SDMS Document ID
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REFERENCES

Anderson, B.W. and R.D. Ohmart. 1977. Wildlife use and densities report of birds and mammals in the lower Colorado River Valley. Annual Report for Bureau of Reclamation, Lower Colorado Region, Boulder City, NV. 355pp.

Baker, L.A. and V.D. Adams. 1982. Predicted limnology of Ridges Basin Reservoir. UWRL/Q-82-01, Utah Water Research Laboratory, Utah State University, Logan, Utah. 115pp.

Bio/West, Inc. 1995. Characterization of the La Plata River Reach 3, wetland/riparian areas considered affected by groundwater depletion impacts. Technical Memorandum to U.S. Bureau of Reclamation. August 25, 1995.

Black and Veatch, Consulting Engineers. 1981. Water supply master plan for San Juan County, New Mexico. Project 8928.

Finger, S.E. 1995. Contaminant impact assessment of the Animas-LaPlata Project. National Biological Service, Midwest Science Center, Colombia, Missouri. 126pp.

Miller, W.J., J. Hogle and D. Rees. 1995. Final report Animas-La Plata project - native fish studies. Prepared for the Southern Ute Indian Tribe, Ignacio, CO. 75pp.

Terry, L.G. and V.D. Adams. 1979. Algal bioassay study for the Animas - La Plata Project. Utah Water Research Laboratory, Utah State University, Logan, Utah.

United States Bureau of Reclamation (BOR). 1980. Final Environmental Impact Statement Animas-La Plata Project. Prepared by Upper Colorado Region Water and Power Resources Service, Department of Interior.

United States Bureau of Reclamation (BOR). 1992a. Draft supplemental report on water quality for the draft supplement to the final environmental statement. Animas-La Plata Project, Colorado-New Mexico. 18pp.

United States Bureau of Reclamation (BOR). 1992b. Trace element analysis report, a supplement to Appendix C - project lands and drainage - definite plan report Animas-La Plata project. October, 1992. 68pp. + appends.

United States Bureau of Reclamation (BOR). 1992c. Final Supplemental Environmental Impact Statement - Animas-La Plate Project.

United States Bureau of Reclamation (BOR). 1995a. Final draft assessment of project impacts to riparian corridor and vegetation communities - The Animas-La Plata Project. Technical Memorandum No. 8260-95-10. August 1995. 73pp.

United States Bureau of Reclamation (BOR). 1995b. Final draft, Animas-La Plata Project, Water Quality Appendix. 150pp.

United States Bureau of Reclamation (BOR). 1995c. Preliminary team draft supplemental environmental impact statement, January 8, 1996.

United States Bureau of Reclamation (BOR). 1995d. Biological assessment of the Animas-La Plata Project. Technical memorandum from C. Calhoun, Regional Director to Regional Director, USFWS, Region 6. 96 pp. + appends.

United States Bureau of Reclamation (BOR). 1995e. Final draft, Animas-LaPlata Project, Wetland/Riparian Vegetation Communities: Classification and Inventory. Technical Memorandum No. 8260-95-08. U.S. Dept. of Interior, Bureau of Reclamation, Technical Service Center, Denver, Colorado. 73 pp. + appends.

United States Fish and Wildlife Service (USFWS). 1991. Final Biological Opinion Animas La Plata Project, Colorado and New Mexico.

United States Fish and Wildlife Service (USFWS). 1991a. Conference Opinion Report on the Razorback Sucker - Animas-La Plata Project.

United States Fish and Wildlife Service (USFWS). 1992. Technical memorandum from G. Auble, M. Scott, and M. Wondzell to G. Patton on the Animas-La Plata Project. December 8, 1992. USFWS National Ecology Research Service, Ft. Collins, CO.

United States Fish and Wildlife Service (USFWS). 1993. Fish and Wildlife Coordination Act Report - Animas-La Plata Project, Colorado and New Mexico. USFWS Region 6 Colorado State Office, Ecological Services in cooperation with the Colorado Division of Wildlife and the New Mexico Department of Fish and Game. January, 1993. 75 pp. + appends.

APPENDIX A SUMMARY - GROUNDWATER STUDY

A task was assigned to determine the potential to replace or augment water for the Animas-La Plata project through groundwater withdrawal. The methodology section attached to this report explains the process used to determine recoverable groundwater within the study area which includes the following drainage areas: Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, Piedra.

The table entitled "Best Estimate of Recoverable Groundwater in Southwest Colorado" shows possible recoverable groundwater as well as overall general water quality for each geologic unit in each river drainage. Water quality was classified as based on TDS values as sampled by the USGS for specific geologic units in the study area. All "poor" quality water (TDS > 500 mg/L) can be eliminated from the study area unless the Bureau plans to establish some type of major filtering systems. A total of 23,100 acre-feet of water is available within the studies river drainage areas. If the list is further narrowed by eliminating "negligible" recharge potential areas, a total recoverable groundwater sum of 19,285 acre-feet is achieved. This is shown in the chart below.

Drainage Basin	Rock Unit	Saturated Thickness	Best Estimate of Recoverable Groundwater	Water Quality	Recharge Potential
		percent	acre-feet		
Dolores	none				
Mancos	Dakota	20	1720	good-poor	small
	Morrison	10	133	good-poor	moderate
La Plata	none				
Animas	Animas	10	1560	good-poor	small
	Fruitland	20	1000	poor	small
	Dakota	20	452	good-poor	small
	Morrison Entrada	10	740	good-poor	small
Florida	none				
Los Pinos	none				

Drainage Basin	Rock Unit	Saturated Thickness	Best Estimate of Recoverable Groundwater	Water Quality	Recharge Potential
		percent	acre-feet		
Piedra	Dakota Burro Canyon	20	1560	good-poor	small
	Morrison Entrada	10	9040	good-poor	moderate
	Granitic Rocks	10	3080	good	large
TOTAL ACRE-FEET			19,285		

It needs to be noted that total recoverable groundwater does not necessarily represent a sustainable yearly yield. Area of "small" recharge potential may allow only minor groundwater removal on a long-term extraction program. A second problem involves potential well yield from producing formations. Tests, as completed by the USGS, indicate average well yields from studied aquifers of one to 15 gpm with a median value estimated near 8 gpm. This suggests that a large number of wells would be required to pump this defined groundwater reserve.

It should also be noted that many of the rock units identified as "small to large" recharge potential are located within the National Forest boundaries. To obtain project approval, it would be expected that the Forest Service would require the Bureau to complete an EIS prior to any groundwater extraction in the area. No appreciable groundwater was identified within tribal land (reservation) boundaries.

The La Plata and Dolores drainages are classified, as overappropriated by the State of Colorado. Therefore, no aquifers were considered in these two drainages. The Dolores drainage was only considered from the headwaters to McPhee Reservoir. It was determined that groundwater areas downstream of McPhee Reservoir would be located far enough from the project area to make pumping non-feasible.

Two possible major environmental impacts were identified during this study. They are: 1) other wells (generally domestic) in close proximity to the Bureau wells could be affected by pumping and associated withdrawal of groundwater and 2) recharge of aquifers

downgradient of a large well field could be adversely affected by withdrawals of large quantities of groundwater.

This study was completed with a very limited scope of existing information. If this cursory study were to become a viable alternative, a more in-depth technical study would need to be completed. Geologic studies including subsurface stratigraphic correlation and lithofacies analysis would be completed on the basins. This would include surface mapping, joint and fracture analysis, identification of major structural features, drilling, and permeability testing, location and analysis of existing wells, and identification and analysis of recharge areas, to name a few.

BEST ESTIMATE OF RECOVERABLE GROUNDWATER IN SOUTHWEST COLORADO

Drainage Basin	Rock Unit	Saturated Thickness	Best Estimate of Recoverable Groundwater	Water Quality	Recharge Potential
		Percent	Acre-Feet		
Dolores	None				
Mancos	Dakota	20	1720	good-poor	small
	Menefee	20	3560	poor	negligible
	Morrison	10	133	good-poor	moderate
La Plata	None				
Animas	Animas	10	1560	good-poor	small
	Fruitland	20	1000	poor	small
	Kirtland	10	320	poor	negligible
	Pictured Cliffs	10	190	poor	negligible
	Menefee Point Lookout	20	1100	poor	negligible
	Dakota	20	452	good-poor	small
	Morrison Entrada	10	740	good-poor	small

BEST ESTIMATE OF RECOVERABLE GROUNDWATER IN SOUTHWEST COLORADO					
Drainage Basin	**Rock Unit**	**Saturated Thickness**	**Best Estimate of Recoverable Groundwater**	**Water Quality**	**Recharge Potential**
		Percent	**Acre-Feet**		
Florida	Animas San Jose Nacimiento	10	1125	good-poor	negligible
Los Pinos	Animas San Jose Nacimiento	10	1970	good-poor	negligible
Piedra	Animas	10	1720	good-poor	negligible
	Kirtland	10	2110	poor	negligible
	Picture Cliffs	10	760	poor	negligible
	Cliff House Menefee Point Lookout	20	1540	poor	negligible
	Dakota Burro Canyon	20	1560	good-poor	small
	Morrison Entrada	10	9040	good-poor	moderate
	Granitic Rocks	10	3080	good	large

Methodology of Preliminary Groundwater Study

1. Outlined basins on 1:100,000-scale USGS topographic maps.

2. Identified and located aquifers within the basin; drew the surface projection of where the bottom of the aquifer is at 1000 feet depth. This projected surface area was the area where

wells could be drilled into the aquifer. All alluvium aquifers were considered part of the surface water system and placed out of the scope of this study.

3. The Colorado State Water Resources Division and the New Mexico State Engineers Office, Water Rights Division were questioned about which areas in Colorado were mapped and excluded from this study. The State of New Mexico has declared groundwater basins where only domestic water well permits are issued. All the study basins are declared basins in New Mexico.

4. The surface area was calculated with a planimeter.

5. The estimated thickness of the aquifer was obtained from literature or measured on the geologic map.

6. Calculated volume of the aquifer by multiplying surface area by thickness (for each particular drainage).

7. Total storage of the aquifer was calculated by assuming the aquifer was 10 - 20 percent saturated (depending on the rock type). The volume was multiplied by the porosity of the aquifer (as given in the literature or assumed from similar lithogic units).

8. The drainable storage was determined by multiplying the volume of the aquifer by the specific yield (specific yield = 1/2 porosity).

9. Removable storage was determined by multiplying the drainable storage by 4 percent. The four percent was the percent recoverable (amount pumped) used in a hydrologic study of the upper Colorado Basin by the USGS (1991).

10. A literature search yielded some water quality data for several of the rock units in the study area. In other aquifers, Reclamation assumed water quality based on type of rock found in the aquifer.

11. The recharge potential of the aquifer was a best guess based on the winter precipitation potential of the area. The USGS hydrologic study for the upper Colorado basin indicated that good recharge occurred in areas where the aquifer could have more than 100 inches of snowpack. Most of the aquifers in the drainage basins in this area are below the 100 inch snowpack line and, therefore, are assumed to have small to negligible recharge.

Drainage Areas Formation Thickness and Associated Area			
Drainage Basin	**Formations or Rock Units**	**Thickness (FT)**	**Area (Sq. Miles)**
Dolores	None		
Mancos River	Menefee	200	17.7
	Morrison	200	4.0
	Dakota-Burro Canyon	200	33.55
Animas River	San Jose, Nacimiento, Animas Undiff.	450	108.2
	Kirtland	700	1.78
	Pictured Cliffs	300	4.93
	Menefee-Point Lookout	300	11.36
	Dakota-Burro Canyon	200	8.82
	Morrison	250	8.05
Florida River	San Jose, Nacimiento, Animas Undiff.	450	78.1
Pine River	San Jose, Nacimiento, Animas Undiff.	600	136.6
Piedra River	San Jose, Nacimiento, Animas Undiff.	600	89.45
	Kirtland	600	13.75
	Pictured Cliffs	400	14.8

3.0 BACKGROUND

The Animas River is located in southwest Colorado in San Juan and La Plata counties. The headwaters of the Animas River and portions of Cement and Mineral Creeks, tributaries of the Animas River, are located within the Silverton caldera, an extensively mineralized area that has been mined for base and precious metals since the late 1800's. The Colorado Division of Minerals and Geology has documented 316 acres of land disturbed by mining in this region, and has located 307 mine openings, 78 of which were actively draining. The last active mine in the area, the Sunnyside Mine, is conducting reclamation pursuant to its Mined Land Reclamation Permit.

4.0 EVALUATION OF EXISTING ANIMAS BASIN DATA

Between 1991 and 1993, the CDPHE Water Quality Control Division, in cooperation with several federal and state agencies, as well as private and local interests, conducted an intensive water quality and biological investigation of the Animas River and its tributaries, from its headwaters to Elk Creek, located approximately 3 miles south of Silverton (Figure 1) (Owen, 1994).

4.1 Study Objectives

The objectives of the study were:

1) to characterize the chemical, biological and physical conditions of the Animas River and selected tributaries above Elk Creek;
2) to quantify areas of highest metal loadings;
3) to determine the potential for water quality improvement sufficient to allow naturally reproducing trout populations; and,
4) to prioritize sites for remedial projects based on relative loadings, environmental impact, feasibility, cost and benefits.

Results and findings of the study are presented in Section 5.0.

4.2 Sample Types and Locations

Water quality samples were collected at 167 locations during the June, 1991 high-flow event and at 121 locations during the July, 1992 high-flow event. Samples were collected at 103 locations during one low-flow event (October, 1992) and at 188 locations during one rain-storm event (September, 1991). Biological sampling of fish and macrobenthos occurred in approximately 25 stream reaches within the basin study area. Figure 1 illustrates the sample site locations. Water quality analytical results of the CDPHE Animas River Basin Study are presented in Appendix A.

Background surface water samples were taken at the head of the various tributaries sampled (CDPHE sample site locations A19, A23, A39, C1, C8, C11, C15, M1, and M8) as well as above apparent sources. **Surface water** samples were also collected above and below sources to quantify impacts to the receiving streams. **Sediment** samples were not collected. Bear Creek (M-30) and Boulder Creek (A62), from which drinking water is supplied to the town of Silverton, were sampled immediately above their confluence with Mineral Creek and the Animas River, respectively.

Source sampling included approximately 50 draining mine adits, seeps from mine waste piles, and naturally occurring seeps. Table I presents the list of draining mine adits and their location in the basin. Solid source sampling, i.e., mine waste piles including tailings and waste rock, is scheduled for future site characterization work. Mineral Creek and its tributaries will be "characterized", i.e., collection of qualitative and quantitative site information and sampling, similar to EPA's Preliminary Assessment and Site Investigation programs, by the CDPHE and the Colorado Division of Minerals and Geology during the summer of 1995. "Site Characterization" of sites in other tributaries are scheduled pursuant to the Animas Stakeholders Group prioritization. Please refer to Sections 6.1.1, 6.1.4 and Figure 7 for further discussion.

Ground water was not sampled. Groundwater use for drinking water is minimal within a four mile radius of Silverton. Five wells are listed on the Colorado State Engineer's well permit list as household or domestic use wells, within a four-mile radius of Silverton (CDH, 1994). The majority of the population within the basin study area live in Silverton, with few households on the lower reaches of Cement and Mineral Creeks.

On-Site soils and air were not sampled. There are few people living or working beyond the town limits of Silverton within the Basin study area. Reclamation is ongoing during summer and early fall months at the Sunnyside mine, located in Cement Creek, Eureka Gulch and along the mainstem of the Animas near the Mayflower mill, as weather permits. The Mining Remedial Recovery Company (MRRC) is also conducting seasonal reclamation on their properties located in Placer Gulch. Please refer to Sections 6.1.5 and 6.1.14 for further information.

4.3 Field and Laboratory Parameters, Analytical Methods and Quality Assurance/Quality Control Provisions

Tables II and III compare the existing CDPHE data to EPA requirements to determine if the existing data can serve in evaluating the site under the Hazard Ranking System (HRS) and prioritizing the site for remedial action (Alexander, 1995; CDH, 1988; EPA, 1992(a); EPA, 1994; Martinez, 1995).

4.3.1 Sampling Methods

As approved by the EPA, all CDPHE samples were handled and preserved as described in the *CDPHE Standard Operating Procedures* (SOP) document (CDH, 1988). Calibration and operation of all field monitoring equipment followed the instrument manufacturer's instructions. Each water sample for total metals was acidified to a pH of 2 with nitric acid as a preservative. Each water sample for dissolved metals were filtered in the field, using a 45-micron membrane filter. Measurements of pH, conductivity, temperature and flow were made and recorded prior to sample collection. Decontamination procedures were adhered to between each sampling event.

Where possible, surface water samples were collected directly into the sampling containers. Sampling progressed from a downstream location to an upstream location to eliminate sediment disturbance in subsequent samples. Surface water samples were collected by immersing the sample bottle several inches beneath the water surface with the mouth of the sample bottle facing upstream. If surface water samples were unable to be collected directly into the sample container, a decontaminated container was used to collect the sample. Care was taken to avoid excessive agitation when transferring samples to sample containers.

4.3.2 Field QA/QC

CDPHE collected 26 **field duplicate** samples (1 duplicate per 8 samples collected) during the September, 1991 sampling event. Eleven duplicates (1 per 15 Samples) were collected during the June, 1992 sampling event. Six duplicates were collected (1 per 17 samples) during the October, 1992 sampling event and eleven duplicates were collected during the July, 1993 sampling event (1 duplicate per 11 samples). EPA requires that one field duplicate be collected at the rate of 1 duplicate per 20 samples collected.

CDPHE collected 1 filtered **field blank** per 8 samples collected during the September, 1991 sampling event; 1 blank per 15 samples during the June, 1992 sampling event; 1 blank per 26 samples during the October, 1992 sampling event; and, 1 blank per 24 samples during the July, 1993 sampling event. EPA requires that field blanks be collected using analyte free water at the rate of 1 per day of sampling, at least 1 per 20 samples.

CDPHE collected filtered field blanks which double for **equipment rinsate blanks**. Thus, the rate of filtered field blanks collected, as listed in the preceding paragraph, correspond to equipment rinsate blanks. EPA requires that rinsate blanks be collected in the field using analyte-free water from decontaminated equipment as a check for decontamination procedures. Rinsate blanks are required to be collected for each day sampling equipment is decontaminated in the field at the rate of 1 per 20 samples.

4.3.3 Laboratory QA/AC

Samples were analyzed by the CDPHE Laboratory, Denver, Colorado. The CDPHE laboratory analyzes 1 **duplicate** for every 10 samples analyzed; EPA requires that one duplicate water sample be collected for every 20 samples to determine accuracy and precision in laboratory analytical procedures as well as sample collection procedures. CDPHE laboratory analyzes 1 **spike** for every 10 samples analyzed; EPA requires that a sufficient volume of water be collected at the rate of 1 per 20 samples to provide to the lab for matrix spike and matrix spike duplicate analyses for quality control.

CDPHE Lab analytical instruments are **calibrated and standardized** daily; laboratory control samples are also used which verify CDPHE standards and checks the accuracy of the lab instruments in use (Alexander, 1995).

4.3.4 Data Validation Requirements

EPA Data Validation Requirements are provided in Appendix B; the CDPHE Laboratory follows the same procedures, as outlined in TABLE III (Alexander, 1995.)

TABLE I
Page 1 of 2

CDPHE Animas Basin Sampling

Draining Mine Adits - Aqueous Sources

Sampling Location	Site Name	Site Location Description
ANIMAS MAINSTEM AND ITS TRIBUTARIES		
A 02	Lucky Jack Drainage	Upper Animas Headwaters
A 02b	Lucky Jack Adit	Upper Animas Headwaters
A 07 LM	Burrows G.; London Mine	Upper Animas Headwaters
A 07 LMS	Burrows G.; London Mine	Upper Animas Headwaters
A 11a	Columbus Mine	California G.; below confluence with Placer G.
A 12	California Adit	California G.; below confluence with Placer G.
A 17a	California G. Adit	Upper California G.
A 17b	California G. Adit	Upper California G.
A 19a	California G. Adit	Upper California G.
A 21a	Placer Adit	Placer G.
A 23a		Placer G.
A 29	Niagara G. Adit	Tributary south of Burns G.
A 38	Terry Tunnel	Upper Eureka G.
A 49	Cunningham Adit	Cunningham Cr.
A 49a	Cunningham Adit	Cunningham Cr.
A 50	Cunningham Adit	Cunningham Cr.
A 57	Mayflower Pipe	Mainstem of Animas above confluence with Arrastra Cr.
A 63	Animas Adit	Small tributary south of Animas, west of Arrastra Cr.
A 63a	Aspen Adit	Small tributary south of Animas, west of Arrastra Cr.
A 69	Idaho Adit	Idaho G.
A 71	Animas Adit	Small tributary west of Animas, below confluence with Mineral Cr.

TABLE I
Page 2 of 2

CDPHE Animas Basin Sampling

Draining Mine Adits - Aqueous Sources

Sampling Location	Site Name	Site Location Description
CEMENT CREEK AND ITS TRIBUTARIES		
CC 01	Queen Ann Adit	North Fork of Cement Creek Headwaters
CC 01b	Mogul Tunnel	North Fork of Cement Creek Headwaters
CC 01c	Mine Adit Above Mogul Tunnel	North Fork of Cement Creek Headwaters
CC 01d	Mine Adit Above Mogul Tunnel	North Fork of Cement Creek Headwaters
CC 01e	Mine Adit Above Mogul Tunnel	North Fork of Cement Creek Headwaters
CC 01f	Mine Adit Above Mogul Tunnel	North Fork of Cement Creek Headwaters
CC 10	Middle Fork Cement Adit	Middle Fork of Cement Creek Headwaters
CC 14	South Fork Cement Adit	N. trib. of S. Fork of Cement Cr. Headwaters
CC 19	American Tunnel	Cement C. below the confluence with Minnehaha
CC 24a	Prospect Adit	Mainstem of Prospect G.
CC 24b	Prospect Adit	Mainstem of Prospect G.
CC 29	Cement Adit	Trib. west of Cement Cr., below Prospect G.
CC 29a	Cement Adit	Trib. west of Cement Cr., below Prospect G.
CC 32	Cement Adit	Mainstem of Cement Creek
CC 37	Anglo Saxon Adit	Mainstem of Cement Creek
CC 37a	Anglo Saxon Adit	Mainstem of Cement Creek
CC 44	Topeka Adit	Mainstem of Cement Creek
MINERAL CREEK AND ITS TRIBUTARIES		
M 02a	Longfellow/Koehler Complex	Mineral Creek Headwaters
M 02b	Longfellow/Koehler Complex	Mineral Creek Headwaters
M 09	Mill Creek Adit	Upper Mill Creek
M 11a	Adit Below Beaver Ponds	Mainstem of Mineral Creek below Mill Cr.
M 12a	Browns G. Adit	Browns Gulch
M 12b	Browns G. Adit	Browns Gulch
M 21	Bonner Adit	Lower Middle Fork of Mineral Creek
M 21a	Bonner Adit	Lower Middle Fork of Mineral Creek
M 24	Bandora Adit	South Fork of Mineral Creek Headwaters
M 36	Mineral Creek Adit	Mineral Creek before confluence with Animas
M 37	Mineral Adit	Mineral Creek before confluence with Animas

From: Owen, 1994

TABLE II

Comparison of CDPHE(1) Existing Data to EPA(2) HRS Requirements
UPPER ANIMAS FIELD MEASUREMENTS

Sample Location		Field Parameters		Field QA/QC	
CDPHE	EPA	CDPHE	EPA	CDPHE	EPA
Background (water)	Background (water)	Temp.	Temp.	1 Field Blank per 18 samples (average)	1 Field Blank per 20 samples (blind)
Aqueous Sources (draining mine adits; mine waste seeps; natural seeps)	Aqueous Sources	pH	pH	1 Rinsate Blank per 18 samples (same as filtered field blanks)	1 Rinsate Blank per day (1 per 20 samples)
+++	Solid Sources	EC	EC	Not Applicable	1 Trip Blank per trip (VOA only)
Surface Water	Surface Water	Discharge (High and low flow)		1 Duplicate per 13 samples (average)	1 Duplicate per 20 samples (blind)
	Sediments	Discharge (storm event)			

Field Blank = Quality Control to assess potential field contamination
Rinsate Blank = Quality Control to assess field decontamination procedures
Trip Blank = (For VOC's) Quality Control to assess sample handling/shipping procedures
+++ = Sampling of solid sources scheduled during future "Site Characterization" of specific sub-basins

(1) Owen, 1994.
(2) Martinez, 1995.

TABLE III

Comparison of CDPHE(1) Existing Data to EPA(2) HRS Requirements
UPPER ANIMAS LABORATORY MEASUREMENTS

Analytical Parameters		Analytical Methods (EPA Methods)		Detection Limits(ug/L)		Laboratory QA/AC		Laboratory Data Validation for Inorganics Analyses	
CDPHE	EPA	CDPHE	EPA	CDPHE	EPA CRDL	CDPHE	EPA	CDPHE	EPA
Aluminum	Aluminum	200.7; ICP	200.7; ICP	50	200	1 Spike per 10 samples	1 Spike per 20 samples	Holding Times: 6 mo; pH<2; (Hg<28 days)	Holding Times: 6 mo; pH<2; (Hg<28 days)
	Antimony		200.7; ICP 204.2; GFAA		60	1 Instrument Blank per 10 samples	1 Instrument Blank per 20 samples	Calibration: once/day	Calibration: once/day
Arsenic	Arsenic	206.3; HYDRIDE	206.2; GFAA	1	10	1 Duplicate per 10 samples	1 Duplicate per 20 samples	Blanks: No contamination	Blanks: No contamination
	Barium		200.7; ICP		200			ICP Interference Check: 1x/8-hrs	ICP Interference Check: 2x/8-hrs
	Beryllium		200.7; ICP 210.2; GFAA		5			Lab Control Sample: +/- 20%	Lab Control Sample: +/- 20%
Cadmium	Cadmium	200.9; GFAA	200.7; ICP 213.2; GFAA	0.25	5			Duplicate Sample: +/- 20%	Duplicate Sample: +/- 20%
	Calcium		200.7; ICP		5000			Matrix Spike: +/- 20%	Matrix Spike: +/- 25%
Chromium	Chromium	200.7; ICP 200.9; GFAA	200.7; ICP 218.2; GFAA	10 5	10			Furnace AA QC: spikes = +/- 15%	Furnace AA QC: spikes = +/- 15%
	Cobalt		200.7; ICP		50			ICP Serial Dilution: +/-10%	ICP Serial Dilution: +/-10%
Copper	Copper	200.7; ICP 200.9; GFAA	200.7; ICP	4 5	25			Sample Result Verification	Sample Result Verification
Cyanide	Cyanide	335.1; COLORIMETRIC	335.2	10	10			Field Duplicates	Field Duplicates
Iron	Iron	200.7; ICP	200.7; ICP	10	100			Overall Data Assessment	Overall Data Assessment
Lead	Lead	234.2; GFAA	200.7; ICP 239.2; GFAA	5	3				
Magnesium	Magnesium	200.7; ICP	200.7; ICP	1000	5000				
Manganese	Manganese	200.7; ICP	200.7; ICP	4	15				
Mercury	Mercury	245.1; MANUAL COLD VAPOR	245.1; MANUAL COLD VAPOR 245.2; AUTO COLD VAPOR	0.2	0.2				
Nickel	Nickel	200.7; ICP	200.7; ICP	20	40				
Potassium	Potassium	200.7 ICP	200.7; ICP		5000				
Selenium	Selenium	SM31114B; HYDRIDE 270.3; HYDRIDE	270.2; GFAA	1	5				
Silver	Silver	272.2; GFAA 200.9; GFAA	200.7; ICP 272.2; GFAA	0.2 0.2	10				
Sodium	Sodium	200.7 ICP	200.7; ICP		5000				
	Thallium		200.7; ICP 279.2; GFAA		10				
	Vanadium		200.7; ICP		50				
Zinc	Zinc	200.7; ICP	200.7; ICP	8	20				
	ORGANICS								

ICP = Inductively Coupled Plasma
GFAA = Graphite Furnace Atomic Absorption
EPA CRDL = EPA Contract Required Detection Limit
(1) Alexander, 199
(2) EPA, 1994.

4.4 Usability of Existing CDPHE Data

Upon review of the EPA HRS data requirements and the data previously collected by CDPHE, it seems that the Data Quality Objectives, sampling locations, sampling methods, analytical methods, required detection limits (except for lead) field and laboratory QA/QC measures and data validation requirements are comparable. Differences between what EPA would have included in a Site Investigation and what CDPHE has thusfar collected appear to be limited to:

1) analyses of antimony, barium, beryllium, cobalt, thallium and vanadium inorganic parameters;
2) analyses of organic parameters;
3) analyses of sediments (collocated with surface water) samples;
4) detection limits for lead (CDPHE = 5ug/L, whereas EPA = 3ug/L); and,
5) CDPHE Lab conducts ICP Interference Checks once every 8 hours, whereas EPA conducts these checks twice in 8 hours.

Sampling conducted in Cement Creek and the Upper Animas basins by Standard Metals and Sunnyside Gold Corporation between 1981 and 1993 reported the following concentrations of those metals (excluding cobalt) not sampled for by CDPHE (Perino, 1995):

TABLE IV

SUNNYSIDE GOLD CORPORATION'S CEMENT CREEK AND ANIMAS RIVER SAMPLING
SELECT METALLIC PARAMETERS

Parameter Sampled	Cement Creek above the American Tunnel Concentrations reported in ug/L			Animas River above Boulder Creek Concentrations reported in ug/L		
	September 1986	September 1991	February 1993	September 1986	September 1991	February 1993
Antimony	< 10	0		< 10	0	
Barium	300	0		400	0	
Beryllium	1	2		< 1	0	
Thallium	< 100	0		< 100	0	
Vanadium			< 10			< 10

Water quality analyses of 89 water quality samples from 49 draining mine sites (aqueous sources) were collected and analyzed by the U.S. Bureau of Mines as part of their field inventory of abandoned mine lands on Bureau of Land Management administered lands in the upper Animas River Watershed, conducted during the summer and fall of 1994 (U.S.BOM, 1995). Amongst other parameters analyzed, the range of concentrations for those metals not analyzed for by CDPHE, except antimony and thallium, follow (Hite, 1995):

Antimony:	not analyzed;	EPA CRDL = 60 ug/L
Barium:	< 2 - 97 ug/L;	EPA CRDL = 200 ug/L
Beryllium:	< 1 - 3 ug/L;	EPA CRDL = 5 ug/L
Cobalt:	< 3 - 46 ug/L;	EPA CRDL = 50 ug/L
Thallium:	not analyzed;	EPA CRDL = 10 ug/L
Vanadium:	< 6 - 6 ug/L;	EPA CRDL = 50 ug/L

The Colorado Department of Health conducted EPA Site Investigations of Standard Metal's Mayflower Mill (on the Animas River) and Sunnyside Mine (on Cement Creek) in June and July, 1984, respectively.

The following table presents the concentrations of antimony, barium, beryllium, cobalt, thallium and vanadium resulting from those investigations [CDH, 1984(a) and 1984(b)]:

TABLE V

CDH Site Investigation Analytical Results - 1984
Standard Metals Mayflower Mill and Sunnyside Mine

Concentrations measured in micrograms per liter (ug/L)

Sample Number	Site Description	Antimony	Barium	Beryllium	Cobalt	Thallium	Vanadium
Animas River: Mayflower Mill SI							
SW-1	Background Boulder Cr. above Tailings (Silverton DW supply)	< 2	43	< .5	< 6	< 2	260
SW-2	Source Active Tailings	< 2	56	1	14	< 2	160
SW-3	Source Seepage from Toe of Tailings	9	89	2	37	< 2	150
SW-4	Source Lowest Clarifier Pond	6	70	1	14	< 2	140
SW-B	Downstream of Site on Animas River	3	38	5	22	< 2	110
Cement Creek: Sunnyside Mine SI							
SW-3	*Background* Cement Creek above Mine Drainage Treatment Settling Ponds	< 20	< 100	< 5	< 50	< 10	< 200
SW-1	Source Influent Pipe for Settling Pond #1 of 4	< 20	< 100	18	53	< 10	< 200
SW-2	Source Effluent from Settling Pond # 3 of 4	< 20	< 100	< 5	< 50	< 10	< 200
SW-4	Downstream of Site on Cement Creek	< 20	< 100	< 5	< 50	< 10	< 200

BOM, Sunnyside Gold and CDH (1984) analyses indicate that antimony, beryllium, and cobalt were below current EPA Contract Laboratory Program (CLP) Contract Required Detection Limits (CRDL). Sunnyside Gold measured barium in concentrations above current the EPA CLP CRDL, whereas BOM and CDH (1984) analyses measured concentrations of barium below current EPA CRDL. Thallium was measured to be less than EPA CRDL by the CDH (1984) analyses, and below 100 ug/L by Sunnyside Gold. Vanadium was measured by Sunnyside Gold to be less than EPA CRDL, yet ranged in concentrations from 110-260 ug/L during the CDH SI of the Mayflower Mill.

Review of the CDH, Sunnyside Gold and BOM analyses of those parameters not analyzed by CDPHE (antimony, beryllium, cobalt, thallium) indicate that these parameters were not detected or were present in very low concentrations in the Basin. Barium and vanadium may be included at select sites in additional sampling planned for by the Animas Stakeholders Group to determine the presence of these parameters.

Organic parameters are typically not associated with draining mine adits or mine waste piles, although may be utilized in and around mineral transportation and processing facilities. Analyses for such may be included for select sites in additional sampling planned for by the Animas Stakeholders to determine the presence of these compounds, determining the need for additional organic parameter analyses.

Sampling of sediments provides information regarding historic releases of wastes that may not be detected in the real time results provided by one-time surface water sampling. CDPHE data, however, was collected during (two) high-flow, (one) low-flow and (one) rainstorm events, thereby characterizing the release of metals through time. CDPHE sampling results represent extremes of stream flows, as well as characterizing a storm runoff event, thereby bracketing the characteristics of wastes released through time.

CDPHE also reviewed the ratio of dissolved to total recoverable metals for the Animas River, Cement Creek and Mineral Creek, as presented in Table VI. CDPHE explains that the partitioning of metals between the dissolved and total forms is largely a function of pH. High total suspended solids, found when surface runoff is present, may also increase the particulate fraction of a metal. Most iron and lead precipitate rapidly at pH's greater than 3. Precipitation of aluminum nears completion at pH's higher than about 4.5. Cadmium, manganese and zinc largely remain dissolved until pH's exceed 8. The pH of the Animas above Silverton (A68) usually ranges between 7 and 8, thus most of the aluminum, copper, lead and iron should be expected in the particulate form, (more likely to precipitate into the sediments) while most of the cadmium, manganese, and zinc will be dissolved. The uniformly low pH of Cement Creek is expected to result in a wide mixture of particulate and dissolved metals, except cadmium, manganese and zinc which will be dissolved. The pH in Mineral Creek, M-34, is highly variable, depending on streamflow, which further complicates partitioning between dissolved and particulate forms of the metals, except again cadmium, manganese, and zinc, which are mainly dissolved (Owen, 1994).

Although sampling of sediments may not provide additional information concerning the parameters found elevated in the aqueous stream analyses, it may yield information regarding historic releases of minerals not currently measured in the

stream analyses, such as mercury. Collection and analyses of sediments may be included for select sites in additional sampling planned for by the Animas Stakeholders to determine the presence of elements not detected in the surface waters.

TABLE VI

CDPHE ANIMAS RIVER LOADING RESULTS
RATIOS OF DISSOLVED TO TOTAL RECOVERABLE METALS
FOR THE ANIMAS RIVER, CEMENT CREEK AND MINERAL CREEK

Metals	ANIMAS RIVER			CEMENT CREEK			MINERAL CREEK		
	Mean	N	Standard Deviation	Mean	N	Standard Deviation	Mean	N	Standard Deviation
Aluminum				0.7	56	0.287			
Cadmium	0.9	44	0.161	0.93	86	0.163	1	40	0.068
Copper	0.56	44	0.231	0.87	79	0.19	0.57	41	0.276
Iron				0.45	66	0.281			
Lead				0.7	72	0.296			
Manganese	0.86	44	0.19	0.89	56	0.193	0.92	41	0.108
Zinc	0.89	45	0.141	0.94	83	0.127	0.96	42	0.099

CDPHE sampling focused on the **surface water pathway**, targeted on the impact to aquatic habitat. **Fisheries** are basically non-existent in the Basin due to heavy metal pollution. The goal of the Animas Stakeholders group is to improve the water quality in the Basin to enable establishment of naturally reproducing trout populations.

Sampling of **groundwater** is not recommended, as it is not used as a drinking water supply within the Basin. Similarly, sampling of **on-site soils** as well as air is not recommended, as there are no residences or work places (except for seasonal reclamation at the Sunnyside Mine/Mayflower Mill and MRCC) within 200 feet of the vast majority of sources.

Aqueous Source sampling was conducted at approximately 50 draining mine adits, seeps from mine waste piles, and naturally occurring seeps (Table I). **Solid source** sampling, i.e., mine waste piles including tailings and waste rock, is scheduled for future site characterization work. Mineral Creek and its tributaries will be "characterized", i.e., collection of qualitative and quantitative site information and sampling, similar to EPA's Preliminary Assessment and Site Investigation programs, by the CDPHE and the Colorado Division of Minerals and Geology during the summer of 1995. "Site Characterization" of sites in other tributaries are scheduled pursuant to the Animas Stakeholders Group prioritization. Please refer to Sections 6.1.1, 6.1.4 and Figure 7 for further discussion.

5.0 SOURCES CONTRIBUTING HEAVY METAL POLLUTION TO THE ENVIRONMENT

The following information was extracted from CDPHE Water Quality Control Division's report entitled *Animas River Loading Analysis* (Owen, 1995):

Results of the investigation conducted by CDPHE et. al., between 1991 and 1993, indicate that the water quality of the area is extensively impacted by heavy metals attributable to both natural and anthropogenic factors. The heavy metals, including aluminum, cadmium, copper, iron, manganese and zinc, result from multiple sources, and impair aquatic life in the Animas River for at least 27 miles downstream of Silverton to Baker's Bridge north of Durango.

Biological sampling found that aquatic life is not supported in much of the following locations:

1) Animas River above Maggie Gulch;
2) Cement Creek basin; and,
3) Mineral Creek.

Aquatic life, including both fish and macrobenthos, was found in the Animas River between Maggie Gulch and Cement Creek. Minimal aquatic life was found in the Animas River between Cement and Elk Creeks.

Lack of aquatic life is attributed to dissolved aluminum, cadmium, copper, and zinc which are present in the Animas River in concentrations both acutely and chronically toxic to most forms of aquatic life. Additionally, ferric iron, coming from the Cement Creek and Mineral Creek watersheds, forms a deposit on the substrate of the Animas River between Cement and Elk Creeks, further inhibiting aquatic life.

Variations in metal concentrations and loadings are compared in the three streams in which aquatic life is not present: Animas River; Cement Creek; and, Mineral Creek. Stream reaches and sampling site locations are illustrated in Figure 1. Analytical results, by sampling site, are provided in Appendix A.

5.1 Animas River

The Animas River below the confluence of California Gulch and North Fork of the Animas (sample location A-14) has high concentrations of dissolved aluminum, cadmium, copper, manganese, and zinc. This was the only site on the mainstem with detectable concentrations of dissolved lead. Although Burns Gulch and Eureka Gulch contribute significant quantities of dissolved metals to the Animas River, the concentration of all trace metals in the mainstem of the Animas shows a general decrease from the Animas Forks (A-14) to Cement Creek (A-68). Dilution from tributaries including Cinnamon Creek, Grouse Gulch, Pacayne Gulch, Minnie Gulch, Maggie Gulch and Cunningham Creek, in which trace metal concentrations are low or absent, decreases the concentration of these metals. In spite of the lowering of concentration of most metals between Animas Forks and Cement Creek, zinc continuously remains at a level that is toxic to several forms of aquatic life.

The mainstem of the Animas has the highest pH of the three streams, ranging between 7 and 8. The higher pH contributes to precipitation of several metals, particularly aluminum, copper, lead and iron. Thus, the ratios of dissolved to total recoverable metals are generally lower in the Animas than in Cement or Mineral Creeks.

The largest contributors of zinc loading to the upper Animas, shown in Figures 2a and 2b, are California Gulch, Eureka Gulch, Burrows Gulch and Burns Gulch, respectively.

Several draining adits and waste piles are located in California Gulch and Placer Gulch, a tributary to California Gulch (TABLE I).

Eureka Gulch accounted for over 25% of the zinc load to the Animas during the October sampling period. Drainage from Sunnyside Gold's Terry Tunnel, which is treated except for when it is inaccessible during the winter, drains into Eureka Gulch.

Zinc loading to the Animas between Eureka Gulch and Cement Creek is small. Aluminum, copper and iron loading to the Animas River is relatively small compared to Cement and Mineral Creeks.

As depicted in Figure 3, upper Animas watershed is comprised primarily of public lands managed by the U.S. Bureau of Land Management (BLM), largely interspersed with patented mining claims (private ownership). Surface Management of the Bureau of Reclamation's (BOR) "Reclamation Withdrawal" near Middleton and Howardsville, approximately four miles north of Silverton, southeast of the Animas River, is also under the jurisdiction of the BLM. The BOR has recommended that these withdrawals be revoked and the encumbrance to the land cleared (Hoffman, 1995).

5.2 Cement Creek

The mainstem and most of the tributaries of Cement Creek have concentrations of dissolved aluminum, cadmium, copper, iron, lead, manganese and zinc that are acutely and chronically toxic to most forms of aquatic life. In contrast to the Animas River, the pH of Cement Creek is consistently less than 5 throughout the watershed, with values as low as 2.9 measured in several tributaries. The low pH in Cement Creek is partly attributable to the surface exposure of pyrite throughout the basin.

Zinc loading in the Cement Creek watershed is from four general areas, as illustrated in Figure 4. They include the North Fork of Cement Creek, South Fork Cement Creek, the mainstem above North Cement Creek, and Prospect Gulch.

Approximately one half of the zinc loading is derived from the upper part of the basin (above CC-05).

The North Fork of Cement Creek, the South Fork of Cement Creek, and Prospect Gulch appear to be significant contributors of zinc during the spring runoff; however, during baseflow, the North Fork appears to be a minor source. Loads were highest during the June, 1991 (high-flow) and September, 1991 (storm) sampling events, when runoff was the highest.

Sunnyside Gold Corporation's American Tunnel discharges into Cement Creek. Prior to treatment, the zinc concentration in the American Tunnel drainage exceeds 15,000 micrograms per liter (ug/L); the treated concentrations averages 300 ug/L total recoverable zinc. The treated American Tunnel drainage constitutes a minor zinc loading source to Cement Creek.

An apparent large natural source of iron and zinc is associated with an iron bog adjacent to Cement Creek between Prospect Gulch and Minnesota Gulch, accounting for approximately 44% of the zinc load to Cement Creek during the October, 1992 sampling event.

Ohio Gulch appears to be a large contributor of iron during the rainfall runoff sampling event of September, 1991.

As depicted in Figure 3, the Cement Creek watershed is primarily comprised of public lands managed by the BLM, and largely interspersed with patented mining claims (private ownership).

5.3 Mineral Creek

Dissolved cadmium, copper and zinc are high in Mineral Creek from near the summit of Red Mountain Pass to the Animas River near Silverton. The highest concentrations of these metals are found between the summit of Red Mountain Pass and Chattanooga; dilution significantly decreases the concentration of cadmium, copper, and zinc towards Silverton. The Middle Fork of Mineral Creek is the largest contributor of acid water, aluminum, and iron to Mineral Creek. The pH of Mineral Creek is highly variable. Acid from the mining area at the summit of Red Mountain Pass and from the Middle Fork of Mineral Creek severely depresses the pH; however, high stream flows dilute the acidity.

The Longfellow Mine-Koehler Tunnel complex, near the summit of Red Mountain Pass, is the most significant source of cadmium, copper, and zinc in Mineral Creek. This area also produces a significant amount of acid water. Figure 5 illustrates that other sources of zinc loading in the Mineral Creek Watershed are relatively minor.

The Middle Fork of Mineral Creek is the largest source of aluminum and iron in the upper Animas Basin. These constituents impact aquatic life in both Mineral Creek and the Animas River below Mineral Creek. As depicted in Figure 3, land ownership in the Mineral Creek watershed is primarily public, managed by the U.S. Forest Service, interspersed with patented mining claims (private ownership).

6.0 CURRENT ACTIVITY IN THE BASIN

There is currently a collaborative effort of key interests in the Upper Animas River Basin to address the severe impacts to aquatic life due to heavy metals contamination. The Animas River Stakeholders, as they are known, are comprised of a core group of approximately 30 individuals representing the U.S. Bureau of Land Management; U.S. Bureau of Mines; U.S. Bureau of Reclamation; U.S. EPA; U.S. Forest Service; U.S. Geologic Survey; Colorado Department of Natural Resources (DNR), Division of Minerals and Geology; Colorado DNR, Division of Wildlife; CDPHE, Hazardous Materials and Waste Management Division; CDPHE, Water Quality Control Division; Sunnyside Gold Corporation; Southwest Water Conservancy District; San Juan County; Durango and Silverton local governments; and local citizens.

The Stakeholders themselves and the participating entities in the Stakeholders group are involved in specific activities, which they bring to the group for information sharing, group involvement, coordination of basin projects, etc. Current "Specific Activities" currently ongoing in the Basin are presented by participating entities as follows:

6.1 PARTICIPATING PARTIES

6.1.1 Animas Stakeholders

The Stakeholders meet monthly (since February, 1994) to plan and coordinate implementation projects aimed at remediating sources of heavy metal pollution to the Animas River with the goal of improving the water quality in the Animas and its tributaries. Additionally, they keep each other apprised of local and governmental efforts, both ongoing and planned, aimed toward improving water quality in the Upper Animas Basin, thereby coordinating and incorporating those projects into their ongoing efforts.

Figure 6 identifies the tributaries of the Animas Watershed identified by the Animas Stakeholders Group as sources of heavy metal pollution and which are currently being focusing upon for development of remedial activities to mitigate the pollution, i.e., the mainstem of the Animas River below the confluence with Mineral Creek; the mainstem of Mineral Creek and its tributaries including the North Fork, Middle Fork and South Fork; the mainstem of Cement Creek and its tributaries including South Fork, Middle Fork, and Prospect Gulch; and tributaries to the upper Animas, including Placer and Picayune Gulches.

Figure 7 presents the schedule that the Animas Stakeholders are following to address the various phases of project development:

(I) Monitoring/General Investigation;
(II) Feasibility Studies/Remediation Plan Development; and,
(III) Remedial Action Plan Implementation.

The Stakeholders, as a collective entity, have organized themselves into three "working groups" to investigate and implement various project components and needs. The Monitoring Working Group focuses on the collection, assessment, and management of data as well as the identification of source areas contributing to heavy metals contamination. The Funding Working Group focuses on the investigation of, and securing funding opportunities for monitoring and remediation projects. The Feasibility Working Group focuses on conducting feasibility studies to identify alternatives for remediating source areas and implementation of remediation projects.

6.1.2 Denver Resources Group

Federal and State agencies involved in the Upper Animas Stakeholders Group have an additional oversight group that meets in Denver, commonly referred to as the Denver Resources Group.

6.1.3 CDPHE Water Quality Control Commission

CDPHE's Water Quality Control Commission conducted it's triennial review of the Animas River Receiving Stream Standards during 1994. The Commission adopted standards comprised of two components: first, goal based numerical and narrative standards for critical river segments proposed by the Water Quality Control Division were adopted by the Commission with a three-year delayed effective date; secondly, the Commission adopted ambient water quality-based standards for the critical segments until the effective date of the goal-based standards.

