0.137 | <0.001 | 25.92 | 0.003 | <0.0002 | <0.001 | <0.001 | 2.28 | <0.001 | 5.0 | <0.001 | 4.78 | 0.011 | <0.001 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 51.2 | 10.0 | <0.001 | | 0.005 | | 0.14 | | | 0.103 | <0.001 | 11.50 | 0.050 | [illegible] | | | 1.27 | <0.001 | 2.9 | <0.001 | 4.0 | 0.005 | | | | | |
| 8-22-73 | | | <0.001 | | | | <0.001 | 57.6 | 4.0 | <0.001 | | 0.006 | | 0.14 | | | 0.164 | <0.001 | 26.9 | 0.026 | <0.001 | | | 1.82 | <0.001 | | <0.001 | 3.96 | 0.012 | | | | | |
| 10-25-73 | | | <0.001 | | | | <0.001 | 72.0 | 9.0 | <0.001 | | 0.009 | | 0.16 | | | 0.183 | <0.001 | 25.9 | 0.030 | <0.0002 | | | 1.80 | <0.001 | | | 3.90 | 0.007 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 80.8 | 6.0 | <0.001 | | 0.001 | | 0.17 | | | 0.200 | <0.001 | 21.4 | 0.047 | [illegible] | | | 2.176 | <0.001 | | | 4.46 | 0.006 | | | | | |
| 2-28-74 | | | <0.001 | | | | <0.001 | 77.0 | <0.1 | <0.001 | | 0.006 | | 0.17 | | | 0.519 | <0.001 | 24.96 | 0.077 | <0.0002 | | | 2.742 | <0.001 | | <0.001 | 4.0 | 0.005 | | | | Overcast | |
| [illegible] | | | <0.001 | | | | <0.001 | 80.8 | 14.0 | <0.001 | | 0.002 | | 0.17 | | | 2.231 | 0.002 | 19.20 | 0.118 | <0.0002 | | | 2.231 | <0.001 | | <0.001 | 3.86 | 0.009 | | | | | |
| [illegible] | | | <0.001 | | | | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] | | [illegible] | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | | | |
| [illegible] | | | <0.001 | | | | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] | | [illegible] | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | | | |
| [illegible] | | | <0.001 | 0.217 | | 0.140 | <0.001 | 15.40 | 2.0 | <0.001 | | [illegible] | | [illegible] | | | 0.560 | <0.001 | 23.06 | 0.452 | [illegible] | | | 2.240 | <0.001 | | <0.001 | 5.75 | 0.007 | | | | | |
| 2-28-75 | | | <0.001 | 0.090 | | 0.115 | <0.001 | 60.20 | 20.0 | <0.001 | | <0.001 | | 0.15 | | | 4.310 | 0.002 | 12.0 | 0.150 | <0.0002 | | | 2.15 | <0.001 | | <0.001 | 5.10 | 0.010 | | | | | |
| 4-22-75 | | | | | | | | 57.40 | 10.0 | | | | | | | | 2.450 | | 12.44 | 0.028 | | | | 2.10 | | | | 3.00 | | | | | | Light Rain |
| [illegible] | | | | | | | | 61.00 | <0.1 | | | | | | | | 1.330 | | 12.16 | 0.050 | | | | 0.91 | | | | 4.00 | | | | | | Natural Showers |
| [illegible] | | | <0.001 | <0.001 | | 0.070 | <0.001 | [illegible] | 6.0 | <0.001 | | <0.001 | | 0.15 | | <0.001 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | 1.87 | <0.001 | | <0.001 | 15.00 | [illegible] | | | | | |
| 11-7-70 | | | | | | | | 57.60 | 3.5 | | | | | | | | 0.215 | | 25.92 | 0.010 | | | | 2.22 | | | | 23.00 | | | | | | |
| 12-13-77 | | | | | | | | 76.40 | 5.75 | | | | | | | | 0.260 | | 23.04 | 0.060 | | | | 2.25 | | | | 5.25 | | | | | | |
| [illegible] | | | 0.001 | 0.050 | | 0.070 | <0.001 | [illegible] | 11.00 | <0.001 | | <0.001 | | 0.31 | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | 2.22 | 0.001 | | <0.001 | 3.70 | 0.010 | | | | | |
| [illegible] | | | | | | | | [illegible] | 12.00 | | | | | | | | 1.210 | | 13.52 | 0.061 | | | | 2.16 | | | | 7.00 | | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | 0.210 | | [illegible] | 0.060 | | | | 1.22 | | | | 4.50 | | | | | | |

B 1-70

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station YC-4
Location [illegible]

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | HYDROGEN ION as pH | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos | TURBIDITY FTU | CARBONATE ALK. as CO3 MG/L | BI-CARBONATE ALK. as HCO3 MG/L | TOTAL ALK. as CaCO3 MG/L | TOTAL HARDNESS as CaCO3 MG/L | ACIDITY as CaCO3 MG/L | ALPHA RADIO-ACTIVITY pC/L | BETA RADIO-ACTIVITY pC/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-10-77 | 14:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-77 | 13:00 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-10-77 | 14:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:[illegible] | 1 | 20 | 4 | 7.0 | | | | | | 10.0 | 7.4 | <1.0 | <0.001 | 0.10 | 0.10 | <0.01 | 0.18 | | | 0.025 | 7.0 | | | 85.0 | | 84.0 | | | 120 | | | 78.2 | | | | | | |
| 7-12-77 | 15:05 | 0.07 | 21 | 14 | 7.7 | | | | | | | 7.3 | <1.0 | | | | | | | | | 74.0 | | | 10.0 | | 110 | | | 130 | | | 127 | | | | | | |
| 8-23-77 | 14:35 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-25-77 | 14:00 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-17-77 | 5:10 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 12:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-18-78 | 12:05 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.1 | 16 | 7 | 8.0 | | | | | | | 8.1 | 1.4 | <0.001 | | 0.12 | | | | | 0.012 | 72.4 | | | 64.0 | | 98.0 | | | 112 | | | 98.2 | 1.0 | | 1.0 | | |
| [illegible] | [illegible] | 0.01 | 17 | 7.5 | 8.3 | | | | | | | 7.4 | <1.0 | 0.004 | | <0.01 | | | | | 0.027 | 10.0 | | | 35.0 | | 222 | | | 360 | | | [illegible] | 202 | | 10.0 | | |
| [illegible] | 13:34 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-27-80 | 14:20 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-19-80 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:05 | 0.8 | 27 | 10 | 8.7 | | | | | | | 8.0 | | <0.002 | <0.01 | | | | | 0.070 | | 50.0 | | | 37.0 | | 112 | | | 170 | | | 44.7 | | | | | |
| [illegible] | 15:40 | 0.01 | 13 | 14 | 8.4 | | | | | | | 7.0 | 7.80 | 0.002 | <0.01 | <0.01 | | | | 0.100 | <0.010 | 7.5 | | | 17.0 | | 220 | | | 240 | | | 221.5 | 170 | | 29.0 | | |
| 10-7-80 | 09:20 | 0.002 | 12 | 6 | 8.7 | | | | | | | | | <0.001 | <0.01 | | | | | 0.100 | | 304 | | | 26.0 | | 600 | | | 920 | | | 273.25 | | | | | |
| 12-10-80 | 14:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | 13:30 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | FERROMANGANESE TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as SiO2 MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-17-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-10-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | 23.2 | 8.0 | <0.001 | | 0.057 | | 0.08 | | | 0.128 | <0.001 | 1.92 | 0.012 | <0.002 | | | 0.457 | <0.001 | 2.50 | <0.001 | 5.5 | 0.006 | | | | | |
| [illegible] | | | <0.001 | | | | | 11.2 | <1.0 | | | | | | | | 0.215 | <0.001 | 1.92 | 0.011 | <0.002 | | | 0.518 | <0.001 | | <0.001 | 28.0 | 0.012 | | | | | |
| 5-23-79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-25-79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-27-79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | [illegible] | <1.0 | <0.001 | | 0.007 | | 0.10 | | | 0.273 | <0.001 | [illegible] | <0.001 | <0.002 | | | 0.075 | <0.001 | | <0.001 | 0.165 | 0.004 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | [illegible] | [illegible] | | | [illegible] | | 0.70 | | | 1.150 | <0.001 | 1.80 | 0.118 | [illegible] | | | 0.225 | <0.001 | | <0.001 | [illegible] | [illegible] | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-7-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-7-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | <0.1 | | | | | | | | 0.710 | | 1.92 | 0.027 | | | | 0.23 | | | | 16.00 | | | | | | |
| [illegible] | | | <0.001 | <0.001 | | 0.020 | <0.001 | [illegible] | 111.0 | <0.001 | | <0.001 | | 0.2 | | <0.01 | 0.020 | <0.002 | [illegible] | <0.001 | <0.002 | | | 0.22 | <0.001 | | <0.001 | <0.02 | <0.001 | | | | | |
| 10-7-80 | | | | | | | | 41.60 | 0.2 | | | | | | | | 0.510 | | 76.00 | <0.001 | | | | 0.87 | | | | 1.20 | | | | | | |
| 12-10-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

R 1-80

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-2
Location Mud Creek above Utah # 2 mine

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. MG/L | B.O.D. MG/L | T.O.C. MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $N_{total}$ MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | FLUORIDE as F MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND. µmhos/cm | TURBIDITY FTU | CARBONATE ALK as $CO_3$ MG/L | BICARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pc/L | BETA RADIO-ACTIVITY pc/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9-24-81 | 09:59 | | 15 | 12 | 7.3 | | | | | | | | 0.40 | <0.001 | <0.01 | <0.01 | | | | 0.220 | <0.001 | 40.0 | | | 12.0 | | 304 | | | 375 | | | 230.6 | 230 | | 14.0 | | |
| 9-14-81 | 11:23 | 5.2 | 2 | 2 | 7.8 | | | | | | | | | <0.001 | 0.20 | | | | | 0.230 | | 36.0 | | | 21.0 | | 340 | | | 530 | | | 242.4 | | | | | |
| 12-23-81 | 11:45 | | -10 | 1 | 7.4 | | | | | | | | | <0.001 | 2.61 | | | | | 0.500 | | 135 | | | 15.0 | | 499 | | | 320 | | | 362.80 | 397.37 | | | | |
| 2-24-82 | 12:42 | | -1 | 2 | 8.1 | | | | | | | | | 0.019 | 1.13 | | | | | 0.910 | | 63.0 | | | 47.0 | | 398 | | | 620 | | | 330.30 | 278.70 | | | | |
| 4-14-82 | 13:15 | | 12 | 7 | 7.9 | | | | | | | | | 0.015 | 0.06 | | | | | 0.870 | | 59.0 | | | 346 | | 370 | | | 594 | | | 316.60 | 259.50 | | | | |
| 6-9-82 | 10:30 | 6.8 | 12 | 5 | 7.9 | | | | | | | | | <0.001 | 0.38 | | | | | 0.110 | | 6.8 | | | 105 | | 195 | | | 200 | | | 228.90 | 187.80 | | | | |
| 8-11-82 | 17:00 | | 18 | 14 | 8.6 | | | | | | | | | 0.004 | 0.12 | | | | | 3.300 | | 15.0 | | | 14025 | | 266 | | | 407 | | | 185.90 | 152.40 | | | | |
| 10-13-82 | 16:10 | 6.2 | 13 | 7 | 8.0 | | | | | | | | 0.6 | <0.001 | 0.05 | <0.01 | | | | 0.140 | 0.120 | 27.0 | | | 53.0 | | 301 | | | 572 | | | 306.21 | 251 | | <0.01 | | |
| 12-21-82 | 14:30 | | 5 | 2 | 8.3 | | | | | | | | | <0.001 | 0.95 | | | | | 0.110 | | 39.0 | | | 11.0 | | 350 | | | 423 | | | 345.90 | | | | | |
| 2-21-83 | 15:15 | | | 2 | 8.0 | | | | | | | | | 0.175 | 0.03 | | | | | 4.200 | | 38.0 | | | 104 | | 338 | | | 493 | | | 303.30 | | | | | |
| 4-21-83 | 12:33 | 15.7 | 5 | 6 | 8.0 | | | | | | | | | <0.001 | 0.02 | | | | | 0.18 | | 50.0 | | | 262 | | 368 | | | 512 | | | 295.20 | | | | | |
| 6-21-83 | 16:35 | | 26 | 8 | 7.9 | | | | | | | | | <0.001 | <0.01 | | | | | 0.700 | | 28.0 | | | 319 | | 230 | | | 286 | | | 163.90 | | | | | |
| 8-23-83 | 17:00 | | 13 | 14 | 7.4 | | | | | | | | <0.1 | <0.001 | <0.01 | 0.05 | | | | 0.65 | | 25 | | | 244 | | 240 | | | 448 | | | 278.60 | 230 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9-24-81 | | | 0.002 | 0.055 | | 0.040 | <0.001 | 72.00 | 12.20 | <0.001 | | 0.010 | | 0.18 | | <0.001 | 0.610 | <0.001 | 24.00 | 0.070 | <0.0002 | | | 2.37 | 0.005 | | <0.001 | 5.60 | 0.015 | | | | | |
| 9-14-81 | | | | | | | | 72.00 | 6.80 | | | | | | | | 1.750 | | 24.48 | 0.060 | | | | 2.20 | | | | 20.00 | | | | | | |
| 12-23-81 | | | | | | | | 90.50 | 10.35 | | | | | | | | 0.790 | | 29.50 | 0.050 | | | | 2.65 | | | | 42.50 | | | | | | |
| 2-24-82 | | | | | | | | 83.00 | 29.00 | | | | | | | | 1.930 | | 25.50 | 0.150 | | | | 2.30 | | | | 26.00 | | | | | | |
| 4-14-82 | | | | | | | | 90.00 | 24.10 | | | | | | | | 7.700 | | 25.00 | 0.300 | | | | 2.43 | | | | 12.00 | | | | | | |
| 6-9-82 | | | | | | | | 53.50 | 6.20 | | | | | | | 0.360 | 1.860 | | 12.30 | 0.065 | | | | 0.96 | | | | 7.5 | | | | | | |
| 8-11-82 | | | | | | | | 58.40 | 54.20 | | | | | | | | 2.950 | | 10.56 | 6.500 | | | | 0.86 | | | | 23.5 | | | | | | Storm Runoff |
| 10-13-82 | | | <0.001 | 0.050 | | 0.070 | <0.001 | 73.60 | 8.00 | <0.001 | | 0.020 | | 0.15 | | 0.665 | 1.370 | <0.001 | 21.60 | 0.100 | <0.0002 | | | 1.32 | 0.006 | | <0.001 | 6.3 | 0.020 | | | | | |
| 12-21-82 | | | | | | | | 73.60 | 10.90 | | | | | | | | 1.410 | | 24.96 | 0.085 | | | | 2.10 | | | | 22.0 | | | | | | |
| 2-21-83 | | | | | | | | 72.00 | 20.80 | | | | | | | | 1.150 | | 23.04 | 0.105 | | | | 2.09 | | | | 17.0 | | | | | | |
| 4-21-83 | | | | | | | | 77.60 | 31.20 | | | | | | | | 5.500 | | 23.52 | 0.250 | | | | 2.58 | | | | 21.0 | | | | | | |
| 6-21-83 | | | | | | | | 48.00 | 6.00 | | | | | | | | 4.000 | | 9.60 | 0.130 | | | | 1.15 | | | | 4.6 | | | | | | |
| 8-24-83 | | | <0.001 | 0.350 | | 0.100 | <0.001 | 46.80 | 7.1 | <0.001 | | <0.001 | | 0.50 | | 1.260 | 3.940 | <0.001 | 9.47 | 0.135 | <0.0002 | | | 1.2 | <0.001 | | <0.001 | 47.5 | 0.005 | | | | | Rain Showers |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-4
Location Whiskey Canyon Creek above Belina Mine

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°F) | TEMPERATURE WATER (°F) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | BOD (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$ (MG/L) | PHOSPHATE ORTHO as $PO_4$ (MG/L) | SULFATE as $SO_4$ (MG/L) | HYDROXIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SO4 (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µMHOS) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BI-CARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pCi/L) | BETA RADIO-ACTIVITY (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-3-81 | 15:10 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.004 | 15 | 12 | 7.4 | | | | | | | | | <0.001 | [illegible] | | | | | [illegible] | | [illegible] | | | [illegible] | | 146 | | [illegible] | | 225 | | | 125.8 | 149 | | <0.01 | | |
| 3-24-81 | 14:45 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-14-81 | 14:13 | 0.004 | -1 | 2 | 8.4 | | | | | | | | | <0.001 | 0.19 | | | | | 0.200 | | 27.0 | | | 64.0 | | 221 | | | 340 | | | 178.40 | | | | | |
| 12-23-81 | 13:40 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-24-82 | 13:20 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | 14:00 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 13:50 | 0.07 | 12 | 8 | 7.7 | | | | | | | | | 0.008 | 0.31 | | | | | 0.060 | | <0.1 | | | 26.0 | | 60.0 | | | 121 | | | 75.90 | 62.20 | | | | |
| 9-11-82 | 16:08 | 0.02 | 14 | 8 | 8.2 | | | | | | | | | 0.008 | 0.10 | | | | | 7.000 | | 3.0 | | | 159.40 | | 235 | | | 270 | | | 184.20 | 151 | | | | |
| 10-13-82 | 14:05 | 0.05 | 9 | 6 | 8.5 | | | | | | | | 0.4 | <0.001 | 0.30 | <0.01 | | | | 1.450 | 3.00 | 81.0 | | | 498 | | 145 | | | 178 | | | 3.30 | 2.70 | | 8.00 | | |
| 12-21-82 | Inaccessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | Inaccessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | Inaccessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 15:17 | 0.7 | 20 | 12 | 7.7 | | | | | | | | | <0.001 | <0.01 | | | | | 0.240 | | 10.0 | | | 89.0 | | 95.0 | | | 92 | | | 68.30 | | | | | |
| 8-25-83 | 13:38 | 0.004 | 23 | 18 | 7.3 | | | | | | | | <0.1 | <0.001 | <0.01 | 0.02 | | | | 0.33 | | 12 | | | 68.0 | | 180 | | | 271 | | | 204.90 | 168 | | <0.01 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | FERRIC IRON TOTAL (MG/L) | FERROUS IRON DISS (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-3-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 48.00 | 7.50 | | | | | | | | 0.130 | | 7.60 | 0.030 | | | | 0.96 | | | | 170 | | | | | | |
| 3-24-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-14-81 | | | | | | | | 52.00 | 3.20 | | | | | | | | 0.335 | | 11.52 | 0.018 | | | | 2.60 | | | | 14.00 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 3-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 6-9-82 | | | | | | | | 19.50 | 1.54 | | | | | | | 0.090 | 0.350 | | 3.60 | 0.020 | | | | 0.40 | | | | 0.4 | | | | | | |
| 9-11-82 | | | | | | | | 49.80 | 50.10 | | | | | | | | 4.420 | | 6.24 | 6.550 | | | | 8.5 | | | | 36.0 | | | | | | Storm Runoff |
| 10-13-82 | | | 0.010 | 0.095 | | 0.100 | <0.001 | 29.00 | 12.30 | 0.026 | | 0.040 | | 0.09 | | 7.650 | 22.500 | 0.021 | 6.72 | 0.560 | <0.0002 | | | 1.59 | 0.006 | | 0.001 | 1.0 | 0.125 | | | | | |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-21-83 | | | | | | | | 17.60 | 2.00 | | | | | | | | 1.100 | | 3.36 | 0.037 | | | | 0.41 | | | | 4.5 | | | | | | |
| 8-25-83 | | | <0.001 | 0.470 | | 0.250 | <0.001 | 16.70 | 1.5 | <0.001 | | 0.002 | | 0.12 | | 0.750 | 1.150 | <0.001 | 3.65 | 0.040 | <0.0002 | | | 0.5 | <0.001 | | <0.001 | 56.0 | 0.017 | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-5
Location Below Belina Mine
Whiskey Canyon Creek
Southwest Miscelle

