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Consolidation Coal Company
Mid-Continent Region
12755 Olive Boulevard
St. Louis, Missouri 63141
(314) 275-2300

February 17, 1987

RECEIVED
FEB 18 1987

Mr. Lowell P. Braxton, Administrator
Mineral Resource Development and Reclamation Program
Division of Oil, Gas and Mining
355 W. North Temple
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

DIVISION OF
OIL, GAS & MINING

Re: Application for Permit Change
Permit ACT/015/015 - Emery Deep Mine
Reconstruction of Revegetation Demonstration Site

Dear Mr. Braxton:

As allowed under the Regulations pertaining to surface effects of underground coal mining activities, Section UMC 788.12 - Permit Changes, Consol submits this application for a Permit Change to the above referenced permit. This request for a permit change concerns the upgrading and reconstruction of the Emery revegetation demonstration sites. As required by Consol's response to the Apparent Completeness Review Comment UMC 784.13(b)(4), a plan to demonstrate that the substitute material and available topsoil is equal to or more suitable for sustaining vegetation was submitted in April 1984. It is this plan for demonstrating revegetation capabilities that Consol feels a need to upgrade and reconstruct. Based upon a technical review of the existing plan and evaluation of the demonstration sites in 1985 and 1986, Consol feels that attached modification to the plan will reflect a more realistic demonstration of revegetation capabilities.

Again this reconstruction plan is based upon monitoring conducted in 1985 and 1986 and review of pertinent publications and technical reports. The proposed changes can be located on the plot layout sheet. Plots C1, C1A, and all D plots will be kept in their current condition and all plots will be monitored as outlined in the presently approved plan. It is Consol's intention to implement this reconstruction plan in mid-April of this year.

Should you have any questions regarding this proposed permit change, please feel free to contact this office.

Sincerely,

Nicolaus P. Neumann, P.E.
Group Leader - Permits

NPN/vls
Attachments

RECONSTRUCTION PLAN
FOR
EMERY REVEGETATION DEMONSTRATION SITES

February 1987

Emery Deep Mine
Permit ACT/015/015

Prepared By: Gary Goodrich
Dave Larson
Rich Hiller

Reconstructed Plot A1 & A1A

Evaluate: Survival and growth rate of containerized shrubs.

This plot will be roto-tilled to eliminate existing vegetation and to break up surface crusting. No other surface treatments are proposed, as a rough-clodded surface is desirable for water infiltration. Twenty five containerized plants of each of the following five species will be obtained from a commercial nursery growing stock adapted to south-central Utah:

Rubber Rabbitbrush

Fourwing Saltbush

Shadscale Saltbush

Winterfat

Greasewood

If these species are not available, substitute species of Ephedra, Black Sage or Forage Kochia will be used. All containerized shrubs will be hardened prior to planting in April.

Individual plants will be evenly spaced within the plot with each species being widely distributed throughout the plot to minimize the possibility of pockets of undesirable soil properties eliminating any one species. Planting will be done using a hand auger or small tilling spade. Prior to planting, the holes will

Reconstructed Plot A1 & A1A (Continued)

be filled with water and allowed to drain. On half of the plot, fertilizer tablets will be placed in the holes in order to evaluate growth response of fertilized seedlings compared to unfertilized seedlings. The slow release tablet, with an analysis of 20-10-5, will be placed at the bottom of the hole and covered with $\frac{1}{2}$ " of soil prior to placement of the containerized shrub. Following planting, the entire plot will be immediately irrigated to saturate the rooting zone (minimum 1" over 4 hours). The plot will then be irrigated to supply one inch of water every other week during the first growing season only. This plot will be monitored during subsequent years for survival and growth rates of the shrubs. No attempt will be made to control invading vegetation in order to better simulate an actual reclamation effort.

Consol recognizes that planting containerized shrubs is more expensive than seeding, assuming that shrub seeding will be successful. Containerized shrubs would be used in the reclamation plan only to augment the shrub seeding program, to produce clumps of shrubs early in the reclamation process. Consol estimates 200-300 containerized shrubs per acre of reclaimed land would cost between \$150-\$250 per acre, which would be economically practical.

Reconstructed Plot B1 & B1A

Evaluate: Natural reseeding from locally adapted mature transplants.

This plot will be roto-tilled to eliminate existing vegetation and break up surface crusting. No other surface treatments are proposed, as a rough-clodded surface is desirable for water infiltration. Twelve holes with a minimum diameter of 30" and minimum depth of 24" will be hand-dug at locations equidistant from the plot borders and each other hole (minimize competitive stress). Each hole will be filled with water and allowed to drain twice immediately prior to transplanting. No soil amendments, such as fertilizers or mulching are proposed at this plot.