The Commission chose this "hybrid approach" to encourage the cooperative, community-based effort toward water quality improvement ongoing in the basin, unencumbered by the potential implications of the goal-based standards being in effect. This action was intended to assess the ability of a cooperative process to achieve meaningful progress toward water quality improvement without the underlying improvement goal being reflected in currently effective, legally binding water quality standards (Frohardt, 1994). Appendix B presents the Commission's findings.

6.1.4 CDPHE Water Quality Control Division/ CDNR Division of Minerals & Geology

The Water Quality Control Division Non-point Source (NPS) Program and the Colorado Department of Natural Resources (CDNR), Division of Minerals and Geology (DMG) are scheduled to assess source areas in the Mineral Creek watershed to locate specific sources of metals and acid loadings to the Mineral Creek drainage, in preparation for developing and implementing a remediation (NPS demonstration) project.

DMG is scheduled to conduct the site assessment work between August 7 and 18, 1995, to focus on the headwaters near the summit of Red Mountain Pass and the Middle Fork of Mineral Creek, which have been determined by the Animas Stakeholders Group to be the two high priority areas in the Basin. Quality sampling and characterization of surface water, (possible) groundwater, and soil pathways, in addition to waste sources (mine drainage and mine waste and tailing piles) will be conducted at five specific sites: the Longfellow, Koehler, Bonner, Paradise and North Star mine areas. Sampling site and mine locations will be determined at these sites using the Global Positioning System (GPS) System (Bucknam, 1995).

Flow measurements and water quality samples will be collected at high-, medium- and low-flow periods and analyzed for pH, and total and dissolved forms of aluminum, cadmium, copper, iron and zinc. Two groundwater wells are proposed for the headwater area to determine if groundwater may be a source of heavy metals in this area. Tailings and mine waste will be analyzed to determine heavy metal constituents (Owen, 1995).

DMG will conduct an Inactive Mine Safeguarding/Closure project near Silverton during 1995 or 1996. The Silverton project proposes to safeguard 4 shafts, 6 stopes and 19 adits. Additionally, DMG is able to write Remedial Action Plans for the potential NPS or other remediation projects in this and other basins (Krabacher, 1995).

6.1.5 Sunnyside Gold Corporation

Sunnyside Gold Corporation is actively reclaiming the Sunnyside Mine and Mayflower Mill pursuant to the Mined Land Reclamation Act and their Mined Land Reclamation Permit, M-77-378.

Tailings Ponds 1 through 3 have been regraded, capped with a minimum of 12 inches of borrow material and revegetated between 1989 and 1994. Outslopes of Tailings Pond 4 have been covered with a minimum of 12 inches of borrow material and revegetated; the surface of the pile remains active, receiving waste rock relocated from the American Tunnel, and precipitates from Sunnyside mine (American Tunnel) drainage treatment. Tailings near the American Tunnel in the Cement Creek basin were relocated to Tailings Pond 1 in 1991.

Mine workings in Sunnyside Basin (Lake Emma, headwaters of Eureka Gulch) were backfilled and partially revegetated between 1992 and 1994; the backfilled area is monitored for settling and additional backfill is added as necessary to maintain positive drainage.

Sunnyside Gold is attempting to contain the water from the Sunnyside mine through the installation of 6 bulkhead seals, of which 5 are in place. A bulkhead has been installed in the Terry Tunnel, also in Eureka Gulch basin, but the valve has yet to be closed. The Terry Tunnel drainage, treated with hydrated lime when accessible, is collected into two settling ponds, as is stormwater runoff from the immediate vicinity. Bulkhead seals have been installed underground. The American Tunnel has one bulkhead seals planned for construction this season. The American Tunnel drainage will continue to be treated and retained in four settling basins prior to discharge into Cement Creek until such time as the bulkhead seal is completed and the valve closed.

Sunnyside Gold maintains Colorado Discharge Permit System (CDPS) permits (with National Pollution Discharge Elimination System (NPDES) approval) for the Terry Tunnel, American Tunnel and Tailings Pond 4 (which has not discharged since 1989). Sunnyside monitors two groundwater wells adjacent to the Animas River semi-annually, as part of their Mining and Reclamation permit (Goodhard, 1995).

6.1.6 U.S. Bureau of Land Management/U.S. Bureau of Mines

The Bureau of Land Management (BLM) has jurisdiction over approximately 46,000 acres of public lands, the majority of land in the upper Animas and Cement Creek basins (Figure 3) (Hoffman, 1995). In a cooperative effort, the BLM and Bureau of Mines (BOM) inventoried 304 inactive/abandoned mine sites and collected 89 water samples from sites located on BLM property within the Animas Basin during 1994, of which 16 were identified as priority sites needing further work. Phase II, site characterization work is planned fro these 16 sites in 1995 (U.S. BOM, 1995). The BLM has the capability to assist with the biological monitoring endeavors of the Animas Stakeholders group, dependent on current levels of funding. The U.S. Department of Interior and the U.S. Department of Agriculture are proposing a joint budget for fiscal years 1996-1998 for watershed characterization of the basin (Hoffman, 1995).

6.1.7 U.S. Bureau of Reclamation

The BLM manages public lands at the BOR "withdrawals" located along the southeast bank of the Animas River near Middletown and Howardsville, approximately four miles northeast of Silverton. The BOR has recommended that these withdrawals be revoked and the encumbrance of the land cleared (Hoffman, 1995).

The BOR will conduct sampling and analyses of the Animas River near three USGS gaging stations: on the mainstem of the Animas, and on Mineral and Cement Creeks before their confluence with the Animas River.

BOR will be able to provide engineering analyses of Feasibility Studies and/or Remedial Action Plans prepared by either the Animas Stakeholders Group or the State, through September of 1995. Additionally, BOR will continue monitoring water quality of the lower Animas River from Durango, Colorado, to Farmington, New Mexico.

6.1.8 U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) funded the CDPHE Water Quality Control Division Non-point Source Program (NPS) to conduct the 1991-1993 upper Animas Basin water sampling effort. Additionally, the EPA is currently funding the Animas Basin Coordinator position through the Rocky Mountain Headwaters Initiative. Additional funding may be provided for future NPS investigations and demonstration/remediation projects.

EPA has assembled a team of individuals from various EPA programs to focus on the Animas Basin to address the region from a Watershed Protection Approach. Representatives from EPA's Groundwater, Stormwater, Headwater, Superfund, Site Assessment, Historical Preservation, NEPA, Wetlands, and Native American Tribes programs, in addition to EPA's General Counsel, focus on Animas watershed issues including, but not limited to: mining; hydrologic modifications; the Animas/La Plata Reservoir; landfill closures; septic tank density; and coalbed methane issues. The EPA hopes that the Animas Group, as they are termed, will fulfill supportive and education role to the Animas Stakeholders Group (Russell, 1995).

This document serves as a summary of existing heavy metal source data in the Upper Animas River Basin, (in and around Silverton, Colorado) to determine sites or geographic regions which may need to be addressed via EPA's Site Assessment program. The primary objective of the site assessment program is to obtain data necessary to identify the highest priority sites posing threats to human health and the environment.

6.1.9 U.S. Forest Service

The U.S. Forest Service (USFS) manages public lands in the Mineral Creek Basin. The USFS is planning on surveying and generating topographic maps of mine site areas located on federal and private lands (if access is authorized) in the Mineral Creek basin during the 1995 field season. USFS may be able to provide geologic mapping of the same area. USFS is able to assist the biological monitoring endeavors of the Animas Stakeholders group in the Animas Canyon by providing laboratory analyses of macroinvertebrates. Additionally, USFS will be coordinating with the Colorado Geologic Service to inventory inactive mine sites located on USFS lands in the upper Animas Basin.

6.1.10 U.S. Geological Survey

The U.S. Geological Survey (USGS) monitors streamflow at four gaging stations, one on the Upper Animas River below Silverton and the three main tributaries (Mineral Creek, Cement Creek and the Animas River) upstream from that site. The USGS collects water-quality samples quarterly at the Animas River below Silverton and assists the BOR, CDPHE and the Colorado Division of Wildlife, River Watch Program, with water quality sampling at the three main tributary sites, in particular during streamflows that cannot be waded. Personnel from the USGS are involved in the coordinating water quality sampling and providing advice on sampling techniques to groups and agencies working in the area.

The USGS is investigating sources of metals contributions from natural sources in the Upper Animas. The investigation is focusing on the use of oxygen isotopes to differentiate between flows from unmined and mined areas. Preliminary work done in the Cement Creek Basin indicates that the use of oxygen isotopes can be used to differentiate between flows. Funding is being sought for additional fieldwork to verify and test the method. Currently a document is being prepared describing the findings from this study to date. As part of a region-wide investigation, the USGS collects snow chemistry data in the vicinity of Red Mountain Pass. The USGS has been investigating and mapping the geology of the Upper Animas Basin and is available to advise groups working in that area (USGS, 1995).

6.1.11 Colorado Division of Wildlife

The Colorado Division of Wildlife (DOW) manages the Riverwatch Program, whereby water quality data is collected by school students in various towns and cities throughout Colorado. Silverton School students sample within the Animas River basin on a monthly basis during the months of September through February, 2x/month in March and August, 3x/month in April and July and 4x/month in May and June. Temperature, alkalinity, hardness, pH, and dissolved oxygen readings are collected in the field; samples are collected, and analyzed by the DOW, for total and dissolved cadmium, copper, iron, lead, manganese and zinc at the following locations: Animas River at the 13th Street bridge; Cement Creek; and, in the Animas Canyon, below the confluence with Mineral Creek.

Additionally, the DOW conducts biological sampling of the Animas River which can assist in the Animas Stakeholders Group biological sampling efforts in the Animas Canyon (Horn, 1995).

6.1.12 San Juan County

San Juan County is soliciting proposals for the sale of their property in the old townsite of Eureka, located on the northeast side of the county road adjacent to the Animas River above Silverton. Sunnyside Gold Corporation owns the majority of the remainder of the townsite. Developers have expressed interest in the land and San Juan County feels it may be necessary to dispose of the property. The county has approached the Animas Stakeholders Group for assistance in developing a use for the former townsite.

A meeting amongst the Animas Basin Coordinator, Bill Simon, and representatives from San Juan County, Sunnyside Gold and the Animas Stakeholders Group identified that the majority of land consists of anthropogenically disturbed river bottom dominated by braided channels of the Animas River. Remediation of the valley bottom was suggested, including rechannelization of the Animas; development of a confined floodplain providing vegetative cover and open space; and, land set aside for potential remedial activities in the Upper Animas or Eureka Gulch (Simon, 1995).

6.1.13 City of Durango

The city of Durango has indicated the possibility of providing funding for water quality improvement projects.

6.1.14 Mining Remedial Recovery Company

The Mining Remedial Recovery Company (MRRC), located in Price, Utah, is planning to implement an NPS demonstration project in Placer Gulch, a tributary to California Gulch, at the Sunbank claims during the summer of 1995.

The "Sunbank Information and Education Demonstration Project" will investigate the effectiveness of high elevation remediation compared to successful reclamation techniques used at lower elevations. The project will demonstrate the effectiveness of: concrete bulkhead seals in reducing acid rock drainage; sulfate reducing biological systems to reduce metal loadings at high altitudes; the use of calcareous host rock in treating acid rock drainage; and neutralizing and revegetating waste rock, with the goal of reducing metal loadings to the receiving stream, Placer Gulch. Remediation plans include: installation of upland diversions; installation of bulkhead seals at 3 draining adits; removal (from Placer Gulch streambed), relocation and consolidation to higher ground, neutralization, cover with a minimum of 12 inches of salvaged borrow material and revegetation of 12 waste rock dumps; and, installation of three passive mine drainage and natural seep treatment methods using limestone,

calcareous country rock, and a constructed sulfate-reducing biological (bog) system. Water quality monitoring of the draining mine adit, and Placer Gulch up- and downstream of the reclamation site will be monitored for five years following remediation (Baum, 1995).

7.0 RECOMMENDATIONS TO EPA FOR SITE ASSESSMENT PROGRAM

The Animas Stakeholders Group and the participating federal, state, local agencies, local mining companies and interested citizens are extensively involved in researching and coordinating efforts to improve the water quality of the upper Animas River Basin. The Stakeholders collectively and individually are working with the CDPHE Water Quality Control Commission toward achieving proposed improvements in the receiving stream standards. Working as a group since February, 1994, and focusing on a proposed schedule currently extending to the year 1999, it appears that the Group is committed to achieving its goals of improving the water quality and associated aquatic habitat in the upper Animas River Basin.

Upon review of the EPA HRS data requirements and the data previously collected by CDPHE, et. al., it appears that the Data Quality Objectives, sampling locations, sampling methods, analytical methods, required detection limits (except for lead) field and laboratory QA/QC measures and data validation requirements are comparable. Differences between what EPA would have included in a Site Investigation and what CDPHE has thusfar collected appear to be limited to:

1) analyses of antimony, barium, beryllium, cobalt, thallium and vanadium inorganic parameters;
2) analyses of organic parameters;
3) analyses of sediments (collocated with surface water) samples;
4) detection limits for lead (CDPHE = 5ug/L, whereas EPA = 3ug/L); and,
5) CDPHE Lab conducts ICP Interference Check once every 8 hours, whereas EPA conducts these checks twice in 8 hours.

Review of the CDH, Sunnyside Gold and BOM analyses of those parameters not analyzed by CDPHE (antimony, beryllium, cobalt, thallium) indicate that these parameters were not detected or were present in very low concentrations in the Basin.

Inclusion of barium, vanadium, organic parameters, and sediments at select sites in future sampling planned for by the Animas Stakeholders Group will supplement the existing Basin data, and provide the additional information that EPA would gather in their Site Assessment program.

CDPHE sampling focused on the **surface water pathway**, targeted on the impact to aquatic habitat. **Fisheries** are basically non-existent in the Basin due to heavy metal pollution. The goal of the Animas Stakeholders group is to improve the water quality in the Basin to enable establishment of naturally reproducing trout populations.

Sampling of **groundwater** is not recommended, as it is not used as a drinking water supply within the Basin. Similarly, sampling of **on-site soils** as well as **air** is not recommended, as there are no residences or work places (except for seasonal reclamation at the Sunnyside Mine/Mayflower Mill and MRCC) within 200 feet of the vast majority of sources.

Aqueous source sampling was conducted at approximately 50 draining mine adits, seeps from mine waste piles, and naturally occurring seeps (Table I). **Solid source** sampling, i.e., mine waste piles including tailings and waste rock, is scheduled for future site characterization work. Mineral Creek and its tributaries will be "characterized", i.e., collection of qualitative and quantitative site information and sampling, similar to EPA's Preliminary Assessment and Site Investigation programs, by the CDPHE and the Colorado Division of Minerals and Geology during the summer of 1995. "Site Characterization" of sites in other tributaries are scheduled pursuant to the Animas Stakeholders Group prioritization (Sections 6.1.1, 6.1.4 and Figure 7).

Considering the comparability and usability of the existing data with EPA HRS requirements, the minor data gaps existing and the willingness of the Animas Stakeholders group to provide the additional data, it is recommended that the EPA's Site Assessment program monitor the progress of the Stakeholders Group to observe the effectiveness of a voluntary process at the local level in achieving water quality and related aquatic habitat improvement by mitigating releases of heavy metals to the environment.

As the Stakeholders Group is extensively involved and committed to focus their resources on mitigating pollution impacting the environment in the upper Animas region, EPA may make additional strides in identifying the highest priority sites posing threats to human health and the environment in other geographic areas within the State and nation where committed parties have yet to identify themselves.

8.0 REFERENCES

Alexander, Sharri, 1995. Colorado Department of Public Health and Environment, Inorganic Laboratory, Denver, Colorado. Telephone conversations, April.

Baum, Michael, 1995. Mining Remedial Recovery Company, Price, Utah. Telephone conversation, February, 1995.

Bucknam, David, 1995. Colorado Department of Natural Resources, Division of Minerals and Geology, Denver, Colorado. Telephone conversation, February, 1995.

Colorado Center for Environmental Management, 1995. *Animas River Demonstration Project - Status Report Executive Summary, January 13, 1995.*

Colorado Department of Health, 1984(a). Hazardous Materials and Waste Management Division, Denver, Colorado. *Site Investigation Report: Standard Metals Mayflower Mill. June 27.*

Colorado Department of Health, 1984(b). Hazardous Materials and Waste Management Division, Denver, Colorado. *Site Investigation Report: Standard Metals Sunnyside Mine. July 27.*

Colorado Department of Health, 1988. Water Quality Control Division, Denver, Colorado. *Standard Operating Procedures.*

Colorado Department of Health, 1994. Hazardous Materials and Waste Management Division, Denver, Colorado. *Preliminary Assessment: Kendrick & Gelder Smelting Company, San Juan County, Colorado.*

Colorado Department of Public Health and Environment, 1994. Hazardous Materials and Waste Management Division, Denver, Colorado. *Support Agency Workplan - Preliminary Assessment and Site Inspection Program - October 1, 1994 - September 30, 1995.* August, 1994.

Colorado Department of Public Health and Environment, 1995. Hazardous Materials and Waste Management Division, Denver, Colorado. *Site Inspection Sampling and Analysis Plan - Cortez Ore Location, Montezuma County - February, 1995.*

EPA, 1992(a). Hazardous Site Evaluation Division - Office of Solid Waste and Emergency Response, Washington D.C. *Guidance for Performing Site Inspections Under CERCLA, Interim Final, September. EPA540-R-92-021.*

EPA, 1992(b). Region VIII, Denver, Colorado. Region VIII Site Investigation Program Quicksheet: Evaluating Existing Data.

EPA, 1994. Office of Solid Waste and Emergency Response. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses. EPA/540/94/083. December.*

Frohardt, Paul, 1994. Colorado Department of Public Health and Environment, Water Quality Control Commission, Denver, Colorado. *Memorandum Regarding Draft Preliminary Final Action Documents, November 22, 1994.*

Goodhard, Bill, 1995. Sunnyside Gold Corporation, Silverton, Colorado. Telephone conversation, February, 1995.

Hite, Barbara, 1995. U.S. Bureau of Mines, Denver, Colorado. Clarification of Draft Animas Discovery Report and telephone conversation, April.

Hoffman, Kent, 1995. U.S. Bureau of Land Management, Durango, Colorado. Clarifications of Draft Animas Discovery Report.

Horn, Barbara, 1995. Colorado Department of Natural Resources, Division of Wildlife, Denver, Colorado. Telephone conversation, February, 1995.

Krabacher, Paul, 1995. Colorado Department of Natural Resources, Division of Minerals and Geology, Grand Junction, Colorado. Telephone conversation, February, 1995.

Martinez, Jeff, 1995. U.S. EPA, Region VIII, Denver. Telephone conversations, April.

Owen, Bob, 1994. Colorado Department of Public Health and Environment, Water Quality Control Division, Denver, Colorado. *Memorandum Regarding Draft Report, Animas River Loading Analysis, December 30, 1994.*

Owen, Bob, 1995. Colorado Department of Public Health and Environment, Water Quality Control Division, Denver, Colorado. *Draft Mineral Creek Sampling Plan, January, 1995.*

Perino, Larry, 1995. Sunnyside Gold Corporation, Silverton, Colorado. Telephone conversation, April.

Russell, Carol, 1995 U.S. EPA, Region VIII, Denver, Colorado. Telephone conversation, February, 1995.

Simon, Bill, 1995. Animas Basin Coordinator, Durango, Colorado. *Summary of February 8, 1995 meeting of the Eureka Workgroup.*

Simon, Bill, 1995. Animas Basin Coordinator, Durango, Colorado. Clarification of Draft Animas Discovery Report.

U.S. Bureau of Land Management, 1990. *Surface Management Status 1:100,000-scale Metric Topographic Map of Silverton Colorado. Durango NW/4. BLM Edition.*

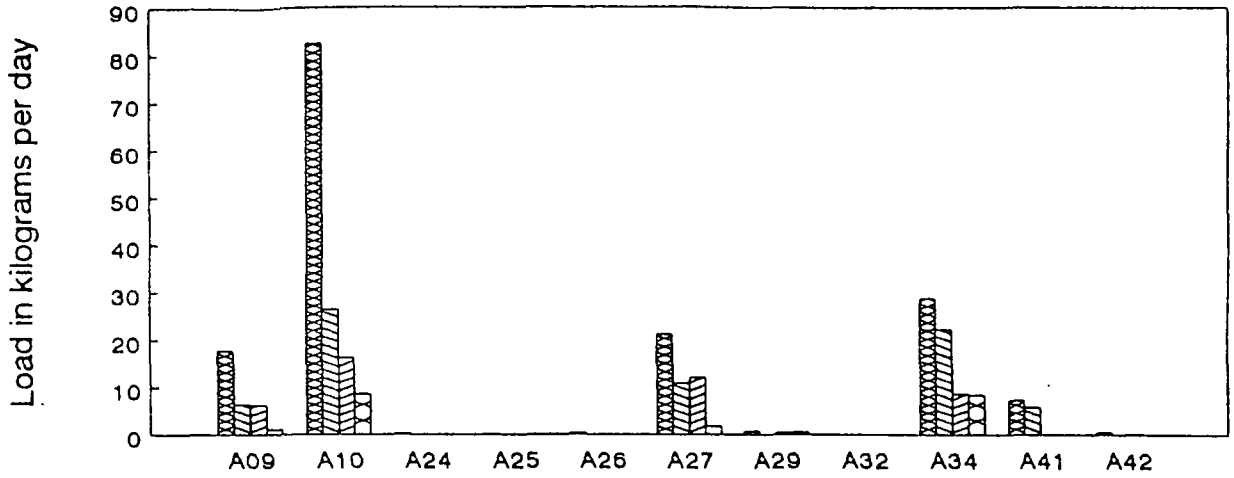
U.S. Bureau of Mines, 1995. Intermountain Field Operations Center, Denver, Colorado. *Abandoned Mine Land Inventory of BLM Administered Land in Upper Animas River Watershed, Colorado. February.*

U.S. Geological Survey, 1995. Colorado District, Water Resources Division, Grand Junction Colorado. Clarification of Draft Animas Discovery Report.

FIGURES

FIGURE 2a

Dissolved Zinc Load Contributed to the Animas River (2) in kilograms per day

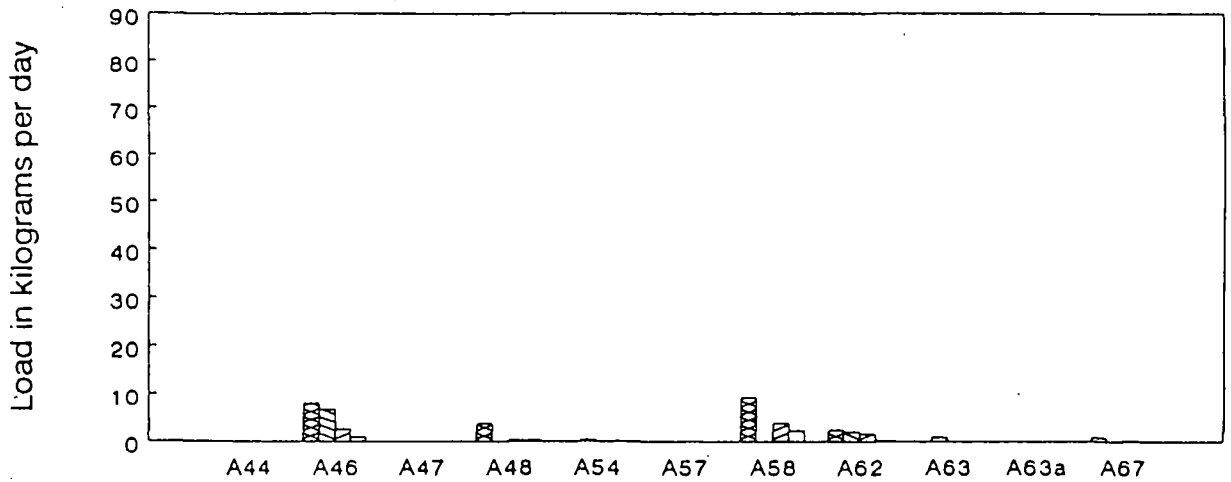


		Load in kilograms per day				Percent Contribution to A-68			
Source	Site	June	July	September	October	June	July	September	October
NF Animas	A09	17.66	6.39	6.23	1.13	6.12%	4.22%	5.42%	3.77%
California	A10	82.50	26.31	16.22	8.55	28.58%	17.37%	14.10%	28.44%
Cinnamon Creek	A24	0.30		0.02		0.10%		0.01%	
Grouse Gulch	A25	0.10		0.01	0.00	0.03%		0.01%	0.01%
Picayne	A26	0.39		0.04	0.02	0.14%		0.03%	0.05%
Burns Gulch	A27	21.04	10.83	12.08	1.81	7.29%	7.15%	10.50%	6.03%
adit abv Niagara	A29	0.64		0.40	0.51	0.22%		0.35%	1.70%
Niagra	A32	0.05		0.02		0.02%		0.02%	
Eureka	A34	28.72	22.14	8.62	8.35	9.95%	14.62%	7.50%	27.79%
Animas (trib)	A41	7.31	5.86	0.01		2.53%	3.87%	0.01%	
Minnie	A42	0.54		0.07		0.19%		0.06%	
Sum	Sum	159.25	71.52	43.71	20.37	55.18%	47.24%	38.01%	67.79%
Animas Gage	A68	288.61	151.41	115.01	30.05				

From: Owen,

E 2b

Dissolved Zinc Load Contributed to the Animas River (3a) in kilograms per day



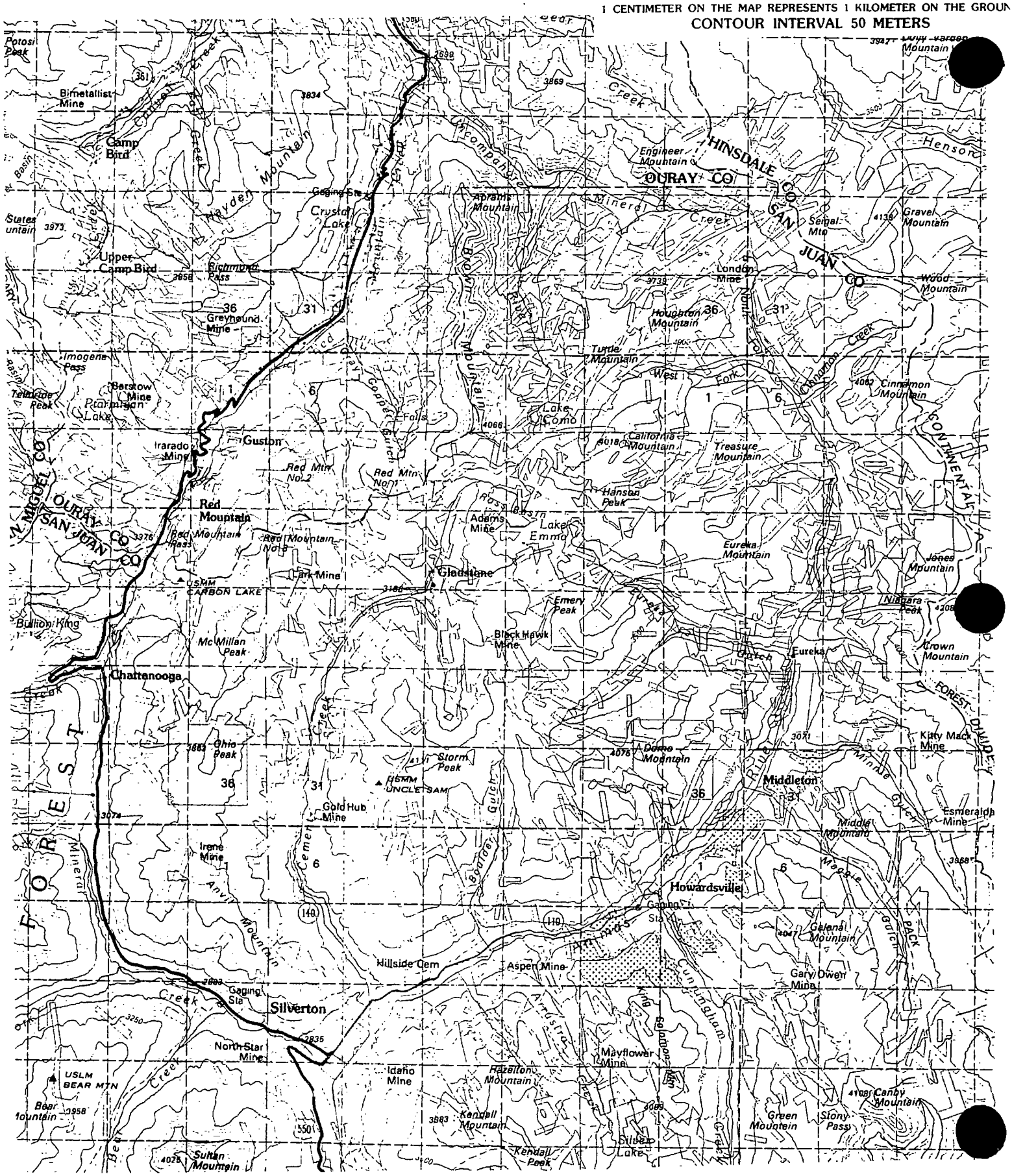
		Load in kilograms per day				Percent Contribution to A-68			
Source	Site	June	July	September	October	June	July	September	October
Animas (trib)	A44	0.05		0.04		0.02%		0.03%	
Animas (trib)	A46	8.13	6.81	2.55	0.97	2.82%	4.50%	2.22%	3.23%
Hematite	A47			0.00				0.00%	
Cunningham	A48	3.80		0.28	0.34	1.32%		0.25%	1.12%
Animas trib	A54		0.41	0.06	0.08		0.27%	0.05%	0.27%
Animas-Mayflwr	A57			0.08				0.07%	
Arrastra	A58	9.27		3.88	2.28	3.21%		3.37%	7.60%
Boulder Cr	A62	2.49	2.10	1.69	0.15	0.86%	1.39%	1.47%	0.49%
Animas adit	A63		0.89				0.59%		
Aspen Mine adit	A63a								
Swansea	A67	0.80		0.33	0.00	0.28%		0.29%	0.00%
Sum	Sum	24.54	10.21	8.91	3.82	8.50%	6.75%	7.75%	12.70%
Animas Gage	A68	288.61	151.41	115.01	30.05				

From: Owen, 1994.

SCALE 1:100 000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUN

CONTOUR INTERVAL 50 METERS



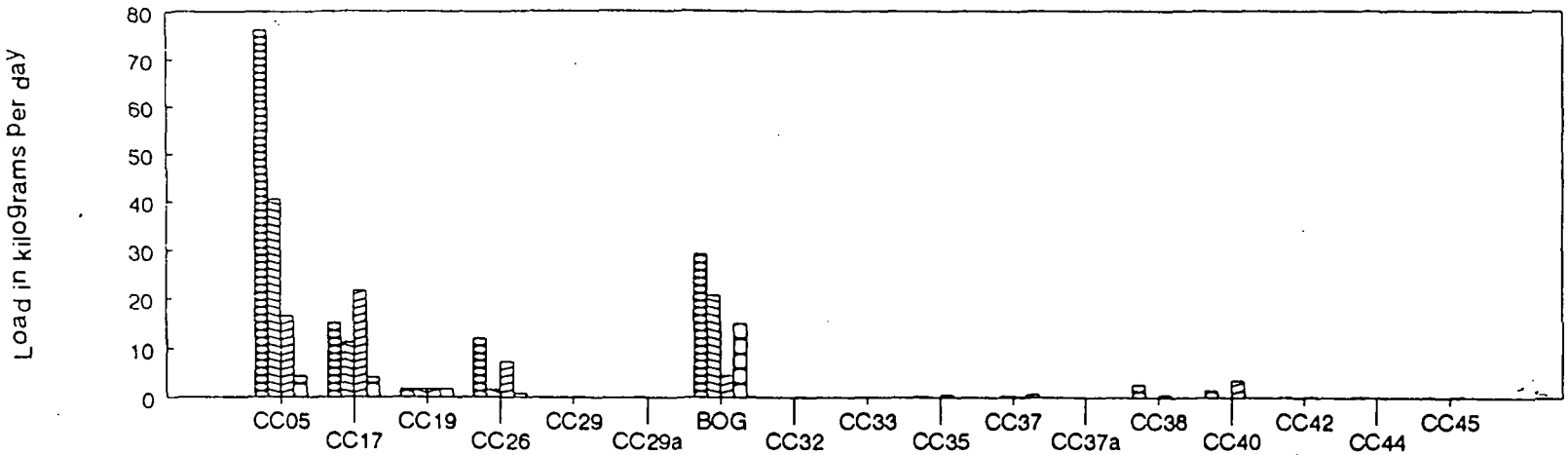
Public Lands (Administered By Bureau of Land Management)		Bureau of Reclamation	
Oregon & California Lands (O&C Lands) Coos Bay Wagon Road (CBWR)	NONE	Tennessee Valley Authority	NONE
National Forest		Patented Lands	
National Grasslands	NONE	State Lands	

Figure 3

Land Ownership of the Upper Animas River Basin

FIGURE 4

Dissolved Zinc Load to Cement Creek

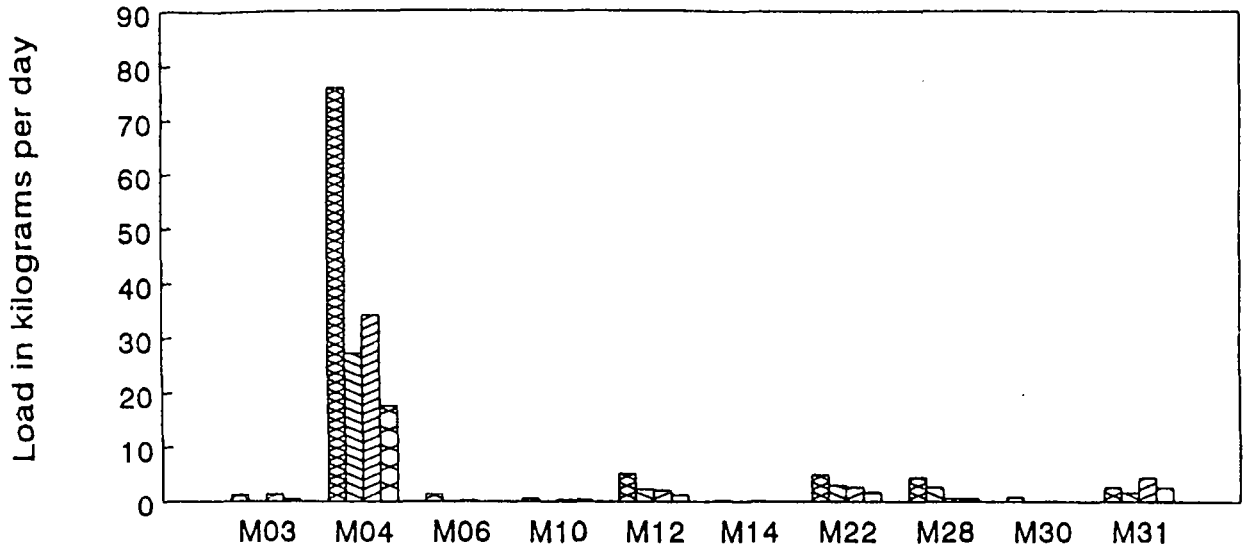


		Load in kilograms per day				Percent Contribution to CC48			
Source	Site	June	July	September	October	June	July	September	October
Cement	CC05	76.22	40.45	16.42	4.24	46.3%	48.6%	33.9%	12.4%
SF Cement	CC17	15.06	11.15	21.61	3.94	9.2%	13.4%	44.6%	11.6%
Cement Amer Tnl	CC19	1.65	1.65	1.65	1.65	1.0%	2.0%	3.4%	4.8%
Prospect	CC26	11.87	1.50	7.20	0.76	7.2%	1.8%	14.9%	2.2%
Cement adit	CC29			0.08	0.06			0.2%	0.2%
Cement adit	CC29a		0.13				0.2%		
Cement Creek ch	BOG	29.24	20.6	4.45	14.93	17.8%	24.8%	9.2%	43.8%
Cement adit	CC32			0.14				0.3%	
Cascade	CC33	0.00		0.00		0.0%		0.0%	
Minnesota	CC35	0.32		0.53		0.2%		1.1%	
Cement adit-ang-	CC37		0.38	0.25	0.68		0.5%	0.5%	2.0%
Cement adit-ang-	CC37a		0.01						
Porcupine Gl	CC38	2.58		0.54	0.03	1.6%		1.1%	0.1%
Ohio	CC40	1.37		3.43		0.8%		7.1%	
Illinois Gl	CC42	0.24		0.30		0.1%		0.6%	
Topeka	CC44	0.31		0.15		0.2%		0.3%	
Niagara Gl	CC45	0.15		0.20		0.1%		0.4%	
Sum		139.00	75.88	56.94	26.29	84.5%	91.2%	117.4%	77.1%
Cement Gaging Str	CC48	164.52	83.23	48.49	34.11				

From: Owen, 1994.

FIGURE 5

Dissolved Zinc Load Contributed to Mineral Creek in kilograms per day



Source	Site	Load in kilograms June	July	September	October	Percent Contribution to M34 June	July	September	October
Carbon lakes	M03	1.155		1.300	0.443	1.2%	0.0%	4.3%	1.6%
Longfellow	M04	75.928	27.155	34.130	17.549	79.8%	62.8%	113.2%	61.9%
Porphory	M06	1.207		0.172		1.3%	0.0%	0.6%	0.0%
Mill Creek	M10	0.553		0.278	0.260	0.6%	0.0%	0.9%	0.9%
Browns Gulch	M12	5.014	2.228	1.945	1.107	5.3%	5.2%	6.5%	3.9%
Trib	M14	0.210		0.036		0.2%	0.0%	0.1%	0.0%
M. F. Mineral	M22	4.883	2.938	2.614	1.603	5.1%	6.8%	8.7%	5.7%
South Mineral	M28	4.383	2.534	0.527	0.480	4.6%	5.9%	1.7%	1.7%
Bear Cr	M30	0.849		0.040		0.9%	0.0%	0.1%	0.0%
North Star	M31	2.614	1.603	4.383	2.534	2.7%	3.7%	14.5%	8.9%
SUM		96.79	36.46	45.43	23.98	101.8%	84.3%	150.7%	84.6%
M34		95.095	43.225	30.144	28.331				

From: Owen, 1994.

Figure 7

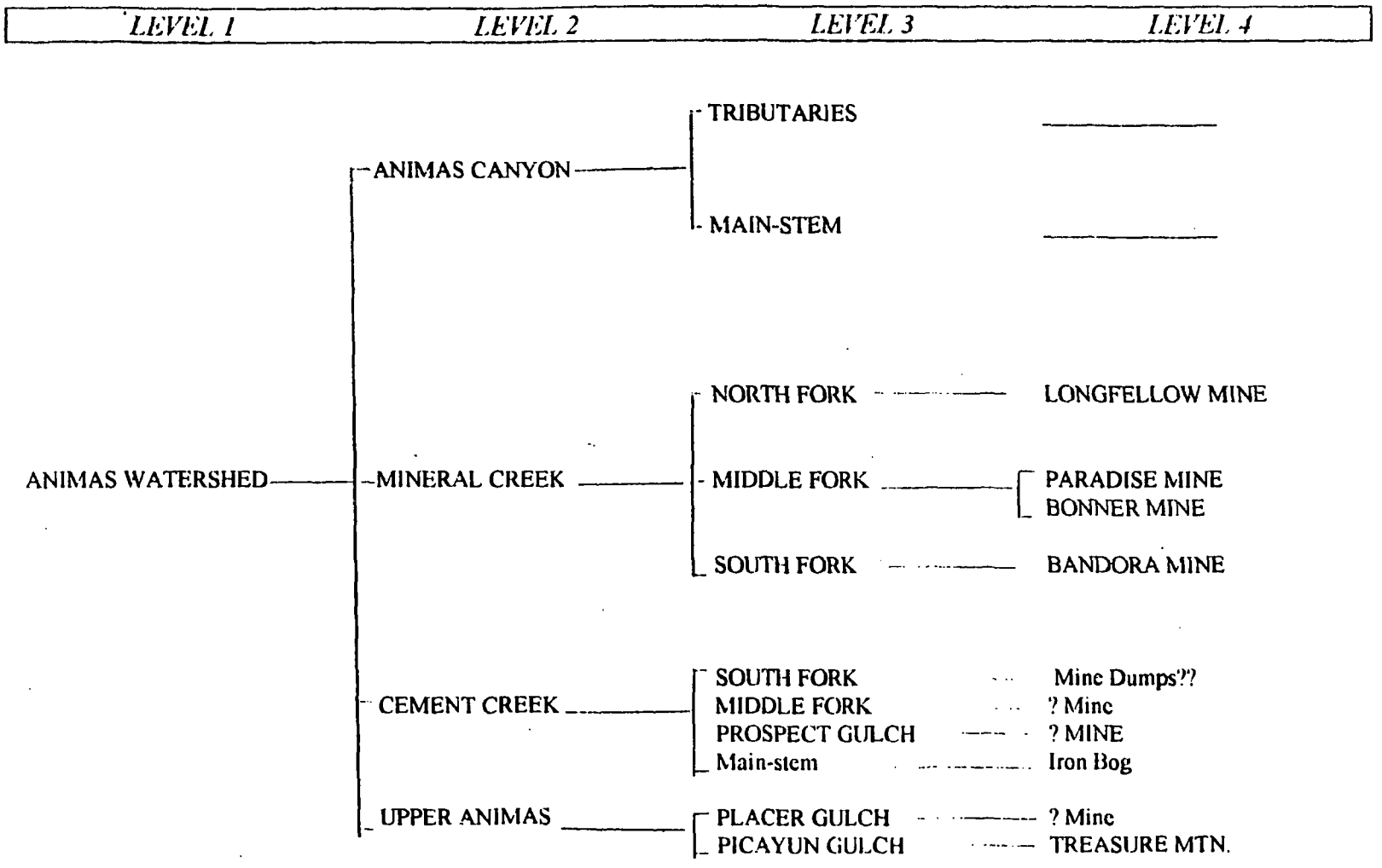
Animas Stakeholders Group
REMEDIATION SCHEDULE

	1995	1996	1997	1998
Mineral Creek Headwaters	I	II	III	
Middle Fork Mineral Creek	I	II	III	
Prospect Gulch		I	II	III
North Fork Cement Creek		I	II	III
California Gulch		I	II	III

Phases of Project Development
I = Monitoring/General Investigation
II = Feasibility Studies/Remediation Plan
III = Remedial Actions

FIGURE 6

ANIMAS WATERSHED REMEDIATION TREE



TABLES

APPENDIX A

CDPHE'S ANIMAS RIVER BASIN STUDY
ANALYTICAL RESULTS

Composition of Major Ions (total) in the Animas,Cement, and Mineral Creek Watersheds--November 1993

	Concentration in milligrams per liter		
Analyte	Animas (A-68)	Cement (CC-48)	Mineral (M-34)
SO4	150	683	277
Ca	173	607	250
Si	9	29	20
Mg	3.3	9.1	7.2
Fe	0.085	7.8	5.267
Na	3	5.5	4.2
Al	0.025	5.133	3.5
Cl	2.5	2.5	2.5
Mn	1.133	2.433	0.57
F	0.49	1.8	0.48
K	0.83	1.6	0.94
Zn	.653	.723	0.417
NO3-N	0.25	0.25	0.25
Cu	0.002	0.033	0.030
P	0.03	0.03	0.03
Pb	0.002	0.0163	0.004
Cd	0.002	0.002	0.002
Sum	344	1356	572
pH s.u.	7.12	4.04	4.6
Alkalinity	23	0	<5
TSS	5	21	19

From: Owen, 1994.