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°C) | TEMPERATURE WATER (°C) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | C.O.D. (MG/L) | B.O.D. (MG/L) | T.O.C. (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as $NH_3$-N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$-P (MG/L) | PHOSPHATE ORTHO as $PO_4$-P (MG/L) | SULFATE as $SO_4$ (MG/L) | CHLORIDE as Cl (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µMHOS) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BI-CARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK. as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pCi/L) | BETA RADIO-ACTIVITY (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-8-81 | 13:23 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | | | | | | | [illegible] | [illegible] | | | | | [illegible] | | [illegible] | | | [illegible] | | [illegible] | | | [illegible] | | | [illegible] | [illegible] | | [illegible] | | |
| 8-26-81 | 16:33 | 0.08 | 20 | 17 | 8.7 | | | | | | | | 1.80 | <0.001 | <0.01 | <0.01 | | | | 0.220 | 0.050 | 54.0 | | | 3.0 | | 275 | | | 370 | | | 180.50 | 156 | | <0.01 | | |
| 2-14-81 | 13:23 | 0.3 | 1 | 0 | 8.3 | | | | | | | | | 0.002 | 0.23 | | | | | 0.235 | | 51.0 | | | 224 | | 400 | | | 610 | | | 349 | | | | | |
| 12-23-81 | 13:08 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-14-82 | 12:50 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-19-82 | 13:39 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 12:55 | 3.7 | 18 | 9 | 7.9 | | | | | | | | | 0.003 | 0.45 | | | | | 0.160 | | 42.0 | | | 215 | | 220 | | | 339 | | | 198.40 | 162.60 | | | | |
| 8-11-82 | 16:47 | 0.3 | 16 | 14 | 8.5 | | | | | | | | | <0.001 | 0.11 | | | | | 20.100 | | 30.0 | | | 17030 | | 377 | | | 661 | | | 188.40 | 148.70 | | | | |
| 10-13-82 | 15:50 | | 9 | 4 | 8.3 | | | | | | | | <0.1 | <0.001 | 0.04 | 0.28 | | | | 0.560 | 0.120 | 39.0 | | | 611 | | 342 | | | 558 | | | 308.50 | 252.90 | | <0.01 | | |
| 12-27-82 | 14:20 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | 13:35 | | | | 7.6 | | | | | | | | | 0.004 | 0.06 | | | | | 0.280 | | 50.0 | | | 3860 | | 359 | | | | | | 233.90 | | | | | |
| 4-21-83 | 12:18 | | 5 | 2 | 8.0 | | | | | | | | | <0.001 | 0.09 | | | | | 0.33 | | 80.0 | | | 4050 | | 410 | | | 578 | | | 217.20 | | | | | |
| 6-21-83 | 16:12 | | 21 | 14 | 7.7 | | | | | | | | | <0.001 | <0.01 | | | | | 0.400 | | 80.0 | | | 141 | | 288 | | | 369 | | | 198.30 | | | | | |
| 8-25-83 | 14:30 | 0.6 | 22 | 16 | 7.6 | | | | | | | | 0.3 | <0.001 | <0.01 | 0.02 | | | | 0.38 | | 78 | | | 45.0 | | 316 | | | 575 | | | 278.60 | 180 | | <0.01 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | GERMANIUM TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-8-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 40.20 | [illegible] | | | | | | | | [illegible] | | [illegible] | [illegible] | | | | [illegible] | | | | [illegible] | | | | | | |
| 8-26-81 | | | 0.003 | 0.040 | | 0.080 | <0.001 | 43.90 | 33.90 | <0.001 | | 0.010 | | 0.20 | | <0.001 | 0.510 | <0.001 | 32.84 | 0.020 | <0.0002 | | | 3.78 | 0.003 | | <0.001 | 6.50 | 0.015 | | | | | |
| 11-14-81 | | | | | | | | 40.00 | 33.90 | | | | | | | | 0.550 | | 32.64 | 0.020 | | | | 3.50 | | | | 67.00 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 2-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 4-19-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 6-9-82 | | | | | | | | 56.00 | 5.10 | | | | | | | 0.390 | 0.510 | | 15.00 | 0.150 | | | | 1.60 | | | | 5.0 | | | | | | |
| 8-11-82 | | | | | | | | 60.00 | 125.30 | | | | | | | | 0.250 | | 38.40 | 7.150 | | | | 1.50 | | | | 21.0 | | | | | | Recent Rain |
| 10-13-82 | | | <0.001 | 0.100 | | 0.060 | <0.001 | 89.00 | 24.30 | <0.001 | | 0.020 | | 0.15 | | 1.450 | 4.250 | <0.001 | 16.80 | 0.260 | <0.0002 | | | 1.33 | 0.005 | | 0.001 | 20.0 | 0.015 | | | | | |
| 12-27-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | | | | | | 60.00 | 60.70 | | | | | | | | 88.000 | | 21.60 | 1.650 | | | | 4.21 | | | | 40.5 | | | | | | |
| 4-21-83 | | | | | | | | 80.80 | 68.50 | | | | | | | | 57.500 | | 19.68 | 1.710 | | | | 4.78 | | | | 29.5 | | | | | | Storm Runoff - H. Snow |
| 6-21-83 | | | | | | | | 64.80 | 6.00 | | | | | | | | 1.530 | | 16.32 | 0.087 | | | | 2.32 | | | | 7.0 | | | | | | |
| 8-25-83 | | | <0.001 | 0.280 | | 0.330 | <0.001 | 65.20 | 5.8 | <0.001 | | 0.008 | | 0.18 | | 0.350 | 1.650 | 0.003 | 15.80 | 0.240 | <0.0002 | | | 2.5 | <0.001 | | <0.001 | 16.0 | 0.026 | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-5
Location Below Bolina mine

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. MG/L | B.O.D. MG/L | T.O.C. MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | CHLORIDE as Cl MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-17-77 | 14:25 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-16-77 | 12:40 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-10-77 | 13:05 | 1.4 | 17 | 2.5 | 7.5 | | | | | | 7.0 | 9.9 | 15.2 | | | 1.12 | 0.02 | 0.55 | | | 0.120 | 102 | | | 264.0 | | 200 | | | 310 | | | 50.0 | | | | | |
| 8-16-77 | 11:55 | 1.6 | 25 | 10 | 7.1 | | | | | | [illegible] | 7.0 | [illegible] | 0.005 | 0.02 | 0.44 | <0.01 | 0.25 | | | 0.022 | 10.0 | | | 86.7 | | 138 | | | 250 | | | 154.2 | | | | | |
| 9-20-77 | 15:45 | 0.3 | 27 | 20.5 | 8.3 | | | | | | | 7.1 | 16.0 | | | | | | | | | 28.0 | | | 75.0 | | 283 | | | 355 | | | 272.52 | | | | | |
| 10-23-77 | 13:10 | 0.01 | 22 | 8 | 8.4 | | | | | | 20.1 | 8.2 | 12.0 | 0.050 | | | | | | | | 26.0 | | | 8.0 | | 210 | | | 320 | | | 217.6 | | | | | |
| 10-25-77 | 11:32 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 10:40 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible]-77 | 12:10 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-18-77 | 11:07 | 0.3 | 10 | 1 | 7.45 | | | | | | 6.0 | 10.0 | 1.8 | 0.000 | | 1.09 | | | | | 2.00 | 191 | | | 391.0 | | 510 | | | 770 | | | 232.8 | 190 | | | | |
| [illegible] | [illegible] | 0.1 | 20 | 10 | 8.3 | | | | | | | [illegible] | 2.7 | <0.001 | | 0.20 | | | | | 0.015 | [illegible] | | | 18.0 | | 210 | | | 310 | | | [illegible] | 192 | | <1.0 | | |
| [illegible] | 09:55 | 0.07 | 16 | 5.5 | 7.1 | | | | | | | [illegible] | <1.0 | 0.001 | | <0.01 | | | | | 0.100 | 44.9 | | | 1.0 | | 275 | | | 450 | | | 274.21 | 178 | | 10.0 | | |
| [illegible] | [illegible] | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-27-80 | 14:26 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-7-77 | 11:32 | 2.16 | 4 | 2 | 7.2 | | | | | | | 7.2 | | 0.015 | 0.20 | | | | | 3.100 | | 32.0 | | | 340.2 | | 215 | | | 380 | | | 185.44 | | | | | |
| 6-[illegible] | 14:25 | 2.2 | 25 | 12 | 7.1 | | | | | | | 7.5 | | 0.030 | <0.01 | | | | | 0.070 | | 45.0 | | | 46.0 | | 188 | | | 290 | | | 142.4 | | | | | |
| [illegible] | 15:08 | 0.6 | 14 | 14 | 8.7 | | | | | | | 7.7 | <0.01 | <0.001 | <0.01 | <0.01 | | | | 0.600 | <0.010 | 52.0 | | | 149 | | 270 | | | 420 | | | 221.2 | 190 | | 14.0 | | |
| 10-7-80 | [illegible] | 0.4 | 7 | 4 | 9.0 | | | | | | | | | <0.001 | <0.01 | | | | | 0.070 | | 255 | | | 340 | | 255 | | | 390 | | | 227.84 | | | | | |
| 12-10-80 | 14:54 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-17-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-16-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-10-77 | | | <0.001 | | | | <0.001 | 47.3 | 10.0 | <0.001 | | 0.002 | | 0.19 | | | 0.089 | <0.001 | 3.64 | 0.015 | <0.0002 | | | 1.344 | <0.001 | 3.90 | <0.001 | 3.79 | 0.008 | | | | | | |
| 6-16-77 | | | <0.001 | | | | <0.001 | 28.4 | 5.0 | <0.001 | | 0.009 | | 0.14 | | | 1.442 | <0.001 | 5.76 | 0.014 | <0.0002 | | | 1.382 | <0.001 | 1.50 | <0.001 | 7.5 | 0.008 | | | | | | |
| 9-12-77 | | | <0.001 | | | | | 37.5 | 5.0 | | | | | | | | 0.078 | <0.001 | 3.80 | 0.070 | <0.0002 | | | 1.496 | <0.001 | | <0.001 | 62.0 | 0.014 | | | | | | |
| 9-23-77 | | | <0.001 | | | | | 49.6 | <1.0 | | | 0.006 | | 0.12 | | | 0.011 | <0.001 | 19.2 | 0.011 | <0.0002 | | | 1.481 | <0.001 | | <0.001 | 2.97 | 0.017 | | | | | | |
| 10-25-77 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-18-77 | | | 0.040 | | | | | 77.6 | 12.0 | | | 0.007 | | 0.20 | | | 28.5 | 0.04 | 11.04 | 1.533 | <0.0002 | | | 2.532 | <0.001 | | <0.001 | 5.58 | 0.108 | | | | | | |
| [illegible] | | | [illegible] | | | | [illegible] | [illegible] | 11.0 | [illegible] | | [illegible] | | [illegible] | | | [illegible] | <0.001 | [illegible] | [illegible] | [illegible] | | | [illegible] | <0.001 | | <0.001 | [illegible] | [illegible] | | | | | | |
| [illegible] | | | [illegible] | | | | <0.001 | [illegible] | 10.0 | | | [illegible] | | 0.127 | | | 0.110 | <0.001 | 6.38 | 0.016 | [illegible] | | | 1.800 | <0.001 | | <0.001 | 11.73 | <0.001 | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-27-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-29-77 | | | | | | | | 51.40 | 14.0 | | | | | | | | 0.750 | | 12.96 | 0.113 | | | | 6.10 | | | | 4.30 | | | | | | Rain |
| [illegible] | | | | | | | | [illegible] | 2.0 | | | | | | | | 3.10 | | 10.28 | 0.020 | | | | 1.71 | | | | 2.70 | | | | | | |
| [illegible] | | | [illegible] | <0.001 | | 0.023 | <0.001 | [illegible] | 10.0 | <0.001 | | <0.001 | | 0.12 | | <0.001 | [illegible] | [illegible] | [illegible] | <0.001 | 0.002 | | | 2.24 | <0.001 | | <0.001 | 4.60 | <0.001 | | | | | | |
| [illegible] | | | | | | | | 64.00 | 3.0 | | | | | | | | 2.650 | | 20.16 | 0.005 | | | | 2.53 | | | | 6.00 | | | | | | |
| 12-10-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-10
Location South Fork Eccles Creek above Eccles Creek

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROGEN SULFIDE as H2S MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SUSPENDED SOLIDS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND. µmhos/cm | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-25-80 | 15:00 | 0.4 | 14 | 13 | 8.2 | 400 | 2.0 | | | | 7.20 | 8.1 | 2.40 | <0.001 | <0.01 | <0.01 | | | | 0.120 | | 25.0 | | | 16.0 | | 225 | | | 360 | 7.20 | | 25132 | 210 | | <0.1 | 1.0 | 2.1 |
| 7-8-80 | 12:04 | 0.5 | 12 | 7 | 8.5 | | | | | | | | | 0.048 | <0.01 | | | | | 0.080 | | 20.0 | | | 10.0 | | 225 | | | 350 | | | 21150 | | | | | |
| 9-11-80 | 12:50 | 0.157 | 21 | 8 | 8.6 | | | | | | | | | 0.023 | <0.01 | | | | | <0.060 | | 6.0 | | | 6.0 | | 212 | | | 320 | | | 24264 | | | | | |
| 11-17-80 | 10:30 | | -6 | 0 | 7.5 | | | | | | | | | <0.001 | <0.01 | | | | | 0.170 | | 12.0 | | | 14.0 | | 278 | | | 260 | | | 33428 | | | | | |
| 12-29-80 | 10:00 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-27-81 | 11:21 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-11-81 | 13:40 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-9-81 | 13:27 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-[illegible] | | 2.6 | 21 | 11 | 8.4 | | | | | | | | | <0.001 | <0.05 | | | | | 0.240 | | 20.0 | | | 11.0 | | 212 | | | 300 | | | 22448 | 190 | | <0.01 | | |
| 6-26-81 | 16:10 | 0.2 | 17 | 14 | 8.4 | | | | | | | | 2.20 | <0.001 | <0.01 | <0.01 | | | | 0.290 | 0.110 | 15.0 | | | 4.0 | | 230 | | | 290 | | | 24838 | 204 | | 14.00 | | |
| 7-9-81 | 13:36 | 0.1 | 3 | 3 | 8.3 | | | | | | | | | <0.001 | 0.18 | | | | | 0.260 | | 27.0 | | | 40.0 | | 320 | | | | | | 27355 | | | | | |
| 12-23-81 | 13:11 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | 12:55 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | 13:44 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 13:08 | 6.8 | 18 | 8 | 7.8 | | | | | | | | | 0.008 | 0.41 | | | | | 0.090 | | <0.1 | | | 41.0 | | 166 | | | 262 | | | 19520 | 160 | | | | |
| 8-11-82 | 15:20 | 0.1 | 16 | 13 | 8.4 | | | | | | | | | <0.001 | 0.08 | | | | | 0.020 | | 24.0 | | | 53.0 | | 326 | | | 433 | | | 27280 | 227.70 | | | | |
| 10-13-82 | 13:45 | 0.8 | 10 | 3 | 8.2 | | | | | | | | <0.1 | <0.001 | 0.02 | 0.05 | | | | 0.100 | 0.050 | 69.0 | | | 25.0 | | 336 | | | | | | 28340 | 248.50 | | 10.01 | | |
| 12-21-82 | 13:35 | | 4 | 1 | 8.1 | | | | | | | | | <0.001 | 0.36 | | | | | 0.160 | | 81.0 | | | 3.0 | | 384 | | | 521 | | | 32480 | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | FERROMANGANESE TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-25-80 | | | <0.001 | 0.030 | | 0.025 | <0.001 | 59.66 | <0.1 | <0.001 | | <0.001 | <0.001 | 0.014 | | 0.100 | 0.520 | <0.001 | 20.64 | 0.010 | <0.002 | | | 0.87 | 0.002 | | <0.001 | 2.10 | 0.060 | | | | | |
| 7-8-80 | | | | | | | | 62.40 | 1.7 | <0.001 | | | | | | | 0.245 | | 15.36 | 0.126 | | | <0.001 | 0.60 | | | | 1.80 | | | | | | |
| 9-11-80 | | | | | | | | 59.20 | 0.4 | | | | | | | | 0.420 | | 12.96 | 0.033 | | | | 1.01 | | | | 6.00 | | | | | | |
| 11-17-80 | | | | | | | | 72.80 | 1.30 | | | | | | | | 0.440 | | 16.80 | 0.085 | | | | 1.07 | | | | 15.00 | | | | | | |
| 12-29-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-27-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-11-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-9-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-[illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | 0.120 | | 15.84 | [illegible] | | | | 0.87 | | | | 7.10 | | | | | | |
| 6-26-81 | | | 0.003 | 0.030 | | 0.020 | <0.001 | 56.80 | 4.69 | <0.001 | | <0.001 | | 0.17 | | 0.030 | 0.420 | <0.001 | 19.72 | 0.070 | <0.0002 | | | 1.22 | 0.004 | | <0.001 | 2.30 | 0.010 | | | | | |
| 7-9-81 | | | | | | | | 60.00 | 4.80 | | | | | | | | 0.440 | | 16.32 | 0.031 | | | | 1.20 | | | | 17.00 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen |
| 6-9-82 | | | | | | | | 49.00 | 3.50 | | | | | | | 0.130 | 0.360 | | 8.80 | 0.050 | | | | 0.58 | | | | 1.90 | | | | | | |
| 8-11-82 | | | | | | | | 64.80 | 50.20 | | | | | | | | [illegible] | | 24.00 | 0.035 | | | | 0.65 | | | | 27.0 | | | | | | |
| 10-13-82 | | | <0.001 | 0.035 | | 0.070 | <0.001 | 86.40 | 4.70 | <0.001 | | 0.010 | | 0.12 | | 0.115 | 0.180 | <0.001 | 22.56 | 0.030 | <0.0002 | | | 1.76 | 0.006 | | <0.001 | 2.6 | 0.003 | | | | | |
| 12-21-82 | | | | | | | | 88.00 | 4.80 | | | | | | | | 0.360 | | 26.48 | 0.030 | | | | 1.65 | | | | 15.0 | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station YC-10
Location South Fork Eccles Creek above Eccles Creek