Four mature specimens each (known seed producers) of fourwing saltbush, greasewood, and rubber rabbitbrush will be located on the mine property and within a similar landscape position as the demo plots. Approximately one third of the topgrowth will be removed prior to transplanting. These shrubs will be excavated with a front-end loader to obtain a minimum root-ball of 24". The shrubs will be immediately moved to the demo plot and transplanted directly from the front-end loader bucket. The hole will be backfilled to within a few inches of the predisturbance surface and excess soil materials will be distributed within the plot. A slight depression will thus be created around each shrub to enhance water retention. The transplanted shrub will be immediately irrigated to saturate the rooting zone. Each shrub

Reconstructed Plot B1 & B1A (Continued)

will be secured with a wooden stake and burlap twine if necessary. No mulching is proposed for this plot. The plot will be irrigated to supply one inch of water to the shrub rooting zone every other week during the first growing season following transplanting. This plot will be monitored during subsequent years for survival and growth of the transplants, and more importantly, for naturally-seeded shrub starts in the vicinity of the mature transplants.

As a large scale transplanting program would be cost prohibitive for mine reclamation, the major objective of this plot is not to demonstrate transplant survival, but to monitor seedling starts from the natural reseeding from the mature transplants. If reseeding does occur, select transplants could be placed in key locations in the reclaimed areas to aid in shrub reestablishment.

Reconstructed Plots A2 and A2A

Evaluate: Customized shrub seed mix and water harvesting furrows.

Existing plots A2 and A2A will be roto-tilled to eliminate existing vegetation and to break up surface crusting. On $\frac{1}{2}$ of the new plot, 2-3 inch deep north to south furrows (approximately 1' wide) will be created on 2' centers. Check dams will be placed every 20 feet to avoid rill erosion. The other $\frac{1}{2}$ of the plot will not have furrows constructed. No other surface amendments, such as fertilizers or mulching, will be used at this plot.

Based upon the repeated failure of several species in the standard DOGM seed mixes at the Emery plots and observations of successfully seeded species and naturally invading ones at the plots, the DOGM seed mix will be simplified to those species currently observed growing at the site. A seed mixture of fourwing saltbush, greasewood, winterfat, and rubber rabbitbrush will be obtained from a local source and broadcast seeded at 2 times the normal drilling rate (to ensure sufficient germination). No grasses or forbs will be seeded.

Seed will be broadcast in early spring, no later than April 30. The seed will be lightly raked in, if conditions permit. Seeding rates will be; fourwing saltbush 4 lb/ac, greasewood 2 lbs/ac, winterfat 4 lbs/ac, and rubber rabbitbrush 2 lbs/ac.

Reconstructed Plots A2 and A2A (Continued)

The plot will be monitored for increased establishment and growth rates in the furrows compared to a level surface, overall establishment, survival, and growth rate of the four seeded shrubs, and invasion of desirable grasses and forbs over time.

Reconstructed Plots B2 and B2A

Evaluate: Customized grass-shrub seed mix and organic amendment to reduce surface crusting.

Existing plots B2 and B2A will be roto-tilled to eliminate existing vegetation and to break up surface crusting. Following the initial roto-tilling, native hay will be spread on the entire plot at a rate of 2.5 tons/acre. Following the hay application, the plot will be roto-tilled twice (second time at 90° to initial direction) to incorporate the hay into the upper few inches of the soil. Ammonium Nitrate will be added at the rate of 35 lbs/ac to maintain an appropriate carbon nitrogen balance in the soil. The entire plot will be broadcast seeded at the recommended DOGM rates with the following seed mixture obtained from a local source:

Slender Wheatgrass	-	5 lbs/ac
Blue Grama	-	1 lb/ac
Sand Dropseed	-	.2 lb/ac
Fourwing Saltbush	-	2 lbs/ac
Greasewood	-	1 lb/ac
Shadscale Saltbush	-	2 lbs/ac
Winterfat	-	2 lbs/ac
Rubber Rabbitbrush	-	½ lb/ac

Seeding will be accomplished in early spring (no later than April 30). The seed will be broadcast and, if conditions permit, will be lightly raked in. No other amendments, such as fertilizer or mulch, are proposed. The plot will be monitored for germination, survival, and growth rate of the seeded species.