9/91

SUB_SEG1	SITE	DATE1	AL_TOT1	AL_DIS1	CD_TOT1	CD_DIS1	COPPERTOT	COPPERDIS	IRON_TOT1	IRON_DIS1	LEAD_TOT1	LEAD_DIS1	MN_TOT1	MN_DIS1	NICKELTOT	NICKELDIS	SE_TOT1	SE_DIS1	SILVERTOT	SILVERDIS	ZINC_TOT1	ZINC_DIS1
Lucky Jack adit	A02	09/10/91	730.0	81.0	8.00	6.00	13.0	BDL	2500.0	150.0	12.0	BDL	330.0	320.0	BDL	BDL	ND	ND	BDL	BDL	1500.0	1400.0
Filtered Dup.	A02d	09/10/91	ND	86.0	ND	7.00	ND	BDL	ND	150.0	ND	BDL	ND	310.0	ND	BDL	ND	ND	ND	BDL	ND	1400.0
Placer	A23	09/10/91	1200.0	610.0	0.60	0.60	BDL	BDL	27.0	60.0	BDL	19.0	480.0	480.0	BDL	BDL	ND	ND	BDL	BDL	310.0	300.0
Filtered Dup.	A23d	09/10/91	ND	580.0	ND	0.70	ND	BDL	ND	99.0	ND	16.0	ND	480.0	ND	BDL	ND	ND	ND	0.60	ND	310.0
Animas	A28	09/10/91	890.0	110.0	2.90	3.80	18.0	8.0	93.0	BDL	7.0	BDL	990.0	970.0	BDL	BDL	ND	ND	BDL	BDL	660.0	590.0
Filtered Dup.	A28d	09/10/91	ND	100.0	ND	3.00	ND	6.0	ND	BDL	ND	BDL	ND	980.0	ND	BDL	ND	ND	ND	BDL	ND	590.0
Cunningham	A52	09/09/91	64.0	BDL	BDL	BDL	BDL	BDL	44.0	20.0	BDL	BDL	5.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Filtered Dup.	A52d	09/09/91	80.0	55.0	BDL	BDL	BDL	BDL	44.0	17.0	BDL	BDL	5.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Animas	A53	09/09/91	160.0	86.0	0.80	0.80	5.0	BDL	93.0	45.0	BDL	BDL	240.0	230.0	BDL	BDL	ND	BDL	BDL	BDL	280.0	270.0
Filtered Dup.	A53d	09/09/91	ND	84.0	ND	0.90	ND	BDL	ND	43.0	ND	BDL	ND	230.0	ND	BDL	ND	ND	ND	BDL	ND	260.0
Arrastra	A59	09/09/91	BDL	BDL	0.50	0.50	5.0	BDL	32.0	13.0	BDL	BDL	11.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	61.0	68.0
Filtered Dup.	A59d	09/09/91	ND	BDL	ND	0.40	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	57.0
Animas	A65	09/09/91	94.0	52.0	1.00	0.90	5.0	BDL	97.0	32.0	5.0	BDL	260.0	250.0	BDL	BDL	ND	ND	BDL	BDL	290.0	280.0
Filtered Dup.	A65d	09/09/91	ND	BDL	ND	0.90	ND	BDL	ND	32.0	ND	BDL	ND	250.0	ND	BDL	ND	ND	ND	BDL	ND	270.0
Animas Gaging Stn	A68	09/10/91	180.0	93.0	1.50	1.40	10.0	BDL	230.0	42.0	25.0	BDL	580.0	560.0	BDL	BDL	ND	ND	BDL	BDL	400.0	370.0
Animas Gaging Stn	A68-1	09/09/91	110.0	72.0	1.10	1.10	6.0	4.0	74.0	29.0	BDL	BDL	300.0	300.0	BDL	BDL	ND	ND	BDL	BDL	290.0	290.0
Animas Gaging Stn	A68-4	09/07/91	310.0	83.0	2.10	1.90	18.0	BDL	710.0	37.0	96.0	5.0	760.0	690.0	BDL	BDL	ND	ND	0.40	BDL	540.0	450.0
Filtered Dup.	A68d	09/10/91	ND	98.0	ND	1.40	ND	6.0	ND	42.0	ND	BDL	ND	560.0	ND	BDL	ND	ND	ND	BDL	ND	370.0
Filtered Dup.	A68d-1	09/09/91	ND	75.0	ND	1.00	ND	4.0	ND	29.0	ND	BDL	ND	300.0	ND	BDL	ND	ND	ND	BDL	ND	290.0
Filtered Dup.	A68d-4	09/07/91	ND	84.0	ND	2.00	ND	5.0	ND	33.0	ND	5.0	ND	700.0	ND	BDL	ND	ND	ND	BDL	ND	490.0
Animas	A72-3	09/06/91	1800.0	77.0	1.50	1.40	50.0	BDL	2700.0	370.0	28.0	BDL	560.0	540.0	BDL	BDL	ND	ND	BDL	BDL	430.0	370.0
Animas	A72-4	09/07/91	1100.0	110.0	1.20	1.10	37.0	6.0	2000.0	460.0	25.0	BDL	430.0	420.0	BDL	BDL	ND	ND	BDL	BDL	350.0	310.0
Filtered Dup.	A72d-3	09/06/91	BDL	81.0	ND	1.40	ND	BDL	ND	340.0	ND	BDL	ND	540.0	ND	BDL	ND	ND	ND	BDL	ND	370.0
Filtered Dup.	A72d-4	09/07/91	ND	BDL	ND	1.10	ND	BDL	ND	300.0	ND	BDL	ND	420.0	ND	BDL	ND	ND	ND	BDL	ND	310.0
NF Cement	CC06	09/07/91	9800.0	8400.0	27.00	27.00	1500.0	1400.0	25000.0	16000.0	BDL	BDL	2400.0	2200.0	BDL	BDL	ND	ND	BDL	BDL	4300.0	4200.0
Filtered Dup.	CC06d	09/07/91	ND	9300.0	ND	27.00	ND	1600.0	ND	18000.0	ND	BDL	ND	2300.0	ND	BDL	ND	ND	ND	BDL	ND	4200.0
Minnehaha	CC09	09/07/91	220.0	80.0	BDL	BDL	BDL	BDL	260.0	26.0	BDL	BDL	24.0	5.0	BDL	BDL	ND	ND	BDL	BDL	17.0	11.0
Filtered Dup.	CC09d	09/07/91	ND	74.0	ND	BDL	ND	BDL	ND	43.0	ND	BDL	ND	5.0	ND	BDL	ND	ND	ND	BDL	ND	10.0
Cement	CC30	09/07/91	5000.0	4100.0	6.00	5.00	130.0	110.0	14000.0	9000.0	99.0	54.0	1800.0	1800.0	BDL	BDL	ND	ND	0.30	BDL	1300.0	1300.0
Filtered Dup.	CC30d	09/07/91	ND	3900.0	ND	4.00	ND	110.0	ND	8700.0	ND	48.0	ND	1700.0	ND	BDL	ND	ND	ND	BDL	ND	1300.0
Cement adit	CC32	09/06/91	BDL	BDL	BDL	BDL	BDL	BDL	3500.0	2600.0	BDL	BDL	1700.0	1700.0	BDL	BDL	ND	ND	BDL	BDL	170.0	160.0
Filtered Dup.	CC32d	09/06/91	ND	BDL	ND	BDL	ND	BDL	ND	2600.0	ND	BDL	ND	1700.0	ND	BDL	ND	ND	ND	BDL	ND	160.0
Cement	CC36	09/06/91	5400.0	3900.0	4.20	3.60	79.0	62.0	11000.0	5700.0	50.0	23.0	2000.0	1700.0	BDL	BDL	BDL	BDL	0.30	BDL	1000.0	960.0
Filtered Dup.	CC36d	09/06/91	ND	4100.0	ND	3.60	ND	69.0	ND	6000.0	ND	23.0	ND	1900.0	ND	BDL	ND	ND	ND	BDL	ND	1000.0
Topeka	CC44	09/06/91	4000.0	1600.0	0.50	0.50	24.0	21.0	6200.0	2600.0	BDL	BDL	1500.0	1500.0	BDL	BDL	BDL	BDL	BDL	BDL	180.0	180.0
Filtered Dup.	CC44d	09/06/91	ND	1600.0	ND	0.50	ND	20.0	ND	2500.0	ND	BDL	ND	1500.0	ND	BDL	ND	BDL	ND	BDL	ND	180.0
Cement Gaging Stn	CC48	09/09/91	4200.0	3600.0	4.00	3.30	96.0	86.0	7800.0	5300.0	21.0	15.0	1400.0	1400.0	BDL	BDL	BDL	BDL	BDL	BDL	970.0	930.0
Filtered Dup.	CC48d1	09/10/91	ND	3400.0	ND	3.30	ND	83.0	ND	4100.0	ND	18.0	ND	1500.0	ND	BDL	ND	ND	ND	BDL	ND	929.0
Cement	CC49	09/06/91	4400.0	4100.0	3.50	3.50	73.0	67.0	5700.0	2500.0	36.0	26.0	2100.0	2000.0	BDL	BDL	BDL	BDL	BDL	BDL	930.0	880.0
Filtered Dup.	CC49d	09/06/91	ND	4100.0	ND	3.50	ND	66.0	ND	2500.0	ND	25.0	ND	2000.0	ND	BDL	ND	BDL	ND	BDL	ND	880.0
Mineral [illegible]	M13	09/05/91	640.0	66.0	5.00	5.00	300.0	190.0	[illegible]	150.0	53.0	7.0	360.0	370.0	BDL	BDL	BDL	BDL	[illegible]	BDL	1500.0	1500.0
Fil[illegible]	M13d	09/05/91	ND	110.0	ND	5.00	ND	[illegible]	[illegible]	210.0	ND	11.0	ND	360.0	ND	[illegible]	ND	ND	[illegible]	BDL	[illegible]	1500.0
NF Mineral	M15	09/05/91	1600.0	870.0	BDL	BDL	BDL	BDL	1700.0	980.0	BDL	BDL	130.0	120.0	BDL	BDL	ND	ND	BDL	BDL	[illegible]	15.0

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Filtered Dup.	M16d	09/05/91	ND	21000.0	ND	BDL	ND	BDL	ND	69000.0	ND	BDL	ND	5600.0	ND	BDL	ND	ND	ND	BDL	ND	600.0
NF Mineral	M20	09/05/91	14000.0	10000.0	0.80	0.80	6.0	5.0	20000.0	16000.0	BDL	BDL	1100.0	1100.0	BDL	BDL	BDL	BDL	BDL	BDL	160.0	150.0
Filtered Dup.	M20d	09/05/91	ND	10000.0	ND	0.80	ND	5.0	ND	15000.0	ND	BDL	ND	1100.0	ND	BDL	ND	ND	ND	BDL	ND	150.0
Mineral	M29	09/05/91	2000.0	BDL	1.40	1.40	82.0	31.0	2400.0	1300.0	12.0	BDL	290.0	290.0	BDL	BDL	BDL	BDL	BDL	BDL	420.0	420.0
Filtered Dup.	M29d	09/05/91	ND	BDL	ND	1.40	ND	30.0	ND	1300.0	ND	BDL	ND	290.0	ND	BDL	ND	ND	ND	BDL	ND	420.0
Mineral	M35	09/05/91	180.0	130.0	1.00	0.90	32.0	23.0	33.0	BDL	BDL	BDL	1400.0	1300.0	BDL	BDL	ND	ND	BDL	BDL	120.0	110.0
Filtered Dup.	M35d	09/05/91	ND	130.0	ND	0.90	ND	22.0	ND	BDL	ND	BDL	ND	1300.0	ND	BDL	ND	ND	ND	BDL	ND	110.0
Team 1 BLANK	TM1	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	TM1	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	TM1	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 3 BLANK	TM3	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 4 BLANK	TM4	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 5 BLANK	TM5	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	TM?	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team X BLANK	TMX	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team X BLANK	TMx	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	Ta1	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	Ta2	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 3 BLANK	Ta3	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 4 BLANK	Ta4	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	18.0	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	Ta?	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
San Juan team BLANK	TaSJ	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	XB	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	10.0	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB9	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB7	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Inter-Mtn bottle BK	XIMB	09/10/91	0.0	73.0	BDL	BDL	BDL	BDL	BDL	95.0	BDL	7.0	BDL	BDL	BDL	BDL	ND	ND	BDL	0.80	BDL	BDL

9/91

188 ~~26~~ H_2O samples

26 Filtered Duplicates (1 dup per 7 samples)

24. Field Blanks (1 Blank / 8 samples)

Filtered Dup.	[illegible]	[illegible]	ND	[illegible]	ND	BDL	ND	BDL	ND	[illegible]	ND	BDL	ND	[illegible]	ND	BDL	ND	ND	ND	BDL	ND	[illegible]
Mineral	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BDL	BDL	[illegible]	[illegible]	[illegible]	BDL	BDL	[illegible]	[illegible]	BDL	[illegible]	150.0
Filtered Dup.	[illegible]	[illegible]	ND	[illegible]	ND	0.80	ND	[illegible]	ND	1300.0	ND	BDL	ND	[illegible]	ND	BDL	ND	ND	ND	BDL	ND	150.0
Mineral	[illegible]	[illegible]	200.0	BDL	1.40	1.40	82.0	51.0	[illegible]	[illegible]	12.0	BDL	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	420.0	420.0
Filtered Dup.	[illegible]	09/05/91	ND	BDL	ND	1.40	ND	30.0	ND	1300.0	ND	BDL	ND	290.0	ND	BDL	ND	ND	ND	BDL	ND	420.0
Mineral	M35	09/05/91	180.0	130.0	1.00	0.90	32.0	23.0	33.0	BDL	BDL	BDL	1400.0	1300.0	BDL	BDL	ND	ND	BDL	BDL	120.0	110.0
Filtered Dup.	M35d	09/05/91	ND	130.0	ND	0.90	ND	22.0	ND	BDL	ND	BDL	ND	1300.0	ND	BDL	ND	ND	ND	BDL	ND	110.0
Tear 1 BLANK	TM1	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 1 BLANK	TM1	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 1 BLANK	TM1	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 2 BLANK	TM2	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 2 BLANK	TM2	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 2 BLANK	TM2	09/03/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 3 BLANK	TM3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
Tear 4 BLANK	TM4	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 5 BLANK	TM5	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 6 BLANK	TM6	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 8 BLANK	TM8	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 8 BLANK	TM8	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 1 BLANK	TM1	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 2 BLANK	TM2	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 3 BLANK	TM3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tear 4 BLANK	TM4	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	16.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 7 BLANK	TM7	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
San Juan Tear BLANK	TM10	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Tear 9 BLANK	TM9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Field Blank	FB10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
Field Blank	FB10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
Field Blank	FB10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
Field Blank	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
Field Blank	FB7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]

9/91
188 ~~26~~ H_2O samples
26 Filtered Duplicates (1 dup per 7 samples)
24 Field Blanks (1 Blank / 8 samples)

04/07/95 Animas River Basin Sample Duplicates and Blanks
July 1993

SUB_SEG	SITE	DATE4	PH4	AL_TOT4	AL_DIS4	CD_TOT4	CD_DIS4	CALCIUM	COPPER4TOT	COPPER4DIS	IRON_TOT4	IRON_DIS4	LEAD_TOT4	LEAD_DIS4	MAGNESIUM	MN_DIS4	ZINC_TOT4	ZINC_DIS4
Filt Duplicate	A10d	07/20/93	0.00	0.00	840.00	0.000	3.070	0.00	0.00	17.00	0.00	62.00	0.00	-1.00	0.00	0.00	0.00	850.00
Filt Duplicate	A30d	07/20/93	0.00	0.00	100.00	0.000	1.970	0.00	0.00	18.00	0.00	23.00	0.00	-1.00	0.00	0.00	0.00	430.00
Filt Duplicate	A40d	07/20/93	0.00	0.00	76.00	0.000	1.900	0.00	0.00	13.00	0.00	11.00	0.00	-1.00	0.00	0.00	0.00	690.00
Filt Duplicate	A53d	07/20/93	0.00	0.00	-1.00	0.000	0.920	0.00	0.00	6.00	0.00	47.00	0.00	-1.00	0.00	0.00	0.00	330.00
Filt duplicate	A68d	07/20/93	0.00	0.00	-1.00	0.000	0.980	0.00	0.00	4.00	0.00	25.00	0.00	-1.00	0.00	0.00	0.00	290.00
Filt duplicate	A73d	07/20/93	0.00	0.00	53.00	0.000	-1.000	22.00	0.00	-1.00	0.00	18.00	0.00	-1.00	1.40	0.00	0.00	48.00
Filt duplicate	CC01d	07/21/93	6.70	0.00	-1.00	0.000	0.680	44.00	0.00	5.00	0.00	13.00	0.00	-1.00	1.50	0.00	0.00	130.00
Filt duplicate	CC19d	07/21/93	0.00	0.00	-1.00	0.000	0.670	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00
Filt duplicate	CC26d	07/21/93	0.00	0.00	5900.00	0.000	3.850	0.00	0.00	200.00	0.00	13000.00	0.00	31.00	0.00	0.00	0.00	840.00
Filt duplicate	CC39d	07/21/93	0.00	0.00	2900.00	0.000	4.650	0.00	0.00	150.00	0.00	3600.00	0.00	13.00	0.00	1600.00	0.00	1000.00
Filt duplicate	M11d	07/21/93	0.00	0.00	-1.00	0.000	1.470	0.00	0.00	52.00	0.00	79.00	0.00	-1.00	0.00	0.00	0.00	340.00
Filt blank M33	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	-1.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	-1.00	0.00	0.00	-1.00
Filt blank M02b	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	60.00
Filt blank	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00
UNFilt blank	xblank	07/21/93	0.00	-1.00	0.00	-1.000	0.000	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00
unfilt blank	xblank	07/20/93	0.00	0.00	0.00	-1.000	0.090	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00

7/93

121 Water Q Samples
11 Filtered Duplicates (1 dup/11 samples)
3 Filtered Blanks } (1 Blank/24 samples)
2 Unfiltered Blanks }

SITE	SUB_SEG	DATE3	AL_TOT3	AL_DIS3	CD_TOT3	CD_DIS3	COPPER3TOT	COPPER3DIS	IRON_TOT3	IRON_DIS3	LEAD_TOT3	LEAD_DIS3	MN_DIS3	SE_TOT3	SE_DIS3	SILVER3TOT	SILVER3DIS	ZINC_TOT3	ZINC_DIS3
A07	Burrows Cr	10/15/92	ND	4600.0	15.00	14.00	56.0	56.0	49.0	ND	BDL	BDL	2700.0	ND	ND	ND	BDL	2100.0	2100.0
A07d	Filt Duplicate	10/15/92	ND	ND	ND	16.00	ND	54.0	ND	ND	ND	BDL	2700.0	ND	ND	ND	ND	ND	2100.0
A39	Eureka	10/15/92	ND	BDL	ND	1.70	ND	18.0	ND	ND	ND	15.0	ND	ND	ND	ND	BDL	ND	640.0
A39d	Filt Duplicate	10/15/92	ND	BDL	ND	1.80	ND	19.0	ND	ND	ND	14.0	ND	ND	ND	ND	BDL	ND	590.0
A45	Animas	10/15/92	ND	BDL	0.59	0.63	BDL	BDL	BDL	ND	BDL	BDL	8.0	ND	ND	ND	BDL	300.0	310.0
A45d	Filt Duplicate	10/15/92	ND	BDL	ND	0.61	ND	BDL	ND	ND	ND	BDL	7.0	ND	ND	ND	BDL	ND	300.0
A58	Arrastra	10/15/92	ND	BDL	1.30	1.40	6.0	8.0	BDL	ND	BDL	BDL	BDL	ND	BDL	ND	BDL	200.0	200.0
A58d	Filt Duplicate	10/15/92	ND	BDL	ND	1.40	ND	9.0	ND	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND	200.0
M32	Mineral	10/14/92	ND	250.0	1.20	1.20	47.0	19.0	4700.0	ND	8.5	BDL	370.0	ND	ND	ND	BDL	370.0	330.0
M32d	Filt Duplicate	10/14/92	ND	ND	ND	1.20	ND	20.0	ND	ND	ND	BDL	370.0	ND	ND	ND	ND	ND	360.0
M34-1	Mineral Gaging Stn	10/15/92	ND	BDL	1.30	1.30	54.0	16.0	4500.0	3100.0	7.4	BDL	420.0	ND	ND	ND	BDL	390.0	370.0
M34d	Filt Duplicate	10/15/92	ND	ND	ND	1.30	ND	20.0	ND	3000.0	ND	BDL	410.0	ND	ND	ND	ND	ND	370.0
XA26	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND	BDL
XA64	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	16.0
XA73	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
XA7b	Filt Blank	10/15/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL

10/92
103 ~~X~~ H_2O Q Samples
6 Duplicates (1 dup / 17 samples)
4 Filtered Blanks (1 blank per 26 samples)

SUB_SEG2	SITE	DATE2	AL_TOT2	AL_DIS2	CD_TOT2	CD_DIS2	COPPER2TOT	COPPER2DIS	IRON_TOT2	IRON_DIS2	LEAD_TOT2	LEAD_DIS2	MN_TOT2	MN_DIS2	SE_DIS2	SILVER2TOT	SILVER2DIS	ZINC_TOT2	ZINC_DIS2
NF Animas	A08	06/25/92	ND	BDL	ND	4.10	ND	5.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	430.0
FILT DUP	A08D	06/25/92	ND	BDL	ND	4.10	ND	6.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	430.0
NF Animas	A14	06/25/92	ND	390.0	4.30	4.40	23.0	17.0	68.0	ND	5.0	BDL	ND	ND	ND	ND	BDL	860.0	860.0
FILT DUP	A14D	06/25/92	ND	390.0	ND	4.60	ND	18.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	840.0
Placer	A20	06/25/92	ND	88.0	ND	3.80	ND	22.0	ND	ND	ND	BDL	ND	1900.0	BDL	ND	BDL	ND	950.0
FILT DUP	A20D	06/25/92	ND	95.0	ND	4.00	ND	25.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	970.0
Animas Gaging Stn	A68	06/25/92	ND	50.0	2.10	1.80	21.0	7.0	260.0	ND	32.0	BDL	ND	ND	ND	ND	BDL	380.0	310.0
FILT DUP	A68D	06/25/92	ND	BDL	ND	1.80	ND	6.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	310.0
Prospect	CC23	06/24/92	ND	BDL	ND	2.10	ND	27.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	460.0
FILT DUP	CC23D	06/24/92	ND	BDL	ND	2.10	ND	25.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	460.0
Cement	CC31	06/24/92	ND	1900.0	ND	5.60	ND	150.0	ND	ND	ND	12.0	ND	ND	ND	ND	BDL	ND	960.0
FILT DUP	CC31D	06/24/92	ND	1900.0	ND	5.50	ND	150.0	ND	ND	ND	11.0	ND	ND	ND	ND	BDL	ND	950.0
Cascade	CC33	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
FILT DUP	CC33D	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
Mineral	M04	06/23/92	ND	930.0	ND	9.00	ND	940.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	2900.0
FILT DUP	M04D	06/23/92	ND	940.0	ND	9.00	ND	950.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	2900.0
NF Mineral trib	M18	06/23/92	ND	9500.0	ND	0.87	ND	9.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	110.0
FILT DUP	M18D	06/23/92	ND	9500.0	ND	0.92	ND	10.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	94.0
SF Mineral	M28	06/23/92	ND	77.0	BDL	BDL	BDL	BDL	160.0	ND	BDL	BDL	ND	9.0	BDL	ND	BDL	12.0	11.0
FILT DUP	M28D	06/23/92	ND	80.0	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	9.0	BDL	ND	BDL	ND	11.0
Mineral	M38	06/23/92	ND	60.0	0.66	0.76	23.0	5.0	820.0	ND	BDL	BDL	ND	ND	ND	ND	BDL	120.0	180.0
FILT DUP	M38D	06/23/92	ND	BDL	ND	0.59	ND	4.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	110.0
•FILT BLANK	ZA29B	06/25/92	ND	BDL	ND	BDL	ND	8.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZA56B	06/25/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	17.0
•FILT BLANK	ZA68B	06/23/92	BDL	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	BDL	ND	ND	BDL	ND	BDL
•FILT BLANK	ZA70B	06/25/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	9.0
•FILT BLANK	ZCC05B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	ND	BDL	ND	32.0
•FILT BLANK	ZCC12B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZCC41B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZCC46B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZM08B	06/23/92	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZM26B	06/23/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
•FILT BLANK	ZM33B	06/23/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	28.0

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• 11 Filtered Blanks (1 filter/ 15 samples)
11 Filtered Duplicates (1 dup/ 15 samples)
11 Water Samples

SITE	SUB_SEG	DATE3	AL_TOT3	AL_DIS3	CD_TOT3	CD_DIS3	COPPER3TOT	COPPER3DIS	IRON_TOT3	IRON_DIS3	LEAD_TOT3	LEAD_DIS3	MN_DIS3	SE_TOT3	SE_DIS3	SILVER3TOT	SILVER3DIS	ZINC_TOT3	ZINC_DIS3
A07	Burrows Cr	10/15/92	ND	4600.0	15.00	14.00	56.0	56.0	49.0	ND	BDL	BDL	2700.0	ND	ND	ND	BDL	2100.0	2100.0
A07d	Filt Duplicate	10/15/92	ND	ND	ND	16.00	ND	54.0	ND	ND	ND	BDL	2700.0	ND	ND	ND	ND	ND	2100.0
A39	Eureka	10/15/92	ND	BDL	ND	1.70	ND	18.0	ND	ND	ND	15.0	ND	ND	ND	ND	BDL	ND	640.0
A39d	Filt Duplicate	10/15/92	ND	BDL	ND	1.80	ND	19.0	ND	ND	ND	14.0	ND	ND	ND	ND	BDL	ND	590.0
A45	Animas	10/15/92	ND	BDL	0.59	0.63	BDL	BDL	BDL	ND	BDL	BDL	8.0	ND	ND	ND	BDL	300.0	310.0
A45d	Filt Duplicate	10/15/92	ND	BDL	ND	0.61	ND	BDL	ND	ND	ND	BDL	7.0	ND	ND	ND	BDL	ND	300.0
A58	Arrastra	10/15/92	ND	BDL	1.30	1.40	6.0	8.0	BDL	ND	BDL	BDL	BDL	ND	BDL	ND	BDL	200.0	200.0
A58d	Filt Duplicate	10/15/92	ND	BDL	ND	1.40	ND	9.0	ND	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND	200.0
M32	Mineral	10/14/92	ND	250.0	1.20	1.20	47.0	19.0	4700.0	ND	8.5	BDL	370.0	ND	ND	ND	BDL	370.0	380.0
M32d	Filt Duplicate	10/14/92	ND	ND	ND	1.20	ND	20.0	ND	ND	ND	BDL	370.0	ND	ND	ND	ND	ND	360.0
M34-1	Mineral Gaging Stn	10/15/92	ND	BDL	1.30	1.30	54.0	16.0	4500.0	3100.0	7.4	BDL	420.0	ND	ND	ND	BDL	390.0	370.0
M34d	Filt Duplicate	10/15/92	ND	ND	ND	1.30	ND	20.0	ND	3000.0	ND	BDL	410.0	ND	ND	ND	ND	ND	370.0
XA26	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND	BDL
XA64	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	16.0
XA73	Filt Blank	10/15/92	ND	ND	ND	BDL	ND	BDL	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
XA76	Filt Blank	10/15/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL

10/92
103 ~~X~~ H_2O Q Samples
6 Duplicates (1 dup / 17 samples)
4 Filtered Blanks (1 blank per 26 samples)

94/07/95 Animas River Basin Sample Duplicates and Blanks

July 1993

SUB_SEG	SITE	DATE4	PH4	AL_TOT4	AL_DIS4	CD_TOT4	CD_DIS4	CALCIUM	COPPER4TOT	COPPER4DIS	IRON_TOT4	IRON_DIS4	LEAD_TOT4	LEAD_DIS4	MAGNESIUM	MN_DIS4	ZINC_TOT4	ZINC_DIS4
Filt Duplicate	A10d	07/20/93	0.00	0.00	840.00	0.000	3.070	0.00	0.00	17.00	0.00	62.00	0.00	-1.00	0.00	0.00	0.00	850.00
Filt Duplicate	A30d	07/20/93	0.00	0.00	100.00	0.000	1.970	0.00	0.00	18.00	0.00	23.00	0.00	-1.00	0.00	0.00	0.00	430.00
Filt Duplicate	A40d	07/20/93	0.00	0.00	76.00	0.000	1.900	0.00	0.00	13.00	0.00	11.00	0.00	-1.00	0.00	0.00	0.00	690.00
Filt Duplicate	A53d	07/20/93	0.00	0.00	-1.00	0.000	0.920	0.00	0.00	6.00	0.00	47.00	0.00	-1.00	0.00	0.00	0.00	330.00
Filt duplicate	A68d	07/20/93	0.00	0.00	-1.00	0.000	0.980	0.00	0.00	4.00	0.00	25.00	0.00	-1.00	0.00	0.00	0.00	290.00
Filt duplicate	A73d	07/20/93	0.00	0.00	53.00	0.000	-1.000	22.00	0.00	-1.00	0.00	18.00	0.00	-1.00	1.40	0.00	0.00	48.00
Filt duplicate	CC01d	07/21/93	6.70	0.00	-1.00	0.000	0.680	44.00	0.00	5.00	0.00	13.00	0.00	-1.00	1.50	0.00	0.00	130.00
Filt duplicate	CC19d	07/21/93	0.00	0.00	-1.00	0.000	0.670	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00
Filt duplicate	CC26d	07/21/93	0.00	0.00	5900.00	0.000	3.850	0.00	0.00	200.00	0.00	13000.00	0.00	31.00	0.00	0.00	0.00	840.00
Filt duplicate	CC39d	07/21/93	0.00	0.00	2900.00	0.000	4.650	0.00	0.00	150.00	0.00	3600.00	0.00	13.00	0.00	1600.00	0.00	1000.00
Filt duplicate	M11d	07/21/93	0.00	0.00	-1.00	0.000	1.470	0.00	0.00	52.00	0.00	79.00	0.00	-1.00	0.00	0.00	0.00	340.00
Filt blank M33	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	-1.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	-1.00	0.00	0.00	-1.00
Filt blank M02b	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	60.00
Filt blank	xblank	07/21/93	0.00	0.00	-1.00	0.000	-1.000	0.00	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00
UNFilt blank	xblank	07/21/93	0.00	-1.00	0.00	-1.000	0.000	0.00	-1.00	0.00	-1.00	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00
unfilt blank	xblank	07/20/93	0.00	0.00	0.00	-1.000	0.000	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	-1.00	0.00

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121 Water Q Samples

11 Filtered Duplicates (1 dup/11 samples)

3 Filtered Blanks } (1 Blank/24 samples)

2 Unfiltered Blanks }

Filtered Dup	[illegible]	[illegible]	[illegible]	[illegible]	ND	BDL	ND	BDL	ND	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	BDL	ND	ND	ND	BDL	ND	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	10.00.0	0.20	0.90	6.0	[illegible]	[illegible]	[illegible]	BDL	BDL	1200.0	1200.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	150.0	150.0
Filtered Dup.	[illegible]	[illegible]	[illegible]	[illegible]	ND	0.90	ND	[illegible]	ND	[illegible]	ND	BDL	ND	[illegible]	ND	BDL	ND	ND	ND	BDL	ND	150.0	150.0
[illegible]	[illegible]	[illegible]	[illegible]	20[illegible]	BDL	1.40	1.40	82.0	51.0	[illegible]	[illegible]	BDL	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	420.0	420.0
Filtered Dup.	[illegible]	09/05/91	ND	BDL	ND	1.40	ND	30.0	ND	1300.0	ND	BDL	ND	290.0	ND	BDL	ND	ND	ND	BDL	ND	420.0	
Mineral	M35	09/05/91	180.0	130.0	1.00	0.90	32.0	23.0	33.0	BDL	BDL	BDL	1400.0	1300.0	BDL	BDL	ND	ND	BDL	BDL	120.0	110.0	
Filtered Dup.	M35d	09/05/91	ND	130.0	ND	0.90	ND	22.0	ND	BDL	ND	BDL	ND	1300.0	ND	BDL	ND	ND	ND	BDL	ND	110.0	
• Tesa 1 BLANK	TM1	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 1 BLANK	TM1	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 1 BLANK	TM1	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 2 BLANK	TM2	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 2 BLANK	TM2	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 2 BLANK	TM2	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 3 BLANK	TM3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	ND	ND	[illegible]	[illegible]	[illegible]	[illegible]	
• Tesa 4 BLANK	TM4	[illegible]		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 5 BLANK	TM5	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 6 BLANK	TM6	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 8 BLANK	TM8	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 8 BLANK	TM8	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 1 BLANK	TM1	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 2 BLANK	TM2	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 3 BLANK	TM3	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 4 BLANK	TM4	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	15.0	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 7 BLANK	TM7	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• San Juan Seep BLANK	TM10	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Tesa 9 BLANK	TM9	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Field Blank	FB10	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Field Blank	FB10	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Field Blank	FB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Field Blank	FB11	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
• Field Blank	FB07	[illegible]	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	BDL	BDL	BDL	BDL	BDL	35.0	BDL	[illegible]	BDL	BDL	BDL	BDL	ND	ND	BDL	0.80	BDL	BDL	

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188 ~~86~~ H_2O Q samples

26 Filtered Duplicates (1 dup per 7 samples)

24. Field Blanks (1 Blank / 8 samples)

Filtered Dup.	M16d	09/05/91	ND	21000.0	ND	BDL	ND	BDL	ND	69000.0	ND	BDL	ND	5600.0	ND	BDL	ND	ND	ND	BDL	ND	600.0
NF "Mineral"	M20	09/05/91	14000.0	10000.0	0.80	0.80	6.0	5.0	20000.0	16000.0	BDL	BDL	1100.0	1100.0	BDL	BDL	BDL	BDL	BDL	BDL	160.0	150.0
Filtered Dup.	M20d	09/05/91	ND	10000.0	ND	0.80	ND	5.0	ND	15000.0	ND	BDL	ND	1100.0	ND	BDL	ND	ND	ND	BDL	ND	150.0
Mineral	M29	09/05/91	2000.0	BDL	1.40	1.40	82.0	31.0	2400.0	1300.0	12.0	BDL	290.0	290.0	BDL	BDL	BDL	BDL	BDL	BDL	420.0	420.0
Filtered Dup.	M29d	09/05/91	ND	BDL	ND	1.40	ND	30.0	ND	1300.0	ND	BDL	ND	290.0	ND	BDL	ND	ND	ND	BDL	ND	420.0
Mineral	M35	09/05/91	180.0	130.0	1.00	0.90	32.0	23.0	33.0	BDL	BDL	BDL	1400.0	1300.0	BDL	BDL	ND	ND	BDL	BDL	120.0	110.0
Filtered Dup.	M35d	09/05/91	ND	130.0	ND	0.90	ND	22.0	ND	BDL	ND	BDL	ND	1300.0	ND	BDL	ND	ND	ND	BDL	ND	110.0
Team 1 BLANK	TM1	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	TM1	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	TM1	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	TM2	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 3 BLANK	TM3	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 4 BLANK	TM4	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 5 BLANK	TM5	09/05/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	TM?	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team X BLANK	TMX	09/06/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team X BLANK	TMx	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 1 BLANK	Tm1	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 2 BLANK	Tm2	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 3 BLANK	TmC	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team 4 BLANK	Tm4	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	18.0	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	Tm?	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
San Juan team BLANK	TmSJ	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Team ? BLANK	XB	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	10.0	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB10	09/10/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB9	09/09/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Filt Blank	XFB7	09/07/91	0.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL	BDL
Inter Min-bottle CK	XINB	09/10/91	0.0	73.0	BDL	BDL	BDL	BDL	BDL	95.0	BDL	7.0	BDL	BDL	BDL	BDL	ND	ND	BDL	0.80	BDL	BDL

9/91

188 ~~86~~ H_2O Q samples

26 Filtered Duplicates (1 dup per 7 samples)

24. Field Blanks (1 Blank / 8 samples)

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SUB_SEGI	SITE	DATEI	AL_TOTI	AL_DISI	CD_TOTI	CD_DISI	COPPERITOI	COPPERIDISI	IRON_TOTI	IRON_DISI	LEAD_TOTI	LEAD_DISI	MN_TOTI	MN_DISI	NICKELITOI	NICKELIDISI	SE_TOTI	SE_DISI	SILVERITOI	SILVERIDISI	ZINC_TOTI	ZINC_DISI
Lucky Jack adit	A02	09/10/91	730.0	81.0	8.00	6.00	13.0	BDL	2500.0	150.0	12.0	BDL	330.0	320.0	BDL	BDL	ND	ND	BDL	BDL	1500.0	1400.0
Filtered Dup.	A02d	09/10/91	ND	86.0	ND	7.00	ND	BDL	ND	150.0	ND	BDL	ND	310.0	ND	BDL	ND	ND	ND	BDL	ND	1400.0
Placer	A23	09/10/91	1200.0	610.0	0.60	0.60	BDL	BDL	27.0	60.0	BDL	19.0	480.0	480.0	BDL	BDL	ND	ND	BDL	BDL	310.0	300.0
Filtered Dup.	A23d	09/10/91	ND	580.0	ND	0.70	ND	BDL	ND	99.0	ND	16.0	ND	480.0	ND	BDL	ND	ND	ND	0.60	ND	310.0
Animas	A28	09/10/91	890.0	110.0	2.90	3.80	18.0	8.0	93.0	BDL	7.0	BDL	990.0	970.0	BDL	BDL	ND	ND	BDL	BDL	660.0	590.0
Filtered Dup.	A28d	09/10/91	ND	100.0	ND	3.00	ND	6.0	ND	BDL	ND	BDL	ND	980.0	ND	BDL	ND	ND	ND	BDL	ND	590.0
Cunningham	A52	09/09/91	64.0	BDL	BDL	BDL	BDL	BDL	44.0	20.0	BDL	BDL	5.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Filtered Dup.	A52d	09/09/91	80.0	55.0	BDL	BDL	BDL	BDL	44.0	17.0	BDL	BDL	5.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Animas	A53	09/09/91	160.0	86.0	0.80	0.80	5.0	BDL	93.0	45.0	BDL	BDL	240.0	230.0	BDL	BDL	ND	BDL	BDL	BDL	280.0	270.0
Filtered Dup.	A53d	09/09/91	ND	84.0	ND	0.90	ND	BDL	ND	43.0	ND	BDL	ND	230.0	ND	BDL	ND	ND	ND	BDL	ND	260.0
Arrastra	A59	09/09/91	BDL	BDL	0.50	0.50	5.0	BDL	32.0	13.0	BDL	BDL	11.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	61.0	68.0
Filtered Dup.	A59d	09/09/91	ND	BDL	ND	0.40	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	57.0
Animas	A65	09/09/91	94.0	52.0	1.00	0.90	5.0	BDL	97.0	32.0	5.0	BDL	260.0	250.0	BDL	BDL	ND	ND	BDL	BDL	290.0	280.0
Filtered Dup.	A65d	09/09/91	ND	BDL	ND	0.90	ND	BDL	ND	32.0	ND	BDL	ND	250.0	ND	BDL	ND	ND	ND	BDL	ND	270.0
Animas Gaging Stn	A68	09/10/91	180.0	93.0	1.50	1.40	10.0	BDL	230.0	42.0	25.0	BDL	580.0	560.0	BDL	BDL	ND	ND	BDL	BDL	400.0	370.0
Animas Gaging Stn	A68-1	09/09/91	110.0	72.0	1.10	1.10	6.0	4.0	74.0	29.0	BDL	BDL	300.0	300.0	BDL	BDL	ND	ND	BDL	BDL	290.0	290.0
Animas Gaging Stn	A68-4	09/07/91	310.0	83.0	2.10	1.90	18.0	BDL	710.0	37.0	96.0	5.0	760.0	690.0	BDL	BDL	ND	ND	0.40	BDL	540.0	450.0
Filtered Dup.	A68d	09/10/91	ND	98.0	ND	1.40	ND	6.0	ND	42.0	ND	BDL	ND	560.0	ND	BDL	ND	ND	ND	BDL	ND	370.0
Filtered Dup.	A68d-1	09/09/91	ND	75.0	ND	1.00	ND	4.0	ND	29.0	ND	BDL	ND	300.0	ND	BDL	ND	ND	ND	BDL	ND	290.0
Filtered Dup.	A68d-4	09/07/91	ND	84.0	ND	2.00	ND	5.0	ND	33.0	ND	5.0	ND	700.0	ND	BDL	ND	ND	ND	BDL	ND	490.0
Animas	A72-3	09/06/91	1800.0	77.0	1.50	1.40	50.0	BDL	2700.0	370.0	28.0	BDL	560.0	540.0	BDL	BDL	ND	ND	BDL	BDL	430.0	370.0
Animas	A72-4	09/07/91	1100.0	110.0	1.20	1.10	37.0	6.0	2000.0	460.0	25.0	BDL	430.0	420.0	BDL	BDL	ND	ND	BDL	BDL	350.0	310.0
Filtered Dup.	A72d-3	09/06/91	BDL	81.0	ND	1.40	ND	BDL	ND	340.0	ND	BDL	ND	540.0	ND	BDL	ND	ND	ND	BDL	ND	370.0
Filtered Dup.	A72d-4	09/07/91	ND	BDL	ND	1.10	ND	BDL	ND	300.0	ND	BDL	ND	420.0	ND	BDL	ND	ND	ND	BDL	ND	310.0
NF Cement	CC06	09/07/91	9800.0	8400.0	27.00	27.00	1500.0	1400.0	25000.0	16000.0	BDL	BDL	2400.0	2200.0	BDL	BDL	ND	ND	BDL	BDL	4300.0	4200.0
Filtered Dup.	CC06d	09/07/91	ND	9300.0	ND	27.00	ND	1600.0	ND	18000.0	ND	BDL	ND	2300.0	ND	BDL	ND	ND	ND	BDL	ND	4200.0
Minnehaha	CC09	09/07/91	220.0	80.0	BDL	BDL	BDL	BDL	260.0	26.0	BDL	BDL	24.0	5.0	BDL	BDL	ND	ND	BDL	BDL	17.0	11.0
Filtered Dup.	CC09d	09/07/91	ND	74.0	ND	BDL	ND	BDL	ND	43.0	ND	BDL	ND	5.0	ND	BDL	ND	ND	ND	BDL	ND	10.0
Cement	CC30	09/07/91	5000.0	4100.0	6.00	5.00	130.0	110.0	14000.0	9000.0	99.0	54.0	1800.0	1800.0	BDL	BDL	ND	ND	0.30	BDL	1300.0	1300.0
Filtered Dup.	CC30d	09/07/91	ND	3900.0	ND	4.00	ND	110.0	ND	8700.0	ND	48.0	ND	1700.0	ND	BDL	ND	ND	ND	BDL	ND	1300.0
Cement adit	CC32	09/06/91	BDL	BDL	BDL	BDL	BDL	BDL	3500.0	2600.0	BDL	BDL	1700.0	1700.0	BDL	BDL	ND	ND	BDL	BDL	170.0	160.0
Filtered Dup.	CC32d	09/06/91	ND	BDL	ND	BDL	ND	BDL	ND	2600.0	ND	BDL	ND	1700.0	ND	BDL	ND	ND	ND	BDL	ND	160.0
Cement	CC36	09/06/91	5400.0	3900.0	4.20	3.60	79.0	62.0	11000.0	5700.0	50.0	23.0	2000.0	1700.0	BDL	BDL	BDL	BDL	0.30	BDL	1000.0	960.0
Filtered Dup.	CC36d	09/06/91	ND	4100.0	ND	3.60	ND	69.0	ND	6000.0	ND	23.0	ND	1900.0	ND	BDL	ND	ND	ND	BDL	ND	1000.0
Topeka	CC44	09/06/91	4000.0	1600.0	0.50	0.50	24.0	21.0	6200.0	2600.0	BDL	BDL	1500.0	1500.0	BDL	BDL	BDL	BDL	BDL	BDL	180.0	180.0
Filtered Dup.	CC44d	09/06/91	ND	1600.0	ND	0.50	ND	20.0	ND	2500.0	ND	BDL	ND	1500.0	ND	BDL	ND	BDL	ND	BDL	ND	180.0
Cement Gaging Stn	CC48	09/09/91	4200.0	3600.0	4.00	3.30	96.0	86.0	7800.0	5300.0	21.0	15.0	1400.0	1400.0	BDL	BDL	BDL	BDL	BDL	BDL	970.0	930.0
Filtered Dup.	CC48d1	09/10/91	ND	3400.0	ND	3.30	ND	83.0	ND	4100.0	ND	18.0	ND	1500.0	ND	BDL	ND	ND	ND	BDL	ND	920.0
Cement	CC49	09/06/91	4400.0	4100.0	3.50	3.50	73.0	67.0	5700.0	2500.0	36.0	26.0	2100.0	2000.0	BDL	BDL	BDL	BDL	BDL	BDL	930.0	880.0
Filtered Dup.	CC49d	09/06/91	ND	4100.0	ND	3.50	ND	66.0	ND	2500.0	ND	25.0	ND	2000.0	ND	BDL	ND	BDL	ND	BDL	ND	880.0
Mineral [illegible]	M13	09/05/91	640.0	66.0	5.00	5.00	300.0	190.0	920.0	150.0	53.0	7.0	360.0	370.0	BDL	BDL	BDL	BDL	BDL	BDL	1500.0	1500.0
Fil[illegible]	M13d	09/05/91	ND	110.0	ND	5.00	ND	[illegible]	ND	210.0	ND	11.0	ND	360.0	ND	[illegible]	ND	ND	[illegible]	BDL	[illegible]	1500.0
NF M[illegible]	M15	09/05/91	1600.0	870.0	BDL	BDL	BDL	BD[illegible]	700.0	980.0	BDL	BDL	130.0	120.0	BDL	[illegible]	ND	ND	[illegible]	BDL	[illegible]	15.0

SUB_SEG2	SITE	DATE2	AL_TOT2	AL_DIS2	CD_TOT2	CD_DIS2	COPPER2TOT	COPPER2DIS	IRON_TOT2	IRON_DIS2	LEAD_TOT2	LEAD_DIS2	MN_TOT2	MN_DIS2	SE_DIS2	SILVER2TOT	SILVER2DIS	ZINC_TOT2	ZINC_DIS2
NF Animas	A08	06/25/92	ND	BDL	ND	4.10	ND	5.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	430.0
FILT DUP	A080	06/25/92	ND	BDL	ND	4.10	ND	6.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	430.0
NF Animas	A14	06/25/92	ND	390.0	4.30	4.40	23.0	17.0	68.0	ND	5.0	BDL	ND	ND	ND	ND	BDL	860.0	860.0
FILT DUP	A140	06/25/92	ND	390.0	ND	4.60	ND	18.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	840.0
Placer	A20	06/25/92	ND	88.0	ND	3.80	ND	22.0	ND	ND	ND	BDL	ND	1900.0	BDL	ND	BDL	ND	950.0
FILT DUP	A200	06/25/92	ND	95.0	ND	4.00	ND	25.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	970.0
Animas Gaging Stn	A68	06/25/92	ND	50.0	2.10	1.80	21.0	7.0	260.0	ND	32.0	BDL	ND	ND	ND	ND	BDL	380.0	310.0
FILT DUP	A680	06/25/92	ND	BDL	ND	1.80	ND	6.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	310.0
Prospect	CC23	06/24/92	ND	BDL	ND	2.10	ND	27.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	460.0
FILT DUP	CC230	06/24/92	ND	BDL	ND	2.10	ND	25.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	460.0
Cement	CC31	06/24/92	ND	1900.0	ND	5.60	ND	150.0	ND	ND	ND	12.0	ND	ND	ND	ND	BDL	ND	960.0
FILT DUP	CC310	06/24/92	ND	1900.0	ND	5.50	ND	150.0	ND	ND	ND	11.0	ND	ND	ND	ND	BDL	ND	950.0
Cascade	CC33	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
FILT DUP	CC330	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
Mineral	M04	06/23/92	ND	930.0	ND	9.00	ND	940.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	2900.0
FILT DUP	M040	06/23/92	ND	940.0	ND	9.00	ND	950.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	2900.0
NF Mineral trib	M18	06/23/92	ND	9500.0	ND	0.87	ND	9.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	110.0
FILT DUP	M180	06/23/92	ND	9500.0	ND	0.92	ND	10.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	94.0
SF Mineral	M28	06/23/92	ND	77.0	BDL	BDL	BDL	BDL	160.0	ND	BDL	BDL	ND	9.0	BDL	ND	BDL	12.0	11.0
FILT DUP	M280	06/23/92	ND	80.0	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	9.0	BDL	ND	BDL	ND	11.0
Mineral	M38	06/23/92	ND	60.0	0.66	0.76	23.0	5.0	820.0	ND	BDL	BDL	ND	ND	ND	ND	BDL	120.0	180.0
FILT DUP	M380	06/23/92	ND	BDL	ND	0.59	ND	4.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	110.0
• FILT BLANK	ZA29B	06/25/92	ND	BDL	ND	BDL	ND	8.0	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZA56B	06/25/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	17.0
• FILT BLANK	ZA68B	06/23/92	BDL	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	BDL	ND	ND	BDL	ND	BDL
• FILT BLANK	ZA70B	06/25/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	9.0
• FILT BLANK	ZCC05B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	ND	BDL	ND	32.0
• FILT BLANK	ZCC12B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZCC41B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZCC46B	06/24/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZM08B	06/23/92	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZM26B	06/23/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	BDL
• FILT BLANK	ZM33B	06/23/92	ND	BDL	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	BDL	ND	28.0

6/92

• 11 Filtered Blanks (1 filter/15 samples)
11 Filtered Duplicates (1 dup/15 samples)
Water Samples