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | DISSOLVED OXYGEN | OIL & GREASE | PHENOL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L |
| 2-21-83 | 12:15 | | 3 | 3 | | | | | | | | | | 0.017 |
| 4-21-83 | 11:20 | 0.9 | 6 | 3 | 8.1 | | | | | | | | | <0.001 |
| 6-21-83 | 14:35 | 10.2 | 21 | 11 | 7.7 | | | | | | | | | 0.040 |
| 8-25-83 | 14:45 | 0.58 | 22 | 14 | 7.9 | | | | | | | | <0.1 | 0.030 |

| DATE | NITROGEN AMMONIA as $NH_3$-N | NITRATE as $NO_3$-N | NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4^{-P}$ | PHOSPHATE ORTHO as $PO_4^{-P}$ | SULFATE as $SO_4$ | HARDNESS as CaCO | SURFACTANT as MBAS |
|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L |
| 2-21-83 | 0.02 | | | | | 0.120 | | 85.0 | | |
| 4-21-83 | 0.16 | | | | | 0.12 | | 70.0 | | |
| 6-21-83 | <0.01 | | | | | 0.420 | | 12.0 | | |
| 8-25-83 | <0.01 | <0.01 | | | | 0.40 | | 11 | | |

| DATE | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK. as $CO_3$ | BI-CARBONATE ALK. as $HCO_3$ | TOTAL ALK. as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | ML/L | MG/L | MG/L | MG/L | μmhos | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pC/L | pC/L |
| 2-21-83 | 38.0 | | 356 | | | 512 | | | 289.96 | | | | | |
| 4-21-83 | 77.0 | | 350 | | | 467 | | | 270.46 | | | | | |
| 6-21-83 | 115 | | 210 | | | 245 | | | 167.96 | | | | | |
| 8-25-83 | 88.0 | | 250 | | | 469 | | | 261 | 214 | | <0.01 | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEX as CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L |
| 2-21-83 | | | | | | | | 81.60 | 5.10 | | | | | |
| 4-21-83 | | | | | | | | 98.80 | 7.90 | | | | | |
| 6-21-83 | | | | | | | | 44.80 | 4.00 | | | | | |
| 8-25-83 | | | <0.001 | 0.450 | | 0.080 | <0.001 | 13.50 | 4.2 | <0.001 | | <0.001 | | 0.13 |

| DATE | GERMANIUM TOTAL | IRON DISS | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | |
| 2-21-83 | | | 0.220 | | 24.00 | 0.035 | | | | 1.55 | | | | 11.8 | | | |
| 4-21-83 | | | 1.870 | | 21.12 | 0.070 | | | | 1.40 | | | | 12.0 | | | H. Snow Showers |
| 6-21-83 | | | 1.360 | | 7.68 | 0.055 | | | | 0.75 | | | | 5.0 | | | |
| 8-25-83 | | 0.775 | 1.330 | 0.005 | 8.15 | 0.049 | <0.0002 | | | 4.9 | <0.001 | | <0.001 | 71.0 | 0.033 | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-11
Location Beardinghouse Creek

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°F) | TEMPERATURE WATER (°F) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | BOD (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as NH3-N (MG/L) | NITROGEN NITRATE as NO3-N (MG/L) | NITROGEN NITRITE as NO2-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as PO4-P (MG/L) | PHOSPHATE ORTHO as PO4-P (MG/L) | SULFATE as SO4 (MG/L) | HYDROGEN SULFIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SUSPENDED SOLIDS (MG/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL DISSOLVED SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µmhos/cm) | TURBIDITY (FTU) | CARBONATE ALK as CO3 (MG/L) | BI-CARBONATE ALK as HCO3 (MG/L) | TOTAL ALK as CaCO3 (MG/L) | TOTAL HARDNESS as CaCO3 (MG/L) | ACIDITY as CaCO3 (MG/L) | ALPHA RADIO-ACTIVITY (PC/L) | BETA RADIO-ACTIVITY (PC/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 1.5 | [illegible] | 9 | 8.6 | | | | | | | 7.5 | | 0.016 | <0.01 | | | | | 0.020 | | [illegible] | | | 33.0 | | 145 | | | 130 | | | [illegible] | | | | | |
| [illegible] | 13:10 | 1.7 | 17 | 10 | 8.4 | | | | | | | 8.2 | <0.01 | <0.001 | <0.01 | 0.04 | | | | 0.060 | 0.001 | 16.5 | | | 19.0 | | 21.8 | | | 410 | | | 224 | | | <0.1 | | |
| 10-7-80 | 12:28 | 0.9 | 21 | 8 | 8.5 | | | | | | | | | 0.014 | 0.01 | | | | | 0.010 | | 3.0 | | | 8.0 | | 252 | | | 390 | | | 348.8 | | | | | |
| 12-10-80 | 15:13 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-5-81 | 12:19 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-[illegible]-81 | 10:28 | 0.6 | 35 | 15 | | | | | | | | | | <0.001 | 0.10 | | | | | 0.080 | | 37.0 | | | 11.0 | | 258 | | | 310 | | | 246.44 | 210 | | <0.1 | | |
| 4-26-81 | 09:48 | 0.5 | 23 | 14 | | | | | | | | | 1.60 | <0.001 | <0.01 | <0.01 | | | | 0.280 | 0.060 | 34.0 | | | 4.0 | | 285 | | | 360 | | | 235.48 | 224 | | 16.00 | | |
| 10-14-81 | 13:06 | 0.5 | 3 | 4 | 7.8 | | | | | | | | | <0.001 | 0.22 | | | | | 0.280 | | 21.0 | | | 51.0 | | 310 | | | 470 | | | 328.15 | | | | | |
| 12-23-81 | 12:45 | | -11 | 2 | 7.9 | | | | | | | | | <0.001 | 2.70 | | | | | 0.440 | | 32.0 | | | 26.0 | | 285 | | | 260 | | | 304.80 | 249.84 | | | | |
| 2-24-82 | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | 13:22 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 11:32 | 5.0 | 10 | 9 | 7.6 | | | | | | | | | <0.001 | 0.39 | | | | | 0.160 | | 3.0 | | | 30.0 | | 155 | | | 255 | | | 130.50 | 148 | | | | |
| 8-11-82 | 10:00 | 1.2 | 19 | 13 | 8.1 | | | | | | | | | <0.001 | 0.12 | | | | | 0.020 | | 3.0 | | | 75.0 | | 283 | | | 382 | | | 295.70 | 242.40 | | | | |
| 10-13-82 | 10:40 | 0.7 | 9 | 4 | 7.7 | | | | | | | | 0.2 | <0.001 | 0.02 | 0.15 | | | | 0.180 | 0.090 | 15.0 | | | 63.0 | | 265 | | | 459 | | | 291.60 | 239 | | <0.01 | | |
| 12-21-82 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX or CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | IRON TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as SiO2 (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-29-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 57.60 | <0.1 | | | | | | | | 0.660 | | 9.60 | 0.040 | | | | 0.87 | | | | 2.20 | | | | | | |
| [illegible] | | | <0.001 | 0.030 | | 0.010 | <0.001 | 70.40 | 18.0 | <0.001 | | <0.001 | | 0.14 | | 0.050 | 0.400 | <0.001 | 15.84 | 0.020 | <0.002 | | | 1.19 | <0.001 | | <0.01 | 7.00 | 0.002 | | | | | |
| 10-7-80 | | | | | | | | 65.60 | 2.2 | | | | | | | | 0.390 | | 18.24 | 0.026 | | | | 1.47 | | | | 8.00 | | | | | | |
| 12-10-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-9-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 56.00 | 4.40 | | | | | | | | [illegible] | | [illegible] | 0.040 | | | | 1.50 | | | | 7.80 | | | | | | |
| 3-26-81 | | | 0.003 | 0.050 | | 0.020 | <0.001 | 71.20 | 6.67 | <0.001 | | 0.010 | | 0.16 | | <0.001 | 0.820 | <0.001 | 23.04 | 0.050 | <0.002 | | | 1.67 | 0.005 | | <0.01 | 3.60 | 0.010 | | | | | |
| 10-14-81 | | | | | | | | 43.20 | 5.90 | | | | | | | | 0.920 | | 16.32 | 0.016 | | | | 1.65 | | | | 5.40 | | | | | | |
| 12-23-81 | | | | | | | | 77.50 | 4.78 | | | | | | | | 0.025 | | 23.00 | 0.009 | | | | 0.86 | | | | 2.10 | | | | | | |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen-Inaccessible Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | 44.00 | 3.50 | | | | | | | 0.150 | 0.880 | | 9.40 | 0.050 | | | | 0.75 | | | | 2.3 | | | | | | |
| 8-11-82 | | | | | | | | 36.00 | 35.30 | | | | | | | | 0.630 | | 33.60 | 0.065 | | | | 0.88 | | | | 29.0 | | | | | | |
| 10-13-82 | | | <0.001 | 0.035 | | 1.090 | <0.001 | 68.00 | 2.50 | <0.001 | | 0.020 | | 0.12 | | 0.995 | 1.600 | <0.001 | 18.20 | 0.050 | <0.002 | | | 1.48 | 0.005 | | <0.001 | 2.8 | 0.020 | | | | | |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-11
Location Boardinghouse Creek

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | HYDROXIDE as OH | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL DISSOLVED SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK. as $CO_3$ | BI-CARBONATE ALK. as $HCO_3$ | TOTAL ALK. as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | µMHOS/CM | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 6-21-83 | 12:00 | 12.8 | 20 | 11 | 7.4 | | | | | | | | | 0.320 | <0.01 | | | | | 0.520 | | 12.0 | | | 201 | | 134 | | | 207 | | | 134.30 | | | | | |
| 8-24-83 | 16:35 | 2.55 | 12 | 15 | 7.3 | | | | | | | | <0.1 | 0.145 | <0.01 | <0.01 | | | | 0.47 | | 13 | | | 140 | | 255 | | | 397 | | | 268.40 | 220 | | <0.01 | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEXavCR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 6-21-83 | | | | | | | | 35.20 | 4.00 | | | | | | | | 2.100 | | 5.76 | 0.085 | | | | 0.85 | | | | 5.8 | | | | | | |
| 8-24-83 | | | <0.001 | 0.670 | | 0.140 | <0.001 | 33.40 | 3.7 | <0.001 | <0.001 | | | 0.12 | | 0.655 | 1.880 | <0.001 | 4.98 | 0.088 | <0.0002 | | | 0.7 | <0.001 | | <0.001 | 59.0 | 0.050 | | | | | |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-12
Location Finn Canyon Creek

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | B.O.D. MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROGEN SULFIDE as H2S MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND. µmhos/cm | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 4.2 | 20 | 6.5 | [illegible] | | | | | | | [illegible] | | <0.002 | <0.01 | | | | | 0.080 | | 16.0 | | | 30.0 | | 125 | | | 210 | | | 117.12 | | | | | |
| [illegible] | 12:53 | 0.2 | 18 | 9 | 7.9 | | | | | | | [illegible] | [illegible] | <0.001 | 0.11 | <0.01 | | | | 0.050 | 0.040 | 13.5 | | | 70.0 | | 238 | | | 300 | | | 251.32 | 206 | | 6.0 | | |
| 10-7-80 | 12:13 | 0.004 | 20 | 10 | 8.4 | | | | | | | | | <0.001 | <0.01 | | | | | 0.060 | | 15.0 | | | 1.0 | | 318 | | | 490 | | | 363.44 | | | | | |
| [illegible] | 15:08 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.4 | 24 | 13 | 8.6 | | | | | | | | | <0.001 | [illegible] | | | | | 0.120 | | 14.9 | | | 3.0 | | 159 | | | 209 | | | 135.48 | 148 | | 10.31 | | |
| 3-26-81 | 09:36 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-14-81 | 10:35 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | 11:50 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | -0- | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | -0- | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 11:18 | 3.8 | 18 | 6 | 7.6 | | | | | | | | | 0.003 | 0.42 | | | | | 0.080 | | 6.8 | | | 36.0 | | 149 | | | 158 | | | 163 | 133.6 | | | | |
| 8-11-82 | 09:50 | 0.04 | 18 | 12 | 8.0 | | | | | | | | | <0.001 | 0.09 | | | | | 0.080 | | 3.6 | | | 21.0 | | 292 | | | 335 | | | 269 | 228.50 | | | | |
| 10-15-82 | 10:13 | 0.06 | 7 | 3 | 7.8 | | | | | | | | 2.4 | <0.001 | 0.06 | 0.07 | | | | 0.100 | 0.050 | 18.0 | | | 7.0 | | 260 | | | 390 | | | 280.10 | 22860 | | 5.00 | | |
| 12-21-82 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 30.00 | <0.1 | | | | | | | | 0.770 | | 8.16 | 0.020 | | | | 0.68 | | | | 2.10 | | | | | | | |
| [illegible] | | | <0.001 | 0.030 | | 0.080 | <0.001 | 62.40 | 12.0 | <0.001 | | 0.010 | | 0.15 | | 0.040 | 0.720 | <0.001 | 16.80 | [illegible] | <0.0002 | | | 1.88 | <0.001 | | <0.001 | 3.50 | 0.004 | | | | | | |
| 10-7-80 | | | | | | | | 79.20 | 4.2 | | | | | | | | 8.200 | | 22.08 | 0.031 | | | | 1.86 | | | | 13.00 | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | 11.52 | [illegible] | | | | [illegible] | | | | 1.70 | | | | | | | |
| 3-21-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen - Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | 0.41 | 1.60 | | | | | | | 0.130 | 0.230 | | 8.70 | 0.045 | | | | 0.64 | | | | 2.2 | | | | | | | |
| 8-11-82 | | | | | | | | 19.60 | 49.30 | | | | | | | | 0.210 | | 23.04 | 0.075 | | | | 0.65 | | | | 33.0 | | | | | | | |
| 10-15-82 | | | <0.001 | 0.030 | | | <0.001 | 64.30 | 4.00 | <0.001 | | 0.010 | | 0.11 | | 0.045 | 0.110 | <0.001 | 17.28 | 0.015 | <0.001 | | | 1.88 | <0.001 | | <0.001 | 8.0 | 0.002 | | | | | | |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-12
Location Finn Canyon Creek

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°F) | TEMPERATURE WATER (°F) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | BOD (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as $NH_3$-N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$-P (MG/L) | PHOSPHATE ORTHO as $PO_4$-P (MG/L) | SULFATE as $SO_4$ (MG/L) | HYDROXIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | SPECIFIC COND (µMHOS) | TURBIDITY (FTU) | CARBONATE ALK as $CO_3$ (MG/L) | BI-CARBONATE ALK as $HCO_3$ (MG/L) | TOTAL ALK as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pCi/L) | BETA RADIO-ACTIVITY (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-21-83 | 12:20 | | 22 | 9 | 8.0 | | | | | | | | | <0.001 | <0.01 | | | | | 0.500 | | 21.0 | | | 228 | | 212 | | | 193 | | | 136.60 | | | | | |
| 8-24-83 | 16:20 | 0.38 | 15 | 11 | 7.3 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.51 | | 19 | | | 174 | | 247 | | | 442 | | | 283 | 232 | | <0.01 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | IRON TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-21-83 | | | | | | | | 35.20 | 12.00 | | | | | | | | 2.900 | | 5.76 | 0.095 | | | | 0.83 | | | | 16.8 | | | | | | | |
| 8-24-83 | | | <0.001 | 0.390 | | 0.140 | <0.001 | 36.50 | 10.8 | <0.001 | <0.001 | | | 0.13 | | 1.445 | 3.010 | <0.001 | 5.60 | 0.090 | <0.002 | | | 0.9 | <0.001 | | <0.001 | 67.0 | 0.045 | | | | | Scattered Showers |

R 1-76

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-13
Location Long Canyon Creek