Reconstructed Plots C2 and C2A

Evaluate: Customized grass-shrub mix.

Existing plots C2 and C2A will be roto-tilled to eliminate existing vegetation and left in a rough-clodded surface condition to promote water infiltration. Following roto-tilling, the entire plot will be broadcast seeded at the recommended DOGM rates with the following seed mixture obtained from a local source:

Slender Wheatgrass	-	5 lbs/ac
Blue Grama	-	1 lb/ac
Sand Dropseed	-	.2 lb/ac
Fourwing Saltbush	-	2 lb/ac
Greasewood	-	1 lb/ac
Shadscale Saltbush	-	2 lbs/ac
Winterfat	-	2 lbs/ac
Rubber Rabbitbrush	-	½ lb/ac

Seeding will be accomplished in early spring (no later than April 30). The seed will be broadcast and, if conditions permit, will be lightly raked in. No other amendments, such as fertilizer or mulch, are proposed. The plot will be monitored for germination, survival, and growth rate of the seeded species.

Reconstructed Borehole Plot

Evaluate: Establishment of mat saltbrush from seed and transplants.

Approximately $\frac{1}{2}$ of the borehole demonstration plot occurs on Bluegate shale, a geologic formation which has chemical and physical properties hostile to plant growth and which locally supports a very limited number and diversity of plants. Adjacent to the borehole site, the Blue Gate shale areas are dominated almost exclusively by mat saltbush. Accordingly, the highly diverse seed mixes proposed by DOGM and seeded in 1984 were especially unsuited for these areas.

A 25' x 25' block of the Bluegate shale portion of the borehole site will be roto-tilled to eliminate existing vegetation and to leave the surface in a rough-clodded condition. One half of the roto-tilled area will be broadcast seeded with mat saltbush obtained from a locally available source. Seeding will be done in early spring (prior to April 30) and the seed will be lightly raked into the surface if conditions permit. The other half of the plot will be prepared for transplants by digging twenty holes (12" deep x 18" diameter) spaced equidistantly in the subplot. Each hole will be filled with water and allowed to drain just prior to transplanting.

Reconstructed Borehole Plot (Continued)

Twenty mat saltbush specimens of various size and ages will be hand dug from the Bluegate shale areas adjacent to the borehole site and immediately transplanted in the prepared holes. The entire rooting zone will be saturated with water following transplanting.

This plot will be monitored for survival and growth rate of mat saltbush.

Reconstructed Flume Plot

Evaluate: Tree establishment in floodplain areas.

Observation suggest that occasional flooding of the flume site washed the previous seed from the plot and, therefore, that seeding is an unreliable method of establishing vegetation on flood prone areas. In addition, salt cedar and rubber rabbitbrush are naturally invading the site and are therefore probably the best suited species for reclamation. As an attempt to introduce more desirable species into this floodplain site, 25 containerized Fremont poplar and 25 containerized willows will be planted at the site.

All Plots

1. Composite soil samples will be taken at all reconstructed plots; one set for the 0-6" layer and one set for the 6-12" layer. Each composite sample will be analyzed for the following parameters:

Electrical Conductivity

SAR

pH

Potassium

Texture

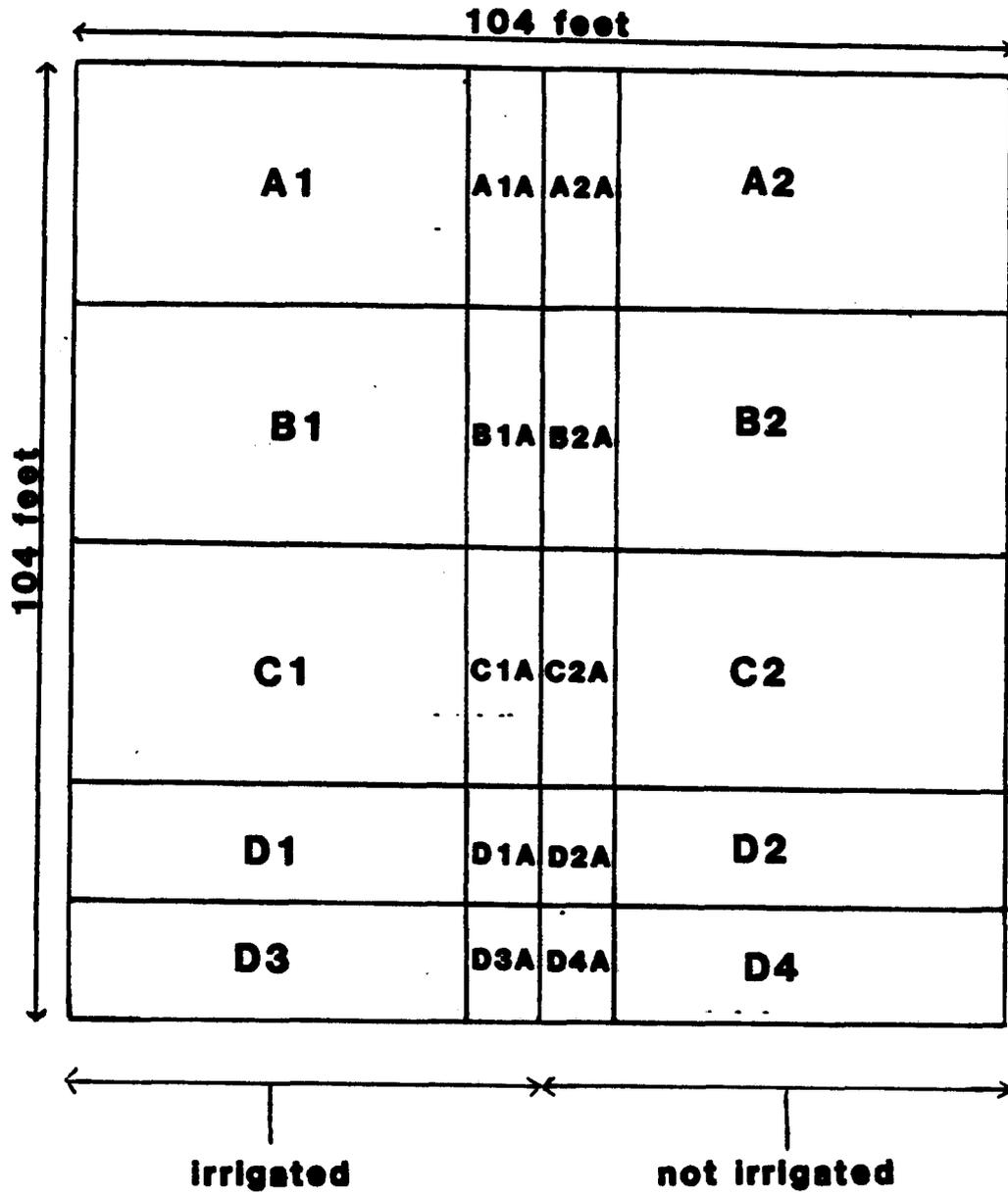
using procedures applicable to Utah soils. Results of the 1987 soil analyses will be included in the 1987 Emery Mine Monitoring Report.

2. For all seeds, a T-Z test will be performed within six weeks of planting. Results of the T-Z tests will be included with the 1987 monitoring report. Appropriate seeds will be stratified prior to spring planting. If available, blue grama seed will be obtained from a Utah source or other northern state. If shrub establishment from spring seeding is unacceptable (based upon 1987 monitoring in August) new shrub seed will be obtained and reseeded in the fall (August-September) of 1987.

3. The minor quantities of irrigation water required for the demonstration plots will be obtained from Quitchupak Creek. Water quality parameters considered pertinent to irrigation water quality are included on the attached laboratory sheets.
4. Once a schedule is established for developing the sites, DOGM will be contacted in order that they can visit the sites when the fieldwork is being done.

Figure 1

**EMERY REVEGETATION DEMONSTRATION SITE
PLOT LAYOUT**





CERTIFICATE OF ANALYSIS

STANDARD LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84528 801-653-2314

Client: CONSOLIDATION GOAL CO.
PO BOX 527
EMERY, UT 84522

Sample ID: SITE #4

Lab. No. 8359
Date Rec'd 7-18-86
Date Sampled 7-17-86
Time Sampled

Acidity	_____	mg/l CaCO ₃
Alkalinity, Total	257	mg/l CaCO ₃
Alkalinity, Bicarbonate	257	mg/l CaCO ₃
Alkalinity, Carbonate	<1.0	mg/l CaCO ₃
Chloride	43	mg/l
Coliform, Fecal	_____	MPN/100 ml
Coliform, Total	_____	MPN/100 ml
Conductivity	1710	umhos/cm
Fluoride	0.41	mg/l
Hardness, Total	545	mg/l CaCO ₃
Nitrogen, Ammonia	_____	mg/l
Nitrogen, Nitrate	0.03	mg/l
Nitrogen, Nitrite	_____	mg/l
Oil & Grease	<0.5	mg/l
pH	7.85	Units
Phosphorus, Ortho	0.10	mg/l
Phosphorus, Total	_____	mg/l
Solids, Total Dissolved	1004	mg/l
Solids, Total Suspended	5136.0	mg/l
Sulfate	550	mg/l
Sulfide	_____	mg/l
Turbidity	_____	NTU
Total Cations	18.06	meq/l
Total Anions	17.80	meq/l