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	PB_D_LOAD2 grams/day	PB_D_LOAD3 grams/day	PB_D_LOAD4 grams/day	MN_T_LOAD1 grams/day	MN_T_LOAD2 grams/day	MN_T_LOAD4 grams/day	MN_D_LOAD1 grams/day	MN_D_LOAD2 grams/day	MN_D_LOAD3 grams/day	MN_D_LOAD4 grams/day	NI_T_LOAD1 grams/day	NI_D_LOAD1 grams/day
A01	ND	ND		ND	ND		ND	ND	ND		ND	ND
A02	BDL	BDL	BDL	57.3	ND	ND	55.6	ND	ND	ND	BDL	BDL
A02a			BDL			ND				ND		
A02b												
A02d	ND	ND		ND	ND		ND	ND	ND		ND	ND
A03	BDL	BDL		44.0	ND		BDL	ND	ND		BDL	BDL
A04	BDL	BDL	BDL	4.0	ND	ND	2.0	ND	BDL	ND	BDL	BDL
A05	BDL	BDL		62.4	ND		51.6	ND	ND		BDL	BDL
A06	BDL			1.6	ND		BDL	ND			BDL	BDL
A07	ND	BDL	19.821	4522.1	ND	ND	4522.1	ND	647.48	ND	BDL	BDL
A07LM												
A07LMS												
A07a			BDL			ND				5990.256		
A07b			7.708			ND				ND		
A07c			3.634			ND				ND		
A08	ND	BDL		4874.4	ND		4813.5	ND	ND		BDL	BDL
A09	BDL	24.1	BDL	4328.7	ND	ND	3973.9	11897.3	241.27	ND	BDL	BDL
A10	BDL	BDL	BDL	42462.8	ND	ND	42462.8	237016.4	15239.92	ND	BDL	BDL
A11	BDL	BDL	BDL	57788.4	ND	ND	57788.4	ND	ND	ND	BDL	BDL
A11a			15.171			ND				ND		
A12	BDL	BDL	BDL	2535.1	ND	ND	2498.9	ND	ND	ND	BDL	BDL
A13	BDL	BDL	BDL	50604.0	ND	ND	50604.0	ND	ND	ND	BDL	BDL
A14	BDL	BDL	BDL	50701.8	ND	ND	48891.1	ND	13081.66	ND	BDL	BDL
A15	BDL	BDL		50579.5	ND		50579.5	ND	ND		BDL	BDL
A16	BDL	ND		243.6	ND		243.6	ND	ND		BDL	BDL
A17	BDL	BDL	BDL	56990.6	ND	ND	56990.6	ND	ND	ND	BDL	BDL
A17a			1.860			ND				ND		
A17b			BDL			ND				ND		
A18	ND	ND	BDL	146.9	ND	ND	143.1	ND	ND	ND	BDL	BDL
A19	ND	ND	BDL	17.6	ND	ND	13.7	ND	ND	ND	BDL	BDL
A19a			8.883			ND				ND		
A20	BDL	BDL		3754.4	ND		3754.4	65555.1	ND		BDL	BDL
A21	111.30	5.3	BDL	3092.5	ND	ND	2988.3	ND	ND	ND	BDL	BDL
A21a	76.50	BDL		796.7	ND		786.0	ND	ND		BDL	BDL
A22	BDL	4.5	BDL	1367.4	ND	ND	1367.4	ND	ND	ND	BDL	BDL
A23	BDL	3.3		963.1	ND		963.1	ND	ND		BDL	BDL
A23a	ND	ND		ND	ND		ND	ND	ND		ND	ND
A23d	ND	ND		ND	ND		ND	ND	ND		ND	ND
A24	BDL			23.1	ND		BDL	ND			BDL	BDL
A25	BDL	BDL		BDL	ND		BDL	ND	ND		BDL	BDL
A26	BDL	BDL		45.2	ND		28.8	ND	16.08		BDL	BDL
A27	146.80	BDL	BDL	1016.0	ND	ND	884.9	ND	ND	ND	BDL	BDL
A28	BDL	BDL	BDL	59352.0	ND	ND	58153.0	ND	ND	ND	BDL	BDL
A28d		ND		ND	ND		ND	ND	ND		ND	ND
A29	BDL	BDL		265.5	ND		265.5	ND	ND		BDL	BDL
A30	BDL	BDL	BDL	74748.5	ND	ND	74748.5	ND	ND	ND	BDL	BDL
A30			BDL	50873.1		ND	50873.10			ND	BDL	BDL
A31	BDL	BDL		38650.4	ND		37218.9	ND	ND		BDL	BDL
A32	BDL			32.5	ND		32.5	ND			BDL	BDL
A33	BDL	ND	BDL	27484.7	ND	ND	27484.7	ND	ND	ND	BDL	BDL
A34	BDL	BDL	BDL	15498.3	ND	ND	15100.9	ND	ND	ND	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	ZN_T_LOAD1 grams/day	ZN_T_LOAD2 grams/day	ZN_T_LOAD3 grams/day	ZN_T_LOAD4 grams/day	ZN_D_LOAD1 grams/day	ZN_D_LOAD2 grams/day	ZN_D_LOAD3 grams/day	ZN_D_LOAD4 grams/day
A01	ND	ND	ND		ND	ND	ND	
A02	260.6	ND	ND	ND	243.2	2620.7	71.9	77.668
A02a				ND				BDL
A02b								
A02d	ND	ND	ND		ND	ND	ND	
A03	97.9	ND	ND		83.2	382.8	5.1	
A04	BDL	ND	0.6	ND	BDL	319.0	0.7	9.592
A05	279.6	ND	ND		279.6	2371.1	61.0	
A06	BDL	ND			BDL	BDL		
A07	5275.7	ND	503.6	ND	5087.3	ND	503.6	4955.175
A07LM								
A07LMS								
A07a				ND				4492.692
A07b				ND				2398.060
A07c				ND				387.605
A08	5971.2	ND	ND		5910.2	ND	743.3	
A09	6528.6	17496.1	1107.0	ND	6173.8	17496.1	1121.2	6330.878
A10	16067.0	81729.8	8890.0	ND	16067.0	81729.8	8466.6	26061.774
A11	16913.7	ND	3786.0	ND	16913.7	78225.7	3549.4	26330.699
A11a				ND				10277.400
A12	1231.3	ND	ND	ND	1231.3	1952.7	1024.1	877.494
A13	12920.2	ND	ND	ND	12920.2	66715.0	3549.4	27369.206
A14	21729.4	137944.7	8721.1	36176.448	21729.4	137944.7	8236.6	36176.448
A15	8429.9	ND	ND		8429.9	40771.2	2907.0	
A16	307.7	ND	164.2		301.3	349.4	ND	
A17	8381.0	ND	ND	ND	8381.0	35799.6	2718.4	10791.270
A17a				ND				22.023
A17b				ND				34.747
A18	73.5	ND	ND	ND	65.7	ND	ND	2048.139
A19	13.7	ND	ND	ND	13.7	ND	ND	254.488
A19a				363.380				363.380
A20	5603.6	ND	ND		5603.6	32777.6	2936.4	
A21	4169.7	ND	ND	ND	4169.7	28948.0	1018.9	9307.409
A21a	570.6	ND	ND		559.9	529.0	BDL	
A22	2890.2	ND	ND	ND	2890.2	36900.8	668.0	9567.770
A23	622.0	ND	ND		602.0	20187.8	637.2	
A23a	ND	ND	ND		ND	ND	ND	
A23d	ND	ND	ND		ND	ND	ND	
A24	BDL	ND			BDL	BDL		
A25	BDL	ND	ND		BDL	BDL	BDL	
A26	37.0	ND	BDL		37.0	386.1	16.1	
A27	12290.7	21142.1	ND	ND	11962.9	20848.4	1794.2	10726.425
A28	39568.0	ND	ND	ND	35371.4	121102.0	8087.6	41246.632
A28d	ND	ND	ND		ND	ND	ND	
A29	428.2	ND	ND		394.0	632.5	506.5	
A30	50285.4	ND	ND	ND	46887.7	118630.6	10080.2	45522.030
A30	35970.9			ND	33915.4			45522.030
A31	30538.6	ND	ND		27198.4	118344.0	9431.7	
A32	BDL	ND			BDL	BDL		
A33	20789.7	124507.3	ND	ND	19380.2	116884.4	ND	35131.090
A34	8742.6	29485.9	8270.9	24372.120	8543.9	28451.3	(8270.9)	21934.908

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SEGMENT	SUB_SEG	SITE	FLOW1 cfs	FLOW2 cfs	FLOW3 cfs	FLOW4 cfs	DATE1	DATE2	DATE3	DATE4	PH1	PH2	PH3	PH4
Animas	NF Animas	A01	ND	ND	ND		09/10/91	06/25/92	15-Oct-92		7.04	5.38	6.97	
Animas	Lucky Jack drainage	A02	.07	1.260	0.014	0.046	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.59	6.88	6.97	7.00
Animas	trib abv Lucky Jack	A02a				0.049				20-Jul-93				7.40
Animas	Lucky Jack adit	A02b				ND				20-Jul-93				3.30
Animas	Filtered Dup.	A02d					09/10/91							
Animas	Horseshoe	A03	1.000	7.110	0.061		09/10/91	06/25/92	15-Oct-92		6.69	6.86	6.98	
Animas	NF Animas	A04	0.164	2.460	0.026	0.280	09/10/91	06/25/92	15-Oct-92	20-Jul-93	7.00	7.36	7.23	7.32
Animas	NF Animas	A05	0.879	5.100	0.089		09/10/91	06/25/92	15-Oct-92		7.07	7.02	6.90	
Animas	NF Animas trib	A06	0.106	0.330			09/10/91	06/25/92			7.01	7.40		
Animas	Burrows Cr	A07	0.770	ND	0.098	1.350	09/10/91	06/25/92	15-Oct-92	20-Jul-93	5.21	4.61	5.40	4.95
Animas	Burws G-Londn Mine	A07LM				ND				20-Jul-93				6.39
Animas	Burws G-Londn Mine	A07LMS				ND				20-Jul-93				4.68
Animas	Burrows Cr	A07a				1.020				20-Jul-93				4.61
Animas	Burrows Cr	A07b				0.350				20-Jul-93				4.62
Animas	Burrows Cr	A07c				0.099				20-Jul-93				4.89
Animas	NF Animas	A08	2.490	ND	0.366		09/10/91	06/25/92	15-Oct-92		5.43	6.01	5.48	
Animas	NF Animas	A09	2.900	14.300	0.580	5.880	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.89	6.43	6.95	7.10
Animas	California	A10	4.690	33.400	1.730	12.530	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.03	6.02	7.25	6.52
Animas	California	A11	5.760	33.300	0.967	12.810	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.05	5.88	6.77	5.99
Animas	Columbus Mine adit	A11a				0.020				20-Jul-93				6.35
Animas	California adit	A12	0.148	0.190	0.135	0.163	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.67	6.27	6.65	6.35
Animas	California	A13	4.400	28.400	0.967	13.640	09/10/91	06/25/92	15-Oct-92	20-Jul-93	5.81	6.05	6.99	6.00
Animas	NF Animas	A14	7.400	65.550	1.980	19.200	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.00	5.95	4.08	6.67
Animas	California	A15	2.650	16.830	0.660		09/10/91	06/25/92	15-Oct-92		5.09	5.78	5.6	
Animas	California	A16	0.131	0.119	0.061		09/10/91	06/25/92	15-Oct-92		7.40	7.04	7.37	
Animas	California	A17	1.370	13.300	0.483	4.410	09/10/91	06/25/92	15-Oct-92	20-Jul-93	4.80	5.89	5.8	5.85
Animas	Calif. Gl adit	A17a				0.002				20-Jul-93				5.12
Animas	Calif. Gl adit	A17b				0.002				20-Jul-93				6.70
Animas	California	A18	0.158	ND	ND	2.700	09/10/91			20-Jul-93	7.15	ND		6.71
Animas	California	A19	0.004	ND	ND	0.650	09/10/91			20-Jul-93	4.83			7.35
Animas	Calif. Gl adit	A19a				0.033				20-Jul-93				3.43
Animas	Placer	A20	2.290	14.100	1.200		09/10/91	06/25/92	15-Oct-92		4.95	6.38	5.6	
Animas	Placer	A21	1.420	9.100	0.347	5.140	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.20	6.23	6.12	6.50
Animas	Placer adit	A21a	0.044	0.046	0.001		09/10/91	06/25/92	15-Oct-92		3.58	4.12	8.8	
Animas	Placer	A22	1.270	11.600	0.210	5.750	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.58	6.20	8.05	6.85
Animas	Placer	A23	0.820	7.500	0.217		09/10/91	06/25/92	15-Oct-92		6.73	5.06	7.9	
Animas	Placer adit	A23a	ND	ND			09/10/91				6.16			
Animas	Filtered Dup.	A23d	0.820				09/10/91				ND			
Animas	Cinnamon Creek	A24	1.570	30.300			09/10/91	06/25/92			7.80	7.71		
Animas	Grouse Gulch	A25	1.000	9.950	0.230		09/10/91	06/25/92	15-Oct-92		7.76	8.00	8.18	
Animas	Picayne	A26	1.680	11.270	0.730		09/10/91	06/25/92	15-Oct-92		6.68	7.66	8.5	
Animas	Burns Gulch	A27	6.697	12.000	0.797	7.970	09/10/91	06/25/92	15-Oct-92	20-Jul-93	7.14	7.54	7.7	7.16
Animas	Animas	A28	24.500	101.000	4.790	39.200	09/10/91	06/25/92	15-Oct-92	20-Jul-93	7.26	7.35	7.08	7.69
Animas	Filtered Dup.	A28d	ND				09/10/91				ND			
Animas	adit abv Niagara Gl	A29	0.035	0.055	0.045	ND	09/10/91	06/25/92	15-Oct-92	20-Jul-93	7.04	6.58	6.54	5.74
Animas	Animas	A30	27.770	101.000	4.790	42.280	09/10/91	06/25/92	15-Oct-92	20-Jul-93	6.80	7.32	7.66	7.60
Animas	Picayne Gl	A30	21.000			42.280	09/09/91			20-Jul-93	7.24			7.60
Animas	Animas	A31	19.500	102.90	5.280		09/09/91	06/25/92	15-Oct-92		7.29	7.11	6.98	
Animas	Niagra	A32	1.900	4.960			09/09/91	06/25/92			7.46	7.18		
Animas	Animas	A33	14.400	103.840	ND	39.880	09/09/91	06/25/92		20-Jul-93	6.93	7.13		6.88
Animas	Eureka	A34	8.120	21.140	2.600	24.900	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.46	7.50	6.42	6.95

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits. 9/91 31 23 29 32

102 Samples

9/91: 188/22 dup = 1/1 Σ6/92: 107 Σ10/92: 103 Σ7/93: 121 + 1 dup

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TEMP1 deg C	TEMP2 deg C	TEMP3 deg C	TEMP4 deg C	COND1 umhos	COND4 umhos	AL_TOT1 ug/l	AL_TOT2 ug/l	AL_TOT3 ug/l	AL_TOT4 ug/l	AL_DIS1 ug/l	AL_DIS2 ug/l	AL_DIS3 ug/l	AL_DIS4 ug/l	CD_TOT1 ug/l	CD_TOT2 ug/l	CD_TOT3 ug/l	CD_TOT4 ug/l
A01	7.20	14.80	8.7		70		130.0	ND	ND		71.0	BDL	BDL		BDL	0.41	BDL	
A02	7.60	18.60	6.7	13.80	70	78	730.0	ND	ND	ND	81.0	130.0	91.0	110.00	8.00	ND	ND	ND
A02a				9.00		50				ND				BDL				ND
A02b				9.00		347				ND				1700.00				ND
A02d							ND				86.0				ND			
A03	7.10	9.60	4.2		75		BDL	ND	ND		BDL	BDL	BDL		0.40	ND	ND	
A04	8.30	13.60	7.7	14.10	60	49	120.0	ND	ND	ND	57.0	BDL	BDL	BDL	BDL	ND	BDL	ND
A05	6.90	11.00	5.2		75		89.0	ND	ND		56.0	BDL	BDL		0.70	ND	ND	
A06	6.50	8.10			80		67.0	ND			BDL	BDL			BDL	ND		
A07	6.40	14.10	6.3	12.20	125	182	6000.0	ND	ND	ND	5800.0	3000.0	4600.0	3200.00	18.00	9.00	15.00	ND
A07LM				10.50		504				ND				BDL				ND
A07LMS				15.50		230				ND				460.00				ND
A07a				11.20		198				ND				3900.00				ND
A07b				11.10		206				ND				4800.00				ND
A07c				10.70		97				ND				1400.00				ND
A08	5.70	9.80	5.6		85		2300.0	ND	ND		880.0	BDL	790.0		5.00	ND	ND	
A09	8.90	44.80	4	11.50	82	50	2000.0	ND	ND	ND	170.0	BDL	65.0	BDL	6.00	3.80	4.00	ND
A10	6.80	46.00	1.8	15.40	200	140	2100.0	ND	ND	ND	1000.0	640.0	180.0	900.00	5.00	4.80	7.00	ND
A11	7.20	7.60	4.2	14.50	204	140	2000.0	ND	ND	ND	1200.0	730.0	160.0	270.00	3.70	ND	6.00	ND
A11a				14.00		620				ND				13000.00				ND
A12	11.50	13.10	9.2	14.00	697	620	110.0	ND	ND	ND	100.0	100.0	59.0	64.00	5.00	ND	ND	ND
A13	8.20	9.10	4.2	13.00	198	140	2500.0	ND	ND	ND	1500.0	790.0	730.0	410.00	3.50	ND	ND	ND
A14	6.50	43.50	1.3	11.00	173	120	2400.0	ND	ND	ND	750.0	390.0	87.0	160.00	4.50	4.30	5.00	3.070
A15	5.00	11.20	6.2		200		3500.0	ND	ND		2400.0	1700.0	1200.0		6.00	ND	ND	
A16	8.50	9.20	12.1		400		92.0	ND	BDL		66.0	BDL	ND		2.30	ND	3.10	
A17	5.00	9.60	8.1	9.72	300	180	7700.0	ND	ND	ND	7400.0	2100.0	5600.0	1300.00	9.00	ND	ND	ND
A17a				10.83		89				ND				410.00				ND
A17b				10.55		159				ND				120.00				ND
A18	4.00	ND		8.33	360	194	570.0	ND	ND	ND	110.0		ND	76.00	1.30		ND	ND
A19	5.00			5.00	560	236	2000.0	ND	ND	ND	1000.0		ND	BDL	10.00		ND	ND
A19a				8.89		203				ND				3000.00				42.000
A20	7.78	47.60	3.7		130		740.0	ND	ND		500.0	88.0	150.0		2.70	ND	ND	
A21	7.50	46.30	6.7	11.00	117	90	1000.0	ND	ND	ND	600.0	190.0	250.0	65.00	2.80	ND	ND	ND
A21a	6.90	42.50	7.9		374		11000.0	ND	ND		11000.0	8000.0	BDL		18.00	ND	ND	
A22	7.50	43.20	7.3	11.50	165	80	520.0	ND	ND	ND	160.0	100.0	240.0	58.00	1.70	ND	ND	ND
A23	6.90	35.70	8		148		1200.0	ND	ND		610.0	BDL	210.0		0.60	ND	ND	
A23a	7.00				150		1800.0	BDL			ND	BDL			0.50			
A23d					0		ND				580.0				ND			
A24	8.50	5.10			164		110.0	ND			56.0	BDL			BDL	ND		
A25	7.50	7.40	8		206		53.0	ND	ND		50.0	BDL	BDL		BDL	ND	ND	
A26	8.00	9.80	1.5		195		87.0	ND	ND		67.0	BDL	BDL		BDL	ND	BDL	
A27	5.70	6.40	4.5	10.11	137	68	94.0	ND	ND	ND	75.0	76.0	BDL	BDL	5.00	4.90	ND	ND
A28	9.00	6.30	5.16	6.90	174	93	890.0	ND	ND	ND	110.0	53.0	BDL	58.00	2.90	ND	ND	ND
A28d					0		ND				100.0				ND			
A29	11.00	12.30	11	12.40	673	560	660.0	ND	ND	ND	74.0	530.0	860.0	280.00	20.00	ND	ND	ND
A30	6.40	5.10	3.7	4.20	178	91	970.0	ND	ND	ND	100.0	52.0	83.0	82.00	3.30	ND	ND	ND
A30	9.80			4.20	183	91	610.0			ND	91.0			82.00	3.30			ND
A31	12.22	4.10	2.5		162		490.0	ND	ND		110.0	59.0	71.0		3.00	ND	ND	
A32	10.20	1.50			110		BDL	ND			BDL	BDL			BDL	ND		
A33	11.00	66.40	dry	11.80	145	95	360.0	ND	ND	ND	74.0	67.0	ND	66.00	2.90	2.10	ND	ND
A34	10.40	6.30	2.3	10.60	140	158	120.0	ND	ND	ND	74.0	94.0	75.0	84.00	1.60	2.20	3.50	1.350

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_DIS1 ug/l	CD_DIS2 ug/l	CD_DIS3 ug/l	CD_DIS4 ug/l	CHROM_T_1 ug/l	CHROM_D_1 ug/l	COPPER1TOT ug/l	COPPER2TOT ug/l	COPPER3TOT ug/l	COPPER4TOT ug/l	COPPER1DIS ug/l	COPPER2DIS ug/l	COPPER3DIS ug/l	COPPER4DIS ug/l
A01	BDL	0.59	BDL		BDL	BDL	BDL	3.0	BDL		BDL	2.0	BDL	
A02	6.00	8.00	10.00	4.630	BDL	BDL	13.0	ND	ND	ND	BDL	4.0	5.0	5.00
A02a				BDL						ND				BDL
A02b				21.900						ND				140.00
A02d	7.00				ND	BDL	ND				BDL			
A03	BDL	BDL	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A04	BDL	0.31	BDL	BDL	BDL	BDL	BDL	ND	BDL	ND	BDL	BDL	BDL	BDL
A05	0.70	2.80	1.50		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A06	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A07	17.00	9.00	14.00	11.500	BDL	BDL	55.0	36.0	56.0	ND	52.0	35.0	56.0	46.00
A07LM				10.700						ND				9.00
A07LMS				4.460						ND				89.00
A07a				10.400						ND				57.00
A07b				11.400						ND				42.00
A07c				8.600						ND				30.00
A08	5.00	4.10	6.00		BDL	BDL	19.0	ND	ND		17.0	5.0	18.0	
A09	6.00	3.70	5.00	3.060	BDL	BDL	19.0	10.0	7.0	ND	13.0	6.0	5.0	8.00
A10	5.00	4.00	7.00	2.970	BDL	BDL	33.0	27.0	44.0	ND	26.0	23.0	29.0	20.00
A11	3.30	4.20	5.00	2.930	BDL	BDL	18.0	ND	18.0	ND	14.0	20.0	8.0	16.00
A11a				900.000						ND				8200.00
A12	4.00	7.00	8.00	5.000	BDL	BDL	BDL	ND	ND	ND	BDL	BDL	BDL	BDL
A13	3.50	4.30	5.00	2.930	BDL	BDL	19.0	ND	ND	ND	14.0	20.0	12.0	16.00
A14	4.40	4.40	5.00	3.230	BDL	BDL	27.0	23.0	31.0	22.00	21.0	17.0	20.0	15.00
A15	5.00	4.60	8.00		BDL	BDL	11.0	ND	ND		8.0	17.0	12.0	
A16	2.10	3.60	ND		BDL	BDL	BDL	ND	BDL		BDL	BDL	ND	
A17	9.00	4.90	9.00	3.800	BDL	BDL	25.0	ND	ND	ND	22.0	15.0	25.0	14.00
A17a				18.600						ND				51.00
A17b				17.100						ND				14.00
A18	1.30		ND	1.610	BDL	BDL	54.0		ND	ND	18.0		ND	20.00
A19	10.00		ND	0.730	BDL	BDL	74.0		ND	ND	63.0		ND	9.00
A19a				42.000						1700.00				1700.00
A20	2.70	3.80	2.10		BDL	BDL	26.0	ND	ND		25.0	22.0	18.0	
A21	2.80	5.00	2.50	2.150	BDL	BDL	31.0	ND	ND	ND	26.0	42.0	18.0	20.00
A21a	17.00	20.00	BDL		BDL	BDL	290.0	ND	ND		280.0	460.0	BDL	
A22	1.60	5.10	2.90	1.750	BDL	BDL	9.0	ND	ND	ND	6.0	36.0	9.0	18.00
A23	0.60	3.90	2.90		BDL	BDL	BDL	ND	ND		BDL	9.0	5.0	
A23a	ND				BDL	ND	BDL				ND			
A23d	0.70				ND	BDL	ND				BDL			
A24	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A25	BDL	BDL	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A26	BDL	BDL	BDL		BDL	BDL	BDL	ND	BDL		BDL	BDL	BDL	
A27	4.60	4.90	6.00	3.390	BDL	BDL	25.0	30.0	ND	ND	22.0	27.0	14.0	16.00
A28	3.80	2.20	2.50	1.860	BDL	BDL	18.0	ND	ND	ND	8.0	6.0	6.0	7.00
A28d	3.00				ND	BDL	ND				6.0			
A29	19.00	17.00	17.00	13.700	BDL	BDL	3000.0	ND	ND	ND	190.0	2300.0	3600.0	960.00
A30	2.90	3.10	3.40	1.940	BDL	BDL	57.0	ND	ND	ND	24.0	10.0	66.0	15.00
A30	3.20			1.940	BDL	BDL	50.0			ND	24.0			15.00
A31	2.90	2.10	2.10		BDL	BDL	43.0	ND	ND		18.0	9.0	38.0	
A32	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A33	2.80	2.10	ND	1.650	BDL	BDL	39.0	17.0	ND	ND	16.0	7.0	ND	12.00
A34	1.60	2.10	3.50	1.320	BDL	BDL	10.0	18.0	22.0	16.00	5.0	11.0	11.0	10.00

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	IRON_TOT1 ug/l	IRON_TOT2 ug/l	IRON_TOT3 ug/l	IRON_TOT4 ug/l	IRON_DIS1 ug/l	IRON_DIS2 ug/l	IRON_DIS3 ug/l	IRON_DIS4 ug/l	LEAD_TOT1 ug/l	LEAD_TOT2 ug/l	LEAD_TOT3 ug/l	LEAD_TOT4 ug/l	LEAD_DIS1 ug/l	LEAD_DIS2 ug/l	LEAD_DIS3 ug/l
A01	440.0	180.0	340.0		220.0	84.0	ND		BDL	BDL	BDL		BDL	BDL	BDL
A02	2500.0	ND	ND	ND	150.0	ND	ND	130.00	12.0	ND	ND	ND	BDL	BDL	BDL
A02a				ND				BDL				ND			
A02b				ND				3600.00				ND			
A02d	ND				150.0				ND				BDL		
A03	69.0	ND	ND		BDL	ND	ND		37.0	ND	ND		BDL	BDL	BDL
A04	130.0	ND	27.0	ND	74.0	ND	12.0	54.00	BDL	ND	BDL	ND	BDL	BDL	BDL
A05	69.0	ND	ND		26.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A06	50.0	ND			BDL	ND			8.0	ND			BDL	BDL	
A07	160.0	67.0	49.0	ND	110.0	ND	ND	78.00	7.0	7.0	BDL	ND	6.0	8.0	BDL
A07LM				ND				47.00				ND			
A07LMS				ND				630.00				ND			
A07a				ND				77.00				ND			
A07b				ND				60.00				ND			
A07c				ND				17.00				ND			
A08	100.0	ND	ND		78.0	ND	ND		7.0	ND	ND		5.0	BDL	BDL
A09	200.0	62.0	BDL	ND	19.0	ND	ND	17.00	30.0	BDL	19.0	ND	7.0	BDL	17.0
A10	220.0	78.0	120.0	ND	46.0	ND	ND	66.00	12.0	7.0	BDL	ND	BDL	BDL	BDL
A11	180.0	ND	100.0	ND	53.0	ND	ND	20.00	12.0	ND	BDL	ND	BDL	BDL	BDL
A11a				ND				63000.00				ND			
A12	680.0	ND	ND	ND	270.0	ND	280.0	140.00	BDL	ND	ND	ND	BDL	BDL	BDL
A13	280.0	ND	ND	ND	54.0	ND	ND	19.00	16.0	ND	ND	ND	6.0	BDL	BDL
A14	230.0	68.0	56.0	53.00	32.0	ND	ND	16.00	16.0	5.0	6.1	BDL	6.0	BDL	BDL
A15	150.0	ND	ND		74.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A16	340.0	ND	ND		13.0	ND	ND		BDL	ND	BDL		BDL	BDL	ND
A17	51.0	ND	ND	ND	BDL	ND	ND	30.00	BDL	ND	ND	ND	BDL	BDL	BDL
A17a				ND				BDL				ND			
A17b				ND				BDL				ND			
A18	250.0		ND	ND	BDL		ND	24.00	BDL		ND	ND	BDL		ND
A19	2200.0		ND	ND	BDL		ND	BDL	70.0		ND	ND	10.0		ND
A19a				6700.00				6800.00				110.00			
A20	230.0	ND	ND		110.0	ND	ND		36.0	ND	ND		16.0	BDL	BDL
A21	270.0	ND	ND	ND	64.0	ND	ND	BDL	42.0	ND	ND	ND	21.0	5.0	6.2
A21a	8200.0	ND	ND		7600.0	9100.0	ND		390.0	ND	ND		370.0	680.0	BDL
A22	20.0	ND	ND	ND	15.0	ND	ND	BDL	24.0	ND	ND	ND	14.0	BDL	8.7
A23	27.0	ND	ND		60.0	ND	ND		BDL	ND	ND		19.0	BDL	6.3
A23a	BDL				ND				BDL				ND		
A23d	ND				99.0				ND				16.0		
A24	71.0	ND			14.0	ND			BDL	ND			BDL	BDL	
A25	27.0	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A26	35.0	ND	ND		11.0	ND	ND		BDL	ND	BDL		BDL	BDL	BDL
A27	80.0	BDL	ND	ND	12.0	ND	ND	BDL	18.0	7.0	ND	ND	BDL	5.0	BDL
A28	93.0	ND	ND	ND	BDL	ND	ND	BDL	7.0	ND	ND	ND	BDL	BDL	BDL
A28d	ND				BDL				ND				BDL		
A29	6500.0	ND	ND	ND	BDL	ND	ND	4300.00	5.0	ND	ND	ND	BDL	BDL	BDL
A30	150.0	ND	ND	ND	BDL	ND	ND	16.00	11.0	ND	ND	ND	BDL	BDL	BDL
A30	65.0			ND	BDL			16.00	5.0			ND	BDL		
A31	51.0	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A32	14.0	ND			BDL	ND			BDL	ND			BDL	BDL	
A33	46.0	61.0	ND	ND	BDL	ND	ND	BDL	BDL	BDL	ND	ND	BDL	BDL	ND
A34	130.0	92.0	260.0	100.00	15.0	ND	ND	17.00	BDL	6.0	BDL	BDL	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	LEAD_DIS4 ug/l	MN_TOT1 ug/l	MN_TOT2 ug/l	MN_TOT4 ug/l	MN_DIS1 ug/l	MN_DIS2 ug/l	MN_DIS3 ug/l	MN_DIS4 ug/l	NICKEL1TOT ug/l	NICKEL1DIS ug/l	SE_TOT_1 ug/l	SE_TOT_3 ug/l	SE_DIS1 ug/l	SE_DIS2 ug/l	SE_DIS3 ug/l	SILVER1TOT ug/l
A01		94.0	ND		85.0	19.0	41.0		BDL	BDL	BDL	ND	BDL	BDL	ND	BDL
A02	BDL	330.0	ND	ND	320.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A02a	BDL			ND				ND								
A02b	570.00			ND				ND								
A02d		ND			310.0				ND	BDL	ND		ND			ND
A03		18.0	ND		BDL	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A04	BDL	10.0	ND	ND	5.0	ND	BDL	ND	BDL	BDL	ND	ND	ND	ND	BDL	BDL
A05		29.0	ND		24.0	ND	ND		BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A06		6.0	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
A07	6.00	2400.0	ND	ND	2400.0	ND	2700.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A07LM	BDL			ND				1400.00								
A07LMS	37.00			ND				ND								
A07a	BDL			ND				2400.00								
A07b	9.00			ND				ND								
A07c	15.00			ND				ND								
A08		800.0	ND		790.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A09	BDL	610.0	ND	ND	560.0	340.0	170.0	ND	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
A10	BDL	3700.0	ND	ND	3700.0	2900.0	3600.0	ND	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
A11	BDL	4100.0	ND	ND	4100.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A11a	310.00			ND				ND								
A12	BDL	7000.0	ND	ND	6900.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A13	BDL	4700.0	ND	ND	4700.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	0.20
A14	BDL	2800.0	ND	ND	2700.0	ND	2700.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A15		7800.0	ND		7800.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A16		760.0	ND		760.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A17	BDL	17000.0	ND	ND	17000.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A17a	380.00			ND				ND								
A17b	BDL			ND				ND								
A18	BDL	380.0		ND	370.0		ND	ND	BDL	BDL	ND	ND	ND		ND	BDL
A19	BDL	1800.0		ND	1400.0		ND	ND	BDL	BDL	BDL	ND	ND		ND	0.60
A19a	110.00			ND				ND								
A20		670.0	ND		670.0	1900.0	ND		BDL	BDL	BDL	ND	BDL	BDL	BDL	1.00
A21	BDL	890.0	ND	ND	860.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A21a		7400.0	ND		7300.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	2.40
A22	BDL	440.0	ND	ND	440.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A23		480.0	ND		480.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A23a		730.0			ND				BDL	ND	ND		ND			BDL
A23d		ND			480.0				ND	BDL	ND		ND			ND
A24		6.0	ND		BDL	ND			BDL	BDL	BDL		BDL	ND		BDL
A25		BDL	ND		BDL	ND	ND		BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A26		11.0	ND		7.0	ND	9.0		BDL	BDL	ND	ND	ND	ND	ND	BDL
A27	BDL	62.0	ND	ND	54.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A28	BDL	990.0	ND	ND	970.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A28d		ND			980.0				ND	BDL	ND		ND			ND
A29	BDL	3100.0	ND	ND	3100.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	BDL	BDL
A30	BDL	1100.0	ND	ND	1100.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A30	BDL	990.0		ND	990.0			ND	BDL	BDL	ND		ND			BDL
A31		810.0	ND		780.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A32		7.0	ND		7.0	ND			BDL	BDL	ND		ND	ND		BDL
A33	BDL	780.0	ND	ND	780.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A34	BDL	780.0	ND	ND	760.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SILVER2TOT ug/l	SILVER3TOT ug/l	SILVER1DIS ug/l	SILVER2DIS ug/l	SILVER3DIS ug/l	ZINC_TOT1 ug/l	ZINC_TOT2 ug/l	ZINC_TOT3 ug/l	ZINC_TOT4 ug/l	ZINC_DIS1 ug/l	ZINC_DIS2 ug/l	ZINC_DIS3 ug/l	ZINC_DIS4 ug/l
A01	ND	ND	BDL	BDL	BDL	21.0	81.0	14.0		16.0	81.0	11.0	
A02	ND	ND	BDL	BDL	BDL	1500.0	ND	ND	ND	1400.0	850.0	2100.0	690.00
A02a									ND				BDL
A02b									ND				7100.00
A02d			BDL			ND				1400.0			
A03	ND	ND	BDL	BDL	BDL	40.0	ND	ND		34.0	22.0	34.0	
A04	ND	ND	BDL	BDL	BDL	BDL	ND	10.0	ND	BDL	53.0	11.0	14.00
A05	ND	ND	BDL	BDL	BDL	130.0	ND	ND		130.0	190.0	280.0	
A06	ND		BDL	BDL		BDL	ND			BDL	BDL		
A07	ND	ND	BDL	BDL	BDL	2800.0	1600.0	2100.0	ND	2700.0	1600.0	2100.0	1500.00
A07LM									ND				8700.00
A07LMS									ND				1400.00
A07a									ND				1800.00
A07b									ND				2800.00
A07c									ND				1600.00
A08	ND	ND	BDL	BDL	BDL	980.0	ND	ND		970.0	430.0	830.0	
A09	ND	ND	BDL	BDL	BDL	920.0	500.0	780.0	ND	870.0	500.0	790.0	440.00
A10	ND	ND	BDL	BDL	BDL	1400.0	1000.0	2100.0	ND	1400.0	1000.0	2000.0	850.00
A11	ND	ND	BDL	BDL	BDL	1200.0	ND	1600.0	ND	1200.0	960.0	1500.0	840.00
A11a									ND				210000.00
A12	ND	ND	BDL	BDL	BDL	3400.0	ND	ND	ND	3400.0	4200.0	3100.0	2200.00
A13	ND	ND	BDL	BDL	BDL	1200.0	ND	ND	ND	1200.0	960.0	1500.0	820.00
A14	ND	ND	BDL	BDL	BDL	1200.0	860.0	1800.0	770.00	1200.0	860.0	1700.0	770.00
A15	ND	ND	BDL	BDL	BDL	1300.0	ND	ND		1300.0	990.0	1800.0	
A16	ND	BDL	BDL	BDL	ND	960.0	ND	1100.0		940.0	1200.0	ND	
A17	ND	ND	BDL	BDL	BDL	2500.0	ND	ND	ND	2500.0	1100.0	2300.0	1000.00
A17a									ND				4500.00
A17b									ND				7100.00
A18		ND	BDL		ND	190.0		ND	ND	170.0		ND	310.00
A19		ND	BDL		ND	1400.0		ND	ND	1400.0		ND	160.00
A19a									4500.00				4500.00
A20	ND	ND	BDL	BDL	BDL	1000.0	ND	ND		1000.0	950.0	1000.0	
A21	ND	ND	BDL	BDL	BDL	1200.0	ND	ND	ND	1200.0	1300.0	1200.0	740.00
A21a	ND	ND	BDL	2.50	BDL	5300.0	ND	ND		5200.0	4700.0	BDL	
A22	ND	ND	BDL	BDL	BDL	930.0	ND	ND	ND	930.0	1300.0	1300.0	680.00
A23	ND	ND	BDL	BDL	BDL	310.0	ND	ND		300.0	1100.0	1200.0	
A23a			ND			160.0				ND			
A23d			0.60			ND				310.0			
A24	ND		BDL	BDL		BDL	ND			BDL	BDL		
A25	ND	ND	BDL	BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A26	ND	ND	BDL	BDL	BDL	9.0	ND	BDL		9.0	14.0	9.0	
A27	ND	ND	BDL	BDL	BDL	750.0	720.0	ND	ND	730.0	710.0	920.0	550.00
A28	ND	ND	BDL	BDL	BDL	660.0	ND	ND	ND	590.0	490.0	690.0	430.00
A28d			BDL			ND				590.0			
A29	ND	ND	BDL	BDL	BDL	5000.0	ND	ND	ND	4600.0	4700.0	4600.0	3800.00
A30	ND	ND	BDL	BDL	BDL	740.0	ND	ND	ND	690.0	480.0	860.0	440.00
A30			BDL			700.0			ND	660.0			440.00
A31	ND	ND	BDL	BDL	BDL	640.0	ND	ND		570.0	470.0	730.0	
A32	ND		BDL	BDL		BDL	ND			BDL	BDL		
A33	ND	ND	BDL	BDL	ND	590.0	490.0	ND	ND	550.0	460.0	ND	360.00
A34	ND	ND	BDL	BDL	BDL	440.0	570.0	1300.0	400.00	430.0	550.0	1300.0	360.00

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AS_DIS1 ug/l	AS_DIS2 ug/l	AS_TOT3 ug/l	AS_DIS3 ug/l	AS_TOT4 ug/l	AS_DIS4 ug/l	CYANIDE1 mg/l	CYANIDE2 mg/l	CYANIDE3 mg/l	CYANIDE4 mg/l	ALK1 mg/l	ALK2 mg/l	HARD1 mg/l	HARD2 mg/l	HARD3 mg/l	HARD4 mg/l
A01	ND	1.00	ND	ND			ND	BDL	ND		24.0	0.0	33.94	23.0	36.23	
A02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34.64	27.0	55.35	29
A02a					ND	ND				ND						21
A02b					ND	ND										
A02d	ND						ND				ND		ND			
A03	ND	ND	ND	ND			ND	ND	ND		ND	ND	36.17	ND	54.23	
A04	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL	ND	ND	ND	4.12	22.0	27.12	19
A05	BDL	ND	ND	ND			ND	ND	ND		ND	ND	35.76	16.0	48.23	
A06	ND	ND					ND	ND			ND	ND	42.93	27.0		
A07	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	45.47	21.0	51.35	30
A07LM					ND	ND				ND						
A07LMS					ND	ND				ND						54
A07a					ND	ND				ND						34
A07b					ND	ND				ND						25
A07c					ND	ND				ND						14
A08	ND	ND	ND	ND			ND	ND	ND		ND	ND	32.58	21.0	46.23	
A09	BDL	BDL	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	ND	43.64	18.0	45.23	22
A10	BDL	BDL	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	ND	76.76	42.0	113.46	57
A11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	59.70	42.0	116.46	58
A11a					ND	ND				ND						
A12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	256.34	ND	ND	318
A13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	55.11	45.0	90.35	56
A14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	49.88	37.0	100.35	45
A15	ND	ND	ND	ND			ND	ND	ND		ND	ND	89.70	50.0	98.69	
A16	ND	ND	ND	ND			ND	ND	ND		ND	ND	199.34	ND	ND	
A17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	78.46	54.0	49.23	68
A17a					ND	ND				ND						27
A17b					ND	ND				ND						62
A18	ND		ND	ND	ND	ND	ND		ND	ND	ND		178.81		ND	100
A19	ND		ND	ND	ND	ND	ND		ND	ND	ND		114.93		ND	129
A19a					ND	ND				ND						36
A20	BDL	BDL	ND	BDL			ND	BDL	ND		ND	ND	45.58	39.0	110.35	
A21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	46.82	48.0	63.23	40
A21a	ND	ND	ND	ND			ND	ND	ND		ND	ND	13.81	ND	ND	
A22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	49.82	47.0	61.23	39
A23	ND	ND	ND	ND			ND	ND	ND		ND	ND	45.58	39.0	64.23	
A23a	ND						ND				ND		40.00			
A23d	ND						ND				ND		ND			
A24	ND	ND					ND	ND			ND	ND	66.00	34.0		
A25	ND	ND	ND	ND			ND	ND	ND		ND	ND	90.82	47.0	112.35	
A26	ND	ND	ND	ND			ND	ND	ND		ND	ND	113.23	49.0	214.69	
A27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	48.53	36.0	80.23	31
A28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	67.82	38.0	110.35	35
A28d	ND						ND				ND		ND			
A29	ND	ND	ND	2.30	ND	ND	ND	ND	ND	ND	ND	ND	296.46	310.0	ND	309
A30	BDL	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	70.23	40.0	124.69	46
A30	ND				ND	ND	ND			ND	ND		62.23			46
A31	ND	ND	ND	ND			ND	ND	ND		ND	ND	66.05	40.0	112.35	
A32	ND	ND					ND	ND			ND	ND	65.58	31.0		
A33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	81.29	40.0	ND	48
A34	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	151.11	71.0	246.46	79

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TSS_1 mg/l	TSS_2 mg/l	TSS_3 mg/l	TSS-4 mg/l	HG_1 ug/l	HG_2 ug/l	HG_3 ug/l	HG_4 ug/l
A01					ND	BDL	ND	
A02					ND	ND	ND	ND
A02a								ND
A02b								
A02d					ND			
A03					ND	ND	ND	
A04			BDL		ND	ND	ND	ND
A05					ND	ND	ND	
A06					ND	ND		
A07					ND	ND	ND	ND
A07LM								ND
A07LMS								ND
A07a								ND
A07b								ND
A07c								ND
A08					ND	ND	ND	
A09					BDL	BDL	ND	ND
A10					BDL	BDL	ND	ND
A11					ND	ND	ND	ND
A11a								ND
A12					ND	ND	ND	ND
A13					ND	ND	ND	ND
A14					ND	ND	BDL	ND
A15					ND	ND	ND	
A16					ND	ND	ND	
A17					ND	ND	ND	ND
A17a								ND
A17b								ND
A18					ND		ND	ND
A19					ND		ND	ND
A19a								ND
A20					ND	BDL	ND	
A21					ND	ND	ND	ND
A21a					ND	ND	BDL	
A22					ND	ND	ND	ND
A23					ND	ND	ND	
A23a					ND			
A23d					ND			
A24					ND	ND		
A25					ND	ND	ND	
A26					ND	ND	ND	
A27					ND	ND	ND	ND
A28					ND	ND	ND	ND
A28d					ND			
A29					ND	ND	ND	ND
A30					ND	BDL	ND	ND
A30					ND			ND
A31					ND	ND	ND	
A32					ND	ND		
A33					ND	ND	ND	ND
A34				BDL	BDL	ND	ND	ND

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AL_T_LOAD1 grams/day	AL_T_LOAD3 grams/day	AL_T_LOAD4 grams/day	AL_D_LOAD1 grams/day	AL_D_LOAD2 grams/day	AL_D_LOAD3 grams/day	AL_D_LOAD4 grams/day	CD_T_LOAD1 grams/day	CD_T_LOAD2 grams/day	CD_T_LOAD3 grams/day	CD_T_LOAD4 grams/day	CD_D_LOAD1 grams/day	CD_D_LOAD2 grams/day
A01	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A02	126.8	ND	ND	14.1	400.8	3.12	12.382	1.4	ND	ND	ND	1.4	24.7
A02a			ND				BDL				ND		
A02b													
A02d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A03	BDL	ND		BDL	BDL	BDL		1.0	ND	ND		1.0	BDL
A04	48.2	ND	ND	22.9	BDL	BDL	BDL	BDL	ND	BDL	ND	BDL	1.9
A05	191.4	ND		120.5	BDL	BDL		1.5	ND	ND		1.5	34.9
A06	17.4			BDL	BDL			BDL	ND			BDL	BDL
A07	11305.1	ND	ND	10928.3	ND	1103.11	10571.040	33.9	ND	3.60	ND	33.9	ND
A07LM													
A07LMS													
A07a			ND				9734.166				ND		
A07b			ND				4110.960				ND		
A07c			ND				339.154				ND		
A08	14014.0	ND		5361.9	ND	707.53		30.5	ND	ND		30.5	ND
A09	14192.6	ND	ND	1206.4	BDL	92.25	BDL	42.6	133.0	5.68	ND	42.6	129.5
A10	24100.5	ND	ND	11476.4	52307.1	762.00	27594.819	57.4	392.3	29.63	ND	57.4	326.9
A11	28189.4	ND	ND	16913.7	59484.1	378.60	8463.439	52.2	ND	14.20	ND	52.2	342.2
A11a			ND				636.220				ND		
A12	39.8	ND	ND	36.2	46.5	19.49	25.527	1.8	ND	ND	ND	1.8	3.3
A13	26917.0	ND	ND	16150.2	54900.9	1727.36	13684.603	37.7	ND	ND	ND	37.7	298.8
A14	43458.7	ND	ND	13580.9	62556.3	421.52	7517.184	81.5	689.7	24.23	144.236	81.5	705.8
A15	22695.9	ND		15562.9	70011.1	1938.02		38.9	ND	ND		38.9	189.4
A16	29.5	BDL		21.2	BDL	BDL		0.7	ND	0.46		0.7	1.0
A17	25813.4	ND	ND	24807.7	68344.7	6618.65	14028.651	30.2	ND	ND	ND	30.2	159.5
A17a			ND				2.007				ND		
A17b			ND				0.587				ND		
A18	220.4	ND	ND	42.5	ND	ND	502.124	0.5	ND	ND	ND	0.5	ND
A19	19.6	ND	ND	9.8	ND	ND	BDL	0.1	ND	ND	ND	0.1	ND
A19a			ND				242.253				3.392		
A20	4146.7	ND		2801.8	3036.2	440.46		15.1	ND	ND		15.1	131.1
A21	3474.7	ND	ND	2084.8	4230.9	212.28	817.543	9.7	ND	ND	ND	9.7	111.3
A21a	1184.3	ND		1184.3	900.5	BDL		1.9	ND	ND		1.9	2.3
A22	1616.0	ND	ND	497.2	2838.5	123.33	816.075	5.3	ND	ND	ND	5.3	144.8
A23	2407.8	ND		1224.0	BDL	111.51		1.2	ND	ND		1.2	71.6
A23a	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A23d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A24	422.6			215.1	BDL			BDL	ND			BDL	BDL
A25	129.7	ND		122.4	BDL	BDL		BDL	ND	ND		BDL	BDL
A26	357.7	ND		275.4	BDL	BDL		BDL	ND	BDL		BDL	BDL
A27	1540.4	ND	ND	1229.1	2231.7	BDL	BDL	81.9	143.9	ND	ND	81.9	143.9
A28	53356.8	ND	ND	6594.7	13098.8	BDL	5563.499	173.9	ND	ND	ND	173.9	543.7
A28d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A29	56.5	ND		6.3	71.3	94.70		1.7	ND	ND		1.7	2.3
A30	65914.6	ND	ND	6795.3	12851.6	972.85	8483.651	224.2	ND	ND	ND	224.2	766.2
A30	31346.1		ND	4676.2			8483.651	169.6			ND	169.6	
A31	23381.1	ND		5248.8	14855.9	917.33		143.1	ND	ND		143.1	528.7
A32	BDL			BDL	BDL			BDL	ND			BDL	BDL
A33	12685.2	ND	ND	2607.5	17024.5	ND	6440.700	102.2	533.6	ND	ND	102.2	533.6
A34	2384.4	ND	ND	1470.4	4862.6	477.17	5118.145	31.8	113.8	22.27	82.256	31.8	108.6