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. MG/L | B.O.D. MG/L | T.O.C. MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | CHLORIDE as CL MG/L | FLUORIDE as MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS T.D.S. MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µMHOS/CM | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-7-79 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | 21 | 4 | [illegible] | | | | | | | 9.1 | | [illegible] | <0.01 | | | | | 0.060 | | 12.0 | | | 23.0 | | 110 | | | 170 | | | 111.5 | | | | | |
| [illegible] | 12:24 | 0.3 | 10 | 10 | 8.5 | | | | | | | 6.2 | 0.30 | <0.001 | 0.1 | 0.01 | | | | 0.100 | 0.050 | 7.0 | | | 34.0 | | 221 | | | 210 | | | 221.10 | 120 | | 6.0 | | |
| 12-10-80 | 15:05 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 17:00 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.04 | 16 | 12 | 8.5 | | | | | | | | | <0.001 | 0.15 | | | | | 0.160 | | 17.0 | | | 2.0 | | 151 | | | 220 | | | 155.10 | 150 | | 10.01 | | |
| 3-26-81 | 09:26 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-14-81 | 10:49 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | 11:45 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 11:55 | 3.1 | 13 | 6 | 7.6 | | | | | | | | | <0.001 | 0.42 | | | | | 0.090 | | 26.0 | | | 19.0 | | 154 | | | 213 | | | 149.10 | 122.20 | | | | |
| 8-11-82 | 09:27 | 0.08 | 19 | 11 | 7.2 | | | | | | | | | <0.001 | 0.10 | | | | | 0.080 | | 10.0 | | | 8.0 | | 279 | | | 283 | | | 262.70 | 215.30 | | | | |
| 10-13-82 | 09:55 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-21-82 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 11:55 | 8.5 | 22 | 7 | 7.5 | | | | | | | | | 0.158 | <0.01 | | | | | 0.480 | | 12.0 | | | 185 | | 140 | | | 197 | | | 141.50 | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 26.40 | <0.1 | | | | | | | | 0.170 | | 10.08 | 0.030 | | | | 0.53 | | | | 1.00 | | | | | | |
| [illegible] | | | <0.001 | 0.050 | | <0.01 | <0.001 | 52.40 | 14.0 | <0.001 | | 0.010 | | 0.13 | | 0.030 | 0.670 | <0.001 | 11.04 | 0.010 | <0.0002 | | | 1.11 | <0.001 | | <0.01 | 12.50 | 0.002 | | | | | |
| 12-10-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | [illegible] | [illegible] | | | | [illegible] | | | | [illegible] | | | | | | |
| 3-26-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-14-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow - Frozen |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | 47.00 | 0.40 | | | | | | | 0.140 | 0.250 | | 7.10 | 0.040 | | | | 0.52 | | | | 1.8 | | | | | | |
| 8-11-82 | | | | | | | | 46.40 | 34.70 | | | | | | | | 0.220 | | 16.32 | 0.007 | | | | 0.50 | | | | 41.0 | | | | | | |
| 10-13-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow - |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-21-83 | | | | | | | | 34.40 | 2.00 | | | | | | | | 2.450 | | 5.76 | 0.087 | | | | 0.82 | | | | 8.9 | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-13
Location Long Canyon Creek

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. MG/L | B.O.D. MG/L | T.O.C. MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROXIDE as OH MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | SPECIFIC COND. µMHOS/CM | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-24-73 | 15:50 | 0.2 | 17 | 12 | 6.7 | | | | | | | | 0.5 | 0.069 | <0.01 | <0.01 | | | | 0.45 | | 14 | | | 145 | | 180 | | | 332 | | | 222 | 182 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-24-73 | | | <0.001 | 0.750 | | 0.200 | <0.001 | 34.10 | 1.9 | <0.001 | | <0.001 | | 0.11 | | 0.865 | 2.650 | 0.002 | 4.69 | 0.076 | <0.002 | | | 0.8 | <0.001 | | <0.001 | 41.0 | 0.095 | | | | | Scattered Showers |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-14
Location Whiskey Canyon Creek below sediment pond

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°F) | TEMPERATURE WATER (°F) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | COD (MG/L) | BOD (MG/L) | TOC (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as NH3-N (MG/L) | NITROGEN NITRATE as NO3-N (MG/L) | NITROGEN NITRITE as NO2-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as PO4-P (MG/L) | PHOSPHATE ORTHO as PO4-P (MG/L) | SULFATE as SO4 (MG/L) | CHLORIDE as Cl (MG/L) | FLUORIDE as F (MG/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS T.S.S. (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND (µmhos) | TURBIDITY (FTU) | CARBONATE ALK as CO3 (MG/L) | BICARBONATE ALK as HCO3 (MG/L) | TOTAL ALK as CaCO3 (MG/L) | TOTAL HARDNESS as CaCO3 (MG/L) | ACIDITY as CaCO3 (MG/L) | ALPHA RADIO-ACTIVITY (PICO-CURIES/L) | BETA RADIO-ACTIVITY (PICO-CURIES/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-29-80 | 11:48 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-80 | 14:00 | 1.1 | [illegible] | [illegible] | 8.7 | | | | | | | [illegible] | | [illegible] | 0.10 | | | | | [illegible] | | [illegible] | | | 24.0 | | 12.0 | | | 340 | | | [illegible] | | | | | |
| [illegible] | [illegible] | [illegible] | 15 | 12 | 8.7 | | | | | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | | [illegible] | [illegible] | 53.0 | | | 18.0 | | [illegible] | | | 460 | | | [illegible] | 228 | | [illegible] | | |
| 8-7-80 | 09:40 | 0.5 | 9 | 6 | 8.9 | | | | | | | | | <0.001 | <0.01 | | | | | 0.080 | | 12.0 | | | 21.0 | | 251 | | | 390 | | | 275.24 | | | | | |
| 10-10-80 | 14:37 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:20 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:45 | | 19 | 12 | 7.2 | | | | | | | | | <0.001 | 1.10 | | | | | 0.710 | | 125 | | | 147 | | 346 | | | 482 | | | [illegible] | 200 | | [illegible] | | |
| 9-26-81 | 14:30 | 0.07 | 20 | 11 | 8.4 | | | | | | | | 0.40 | <0.001 | <0.01 | 0.16 | | | | 0.190 | 0.040 | 55.5 | | | 3.0 | | 320 | | | 390 | | | 263.55 | 220 | | <0.01 | | |
| 10-14-81 | 13:58 | 0.04 | 0 | 4 | 8.4 | | | | | | | | | <0.001 | 0.21 | | | | | 0.250 | | 60.0 | | | 22.0 | | 320 | | | 500 | | | 282.90 | | | | | |
| 12-23-81 | 13:40 | -0- | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-7-82 | 13:40 | | 19 | 6 | 7.5 | | | | | | | | | 0.003 | 0.40 | | | | | 0.070 | | 28.0 | | | 28.0 | | 220 | | | 372 | | | 208.70 | 164.50 | | | | |
| 8-11-82 | 16:32 | 0.07 | 15 | 10 | 8.4 | | | | | | | | | 0.004 | 0.07 | | | | | 0.110 | | 21.0 | | | 36.0 | | 346 | | | 514 | | | 290.80 | 238.90 | | | | |
| 10-13-82 | 15:25 | | 7 | 5 | 7.8 | | | | | | | | <0.1 | 0.005 | 0.05 | 0.21 | | | | 1.230 | 1.150 | 52.0 | | | 418 | | 288 | | | 419 | | | 175.90 | 148.20 | | 4.00 | | |
| 12-21-82 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 15:45 | 1.1 | 18 | 11 | 7.7 | | | | | | | | | 0.070 | 0.20 | | | | | 0.220 | | 21.0 | | | 75.0 | | 134 | | | 170 | | | 107.40 | | | | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | MANGANESE TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-29-80 | | | | | | | | [illegible] | 7.10 | | | | | | | | | | | | | | | | | | | | | | | | | | Rain & Snow |
| 2-25-80 | | | | | | | | [illegible] | | | | | | | | | 0.250 | | [illegible] | 0.040 | | | | 1.18 | | | | 3.90 | | | | | | |
| 7-15-80 | | | <0.001 | 0.050 | | 0.050 | <0.001 | 13.60 | 15.0 | <0.001 | | 0.020 | | 0.19 | | 0.030 | 0.370 | <0.001 | 22.04 | 0.020 | <0.0002 | | | 0.36 | <0.001 | | <0.001 | 3.90 | 0.050 | | | | | |
| 10-7-80 | | | | | | | | 59.20 | 3.5 | | | | | | | | 0.288 | | 12.68 | 0.050 | | | | 2.75 | | | | 12.00 | | | | | | |
| 12-10-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-29-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | 12.20 | | | | | | | | [illegible] | | [illegible] | 0.080 | | | | 3.76 | | | | [illegible] | | | | | | |
| 7-26-81 | | | 0.002 | 0.045 | | 0.090 | 0.002 | 52.80 | 22.00 | <0.001 | | <0.001 | | 0.21 | | <0.001 | 0.330 | <0.001 | 27.72 | 0.060 | <0.0002 | | | 3.90 | 0.005 | | <0.001 | 7.60 | 0.130 | | | | | |
| 10-14-81 | | | | | | | | 62.00 | 11.10 | | | | | | | | 0.380 | | 21.16 | 0.065 | | | | 4.10 | | | | 31.00 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen - Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Frozen - Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-7-82 | | | | | | | | 54.00 | 10.10 | | | | | | | 0.340 | 0.390 | | 15.10 | 0.060 | | | | 1.68 | | | | 5.3 | | | | | | |
| 8-11-82 | | | | | | | | 50.40 | 54.70 | | | | | | | | 0.350 | | 39.36 | 0.055 | | | | 1.50 | | | | 26.0 | | | | | | Recent Rain |
| 10-13-82 | | | 0.002 | 0.065 | | 0.120 | <0.001 | 53.60 | 8.70 | <0.001 | | 0.030 | | 0.11 | | 6.650 | 11.100 | 0.015 | 13.44 | 0.305 | <0.0002 | | | 0.74 | 0.006 | | 0.001 | 7.4 | 0.190 | | | | | |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | In-Accessible Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-21-83 | | | | | | | | 28.80 | 4.00 | | | | | | | | 0.850 | | 4.80 | 0.035 | | | | 0.68 | | | | 10.0 | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station VC-14
Location Whiskey Canyon Creek below sediment pond

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | B.O.D. | T.O.C. | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | HYDROGEN ION as pH | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK. as $CO_3$ | BI-CARBONATE ALK as $HCO_3$ | TOTAL ALK as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | µMHOS | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 8-25-83 | 13:54 | 0.04 | 19 | 11 | 7.4 | | | | | | | | 0.6 | 0.045 | <0.01 | 0.12 | | | | 0.17 | | 20 | | | 340 | | 295 | | | 592 | | | 290.30 | 238 | | <0.01 | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS. | CHROMIUM HEX as CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS. | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 8-25-83 | | | <0.001 | 0.810 | | 0.150 | <0.001 | 30.10 | 4.2 | <0.001 | | <0.001 | | 0.11 | | 0.350 | 0.980 | 0.012 | 5.20 | 0.033 | <0.0002 | | | 0.6 | <0.001 | | <0.001 | 75.5 | 0.064 | | | | | |

8-1-70

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station 10 19-1
Location [illegible]

| DATE | TIME | FLOW | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROGEN SULFIDE as H2S MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL NONFILTERABLE MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL NONFILTERABLE MG/L | SOLIDS TOTAL VOLATILE MG/L | COND µmhos/cm | TURBIDITY NTU | CARBONATE ALK as $CO_3$ MG/L | BICARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIOACTIVITY pc/L | BETA RADIOACTIVITY pc/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-8-81 | [illegible] | 0.03 | | 6.0 | 7.60 | [illegible] | [illegible] | | 5.0 | 7.0 | | | | 0.001 | <0.01 | 0.30 | | | | 0.121 | | [illegible] | | | 16.0 | | 306 | | | 500 | [illegible] | | 305 | 250 | | | | |
| [illegible] | [illegible] | [illegible] | | [illegible] | 7.60 | [illegible] | [illegible] | | 5.0 | 7.0 | | | | 0.001 | 0.01 | 0.24 | | | | 0.120 | | [illegible] | | | 18.0 | | 300 | | | [illegible] | [illegible] | | [illegible] | 254 | | | | |
| [illegible] | [illegible] | 0.12 | | [illegible] | [illegible] | [illegible] | [illegible] | | | [illegible] | [illegible] | | 1.00 | 0.001 | 0.01 | [illegible] | | | | [illegible] | | 110 | | | 10.0 | | 300 | | | 500 | 5.40 | | [illegible] | 210 | | | | |
| [illegible] | [illegible] | 0.12 | | 7.0 | [illegible] | [illegible] | [illegible] | | [illegible] | [illegible] | | | 1.00 | 0.014 | <0.01 | 0.27 | | | | 0.005 | | 940 | | | 14.0 | | 310 | | | 550 | 1.20 | | [illegible] | 220 | | | | |
| [illegible] | 17:00 | | | 3.0 | 8.5 | | | | | | | | | <0.001 | 0.20 | | | | | 0.040 | | 15.0 | | | 3.0 | | 290 | | | 1150 | | | 340.60 | | | | | |
| [illegible] | 14:05 | | | 5 | 7.2 | | | | | | | | | 0.001 | <0.01 | | | | | 0.030 | | 16.5 | | | 6.0 | | 294 | | | 450 | | | 339.16 | | | | | |
| [illegible] | [illegible] | | | | 8.0 | | | | | | | | 1.20 | 0.009 | <0.01 | 0.20 | | | | 0.001 | | 40.0 | | | | | 302 | | | 440 | | | 322.6 | 230 | | 10.1 | | |
| [illegible] | [illegible] | | | 3 | 8.0 | | | | | | | | | 0.032 | 0.14 | | | | | 0.025 | | 22.0 | | | 2.0 | | 277 | | | 270 | | | 282.91 | | | | | |
| 8-26-81 | 15:06 | | | 13 | 8.1 | | | | | | | | <0.01 | <0.001 | <0.01 | 0.26 | | | | 0.160 | 0.040 | 36.0 | | | | | 290 | | | 370 | | | 292.80 | 240 | | 12.00 | | |
| 10-14-81 | 14:46 | | | | 8.0 | | | | | | | | | <0.001 | 0.19 | | | | | 0.200 | | 18.0 | | | | | 293 | | | 440 | | | 334.40 | | | | | |
| 12-23-81 | 13:39 | | | 4 | 7.6 | | | | | | | | | 0.006 | 2.48 | | | | | 0.420 | | 20.0 | | | 6.0 | | 293 | | | 285 | | | 327.90 | 267.75 | | | | |
| 2-24-82 | 13:06 | | | | 7.5 | | | | | | | | | <0.001 | 1.14 | | | | | 0.010 | | 18.0 | | | 2.0 | | 298 | | | 450 | | | 329.80 | 270.30 | | | | |
| 4-14-82 | 14:18 | | | 4 | 7.4 | | | | | | | | | 0.038 | 0.07 | | | | | 0.330 | | 24.0 | | | | | 315 | | | 503 | | | 349.70 | 279.30 | | | | |
| 6-9-82 | 14:13 | | | 8 | 7.1 | | | | | | | | | 0.008 | 0.50 | | | | | 0.040 | | 9.0 | | | | | 320 | | | 476 | | | 350.10 | 287 | | | | |
| 8-11-82 | 16:22 | | | 11 | 7.8 | | | | | | | | | <0.001 | 0.13 | | | | | 0.100 | | 3.0 | | | | | 306 | | | 457 | | | 332.30 | 272.40 | | | | |
| 10-13-82 | 15:07 | | 10 | 9 | 7.4 | | | | | | | | 0.8 | <0.001 | 0.06 | 0.17 | | | | 0.150 | 0.040 | 15.0 | | | | | 285 | | | 496 | | | 325.30 | 266.60 | | 9.00 | | |
| 12-23-82 | | | No | sample | | Collected | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | 13:10 | | 6 | 5 | 7.8 | | | | | | | | | 0.096 | 0.21 | | | | | 0.180 | | 34.0 | | | | | 349 | | | 436 | | | 368.30 | | | | | |
| 4-21-83 | 11:58 | | | 4 | 7.9 | | | | | | | | | <0.001 | 0.15 | | | | | 0.08 | | 30.0 | | | 19.0 | | 308 | | | 406 | | | 314.8 | | | | | |
| 6-21-83 | 15:30 | | 21 | 10 | 7.6 | | | | | | | | | 0.030 | <0.01 | | | | | 0.120 | | 33.0 | | | | | 316 | | | 373 | | | 317.20 | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS MG/L | GERMANIUM TOTAL MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | [illegible] | [illegible] | 4.0 | [illegible] | | [illegible] | [illegible] | | | 0.010 | 0.470 | <0.001 | [illegible] | [illegible] | [illegible] | | | 1.48 | <0.001 | | <0.001 | 2.50 | 0.105 | | | | | Total Depth 350' |
| [illegible] | | | | | | | <0.001 | [illegible] | 4.0 | <0.001 | | [illegible] | <0.001 | | | 0.010 | 0.465 | <0.001 | [illegible] | [illegible] | [illegible] | | | 1.49 | <0.001 | | <0.001 | 2.51 | 0.104 | | | | | Total Depth 350' |
| 11-8-80 | | | <0.001 | | | | <0.001 | [illegible] | 4.0 | <0.001 | | [illegible] | <0.001 | | | | 0.310 | <0.001 | [illegible] | [illegible] | [illegible] | | | [illegible] | <0.001 | | <0.001 | 35.80 | 0.015 | | | | | |
| [illegible] | | | <0.001 | | | | <0.001 | [illegible] | 4.0 | <0.001 | | 0.005 | <0.001 | | | | 0.[illegible] | <0.001 | [illegible] | 0.004 | [illegible] | | | 10.00 | <0.001 | | <0.001 | 31.75 | 0.071 | | | | | |
| 12-9-80 | | | | | | | | 68.00 | 0.4 | | | | | | | | 0.200 | | 23.04 | 0.020 | | | | 1.33 | | | | 12.10 | | | | | | |
| [illegible]-80 | | | | | | | | 75.20 | 2.35 | | | | | | | | 0.120 | | 19.68 | 0.005 | | | | 1.35 | | | | 2.70 | | | | | | |
| [illegible]-81 | | | 0.001 | 0.070 | | 0.45 | <0.001 | 70.30 | 6.00 | <0.001 | | 0.010 | | 0.19 | | | 0.310 | [illegible] | 10.20 | 0.010 | <0.0002 | | | 1.36 | 0.001 | | <0.001 | 7.60 | 1.270 | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | 0.850 | | [illegible] | 0.014 | | | | 1.29 | | | | 3.00 | | | | | | |
| [illegible]-81 | | | <0.001 | 0.070 | | 0.020 | <0.001 | [illegible] | 3.94 | <0.001 | | 0.010 | | 0.17 | | <0.001 | 0.040 | 0.144 | 21.60 | <0.001 | <0.0002 | | | 1.33 | 0.003 | | <0.001 | 3.50 | 0.880 | | | | | |
| 10-14-81 | | | | | | | | 73.60 | 3.70 | | | | | | | | 0.140 | | 19.68 | 0.010 | | | | 8.55 | | | | 9.30 | | | | | | |
| 12-23-81 | | | | | | | | 78.00 | 4.20 | | | | | | | | 0.046 | | 23.00 | 0.002 | | | | 1.55 | | | | 2.65 | | | | | | |
| 2-24-82 | | | | | | | | 71.00 | 3.70 | | | | | | | | 0.010 | | 21.50 | <0.001 | | | | 1.32 | | | | 11.00 | | | | | | |
| 4-14-82 | | | | | | | | 70.00 | 1.80 | | | | | | | | 0.020 | | 23.00 | 0.010 | | | | 1.35 | | | | 15.0 | | | | | | |
| 6-9-82 | | | | | | | | 76.00 | 2.50 | | | | | | | | 0.010 | | 23.60 | 0.002 | | | | 1.32 | | | | 2.8 | | | | | | |
| 8-11-82 | | | | | | | | 75.20 | 15.30 | | | | | | | | 0.012 | | 19.20 | 0.003 | | | | 1.29 | | | | 12.0 | | | | | | |
| 10-13-82 | | | <0.001 | 0.060 | | 0.100 | <0.001 | [illegible] | 3.90 | <0.001 | | 0.009 | | 0.13 | | 0.019 | 0.020 | <0.001 | 16.32 | 0.005 | <0.0002 | | | 1.38 | 0.005 | | <0.001 | 10.0 | 0.850 | | | | | |
| 12-23-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Pump under repair |
| 2-21-83 | | | | | | | | 74.40 | 2.40 | | | | | | | | 0.600 | | 17.76 | 0.005 | | | | 1.35 | | | | 34.0 | | | | | | |
| 4-21-83 | | | | | | | | 72.00 | 7.80 | | | | | | | | 0.150 | | 23.04 | 0.004 | | | | 1.39 | | | | 8.0 | | | | | | |
| 6-21-83 | | | | | | | | 72.00 | 10.00 | | | | | | | | 0.600 | | 21.60 | 0.011 | | | | 1.42 | | | | 16.0 | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station W19-1
Location Whiskey Canyon Well