Aluminum	_____	mg/l
Arsenic	_____	mg/l
Barium	_____	mg/l
Beryllium	_____	mg/l
Boron	0.39	mg/l
Cadmium	_____	mg/l
Calcium	118	mg/l
Chromium	_____	mg/l
Copper	_____	mg/l
Iron	0.75	mg/l
Lead	_____	mg/l
Magnesium	61	mg/l
Manganese	0.51	mg/l
Mercury	_____	ug/l
Nickel	_____	mg/l
Potassium	8	mg/l
Selenium	_____	mg/l
Silica	5.2	mg/l
Sodium	160	mg/l
Vanadium	_____	mg/l
Zinc	_____	mg/l
Strontium	1.5	mg/l

Analyst:

Paul D. Jones

Respectfully submitted

Paul D. Jones

CERTIFICATE OF ANALYSIS



STANDARD LABORATORIES, INC.

P.O. Box 1140, Hurttington, Utah 84528 801-663-2314

Client: **CONSOLIDATION COAL CO.** Sample ID: **SITE #4**
 P.O. BOX 527
 EMERY, UT 84522

Lab. No. 8067
 Date Rec'd 5-21-86
 Date Sampled 5-20-86
 Time Sampled _____

Acidity	_____	mg/l Ca CO ₃
Alkalinity, Total	<u>257</u>	mg/l Ca CO ₃
Alkalinity, Bicarbonate	<u>257</u>	mg/l Ca CO ₃
Alkalinity, Carbonate	<u><1.0</u>	mg/l Ca CO ₃
Chloride	<u>36</u>	mg/l
Coliform, Fecal	_____	MPN/100 ml
Coliform, Total	_____	MPN/100 ml
Conductivity	<u>1500</u>	umhos/cm
Fluoride	<u>0.38</u>	mg/l
Hardness, Total	<u>421</u>	mg/l Ca CO ₃
Nitrogen, Ammonia	_____	mg/l
Nitrogen, Nitrate	<u>0.22</u>	mg/l
Nitrogen, Nitrite	_____	mg/l
Oil & Grease	<u><0.5</u>	mg/l
pH	<u>7.60</u>	Units
Phosphorus, Ortho	<u>0.08</u>	mg/l
Phosphorus, Total	_____	mg/l
Solids, Total Dissolved	<u>968</u>	mg/l
Solids, Total Suspended	<u>989.0</u>	mg/l
Sulfate	<u>465</u>	mg/l
Sulfide	_____	mg/l
Turbidity	_____	NTU
Total Cations	<u>16.08</u>	meq/l
Total Anions	<u>15.85</u>	meq/l

Aluminum	_____	mg/l
Arsenic	_____	mg/l
Barium	_____	mg/l
Beryllium	_____	mg/l
Boron	<u>0.19</u>	mg/l
Cadmium	_____	mg/l
Calcium	<u>84</u>	mg/l
Chromium	_____	mg/l
Copper	_____	mg/l
Iron	<u>0.53</u>	mg/l
Lead	_____	mg/l
Magnesium	<u>51</u>	mg/l
Manganese	<u>0.16</u>	mg/l
Mercury	_____	ug/l
Nickel	_____	mg/l
Potassium	<u>4</u>	mg/l
Selenium	_____	mg/l
Silica	<u>4.5</u>	mg/l
Sodium	<u>174</u>	mg/l
Vanadium	_____	mg/l
Zinc	_____	mg/l
Strontium	<u>1.45</u>	mg/l

Analyst: David A. Panay

Respectfully submitted [Signature]

CERTIFICATE OF ANALYSIS



STANDARD LABORATORIES, INC.