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_D_LOAD3 grams/day	CD_D_LOAD4 grams/day	CR_T_LOAD1 grams/day	CR_D_LOAD1 grams/day	CU_T_LOAD1 grams/day	CU_T_LOAD2 grams/day	CU_T_LOAD3 grams/day	CU_T_LOAD4 grams/day	CU_D_LOAD1 grams/day	CU_D_LOAD2 grams/day	CU_D_LOAD3 grams/day	CU_D_LOAD4 grams/day
A01	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A02	0.34	0.521	BDL	BDL	2.3	ND	ND	ND	BDL	12.3	0.17	0.563
A02a		BDL						ND				BDL
A02b												
A02d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A03	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A04	BDL	BDL	BDL	BDL	BDL	ND	BDL	ND	BDL	BDL	BDL	BDL
A05	0.33		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A06			BDL	BDL	BDL	ND			BDL	BDL		
A07	3.36	37.990	BDL	BDL	103.6	ND	13.43	ND	98.0	ND	13.43	151.959
A07LM												
A07LMS												
A07a		25.958						ND				142.269
A07b		9.764						ND				35.971
A07c		2.083						ND				7.268
A08	5.37		BDL	BDL	115.8	ND	ND		103.6	ND	16.12	
A09	7.10	44.028	BDL	BDL	134.8	349.9	9.93	ND	92.3	210.0	7.10	115.107
A10	29.63	91.063	BDL	BDL	378.7	2206.7	186.27	ND	298.4	1879.8	122.77	613.218
A11	11.83	91.844	BDL	BDL	253.7	ND	42.59	ND	197.3	1629.7	18.93	501.537
A11a		44.046						ND				401.308
A12	2.64	1.994	BDL	BDL	BDL	ND	ND	ND	BDL	BDL	BDL	BDL
A13	11.83	97.795	BDL	BDL	204.6	ND	ND	ND	150.7	1389.9	28.39	534.033
A14	24.23	151.753	BDL	BDL	488.9	3689.2	150.20	1033.613	380.3	2726.8	96.90	704.736
A15	12.92		BDL	BDL	71.3	ND	ND		51.9	700.1	19.38	
A16	ND		BDL	BDL	BDL	ND	BDL		BDL	BDL	ND	
A17	10.64	41.007	BDL	BDL	83.8	ND	ND	ND	73.8	488.2	29.55	151.078
A17a		0.091						ND				0.250
A17b		0.084						ND				0.069
A18	ND	10.637	BDL	BDL	20.9	ND	ND	ND	7.0	ND	ND	132.138
A19	ND	1.161	BDL	BDL	0.7	ND	ND	ND	0.6	ND	ND	14.315
A19a		3.392						137.277				137.277
A20	6.17		BDL	BDL	145.7	ND	ND		140.1	759.1	52.86	
A21	2.12	27.042	BDL	BDL	107.7	ND	ND	ND	90.3	935.2	15.28	251.552
A21a	BDL		BDL	BDL	31.2	ND	ND		30.1	51.8	BDL	
A22	1.49	24.623	BDL	BDL	28.0	ND	ND	ND	18.6	1021.9	4.62	253.265
A23	1.54		BDL	BDL	BDL	ND	ND		BDL	165.2	2.65	
A23a	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A23d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A24			BDL	BDL	BDL	ND			BDL	BDL		
A25	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A26	BDL		BDL	BDL	BDL	ND	BDL		BDL	BDL	BDL	
A27	11.70	66.114	BDL	BDL	409.7	880.9	ND	ND	360.5	792.8	27.30	312.041
A28	29.30	178.416	BDL	BDL	1079.1	ND	ND	ND	479.6	1482.9	70.33	671.457
A28d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A29	1.87		BDL	BDL	256.9	ND	ND		16.3	309.5	396.41	
A30	39.85	200.711	BDL	BDL	3873.3	ND	ND	ND	1630.9	2471.5	773.59	1551.887
A30		200.711	BDL	BDL	2569.4			ND	1233.3			1551.887
A31	27.13		BDL	BDL	2051.8	ND	ND		858.9	2266.1	490.97	
A32			BDL	BDL	BDL	ND			BDL	BDL		
A33	ND	161.017	BDL	BDL	1374.2	4319.6	ND	ND	563.8	1778.7	ND	1171.036
A34	22.27	80.428	BDL	BDL	198.7	931.1	139.97	974.885	99.3	569.0	69.98	609.303

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	FE_T_LOAD1 grams/day	FE_T_LOAD2 grams/day	FE_T_LOAD3 grams/day	FE_T_LOAD4 grams/day	FE_D_LOAD1 grams/day	FE_D_LOAD2 grams/day	FE_D_LOAD3 grams/day	FE_D_LOAD4 grams/day	PB_T_LOAD1 grams/day	PB_T_LOAD2 grams/day	PB_T_LOAD3 grams/day	PB_T_LOAD4 grams/day	PB_D_LOAD1 grams/day
A01	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A02	434.3	ND	ND	ND	26.1	ND	ND	14.633	2.1	ND	ND	ND	BDL
A02a				ND				BDL				ND	
A02b													
A02d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A03	168.8	ND	ND		BDL	ND	ND		90.5	ND	ND		BDL
A04	52.2	ND	1.72	ND	29.7	ND	0.76	36.999	BDL	ND	BDL	ND	BDL
A05	148.4	ND	ND		55.9	ND	ND		BDL	ND	ND		BDL
A06	13.0	ND			BDL	ND			2.1	ND			BDL
A07	301.5	ND	11.75	ND	207.3	ND	ND	257.669	13.2	ND	BDL	ND	11.3
A07LM													
A07LMS													
A07a				ND				192.187				ND	
A07b				ND				51.387				ND	
A07c				ND				4.118				ND	
A08	609.3	ND	ND		475.3	ND	ND		42.7	ND	ND		30.5
A09	1419.3	2169.5	BDL	ND	134.8	ND	ND	244.602	212.9	BDL	27.0	ND	49.7
A10	2524.8	6374.9	508.00	ND	527.9	ND	ND	2023.620	137.7	572.1	BDL	ND	BDL
A11	2537.0	ND	236.62	ND	747.0	ND	ND	626.921	169.1	ND	BDL	ND	BDL
A11a				ND				3083.220				ND	
A12	246.3	ND	ND	ND	97.8	ND	92.50	55.841	BDL	ND	ND	ND	BDL
A13	3014.7	ND	ND	ND	581.4	ND	ND	634.165	172.3	ND	ND	ND	64.6
A14	4164.8	10907.3	271.32	2490.067	579.4	ND	ND	751.718	289.7	802.0	29.6	BDL	108.6
A15	972.7	ND	ND		479.9	ND	ND		BDL	ND	ND		BDL
A16	109.0	ND	ND		4.2	ND	ND		BDL	ND	BDL		BDL
A17	171.0	ND	ND	ND	BDL	ND	ND	323.738	BDL	ND	ND	ND	BDL
A17a				ND				BDL				ND	
A17b				ND				BDL				ND	
A18	96.7	ND	ND	ND	BDL	ND	ND	158.566	BDL	ND	ND	ND	BDL
A19	21.5	ND	ND	ND	BDL	ND	ND	BDL	0.7	ND	ND	ND	0.1
A19a				541.032				549.107				8.883	
A20	1288.8	ND	ND		616.4	ND	ND		201.7	ND	ND		89.7
A21	938.2	ND	ND	ND	222.4	ND	ND	BDL	145.9	ND	ND	ND	73.0
A21a	882.9	ND	ND		818.3	1024.3	ND		42.0	ND	ND		39.8
A22	62.2	ND	ND	ND	46.6	ND	ND	BDL	74.6	ND	ND	ND	43.5
A23	54.2	ND	ND		120.4	ND	ND		BDL	ND	ND		38.1
A23a	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A23d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A24	272.8	ND			53.8	ND			BDL	ND			BDL
A25	66.1	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL
A26	143.9	ND	ND		45.2	ND	ND		BDL	ND	BDL		BDL
A27	1311.0	BDL	ND	ND	196.7	ND	ND	BDL	295.0	205.5	ND	ND	BDL
A28	5575.5	ND	ND	ND	BDL	ND	ND	BDL	419.7	ND	ND	ND	BDL
A28d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A29	556.7	ND	ND		BDL	ND	ND		0.4	ND	ND		BDL
A30	10193.0	ND	ND	ND	BDL	ND	ND	1655.347	747.5	ND	ND	ND	BDL
A30	3340.2			ND	BDL			1655.347	256.9			ND	BDL
A31	2433.5	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL
A32	65.1	ND			BDL	ND			BDL	ND			BDL
A33	1620.9	15499.9	ND	ND	BDL	ND	ND	BDL	BDL	BDL	ND	ND	BDL
A34	2583.1	4759.1	1654.17	6093.030	298.0	ND	ND	1035.815	BDL	310.4	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SE_T_LOAD1 grams/day	SE_T_LOAD3 grams/day	SE_D_LOAD1 grams/day	SE_D_LOAD2 grams/day	SE_D_LOAD3 grams/day	AG_T_LOAD1 grams/day	AG_T_LOAD2 grams/day	AG_T_LOAD3 grams/day	AG_D_LOAD1 grams/day	AG_D_LOAD2 grams/day	AG_D_LOAD3 grams/day
A01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A02	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A02a											
A02b											
A02d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A03	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A04	ND	ND	ND	ND	BDL	BDL	ND	ND	BDL	BDL	BDL
A05	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A06	ND		ND	ND		BDL	ND		BDL	BDL	
A07	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	ND	BDL
A07LM											
A07LMS											
A07a											
A07b											
A07c											
A08	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A09	BDL	ND	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
A10	BDL	ND	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
A11	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A11a											
A12	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A13	ND	ND	ND	ND	ND	2.2	ND	ND	BDL	BDL	BDL
A14	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A15	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A16	ND	ND	ND	ND	ND	BDL	ND	BDL	BDL	BDL	ND
A17	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A17a											
A17b											
A18	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	ND
A19	BDL	ND	ND	ND	ND	0.01	ND	ND	BDL	ND	ND
A19a											
A20	BDL	ND	BDL	BDL	BDL	5.6	ND	ND	BDL	BDL	BDL
A21	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A21a	ND	ND	ND	ND	ND	0.3	ND	ND	BDL	0.3	BDL
A22	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A23	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A23a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A23d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A24	BDL		BDL	ND		BDL	ND		BDL	BDL	
A25	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A26	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A27	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A28	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A28d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A29	ND	ND	ND	ND	BDL	BDL	ND	ND	BDL	BDL	BDL
A30	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A30	ND		ND			BDL			BDL		
A31	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A32	ND		ND	ND		BDL	ND		BDL	BDL	
A33	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND
A34	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SEGMENT	SUB_SEG	SITE	FLOW1 cfs	FLOW2 cfs	FLOW3 cfs	FLOW4 cfs	DATE1	DATE2	DATE3	DATE4	PH1	PH2	PH3	PH4
Animas	Animas	A35	23.780	ND	ND	59.330	09/09/91	06/25/92		20-Jul-93	6.48	7.13		6.96
Animas	Eureka (So)	A36	5.150	13.540			09/09/91	06/25/92			7.15	7.40		
Animas	Eureka	A37	3.970	11.640	1.230		09/09/91	06/25/92	15-Oct-92		7.19	7.44	6.94	
Animas	Eureka-Terry Tunnel	A38	0.339	1.570	0.180		09/09/91	06/25/92	15-Oct-92		7.65	7.76	6.60	Discharge Sample
Animas	Eureka	A39	2.300	9.270	0.360		09/09/91	06/25/92	15-Oct-92		6.77	7.58	6.99	
Animas	Animas	A40	24.100	ND	ND	50.830	09/09/91	06/25/92		20-Jul-93	7.30	7.02		6.89
Animas	Animas (trib)	A41	0.012	2.690	ND	4.160	09/09/91	06/25/92		20-Jul-93	5.77	6.56		6.62
Animas	Animas blw Minnie	A41a				80.560				20-Jul-93				7.04
Animas	Animas abv Maggie	A41b				99.650				20-Jul-93				7.10
Animas	Minnie	A42	7.250	24.340			09/09/91	06/25/92			7.54	7.86		
Animas	Maggie	A43	9.590	27.040			09/09/91	06/25/92			7.76	7.80		
Animas	Animas (trib)	A44	0.323	0.300			09/09/91	06/25/92			8.01	8.10		
Animas	Animas	A45	58.000	ND	12.800	107.800	09/09/91	06/25/92	15-Oct-92	20-Jul-93	7.37	7.20	7.23	6.99
Animas	Animas (trib)	A46	0.127	1.070	0.033	0.278	09/09/91	06/25/92	15-Oct-92	20-Jul-93	5.85	6.05	5.55	5.10
Animas	Animas blw tailings	A46a				101.730				20-Jul-93				5.60
Animas	Hematite	A47	2.390	ND			09/09/91	06/25/92			7.56	7.65		
Animas	Cunningham	A48	10.500	67.500	5.700		09/09/91	06/25/92	15-Oct-92		6.75	6.60	7.35	
Animas	Cunningham adit	A49	1.020	0.510			09/09/91	06/25/92			7.50	7.12		
Animas	Cunningham adit	A49a	0.097	ND			09/09/91				7.70			
Animas	Cunningham adit	A50	0.427	0.460			09/09/91	06/25/92			7.41	7.27		
Animas	Cunningham	A51	19.500	46.500			09/09/91	06/25/92			7.49	7.58		
Animas	Cunningham	A52	15.100	38.800			09/09/91	06/25/92			7.50	7.50		
Animas	Filtered Dup.	A52d	15.100				09/09/91				ND			
Animas	Animas	A53	88.170	ND	14.310	154.560	09/09/91	06/25/92	15-Oct-92	20-Jul-93	7.02	7.25	7.05	5.30
Animas	Filtered Dup.	A53d	88.170			154.560	09/09/91			20-Jul-93	ND			
Animas	Animas trib	A54	0.090	ND	0.067	0.267	09/09/91	06/25/92	15-Oct-92	20-Jul-93	7.27	6.65	6.75	5.20
Animas	Animas	A55	89.430	ND	23.060	145.550	09/09/91	06/25/92	15-Oct-92	20-Jul-93	7.69	7.25	7.25	6.00
Animas	Animas	A56	96.940	ND	18.560		09/09/91	06/25/92	15-Oct-92		7.88	7.25	7.25	
Animas	Animas-Mayflwr pipe	A57	0.247	ND	ND		09/09/91	06/25/92	15-Oct-92		7.81	8.29		
Animas	Arrastra	A58	13.190	34.400	4.660		09/09/91	06/25/92	15-Oct-92		7.80	8.36	7.40	
Animas	Arrastra	A59	8.260	30.850			09/09/91	06/25/92			7.66	8.48		
Animas	Filtered Dup.	A59d	8.260				09/09/91				ND			
Animas	Animas	A60	114.260	ND	28.560	166.090	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.85	6.71	7.31	5.60
Animas	Animas	A61	101.000	ND	30.446	152.240	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.93	6.59	7.32	7.08
Animas	Boulder Cr	A62	6.880	17.800	0.602	8.590	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.89	6.80	7.72	7.38
Animas	Animas adit	A63	0.000	ND	ND	0.650	09/09/91		15-Oct-92	20-Jul-93	6.22		7.67	6.99
Animas	Aspen Mine adit	A63a				ND				20-Jul-93				6.72
Animas	Animas	A64	122.900	ND	31.090	95.210	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.80	6.83	7.30	7.10
Animas	Animas	A65	118.000	ND	35.010	195.630	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.84	6.54	7.57	7.09
Animas	Filtered Dup.	A65d	118.000				09/09/91				ND			
Animas	Animas	A66	81.270	ND	28.300	212.100	09/09/91	06/25/92	15-Oct-92	20-Jul-93	7.71	6.40	6.60	7.09
Animas	Swansea	A67	1.790	4.800	0.180		09/09/91	06/25/92	15-Oct-92		6.90	8.25	6.60	
Animas	Animas Gaging Stn	A68	126.870	380.000	29.200	206.000	09/10/91	06/25/92	15-Oct-92	20-Jul-93	7.77	7.60	6.50	7.70
Animas	Animas Gaging Stn	A68-2	84.500	442.000	26.800	206.000	09/06/91	06/23/92	14-Oct-92	21-Jul-93	7.80	7.30	6.30	6.55
Animas	Animas Gaging Stn	A68-3	61.170	400.000			09/05/91	06/24/92			7.91	7.50		
Animas	Animas Gaging Stn	A68-4	101.630				09/07/91				7.66			
Animas	Animas Gaging Stn	A68-5	116.500				09/09/91				7.53			
Animas	Filtered Dup.	A68d	126.870			206.000	09/10/91			20-Jul-93	ND			
Animas	Filtered Dup.	A68d-1	116.500				09/09/91				ND			
Animas	Filtered Dup.	A68d-2	101.630				09/07/91				ND			
Animas	Idaho adit	A69	0.160	1.550			09/09/91	06/25/92			8.04	5.38		
			15				11	36	22	22, 1d.up				

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TEMP1 deg C	TEMP2 deg C	TEMP3 deg C	TEMP4 deg C	COND1 umhos	COND4 umhos	AL_TOT1 ug/l	AL_TOT2 ug/l	AL_TOT3 ug/l	AL_TOT4 ug/l	AL_DIS1 ug/l	AL_DIS2 ug/l	AL_DIS3 ug/l	AL_DIS4 ug/l	CD_TOT1 ug/l	CD_TOT2 ug/l	CD_TOT3 ug/l	CD_TOT4 ug/l
A35	10.40	66.20	dry	10.70	170	117	270.0		ND	ND	65.0		ND	75.00	2.40		ND	1.580
A36	11.50	6.50			170		120.0	ND			110.0	58.0			BDL	ND		
A37	11.00	7.70	5.7		280		120.0	ND	ND		60.0	87.0	64.0		5.00	ND	ND	
A38	9.50	5.50	4.7		1140		71.0	ND	ND		BDL	54.0	240.0		24.00	ND	ND	
A39	9.50	10.10	6.9		333		310.0	ND	ND		160.0	110.0	BDL		5.00	ND	ND	
A40	10.10	77.70	dry		222		270.0	ND	ND	ND	100.0	55.0	ND	78.00	2.40	ND	ND	ND
A41	12.70	65.20	dry	7.30	1330	173	1100.0	ND	ND	ND	1000.0	110.0	ND	93.00	2.10	ND	ND	ND
A41a				7.60		158				ND				72.00				1.580
A41b				6.40		159				ND				58.00				1.750
A42	11.00	60.50			170		53.0	ND			BDL	BDL			BDL	ND		
A43	13.00	69.40			150		110.0	ND			88.0	51.0			BDL	ND		
A44	12.00	65.10			640		BDL	ND			BDL	BDL			BDL	ND		
A45	12.00	12.00	5.28	5.70	1900	167	120.0	ND	ND	ND	58.0	68.0	BDL	51.00	1.30	2.20	0.59	ND
A46	11.50	15.00	10	16.00	530	880	910.0	ND	ND	ND	890.0	410.0	970.0	1100.00	13.00	ND	ND	16.700
A46a				12.00		178				94.00				BDL				1.350
A47	9.00	14.00			140		BDL	ND			BDL	BDL			BDL	ND		
A48	8.00	49.00	9		144		BDL	ND	ND		BDL	BDL	BDL		BDL	ND	ND	
A49	12.78	56.00			543		BDL	ND			BDL	BDL			1.00	ND		
A49a	11.30				524		BDL				BDL				1.00			
A50	10.00	50.00			312		100.0	1200.0			BDL	BDL			9.00	19.00		
A51	11.50	48.50			97		59.0	ND			51.0	BDL			BDL	ND		
A52	11.67	52.00			90		64.0	ND			BDL	BDL			BDL	ND		
A52d	0.00				0		80.0				55.0				ND			
A53	7.00	9.00	10	11.00	160	160	160.0	ND	ND	ND	86.0	BDL	BDL	BDL	0.80	ND	ND	ND
A53d	0.00				0		ND				84.0			BDL	ND			ND
A54	9.00	9.00	6	5.00	585	390	BDL	ND	ND	ND	BDL	81.0	60.0	170.00	0.90	ND	ND	ND
A55	11.00	14.00	6	8.50	210	175	65.0	ND	ND	ND	BDL	75.0	BDL	BDL	0.80	ND	ND	ND
A56	8.80	5.00	4		212		72.0	ND	ND		BDL	BDL	BDL		0.90	1.90	0.70	
A57	7.60	5.40			159		BDL	ND	ND		BDL	BDL	BDL		1.10	ND	ND	
A58	7.80	6.50	4		160		BDL	ND	ND		BDL	BDL	BDL		0.90	1.10	1.30	
A59	5.50	3.90			150		BDL	ND			BDL	BDL			0.50	ND		
A59d	0.00				0		ND				BDL				ND			
A60	9.30	9.30	8.89	7.00	150	110	70.0	ND	ND	ND	BDL	BDL	52.0	BDL	1.00	1.70	0.74	ND
A61	8.80	6.30	8.89	12.00	160	217	95.0	ND	ND	ND	60.0	BDL	ND	BDL	0.90	ND	ND	ND
A62	9.30	7.20	6.22	10.00	88	99	BDL	ND	ND	ND	BDL	BDL	BDL	BDL	0.60	ND	ND	ND
A63	8.60		3.6	12.00	600	775	BDL		ND	ND	BDL		BDL	BDL	4.00		ND	ND
A63a				12.00		907				ND				BDL				ND
A64	6.00	7.00	4.12	9.70	150	206	65.0	ND	ND	ND	BDL	51.0	ND	BDL	0.90	1.60	1.10	ND
A65	6.50	6.00	4.8	9.50	145	204	94.0	ND	ND	ND	52.0	BDL	BDL	BDL	1.00	1.70	1.00	ND
A65d	0.00				0		ND				BDL				ND			
A66	9.80	7.10	6	9.20	214	200	86.0	ND	ND	ND	BDL	BDL	ND	BDL	1.00	ND	ND	ND
A67	4.90	5.40	4		92		BDL	ND	ND		BDL	BDL	BDL		0.60	0.73	BDL	
A68	8.00	5.50	4.5	12.50	227	176	180.0	ND	ND	ND	93.0	50.0	BDL	BDL	1.50	2.10	1.30	0.980
A68-2	8.30	7.00	5.5	9.10	245	186	270.0	ND	ND	ND	95.0	BDL	BDL	BDL	1.50	1.40	1.20	1.050
A68-3	12.80	9.00			265		79.0	ND			56.0	60.0			1.20	1.70		
A68-4	7.40				231		310.0				83.0				2.10			
A68-5	5.20				222		110.0				72.0				1.10			
A68d	0.00				0		ND				98.0			BDL	ND			ND
A68d-1	0.00				0		ND				75.0				ND			
A68d-2	0.00				0		ND				84.0				ND			
A69	4.70	5.70			214		BDL	ND			BDL	50.0			0.30	ND		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_DIS1 ug/l	CD_DIS2 ug/l	CD_DIS3 ug/l	CD_DIS4 ug/l	CHROM_T_1 ug/l	CHROM_D_1 ug/l	COPPER1TOT ug/l	COPPER2TOT ug/l	COPPER3TOT ug/l	COPPER4TOT ug/l	COPPER1DIS ug/l	COPPER2DIS ug/l	COPPER3DIS ug/l	COPPER4DIS ug/l
A35	2.30		ND	1.530	BDL	BDL	28.0		ND	23.00	13.0		ND	13.00
A36	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A37	4.00	3.90	11.00		BDL	BDL	19.0	ND	ND		6.0	13.0	35.0	
A38	21.00	2.40	51.00		BDL	BDL	12.0	ND	ND		BDL	BDL	170.0	
A39	5.00	4.80	1.70		BDL	BDL	37.0	ND	ND		18.0	24.0	18.0	
A40	2.20	2.90	ND	1.910	BDL	BDL	29.0	ND	ND	ND	16.0	8.0	ND	13.00
A41	2.00	5.60	ND	1.600	BDL	BDL	BDL	ND	ND	ND	BDL	24.0	ND	13.00
A41a				1.770						15.00				11.00
A41b				1.670						11.00				9.00
A42	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A43	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A44	BDL	0.39			BDL	BDL	BDL	ND			BDL	BDL		
A45	1.20	2.10	0.63	1.160	BDL	BDL	8.0	13.0	BDL	ND	5.0	7.0	BDL	7.00
A46	13.00	8.20	17.00	17.400	BDL	BDL	28.0	ND	ND	61.00	23.0	21.0	23.0	51.00
A46a				1.330						9.00				9.00
A47	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A48	BDL	BDL	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A49	1.00	0.85			BDL	BDL	11.0	ND			8.0	5.0		
A49a	0.90				BDL	BDL	6.0				4.0			
A50	9.00	12.00			BDL	BDL	25.0	340.0			9.0	14.0		
A51	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A52	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
A52d	BDL				BDL	BDL	BDL				BDL			
A53	0.80	1.30	0.60	0.930	BDL	BDL	5.0	ND	ND	ND	BDL	5.0	BDL	5.00
A53d	0.90			0.920	ND	BDL	ND			ND	BDL			6.00
A54	0.70	1.70	1.00	2.340	BDL	BDL	BDL	ND	ND	ND	BDL	BDL	BDL	7.00
A55	0.80	1.80	0.79	0.900	BDL	BDL	5.0	ND	ND	ND	BDL	7.0	BDL	7.00
A56	0.80	1.80	0.69		BDL	BDL	4.0	8.0	4.0		BDL	8.0	5.0	
A57	1.10	1.50	BDL		BDL	BDL	4.0	ND	ND		BDL	BDL	BDL	
A58	0.90	1.10	1.40		BDL	BDL	5.0	8.0	6.0		BDL	6.0	8.0	
A59	0.50	0.73			BDL	BDL	5.0	ND			BDL	5.0		
A59d	0.40				ND	BDL	ND				BDL			
A60	0.90	1.90	0.75	0.900	BDL	BDL	5.0	10.0	9.0	ND	BDL	6.0	5.0	6.00
A61	0.90	1.80	1.10	0.930	BDL	BDL	5.0	ND	ND	ND	4.0	6.0	5.0	5.00
A62	0.50	0.37	0.52	0.400	BDL	BDL	5.0	ND	ND	ND	5.0	BDL	BDL	BDL
A63	3.20		2.80	2.900	BDL	BDL	BDL		ND	ND	BDL		BDL	BDL
A63a				6.520						ND				15.00
A64	1.30	1.60	1.20	0.960	BDL	BDL	5.0	9.0	BDL	ND	BDL	7.0	BDL	9.00
A65	0.90	1.70	1.10	1.000	BDL	BDL	5.0	12.0	BDL	ND	BDL	5.0	BDL	4.00
A65d	0.90				ND	BDL	ND				BDL			
A66	1.00	1.70	1.20	0.990	BDL	BDL	BDL	ND	ND	ND	BDL	7.0	BDL	4.00
A67	0.60	0.69	BDL		BDL	BDL	BDL	0.0	BDL		BDL	BDL	BDL	
A68	1.40	1.80	1.20	1.040	BDL	BDL	10.0	21.0	BDL	5.00	BDL	7.0	2.5	6.00
A68-2	1.40	1.40	1.20	0.980	BDL	BDL	10.0	4.0	5.0	8.00	BDL	6.0	BDL	BDL
A68-3	1.10	1.70			BDL	BDL	8.0	16.0			6.0	6.0		
A68-4	1.90				BDL	BDL	18.0				BDL			
A68-5	1.10				BDL	BDL	6.0				4.0			
A68d	1.40			0.980	ND	BDL	ND			ND	6.0			4.00
A68d-1	1.00				ND	BDL	ND				4.0			
A68d-2	2.00				ND	BDL	ND				5.0			
A69	0.30	0.49			BDL	BDL	BDL	ND			BDL	6.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	IRON_TOT1 ug/l	IRON_TOT2 ug/l	IRON_TOT3 ug/l	IRON_TOT4 ug/l	IRON_DIS1 ug/l	IRON_DIS2 ug/l	IRON_DIS3 ug/l	IRON_DIS4 ug/l	LEAD_TOT1 ug/l	LEAD_TOT2 ug/l	LEAD_TOT3 ug/l	LEAD_TOT4 ug/l	LEAD_DIS1 ug/l	LEAD_DIS2 ug/l	LEAD_DIS3 ug/l
A35	75.0		ND	76.00	10.0		ND	12.00	BDL		ND	BDL	BDL		ND
A36	130.0	ND			47.0	ND			BDL	ND			BDL	BDL	
A37	90.0	ND	ND		BDL	ND	ND		14.0	ND	ND		BDL	BDL	BDL
A38	130.0	ND	ND		BDL	ND	ND		10.0	ND	ND		BDL	BDL	BDL
A39	220.0	ND	ND		BDL	ND	ND		20.0	ND	ND		BDL	8.0	15.0
A40	81.0	ND	ND	ND	BDL	ND	ND	11.00	8.0	ND	ND	ND	BDL	BDL	ND
A41	15000.0	ND	ND	ND	14000.0	ND	ND	10.00	BDL	ND	ND	ND	BDL	29.0	ND
A41a				58.00				17.00				6.00			
A41b				40.00				BDL				6.00			
A42	77.0	ND			52.0	ND			BDL	ND			BDL	BDL	
A43	100.0	ND			41.0	ND			BDL	ND			BDL	BDL	
A44	260.0	ND			18.0	ND			BDL	ND			BDL	BDL	
A45	60.0	67.0	BDL	ND	14.0	ND	ND	BDL	BDL	BDL	BDL	ND	BDL	BDL	BDL
A46	14000.0	ND	ND	20000.00	14000.0	ND	ND	18000.00	58.0	ND	ND	90.00	13.0	20.0	22.0
A46a				97.00				58.00				BDL			
A47	BDL	ND			BDL	ND			BDL	ND			BDL	BDL	
A48	43.0	ND	ND		10.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A49	20.0	ND			BDL	ND			BDL	ND			BDL	BDL	
A49a	22.0				BDL				BDL				BDL		
A50	140.0	ND			BDL	ND			26.0	370.0			7.0	BDL	
A51	37.0	ND			13.0	ND			BDL	ND			BDL	BDL	
A52	44.0	ND			20.0	ND			BDL	ND			BDL	BDL	
A52d	44.0				17.0				BDL				BDL		
A53	93.0	ND	ND	ND	45.0	ND	ND	57.00	BDL	ND	ND	ND	BDL	BDL	BDL
A53d	ND			ND	43.0			47.00	ND			ND	BDL		
A54	1500.0	ND	ND	ND	460.0	ND	ND	6200.00	BDL	ND	ND	ND	BDL	BDL	BDL
A55	81.0	ND	ND	ND	32.0	ND	ND	42.00	BDL	ND	ND	ND	BDL	BDL	BDL
A56	79.0	80.0	68.0		32.0	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL
A57	10.0	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A58	10.0	14.0	BDL		BDL	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL
A59	32.0	ND			13.0	ND			BDL	ND			BDL	BDL	
A59d	ND				BDL				ND				BDL		
A60	78.0	79.0	71.0	ND	30.0	ND	ND	31.00	BDL	BDL	BDL	ND	BDL	BDL	BDL
A61	89.0	ND	ND	ND	33.0	ND	ND	29.00	BDL	ND	ND	ND	BDL	BDL	BDL
A62	29.0	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	BDL	BDL	BDL
A63	64.0		ND	ND	28.0		ND	11.00	BDL		ND	ND	BDL		BDL
A63a				ND				BDL				ND			
A64	70.0	64.0	59.0	ND	29.0	ND	ND	28.00	BDL	BDL	BDL	ND	BDL	BDL	BDL
A65	97.0	70.0	67.0	ND	32.0	ND	ND	29.00	5.0	BDL	BDL	ND	BDL	BDL	BDL
A65d	ND				32.0				ND				BDL		
A66	77.0	ND	ND	ND	29.0	ND	ND	28.00	5.0	ND	ND	ND	BDL	BDL	BDL
A67	58.0	56.0	100.0		24.0	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL
A68	230.0	260.0	ND	59.00	42.0	ND	ND	28.00	25.0	32.0	BDL	BDL	BDL	BDL	BDL
A68-2	430.0	43.0	46.0	58.00	54.0	26.0	ND	44.00	29.0	BDL	BDL	BDL	BDL	BDL	BDL
A68-3	99.0	130.0			60.0	ND			6.0	15.0			BDL	BDL	
A68-4	710.0				37.0				96.0				5.0		
A68-5	74.0				29.0				BDL				BDL		
A68d	ND			ND	42.0			25.00	ND			ND	BDL		
A68d-1	ND				29.0				ND				BDL		
A68d-2	ND				33.0				ND				5.0		
A69	92.0	ND			23.0	ND			BDL	ND			BDL	BDL	

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	LEAD_DIS4 ug/l	MN_TOT1 ug/l	MN_TOT2 ug/l	MN_TOT4 ug/l	MN_DIS1 ug/l	MN_DIS2 ug/l	MN_DIS3 ug/l	MN_DIS4 ug/l	NICKEL1TOT ug/l	NICKEL1DIS ug/l	SE_TOT_1 ug/l	SE_TOT_3 ug/l	SE_DIS1 ug/l	SE_DIS2 ug/l	SE_DIS3 ug/l	SILVER1TOT ug/l
A35	BDL	790.0		ND	770.0		ND	ND	BDL	BDL	ND	ND	ND		ND	BDL
A36		33.0	ND		18.0	ND			BDL	BDL	ND		ND	ND		BDL
A37		4100.0	ND		3800.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A38		31000.0	ND		29000.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A39		3900.0	ND		3700.0	ND	ND		BDL	BDL	ND	ND	BDL	ND	ND	BDL
A40	BDL	780.0	ND	ND	750.0	800.0	ND	ND	BDL	BDL	BDL	ND	BDL	BDL	ND	BDL
A41	27.00	2500.0	ND	ND	2400.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A41a	BDL			ND				410.00								
A41b	BDL			ND				340.00								
A42		13.0	ND		11.0	ND			BDL	BDL	BDL		BDL	ND		BDL
A43		20.0	ND		15.0	ND			BDL	BDL	BDL		BDL	ND		BDL
A44		300.0	ND		300.0	ND			BDL	BDL	BDL		BDL	ND		BDL
A45	BDL	310.0	ND	ND	320.0	ND	8.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A46	12.00	17000.0	ND	ND	16000.0	5400.0	ND	ND	BDL	BDL	ND	ND	ND	BDL	BDL	BDL
A46a	BDL			ND				280.00								
A47		BDL	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
A48		8.0	ND		BDL	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A49		21.0	ND		20.0	ND			BDL	BDL	ND		ND	ND		BDL
A49a		6.0			5.0				BDL	BDL	ND		ND			BDL
A50		300.0	ND		290.0	ND			BDL	BDL	ND		ND	ND		BDL
A51		4.0	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
A52		5.0	ND		BDL	ND			BDL	BDL	BDL		BDL	ND		BDL
A52d		5.0			BDL				BDL	BDL	BDL		BDL			BDL
A53	BDL	240.0	ND	ND	230.0	ND	ND	ND	BDL	BDL	ND	ND	BDL	ND	ND	BDL
A53d	BDL	ND		ND	230.0			ND	ND	BDL	ND		ND			ND
A54	BDL	820.0	ND	ND	750.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A55	BDL	220.0	ND	ND	210.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A56		210.0	ND		210.0	ND	170.0		BDL	BDL	ND	ND	ND	ND	BDL	BDL
A57		BDL	ND		BDL	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A58		BDL	ND		BDL	ND	BDL		BDL	BDL	BDL	ND	BDL	ND	BDL	BDL
A59		11.0	ND		BDL	ND			BDL	BDL	BDL		BDL	ND		BDL
A59d		ND			BDL				ND	BDL	ND		BDL			ND
A60	BDL	190.0	ND	ND	180.0	ND	130.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A61	BDL	210.0	ND	ND	200.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A62	BDL	300.0	ND	ND	290.0	89.0	ND	ND	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
A63	BDL	24.0		ND	23.0		ND	ND	BDL	BDL	ND	ND	ND		ND	BDL
A63a	BDL			ND				ND								
A64	BDL	220.0	ND	ND	220.0	ND	230.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
A65	BDL	260.0	ND	ND	250.0	ND	400.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A65d		ND			250.0				ND	BDL	ND		ND			ND
A66	BDL	310.0	ND	ND	300.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A67		9.0	ND		7.0	ND	BDL		BDL	BDL	ND	ND	ND	ND	ND	BDL
A68	BDL	580.0	ND	ND	560.0	ND	520.0	ND	BDL	BDL	ND	ND	ND	ND	BDL	BDL
A68-2	BDL	440.0	ND	ND	400.0	400.0	500.0	ND	BDL	BDL	ND	ND	ND	ND	ND	ND
A68-3		370.0	ND		360.0	ND			BDL	BDL	BDL		BDL	ND		BDL
A68-4		760.0			690.0				BDL	BDL	ND		ND			0.40
A68-5		300.0			300.0				BDL	BDL	ND		ND			BDL
A68d	BDL	ND		ND	560.0			ND	ND	BDL	ND		ND			ND
A68d-1		ND			300.0				ND	BDL	ND		ND			ND
A68d-2		ND			700.0				ND	BDL	ND		ND			ND
A69		76.0	ND		74.0	ND			BDL	BDL	BDL		BDL	ND		BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SILVER2TOT ug/l	SILVER3TOT ug/l	SILVER1DIS ug/l	SILVER2DIS ug/l	SILVER3DIS ug/l	ZINC_TOT1 ug/l	ZINC_TOT2 ug/l	ZINC_TOT3 ug/l	ZINC_TOT4 ug/l	ZINC_DIS1 ug/l	ZINC_DIS2 ug/l	ZINC_DIS3 ug/l	ZINC_DIS4 ug/l
A35		ND	BDL		ND	520.0		ND	390.00	490.0		ND	370.00
A36	ND		BDL	BDL		14.0	ND			10.0	25.0		
A37	ND	ND	BDL	BDL	BDL	880.0	ND	ND		780.0	890.0	2700.0	
A38	ND	ND	BDL	BDL	BDL	1400.0	ND	ND		680.0	43.0	7200.0	
A39	ND	ND	BDL	BDL	BDL	1700.0	ND	ND		1700.0	1200.0	640.0	
A40	ND	ND	ND	BDL	ND	530.0	ND	ND	ND	500.0	590.0	ND	700.00
A41	ND	ND	BDL	BDL	ND	440.0	ND	ND	ND	430.0	1100.0	ND	570.00
A41a									590.00				590.00
A41b									560.00				550.00
A42	ND		BDL	BDL		BDL	ND			BDL	9.0		
A43	ND		BDL	BDL		BDL	ND			BDL	13.0		
A44	ND		BDL	BDL		55.0	ND			49.0	69.0		
A45	ND	ND	BDL	BDL	BDL	340.0	440.0	300.0	ND	340.0	410.0	310.0	450.00
A46	ND	ND	BDL	BDL	BDL	8300.0	ND	ND	10000.00	8200.0	3100.0	12000.0	10000.00
A46a									450.00				440.00
A47	ND		BDL	BDL		BDL	ND			BDL	10.0		
A48	ND	ND	BDL	BDL	BDL	13.0	ND	ND		11.0	23.0	24.0	
A49	ND		BDL	BDL		110.0	ND			100.0	51.0		
A49a			BDL			93.0				90.0			
A50	0.80		BDL	BDL		1600.0	4800.0			1600.0	2000.0		
A51	ND		BDL	BDL		BDL	ND			BDL	BDL		
A52	ND		BDL	BDL		BDL	ND			BDL	BDL		
A52d			BDL			BDL				BDL			
A53	ND	ND	BDL	BDL	BDL	280.0	ND	ND	ND	270.0	240.0	270.0	330.00
A53d			BDL			ND			ND	260.0			330.00
A54	ND	ND	BDL	BDL	BDL	300.0	ND	ND	ND	280.0	540.0	490.0	620.00
A55	ND	ND	BDL	BDL	BDL	230.0	ND	ND	ND	220.0	340.0	320.0	340.00
A56	ND	ND	BDL	BDL	BDL	240.0	370.0	350.0		240.0	360.0	330.0	
A57	ND	ND	BDL	BDL	BDL	130.0	ND	ND		130.0	140.0	8.0	
A58	ND	ND	BDL	BDL	BDL	120.0	110.0	200.0		120.0	110.0	200.0	
A59	ND		BDL	BDL		61.0	ND			68.0	68.0		
A59d			BDL			ND				57.0			
A60	ND	ND	BDL	BDL	BDL	240.0	340.0	240.0	ND	230.0	320.0	230.0	320.00
A61	ND	ND	BDL	BDL	BDL	280.0	ND	ND	ND	260.0	350.0	360.0	300.00
A62	ND	ND	BDL	BDL	BDL	100.0	ND	ND	ND	100.0	57.0	99.0	100.00
A63		ND	BDL		BDL	960.0		ND	ND	940.0		500.0	560.00
A63a									ND				1100.00
A64	ND	ND	BDL	BDL	BDL	260.0	360.0	360.0	ND	250.0	340.0	350.0	330.00
A65	ND	ND	BDL	BDL	BDL	290.0	360.0	430.0	ND	280.0	350.0	430.0	350.00
A65d			BDL			ND				270.0			
A66	ND	ND	BDL	BDL	BDL	260.0	ND	ND	ND	250.0	360.0	360.0	400.00
A67	ND	ND	BDL	BDL	BDL	81.0	71.0	BDL		76.0	68.0	BDL	
A68	ND	ND	BDL	BDL	BDL	400.0	380.0	420.0	310.00	370.0	310.0	420.0	300.00
A68-2	ND	ND	BDL	BDL	BDL	410.0	270.0	390.0	330.00	350.0	360.0	370.0	340.00
A68-3	ND		BDL	BDL		310.0	350.0			290.0	300.0		
A68-4			BDL			540.0				450.0			
A68-5			BDL			290.0				290.0			
A68d			BDL			ND			ND	370.0			290.00
A68d-1			BDL			ND				290.0			
A68d-2			BDL			ND				490.0			
A69	ND		BDL	BDL		43.0	ND			36.0	58.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AS_DIS1 ug/l	AS_DIS2 ug/l	AS_TOT3 ug/l	AS_DIS3 ug/l	AS_TOT4 ug/l	AS_DIS4 ug/l	CYANIDE1 mg/l	CYANIDE2 mg/l	CYANIDE3 mg/l	CYANIDE4 mg/l	ALK1 mg/l	ALK2 mg/l	HARD1 mg/l	HARD2 mg/l	HARD3 mg/l	HARD4 mg/l
A35	ND		ND	ND	ND	ND	ND		ND	ND	ND		105.29		ND	61
A36	ND	ND					ND	ND			ND	ND	79.82	43.0		
A37	ND	ND	ND	ND			ND	ND	ND		ND	ND	175.23	83.0	290.58	
A38	ND	ND	ND	ND			ND	ND	ND		ND	ND	647.16	ND	781.15	
A39	BDL	ND	ND	ND			ND	ND	ND		ND	ND	122.76	59.0	94.35	
A40	BDL	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	84.64	58.0	ND	62
A41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	809.38	ND	ND	68
A41a					ND	ND				ND						63
A41b					ND	ND				ND						64
A42	BDL	ND					ND	ND			ND	ND	92.93	52.0		
A43	BDL	ND					ND	ND			ND	ND	93.81	ND		
A44	BDL	ND					ND	ND			ND	ND	463.74	ND		
A45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	107.93	62.0	118.23	70
A46	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	297.04	120.0	415.27	331
A46a					ND	ND				ND						73
A47	ND	ND					ND	ND			ND	ND	79.58	57.0		
A48	ND	ND	ND	ND			ND	ND	ND		ND	ND	82.29	61.0	138.23	
A49	ND	ND					ND	ND			ND	ND	326.46	ND		
A49a	ND						ND				ND		272.76			
A50	ND	ND					ND	ND			ND	ND	190.99	ND		
A51	ND	ND					ND	ND			ND	ND	41.41	33.0		
A52	BDL	ND					ND	ND			ND	ND	39.00	31.0		
A52d	ND						ND				ND		40.41			
A53	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	78.47	55.0	138.23	71
A53d	ND				ND	ND	ND			ND	ND		75.88			
A54	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	307.98	ND	ND	256
A55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100.52	58.0	142.35	70
A56	ND	ND	ND	ND			ND	ND	ND		ND	ND	99.11	56.0	138.23	
A57	ND	ND	ND	ND			ND	ND	ND		ND	ND	76.41	44.0	132.35	
A58	BDL	ND	ND	BDL			ND	ND	ND		ND	ND	72.58	49.0	107.23	
A59	BDL	ND					ND	ND			ND	ND	72.82	49.0		
A59d	ND						ND				ND		ND			
A60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	68.82	57.0	138.23	70
A61	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	80.23	58.0	132.35	70
A62	BDL	BDL	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	ND	46.12	32.0	87.12	32
A63	ND		ND	ND	ND	ND	ND		ND	ND	ND		442.35		ND	301
A63a					ND	ND				ND						
A64	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99.52	28.0	142.35	70
A65	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	82.82	57.0	138.23	70
A65d	ND						ND				ND		ND			
A66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	75.82	58.0	142.35	72
A67	ND	ND	ND	ND			ND	ND	ND		ND	ND	30.00	22.0	122.35	
A68	ND	ND	ND	BDL	ND	ND	ND	ND	ND	ND	ND	ND	86.05	58.0	152.35	71
A68-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	24.0	97.47	57.0	152.35	70
A68-3	ND	ND					ND	ND			ND	ND	120.70	55.0		
A68-4	ND						ND				ND		87.05			
A68-5	ND						ND				ND		77.05			
A68d	ND				ND	ND	ND			ND	ND		ND			
A68d-1	ND						ND				ND		ND			
A68d-2	ND						ND				ND		ND			
A69	BDL	ND					ND	ND			ND	ND	105.47	ND		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TSS_1 mg/l	TSS_2 mg/l	TSS_3 mg/l	TSS-4 mg/l	HG_1 ug/l	HG_2 ug/l	HG_3 ug/l	HG_4 ug/l
A35				BDL	ND		ND	ND
A36					ND	ND		
A37					ND	ND	ND	
A38					ND	ND	ND	
A39					ND	ND	ND	
A40					BDL	BDL	ND	ND
A41					ND	ND	ND	ND
A41a								ND
A41b								ND
A42					ND	ND		
A43					ND	ND		
A44					ND	ND		
A45					ND	ND	ND	ND
A46					ND	BDL	BDL	ND
A46a								ND
A47					ND	ND		
A48					ND	BDL	ND	
A49					ND	ND		
A49a					ND			
A50					ND	ND		
A51					ND	ND		
A52					ND	ND		
A52d					ND			
A53					ND	ND	ND	ND
A53d					ND			ND
A54					ND	ND	ND	ND
A55					ND	ND	ND	ND
A56					ND	ND	ND	
A57					ND	ND	ND	
A58					ND	ND	ND	
A59					ND	ND		
A59d					ND			
A60					ND	ND	ND	ND
A61					ND	ND	ND	ND
A62					BDL	BDL	BDL	ND
A63					ND		ND	ND
A63a								ND
A64					ND	ND	ND	ND
A65					ND	ND	ND	ND
A65d					ND			
A66					ND	ND	ND	ND
A67					ND	ND	ND	
A68			BDL	BDL	ND	ND	BDL	0.30
A68-2				BDL	ND	BDL	ND	ND
A68-3	11.0				ND	ND		
A68-4					ND			
A68-5					ND			
A68d					ND			ND
A68d-1					ND			
A68d-2					ND			
A69					ND	ND		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AL_T_LOAD1 grams/day	AL_T_LOAD3 grams/day	AL_T_LOAD4 grams/day	AL_D_LOAD1 grams/day	AL_D_LOAD2 grams/day	AL_D_LOAD3 grams/day	AL_D_LOAD4 grams/day	CD_T_LOAD1 grams/day	CD_T_LOAD2 grams/day	CD_T_LOAD3 grams/day	CD_T_LOAD4 grams/day	CD_D_LOAD1 grams/day	CD_D_LOAD2 grams/day
A35	15711.2	ND	ND	3782.3	ND	ND	10888.538	139.7	ND	ND	229.385	139.7	ND
A36	1512.2			1386.2	1921.7			BDL	ND			BDL	BDL
A37	1165.8	ND		582.9	2478.0	192.63		48.6	ND	ND		48.6	111.1
A38	58.9	ND		BDL	207.5	105.71		19.9	ND	ND		19.9	9.2
A39	1744.7	ND		900.5	2495.2	BDL		28.1	ND	ND		28.1	108.9
A40	15922.6	ND	ND	5897.3	ND	ND	9701.719	141.5	ND	ND	ND	141.5	ND
A41	32.3	ND	ND	29.4	724.1	ND	946.695	0.1	ND	ND	ND	0.1	36.9
A41a			ND				14193.383				311.466		
A41b			ND				14142.926				426.726		
A42	940.3			BDL	BDL			BDL	ND			BDL	BDL
A43	2581.3			2065.1	3374.5			BDL	ND			BDL	BDL
A44	BDL			BDL	BDL			BDL	ND			BDL	0.3
A45	17031.1	ND	ND	8231.7	ND	BDL	13453.117	184.5	ND	18.48	ND	184.5	ND
A46	282.8	ND	ND	276.6	1073.5	78.33	748.293	4.0	ND	ND	11.360	4.0	21.5
A46a			23399.731				BDL				336.060		
A47	BDL			BDL	ND			BDL	ND			BDL	ND
A48	BDL	ND		BDL	BDL	BDL		BDL	ND	ND		BDL	BDL
A49	BDL			BDL	BDL			2.5	ND			2.5	1.1
A49a	BDL			BDL	ND			0.2	ND			0.2	ND
A50	104.5			BDL	BDL			9.4	21.4			9.4	13.5
A51	2815.3			2433.5	BDL			BDL	ND			BDL	BDL
A52	2364.8			BDL	BDL			BDL	ND			BDL	BDL
A52d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A53	34520.3	ND	ND	18554.7	ND	BDL	BDL	172.6	ND	ND	ND	172.6	ND
A53d	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	ND
A54	BDL	ND	ND	BDL	ND	9.84	111.069	0.2	ND	ND	ND	0.2	ND
A55	14224.3	ND	ND	BDL	ND	BDL	BDL	175.1	ND	ND	ND	175.1	ND
A56	17079.3	ND		BDL	ND	BDL		213.5	ND	31.79		213.5	ND
A57	BDL	ND		BDL	ND	ND		0.7	ND	ND		0.7	ND
A58	BDL	ND		BDL	BDL	BDL		29.0	92.6	14.82		29.0	92.6
A59	BDL			BDL	BDL			10.1	ND			10.1	55.1
A59d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A60	19571.6	ND	ND	BDL	ND	3634.09	BDL	279.6	ND	51.72	ND	279.6	ND
A61	23479.0	ND	ND	14828.8	ND	ND	BDL	222.4	ND	ND	ND	222.4	ND
A62	BDL	ND	ND	BDL	BDL	BDL	BDL	10.1	ND	ND	ND	10.1	16.1
A63	BDL	ND	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND
A63a							ND		ND				
A64	19547.9	ND	ND	BDL	ND	ND	BDL	270.7	ND	83.68	ND	270.7	ND
A65	27142.1	ND	ND	15014.8	ND	BDL	BDL	288.7	ND	85.67	ND	288.7	ND
A65d	ND	ND		ND	ND	ND	BDL	ND	ND	ND		ND	ND
A66	17102.6	ND	ND	BDL	ND	ND	BDL	198.9	ND	ND	ND	198.9	ND
A67	BDL	ND		BDL	BDL	BDL	BDL	2.6	8.6	BDL		2.6	8.1
A68	55881.2	ND	ND	28871.9	46493.0	BDL	BDL	465.7	1952.7	92.89	494.000	465.7	1673.7
A68-2	55828.3	ND	ND	19643.3	BDL	BDL	BDL	310.2	1514.2	78.70	529.286	310.2	1514.2
A68-3	11825.0			8382.2	58728.0			179.6	1664.0			179.6	1664.0
A68-4	77093.5			20641.2				522.2				522.2	
A68-5	31358.3			20525.4				313.6				313.6	
A68d	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	ND
A68d-1	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A68d-2	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A69	BDL			BDL	189.6			0.1	ND			0.1	1.9