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HARDNESS as CaCO MG/L | DETERGENT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SUSPENDED SOLIDS MG/L | SOLIDS T.D.S. MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | SPECIFIC COND µmhos/cm | TURBIDITY FTU | CARBONATE ALK as $CO_3$ MG/L | BI-CARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-25-83 | 13:06 | | 24 | 12 | 7.2 | | | | | | | | <0.1 | 0.024 | <0.01 | <0.01 | | | | 0.15 | | 34 | | | | | 310 | | | 496 | | | 310 | 260 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-25-83 | | | <0.001 | 0.079 | | 0.090 | <0.001 | 74.50 | 11.20 | <0.001 | | <0.001 | | 0.12 | | 0.530 | 0.650 | <0.001 | 20.50 | 0.015 | <0.0002 | | | 1.5 | <0.001 | | <0.001 | 16.5 | 0.036 | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S7-11
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | B.O.D. MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | HYDROGEN as pH MG/L | ALKALINITY as MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-2-80 | | | Snow | Snow | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-20-80 | 11:05 | 0.01 | 3.0 | 2.0 | 8.6 | | | | | | | | <0.01 | 0.020 | <0.01 | 0.30 | | | | 0.015 | 0.010 | 2.00 | | | 1.0 | 169 | | | 310 | | | 192 | 150 | | 2.0 | | |
| 3-7-80 | 11:22 | 0.002 | 15 | 7 | 8.6 | | | | | | | | | <0.001 | 0.01 | | | | | 0.360 | | 4.5 | | | 9.0 | 219 | | | 340 | | | 261.0 | | | | | |
| 3-14-80 | In-Accessible | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-25-80 | In-Accessible | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-5-80 | In-Accessible | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-[illegible]-80 | 1:40 | 0.021 | 19 | 18 | 8.7 | | | | | | | | | <0.001 | <0.01 | | | | | 0.210 | | 37.5 | | | | 172 | | | 230 | | | 122.3 | 114 | | <0.01 | | |
| 9-[illegible]-80 | 11:06 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-27-80 | 11:55 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | 13:35 | 0.002 | 12 | 10 | 8.1 | | | | | | | | | <0.001 | 0.16 | | | | | 0.110 | | 3.5 | | | | 146 | | | 131 | | | 131.30 | 107.60 | | | | |
| 10-13-82 | 12:08 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-21-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | | | In-Accessible | | | Mud slide across road - snow drifts | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | 07:20 | 0.004 | 11 | 5 | 6.8 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.13 | | 6 | | | | 260 | | | 442 | | | 244 | 200 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-2-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered by Snow |
| 2-20-80 | | | <0.001 | 0.010 | | 0.010 | <0.001 | 48.00 | 2.0 | <0.001 | | 0.010 | | 0.06 | | 0.010 | 0.140 | <0.002 | 8.64 | <0.001 | <0.0002 | | | 0.53 | <0.001 | | <0.001 | 3.00 | 0.010 | | | | | |
| 3-7-80 | | | | | | | | 65.60 | 0.6 | | | | | | | | 0.350 | | 7.68 | 0.020 | | | | 0.64 | | | | 9.00 | | | | | | |
| 3-14-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-25-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-5-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-[illegible]-80 | | | | | | | | 45.00 | 12.30 | | | | | | | | 0.033 | | 7.12 | 0.010 | | | | 0.50 | | | | 4.00 | | | | | | |
| 8-26-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-29-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered with Snow |
| 10-27-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered with Snow |
| 6-9-82 | | | | | | | | 44.80 | 24.50 | | | | | | | | 0.025 | | 6.72 | 0.003 | | | | 0.95 | | | | 3.0 | | | | | | Snow above Spring |
| 8-11-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered with Snow - Road Closed |
| 10-13-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | | | <0.001 | 0.045 | | 0.050 | <0.001 | 30.20 | 21.00 | <0.001 | | 0.005 | | 0.12 | | 0.210 | 0.350 | <0.001 | 2.40 | 0.020 | <0.0002 | | | 1.7 | <0.001 | | <0.001 | 67.0 | 0.018 | | | | | |

R 1-70

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S24-12
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | HYDROGEN SULFIDE as H2S MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL DISSOLVED SOLIDS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos/cm | TURBIDITY FTU | CARBONATE ALK. as CO3 MG/L | BICARBONATE ALK. as HCO3 MG/L | TOTAL ALK. as CaCO3 MG/L | TOTAL HARDNESS as CaCO3 MG/L | ACIDITY as CaCO3 MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | 17 | 4 | 7.4 | | | | | | | | | [illegible] | [illegible] | | | | | [illegible] | | [illegible] | | | 1.0 | | [illegible] | | | 410 | | | [illegible] | | | | | |
| [illegible] | | [illegible] | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | 560 | | | | | | | | | |
| [illegible] | 15:53 | [illegible] | [illegible] | 7 | 7.1 | [illegible] | [illegible] | | | | [illegible] | | [illegible] | [illegible] | <0.01 | 0.33 | | | | [illegible] | | 13.0 | | | 15.0 | | 320 | | | 470 | 0.58 | | [illegible] | 294 | | [illegible] | 1.1 | 2.5 |
| [illegible] | [illegible] | [illegible] | 12 | 6 | 7.3 | | | | | | | | | | <0.01 | | | | | | | | | | | | | | | 470 | | | | | | | | | |
| 1-26-80 | 13:40 | 0.002 | 21 | 9 | 8.6 | | | | | | | | | 0.003 | <0.01 | | | | | 0.050 | | 12.0 | | | 38.0 | | 350 | | | 540 | | | 422.12 | | | | | |
| 11-19-80 | 11:07 | 0.002 | -2 | 5 | 7.4 | | | | | | | | | | | | | | | | | | | | | | | | | 460 | | | | | | | | | |
| 12-29-80 | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-29-81 | 15:24 | 0.002 | 23 | 10 | 7.7 | | | | | | | | | [illegible] | 0.10 | | | | | 1.50 | | 48.0 | | | | | 360 | | | 295 | | | 332.75 | 274 | | 11.40 | | |
| 2-26-81 | 15:45 | 0.001 | 15 | 11 | 8.1 | | | | | | | | 4.80 | <0.001 | <0.01 | <0.01 | | | | 0.180 | <0.001 | 26.0 | | | | | 335 | | | 375 | | | 363.54 | 302 | | <0.01 | | |
| 4-29-81 | 10:15 | 0.001 | 6 | 5 | 6.5 | | | | | | | | | <0.001 | 0.10 | | | | | 0.200 | | 13.0 | | | | | 315 | | | 344 | | | 372.30 | | | | | |
| 12-23-81 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | 15:00 | 0.002 | 16 | 8 | 7.7 | | | | | | | | | <0.001 | 0.12 | | | | | 0.140 | | 3.0 | | | | | 322 | | | 530 | | | 362.90 | 303.20 | | | | |
| 11-3-82 | 12:08 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-2-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS MG/L | VANADIUM TOTAL MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as SiO2 MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | 71.20 | 1.0 | | | | | | | | 0.020 | | 27.12 | <0.010 | | | | 1.16 | | | | 7.40 | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | <0.001 | 0.150 | | 0.005 | <0.001 | 75.60 | 11.0 | <0.001 | | <0.001 | 0.002 | 0.016 | | | 0.260 | <0.001 | 20.36 | 0.004 | <0.002 | | | 12.50 | 0.001 | | <0.001 | 2.60 | 0.010 | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-27-80 | | | | | | | | 74.40 | 0.40 | | | | | | | | 0.53 | | 32.16 | 0.030 | | | | 1.72 | | | | 16.00 | | | | | | | |
| 11-19-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-29-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 52.20 | [illegible] | | | | | | | | 0.120 | | 40.52 | 0.010 | | | | 1.65 | | | | 7.20 | | | | | | | |
| 8-26-81 | | | <0.001 | 0.060 | | 0.040 | <0.001 | 73.20 | 3.00 | <0.001 | | 0.011 | | 0.18 | | 0.010 | 0.170 | <0.001 | 28.32 | 0.010 | <0.002 | | | 1.89 | 0.002 | | 0.002 | 2.70 | 0.015 | | | | | | |
| 12-23-81 | | | | | | | | 72.30 | 3.30 | | | | | | | | 0.15 | | 33.12 | 0.014 | | | | 1.90 | | | | 2.20 | | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 8-11-82 | | | | | | | | 80.00 | 18.70 | | | | | | | | 0.014 | | 29.76 | 0.005 | | | | 1.20 | | | | 2.6 | | | | | | | |
| 11-3-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 12-2-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S24-12
Location

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as NH3-N | NITROGEN NITRATE as NO3-N | NITROGEN NITRITE as NO2-N | NITROGEN TOTAL KJELDAHL | NITROGEN INORGANIC | PHOSPHATE TOTAL as PO4-P | PHOSPHATE ORTHO as PO4-P | SULFATE as SO4 | HYDROGEN SULFIDE as H2S | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SUSPENDED SOLIDS | SOLIDS TDS | SOLIDS TOTAL DISSOLVED SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK. as CO3 | BI-CARBONATE ALK. as HCO3 | TOTAL ALK. as CaCO3 | TOTAL HARDNESS as CaCO3 | ACIDITY as CaCO3 | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °F | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | µMHOS/CM | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | PC/L | PC/L |
| 4-21-83 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 14:25 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | 15:45 | 0.01 | 23 | 11 | 7.8 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.24 | | 7 | | | | | 310 | | | 585 | | | 336.7 | 276 | | <0.01 | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEX or CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as SiO2 | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snowbanks |
| 8-25-83 | | | <0.001 | 0.060 | | 0.058 | <0.001 | 15.10 | 10.50 | <0.001 | | 0.004 | | 0.14 | | 0.150 | 0.185 | <0.001 | 3.70 | 0.045 | <0.0002 | | | 2.1 | <0.001 | | <0.001 | 110 | 0.025 | | | | | |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S 25-1
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | CHLORIDE as Cl MG/L | DETERGENT as MBAS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SUSPD SOLIDS MG/L | SOLIDS FDS MG/L | SOLIDS TOTAL DISSOLVED SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | SPECIFIC COND µmhos/cm | TURBIDITY NTU | CARBONATE ALK as CaCO3 MG/L | BI-CARBONATE ALK as HCO3 MG/L | TOTAL ALK as CaCO3 MG/L | TOTAL HARDNESS as CaCO3 MG/L | ALPHA RADIO ACTIVITY pc/L | BETA RADIO ACTIVITY pc/L | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-25-81 | | | | | 8.00 | | | | | | | | | | | | | | | | | 64.0 | | | | | 295 | | | 450 | | <0.01 | 226.92 | | | | | |

| DATE | ALUMINUM DISS MG/L | ANTIMONY DISS MG/L | ARSENIC DISS MG/L | BARIUM DISS MG/L | BERYLLIUM DISS MG/L | BORON DISS MG/L | CADMIUM DISS MG/L | CALCIUM DISS MG/L | CHLORIDE DISS MG/L | CHROMIUM HEXavalent CR MG/L | COBALT DISS MG/L | COPPER DISS MG/L | CYANIDE as Cn MG/L | FLUORIDE DISS. MG/L | FERROMANGANESE DISS MG/L | IRON DISS MG/L | IRON TOTAL MG/L | LEAD DISS MG/L | MAGNESIUM DISS MG/L | MANGANESE DISS MG/L | MERCURY DISS MG/L | MOLYBDENUM DISS MG/L | NICKEL DISS MG/L | POTASSIUM DISS MG/L | SELENIUM DISS MG/L | SILICA as $SiO_2$ MG/L | SILVER DISS MG/L | SODIUM DISS MG/L | ZINC DISS MG/L | VANADIUM DISS MG/L | S.A.R. | NITRATE + NITRITE MG/L | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-25-81 | | | | | | | | 73.60 | 6.0 | | | | | | | | | | 2.40 | | | | | 5.8 | | | | 26.0 | | | | | | |

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station C25-13
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROXIDE as OH MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos/cm | TURBIDITY FTU | CARBONATE ALK. $CO_3$ MG/L | BICARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY PC/L | BETA RADIO-ACTIVITY PC/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-26-80 | 17:34 | 0.04 | 21 | 5 | 7.4 | | | | | | | | | | <0.01 | | | | | | | 13.0 | | | 12.0 | | 51.2 | | | 48 | | | [illegible] | | | | | |
| 7-26-80 | 18:05 | 0.002 | 12 | 7 | 7.4 | | | | | | | | <0.01 | 0.010 | <0.01 | 0.33 | | | | 0.070 | 0.000 | 13.0 | | | 43.0 | | 159 | | | 250 | | | [illegible] | 124 | | 12.0 | | |
| 10-8-80 | 09:33 | 0.003 | 14 | 8 | 7.8 | | | | | | | | | 0.003 | <0.01 | | | | | 0.060 | | 16.0 | | | 17.0 | | 218 | | | 330 | | | [illegible] | | | | | |
| 12-29-80 | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-7-81 | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-24-81 | 13:53 | 0.003 | 24 | 6 | 7.5 | | | | | | | | | <0.001 | 0.15 | | | | | 0.370 | | 33.0 | | | | | 210 | | | 225 | | | [illegible] | 164 | | 7.6 | | |
| 8-26-81 | 14:00 | 0.001 | 19 | 11 | 8.1 | | | | | | | | 3.30 | <0.001 | <0.01 | 0.52 | | | | 0.230 | 0.050 | 7.0 | | | | | 220 | | | 290 | | | 241.54 | 198 | | 12.00 | | |
| 10-25-81 | 13:19 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-23-81 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 12:55 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | 16:00 | 0.002 | 16 | 11 | 8.2 | | | | | | | | | <0.001 | 0.17 | | | | | 0.350 | | <0.1 | | | | | 189 | | | 286 | | | 184.66 | 151.30 | | | | |
| 10-13-82 | 14:20 | 0.02 | 8 | 4 | 8.4 | | | | | | | | 0.2 | <0.001 | 0.03 | <0.01 | | | | 0.160 | 0.080 | 43.0 | | | | | 200 | | | 128 | | | 12.40 | 10.20 | | 3.00 | | |
| 12-21-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 15:05 | 0.09 | 20 | 8 | 7.9 | | | | | | | | | <0.001 | <0.01 | | | | | 0.140 | | <3.0 | | | | | 148 | | | 64 | | | 46.40 | | | | | |
| 8-25-83 | 12:38 | 0.004 | 16 | 9 | 7.3 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.15 | | 4 | | | | | 135 | | | 221 | | | 139 | 114 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-26-80 | | | | | | | | 11.20 | 4.0 | | | | | | | | 2.90 | | 4.32 | <0.010 | | | | 0.36 | | | | 0.60 | | | | | | | |
| 7-26-80 | | | <0.001 | 0.010 | | <0.001 | <0.001 | 49.20 | 6.0 | <0.001 | | 0.010 | | 0.09 | | 0.020 | 0.75 | <0.001 | 6.02 | <0.001 | <0.0002 | | | 0.65 | <0.001 | | <0.001 | 6.20 | 0.010 | | | | | | |
| 10-8-80 | | | | | | | | 54.40 | 0.6 | | | | | | | | 0.530 | | 15.36 | 0.020 | | | | 0.77 | | | | 9.30 | | | | | | | |
| 12-29-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-7-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-24-81 | | | | | | | | [illegible] | [illegible] | | | | | | | | 0.300 | | 12.44 | 0.010 | | | | 0.50 | | | | 7.00 | | | | | | | |
| 8-26-81 | | | <0.001 | 0.015 | | 0.010 | <0.001 | 62.40 | 2.98 | <0.001 | | 0.014 | | 0.14 | | 0.010 | 0.310 | <0.001 | 12.96 | 0.020 | <0.0002 | | | 0.70 | 0.003 | | <0.001 | 2.30 | 0.010 | | | | | | Covered with Snow |
| 10-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered with Snow |
| 6-9-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | | | | | | | | 44.80 | 28.50 | | | | | | | | 0.075 | | 16.80 | 0.110 | | | | 1.14 | | | | 3.5 | | | | | | |
| 10-13-82 | | | <0.001 | 0.010 | | 0.070 | <0.001 | 16.00 | 0.90 | <0.001 | | 0.010 | | 0.05 | | 0.650 | 0.680 | <0.001 | 2.40 | 0.020 | <0.0002 | | | 1.39 | 0.004 | | <0.001 | 1.5 | 0.015 | | | | | | |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Food Closed - Snow |
| 6-21-83 | | | | | | | | 11.20 | <0.01 | | | | | | | | 0.430 | | 1.42 | 0.012 | | | | 0.37 | | | | 0.6 | | | | | | | |
| 8-25-83 | | | <0.001 | 0.050 | | 0.044 | <0.001 | 12.10 | <0.01 | <0.001 | | 0.008 | | 0.09 | | 0.350 | 0.480 | <0.001 | 2.50 | 0.014 | <0.0002 | | | 0.5 | <0.001 | | <0.001 | 3.45 | 0.058 | | | | | | |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S 31-13
Location