Box 1140, Huntington, Utah 84528 801-653-2314

Client: CONSOLIDATION COAL CO.
P.O. BOX 527
EMERY, UT 84522

Sample ID: SITE #4

Lab. No. 7778
Date Rec'd 1-15-86
Date Sampled 1-15-86
Time Sampled _____

Acidity	_____	mg/l CaCO ₃
Alkalinity, Total	<u>288</u>	mg/l CaCO ₃
Alkalinity, Bicarbonate	<u>288</u>	mg/l CaCO ₃
Alkalinity, Carbonate	<u>< 1.0</u>	mg/l CaCO ₃
Chloride	<u>29</u>	mg/l
Coliform, Fecal	_____	MPN/100 ml
Coliform, Total	_____	MPN/100 ml
Conductivity	<u>1625</u>	umhos/cm
Fluoride	<u>0.47</u>	mg/l
Hardness, Total	<u>450</u>	mg/l CaCO ₃
Nitrogen, Ammonia	_____	mg/l
Nitrogen, Nitrate	<u>0.40</u>	mg/l
Nitrogen, Nitrite	_____	mg/l
Oil & Grease	<u>< 0.5</u>	mg/l
pH	<u>7.80</u>	Units
Phosphorus, Ortho	<u>0.02</u>	mg/l
Phosphorus, Total	_____	mg/l
Solids, Total Dissolved	<u>1058</u>	mg/l
Solids, Total Suspended	<u>567.0</u>	mg/l
Sulfate	<u>520</u>	mg/l
Sulfide	_____	mg/l
Turbidity	_____	NTU
Total Cations	<u>17.71</u>	meq/l
Total Anions	<u>17.41</u>	meq/l

Aluminum	_____	mg/l
Arsenic	_____	mg/l
Barium	_____	mg/l
Beryllium	_____	mg/l
Boron	<u>0.15</u>	mg/l
Cadmium	_____	mg/l
Calcium	<u>82</u>	mg/l
Chromium	_____	mg/l
Copper	_____	mg/l
Iron	<u>0.09</u>	mg/l
Lead	_____	mg/l
Magnesium	<u>59</u>	mg/l
Manganese	<u>0.07</u>	mg/l
Mercury	_____	ug/l
Nickel	_____	mg/l
Potassium	<u>4</u>	mg/l
Selenium	_____	mg/l
Silica	<u>5.1</u>	mg/l
Sodium	<u>198</u>	mg/l
Vanadium	_____	mg/l
Zinc	_____	mg/l
Strontium	<u>1.65</u>	mg/l

Analyst: Daniel A. Jones

Respectfully submitted [Signature]

SPRING LABORATORIES, INC.

P.O. Box 1140, Huntington, Utah 84520 801-653-2314

Client: Consolidation Coal Company Sample ID: Site #4
 P.O. Box 527
 Emery, Utah 84522

Lab. No. 7525
 Date Rec'd 9-27-85
 Date Sampled 9-27-85
 Time Sampled _____

Acidity	_____	mg/l CaCO ₃
Alkalinity, Total	316	mg/l CaCO ₃
Alkalinity, Bicarbonate	316	mg/l CaCO ₃
Alkalinity, Carbonate	< 1.0	mg/l CaCO ₃
Chloride	49	mg/l
Coliform, Fecal	_____	MPN/100 ml
Coliform, Total	_____	MPN/100 ml
Conductivity	2276	umhos/cm
Fluoride	0.45	mg/l
Hardness, Total	712	mg/l CaCO ₃
Nitrogen, Ammonia	_____	mg/l
Nitrogen, Nitrate	0.18	mg/l
Nitrogen, Nitrite	_____	mg/l
Oil & Grease	< 0.5	mg/l
pH	7.60	Units
Phosphorus, Ortho	0.06	mg/l
Phosphorus, Total	_____	mg/l
Solids, Total Dissolved	1560	mg/l
Solids, Total Suspended	89.0	mg/l
Sulfate	780	mg/l
Sulfide	_____	mg/l
Turbidity	_____	NTU
Total Cations	24.07	meq/l
Total Anions	23.95	meq/l

Aluminum	_____	mg/l
Arsenic	_____	mg/l
Barium	_____	mg/l
Beryllium	_____	mg/l
Boron	0.36	mg/l
Cadmium	_____	mg/l
Calcium	130	mg/l
Chromium	_____	mg/l
Copper	_____	mg/l
Iron	0.38	mg/l
Lead	_____	mg/l
Magnesium	94	mg/l
Manganese	0.05	mg/l
Mercury	_____	ug/l
Nickel	_____	mg/l
Potassium	7	mg/l
Selenium	_____	mg/l
Silica	4.8	mg/l
Sodium	222	mg/l
Vanadium	_____	mg/l
Zinc	_____	mg/l
Strontium	1.58	mg/l

Analyst:

David A. Ganney

Respectfully submitted

[Signature]