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_D_LOAD3 grams/day	CD_D_LOAD4 grams/day	CR_T_LOAD1 grams/day	CR_D_LOAD1 grams/day	CU_T_LOAD1 grams/day	CU_T_LOAD2 grams/day	CU_T_LOAD3 grams/day	CU_T_LOAD4 grams/day	CU_D_LOAD1 grams/day	CU_D_LOAD2 grams/day	CU_D_LOAD3 grams/day	CU_D_LOAD4 grams/day
A35	ND	222.126	BDL	BDL	1629.3	ND	ND	3339.152	756.5	ND	ND	1887.347
A36			BDL	BDL	BDL	ND	ND		BDL	BDL		
A37	33.11		BDL	BDL	184.6	ND	ND		58.3	370.3	105.34	
A38	22.46		BDL	BDL	10.0	ND	ND		BDL	BDL	74.88	
A39	1.50		BDL	BDL	208.2	ND	ND		101.3	544.4	15.86	
A40	ND	237.568	BDL	BDL	1710.2	ND	ND	ND	943.6	ND	ND	1616.953
A41	ND	16.287	BDL	BDL	BDL	ND	ND	ND	BDL	158.0	ND	132.334
A41a		348.921						2956.955				2168.434
A41b		407.219						2682.279				2194.592
A42			BDL	BDL	BDL	ND			BDL	BDL		
A43			BDL	BDL	BDL	ND			BDL	BDL		
A44			BDL	BDL	BDL	ND			BDL	BDL		
A45	19.73	305.992	BDL	BDL	1135.4	ND	BDL	ND	709.6	ND	BDL	1846.506
A46	1.37	11.837	BDL	BDL	8.7	ND	ND	41.496	7.1	55.0	1.86	34.694
A46a		331.081						2240.400				2240.400
A47			BDL	BDL	BDL	ND			BDL	ND		
A48	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
A49			BDL	BDL	27.5	ND			20.0	6.2		
A49a			BDL	BDL	1.4	ND			0.9	ND		
A50			BDL	BDL	26.1	382.7			9.4	15.8		
A51			BDL	BDL	BDL	ND			BDL	BDL		
A52			BDL	BDL	BDL	ND			BDL	BDL		
A52d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A53	21.01	351.734	BDL	BDL	1078.8	ND	ND	ND	BDL	ND	BDL	1891.042
A53d	ND	347.952	ND	ND	ND	ND	ND	ND	ND	ND	ND	2269.250
A54	0.16	1.529	BDL	BDL	BDL	ND	ND	ND	BDL	ND	BDL	4.573
A55	44.58	320.545	BDL	BDL	1094.2	ND	ND	ND	BDL	ND	BDL	2493.126
A56	31.34		BDL	BDL	948.8	ND	181.67		BDL	ND	227.08	
A57	ND		BDL	BDL	2.4	ND	ND		BDL	ND	ND	
A58	15.96		BDL	BDL	161.4	673.4	68.42		BDL	505.1	91.22	
A59			BDL	BDL	101.1	ND			BDL	377.4		
A59d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A60	52.41	365.780	BDL	BDL	1398.0	ND	628.98	ND	BDL	ND	349.43	2438.533
A61	81.95	346.454	BDL	BDL	1235.7	ND	ND	ND	988.6	ND	372.51	1862.656
A62	0.77	8.408	BDL	BDL	84.2	ND	ND	ND	84.2	BDL	BDL	BDL
A63	ND	4.613	BDL	BDL	BDL	ND	ND	ND	BDL	ND	ND	BDL
A63a												
A64	91.29	223.660	BDL	BDL	1503.7	ND	BDL	ND	BDL	ND	BDL	2096.810
A65	94.24	478.707	BDL	BDL	1443.7	ND	BDL	ND	BDL	ND	BDL	1914.826
A65d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A66	83.10	513.819	BDL	BDL	BDL	ND	ND	ND	BDL	ND	BDL	2076.035
A67	BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	
A68	85.74	524.245	BDL	BDL	3104.5	19527.1	BDL	2520.410	BDL	6509.0	178.63	3024.492
A68-2	78.70	494.000	BDL	BDL	2067.7	4326.3	327.90	4032.656	BDL	6489.4	BDL	BDL
A68-3			BDL	BDL	1197.5	15660.8			898.1	5872.8		
A68-4			BDL	BDL	4476.4				BDL			
A68-5			BDL	BDL	1710.5				1140.3			
A68d	ND	494.000	ND	ND	ND	ND	ND	ND	ND	ND	ND	2016.328
A68d-1	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A68d-2	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A69			BDL	BDL	BDL	ND			BDL	22.8		

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ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	FE_T_LOAD1 grams/day	FE_T_LOAD2 grams/day	FE_T_LOAD3 grams/day	FE_T_LOAD4 grams/day	FE_D_LOAD1 grams/day	FE_D_LOAD2 grams/day	FE_D_LOAD3 grams/day	FE_D_LOAD4 grams/day	PB_T_LOAD1 grams/day	PB_T_LOAD2 grams/day	PB_T_LOAD3 grams/day	PB_T_LOAD4 grams/day	PB_D_LOAD1 grams/day
A35	4364.2	ND	ND	11033.719	581.9	ND	ND	1742.166	BDL	ND	ND	BDL	BDL
A36	1638.3	ND			592.3	ND			BDL	ND			BDL
A37	874.3	ND	ND		BDL	ND	ND		136.0	ND	ND		BDL
A38	107.8	ND	ND		BDL	ND	ND		8.3	ND	ND		BDL
A39	1238.2	ND	ND		BDL	ND	ND		112.6	ND	ND		BDL
A40	4776.8	ND	ND	ND	BDL	ND	ND	1368.191	471.8	ND	ND	ND	BDL
A41	440.5	ND	ND	ND	411.1	ND	ND	101.795	BDL	ND	ND	ND	BDL
A41a				11433.559				3351.215				1182.782	
A41b				9753.742				BDL				1463.061	
A42	1366.0	ND			922.5	ND			BDL	ND			BDL
A43	2346.7	ND			962.1	ND			BDL	ND			BDL
A44	205.5	ND			14.2	ND			BDL	ND			BDL
A45	8515.6	ND	BDL	ND	1987.0	ND	ND	BDL	BDL	ND	BDL	ND	BDL
A46	4350.8	ND	ND	13605.320	4350.8	ND	ND	12244.788	18.0	ND	ND	61.224	4.0
A46a				24146.531				14438.132				BDL	
A47	BDL	ND			BDL	ND			BDL	ND			BDL
A48	1104.8	ND	ND		256.9	ND	ND		BDL	ND	ND		BDL
A49	49.9	ND			BDL	ND			BDL	ND			BDL
A49a	5.2	ND			BDL	ND			BDL	ND			BDL
A50	146.3	ND			BDL	ND			27.2	416.5			7.3
A51	1765.5	ND			620.3	ND			BDL	ND			BDL
A52	1625.8	ND			739.0	ND			BDL	ND			BDL
A52d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A53	20064.9	ND	ND	ND	9708.8	ND	ND	21557.874	BDL	ND	ND	ND	BDL
A53d	ND	ND	ND	ND	ND	ND	ND	17775.791	ND	ND	ND	ND	ND
A54	330.3	ND	ND	ND	101.3	ND	ND	4050.764	BDL	ND	ND	ND	BDL
A55	17725.7	ND	ND	ND	7002.7	ND	ND	14958.756	BDL	ND	ND	ND	BDL
A56	18739.8	ND	3088.31		7590.8	ND	ND		BDL	ND	BDL		BDL
A57	6.0	ND	ND		BDL	ND	ND		BDL	ND	ND		BDL
A58	322.8	1178.5	BDL		BDL	ND	ND		BDL	BDL	BDL		BDL
A59	646.8	ND			262.8	ND			BDL	ND			BDL
A59d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A60	21808.3	ND	4961.93	ND	8387.8	ND	ND	12599.089	BDL	ND	BDL	ND	BDL
A61	21996.1	ND	ND	ND	8155.9	ND	ND	10803.407	BDL	ND	ND	ND	BDL
A62	488.2	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	BDL
A63	NO FLOW	ND	ND	ND	ND	ND	ND	17.496	BDL	ND	ND	ND	BDL
A63a													
A64	21051.5	ND	4488.56	ND	8721.4	ND	ND	6523.408	BDL	ND	BDL	ND	BDL
A65	28008.4	ND	5739.85	ND	9239.9	ND	ND	13882.492	1443.7	ND	BDL	ND	BDL
A65d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A66	15312.8	ND	ND	ND	5767.2	ND	ND	14532.244	994.3	ND	ND	ND	BDL
A67	254.0	657.8	44.05		105.1	ND	ND		BDL	BDL	BDL		BDL
A68	71403.7	241763.6	ND	29740.838	13038.9	ND	ND	14114.296	7761.3	29755.5	BDL	BDL	BDL
A68-2	88911.7	46507.7	3016.66	29236.756	11165.7	28120.9	ND	22179.608	5996.4	BDL	BDL	BDL	BDL
A68-3	14818.6	127244.0			8981.0	ND			898.1	14682.0			BDL
A68-4	176568.9				9201.5				23874.1				1243.4
A68-5	21095.6				8267.2				BDL				BDL
A68d	ND	ND	ND	ND	ND	ND	ND	12602.050	ND	ND	ND	ND	ND
A68d-1	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A68d-2	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A69	36.0	ND			9.0	ND			BDL	ND			BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	PB_D_LOAD2 grams/day	PB_D_LOAD3 grams/day	PB_D_LOAD4 grams/day	MN_T_LOAD1 grams/day	MN_T_LOAD2 grams/day	MN_T_LOAD4 grams/day	MN_D_LOAD1 grams/day	MN_D_LOAD2 grams/day	MN_D_LOAD3 grams/day	MN_D_LOAD4 grams/day	NI_T_LOAD1 grams/day	NI_D_LOAD1 grams/day
A35	ND	ND	BDL	45969.8	ND	ND	44806.0	ND	ND	ND	BDL	BDL
A36	BDL			415.9	ND		226.8	ND			BDL	BDL
A37	BDL	BDL		39829.8	ND		36915.4	ND	ND		BDL	BDL
A38	BDL	BDL		25715.5	ND		24056.5	ND	ND		BDL	BDL
A39	181.50	13.2		21949.6	ND		20824.0	ND	ND		BDL	BDL
A40	ND	ND	BDL	45998.7	ND	ND	44229.5	ND	ND	ND	BDL	BDL
A41	190.90	ND	274.847	73.4	ND	ND	70.5	ND	ND	ND	BDL	BDL
A41a			BDL			ND				80823.431		
A41b			BDL			ND				82906.807		
A42	BDL			230.6	ND		195.1	ND			BDL	BDL
A43	BDL			469.3	ND		352.0	ND			BDL	BDL
A44	BDL			237.1	ND		237.1	ND			BDL	BDL
A45	ND	BDL	BDL	43997.1	ND	ND	45416.3	ND	250.57	ND	BDL	BDL
A46	52.40	1.8	8.163	5283.1	ND	ND	4972.3	14138.8	ND	ND	BDL	BDL
A46a			BDL			ND				69701.327		
A47	ND			BDL	ND		BDL	ND			BDL	BDL
A48	BDL	BDL		205.5	ND		BDL	ND	ND		BDL	BDL
A49	BDL			52.4	ND		49.9	ND			BDL	BDL
A49a	ND			1.4	ND		1.2	ND			BDL	BDL
A50	BDL			313.5	ND		303.0	ND			BDL	BDL
A51	BDL			190.9	ND		BDL	ND			BDL	BDL
A52	BDL			184.7	ND		BDL	ND			BDL	BDL
A52d		ND		ND	ND		ND	ND	ND		ND	ND
A53	ND	BDL	BDL	51780.5	ND	ND	49623.0	ND	ND	ND	BDL	BDL
A53d		ND	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND
A54	ND	BDL	BDL	180.6	ND	ND	165.2	ND	ND	ND	BDL	BDL
A55	ND	BDL	BDL	48143.7	ND	ND	45955.4	ND	ND	ND	BDL	BDL
A56	ND	BDL		49814.6	ND		49814.6	ND	7720.77		BDL	BDL
A57	ND	ND		BDL	ND		BDL	ND	ND		BDL	BDL
A58	BDL	BDL		BDL	ND		BDL	ND	BDL		BDL	BDL
A59	BDL			222.3	ND		BDL	ND			BDL	BDL
A59d		ND		ND	ND		ND	ND	ND		ND	ND
A60	ND	BDL	BDL	53122.9	ND	ND	50327.0	ND	9085.22	ND	BDL	BDL
A61	ND	BDL	BDL	51900.9	ND	ND	49429.4	ND	ND	ND	BDL	BDL
A62	BDL	BDL	BDL	5050.6	ND	ND	4882.3	3876.5	ND	ND	BDL	BDL
A63	ND	ND	BDL	ND	ND	ND	ND	ND	ND	ND	BDL	BDL
A63a												
A64	ND	BDL	BDL	66162.0	ND	ND	66162.0	ND	17497.76	ND	BDL	BDL
A65	ND	BDL	BDL	75074.0	ND	ND	72186.5	ND	34267.79	ND	BDL	BDL
A65d		ND		ND	ND		ND	ND	ND		ND	ND
A66	ND	BDL	BDL	61649.0	ND	ND	59660.3	ND	ND	ND	BDL	BDL
A67	BDL	BDL		39.4	ND		30.7	ND	BDL		BDL	BDL
A68	BDL	BDL	BDL	180061.5	ND	ND	173852.5	ND	37155.25	ND	BDL	BDL
A68-2	BDL	BDL	BDL	90979.5	ND	ND	82708.6	432629.6	32789.80	ND	BDL	BDL
A68-3	BDL			55382.7	ND		53885.9	ND			BDL	BDL
A68-4				189003.3			171595.1				BDL	BDL
A68-5				85522.7			85522.7				BDL	BDL
A68d	ND	ND	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND
A68d-1		ND		ND	ND		ND	ND	ND		ND	ND
A68d-2		ND		ND	ND		ND	ND	ND		ND	ND
A69	BDL			29.8	ND		29.0	ND			BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SE_T_LOAD1 grams/day	SE_T_LOAD3 grams/day	SE_D_LOAD1 grams/day	SE_D_LOAD2 grams/day	SE_D_LOAD3 grams/day	AG_T_LOAD1 grams/day	AG_T_LOAD2 grams/day	AG_T_LOAD3 grams/day	AG_D_LOAD1 grams/day	AG_D_LOAD2 grams/day	AG_D_LOAD3 grams/day
A35	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	ND
A36	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	
A37	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A38	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A39	ND	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A40	BDL	ND	BDL	ND	ND	BDL	ND	ND	ND	ND	ND
A41	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND
A41a											
A41b											
A42	BDL		BDL	ND		BDL	ND		BDL	BDL	
A43	BDL		BDL	ND		BDL	ND		BDL	BDL	
A44	BDL		BDL	ND		BDL	ND		BDL	BDL	
A45	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A46	ND	ND	ND	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
A46a											
A47	ND		ND	ND		BDL	ND		BDL	ND	
A48	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A49	ND		ND	ND		BDL	ND		BDL	BDL	
A49a	ND		ND	ND		BDL	ND		BDL	ND	
A50	ND		ND	ND		BDL	0.9		BDL	BDL	
A51	ND		ND	ND		BDL	ND		BDL	BDL	
A52	BDL		BDL	ND		BDL	ND		BDL	BDL	
A52d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A53	ND	ND	BDL	ND	ND	BDL	ND	ND	BDL	ND	BDL
A53d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A54	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A55	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A56	ND	ND	ND	ND	BDL	BDL	ND	ND	BDL	ND	BDL
A57	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	ND
A58	BDL	ND	BDL	ND	BDL	BDL	ND	ND	BDL	BDL	BDL
A59	BDL	ND	BDL	ND		BDL	ND	ND	BDL	BDL	
A59d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A60	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A61	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A62	BDL	ND	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
A63	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	ND
A63a							ND	ND			
A64	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	ND	BDL
A65	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A65d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A66	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
A67	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A68	ND	ND	ND	ND	BDL	BDL	ND	ND	BDL	BDL	BDL
A68-2	ND	ND	ND	ND	ND	ND	ND	ND	BDL	BDL	BDL
A68-3	BDL		BDL	ND		BDL	ND		BDL	BDL	
A68-4	ND		ND			99.5			BDL		
A68-5	ND		ND			BDL			BDL		
A68d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A68d-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A68d-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A69	BDL		BDL	ND		BDL	ND		BDL	BDL	

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	ZN_T_LOAD1 grams/day	ZN_T_LOAD2 grams/day	ZN_T_LOAD3 grams/day	ZN_T_LOAD4 grams/day	ZN_D_LOAD1 grams/day	ZN_D_LOAD2 grams/day	ZN_D_LOAD3 grams/day	ZN_D_LOAD4 grams/day
A35	30258.6	ND	ND	56620.399	28512.9	ND	ND	53716.789
A36	176.4	ND			126.0	828.3		
A37	8548.8	ND	ND		7577.4	25349.9	8126.5	
A38	1161.3	ND	ND		564.1	165.2	3171.3	
A39	9567.8	ND	ND		9567.8	27220.4	563.8	
A40	31255.5	ND	ND	ND	29486.4	ND	ND	87066.707
A41	12.9	ND	ND	ND	12.6	7240.7	ND	5802.326
A41a				116306.889				116306.889
A41b				136552.388				134113.953
A42	BDL	ND			BDL	536.0		
A43	BDL	ND			BDL	860.2		
A44	43.5	ND			38.7	50.7		
A45	48254.8	ND	9396.5	ND	48254.8	ND	9709.7	118703.970
A46	2579.4	ND	ND	6802.660	2548.3	8116.7	969.0	6802.660
A46a				112019.990				109530.656
A47	BDL	ND			BDL	ND		
A48	334.0	ND	ND		282.6	3799.0	334.7	
A49	274.6	ND			249.6	63.6		
A49a	22.1	ND			21.4	ND		
A50	1671.8	5403.0			1671.8	2251.2		
A51	BDL	ND			BDL	BDL		
A52	BDL	ND			BDL	BDL		
A52d	ND	ND	ND		ND	ND	ND	
A53	60410.6	ND	ND	ND	58253.0	ND	9454.5	124808.746
A53d	ND	ND	ND	ND	ND	ND	ND	124808.746
A54	66.1	ND	ND	ND	61.7	ND	80.3	405.076
A55	50332.1	ND	ND	ND	48143.7	ND	18056.9	121094.689
A56	56930.9	ND	15895.7		56930.9	ND	14987.4	
A57	78.6	ND	ND		78.6	ND	ND	
A58	3873.1	9259.4	2280.6		3873.1	9259.4	2280.6	
A59	1232.9	ND			1374.4	5133.3		
A59d	ND	ND	ND		ND	ND	ND	
A60	67102.6	ND	16772.7	ND	64306.7	ND	16073.9	130055.114
A61	69201.2	ND	ND	ND	64258.2	ND	26820.5	111759.384
A62	1683.5	ND	ND	ND	1683.5	2482.7	145.8	2101.973
A63	ND	ND	ND	ND	ND	ND	ND	890.708
A63a								
A64	78191.4	ND	27387.8	ND	75184.1	ND	26627.0	76883.027
A65	83736.3	ND	36837.9	ND	80848.9	ND	36837.9	167547.314
A65d	ND	ND	ND		ND	ND	ND	
A66	51705.6	ND	ND	ND	49716.9	ND	24930.0	207603.480
A67	354.8	833.9	BDL		332.9	798.7	BDL	
A68	124180.4	353346.8	30010.0	156265.420	114866.8	288256.6	30010.0	151224.600
A68-2	84776.3	292025.0	25576.0	166347.060	72370.0	389366.6	24264.5	171387.880
A68-3	46401.7	342580.0			43408.1	293640.0		
A68-4	134291.8				111909.9			
A68-5	82671.9				82671.9			
A68d	ND	ND	ND	ND	ND	ND	ND	146183.780
A68d-1	ND	ND	ND		ND	ND	ND	
A68d-2	ND	ND	ND		ND	ND	ND	
A69	16.8	ND			14.1	220.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SEGMENT	SUB_SEG	SITE	FLOW1 cfs	FLOW2 cfs	FLOW3 cfs	FLOW4 cfs	DATE1	DATE2	DATE3	DATE4	PH1	PH2	PH3	PH4
Animas	Idaho	A70	ND	0.023			09/09/91	06/25/92			ND	8.15		
Animas	Animas adit	A71	0.130	0.190	0.280		09/09/91	06/25/92	15-Oct-92		6.20	8.10	6.50	
Animas	Animas	A72	269.000	797.000	78.000	434.000	09/09/91	06/25/92	15-Oct-92	20-Jul-93	6.42	7.20	6.80	7.40
Animas	Animas	A72-1	131.000	874.000	80.000	434.000	09/05/91	06/24/92	14-Oct-92	21-Jul-93	6.20	7.20	6.30	6.73
Animas	Animas	A72-2	263.000	854.000			09/10/91	06/23/92			6.35	7.40		
Animas	Animas	A72-3	185.000				09/06/91				6.30			
Animas	Animas	A72-4	261.000				09/07/91				6.86			
Animas	Filtered Dup.	A72d	185.000				09/06/91				ND			
Animas	Filtered Dup.	A72d-1	261.000				09/07/91				ND			
Animas	Animas abv Elk Cr	A73	ND		ND	ND	09/08/91	06/25/92	15-Oct-92	20-Jul-93	ND	7.25	6.98	7.76
Animas	Animas @ Needleton	A74	ND	ND	ND	ND	09/08/91	06/25/92	15-Oct-92	20-Jul-93	ND	7.54	7.1	6.54
Animas	Animas@Bakers bridg	A75	ND	ND	ND	ND	09/08/91	06/25/92	15-Oct-92	22-Jul-93	ND	6.66	7.36	6.60
Cement	Cement	CC01	1.790	15.400			09/07/91	06/24/92			5.93	6.27		
Cement	Queen Ann Mine adit	CC01a				0.013				21-Jul-93				6.73
Cement	Mogul tnl mine drng	CC01b				0.031				21-Jul-93				3.12
Cement	Mine adit abv Mogul	CC01c				0.062				21-Jul-93				3.69
Cement		CC01d				0.880				21-Jul-93				6.70
Cement		CC01e				0.635				21-Jul-93				6.86
Cement		CC01f				1.440				21-Jul-93				6.90
Cement	Cement	CC02	2.300	11.900		5.470	09/07/91	06/24/92		21-Jul-93	5.00	4.88		4.50
Cement	Cement	CC03	3.350	ND	0.637	6.570	09/07/91	06/24/92	14-Oct-92	21-Jul-93	4.48	5.28	4.1	3.40
Cement	NF Cement	CC04	0.153	ND			09/07/91				4.24			
Cement	Cement	CC05	2.680	18.300	0.468	6.880	09/07/91	06/24/92	14-Oct-92	21-Jul-93	4.00	4.01	4.23	3.51
Cement	NF Cement	CC06	0.179	ND		0.570	09/07/91	06/24/92		21-Jul-93	3.19	3.20		2.73
Cement	Filtered Dup.	CC06d	0.179				09/07/91				ND			
Cement	NF Cement	CC07	0.063	ND			09/07/91				3.70			
Cement	Minnehaha	CC08	0.007	1.200			09/07/91	06/24/92			4.69	0.00		
Cement	Minnehaha	CC09	0.444	2.250			09/07/91	06/24/92			8.57	7.30		
Cement	Filtered Dup.	CC09d	0.444				09/07/91				ND			
Cement	MF Cement adit	CC10	0.017	0.340			09/07/91	06/24/92			7.64	6.93		
Cement	MF Cement	CC11	0.267	ND			09/07/91	06/24/92			8.48	7.04		
Cement	Minnehaha	CC12	0.840	2.850			09/07/91	06/24/92			7.02	7.28		
Cement	MF Cement	CC13	1.880	4.800			09/07/91	06/24/92			7.04	6.52		
Cement	SF Cement adit	CC14	0.620	1.290	1.000	1.500	09/07/91	06/24/92	14-Oct-92	21-Jul-93	6.37	5.62	6.7	5.78
Cement	SF Cement	CC15	1.200	7.070	0.200		09/07/91	06/24/92	14-Oct-92		3.32	6.27	7.55	
Cement	SF Cement	CC16	3.180	13.220	1.290		09/07/91	06/24/92	14-Oct-92		3.63	6.12	6.53	
Cement	SF Cement	CC17	6.300	18.080	2.300	9.100	09/07/91	06/24/92	14-Oct-92	21-Jul-93	4.03	6.16	6.04	6.36
Cement	Cement	CC18	2.400	20.500		7.450	09/07/91	06/24/92		21-Jul-93	3.80	3.78		3.59
Cement	Cement Amer Tnl	CC19	3.260	3.400	3.190	3.350	09/07/91	06/24/92	14-Oct-92	21-Jul-93	9.30	8.90	9.36	9.05
Cement	Cement ditch	CC19a	ND				09/07/91				5.87			
Cement	Cement	CC20	6.500	27.700		11.040	09/07/91	06/24/92		21-Jul-93	6.53	5.77		4.11
Cement	Cement	CC21	9.830	35.330	5.600	19.410	09/07/91	06/24/92	14-Oct-92	21-Jul-93	5.59	5.17	7.41	5.16
Cement	Prospect	CC22	1.000	0.220	0.009		09/07/91	06/24/92	14-Oct-92		3.70	3.38	4.07	
Cement	Prospect	CC23	0.500	2.530	0.045	0.320	09/07/91	06/24/92	14-Oct-92	21-Jul-93	3.70	6.13	7.52	7.40
Cement	Prospect	CC23a				0.590				21-Jul-93				5.05
Cement	Prospect	CC24	1.290	3.000	0.054		09/07/91	06/24/92	14-Oct-92		3.50	4.45	2.79	
Cement	Prospect adit	CC24a				ND				21-Jul-93				4.30
Cement	Prospect adit	CC24b				ND				21-Jul-93				5.30
Cement	Prospect	CC25	3.300	4.070	0.042		09/07/91	06/24/92	14-Oct-92		3.30	3.07	3.61	
Cement	Prospect	CC26	1.960	5.100	0.259	0.730	09/07/91	06/24/92	14-Oct-92	21-Jul-93	3.40	3.76	3.49	4.10
Cement	Cement	CC27	15.650	45.600			09/07/91	06/24/92			4.20	4.90		
			51				10	23	19	16				

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TEMP1 deg C	TEMP2 deg C	TEMP3 deg C	TEMP4 deg C	COND1 umhos	COND4 umhos	AL_TOT1 ug/l	AL_TOT2 ug/l	AL_TOT3 ug/l	AL_TOT4 ug/l	AL_DIS1 ug/l	AL_DIS2 ug/l	AL_DIS3 ug/l	AL_DIS4 ug/l	CD_TOT1 ug/l	CD_TOT2 ug/l	CD_TOT3 ug/l	CD_TOT4 ug/l
A70	ND	4.70			ND		BDL	ND			BDL	BDL			BDL	ND		
A71	8.10	8.80	8.5		550		BDL	ND	ND		BDL	BDL	BDL		0.70	ND	ND	
A72	4.80	7.00	3.5	8.00	180	220	790.0	ND	ND	ND	BDL	BDL	52.0	BDL	1.10	ND	1.30	0.970
A72-1	9.50	4.00	4.5	10.00	265	252	1200.0	ND	ND	ND	BDL	BDL	BDL	BDL	1.40	1.70	ND	0.970
A72-2	11.50	8.00			170		1000.0	BDL			70.0	BDL			1.20	1.60		
A72-3	8.50				370		1800.0				77.0				1.50			
A72-4	8.50				270		1100.0				110.0				1.20			
A72d	ND				0		BDL				81.0				ND			
A72d-1	ND				0		ND				BDL				ND			
A73	ND		415.5	20.00	0	118	270.0	ND	ND	ND	130.0	BDL	ND	65.00	BDL	1.30	1.40	BDL
A74	ND	50.50	6.1	15.55	0	140	BDL	ND	ND	220.00	BDL	380.0	BDL	BDL	BDL	1.00	0.95	0.450
A75	ND	48.00	13.9		0	193	530.0	ND	ND	290.00	62.0	BDL	BDL	BDL	1.00	0.76	1.10	0.490
CC01	5.90	ND			185		850.0	ND			300.0	300.0			9.00	5.70		
CC01a				5.55		296				ND				51.00				ND
CC01b				5.94		1105				ND				6300.00				ND
CC01c				7.89		268				ND				2000.00				ND
CC01d				10.55		112				ND				BDL				ND
CC01e				8.89		109				ND				BDL				ND
CC01f				10.33		159				ND				120.00				ND
CC02	7.00	18.10		4.80	208	140	1700.0	ND		ND	1300.0	420.0		180.00	11.00	ND		4.990
CC03	7.30	10.70	6.28	6.80	243	155	1700.0	ND	ND	ND	1300.0	570.0	2500.0	330.00	12.00	ND	ND	ND
CC04	6.20				170		1700.0				1500.0				4.00			
CC05	6.90	8.70	6.33	11.50	285	390	4100.0	ND	ND	ND	2000.0	1800.0	2600.0	3000.00	12.00	ND	ND	ND
CC06	6.50	10.00		9.00	353	1280	9800.0	13000.0		ND	8400.0	13000.0		38000.00	27.00	37.00		100.000
CC06d	0.00				0		ND				9300.0				ND			
CC07	6.30				222		4000.0				2700.0				8.00			
CC08	6.50	0.00			129		3100.0	ND			2900.0	BDL			BDL	ND		
CC09	6.10	7.20			132		220.0	ND			80.0	100.0			BDL	ND		
CC09d	0.00				0		ND				74.0				ND			
CC10	5.60	8.50			702		1500.0	ND			69.0	BDL			5.00	ND		
CC11	5.50	5.10			227		BDL	ND			BDL	BDL			BDL	ND		
CC12	7.00	6.70			100		950.0	ND			110.0	120.0			1.30	0.59		
CC13	7.50	6.20			250		690.0	ND			BDL	67.0			1.00	1.30		
CC14	7.00	54.50	6.1	9.00	880	760	1100.0	ND	ND	ND	940.0	2300.0	860.0	1800.00	2.30	ND	ND	ND
CC15	7.00	55.00	3.8		430		7100.0	ND	ND		6900.0	91.0	BDL		0.80	ND	ND	
CC16	7.00	55.40	6.4		480		6000.0	ND	ND		5000.0	120.0	720.0		2.00	ND	ND	
CC17	8.00	57.50	3.8	8.50	390	260	4200.0	ND	ND	ND	3200.0	63.0	910.0	390.00	6.00	1.80	2.90	ND
CC18	6.60	8.20		9.00	376	300	3800.0	ND		ND	2700.0	1600.0		3000.00	15.00	9.00		ND
CC19	11.00	12.50	10	13.00	1978	1890	130.0	ND	ND	ND	BDL	BDL	130.0	BDL	1.20	ND	ND	ND
CC19a	7.70				165		72000.0				290.0				23.00			
CC20	8.70	9.70		8.50	1281	1150	2500.0	ND		ND	840.0	1500.0		1800.00	9.00	ND		ND
CC21	7.90	6.70	3.7	9.00	575	560	3300.0	ND	ND	ND	1600.0	890.0	120.0	890.00	8.00	ND	5.00	5.310
CC22	4.50	5.30	8.8		270		3500.0	ND	ND		BDL	3300.0	7400.0		BDL	ND	ND	
CC23	7.50	8.60	5.1	13.00	275	220	990.0	ND	ND	ND	830.0	BDL	160.0	60.00	11.00	ND	ND	ND
CC23a				13.00		215				ND				1600.00				ND
CC24	7.00	12.30	4.2		380		3200.0	ND	ND		3000.0	660.0	5900.0		9.00	ND	ND	
CC24a				15.00		650				ND				3000.00				ND
CC24b				13.00		60				ND				180.00				ND
CC25	7.00	8.80	3.9		390		4500.0	ND	ND		3000.0	1700.0	7600.0		8.00	ND	ND	
CC26	5.50	5.30	7.6	9.50	410	390	13000.0	ND	ND	ND	4700.0	3100.0	19000.0	5900.00	8.00	7.00	4.50	ND
CC27	7.00	8.50			750		5400.0	ND			2700.0	1400.0			6.00	6.70		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_DIS1 ug/l	CD_DIS2 ug/l	CD_DIS3 ug/l	CD_DIS4 ug/l	CHROM_T_1 ug/l	CHROM_D_1 ug/l	COPPER1TOT ug/l	COPPER2TOT ug/l	COPPER3TOT ug/l	COPPER4TOT ug/l	COPPER1DIS ug/l	COPPER2DIS ug/l	COPPER3DIS ug/l	COPPER4DIS ug/l
A70	BDL	0.35			BDL	BDL	BDL	ND			BDL	9.0		
A71	0.60	0.96	0.48		BDL	BDL	32.0	ND	ND		5.0	4.0	BDL	
A72	1.10	1.70	1.20	0.990	BDL	BDL	20.0	ND	26.0	19.00	BDL	6.0	5.0	6.00
A72-1	1.40	1.70	1.50	0.960	BDL	BDL	29.0	35.0	ND	19.00	5.0	8.0	6.0	5.00
A72-2	1.00	1.60			BDL	BDL	26.0	8.0			BDL	7.0		
A72-3	1.40				BDL	BDL	50.0				BDL			
A72-4	1.10				BDL	BDL	37.0				6.0			
A72d	1.40				ND	BDL	ND				BDL			
A72d-1	1.10				ND	BDL	ND				BDL			
A73	BDL	1.20	ND	BDL	BDL	BDL	BDL	23.00	22.0	8.00	BDL	9.00	ND	BDL
A74	BDL	0.94	BDL	0.400	BDL	BDL	BDL	16.0	13.0	9.00	BDL	5.0	BDL	4.00
A75	0.60	0.57	0.52	0.450	BDL	BDL	17.0	12.0	8.0	10.00	5.0	BDL	6.0	4.00
CC01	9.00	5.50			BDL	BDL	200.0	150.0			170.0	140.0		
CC01a				9.060						ND				75.00
CC01b				210.000						ND				10000.00
CC01c				26.200						ND				920.00
CC01d				0.680						ND				5.00
CC01e				BDL						ND				BDL
CC01f				2.910						ND				39.00
CC02	11.00	6.50		4.260	BDL	BDL	230.0	ND		100.00	210.0	140.0		84.00
CC03	10.00	6.00	14.00	5.260	BDL	BDL	200.0	ND	ND	ND	190.0	130.0	260.0	88.00
CC04	3.20				BDL	BDL	180.0				170.0			
CC05	12.00	9.00	15.00	11.700	BDL	BDL	320.0	ND	ND	ND	310.0	330.0	270.0	520.00
CC06	27.00	37.00		110.000	BDL	BDL	1500.0	2200.0		5900.00	1400.0	2100.0		6300.00
CC06d	27.00				ND	BDL	ND				1600.0			
CC07	8.00				BDL	BDL	720.0				690.0			
CC08	BDL	BDL			BDL	BDL	31.0	ND			30.0	BDL		
CC09	BDL	0.43			BDL	BDL	BDL	ND			BDL	9.0		
CC09d	BDL				ND	BDL	ND				BDL			
CC10	2.00	6.10			BDL	BDL	160.0	ND			BDL	4.0		
CC11	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
CC12	0.90	0.55			BDL	BDL	38.0	12.0			BDL	10.0		
CC13	0.80	1.20			BDL	BDL	37.0	26.0			BDL	15.0		
CC14	2.20	7.00	2.00	3.900	BDL	BDL	19.0	ND	ND	ND	9.0	110.0	9.0	39.00
CC15	0.70	BDL	BDL		BDL	BDL	160.0	ND	ND		160.0	BDL	BDL	
CC16	1.90	1.60	2.10		BDL	BDL	130.0	ND	ND		120.0	10.0	23.0	
CC17	6.00	4.80	2.90	2.010	BDL	BDL	130.0	25.0	37.0	ND	120.0	11.0	28.0	18.00
CC18	15.00	8.00		11.200	BDL	BDL	380.0	310.0		ND	360.0	300.0		530.00
CC19	0.30	7.60	1.10	0.700	BDL	BDL	BDL	ND	ND	ND	BDL	BDL	BDL	BDL
CC19a	9.00				32.00	BDL	560.0				14.0			
CC20	9.00	9.00		9.620	BDL	BDL	190.0	ND		ND	81.0	270.0		290.00
CC21	6.00	7.20	4.00	5.620	BDL	BDL	160.0	ND	61.0	150.00	91.0	160.0	8.0	130.00
CC22	BDL	BDL	0.27		BDL	BDL	12.0	ND	ND		12.0	12.0	16.0	
CC23	11.00	2.10	3.80	1.750	BDL	BDL	280.0	ND	ND	ND	280.0	27.0	65.0	19.00
CC23a				1.560						ND				45.00
CC24	9.00	1.80	10.00		BDL	BDL	300.0	ND	ND		300.0	43.0	570.0	
CC24a				51.000						ND				2600.00
CC24b				BDL						ND				BDL
CC25	7.00	4.60	14.00		BDL	BDL	330.0	ND	ND		330.0	240.0	760.0	
CC26	7.00	5.20	4.50	3.890	BDL	BDL	300.0	330.0	76.0	ND	270.0	310.0	76.0	200.00
CC27	6.00	6.70			BDL	BDL	190.0	170.0			140.0	170.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	IRON_TOT1 ug/l	IRON_TOT2 ug/l	IRON_TOT3 ug/l	IRON_TOT4 ug/l	IRON_DIS1 ug/l	IRON_DIS2 ug/l	IRON_DIS3 ug/l	IRON_DIS4 ug/l	LEAD_TOT1 ug/l	LEAD_TOT2 ug/l	LEAD_TOT3 ug/l	LEAD_TOT4 ug/l	LEAD_DIS1 ug/l	LEAD_DIS2 ug/l	LEAD_DIS3 ug/l
A70	BDL	ND			BDL	ND			BDL	ND			BDL	BDL	
A71	1800.0	ND	ND		18.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
A72	1200.0	ND	3000.0	750.00	480.0	ND	1700.0	190.00	5.0	ND	6.3	BDL	BDL	BDL	BDL
A72-1	1500.0	950.0	ND	740.00	390.0	ND	ND	240.00	10.0	12.0	5.5	BDL	BDL	BDL	BDL
A72-2	1500.0	78.0			250.0	42.0			11.0	BDL			BDL	BDL	
A72-3	2700.0				370.0				28.0				BDL		
A72-4	2000.0				460.0				25.0				BDL		
A72d	ND				340.0				ND				BDL		
A72d-1	ND				300.0				ND				BDL		
A73	45.0	790.00	2000.0	110.00	19.0	ND	ND	20.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL
A74	17.0	580.0	1000.0	330.00	BDL	ND	ND	33.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL
A75	1100.0	550.0	390.0	ND	52.0	ND	ND	ND	17.0	5.0	BDL	BDL	BDL	BDL	BDL
CC01	470.0	500.0			40.0	53.0			6.0	11.0			BDL	BDL	
CC01a				ND				120.00				ND			
CC01b				ND				65000.00				ND			
CC01c				ND				5500.00				ND			
CC01d				ND				13.00				ND			
CC01e				ND				BDL				ND			
CC01f				ND				16.00				ND			
CC02	1000.0	ND		330.00	500.0	ND		120.00	17.0	ND		7.00	12.0	BDL	
CC03	1300.0	ND	ND	ND	190.0	ND	ND	41.00	39.0	ND	ND	ND	9.0	BDL	11.0
CC04	1700.0				1500.0				BDL				BDL		
CC05	5000.0	ND	ND	ND	1100.0	ND	ND	9800.00	35.0	ND	ND	ND	9.0	6.0	11.0
CC06	25000.0	45000.0		140000.00	16000.0	ND		150000.00	BDL	BDL		5.00	BDL	BDL	
CC06d	ND				18000.0				ND				BDL		
CC07	7000.0				2200.0				BDL				BDL		
CC08	540.0	ND			67.0	ND			BDL	ND			BDL	BDL	
CC09	260.0	ND			26.0	ND			BDL	ND			BDL	BDL	
CC09d	ND				43.0				ND				BDL		
CC10	19000.0	ND			530.0	ND			58.0	ND			BDL	BDL	
CC11	25.0	ND			BDL	ND			BDL	ND			BDL	BDL	
CC12	1700.0	230.0			51.0	ND			82.0	6.0			BDL	BDL	
CC13	1300.0	180.0			39.0	ND			BDL	BDL			BDL	BDL	
CC14	14000.0	ND	ND	ND	11000.0	ND	ND	14000.00	7.0	ND	ND	ND	BDL	BDL	BDL
CC15	19000.0	ND	ND		18000.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
CC16	17000.0	ND	ND		6300.0	ND	ND		13.0	ND	ND		BDL	BDL	BDL
CC17	11000.0	1600.0	4300.0	ND	2100.0	ND	ND	2000.00	48.0	BDL	BDL	ND	23.0	BDL	BDL
CC18	8100.0	4100.0		ND	1300.0	ND		7600.00	92.0	9.0		ND	61.0	6.0	
CC19	610.0	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	BDL	BDL	BDL
CC19a	170000.0				52.0				5200.0				34.0		
CC20	4300.0	ND		ND	81.0	ND		1300.00	580.0	ND		ND	35.0	11.0	
CC21	7200.0	ND	3000.0	3200.00	950.0	ND	710.0	740.00	200.0	ND	30.0	10.00	15.0	BDL	BDL
CC22	510.0	ND	ND		420.0	ND	ND		40.0	ND	ND		38.0	26.0	54.0
CC23	5700.0	ND	ND	ND	4400.0	ND	ND	200.00	160.0	ND	ND	ND	160.0	BDL	22.0
CC23a				ND				340.00				ND			
CC24	9400.0	ND	ND		7900.0	ND	ND		130.0	ND	ND		120.0	15.0	75.0
CC24a				ND				7300.00				ND			
CC24b				ND				140.00				ND			
CC25	15000.0	ND	ND		7300.0	ND	ND		220.0	ND	ND		150.0	19.0	75.0
CC26	38000.0	9400.0	48000.0	ND	9700.0	ND	ND	13000.00	610.0	35.0	5.0	ND	110.0	33.0	5.1
CC27	15000.0	4000.0			4100.0	ND			390.0	16.0			130.0	10.0	