| DATE | TIME | FLOW cfs | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | C.O.D. mg/L | B.O.D. mg/L | T.O.C. mg/L | DISSOLVED OXYGEN mg/L | OIL & GREASE mg/L | PHENOL mg/L | NITROGEN AMMONIA as $NH_3$-N mg/L | NITROGEN NITRATE as $NO_3$-N mg/L | NITROGEN NITRITE as $NO_2$-N mg/L | NITROGEN TOTAL KJELDAHL mg/L | NITROGEN ORGANIC mg/L | PHOSPHATE TOTAL as $PO_4$-P mg/L | PHOSPHATE ORTHO as $PO_4$-P mg/L | SULFATE as $SO_4$ mg/L | HYDROGEN as pH mg/L | SURFACTANT as MBAS mg/L | SOLIDS TDS mg/L | SOLIDS TOTAL NITRATE SOLIDS mg/L | SOLIDS T.S.S. mg/L | SOLIDS TOTAL SOLIDS mg/L | SOLIDS TOTAL VOLATILE SOLIDS mg/L | COND. µmhos/cm | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ mg/L | BI-CARBONATE ALK. as $HCO_3$ mg/L | TOTAL ALK. as $CaCO_3$ mg/L | TOTAL HARDNESS as $CaCO_3$ mg/L | ACIDITY as $CaCO_3$ mg/L | ALPHA RADIO ACTIVITY pc/L | BETA RADIO ACTIVITY pc/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | 0.02 | 14 | [illegible] | 7.8 | | | | | | | | | 0.002 | <0.01 | | | | | 0.040 | | 13.5 | | | 1.0 | | 152 | | | [illegible] | | | 158.6 | | | | | |
| [illegible] | [illegible] | 0.004 | 14 | 9 | 7.8 | | | | | | | | <0.01 | 0.256 | <0.01 | 0.68 | | | | 0.020 | 0.010 | 30.0 | | | 8.0 | | 250 | | | 280 | | | 211.62 | 19.7 | | 11.0 | | |
| [illegible] | 2:40 | 0.003 | 19 | 10 | 8.5 | | | | | | | | | <0.001 | <0.01 | | | | | 0.070 | | 18.0 | | | 2.0 | | 258 | | | 400 | | | 217.68 | | | | | |
| [illegible] | In-Accessible | | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | 16 | 5 | 7.3 | | | | | | | | | <0.001 | <0.01 | | | | | 0.220 | | 42.0 | | | | | 272 | | | 190 | | | [illegible] | 216 | | 12.0 | | |
| [illegible] | 11:40 | 0.001 | 24 | 13 | 7.8 | | | | | | | | <0.01 | 0.002 | <0.01 | 0.82 | | | | 0.170 | 0.050 | 36.0 | | | | | 290 | | | 328 | | | 228.61 | 230 | | 10.00 | | |
| [illegible] | 12:26 | 0.001 | 9 | 5 | 7.6 | | | | | | | | | <0.001 | 0.20 | | | | | 0.100 | | 20.0 | | | | | 280 | | | 282 | | | 310.40 | | | | | |
| 12-23-81 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | 11:48 | 0.1 | 17 | 7 | 7.5 | | | | | | | | | <0.001 | 0.12 | | | | | 0.120 | | <0.1 | | | | | 289 | | | 462 | | | 284.40 | 233.10 | | | | |
| 10-13-82 | 12:08 | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-21-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | 10:10 | 0.01 | 14 | 5 | 6.6 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.08 | | 10 | | | | | 345 | | | 459 | | | 265.90 | 218 | | <0.01 | | |

| DATE | ALUMINUM TOTAL mg/L | ANTIMONY TOTAL mg/L | ARSENIC TOTAL mg/L | BARIUM TOTAL mg/L | BERYLLIUM TOTAL mg/L | BORON TOTAL mg/L | CADMIUM TOTAL mg/L | CALCIUM TOTAL mg/L | CHLORIDE DISS. mg/L | CHROMIUM HEX as CR mg/L | COBALT TOTAL mg/L | COPPER TOTAL mg/L | CYANIDE as CN mg/L | FLUORIDE DISS. mg/L | GERMANIUM TOTAL mg/L | IRON DISS. mg/L | IRON TOTAL mg/L | LEAD TOTAL mg/L | MAGNESIUM TOTAL mg/L | MANGANESE TOTAL mg/L | MERCURY TOTAL mg/L | MOLYBDENUM TOTAL mg/L | NICKEL TOTAL mg/L | POTASSIUM TOTAL mg/L | SELENIUM TOTAL mg/L | SILICA as $SiO_2$ mg/L | SILVER TOTAL mg/L | SODIUM TOTAL mg/L | ZINC TOTAL mg/L | VANADIUM TOTAL mg/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | 55.20 | <0.1 | | | | | | | | 0.110 | | 1.44 | <0.010 | | | | 0.64 | | | | 1.20 | | | | | | | |
| [illegible] | | | <0.001 | 0.020 | | 0.010 | <0.001 | 43.00 | 1.10 | <0.001 | | <0.001 | | 0.09 | | 0.010 | 0.140 | <0.002 | 12.96 | <0.001 | <0.0002 | | | 0.94 | <0.001 | | <0.001 | 1.60 | 0.005 | | | | | |
| 8-9-80 | | | | | | | | 71.20 | <0.1 | | | | | | | | 0.040 | | 13.92 | <0.001 | | | | 0.95 | | | | 10.80 | | | | | | |
| 10-24-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | 56.40 | 1.73 | | | | | | | | 0.060 | | 16.80 | <0.001 | | | | 0.94 | | | | 1.90 | | | | | | |
| [illegible] | | | <0.001 | 0.025 | | 0.010 | <0.001 | 78.40 | 2.32 | <0.001 | | 0.006 | | 0.11 | | <0.001 | 0.070 | <0.001 | 17.76 | 0.010 | <0.002 | | | 0.96 | 0.004 | | <0.001 | 2.20 | 0.015 | | | | | |
| [illegible] | | | | | | | | 76.00 | 3.30 | | | | | | | | 0.065 | | 22.08 | 0.012 | | | | 0.95 | | | | 1.80 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 8-11-82 | | | | | | | | 70.40 | 10.80 | | | | | | | | 0.033 | | 15.84 | 0.003 | | | | 1.20 | | | | 2.1 | | | | | | |
| 10-13-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 12-21-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Mudslide & Snow |
| 8-25-83 | | | <0.001 | 0.178 | | 0.078 | <0.001 | 48.20 | 2.50 | <0.001 | | <0.001 | | 0.09 | | 0.165 | 0.222 | <0.001 | 10.40 | 0.010 | <0.002 | | | 0.9 | <0.001 | | <0.001 | 2.85 | 0.045 | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S36-17
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °C | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | HYDROXIDE as OH MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL DISSOLVED MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL $SiO_2$ MG/L | SOLIDS TOTAL VOLATILE $SiO_2$ MG/L | COND µmhos | TURBIDITY FTU | CARBONATE ALK. as $CO_3$ MG/L | BI-CARBONATE ALK. as $HCO_3$ MG/L | TOTAL ALK. as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-26-87 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.01 | 14 | 1[illegible] | 7.10 | | | | | | | | <0.01 | 0.46 | 0.01 | 2.20 | | | | 0.060 | 0.005 | 10.0 | | | 3.0 | | 239 | | | 2[illegible] | | | [illegible] | 210 | | 1[illegible] | | |
| 11-9-90 | 13:55 | 0.004 | 11 | 8 | 7.7 | | | | | | | | | 0.001 | <0.01 | | | | | 0.060 | | 6.0 | | | 5.0 | | 231 | | | 350 | | | 2[illegible] | | | | | |
| 12-2-88 | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In-Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | [illegible] | 0.01 | 21 | 11 | 8.0 | | | | | | | | | [illegible] | <0.01 | | | | | 0.130 | | 36.0 | | | | | 278 | | | 285 | | | [illegible] | 210 | | 1[illegible] | | |
| 4-26-91 | 10:18 | 0.002 | 22 | 13 | 8.3 | | | | | | | | <0.01 | <0.001 | <0.01 | 1.24 | | | | 0.150 | 0.080 | 20.5 | | | | | 241 | | | 270 | | | [illegible] | 210 | | <0.01 | | |
| 11-29-91 | 13:48 | 0.02 | 7 | 6 | 7.8 | | | | | | | | | <0.001 | 0.10 | | | | | 0.100 | | 3.0 | | | | | 245 | | | 232 | | | 292.20 | | | | | |
| 12-23-81 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | 12:05 | 0.07 | 15 | 9 | 7.4 | | | | | | | | | <0.001 | 0.40 | | | | | 0.080 | | 3.0 | | | | | 228 | | | 363 | | | 268.90 | 220.90 | | | | |
| 8-11-82 | 10:30 | 0.01 | 19 | 9 | 8.0 | | | | | | | | | 0.042 | 0.13 | | | | | 0.170 | | <0.1 | | | | | 259 | | | 373 | | | 288.70 | 236.60 | | | | |
| 10-13-82 | 11:15 | 0.04 | 7 | 6 | 7.6 | | | | | | | | <0.1 | <0.001 | <0.01 | 0.98 | | | | 0.100 | 0.050 | 6.0 | | | | | 267 | | | 479 | | | 311.20 | 255.10 | | 6.00 | | |
| 1-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-7-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | 13:30 | 0.09 | 19 | 10 | 7.4 | | | | | | | | | 0.013 | <0.01 | | | | | 0.080 | | 4.0 | | | | | 192 | | | 259 | | | 208.90 | | | | | |
| 8-25-83 | 08:20 | 0.09 | 10 | 7 | 7.2 | | | | | | | | <0.1 | 0.010 | <0.01 | <0.01 | | | | 0.09 | | 4 | | | | | 255 | | | | | | 300.10 | 246 | | <0.01 | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-26-87 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Covered by Snow |
| [illegible] | | | <0.001 | 0.010 | | 0.010 | <0.001 | [illegible] | 6.0 | <0.001 | | <0.001 | | 0.11 | | 0.010 | 0.250 | <0.002 | 12.00 | <0.001 | <0.0002 | | | 0.57 | <0.001 | | <0.001 | 1.70 | 0.007 | | | | | | |
| 11-9-90 | | | | | | | | 64.00 | <0.1 | | | | | | | | 0.100 | | 12.96 | 0.010 | | | | 0.65 | | | | 7.20 | | | | | | | |
| 12-2-88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | [illegible] | 0.010 | | | | [illegible] | | | | 14.00 | | | | | | |
| 2-24-82 | | | 0.002 | 0.020 | | 0.020 | <0.001 | 63.00 | 1.37 | <0.001 | | 0.009 | | 0.15 | | <0.001 | 0.050 | <0.001 | 14.40 | <0.001 | <0.0002 | | | 0.70 | 0.003 | | <0.001 | 2.00 | 0.007 | | | | | | |
| 4-14-82 | | | | | | | | 64.00 | 3.20 | | | | | | | | 0.065 | | 13.72 | 0.003 | | | | 0.80 | | | | 4.00 | | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | 68.00 | 1.40 | | | | | | | | 0.050 | | 11.80 | 0.003 | | | | 0.46 | | | | 1.9 | | | | | | | |
| 8-11-82 | | | | | | | | 65.60 | 13.40 | | | | | | | | 0.065 | | 14.88 | 0.010 | | | | 0.65 | | | | 13.0 | | | | | | | |
| 10-13-82 | | | <0.001 | 0.015 | | 0.040 | <0.001 | 72.00 | 3.10 | <0.001 | | 0.011 | | 0.12 | | 0.095 | 0.100 | <0.001 | 11.52 | 0.010 | <0.0002 | | | 0.78 | 0.003 | | <0.001 | 16.0 | 0.007 | | | | | | |
| 1-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-7-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-21-83 | | | | | | | | 53.60 | <0.01 | | | | | | | | 0.110 | | 8.16 | 0.003 | | | | 0.41 | | | | 1.5 | | | | | | | |
| 8-25-83 | | | <0.001 | 0.035 | | 0.160 | <0.001 | 55.10 | <0.01 | <0.001 | | <0.001 | | 0.12 | | 0.146 | 0.150 | <0.001 | 9.50 | 0.017 | <0.0002 | | | 1.8 | <0.001 | | <0.001 | 34.0 | 0.039 | | | | | | |

8-1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station 536-19
Location

| DATE | TIME | FLOW (CFS) | TEMPERATURE AIR (°C) | TEMPERATURE WATER (°C) | pH | COLIFORM TOTAL (MPN) | COLIFORM FECAL (MPN) | FECAL STREP (MPN) | C.O.D. (MG/L) | B.O.D. (MG/L) | T.O.C. (MG/L) | DISSOLVED OXYGEN (MG/L) | OIL & GREASE (MG/L) | PHENOL (MG/L) | NITROGEN AMMONIA as $NH_3$-N (MG/L) | NITROGEN NITRATE as $NO_3$-N (MG/L) | NITROGEN NITRITE as $NO_2$-N (MG/L) | NITROGEN TOTAL KJELDAHL (MG/L) | NITROGEN ORGANIC (MG/L) | PHOSPHATE TOTAL as $PO_4$-P (MG/L) | PHOSPHATE ORTHO as $PO_4$-P (MG/L) | SULFATE as $SO_4$ (MG/L) | HYDROXIDE as OH (MG/L) | SURFACTANT as MBAS (MG/L) | SOLIDS TSS (MG/L) | SOLIDS TOTAL SETTLEABLE SOLIDS (ML/L) | SOLIDS TDS (MG/L) | SOLIDS TOTAL SOLIDS (MG/L) | SOLIDS TOTAL VOLATILE SOLIDS (MG/L) | COND. (µMHOS/CM) | TURBIDITY (FTU) | CARBONATE ALK. as $CO_3$ (MG/L) | BICARBONATE ALK. as $HCO_3$ (MG/L) | TOTAL ALK. as $CaCO_3$ (MG/L) | TOTAL HARDNESS as $CaCO_3$ (MG/L) | ACIDITY as $CaCO_3$ (MG/L) | ALPHA RADIO-ACTIVITY (pCi/L) | BETA RADIO-ACTIVITY (pCi/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 11:30 | 0.01 | 17 | 5 | 7.80 | | | | | | | | | [illegible] | [illegible] | | | | | 0.070 | | 8.5 | | | 1.0 | | 25.0 | | | 150 | | | [illegible] | | | | | |
| [illegible] | [illegible]:45 | 0.003 | 11 | 6 | 7.5 | | | | | | | | [illegible] | [illegible] | [illegible] | 1.54 | | | | [illegible] | [illegible] | 7.5 | | | 5.0 | | 135 | | | 200 | | | [illegible] | 122 | | [illegible] | | |
| 12-29-80 | In Accessible | | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-25-81 | In Accessible | | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In Accessible | | | [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 13:04 | 0.01 | 20 | 4 | 7.2 | | | | | | | | | [illegible] | [illegible] | | | | | 0.050 | | [illegible] | | | | | 150 | | | 89 | | | [illegible] | 12.00 | | [illegible] | | |
| [illegible] | 12:40 | 0.001 | 24 | 18 | 8.0 | | | | | | | | 3.40 | <0.001 | <0.01 | 0.56 | | | | 0.340 | 0.340 | 7.5 | | | | | 191 | | | 235 | | | 209.31 | 172 | | 10.00 | | |
| 11-28-81 | 11:33 | -0- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-29-81 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-24-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-8-82 | 12:00 | 0.004 | 15 | 5 | 7.5 | | | | | | | | | <0.001 | 0.06 | | | | | 0.080 | | <0.1 | | | | | 132 | | | 216 | | | 142.10 | 116.50 | | | | |
| 10-13-82 | 12:08 | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-22-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-21-83 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-21-83 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | 10:55 | 0.004 | 16 | 9 | 7.2 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.06 | | 22 | | | | | 145 | | | 236 | | | 142.60 | 125 | | <0.01 | | |