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	LEAD_DIS4 ug/l	MN_TOT1 ug/l	MN_TOT2 ug/l	MN_TOT4 ug/l	MN_DIS1 ug/l	MN_DIS2 ug/l	MN_DIS3 ug/l	MN_DIS4 ug/l	NICKEL1TOT ug/l	NICKEL1DIS ug/l	SE_TOT_1 ug/l	SE_TOT_3 ug/l	SE_DIS1 ug/l	SE_DIS2 ug/l	SE_DIS3 ug/l	SILVER1TOT ug/l
A70		BDL	ND		BDL	ND			BDL	BDL	ND		ND	ND		ND
A71		5600.0	ND		5500.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
A72	BDL	290.0	ND	330.00	290.0	360.0	940.0	ND	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
A72-1	BDL	550.0	ND	ND	550.0	ND	880.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A72-2		360.0	ND		340.0	350.0			BDL	BDL	ND		ND	BDL		BDL
A72-3		560.0			540.0				BDL	BDL	ND		ND			BDL
A72-4		430.0			420.0				BDL	BDL	ND		ND			BDL
A72d		ND			540.0				ND	BDL	ND		ND			ND
A72d-1		ND			420.0				ND	BDL	ND		ND			ND
A73	BDL	12.0	ND	ND	9.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
A74	BDL	BDL	ND	150.00	BDL	ND	480.0	150.00	BDL	BDL	ND	ND	ND	ND	ND	BDL
A75	BDL	150.0	ND	150.00	61.0	ND	250.0	130.00	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC01		540.0	ND		540.0	650.0			BDL	BDL	BDL		BDL	BDL		BDL
CC01a	11.00			ND				ND								
CC01b	230.00			ND				ND								
CC01c	36.00			ND				ND								
CC01d	BDL			ND				ND								
CC01e	BDL			ND				ND								
CC01f	5.00			ND				ND								
CC02	BDL	720.0	ND	ND	700.0	ND		420.00	BDL	BDL	ND		ND	ND		0.30
CC03	BDL	760.0	ND	ND	740.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	1.40
CC04		450.0			420.0				BDL	BDL	ND		ND			BDL
CC05	5.00	940.0	ND	ND	890.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC06	5.00	2400.0	ND	ND	2200.0	ND		ND	BDL	BDL	ND		ND	ND		BDL
CC06d		ND			2300.0				ND	BDL	ND		ND			ND
CC07		880.0			750.0				BDL	BDL	ND		ND			BDL
CC08		210.0	ND		200.0	ND			BDL	BDL	ND		ND	ND		BDL
CC09		24.0	ND		5.0	ND			BDL	BDL	ND		ND	ND		BDL
CC09d		ND			5.0				ND	BDL	ND		ND			ND
CC10		3000.0	ND		1800.0	ND			BDL	BDL	ND		ND	ND		BDL
CC11		BDL	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
CC12		150.0	ND		120.0	ND			BDL	BDL	BDL		BDL	ND		0.50
CC13		140.0	ND		110.0	ND			BDL	BDL	BDL		BDL	ND		BDL
CC14	BDL	2200.0	ND	ND	2200.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC15		560.0	ND		540.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
CC16		990.0	ND		960.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	0.40
CC17	BDL	2300.0	ND	ND	2200.0	ND	1700.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	0.30
CC18	5.00	2100.0	ND	ND	2000.0	ND		ND	BDL	BDL	BDL		BDL	ND		0.30
CC19	BDL	2300.0	ND	ND	1900.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC19a		6500.0			1600.0				BDL	BDL	ND		ND			14.00
CC20	10.00	2600.0	ND	ND	2300.0	ND		ND	BDL	BDL	BDL		BDL	ND		0.70
CC21	BDL	2800.0	ND	ND	2600.0	1900.0	ND	1300.00	BDL	BDL	ND	ND	ND	BDL	BDL	0.70
CC22		610.0	ND		600.0	ND	ND		BDL	BDL	BDL	ND	BDL	ND	ND	BDL
CC23	BDL	190.0	ND	ND	180.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC23a	29.00			ND				ND								
CC24		450.0	ND		440.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	0.20
CC24a	360.00			ND				ND								
CC24b	BDL			ND				ND								
CC25		410.0	ND		340.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	1.00
CC26	28.00	540.0	ND	ND	390.0	ND	800.0	ND	BDL	BDL	1.7	ND	BDL	ND	ND	4.10
CC27		2200.0	ND		2000.0	1700.0			BDL	BDL	ND		ND	BDL		1.10

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SILVER2TOT ug/l	SILVER3TOT ug/l	SILVER1DIS ug/l	SILVER2DIS ug/l	SILVER3DIS ug/l	ZINC_TOT1 ug/l	ZINC_TOT2 ug/l	ZINC_TOT3 ug/l	ZINC_TOT4 ug/l	ZINC_DIS1 ug/l	ZINC_DIS2 ug/l	ZINC_DIS3 ug/l	ZINC_DIS4 ug/l
A70	ND		ND	BDL		ND	ND			BDL	50.0		
A71	ND	ND	BDL	BDL	BDL	350.0	ND	ND		250.0	330.0	240.0	
A72	ND	ND	BDL	BDL	BDL	270.0	ND	540.0	300.00	260.0	260.0	510.0	290.00
A72-1	ND	ND	BDL	BDL	BDL	410.0	320.0	ND	280.00	380.0	290.0	480.0	260.00
A72-2	ND		BDL	BDL		310.0	240.0			270.0	240.0		
A72-3			BDL			430.0				370.0			
A72-4			BDL			350.0				310.0			
A72d			BDL			ND				370.0			
A72d-1			BDL			ND				310.0			
A73	ND	ND	BDL	BDL	BDL	BDL	280.00	490.0	59.00	BDL	270.00	ND	58.00
A74	ND	ND	BDL	BDL	BDL	BDL	210.0	290.0	150.00	BDL	180.0	260.0	160.00
A75	ND	ND	BDL	BDL	BDL	130.0	150.0	170.0	130.00	49.0	79.0	120.0	61.00
CC01	ND		BDL	BDL		1600.0	950.0			1600.0	950.0		
CC01a									ND				1700.00
CC01b									ND				38000.00
CC01c									ND				4900.00
CC01d									ND				130.00
CC01e									ND				50.00
CC01f									ND				440.00
CC02	ND		BDL	BDL		2100.0	ND		920.00	2100.0	1100.0		920.00
CC03	ND	ND	BDL	BDL	BDL	2300.0	ND	ND	ND	2300.0	1100.0	3700.0	1100.00
CC04			BDL			690.0				670.0			
CC05	ND	ND	BDL	BDL	BDL	2500.0	ND	ND	ND	2500.0	1700.0	3700.0	2400.00
CC06	ND		BDL	BDL		4300.0	7000.0		200000.00	4200.0	6900.0		210000.00
CC06d			BDL			ND				4200.0			
CC07			BDL			1400.0				1400.0			
CC08	ND		BDL	BDL		37.0	ND			37.0	13.0		
CC09	ND		BDL	BDL		17.0	ND			11.0	87.0		
CC09d			BDL			ND				10.0			
CC10	ND		BDL	BDL		1000.0	ND			570.0	1300.0		
CC11	ND		BDL	BDL		13.0	ND			12.0	15.0		
CC12	ND		BDL	BDL		400.0	140.0			230.0	140.0		
CC13	ND		BDL	BDL		240.0	230.0			180.0	230.0		
CC14	ND	ND	BDL	BDL	BDL	760.0	ND	ND	ND	750.0	1400.0	740.0	1200.00
CC15	ND	ND	BDL	BDL	BDL	130.0	ND	ND		130.0	35.0	10.0	
CC16	ND	ND	BDL	BDL	BDL	360.0	ND	ND		350.0	260.0	510.0	
CC17	ND	ND	BDL	BDL	BDL	1400.0	340.0	710.0	ND	1400.0	340.0	700.0	500.00
CC18	ND		BDL	BDL		3200.0	1600.0		ND	3100.0	1600.0		2500.00
CC19	ND	ND	BDL	0.20	0.25	360.0	ND	ND	ND	BDL	91.0	140.0	BDL
CC19a			BDL			4300.0				1600.0			
CC20	ND		BDL	BDL		2000.0	ND		ND	1800.0	1600.0		1600.00
CC21	ND	ND	BDL	BDL	0.22	1900.0	ND	1200.0	970.00	1800.0	1000.0	790.0	890.00
CC22	ND	ND	BDL	BDL	BDL	55.0	ND	ND		110.0	46.0	110.0	
CC23	ND	ND	BDL	BDL	BDL	2400.0	ND	ND	ND	2400.0	460.0	920.0	410.00
CC23a									ND				350.00
CC24	ND	ND	BDL	BDL	BDL	1900.0	ND	ND		1900.0	360.0	2100.0	
CC24a									ND				12000.00
CC24b									ND				36.00
CC25	ND	ND	BDL	BDL	BDL	1900.0	ND	ND		1900.0	850.0	3000.0	
CC26	ND	ND	BDL	BDL	BDL	1600.0	950.0	1100.0	ND	1500.0	950.0	1200.0	840.00
CC27	ND		BDL	BDL		1700.0	1000.0			1600.0	1000.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AS_DIS1 ug/l	AS_DIS2 ug/l	AS_TOT3 ug/l	AS_DIS3 ug/l	AS_TOT4 ug/l	AS_DIS4 ug/l	CYANIDE1 mg/l	CYANIDE2 mg/l	CYANIDE3 mg/l	CYANIDE4 mg/l	ALK1 mg/l	ALK2 mg/l	HARD1 mg/l	HARD2 mg/l	HARD3 mg/l	HARD4 mg/l
A70	ND	ND					ND	ND			ND	ND	-5.12	46.0		
A71	ND	ND	ND	ND			ND	ND	ND		ND	ND	435.27	ND	ND	
A72	BDL	BDL	ND	BDL	ND	ND	ND	BDL	ND	BDL	ND	ND	-5.12	73.0	256.46	93
A72-1	ND	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	183.99	61.0	ND	91
A72-2	ND	BDL					ND	BDL			ND	18.0	104.11	69.0		
A72-3	ND						ND				ND		133.58			
A72-4	ND						ND				ND		109.11			
A72d	ND						ND				ND		ND			
A72d-1	ND						ND				ND		ND			
A73	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		7.41	65	240.58	28
A74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.11	55.0	176.46	
A75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	75.40	ND	160.58	76
CC01	ND	BDL					ND	BDL			ND	0.0	76.52	48.0		
CC01a					ND	ND				ND						176
CC01b					ND	ND				ND						209
CC01c					ND	ND				ND						44
CC01d					ND	ND				ND						50
CC01e					ND	ND				ND						50
CC01f					ND	ND				ND						59
CC02	ND	ND			ND	ND	ND	ND		BDL	ND	ND	68.88	45.0		57
CC03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	78.47	41.0	142.35	64
CC04	ND						ND				ND		84.99			
CC05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	69.17	41.0	142.35	68
CC06	ND	ND			ND	ND	ND	ND		BDL	ND	ND	64.69	52.0		159
CC06d	ND						ND				ND		ND			
CC07	ND						ND				ND		73.11			
CC08	ND	ND					ND	ND			ND	ND	11.11	46.0		
CC09	ND	ND					ND	ND			ND	ND	54.53	59.0		
CC09d	ND						ND				ND		45.88			
CC10	ND	ND					ND	ND			ND	ND	302.22	470.0		
CC11	ND	ND					ND	ND			ND	ND	104.76	93.0		
CC12	BDL	ND					ND	ND			ND	ND	50.00	56.0		
CC13	BDL	ND					ND	ND			ND	ND	111.11	85.0		
CC14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	447.57	440.0	ND	435
CC15	ND	ND	ND	ND			ND	ND	ND		ND	ND	50.40	52.0	62.00	
CC16	ND	ND	ND	ND			ND	ND	ND		ND	ND	141.81	110.0	364.69	
CC17	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	188.93	100.0	338.81	143
CC18	BDL	ND			ND	ND	BDL	ND		ND	ND	ND	119.75	41.0		68
CC19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	773.17	1100.0	1141.1	1245
CC19a	ND						ND				ND		143.03			
CC20	BDL	ND			ND	ND	ND	ND		ND	ND	ND	523.05	250.0		381
CC21	ND	BDL	ND	BDL	ND	ND	ND	BDL	ND	ND	ND	ND	353.46	150.0	717.04	223
CC22	ND	ND	ND	ND			ND	ND	ND		ND	ND	56.87	31.0	83.92	
CC23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	49.05	55.0	150.58	94
CC23a					ND	ND				ND						89
CC24	ND	ND	ND	ND			ND	ND	ND		ND	ND	45.17	52.0	126.81	
CC24a					ND	ND				ND						27
CC24b					ND	ND				ND						20
CC25	ND	ND	ND	ND			ND	ND	ND		ND	ND	35.76	50.0	116.81	
CC26	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	18.11	42.0	83.92	71
CC27	ND	1.00					ND	BDL			ND	ND	261.81	140.0		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TSS_1 mg/l	TSS_2 mg/l	TSS_3 mg/l	TSS-4 mg/l	HG_1 ug/l	HG_2 ug/l	HG_3 ug/l	HG_4 ug/l
A70					ND	ND		
A71					ND	ND	ND	
A72	BDL		11	BDL	BDL	BDL	BDL	BDL
A72-1	14.0				ND	ND	ND	ND
A72-2					ND	BDL		
A72-3					ND			
A72-4					ND			
A72d					ND			
A72d-1					ND			
A73	BDL			BDL	ND		ND	ND
A74				BDL	ND	ND	ND	ND
A75				BDL	ND	ND	ND	ND
CC01	BDL				ND	BDL		
CC01a								ND
CC01b								ND
CC01c								ND
CC01d								ND
CC01e								ND
CC01f								ND
CC02					ND	ND		0.80
CC03					ND	ND	ND	ND
CC04					ND			
CC05					ND	ND	ND	ND
CC06					ND	ND		BDL
CC06d					ND			
CC07					ND			
CC08					ND	ND		
CC09					ND	ND		
CC09d					ND			
CC10					ND	ND		
CC11					ND	ND		
CC12					ND	ND		
CC13					ND	ND		
CC14					ND	ND	ND	ND
CC15					ND	ND	ND	
CC16					ND	ND	ND	
CC17					BDL	ND	ND	ND
CC18					BDL	ND		ND
CC19					ND	ND	ND	ND
CC19a					ND			
CC20					ND	ND		ND
CC21					ND	BDL	BDL	ND
CC22					ND	ND	ND	
CC23					ND	ND	ND	ND
CC23a								ND
CC24					ND	ND	ND	
CC24a								ND
CC24b								ND
CC25					ND	ND	ND	
CC26					BDL	ND	ND	ND
CC27					ND	BDL		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AL_T_LOAD1 grams/day	AL_T_LOAD3 grams/day	AL_T_LOAD4 grams/day	AL_D_LOAD1 grams/day	AL_D_LOAD2 grams/day	AL_D_LOAD3 grams/day	AL_D_LOAD4 grams/day	CD_T_LOAD1 grams/day	CD_T_LOAD2 grams/day	CD_T_LOAD3 grams/day	CD_T_LOAD4 grams/day	CD_D_LOAD1 grams/day	CD_D_LOAD2 grams/day
A70	ND			ND	BDL			ND	ND			ND	0.02
A71	BDL	ND		BDL	BDL	BDL		0.2	ND	ND		0.2	0.4
A72	520012.0	ND	ND	BDL	BDL	9925.03	BDL	724.1	ND	248.13	1030.138	724.1	3315.4
A72-1	384668.4	ND	ND	BDL	BDL	BDL	BDL	448.8	3635.8	ND	1030.138	448.8	3635.8
A72-2	643561.0			45049.3	BDL			772.3	3343.6			772.3	3343.6
A72-3	814851.0			34857.5				679.0				679.0	
A72-4	702533.7			70253.4				766.4				766.4	
A72d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A72d-1	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A73	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A74	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
A75	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC01	3723.1			1314.0	11305.1			39.4	214.8			39.4	207.3
CC01a			ND				1.622				ND		
CC01b			ND				477.899				ND		
CC01c			ND				303.428				ND		
CC01d			ND				BDL				ND		
CC01e			ND				BDL				ND		
CC01f			ND				422.842				ND		
CC02	9567.8		ND	7316.5	12230.1		2409.316	61.9	ND		66.792	61.9	189.3
CC03	13935.7	ND	ND	10656.7	ND	3896.85	5305.341	98.4	ND	ND	ND	98.4	ND
CC04	636.5			561.6	ND			1.5	ND			1.5	ND
CC05	26887.6	ND	ND	13115.9	80604.2	2977.51	50506.080	78.7	ND	ND	ND	78.7	403.0
CC06	4292.5		ND	3679.3	ND		53002.020	11.8	ND		139.479	11.8	ND
CC06d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC07	616.6			416.2	ND			1.2	ND			1.2	ND
CC08	53.1			49.7	BDL			BDL	ND			BDL	BDL
CC09	239.0			86.9	550.6			BDL	ND			BDL	2.4
CC09d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC10	62.4			2.9	BDL			0.2	ND			0.2	5.1
CC11	BDL			BDL	ND			BDL	ND			BDL	ND
CC12	1952.7			226.1	836.9			2.7	4.1			2.7	3.8
CC13	3174.2			BDL	787.0			4.6	15.3			4.6	14.1
CC14	1668.9	ND	ND	1426.1	7260.2	2104.42	6606.900	3.5	ND	ND	ND	3.5	22.1
CC15	20848.4	ND		20261.2	1574.3	BDL		2.3	ND	ND		2.3	BDL
CC16	46688.8	ND		38907.3	3881.9	2272.77		15.6	ND	ND		15.6	51.8
CC17	64747.6	ND	ND	49331.5	2787.2	5121.57	8684.403	92.5	79.6	16.32	ND	92.5	79.6
CC18	22316.6		ND	15856.6	80261.6		54690.450	88.1	451.5		ND	88.1	401.3
CC19	1037.0	ND	ND	BDL	BDL	1014.77	BDL	9.6	ND	ND	ND	9.6	63.2
CC19a	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC20	39763.8		ND	13360.6	101672.9		48626.784	143.1	ND		ND	143.1	610.0
CC21	79378.2	ND	ND	38486.4	76942.7	1644.38	42271.680	192.4	ND	68.52	252.205	192.4	622.5
CC22	8564.5	ND		8564.5	1776.5	162.97		BDL	ND	ND		BDL	BDL
CC23	1211.3	ND	ND	1015.5	BDL	17.62	46.982	13.5	ND	ND	ND	13.5	13.0
CC23a			ND				2309.968				ND		
CC24	10101.2	ND		9469.9	4845.1	779.61		28.4	ND	ND		28.4	13.2
CC24a													
CC24b													
CC25	36338.0	ND		24225.3	16930.8	781.08		64.6	ND	ND		64.6	45.8
CC26	62349.6	ND	ND	22541.8	38687.1	12041.69	10539.229	38.4	87.4	2.85	ND	38.4	64.9
CC27	206796.0			103398.0	156216.5			229.8	747.6			229.8	747.6

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_D_LOAD3 grams/day	CD_D_LOAD4 grams/day	CR_T_LOAD1 grams/day	CR_D_LOAD1 grams/day	CU_T_LOAD1 grams/day	CU_T_LOAD2 grams/day	CU_T_LOAD3 grams/day	CU_T_LOAD4 grams/day	CU_D_LOAD1 grams/day	CU_D_LOAD2 grams/day	CU_D_LOAD3 grams/day	CU_D_LOAD4 grams/day
A70			ND	ND	ND	ND			ND	0.50		
A71	0.33		BDL	BDL	10.2	ND	ND		1.6	1.9	BDL	
A72	229.04	1051.378	BDL	BDL	13164.9	ND	4962.52	20177.962	BDL	11701.6	954.33	6371.988
A72-1	293.64	1019.518	BDL	BDL	9296.2	74853.7	ND	20177.962	1602.8	17109.4	1174.56	5309.990
A72-2			BDL	BDL	16732.6	16717.9			BDL	14628.2		
A72-3			BDL	BDL	22634.8				BDL			
A72-4			BDL	BDL	23630.7				3832.0			
A72d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A72d-1	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A73	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A74	ND		ND	ND	ND	ND	ND		ND	ND	ND	
A75	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC01			BDL	BDL	876.0	5652.6			744.6	5275.7		
CC01a		0.288						ND				2.386
CC01b		15.930						ND				758.570
CC01c		3.975						ND				139.577
CC01d		1.464						ND				10.767
CC01e		BDL						ND				BDL
CC01f		10.254						ND				137.424
CC02		57.020	BDL	BDL	1294.5	ND		1338.509	1181.9	4076.7		1124.348
CC03	21.82	84.564	BDL	BDL	1639.5	ND	ND	ND	1557.5	ND	405.27	1414.758
CC04			BDL	BDL	67.4	ND			63.6	ND		
CC05	17.18	196.974	BDL	BDL	2098.5	ND	ND	ND	2033.0	14777.4	309.20	8754.387
CC06		153.427	BDL	BDL	657.0	ND		8229.261	613.2	ND		8787.177
CC06d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC07			BDL	BDL	111.0	ND			106.4	ND		
CC08			BDL	BDL	0.5	ND			0.5	BDL		
CC09			BDL	BDL	BDL	ND			BDL	49.6		
CC09d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC10			BDL	BDL	6.7	ND			BDL	3.3		
CC11			BDL	BDL	BDL	ND			BDL	ND		
CC12			BDL	BDL	78.1	83.7			BDL	69.7		
CC13			BDL	BDL	170.2	305.4			BDL	176.2		
CC14	4.89	14.315	BDL	BDL	28.8	ND	ND	ND	13.7	347.2	22.02	143.150
CC15	BDL		BDL	BDL	469.8	ND	ND		469.8	BDL	BDL	
CC16	6.63		BDL	BDL	1011.6	ND	ND		933.8	323.5	72.60	
CC17	16.32	44.758	BDL	BDL	2004.1	1106.0	208.24	ND	1849.9	486.7	157.59	400.819
CC18		204.178	BDL	BDL	2231.7	15550.7		ND	2114.2	15049.1		9661.980
CC19	8.59	5.738	BDL	BDL	BDL	ND	ND	ND	BDL	BDL	BDL	BDL
CC19a	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC20		259.883	BDL	BDL	3022.0	ND		ND	1288.3	18301.1		7834.315
CC21	56.81	266.929	BDL	BDL	3848.6	ND	835.90	7124.441	2188.9	13832.4	109.63	6174.515
CC22	0.01		BDL	BDL	29.4	ND	ND		29.4	6.5	0.35	
CC23	0.42	1.370	BDL	BDL	342.6	ND	ND	ND	342.6	167.2	7.16	14.878
CC23a		2.252						ND				64.968
CC24	1.32		BDL	BDL	947.0	ND	ND		947.0	315.7	75.32	
CC24a												
CC24b												
CC25	1.44		BDL	BDL	2664.8	ND	ND		2664.8	2390.2	78.11	
CC26	2.85	6.949	BDL	BDL	1438.8	4118.3	48.17	ND	1295.0	3868.7	48.17	357.262
CC27			BDL	BDL	7276.2	18969.1			5361.4	18969.1		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	FE_T_LOAD1 grams/day	FE_T_LOAD2 grams/day	FE_T_LOAD3 grams/day	FE_T_LOAD4 grams/day	FE_D_LOAD1 grams/day	FE_D_LOAD2 grams/day	FE_D_LOAD3 grams/day	FE_D_LOAD4 grams/day	PB_T_LOAD1 grams/day	PB_T_LOAD2 grams/day	PB_T_LOAD3 grams/day	PB_T_LOAD4 grams/day	PB_D_LOAD1 grams/day
A70	ND	ND			ND	ND			ND	ND			ND
A71	572.6	ND	ND		5.7	ND	ND		BDL	ND	ND		BDL
A72	789891.6	ND	572598.00	796498.500	315956.6	ND	324472.20	201779.620	3291.2	ND	1202.5	BDL	BDL
A72-1	480835.5	2031744.1	ND	785878.520	125017.2	ND	ND	254879.520	3205.6	25664.1	1076.7	BDL	BDL
A72-2	965341.5	162999.6			160890.3	87769.0			7079.2	BDL			BDL
A72-3	1222276.5				167497.2				12675.5				BDL
A72-4	1277334.0				293786.8				15966.7				BDL
A72d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A72d-1	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A73	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A74	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
A75	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC01	2058.7	18841.9			175.2	1997.2			26.3	414.5			BDL
CC01a				ND				3.817				ND	
CC01b				ND				4930.705				ND	
CC01c				ND				834.427				ND	
CC01d				ND				27.994				ND	
CC01e				ND				BDL				ND	
CC01f				ND				56.379				ND	
CC02	5628.1	ND		4417.080	2814.1	ND		1606.211	95.7	ND		93.696	67.5
CC03	10656.7	ND	ND	ND	1557.5	ND	ND	659.148	319.7	ND	ND	ND	73.8
CC04	636.5	ND			561.6	ND			BDL	ND			BDL
CC05	32789.8	ND	ND	ND	7213.8	ND	ND	164986.528	229.5	ND	ND	ND	59.0
CC06	10950.3	ND		195270.600	7008.2	ND		209218.500	BDL	ND		6.974	BDL
CC06d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC07	1079.1	ND			339.2	ND			BDL	ND			BDL
CC08	9.2	ND			1.1	ND			BDL	ND			BDL
CC09	282.5	ND			28.2	ND			BDL	ND			BDL
CC09d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC10	790.4	ND			22.0	ND			2.4	ND			BDL
CC11	16.3	ND			BDL	ND			BDL	ND			BDL
CC12	3494.3	1604.0			104.8	ND			168.5	41.8			BDL
CC13	5980.5	2114.2			179.4	ND			BDL	BDL			BDL
CC14	21240.0	ND	ND	ND	16688.5	ND	ND	51387.000	10.6	ND	ND	ND	BDL
CC15	55791.6	ND	ND		52855.2	ND	ND		BDL	ND	ND		BDL
CC16	132284.8	ND	ND		49023.2	ND	ND		101.2	ND	ND		BDL
CC17	169577.1	70786.8	24200.83	ND	32373.8	ND	ND	44535.400	740.0	BDL	BDL	ND	354.6
CC18	47569.7	205670.4		ND	7634.6	ND		138549.140	540.3	451.5		ND	358.2
CC19	4866.1	ND	ND	ND	BDL	ND	ND	BDL	BDL	ND	ND	ND	BDL
CC19a	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC20	68393.7	ND		ND	1288.3	ND		35119.344	9225.2	ND		ND	556.7
CC21	173188.9	ND	41109.60	151988.064	22851.3	ND	9729.27	35147.240	4810.8	ND	411.1	474.963	360.8
CC22	1248.0	ND	ND		1027.7	ND	ND		97.9	ND	ND		93.0
CC23	6974.0	ND	ND	ND	5383.4	ND	ND	156.608	195.8	ND	ND	ND	195.8
CC23a				ND				490.868				ND	
CC24	29672.3	ND	ND		24937.4	ND	ND		410.4	ND	ND		378.8
CC24a													
CC24b													
CC25	121126.5	ND	ND		58948.2	ND	ND		1776.5	ND	ND		1211.3
CC26	182252.6	117309.2	30421.10	ND	46522.4	ND	ND	23222.030	2925.6	436.8	3.2	ND	527.6
CC27	574433.3	446332.8			157011.8	ND			14935.3	1785.3			4978.4

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	PB_D_LOAD2 grams/day	PB_D_LOAD3 grams/day	PB_D_LOAD4 grams/day	MN_T_LOAD1 grams/day	MN_T_LOAD2 grams/day	MN_T_LOAD4 grams/day	MN_D_LOAD1 grams/day	MN_D_LOAD2 grams/day	MN_D_LOAD3 grams/day	MN_D_LOAD4 grams/day	NI_T_LOAD1 grams/day	NI_D_LOAD1 grams/day
A70	BDL			ND	ND		ND	ND			ND	ND
A71	BDL	BDL		1781.4	ND		1749.6	ND	ND		BDL	BDL
A72	BDL	BDL	BDL	190890.5	ND	350459.340	190890.5	702093.2	179414.04	ND	BDL	BDL
A72-1	BDL	BDL	BDL	176306.4	ND	ND	176306.4	ND	172268.80	ND	BDL	BDL
A72-2	BDL			231682.0	ND		218810.7	731408.3			BDL	BDL
A72-3	ND			253509.2			244455.3				BDL	BDL
A72-4				274626.8			268240.1				BDL	BDL
A72d		ND		ND	ND		ND	ND	ND		ND	ND
A72d-1		ND		ND	ND		ND	ND	ND		ND	ND
A73	ND	ND		ND	ND		ND	ND	ND		ND	ND
A74	ND	ND		ND	ND		ND	ND	ND		ND	ND
A75	ND	ND		ND	ND		ND	ND	ND		ND	ND
CC01	BDL			2365.3	ND		2365.3	24494.5			BDL	BDL
CC01a			0.350			ND				ND		
CC01b			17.447			ND				ND		
CC01c			5.462			ND				ND		
CC01d			BDL			ND				ND		
CC01e			BDL			ND				ND		
CC01f			17.618			ND				ND		
CC02	BDL		BDL	4052.2	ND	ND	3939.7	ND		5621.738	BDL	BDL
CC03	ND	17.1	BDL	6230.1	ND	ND	6066.1	ND	ND	ND	BDL	BDL
CC04	ND			168.5	ND		157.2	ND			BDL	BDL
CC05	268.70	12.6	84.177	6164.5	ND	ND	5836.6	ND	ND	ND	BDL	BDL
CC06	ND		6.974	1051.2	ND	ND	963.6	ND		ND	BDL	BDL
CC06d		ND		ND	ND		ND	ND	ND		ND	ND
CC07	ND			135.7	ND		115.6	ND			BDL	BDL
CC08	BDL			3.6	ND		3.4	ND			BDL	BDL
CC09	BDL			26.1	ND		5.4	ND			BDL	BDL
CC09d		ND		ND	ND		ND	ND	ND		ND	ND
CC10	BDL			124.8	ND		74.9	ND			BDL	BDL
CC11	ND			BDL	ND		BDL	ND			BDL	BDL
CC12	BDL			308.3	ND		246.7	ND			BDL	BDL
CC13	BDL			644.1	ND		506.0	ND			BDL	BDL
CC14	BDL	BDL	BDL	3337.7	ND	ND	3337.7	ND	ND	ND	BDL	BDL
CC15	BDL	BDL		1644.4	ND		1585.7	ND	ND		BDL	BDL
CC16	BDL	BDL		7703.6	ND		7470.2	ND	ND		BDL	BDL
CC17	BDL	BDL	BDL	35457.0	ND	ND	33915.4	ND	9567.77	ND	BDL	BDL
CC18	301.00		91.151	12332.9	ND	ND	11745.6	ND		ND	BDL	BDL
CC19	BDL	BDL	BDL	18347.6	ND	ND	15156.7	ND	ND	ND	BDL	BDL
CC19a		ND		ND	ND		ND	ND	ND		ND	ND
CC20	745.60		270.149	41354.3	ND	ND	36582.7	ND		ND	BDL	BDL
CC21	BDL	BDL	BDL	67351.2	ND	ND	62540.4	164259.8	ND	61745.151	BDL	BDL
CC22	14.00	1.2		1492.7	ND		1468.2	ND	ND		BDL	BDL
CC23	BDL	2.4	BDL	232.5	ND	ND	220.2	ND	ND	ND	BDL	BDL
CC23a			41.868			ND				ND		
CC24	110.10	9.9		1420.5	ND		1388.9	ND	ND		BDL	BDL
CC24a												
CC24b												
CC25	189.20	7.7		3310.8	ND		2745.5	ND	ND		BDL	BDL
CC26	411.80	3.2	50.017	2589.9	ND	ND	1870.5	ND	507.02	ND	BDL	BDL
CC27	1115.80			84250.2	ND		76591.1	189691.4			BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SE_T_LOAD1 grams/day	SE_T_LOAD3 grams/day	SE_D_LOAD1 grams/day	SE_D_LOAD2 grams/day	SE_D_LOAD3 grams/day	AG_T_LOAD1 grams/day	AG_T_LOAD2 grams/day	AG_T_LOAD3 grams/day	AG_D_LOAD1 grams/day	AG_D_LOAD2 grams/day	AG_D_LOAD3 grams/day
A70	ND		ND	ND		ND	ND		ND	BDL	
A71	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A72	BDL	ND	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
A72-1	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
A72-2	ND		ND	BDL		BDL	ND		BDL	BDL	
A72-3	ND		ND			BDL			BDL		
A72-4	ND		ND			BDL			BDL		
A72d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A72d-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A73	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A74	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC01	BDL		BDL	BDL		BDL	ND		BDL	BDL	
CC01a											
CC01b											
CC01c											
CC01d											
CC01e											
CC01f											
CC02	ND		ND	ND		1.7	ND		BDL	BDL	
CC03	ND	ND	ND	ND	ND	11.5	ND	ND	BDL	ND	BDL
CC04	ND		ND	ND		BDL	ND		BDL	ND	
CC05	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC06	ND		ND	ND		BDL	ND		BDL	ND	
CC06d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC07	ND		ND	ND		BDL	ND		BDL	ND	
CC08	ND		ND	ND		BDL	ND		BDL	BDL	
CC09	ND		ND	ND		BDL	ND		BDL	BDL	
CC09d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC10	ND		ND	ND		BDL	ND		BDL	BDL	
CC11	ND		ND	ND		BDL	ND		BDL	ND	
CC12	BDL		BDL	ND		1.0	ND		BDL	BDL	
CC13	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC14	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC15	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC16	ND	ND	ND	ND	ND	3.1	ND	ND	BDL	BDL	BDL
CC17	BDL	ND	BDL	ND	ND	4.6	ND	ND	BDL	BDL	BDL
CC18	BDL		BDL	ND		1.8	ND		BDL	BDL	
CC19	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	1.7	1.951
CC19a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC20	BDL		BDL	ND		11.1	ND		BDL	BDL	
CC21	ND	ND	ND	BDL	BDL	16.8	ND	ND	BDL	BDL	3.015
CC22	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC23	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC23a											
CC24	ND	ND	ND	ND	ND	0.6	ND	ND	BDL	BDL	BDL
CC24a											
CC24b											
CC25	ND	ND	ND	ND	ND	8.1	ND	ND	BDL	BDL	BDL
CC26	8.2	ND	BDL	ND	ND	19.7	ND	ND	BDL	BDL	BDL
CC27	ND		ND	BDL		42.1	ND		BDL	BDL	

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	ZN_T_LOAD1 grams/day	ZN_T_LOAD2 grams/day	ZN_T_LOAD3 grams/day	ZN_T_LOAD4 grams/day	ZN_D_LOAD1 grams/day	ZN_D_LOAD2 grams/day	ZN_D_LOAD3 grams/day	ZN_D_LOAD4 grams/day
A70	ND	ND			ND	2.80		
A71	111.3	ND	ND		79.5	153.4	164.4	
A72	177725.6	ND	103067.6	318599.400	171143.2	507067.3	97341.7	307979.420
A72-1	131428.4	684377.0	ND	297359.440	121811.7	620216.6	93964.8	276119.480
A72-2	199503.9	501537.1			173761.5	501537.1		
A72-3	194658.9				167497.2			
A72-4	223533.5				197986.8			
A72d	ND	ND	ND		ND	ND	ND	
A72d-1	ND	ND	ND		ND	ND	ND	
A73	ND	ND	ND		ND	ND	ND	
A74	ND	ND	ND		ND	ND	ND	
A75	ND	ND	ND		ND	ND	ND	
CC01	7008.2	35799.6			7008.2	35799.6		
CC01a				ND				54.079
CC01b				ND				2882.566
CC01c				ND				743.399
CC01d				ND				279.937
CC01e				ND				77.692
CC01f				ND				1550.419
CC02	11819.0	ND		12314.283	11819.0	32031.2		12314.283
CC03	18854.1	ND	ND	ND	18854.1	ND	5767.3	17684.469
CC04	258.3	ND			250.8	ND		
CC05	16394.9	ND	ND	ND	16394.9	76126.2	4237.2	40404.864
CC06	1883.5	ND		278958.000	1839.7	ND		292905.900
CC06d	ND	ND	ND		ND	ND	ND	
CC07	215.8	ND			215.8	ND		
CC08	0.6	ND			0.6	38.2		
CC09	18.5	ND			12.0	479.0		
CC09d	ND	ND	ND		ND	ND	ND	
CC10	41.6	ND			23.7	1081.6		
CC11	8.5	ND			7.8	ND		
CC12	822.2	976.4			472.8	976.4		
CC13	1104.1	2701.5			828.1	2701.5		
CC14	1153.0	ND	ND	ND	1137.9	4419.3	1810.8	4404.600
CC15	381.7	ND	ND		381.7	605.5	4.9	
CC16	2801.3	ND	ND		2723.5	8410.8	1609.9	
CC17	21582.5	15042.2	3996.0	ND	21582.5	15042.2	3939.7	11133.850
CC18	18793.0	80261.6		ND	18205.7	80261.6		45575.375
CC19	2871.8	ND	ND	ND	BDL	757.1	1092.8	BDL
CC19a	ND	ND	ND		ND	ND	ND	
CC20	31811.0	ND		ND	28629.9	108451.0		43223.808
CC21	45702.6	ND	16443.8	46071.382	43297.2	86452.5	10825.5	42271.680
CC22	134.6	ND	ND		269.2	24.8	2.4	
CC23	2936.4	ND	ND	ND	2936.4	2847.8	101.3	321.046
CC23a				ND				505.306
CC24	5997.6	ND	ND		5997.6	2642.8	277.5	
CC24a								
CC24b								
CC25	15342.7	ND	ND		15342.7	8465.4	308.3	
CC26	7673.8	11855.7	697.2	ND	7194.2	11855.7	760.5	1500.500
CC27	65102.4	111583.2			61272.9	111583.2		

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SEGMENT	SUB_SEG	SITE	FLOW1 cfs	FLOW2 cfs	FLOW3 cfs	FLOW4 cfs	DATE1	DATE2	DATE3	DATE4	PH1	PH2	PH3	PH4
Cement	Cement	CC28	22.050	47.250		25.990	09/07/91	06/24/92		21-Jul-93	5.06	4.38		
Cement	Cement adit	CC29	0.053	ND	0.023	ND	09/07/91	06/24/92	14-Oct-92	21-Jul-93	4.18	2.95	2.9	
Cement	Cement adit	CC29a				0.058				21-Jul-93				
Cement	Cement	CC30	18.290	47.290	10.520	23.910	09/07/91	06/24/92	14-Oct-92	21-Jul-93	4.10	4.37	5.43	
Cement	Cement	CC30	15.300	47.290	10.520	23.910	09/06/91	06/24/92	14-Oct-92	21-Jul-93	4.13	4.37	5.43	
Cement	Filtered Dup.	CC30d	18.290				09/07/91				ND			
Cement	Cement	CC31	13.900	61.710			09/06/91	06/24/92			4.04	4.47		
Cement	Cement adit	CC32	0.368	ND			09/06/91	06/24/92			7.12	7.78		
Cement	Filtered Dup.	CC32d	0.368				09/06/91				ND			
Cement	Cascade	CC33	0.320	2.930			09/06/91	06/24/92			7.18	7.55		
Cement	Cement	CC34	11.990	25.970			09/06/91	06/24/92			4.28	4.90		
Cement	Minnesota	CC35	0.770	1.520			09/06/91	06/24/92			4.64	7.28		
Cement	Cement	CC36	13.800	36.480		30.530	09/06/91	06/24/92		21-Jul-93	4.77	4.85		
Cement	Filtered Dup.	CC36d	13.800				09/06/91				ND			
Cement	Cement adit-ang-sax	CC37	0.040	ND	0.107	0.060	09/06/91	06/24/92	14-Oct-92	21-Jul-93	6.10	6.62	6.17	
Cement	Cement adit-ang-sax	CC37a				0.002				20-Jul-93				
Cement	Porcupine Gl	CC38	0.104	ND	0.008		09/06/91	06/24/92	14-Oct-92		5.00	6.98	6.53	
Cement	Cement	CC39	19.270	83.000	10.240	32.720	09/06/91	06/24/92	14-Oct-92	21-Jul-93	4.00	5.11	5.54	
Cement	Ohio	CC40	1.400	ND			09/06/91	06/24/92			2.90	3.74		
Cement	Cement	CC41	18.300	69.800			09/06/91	06/24/92			4.06	4.93		
Cement	Illinois Gl	CC42	1.240	1.630			09/06/91	06/24/92			6.22	7.59		
Cement	Cement	CC43	20.190	63.300		28.240	09/06/91	06/24/92		21-Jul-93	4.84	5.72		4.79
Cement	Topeka	CC44	0.330	0.960			09/06/91	06/24/92			5.61	4.55		
Cement	Filtered Dup.	CC44d	0.330				09/06/91				ND			
Cement	Niagara Gl	CC45	0.580	1.530			09/06/91	06/24/92			3.30	3.75		
Cement	Cement	CC46	21.690	68.200		32.610	09/06/91	06/24/92		21-Jul-93	4.13	5.05		4.66
Cement	Cement	CC47	21.580	61.700	9.920	32.740	09/06/91	06/24/92	14-Oct-92	21-Jul-93	4.23	5.05	5.18	4.50
Cement	Cement Gaging Stn	CC48	25.360	85.000	15.300	43.000	09/09/91	06/24/92	14-Oct-92	20-Jul-93	4.65	5.10	4.6	4.40
Cement	Cement Gaging Stn	CC48-1	13.100	84.000	15.000	43.000	09/10/91	06/25/92	15-Oct-92	21-Jul-93	4.08	5.10	5.1	4.59
Cement	Cement Gaging Stn	CC48-2	19.790	95.300			09/06/91	06/23/92			4.44	5.00		
Cement	Cement Gaging Stn	CC48-3	14.760				09/05/91				4.58			
Cement	Cement Gaging Stn	CC48-4	22.710				09/07/91				4.36			
Cement	Filtered Dup.	CC48d	13.100				09/10/91				ND			
Cement	Cement	CC49	19.420	81.600	13.250		09/06/91	06/24/92	14-Oct-92		4.03	5.20	4.96	
	Filtered Dup.	CC49d	19.420				09/06/91				ND			
Mineral	Mineral	M01	0.400	ND	0.029		09/06/91	06/23/92	14-Oct-92		5.77	7.04	6.85	
Mineral	Mineral trib	M02	0.504	ND	ND	0.097	09/06/91	06/23/92	14-Oct-92	21-Jul-93	2.63	2.81	3	2.79
Mineral	Longfellow abv pond	M02a				0.320				21-Jul-93				3.35
Mineral	Longfllw blw tailgs	M02b				0.007				21-Jul-93				2.77
Mineral		M02c				0.005				21-Jul-93				3.01
Mineral	Mineral trib	M03	0.135	ND	0.039		09/06/91	06/23/92	14-Oct-92		3.30	3.58	3.08	
Mineral	Carbon Lake area	M03a				0.029				21-Jul-93				5.70
Mineral	Mineral	M04	0.658	10.600	0.203	4.780	09/06/91	06/23/92	14-Oct-92	21-Jul-93	3.16	3.75	2.67	3.21
Mineral	Mineral	M05	0.822	8.900	0.230	4.680	09/06/91	06/23/92	14-Oct-92	21-Jul-93	3.18	3.90	2.94	3.09
Mineral	Porphyry	M06	0.940	8.570			09/06/91	06/23/92			6.20	6.95		
Mineral	Mineral	M07	1.560	24.000			09/05/91	06/23/92			3.54	6.65		
Mineral	Mineral	M07-1	2.950				09/06/91				3.51			
Mineral	Mill Cr	M08	2.350	14.850			09/05/91	06/23/92			6.93	7.06		
Mineral	Mill Cr adit	M09	0.140	0.050			09/05/91	06/23/92			7.53	7.73		
Mineral	Mill Cr	M10	4.900	16.000	2.630		09/05/91	06/23/92	14-Oct-92		7.29	7.48	6.81	
Mineral	Mineral	M11	5.390	57.000	3.890	28.000	09/05/91	06/23/92	14-Oct-92	21-Jul-93	5.75	6.89	6.75	6.25

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TEMP1 deg C	TEMP2 deg C	TEMP3 deg C	TEMP4 deg C	COND1 umhos	COND4 umhos	AL_TOT1 ug/l	AL_TOT2 ug/l	AL_TOT3 ug/l	AL_TOT4 ug/l	AL_DIS1 ug/l	AL_DIS2 ug/l	AL_DIS3 ug/l	AL_DIS4 ug/l	CD_TOT1 ug/l	CD_TOT2 ug/l	CD_TOT3 ug/l	CD_TOT4 ug/l
CC28	7.50	64.50		10.00	776	528	5100.0	ND		ND	4100.0	1800.0		3100.00	5.00	ND		5.370
CC29	7.30	71.80	5.7	16.90	822	1389	4200.0	ND	ND	ND	2600.0	2100.0	2100.0	2400.00	1.90	ND	ND	ND
CC29a				10.90		1121				ND				1800.00				ND
CC30	7.50	53.50	8.4	8.90	850	543	5000.0	ND	ND	ND	4100.0	1900.0	4200.0	3000.00	6.00	ND	ND	ND
CC30	11.50	53.50	8.4	8.90	760	543	5000.0	ND	ND	ND	4100.0	1900.0	4200.0	3000.00	7.00	ND	ND	ND
CC30d	ND				0		ND				3900.0				ND			
CC31	10.50	47.80			760		4800.0	ND			4500.0	1900.0			4.30	ND		
CC32	13.00	15.60			1260		BDL	ND			BDL	BDL			BDL	ND		
CC32d	ND				ND		ND				BDL				ND			
CC33	8.50	6.70			150		BDL	ND			BDL	BDL			BDL	ND		
CC34	9.00	8.90			735		4500.0	ND			3900.0	1700.0			4.00	ND		
CC35	9.00	9.70			245		3900.0	ND			1200.0	110.0			1.90	0.49		
CC36	9.50	6.50		7.60	705	497	5400.0	ND		ND	3900.0	1700.0		2700.00	4.20	5.00		ND
CC36d	ND				ND		ND				4100.0				ND			
CC37	11.00	54.50	11.1	11.50	1850	1226	320.0	ND	ND	ND	140.0	330.0	89.0	370.00	5.00	ND	ND	ND
CC37a				13.50		1232				ND				BDL				ND
CC38	11.50	53.50	10.6		630		2700.0	ND	ND		800.0	220.0	BDL		8.00	ND	ND	
CC39	10.50	42.70	7.7	4.50	945	510	4500.0	ND	ND	2800.00	4000.0	1800.0	4100.0	3300.00	3.70	ND	ND	5.030
CC40	9.50	45.30			970		120000.0	ND			18000.0	2400.0			9.00	ND		
CC41	10.30	9.00			650		6800.0	ND			4900.0	1800.0			4.00	ND		
CC42	13.00	10.00			875		370.0	ND			84.0	76.0			0.50	ND		
CC43	9.80	9.00		12.30	690	703	4400.0	ND		ND	4000.0	1400.0		2900.00	3.60	5.10		ND
CC44	9.20	11.40			700		4000.0	ND			1600.0	1300.0			0.50	ND		
CC44d	ND				ND		ND				1600.0				ND			
CC45	11.10	12.00			412		7000.0	ND			6900.0	860.0			1.00	ND		
CC46	11.60	11.00		12.10	931	699	4800.0	ND		ND	4500.0	1500.0		2600.00	5.00	4.40		ND
CC47	10.10	9.00	5.6	12.10	957	702	5000.0	ND	ND	ND	4700.0	1500.0	3800.0	2800.00	3.50	ND	ND	ND
CC48	6.90	8.00	3.5	12.50	687	176	4200.0	ND	ND	ND	3600.0	1300.0	4300.0	2600.00	4.00	5.10	2.80	3.530
CC48-1	9.00	3.50	9.5	8.00	685	686	3800.0	ND	ND	ND	3500.0	1500.0	4500.0	2500.00	3.60	4.60	3.10	3.350
CC48-2	9.00	5.00			715		4700.0	ND			4400.0	1700.0			3.70	3.60		
CC48-3	14.40				750		4600.0				4500.0				3.30			
CC48-4	8.60				575		5000.0				4200.0				3.80			
CC48d	ND				ND		ND				3400.0				ND			
CC49	10.00	8.00	5.2		975		4400.0	ND	ND		4100.0	1300.0	4600.0		3.50	4.40	2.90	
CC49d	ND				ND		ND				4100.0				ND			
M01	6.00	10.00	5.5		70		BDL	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL	
M02	8.50	14.40	4.4	9.22	2600	2350	67000.0	ND	ND	ND	67000.0	14000.0	85000.0	37000.00	630.00	210.00	810.00	350.000
M02a				4.83		736				ND				5700.00				ND
M02b				7.61		2740				ND				47000.00				ND
M02c				3.89		1390				ND				20000.00				ND
M03	7.60	20.20	2.94		362		3900.0	ND	ND		3700.0	680.0	5100.0		13.00	6.10	10.00	
M03a				7.89		491				ND				1500.00				ND
M04	8.30	13.60	.89	16.67	420	137	7500.0	ND	ND	ND	7500.0	930.0	13000.0	750.00	71.00	ND	ND	8.390
M05	8.10	14.70	2.61	17.22	423	138	6900.0	ND	ND	ND	6800.0	870.0	12000.0	700.00	58.00	9.00	110.00	7.790
M06	7.00	11.10			88		92.0	ND			BDL	BDL			0.40	ND		
M07	12.50	48.50			365		1900.0	ND			1800.0	91.0			19.00	4.50		
M07-1	7.70				402		2500.0				2300.0				23.00			
M08	12.50	10.80			60		BDL	ND			BDL	BDL			BDL	ND		
M09	13.50	13.40			390		BDL	ND			BDL	BDL			BDL	ND		
M10	13.00	44.00	5.56		310		84.0	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL	
M11	14.00	48.30	2.78	11.11	280	137	560.0	ND	ND	ND	65.0	BDL	120.0	BDL	5.00	ND	ND	ND