| DATE | ALUMINUM TOTAL (MG/L) | ANTIMONY TOTAL (MG/L) | ARSENIC TOTAL (MG/L) | BARIUM TOTAL (MG/L) | BERYLLIUM TOTAL (MG/L) | BORON TOTAL (MG/L) | CADMIUM TOTAL (MG/L) | CALCIUM TOTAL (MG/L) | CHLORIDE DISS. (MG/L) | CHROMIUM HEX as CR (MG/L) | COBALT TOTAL (MG/L) | COPPER TOTAL (MG/L) | CYANIDE as CN (MG/L) | FLUORIDE DISS. (MG/L) | MANGANESE TOTAL (MG/L) | IRON DISS. (MG/L) | IRON TOTAL (MG/L) | LEAD TOTAL (MG/L) | MAGNESIUM TOTAL (MG/L) | MANGANESE TOTAL (MG/L) | MERCURY TOTAL (MG/L) | MOLYBDENUM TOTAL (MG/L) | NICKEL TOTAL (MG/L) | POTASSIUM TOTAL (MG/L) | SELENIUM TOTAL (MG/L) | SILICA as $SiO_2$ (MG/L) | SILVER TOTAL (MG/L) | SODIUM TOTAL (MG/L) | ZINC TOTAL (MG/L) | VANADIUM TOTAL (MG/L) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | 23.40 | <0.1 | | | | | | | | 0.070 | | 0.48 | <0.010 | | | | 0.32 | | | | | 12.00 | | | |
| [illegible] | | | <0.001 | 0.010 | | <0.001 | <0.001 | 144.00 | <0.1 | <0.001 | | <0.001 | | 0.08 | | 0.010 | 1.350 | <0.002 | 4.32 | <0.001 | | | | 0.43 | <0.001 | | <0.001 | 1.20 | 0.002 | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-[illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | 5.[illegible] | 0.010 | | | | 0.33 | | | | 3.40 | | | |
| [illegible] | | | 0.003 | 0.017 | | 0.010 | <0.001 | 62.40 | 2.08 | <0.010 | | 0.011 | | 0.15 | | <0.001 | 0.270 | <0.001 | 6.24 | 0.050 | <0.002 | | | 0.40 | 0.004 | | <0.001 | 1.90 | 0.010 | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-29-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 8-11-82 | | | | | | | | 38.40 | 12.90 | | | | | | | | 0.049 | | 3.36 | 0.003 | | | | 0.88 | | | | 10.0 | | | |
| 10-13-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 12-22-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - mudslide & Snow |
| 8-25-83 | | | <0.001 | 0.055 | | 0.177 | <0.001 | 49.50 | 4.10 | <0.001 | | <0.001 | | 0.08 | | 0.180 | 0.198 | <0.001 | 4.50 | 0.020 | <0.0002 | | | 0.4 | <0.001 | | <0.001 | 3.8 | 0.024 | | |

R 1-79

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S76-23
Location

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °F | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as $NH_3$-N MG/L | NITROGEN NITRATE as $NO_3$-N MG/L | NITROGEN NITRITE as $NO_2$-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as $PO_4$-P MG/L | PHOSPHATE ORTHO as $PO_4$-P MG/L | SULFATE as $SO_4$ MG/L | FLUORIDE as F MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SUSPENDED SOLIDS MG/L | SOLIDS TDS MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos | TURBIDITY FTU | CARBONATE ALK as $CO_3$ MG/L | BICARBONATE ALK as $HCO_3$ MG/L | TOTAL ALK as $CaCO_3$ MG/L | TOTAL HARDNESS as $CaCO_3$ MG/L | ACIDITY as $CaCO_3$ MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 11:54 | 0.01 | 15 | 3 | 7.70 | | | | | | | | | 0.061 | <0.01 | | | | | 0.040 | | 70.0 | | | 1.0 | | 178 | | | 750 | | | 105.52 | | | | | |
| [illegible] | [illegible] | 0.07 | | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | 300 | | | | | | | | | |
| [illegible] | [illegible] | [illegible] | 12 | 2 | [illegible] | <2.0 | <2.0 | | | | <0.01 | | <0.01 | [illegible] | <0.01 | 0.27 | | | | 0.010 | | 1.5 | | | 1.0 | | 312 | | | 470 | 0.58 | | 264.46 | 232 | | 18.0 | 1.5 | 2.2 |
| [illegible] | [illegible] | [illegible] | 17 | 4 | 7.0 | | | | | | | | | | | | | | | | | | | | | | | | | 350 | | | | | | | | | |
| 10-8-80 | 12:24 | 0.008 | 18 | 6 | 7.4 | | | | | | | | | <0.001 | <0.01 | | | | | 0.050 | | 4.5 | | | 1.0 | | 229 | | | 350 | | | | | | | | |
| 11-8-80 | 15:06 | 0.007 | 4 | 2 | 6.8 | | | | | | | | | | | | | | | | | | | | | | | | | 470 | | | | | | | | | |
| 12-2-80 | In Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | In Accessible | | | Snow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | 15:57 | 0.01 | 17 | 3 | 7.2 | | | | | | | | | <0.001 | [illegible] | | | | | [illegible] | | 57.0 | | | | | 249 | | | 233 | | | 229.2 | 176 | | 240 | | |
| 3-26-81 | 13:18 | 0.007 | 15 | 5 | 7.6 | | | | | | | | 0.40 | <0.001 | <0.01 | 0.42 | | | | 0.240 | 0.050 | 7.0 | | | | | 244 | | | 255 | | | 243.52 | 216 | | 16.00 | | |
| 10-28-81 | 11:09 | 0.01 | 6 | 5 | 7.7 | | | | | | | | | <0.001 | 0.30 | | | | | 0.200 | | 3.0 | | | | | 250 | | | 235 | | | 230.31 | | | | | |
| 12-23-81 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-4-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-14-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-9-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-11-82 | 14:13 | 0.04 | 12 | 4 | 7.5 | | | | | | | | | <0.001 | 0.13 | | | | | 0.150 | | <0.1 | | | | | 251 | | | 344 | | | 283.42 | 232.20 | | | | |
| 10-13-82 | 12:23 | 0.008 | 9 | 7 | 7.7 | | | | | | | | 0.4 | <0.001 | 0.04 | 0.29 | | | | 0.110 | 0.060 | 9.0 | | | | | 240 | | | 472 | | | 272.10 | 223 | | 8.00 | | |
| 12-8-82 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-21-83 | | | In Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS. MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as $SiO_2$ MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | | | | | | | | [illegible] | <0.1 | | | | | | | | 0.100 | | 1.92 | <0.010 | | | | 0.46 | | | | 18.0 | | | | | | | Some Snow melt |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | <0.001 | 0.035 | | 0.003 | <0.001 | 26.30 | 2.0 | <0.001 | | 0.002 | 0.002 | 0.11 | | 0.100 | 0.150 | 0.005 | 2.40 | 0.003 | <0.002 | | | 0.41 | 0.001 | | <0.001 | 4.30 | 0.020 | | | | | |
| 7-8-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-8-80 | | | | | | | | 71.20 | <0.1 | | | | | | | | 0.050 | | 2.40 | 0.010 | | | | 0.42 | | | | 18.00 | | | | | | |
| 11-8-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-2-80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [illegible] | | | | | | | | [illegible] | [illegible] | | | | | | | | [illegible] | | [illegible] | [illegible] | | | | 0.46 | | | | 18.00 | | | | | | |
| 5-26-81 | | | <0.001 | 0.015 | | 0.010 | <0.001 | 26.00 | 1.67 | <0.001 | | 0.020 | | 0.13 | | <0.001 | 0.100 | <0.001 | 7.68 | 0.020 | <0.002 | | | 0.33 | 0.004 | | <0.001 | 2.00 | 0.015 | | | | | |
| 10-28-81 | | | | | | | | 75.20 | 4.00 | | | | | | | | 0.114 | | 10.08 | 0.022 | | | | 0.40 | | | | 6.00 | | | | | | |
| 12-23-81 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-24-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 4-14-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 6-9-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 8-11-82 | | | | | | | | 67.10 | 18.70 | | | | | | | | 0.049 | | 9.60 | 0.002 | | | | 0.76 | | | | 22.0 | | | | | | |
| 10-13-82 | | | <0.001 | 0.010 | | 0.100 | <0.001 | 78.40 | 0.90 | <0.001 | | 0.010 | | 0.09 | | 0.020 | [illegible] | <0.001 | 7.68 | 0.005 | <0.002 | | | 0.59 | 0.005 | | <0.001 | 10.4 | 0.007 | | | | | |
| 12-8-82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |
| 2-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Snow |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station S36-23
Location

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | CHLORIDE as Cl | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND | TURBIDITY | CARBONATE ALK as $CO_3$ | BI-CARBONATE ALK as $HCO_3$ | TOTAL ALK as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | μMHOS/CM | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 9-21-82 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-27-83 | | | In-Accessible | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-25-83 | 11:26 | 0.01 | 19 | 6 | 7.0 | | | | | | | | <0.1 | <0.001 | <0.01 | <0.01 | | | | 0.10 | | 12 | | | | | 244 | | | 374 | | | 261 | 214 | | <0.01 | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS. | CHROMIUM HEX as CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS. | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 4-21-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Snow |
| 6-27-83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Road Closed - Mudslide & Snow |
| 8-25-83 | | | <0.001 | 0.048 | | 0.098 | <0.001 | 50.40 | 3.60 | <0.001 | | <0.001 | | 0.10 | | 0.210 | 0.244 | <0.001 | 3.40 | 0.013 | <0.0002 | | | 0.3 | <0.001 | | <0.001 | 40.5 | 0.015 | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station North main
Location Station 91

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | BOD | TOC | CHLORINATED ORGANICS | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | HYDROGEN SULFIDE as $H_2S$ | SURFACTANT as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | COND | TURBIDITY | CARBONATE ALK as $CO_3$ | BI-CARBONATE ALK as $HCO_3$ | TOTAL ALK as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °C | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | µmhos | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 8-27-71 | | | | | 7.70 | | | | | | | | | | 0.10 | | | | | <0.001 | | 177 | | | | | 273 | | | 430 | | | 43.30 | | | | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEXavCR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 8-27-71 | | | | | | | | 50.40 | 3.40 | | | | | | | | 0.125 | | 20.16 | 0.010 | | | | 3.50 | | | | 5.40 | | | | | | |

R 1-70

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station 4 N 1E #050
Location [illegible]

| DATE | TIME | FLOW CFS | TEMPERATURE AIR °F | TEMPERATURE WATER °C | pH | COLIFORM TOTAL MPN | COLIFORM FECAL MPN | FECAL STREP MPN | COD MG/L | BOD MG/L | TOC MG/L | DISSOLVED OXYGEN MG/L | OIL & GREASE MG/L | PHENOL MG/L | NITROGEN AMMONIA as NH3-N MG/L | NITROGEN NITRATE as NO3-N MG/L | NITROGEN NITRITE as NO2-N MG/L | NITROGEN TOTAL KJELDAHL MG/L | NITROGEN ORGANIC MG/L | PHOSPHATE TOTAL as PO4-P MG/L | PHOSPHATE ORTHO as PO4-P MG/L | SULFATE as SO4 MG/L | HYDROXIDE as OH MG/L | SURFACTANT as MBAS MG/L | SOLIDS TSS MG/L | SOLIDS TOTAL SETTLEABLE SOLIDS ML/L | SOLIDS T.D.S. MG/L | SOLIDS TOTAL SOLIDS MG/L | SOLIDS TOTAL VOLATILE SOLIDS MG/L | COND µmhos/cm | TURBIDITY FTU | CARBONATE ALK. as CO3 MG/L | BICARBONATE ALK. as HCO3 MG/L | TOTAL ALK. as CaCO3 MG/L | TOTAL HARDNESS as CaCO3 MG/L | ACIDITY as CaCO3 MG/L | ALPHA RADIO-ACTIVITY pCi/L | BETA RADIO-ACTIVITY pCi/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-27-81 | 11:47 | | | | 7.40 | | | | | | | | | | | | | | | | | | | | | | 373 | | | 425 | | | [illegible] | | | | | | |
| 10-27-81 | | | | | 7.70 | | | | | | | | | | 0.30 | | | | | 0.100 | | 15.0 | | | | | 375 | | | 570 | | | 425 | | | | | | |

| DATE | ALUMINUM TOTAL MG/L | ANTIMONY TOTAL MG/L | ARSENIC TOTAL MG/L | BARIUM TOTAL MG/L | BERYLLIUM TOTAL MG/L | BORON TOTAL MG/L | CADMIUM TOTAL MG/L | CALCIUM TOTAL MG/L | CHLORIDE DISS MG/L | CHROMIUM HEX as CR MG/L | COBALT TOTAL MG/L | COPPER TOTAL MG/L | CYANIDE as CN MG/L | FLUORIDE DISS. MG/L | GERMANIUM TOTAL MG/L | IRON DISS. MG/L | IRON TOTAL MG/L | LEAD TOTAL MG/L | MAGNESIUM TOTAL MG/L | MANGANESE TOTAL MG/L | MERCURY TOTAL MG/L | MOLYBDENUM TOTAL MG/L | NICKEL TOTAL MG/L | POTASSIUM TOTAL MG/L | SELENIUM TOTAL MG/L | SILICA as SiO2 MG/L | SILVER TOTAL MG/L | SODIUM TOTAL MG/L | ZINC TOTAL MG/L | VANADIUM TOTAL MG/L | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-27-81 | | | | | | | | 73.40 | 1.5 | | | | | | | | | | 13.44 | | | | | 1.36 | | | | 2.20 | | | | | | | |
| 10-27-81 | | | | | | | | 64.00 | 7.3 | | | | | | | | 0.120 | | 26.88 | 0.012 | | | | 4.50 | | | | 44.00 | | | | | | | |

R 1-78

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

# WATER QUALITY DATA

Station Belina Mine
Location

| DATE | TIME | FLOW | TEMPERATURE AIR | TEMPERATURE WATER | pH | COLIFORM TOTAL | COLIFORM FECAL | FECAL STREP | COD | B.O.D. | T.O.C. | DISSOLVED OXYGEN | OIL & GREASE | PHENOL | NITROGEN AMMONIA as $NH_3$-N | NITROGEN NITRATE as $NO_3$-N | NITROGEN NITRITE as $NO_2$-N | NITROGEN TOTAL KJELDAHL | NITROGEN ORGANIC | PHOSPHATE TOTAL as $PO_4$-P | PHOSPHATE ORTHO as $PO_4$-P | SULFATE as $SO_4$ | HYDROXIDE as OH | SULFIDE as MBAS | SOLIDS TSS | SOLIDS TOTAL SETTLEABLE SOLIDS | SOLIDS TDS | SOLIDS TOTAL SOLIDS | SOLIDS TOTAL VOLATILE SOLIDS | SPECIFIC COND. | TURBIDITY | CARBONATE ALK. as $CO_3$ | BI-CARBONATE ALK. as $HCO_3$ | TOTAL ALK. as $CaCO_3$ | TOTAL HARDNESS as $CaCO_3$ | ACIDITY as $CaCO_3$ | ALPHA RADIO-ACTIVITY | BETA RADIO-ACTIVITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CFS | °C | °F | | MPN | MPN | MPN | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | μMHOS/CM | FTU | MG/L | MG/L | MG/L | MG/L | MG/L | pCi/L | pCi/L |
| 12-14-83 | | | | | 7.4 | | | | | | | | | | | | | | | | | 9.0 | | | | | 320 | | | 490 | | | 343.30 | | | | | |

| DATE | ALUMINUM TOTAL | ANTIMONY TOTAL | ARSENIC TOTAL | BARIUM TOTAL | BERYLLIUM TOTAL | BORON TOTAL | CADMIUM TOTAL | CALCIUM TOTAL | CHLORIDE DISS | CHROMIUM HEX as CR | COBALT TOTAL | COPPER TOTAL | CYANIDE as CN | FLUORIDE DISS. | GERMANIUM TOTAL | IRON DISS. | IRON TOTAL | LEAD TOTAL | MAGNESIUM TOTAL | MANGANESE TOTAL | MERCURY TOTAL | MOLYBDENUM TOTAL | NICKEL TOTAL | POTASSIUM TOTAL | SELENIUM TOTAL | SILICA as $SiO_2$ | SILVER TOTAL | SODIUM TOTAL | ZINC TOTAL | VANADIUM TOTAL | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | MG/L | | | | |
| 12-14-83 | | | | | | | | 90.40 | 2.00 | | | | | | | | 0.400 | | 18.24 | 0.007 | | | | 1.20 | | | | 4.20 | | | Belina Mine No 2 Entry No. 3 West Mains Sta. 376 + 40 | | | |

R 1-78

15 September 1983

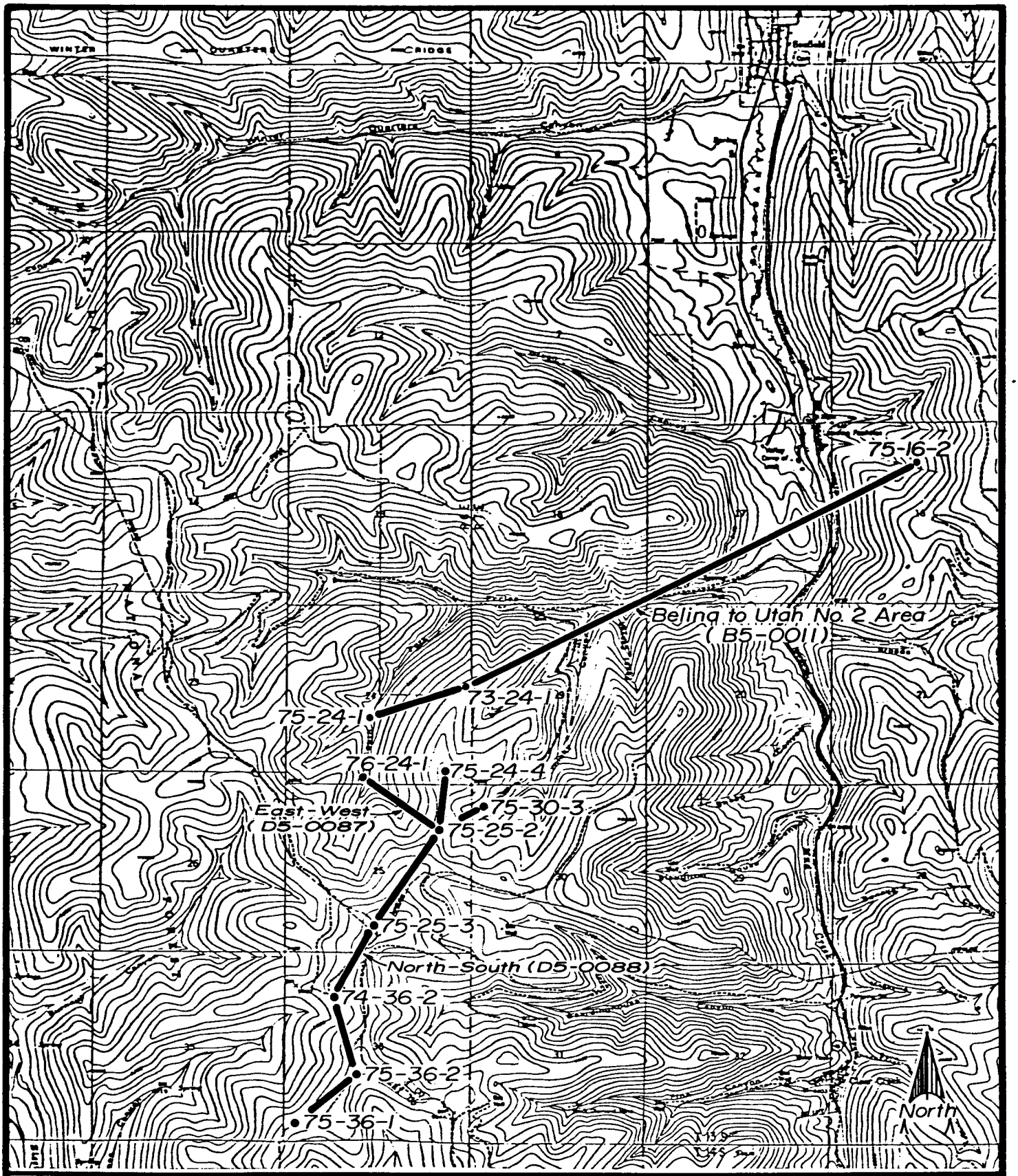
# APPENDIX B

## GEOLOGIC CROSS SECTIONS

Drawing No. A5-0072: Cross Section Locational Map

Drawing No. D5-0087: North South Cross Section, Connelville Block

Drawing No. D5-0088: East West Cross Section Connelville Block




| | | |
|---|---|---|
| DRAWN BY: Ed Sanderson | DATE: Sept. 15, 83 | VALLEY CAMP of UTAH<br>SCOFIELD ROUTE<br>HELPER, UTAH 84526 |
| CHECKED BY: | DATE: | |
| REVISED BY: | SCALE: None | |
| APPROVAL ENG.: | | |
| APPROVAL SAFETY: | TITLE: CROSS SECTION LOCATIONS | DRAWING NO. A5-0072 / REV. NO. 0 |
| APPROVAL MINE: | | |

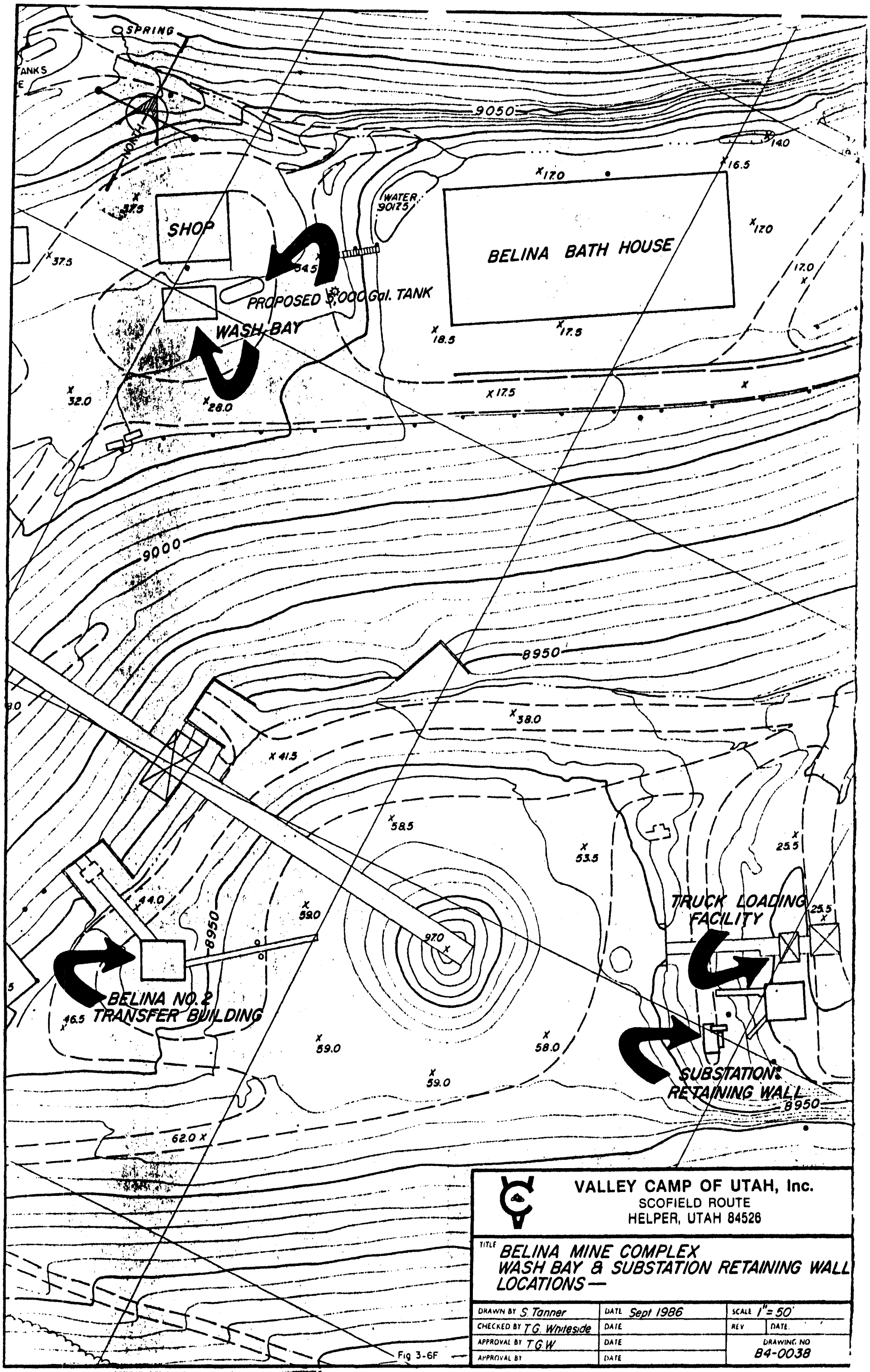
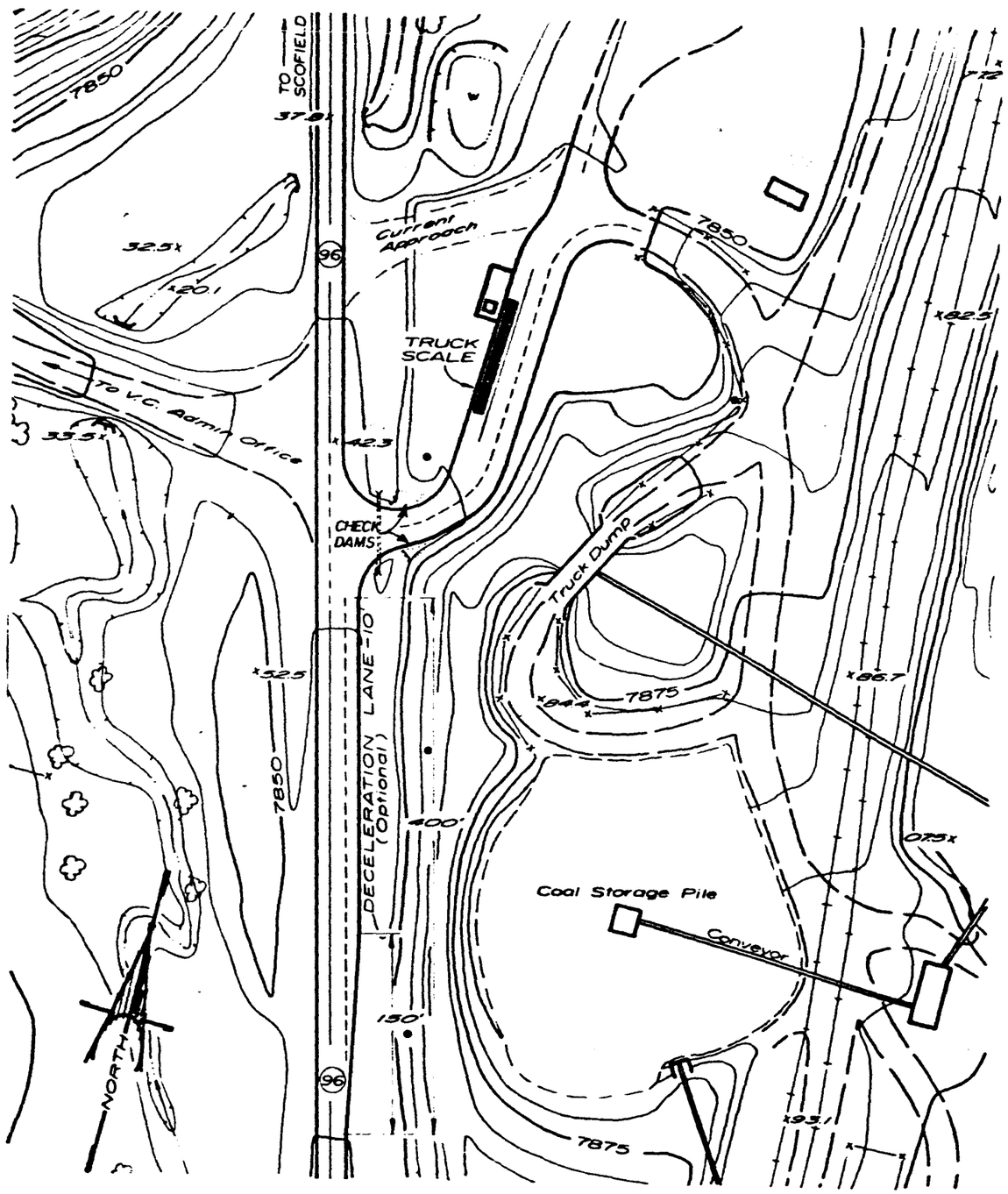
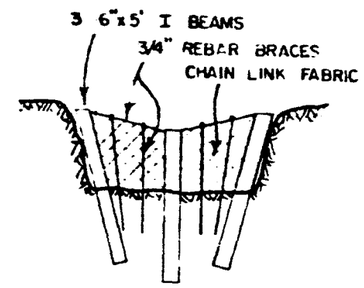

SPRING
TANKS
NORTH
9050
140
16.5
17.0
WATER
90175
SHOP
BELINA BATH HOUSE
37.5
34.5
PROPOSED 5,000 Gal. TANK
WASH BAY
18.5
17.5
17.0
32.0
28.0
17.5
9000
8950
38.0
41.5
58.5
53.5
25.5
44.0
52.0
97.0
TRUCK LOADING FACILITY
BELINA NO. 2 TRANSFER BUILDING
46.5
59.0
58.0
59.0
SUBSTATION RETAINING WALL
62.0
VALLEY CAMP OF UTAH, Inc.
SCOFIELD ROUTE
HELPER, UTAH 84526
TITLE BELINA MINE COMPLEX
WASH BAY & SUBSTATION RETAINING WALL
LOCATIONS —
DRAWN BY S. Tanner
DATE Sept 1986
SCALE 1" = 50'
CHECKED BY T.G. Whiteside
DATE
REV
DATE
APPROVAL BY T.G.W
DATE
DRAWING NO
B4-0038
APPROVAL BY
DATE

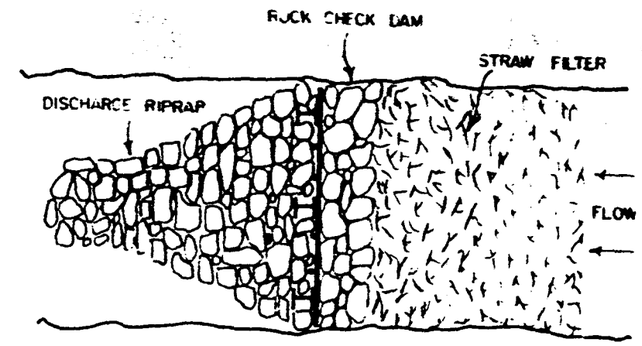
Fig 3-6F




LOCATION MAP
1" = 100'

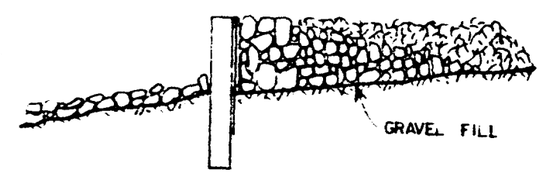



FRONT SECTION VIEW




PLAN VIEW

DETAILS: 1" = 5'




CROSS SECTION VIEW

| | |
|---|---|
| DRAWN BY: | J.A.U. |
| DATE: | 7-26-84 |
| CHECKED BY: | |
| DATE: | |
| APPROVAL: | |
| APPROVAL: | |
| APPROVAL: | |

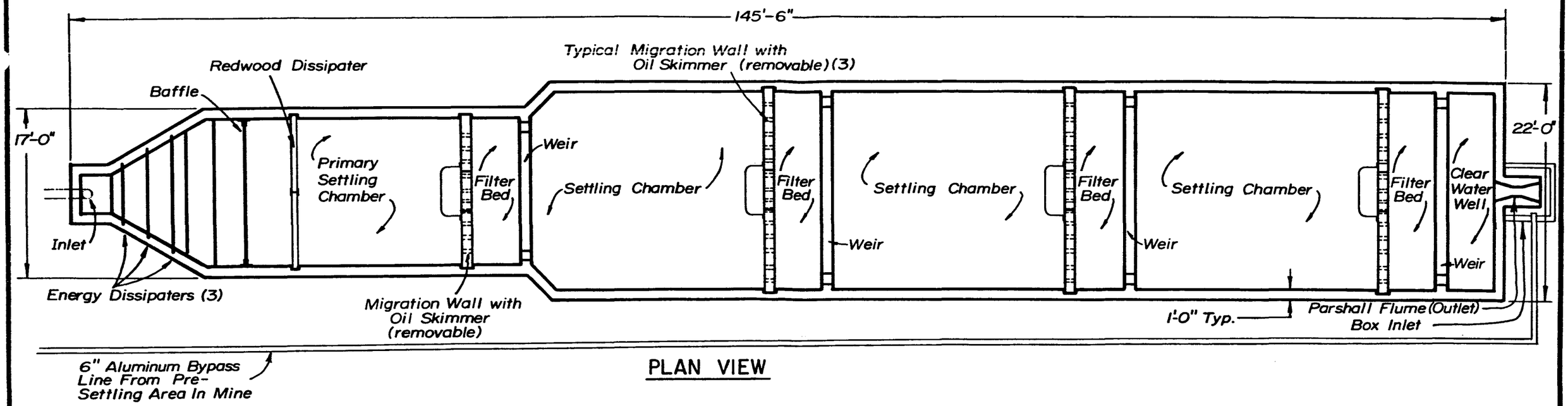
**VALLEY CAMP OF UTAH, INC.**
**SCOFIELD ROUTE**
**HELPER, UTAH 84526**

TITLE: LOCATION AND TYPICAL DETAILS OF INSTALLED SINGLE FENCE CHECK DAMS.

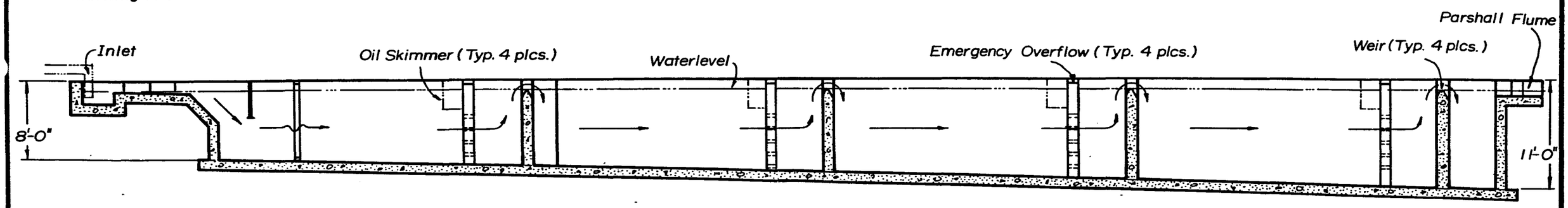
SCALE:

DRAWING NO. B3-0020

MONSEN ENG. • MC703




PLAN VIEW




SECTION VIEW & FLOW DIAGRAM

| | |
|---|---|
| DRAWN BY: Ed Sanderson | **VALLEY CAMP OF UTAH, INC.** |
| DATE: Sept. 12, 1983 | **SCOFIELD ROUTE** |
| CHECKED BY: | **HELPER, UTAH 84526** |
| DATE: | |
| APPROVAL: | TITLE: CONCRETE FILTER POND |
| APPROVAL: | |
| APPROVAL: | SCALE: NONE — DRAWING NO. B4-0010 |