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_DIS1 ug/l	CD_DIS2 ug/l	CD_DIS3 ug/l	CD_DIS4 ug/l	CHROM_T_1 ug/l	CHROM_D_1 ug/l	COPPER1TOT ug/l	COPPER2TOT ug/l	COPPER3TOT ug/l	COPPER4TOT ug/l	COPPER1DIS ug/l	COPPER2DIS ug/l	COPPER3DIS ug/l	COPPER4DIS ug/l
CC28	5.00	6.50		4.970	BDL	BDL	170.0	ND		170.00	140.0	160.0		170.00
CC29	1.70	1.80	1.30	1.790	BDL	BDL	95.0	ND	ND	ND	79.0	33.0	34.0	38.00
CC29a				1.190						ND				20.00
CC30	5.00	7.00	3.30	4.000	BDL	BDL	130.0	ND	ND	ND	110.0	160.0	23.0	160.00
CC30	7.00	7.00	3.30	4.000	BDL	BDL	120.0	ND	ND	ND	96.0	160.0	23.0	160.00
CC30d	4.00				ND	BDL	ND				110.0			
CC31	4.40	5.60			BDL	BDL	110.0	ND			100.0	150.0		
CC32	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
CC32d	BDL				ND	BDL	ND				BDL			
CC33	BDL	BDL			BDL	BDL	15.0	ND			BDL	BDL		
CC34	3.80	5.20			BDL	BDL	69.0	ND			64.0	140.0		
CC35	1.70	0.47			BDL	BDL	97.0	8.0			71.0	BDL		
CC36	3.60	5.00		3.690	BDL	BDL	79.0	140.0		ND	62.0	140.0		140.00
CC36d	3.60				ND	BDL	ND				69.0			
CC37	3.70	4.30	3.30	4.780	BDL	11.00	11.0	ND	ND	ND	BDL	20.0	BDL	8.00
CC37a				3.210						ND				BDL
CC38	8.00	2.10	1.10		BDL	BDL	220.0	ND	ND		180.0	23.0	BDL	
CC39	3.70	4.70	3.30	5.320	BDL	BDL	76.0	ND	ND	140.00	72.0	140.0	33.0	170.00
CC40	5.40	0.83			BDL	BDL	720.0	ND			330.0	39.0		
CC41	3.70	4.50			BDL	BDL	98.0	ND			85.0	140.0		
CC42	0.40	0.32			BDL	BDL	14.0	ND			BDL	BDL		
CC43	3.60	5.20		4.430	BDL	BDL	87.0	140.0		ND	80.0	130.0		140.00
CC44	0.50	0.54			BDL	BDL	24.0	ND			21.0	12.0		
CC44d	0.50				ND	BDL	ND				20.0			
CC45	1.00	0.36			BDL	BDL	43.0	ND			43.0	11.0		
CC46	3.60	4.40		4.270	BDL	BDL	91.0	130.0		ND	87.0	120.0		120.00
CC47	3.50	4.00	3.00	4.860	BDL	BDL	87.0	ND	ND	ND	79.0	120.0	41.0	120.00
CC48	3.30	5.40	2.70	3.970	BDL	BDL	96.0	120.0	47.0	120.00	86.0	110.0	41.0	110.00
CC48-1	3.60	4.60	3.00	3.280	BDL	BDL	91.0	130.0	46.0	120.00	87.0	120.0	44.0	110.00
CC48-2	3.70	3.60			BDL	BDL	77.0	120.0			73.0	110.0		
CC48-3	5.10				BDL	BDL	57.0				57.0			
CC48-4	3.80				BDL	BDL	98.0				90.0			
CC48d	3.30				ND	BDL	ND				83.0			
CC49	3.50	5.10	2.70		BDL	BDL	73.0	120.0	50.0		67.0	110.0	40.0	
CC49d	3.50				ND	BDL	ND				66.0			
M01	BDL	BDL	BDL		BDL	BDL	BDL	0.0	5.0		BDL	BDL	BDL	
M02	630.00	150.00	810.00	350.000	26.00	26.00	62000.0	18000.0	82000.0	33000.00	62000.0	14000.0	82000.0	33000.00
M02a				35.000						ND				1200.00
M02b				620.000						ND				63000.00
M02c				250.000						ND				23000.00
M03	13.00	5.90	13.00		BDL	BDL	3300.0	1100.0	2000.0		3300.0	1100.0	2800.0	
M03a				25.000						ND				3700.00
M04	71.00	9.00	120.00	8.160	BDL	BDL	6600.0	ND	ND	720.00	6600.0	940.0	11000.0	720.00
M05	58.00	9.00	100.00	8.030	BDL	BDL	5700.0	890.0	10000.0	700.00	5700.0	900.0	9900.0	700.00
M06	0.30	0.48			BDL	BDL	BDL	ND			BDL	BDL		
M07	19.00	4.30			BDL	BDL	1600.0	270.0			1500.0	140.0		
M07-1	23.00				BDL	BDL	2000.0				1900.0			
M08	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
M09	BDL	0.47			BDL	BDL	BDL	ND			BDL	BDL		
M10	BDL	BDL	BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	
M11	5.00	2.80	5.60	1.470	BDL	BDL	430.0	ND	ND	ND	350.0	51.0	350.0	47.00

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	IRON_TOT1 ug/l	IRON_TOT2 ug/l	IRON_TOT3 ug/l	IRON_TOT4 ug/l	IRON_DIS1 ug/l	IRON_DIS2 ug/l	IRON_DIS3 ug/l	IRON_DIS4 ug/l	LEAD_TOT1 ug/l	LEAD_TOT2 ug/l	LEAD_TOT3 ug/l	LEAD_TOT4 ug/l	LEAD_DIS1 ug/l	LEAD_DIS2 ug/l	LEAD_DIS3 ug/l
CC28	16000.0	ND		8100.00	8000.0	ND		5700.00	230.0	ND		16.00	92.0	11.0	
CC29	17000.0	ND	ND	ND	11000.0	ND	ND	8200.00	170.0	ND	ND	ND	84.0	11.0	BDL
CC29a				ND				24000.00				ND			
CC30	14000.0	ND	ND	ND	9000.0	ND	ND	5700.00	99.0	ND	ND	ND	54.0	12.0	7.0
CC30	13000.0	ND	ND	ND	9100.0	ND	ND	5700.00	200.0	ND	ND	ND	94.0	12.0	7.0
CC30d	ND				8700.0				ND				48.0		
CC31	11000.0	ND			8100.0	ND			46.0	ND			30.0	12.0	
CC32	3500.0	ND			2600.0	ND			BDL	ND			BDL	BDL	
CC32d	ND				2600.0				ND				BDL		
CC33	290.0	ND			14.0	ND			BDL	ND			BDL	BDL	
CC34	8800.0	ND			6200.0	ND			40.0	ND			26.0	10.0	
CC35	13000.0	500.0			320.0	ND			96.0	BDL			BDL	BDL	
CC36	11000.0	4800.0		ND	5700.0	ND		3600.00	50.0	14.0		ND	23.0	9.0	
CC36d	ND				6000.0				ND				23.0		
CC37	32000.0	ND	ND	ND	24000.0	ND	ND	24000.00	13.0	ND	ND	ND	BDL	12.0	BDL
CC37a				ND				16000.00				ND			
CC38	12000.0	ND	ND		4900.0	ND	ND		320.0	ND	ND		98.0	20.0	BDL
CC39	8900.0	ND	ND	5600.00	5500.0	ND	ND	4100.00	44.0	ND	ND	16.00	26.0	10.0	7.2
CC40	430000.0	ND			25000.0	ND			4900.0	ND			180.0	32.0	
CC41	21000.0	ND			5800.0	ND			86.0	ND			43.0	9.0	
CC42	2500.0	ND			760.0	ND			BDL	ND			BDL	BDL	
CC43	6600.0	4500.0		ND	3600.0	ND		2200.00	39.0	13.0		ND	25.0	7.0	
CC44	6200.0	ND			2600.0	ND			BDL	ND			BDL	BDL	
CC44d	ND				2500.0				ND				BDL		
CC45	2400.0	ND			2200.0	ND			BDL	ND			BDL	BDL	
CC46	7800.0	4600.0		ND	3400.0	ND		1700.00	49.0	15.0		ND	31.0	7.0	
CC47	8300.0	ND	ND	ND	3500.0	ND	ND	2400.00	42.0	ND	ND	ND	25.0	5.0	5.0
CC48	7800.0	4900.0	8600.0	4200.00	5300.0	ND	ND	1900.00	21.0	15.0	12.0	15.00	15.0	6.0	5.5
CC48-1	7500.0	5000.0	7500.0	4500.00	4200.0	ND	ND	2500.00	33.0	14.0	12.0	13.00	17.0	BDL	7.3
CC48-2	8100.0	5000.0			3200.0	4200.0			47.0	14.0			27.0	11.0	
CC48-3	4800.0				2700.0				23.0				20.0		
CC48-4	7200.0				3400.0				61.0				31.0		
CC48d	ND				4100.0				ND				18.0		
CC49	5700.0	4500.0	8400.0		2500.0	ND	5600.0		36.0	12.0	12.0		26.0	BDL	6.9
CC49d	ND				2500.0				ND				25.0		
M01	22.0	14.0	26.0		BDL	BDL	ND		BDL	BDL	BDL		BDL	BDL	BDL
M02	490000.0	160000.0	580000.0	290000.00	490000.0	ND	ND	280000.00	300.0	110.0	99.0	98.00	300.0	88.0	101.0
M02a				ND				57000.00				ND			
M02b				ND				520000.00				ND			
M02c				ND				160000.00				ND			
M03	17000.0	5000.0	2300.0		16000.0	ND	ND		150.0	15.0	51.0		92.0	12.0	54.0
M03a				ND				22000.00				ND			
M04	44000.0	ND	ND	5600.00	38000.0	ND	ND	680.00	25.0	ND	ND	BDL	23.0	BDL	15.0
M05	38000.0	8000.0	58000.0	5200.00	33000.0	ND	ND	830.00	130.0	6.0	19.0	BDL	29.0	BDL	19.0
M06	170.0	ND			12.0	ND			BDL	ND			BDL	BDL	
M07	3700.0	2300.0			2200.0	ND			310.0	17.0			260.0	BDL	
M07-1	9100.0				5800.0				200.0				190.0		
M08	BDL	ND			BDL	ND			BDL	ND			BDL	BDL	
M09	320.0	ND			45.0	ND			BDL	ND			BDL	BDL	
M10	44.0	30.0	21.0		21.0	ND	ND		BDL	BDL	BDL		BDL	BDL	BDL
M11	1000.0	ND	ND	ND	370.0	ND	ND	100.00	73.0	ND	ND	ND	27.0	BDL	15.0

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	LEAD_DIS4 ug/l	MN_TOT1 ug/l	MN_TOT2 ug/l	MN_TOT4 ug/l	MN_DIS1 ug/l	MN_DIS2 ug/l	MN_DIS3 ug/l	MN_DIS4 ug/l	NICKEL1TOT ug/l	NICKEL1DIS ug/l	SE_TOT_1 ug/l	SE_TOT_3 ug/l	SE_DIS1 ug/l	SE_DIS2 ug/l	SE_DIS3 ug/l	SILVER1TOT ug/l
CC28	13.00	2200.0	ND	ND	2100.0	1700.0		1900.00	BDL	BDL	ND		ND	BDL		0.80
CC29	29.00	2700.0	ND	ND	2500.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	0.40
CC29a	BDL			ND				ND								
CC30	12.00	1800.0	ND	ND	1800.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	BDL	0.30
CC30	12.00	2200.0	ND	ND	2200.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	BDL	0.50
CC30d		ND			1700.0				ND	BDL	ND		ND			ND
CC31		1800.0	ND		1700.0	ND			BDL	BDL	BDL		BDL	ND		BDL
CC32		1700.0	ND		1700.0	ND			BDL	BDL	ND		ND	ND		BDL
CC32d		ND			1700.0				ND	BDL	ND		ND			ND
CC33		5.0	ND		BDL	ND			BDL	BDL	BDL		BDL	ND		BDL
CC34		1900.0	ND		1900.0	ND			BDL	BDL	BDL		BDL	ND		BDL
CC35		1000.0	ND		750.0	ND			BDL	BDL	BDL		BDL	ND		0.80
CC36	12.00	2000.0	ND	ND	1700.0	ND		ND	BDL	BDL	BDL		BDL	ND		0.30
CC36d		ND			1900.0				ND	BDL	ND		ND			ND
CC37	BDL	8300.0	ND	ND	8000.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
CC37a	BDL			ND				ND								
CC38		3900.0	ND		3900.0	ND	ND		BDL	BDL	BDL	ND	BDL	ND	ND	0.70
CC39	15.00	1800.0	ND	ND	1800.0	ND	ND	1800.00	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
CC40		7500.0	ND		530.0	ND			55.0	36.0	10.0		BDL	ND		79.00
CC41		2200.0	ND		2000.0	ND			BDL	BDL	1.4		BDL	ND		1.60
CC42		870.0	ND		870.0	ND			BDL	BDL	BDL		BDL	ND		BDL
CC43	15.00	2000.0	ND	ND	1900.0	1500.0		ND	BDL	BDL	BDL		BDL	BDL		BDL
CC44		1500.0	ND		1500.0	ND			BDL	BDL	BDL		BDL	ND		BDL
CC44d		ND			1500.0				ND	BDL	ND		BDL			ND
CC45		510.0	ND		500.0	ND			BDL	BDL	ND		ND	ND		BDL
CC46	13.00	1900.0	ND	ND	1900.0	ND		ND	BDL	BDL	BDL		BDL	ND		0.30
CC47	11.00	2100.0	ND	ND	2000.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
CC48	20.00	1400.0	ND	ND	1400.0	ND	ND	1500.00	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
CC48-1	10.00	1600.0	ND	ND	1600.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
CC48-2		2400.0	ND		2300.0	1100.0			BDL	BDL	BDL		BDL	BDL		BDL
CC48-3		2500.0			2500.0				BDL	BDL	BDL		BDL			BDL
CC48-4		1700.0			1700.0				BDL	BDL	BDL		BDL			0.20
CC48d		ND			1500.0				ND	BDL	ND		ND			ND
CC49		2100.0	ND		2000.0	1300.0	3100.0		BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
CC49d		ND			2000.0				ND	BDL	ND		BDL			ND
M01		BDL	ND		BDL	BDL	BDL		BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
M02	90.00	17000.0	ND	ND	17000.0	3000.0	26000.0	12000.00	220.0	220.0	BDL	ND	BDL	BDL	ND	0.50
M02a	300.00			ND				ND								
M02b	170.00			ND				ND								
M02c	31.00			ND				ND								
M03		650.0	ND		640.0	130.0	690.0		BDL	BDL	BDL	ND	BDL	BDL	BDL	0.60
M03a	16.00			ND				ND								
M04	BDL	2100.0	ND	ND	2100.0	ND	ND	260.00	32.0	32.0	BDL	ND	BDL	ND	ND	BDL
M05	BDL	1700.0	ND	ND	1700.0	200.0	3600.0	240.00	25.0	23.0	BDL	ND	BDL	BDL	ND	0.20
M06		24.0	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
M07		700.0	ND		700.0	100.0			BDL	BDL	ND		ND	ND		BDL
M07-1		790.0			720.0				BDL	BDL	BDL		BDL			BDL
M08		BDL	ND		BDL	ND			BDL	BDL	BDL		BDL	ND		BDL
M09		76.0	ND		67.0	ND			BDL	BDL	ND		ND	ND		BDL
M10		22.0	ND		20.0	ND	20.0		BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M11	BDL	200.0	ND	ND	200.0	ND	ND	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SILVER2TOT ug/l	SILVER3TOT ug/l	SILVER1DIS ug/l	SILVER2DIS ug/l	SILVER3DIS ug/l	ZINC_TOT1 ug/l	ZINC_TOT2 ug/l	ZINC_TOT3 ug/l	ZINC_TOT4 ug/l	ZINC_DIS1 ug/l	ZINC_DIS2 ug/l	ZINC_DIS3 ug/l	ZINC_DIS4 ug/l
CC28	ND		BDL	BDL		1600.0	ND		1100.00	1600.0	1000.0		1100.00
CC29	ND	ND	BDL	BDL	BDL	720.0	ND	ND	ND	650.0	1100.0	1000.0	1200.00
CC29a									ND				930.00
CC30	ND	ND	BDL	BDL	BDL	1300.0	ND	ND	ND	1300.0	1000.0	1000.0	1100.00
CC30	ND	ND	BDL	BDL	BDL	1500.0	ND	ND	ND	1400.0	1000.0	1000.0	1100.00
CC30d			BDL			ND				1300.0			
CC31	ND		BDL	BDL		1200.0	ND			1200.0	960.0		
CC32	ND		BDL	BDL		170.0	ND			160.0	140.0		
CC32d			BDL			ND				160.0			
CC33	ND		BDL	BDL		43.0	ND			BDL	BDL		
CC34	ND		BDL	BDL		1100.0	ND			1000.0	870.0		
CC35	ND		BDL	BDL		310.0	100.0			280.0	85.0		
CC36	ND		BDL	BDL		1000.0	870.0		ND	960.0	860.0		930.00
CC36d			BDL			ND				1000.0			
CC37	ND	ND	BDL	BDL	0.21	2600.0	ND	ND	ND	2500.0	2900.0	2600.0	2600.00
CC37a									ND				2400.00
CC38	ND	ND	BDL	BDL	0.20	2100.0	ND	ND		2100.0	810.0	1300.0	
CC39	ND	ND	BDL	BDL	BDL	1000.0	ND	ND	940.00	1000.0	920.0	1100.0	1100.00
CC40	ND		0.30	BDL		2200.0	ND			1000.0	280.0		
CC41	ND		BDL	BDL		980.0	ND			960.0	910.0		
CC42	ND		BDL	BDL		120.0	ND			98.0	59.0		
CC43	ND		BDL	BDL		990.0	840.0		ND	990.0	840.0		970.00
CC44	ND		BDL	BDL		180.0	ND			180.0	130.0		
CC44d			BDL			ND				180.0			
CC45	ND		BDL	BDL		140.0	ND			140.0	39.0		
CC46	ND		BDL	BDL		990.0	840.0		ND	990.0	850.0		880.00
CC47	ND	ND	BDL	BDL	BDL	1000.0	ND	ND	ND	960.0	790.0	940.0	870.00
CC48	ND	ND	BDL	BDL	BDL	970.0	790.0	910.0	870.00	930.0	790.0	910.0	820.00
CC48-1	ND	ND	BDL	BDL	BDL	950.0	810.0	1000.0	840.00	950.0	790.0	1000.0	790.00
CC48-2	ND		BDL	0.05		1000.0	720.0			1000.0	720.0		
CC48-3			BDL			1100.0				1000.0			
CC48-4			BDL			1000.0				980.0			
CC48d			BDL			ND				920.0			
CC49	ND	ND	BDL	BDL	BDL	930.0	730.0	960.0		880.0	730.0	920.0	
CC49d			BDL			ND				880.0			
M01	ND	ND	BDL	BDL	BDL	BDL	BDL	44.0		BDL	8.0	19.0	
M02	ND	ND	0.40	BDL	0.34	180000.0	54000.0	230000.0	100000.00	180000.0	40000.0	230000.0	100000.00
M02a									ND				7200.00
M02b									ND				180000.00
M02c									ND				74000.00
M03	ND	ND	BDL	BDL	BDL	3900.0	1400.0	4500.0		3900.0	1400.0	4600.0	
M03a									ND				4700.00
M04	ND	ND	BDL	BDL	BDL	21000.0	ND	ND	2300.00	21000.0	2900.0	35000.0	2300.00
M05	ND	ND	BDL	BDL	BDL	17000.0	2600.0	30000.0	2200.00	17000.0	2600.0	30000.0	2100.00
M06	ND		BDL	BDL		92.0	ND			74.0	57.0		
M07	ND		BDL	BDL		5800.0	920.0			5800.0	880.0		
M07-1			BDL			6200.0				6100.0			
M08	ND		BDL	BDL		23.0	ND			23.0	13.0		
M09	ND		BDL	BDL		53.0	ND			43.0	72.0		
M10	ND	ND	BDL	BDL	BDL	25.0	14.0	56.0		23.0	14.0	40.0	
M11	ND	ND	BDL	BDL	BDL	1700.0	ND	ND	ND	1600.0	540.0	1800.0	330.00

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AS_DIS1 ug/l	AS_DIS2 ug/l	AS_TOT3 ug/l	AS_DIS3 ug/l	AS_TOT4 ug/l	AS_DIS4 ug/l	CYANIDE1 mg/l	CYANIDE2 mg/l	CYANIDE3 mg/l	CYANIDE4 mg/l	ALK1 mg/l	ALK2 mg/l	HARD1 mg/l	HARD2 mg/l	HARD3 mg/l	HARD4 mg/l
CC28	ND	BDL			ND	ND	ND	BDL		ND	ND	ND	275.10	140.0		291
CC29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	229.38	520.0	ND	668
CC29a					ND	ND				ND						522
CC30	ND	ND	ND	3.50	ND	ND	ND	ND	ND	ND	ND	ND	295.88	150.0	587.04	281
CC30	BDL	ND	ND	3.50	ND	ND	BDL	ND	ND	ND	ND	ND	355.51	150.0	587.04	281
CC30d	ND						ND				ND		ND			
CC31	ND	ND					ND	ND			ND	ND	336.75	140.0		
CC32	ND	ND					ND	ND			ND	ND	719.75	720.0		
CC32d	ND						ND				ND		ND			
CC33	ND	ND					ND	ND			ND	ND	81.76	80.0		
CC34	ND	ND					ND	ND			ND	ND	31.51	140.0		
CC35	ND	ND					ND	ND			ND	ND	99.33	48.0		
CC36	ND	ND			ND	ND	ND	ND		ND	ND	ND	328.40	140.0		270
CC36d	ND						ND				ND		ND			
CC37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	927.61	ND	ND	756
CC37a					ND	ND				ND						790
CC38	ND	ND	ND	ND			ND	ND	ND		ND	ND	314.98	180.0	761.73	
CC39	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	305.93	140.0	611.15	314
CC40	ND	ND					ND	ND			ND	ND	90.53	69.0		
CC41	BDL	ND					ND	ND			ND	ND	445.51	140.0		
CC42	BDL	ND					BDL	ND			ND	ND	671.40	ND		
CC43	BDL	BDL			ND	ND	ND	BDL		ND	ND	ND	486.34	150.0		313
CC44	ND	ND					ND	ND			ND	ND	379.63	160.0		
CC44d	ND						ND				ND		ND			
CC45	ND	ND					ND	ND			ND	ND	11.93	0.0		
CC46	BDL	ND			ND	ND	ND	ND		ND	ND	ND	318.81	140.0		281
CC47	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140.0	577.04	291
CC48	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	437.57	140.0	ND	269
CC48-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	ND	ND	430.45	140.0	607.04	259
CC48-2	BDL	2.00					BDL	BDL			ND	0.0	343.33	130.0		
CC48-3	ND						ND				ND		502.92			
CC48-4	ND						ND				ND		316.75			
CC48d	ND						ND				ND		ND			
CC49	ND	BDL	ND	BDL			ND	BDL	ND		ND	ND	367.57	150.0	567.04	
CC49d	ND						ND				ND		ND			
M01	BDL	BDL	ND	BDL			BDL	ND	ND		14.0	0.0	38.00	17.0	21.88	
M02	3500.00	1300.00	ND	ND	ND	ND	ND	BDL	ND	0.012	ND	ND	244.07	83.0	422.26	278
M02a					ND	ND				ND						143
M02b					ND	ND				ND						266
M02c					ND	ND				ND						171
M03	35.00	14.00	ND	5.00			ND	BDL	ND		ND	ND	57.17	23.0	71.46	
M03a					ND	ND				ND						46
M04	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	ND	ND	66.23	19.0	106.81	25
M05	ND	2.00	ND	ND	ND	ND	ND	ND	ND	BDL	ND	ND	63.23	24.0	96.69	23
M06	ND	ND					ND	ND			ND	ND	32.12	12.0		
M07	ND	ND					BDL	ND			ND	ND	58.05	28.0		
M07-1	28.00						ND				ND		81.58			
M08	ND	ND					ND	ND			ND	ND	4.94	15.0		
M09	ND	ND					ND	ND			ND	ND	224.81	ND		
M10	ND	ND	ND	ND			ND	ND	ND		ND	ND	164.12	41.0	228.23	
M11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	145.35	34.0	218.23	39

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TSS_1 mg/l	TSS_2 mg/l	TSS_3 mg/l	TSS-4 mg/l	HG_1 ug/l	HG_2 ug/l	HG_3 ug/l	HG_4 ug/l
CC28					ND	ND		ND
CC29					ND	BDL	ND	ND
CC29a								ND
CC30					ND	ND	ND	ND
CC30					ND	ND	ND	ND
CC30d					ND			
CC31					ND	ND		
CC32					ND	ND		
CC32d					ND			
CC33					ND	ND		
CC34					ND	ND		
CC35					ND	ND		
CC36					ND	ND		ND
CC36d					ND			
CC37					ND	ND	ND	ND
CC37a								ND
CC38					ND	ND	ND	
CC39					ND	ND	ND	ND
CC40					ND	ND		
CC41					ND	ND		
CC42					BDL	ND		
CC43					ND	BDL		ND
CC44					ND	ND		
CC44d					ND			
CC45					ND	ND		
CC46					ND	ND		ND
CC47					ND	ND	ND	ND
CC48				10	ND	ND	ND	ND
CC48-1				16	ND	ND	ND	BDL
CC48-2		15.00			BDL	BDL		
CC48-3					ND			
CC48-4					ND			
CC48d					ND			
CC49			21		ND	BDL	BDL	
CC49d					ND			
M01			BDL		BDL	ND	BDL	
M02					ND	BDL	ND	0.60
M02a								ND
M02b								ND
M02c								ND
M03					ND	BDL	BDL	
M03a								ND
M04					ND	ND	ND	1.10
M05					ND	ND	ND	ND
M06					ND	ND		
M07					BDL	ND		
M07-1					ND			
M08					ND	ND		
M09					ND	ND		
M10					ND	ND	ND	
M11					ND	ND	ND	ND

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AL_T_LOAD1 grams/day	AL_T_LOAD3 grams/day	AL_T_LOAD4 grams/day	AL_D_LOAD1 grams/day	AL_D_LOAD2 grams/day	AL_D_LOAD3 grams/day	AL_D_LOAD4 grams/day	CD_T_LOAD1 grams/day	CD_T_LOAD2 grams/day	CD_T_LOAD3 grams/day	CD_T_LOAD4 grams/day	CD_D_LOAD1 grams/day	CD_D_LOAD2 grams/day
CC28	275177.4		ND	221221.0	208117.4		197152.343	269.8	ND		341.519	269.8	751.5
CC29	544.7	ND		337.2	ND	118.19		0.2	ND	ND		0.2	ND
CC29a			ND				255.467				ND		
CC30	223778.2	ND	ND	183498.1	219865.4	108118.25	175523.310	268.5	ND	ND	ND	268.5	810.0
CC30	187195.5	ND	ND	153500.3	219865.4	108118.25	175523.310	262.1	ND	ND	ND	262.1	810.0
CC30d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC31	163263.8			153059.9	286908.3			146.3	ND			146.3	845.6
CC32	BDL			BDL	ND			BDL	ND			BDL	ND
CC32d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC33	BDL			BDL	BDL			BDL	ND			BDL	BDL
CC34	132027.9			114424.2	108032.6			117.4	ND			117.4	330.5
CC35	7348.3			2261.0	409.1			3.6	1.8			3.6	1.7
CC36	182350.4		ND	131697.5	151753.2		201708.657	141.8	446.3		ND	141.8	446.3
CC36d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC37	31.3	ND	ND	13.7	ND	23.30	54.323	0.5	ND	ND	ND	0.5	ND
CC37a			ND				BDL				ND		
CC38	687.1	ND		203.6	ND	BDL		2.0	ND	ND		2.0	ND
CC39	212191.6	ND	224184.352	188614.8	365581.8	102734.85	264217.272	174.5	ND	ND	402.731	174.5	954.6
CC40	411096.0			61664.4	ND			30.8	ND			30.8	ND
CC41	304504.7			219422.5	307441.1			179.1	ND			179.1	768.6
CC42	1122.7			254.9	303.1			1.5	ND			1.5	1.3
CC43	217381.7		ND	197619.7	216853.1		200399.512	177.9	790.0		ND	177.9	805.5
CC44	3230.0			1292.0	3053.9			0.4	ND			0.4	1.3
CC44d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC45	9934.8			9792.9	3219.8			1.4	ND			1.4	1.3
CC46	254762.1		ND	238839.4	250328.1		207471.342	265.4	734.3		ND	265.4	734.3
CC47	264031.3	ND	ND	248189.4	226469.9	92242.11	224321.384	184.8	ND	ND	ND	184.8	603.9
CC48	260634.9	ND	ND	223401.3	270393.5	160988.13	273574.600	248.2	1060.8	104.83	371.430	248.2	1123.2
CC48-1	121811.7	ND	ND	112195.0	308322.0	165172.50	263052.500	115.4	945.5	113.79	352.490	115.4	945.5
CC48-2	227602.8			213075.0	396438.5			179.2	839.5			179.2	839.5
CC48-3	166141.5			162529.7				119.2				119.2	
CC48-4	277856.9			233399.8				211.2				211.2	
CC48d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
CC49	209091.3	ND		194835.0	259577.8	149144.65		166.3	878.6	94.03		166.3	1018.3
CC49d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M01	BDL	ND		BDL	ND	BDL		0.0	ND	BDL		BDL	ND
M02	82630.3	ND	ND	82630.3	ND	ND	8782.283	777.0	ND	ND	83.076	777.0	ND
M02a			ND				4463.328				ND		
M02b			ND				805.063				ND		
M02c			ND				244.700				ND		
M03	1288.3	ND		1222.3	ND	486.71		4.3	ND	0.95		4.3	ND
M03a			ND				106.445				ND		
M04	12075.9	ND	ND	12075.9	24122.5	6457.63	8772.495	114.3	ND	ND	98.135	114.3	233.4
M05	13878.9	ND	ND	13677.8	18947.1	6753.72	8016.372	116.7	196.0	61.91	89.211	116.7	196.0
M06	211.6			BDL	BDL			0.9	ND			0.9	10.1
M07	7252.9			6871.2	5344.2			72.5	264.3			72.5	252.5
M07-1	18046.6			16602.9				166.0				166.0	
M08	BDL			BDL	BDL			BDL	ND			BDL	BDL
M09	BDL			BDL	BDL			BDL	ND			BDL	0.1
M10	1007.2	ND		BDL	BDL	BDL		BDL	BDL	BDL		BDL	BDL
M11	7386.0	ND	ND	857.3	BDL	1142.26	BDL	65.9	ND	ND	ND	65.9	390.5

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_D_LOAD3 grams/day	CD_D_LOAD4 grams/day	CR_T_LOAD1 grams/day	CR_D_LOAD1 grams/day	CU_T_LOAD1 grams/day	CU_T_LOAD2 grams/day	CU_T_LOAD3 grams/day	CU_T_LOAD4 grams/day	CU_D_LOAD1 grams/day	CU_D_LOAD2 grams/day	CU_D_LOAD3 grams/day	CU_D_LOAD4 grams/day
CC28		316.080	BDL	BDL	9172.6	ND		10811.580	7553.9	18499.3		10811.580
CC29	0.07		BDL	BDL	12.3	ND	ND		10.2	ND	1.91	
CC29a		0.169						ND				2.839
CC30	84.95	234.031	BDL	BDL	5818.2	ND	ND	ND	4923.1	18515.0	592.08	9361.243
CC30	84.95	234.031	BDL	BDL	4492.7	ND	ND	ND	3594.2	18515.0	592.08	9361.243
CC30d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC31			BDL	BDL	3741.5	ND			3401.3	22650.7		
CC32			BDL	BDL	BDL	ND			BDL	ND		
CC32d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC33			BDL	BDL	11.7	ND			BDL	BDL		
CC34			BDL	BDL	2024.4	ND			1877.7	8896.8		
CC35			BDL	BDL	182.8	29.8			133.8	BDL		
CC36		275.668	BDL	BDL	2667.7	12497.3		ND	2093.7	12497.3		10458.967
CC36d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
CC37	0.86	0.702	BDL	1.10	1.1	ND	ND	ND	BDL	ND	BDL	1.175
CC37a		0.016						ND				BDL
CC38	0.02		BDL	BDL	56.0	ND	ND		45.8	ND	BDL	
CC39	82.69	425.950	BDL	BDL	3583.7	ND	ND	11209.218	3395.1	28434.1	826.89	13611.193
CC40			BDL	BDL	2466.6	ND			1130.5	ND		
CC41			BDL	BDL	4388.4	ND			3806.3	23912.1		
CC42			BDL	BDL	42.5	ND			BDL	BDL		
CC43		306.128	BDL	BDL	4298.2	21685.3		ND	3952.4	20136.4		9674.459
CC44			BDL	BDL	19.4	ND			17.0	28.2		
CC44d	ND		ND	BDL	ND	ND	ND		ND	ND	ND	
CC45			BDL	BDL	61.0	ND			61.0	41.2		
CC46		340.732	BDL	BDL	4829.9	21695.1		ND	4617.6	20026.2		9575.600
CC47	72.82	389.358	BDL	BDL	4594.1	ND	ND	ND	4171.7	18117.6	995.24	9613.774
CC48	101.09	417.727	BDL	BDL	5957.4	24959.4	1759.64	12626.520	5336.8	22879.5	1535.00	11574.310
CC48-1	110.12	345.125	BDL	BDL	2917.1	26721.2	1688.43	12626.520	2788.8	24665.8	1615.02	11574.310
CC48-2			BDL	BDL	3728.8	27983.9			3535.1	25651.9		
CC48-3			BDL	BDL	2058.7				2058.7			
CC48-4			BDL	BDL	5446.0				5001.4			
CC48d	ND		ND	BDL	ND	ND	ND		ND	ND	ND	
CC49	87.54		BDL	BDL	3469.0	23961.0	1621.14		3183.9	21964.3	1296.91	
CC49d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M01	BDL		BDL	BDL	BDL	ND	0.35		BDL	ND	BDL	
M02	ND	83.076	32.1	32.10	76463.9	ND	ND	7832.847	76463.9	ND	ND	7832.847
M02a		27.406						ND				939.648
M02b		10.620						ND				1079.127
M02c		3.059						ND				281.405
M03	1.24		BDL	BDL	1090.1	ND	190.87		1090.1	ND	267.21	
M03a		1.774						ND				262.563
M04	59.61	95.445	BDL	BDL	10626.8	ND	ND	8421.595	10626.8	24381.9	5464.15	8421.595
M05	56.28	91.959	BDL	BDL	11465.2	19382.7	5628.10	8016.372	11465.2	19600.5	5571.82	8016.372
M06			BDL	BDL	BDL	ND			BDL	BDL		
M07			BDL	BDL	6107.7	15856.6			5726.0	8221.9		
M07-1			BDL	BDL	14437.3				13715.4			
M08			BDL	BDL	BDL	ND			BDL	BDL		
M09			BDL	BDL	BDL	ND			BDL	BDL		
M10	BDL		BDL	BDL	BDL	BDL	BDL		BDL	BDL	BDL	
M11	53.31	100.719	BDL	BDL	5671.4	ND	ND	ND	4616.3	7113.4	3331.59	3220.252

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	FE_T_LOAD1 grams/day	FE_T_LOAD2 grams/day	FE_T_LOAD3 grams/day	FE_T_LOAD4 grams/day	FE_D_LOAD1 grams/day	FE_D_LOAD2 grams/day	FE_D_LOAD3 grams/day	FE_D_LOAD4 grams/day	PB_T_LOAD1 grams/day	PB_T_LOAD2 grams/day	PB_T_LOAD3 grams/day	PB_T_LOAD4 grams/day	PB_D_LOAD1 grams/day
CC28	863301.6	ND		515139.993	431650.8	ND		362505.921	12410.0	ND		1017.560	4964.0
CC29	2204.7	ND	ND		1426.6	ND	ND		22.0	ND	ND		10.9
CC29a				ND				3406.224				ND	
CC30	626578.8	ND	ND	ND	402800.7	ND	ND	333494.289	4430.8	ND	ND	ND	2416.8
CC30	486708.3	ND	ND	ND	340695.8	ND	ND	333494.289	7487.8	ND	ND	ND	3519.3
CC30d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC31	374146.3	ND			275507.7	ND			1564.6	ND			1020.4
CC32	3151.7	ND			2341.3	ND			BDL	ND			BDL
CC32d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC33	227.1	ND			11.0	ND			BDL	ND			BDL
CC34	258187.9	ND			181905.1	ND			1173.6	ND			762.8
CC35	24494.5	1859.7			602.9	ND			180.9	BDL			BDL
CC36	371454.6	428479.5		ND	192481.0	ND		268944.876	1688.4	1249.7		ND	776.7
CC36d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC37	3132.2	ND	ND	ND	2349.1	ND	ND	3523.680	1.3	ND	ND	ND	BDL
CC37a				ND				78.304				ND	
CC38	3053.9	ND	ND		1247.0	ND	ND		81.4	ND	ND		24.9
CC39	419667.8	ND	ND	448368.704	259345.3	ND	ND	328269.944	2074.8	ND	ND	1281.053	1226.0
CC40	1473094.0	ND			85645.0	ND			16786.4	ND			616.6
CC41	940382.1	ND			259724.6	ND			3851.1	ND			1925.5
CC42	7585.7	ND			2306.1	ND			BDL	ND			BDL
CC43	326072.5	697028.0		ND	177857.7	ND		152027.216	1926.8	2013.6		ND	1235.1
CC44	5006.6	ND			2099.5	ND			BDL	ND			BDL
CC44d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC45	3406.2	ND			3122.4	ND			BDL	ND			BDL
CC46	413988.4	767672.8		ND	180456.5	ND		135654.339	2600.7	2503.3		ND	1645.3
CC47	438292.0	ND	ND	ND	184821.9	ND	ND	192275.472	2217.9	ND	ND	ND	1320.2
CC48	484036.2	1019175.5	321976.26	441928.200	328896.4	ND	ND	199919.900	1303.2	3119.9	449.3	1578.315	930.8
CC48-1	240417.8	1027740.0	275287.50	473494.500	134633.9	ND	ND	263052.500	1057.8	2877.7	440.5	1367.873	544.9
CC48-2	392251.7	1165995.5			154963.6	979436.2			2276.0	3264.8			1307.5
CC48-3	173365.1				97517.8				830.7				722.4
CC48-4	400113.9				188942.7				3389.9				1722.7
CC48d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
CC49	270868.2	898538.4	272351.10		118801.9	ND	181567.40		1710.7	2396.1	389.1		1235.5
CC49d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M01	21.5	ND	1.85		BDL	ND	ND		BDL	ND	BDL		BDL
M02	604311.1	ND	ND	68834.110	604311.1	ND	ND	66460.520	370.0	ND	ND	23.261	370.0
M02a				ND				44633.280				ND	
M02b				ND				8907.080				ND	
M02c				ND				1957.600				ND	
M03	5615.9	ND	219.50		5285.5	ND	ND		49.6	ND	4.9		30.4
M03a				ND				1561.186				ND	
M04	70845.5	ND	ND	65501.296	61184.8	ND	ND	7953.729	40.3	ND	ND	BDL	37.0
M05	76434.5	174226.4	32642.98	59550.192	66377.3	ND	ND	9505.127	261.5	130.7	10.7	BDL	58.3
M06	391.0	ND			27.6	ND			BDL	ND			BDL
M07	14124.1	135074.4			8398.1	ND			1183.4	998.4			992.5
M07-1	65689.7				41868.2				1443.7				1371.5
M08	0.0	ND			BDL	ND			BDL	ND			BDL
M09	109.6	ND			15.4	ND			BDL	ND			BDL
M10	527.6	1174.6	135.15		251.8	ND	ND		BDL	BDL	BDL		BDL
M11	13189.3	ND	ND	ND	4880.1	ND	ND	6851.600	962.8	ND	ND	ND	356.1

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	PB_D_LOAD2 grams/day	PB_D_LOAD3 grams/day	PB_D_LOAD4 grams/day	MN_T_LOAD1 grams/day	MN_T_LOAD2 grams/day	MN_T_LOAD4 grams/day	MN_D_LOAD1 grams/day	MN_D_LOAD2 grams/day	MN_D_LOAD3 grams/day	MN_D_LOAD4 grams/day	NI_T_LOAD1 grams/day	NI_D_LOAD1 grams/day
CC28	1271.80		826.768	118704.0	ND	ND	113308.3	196555.3		120835.307	BDL	BDL
CC29	ND	BDL		350.2	ND		324.2	ND	ND		BDL	BDL
CC29a			BDL			ND				ND		
CC30	1388.60	180.2	702.093	80560.1	ND	ND	80560.1	ND	ND	ND	BDL	BDL
CC30		180.2	702.093	82366.0	ND	ND	82366.0	ND	ND	ND	BDL	BDL
CC30d		ND		ND	ND		ND	ND	ND		ND	ND
CC31	1812.10			61223.9	ND		57822.6	ND			BDL	BDL
CC32	ND			1530.8	ND		1530.8	ND			BDL	BDL
CC32d		ND		ND	ND		ND	ND	ND		ND	ND
CC33	BDL			3.9	ND		BDL	ND			BDL	BDL
CC34	635.50			55745.1	ND		55745.1	ND			BDL	BDL
CC35	BDL			1884.2	ND		1413.1	ND			BDL	BDL
CC36	803.40		896.483	67537.2	ND	ND	57406.6	ND		ND	BDL	BDL
CC36d		ND		ND	ND		ND	ND	ND		ND	ND
CC37	ND	BDL	BDL	812.4	ND	ND	783.0	ND	ND	ND	BDL	BDL
CC37a			BDL			ND		ND		ND		
CC38	ND	BDL		992.5	ND		992.5	ND	ND		BDL	BDL
CC39	2031.00	180.4	1200.988	84876.6	ND	ND	84876.6	ND	ND	144118.512	BDL	BDL
CC40	ND			25693.5	ND		1815.7	ND			188.4	123.3
CC41	1537.20			98516.2	ND		89560.2	ND			BDL	BDL
CC42	BDL			2639.8	ND		2639.8	ND			BDL	BDL
CC43	1084.30		1036.549	98809.9	ND	ND	93869.4	232342.7		ND	BDL	BDL
CC44	BDL			1211.3	ND		1211.3	ND			BDL	BDL
CC44d		ND		ND	ND		ND	ND	ND		ND	ND
CC45	BDL			723.8	ND		709.6	ND			BDL	BDL
CC46	1168.20		1037.357	100843.3	ND	ND	100843.3	ND		ND	BDL	BDL
CC47	754.90	121.4	881.263	110893.1	ND	ND	105612.5	ND	ND	ND	BDL	BDL
CC48	1248.00	205.9	2104.420	86878.3	ND	ND	86878.3	ND	ND	157831.500	BDL	BDL
CC48-1	BDL	267.9	1052.210	51289.1	ND	ND	51289.1	ND	ND	ND	BDL	BDL
CC48-2	2565.20			116222.7	ND		111380.1	256519.0			BDL	BDL
CC48-3				90294.3			90294.3				BDL	BDL
CC48-4				94471.3			94471.3				BDL	BDL
CC48d		ND		ND	ND		ND	ND	ND		ND	ND
CC49	BDL	223.7		99793.6	ND		95041.5	259577.8	100510.53		BDL	BDL
CC49d		ND		ND	ND		ND	ND	ND		ND	ND
M01	ND	BDL		BDL	ND		BDL	ND	BDL		BDL	BDL
M02	ND	ND	21.362	20965.9	ND	ND	20965.9	ND	ND	2848.308	271.3	271.3
M02a			234.912			ND				ND		
M02b			2.912			ND				ND		
M02c			0.379			ND				ND		
M03	ND	5.2		214.7	ND		211.4	ND	65.85		BDL	BDL
M03a			1.135			ND				ND		
M04	BDL	7.5	BDL	3381.3	ND	ND	3381.3	ND	ND	3041.132	51.5	51.5
M05	BDL	10.7	BDL	3419.4	ND	ND	3419.4	4355.7	2026.12	2748.470	50.3	46.3
M06	BDL			55.2	ND		BDL	ND			BDL	BDL
M07	BDL			2672.1	ND		2672.1	5872.8			BDL	BDL
M07-1				5702.7			5197.4				BDL	BDL
M08	BDL			BDL	ND		BDL	ND			BDL	BDL
M09	BDL			26.0	ND		23.0	ND			BDL	BDL
M10	BDL	BDL		263.8	ND		239.8	ND	128.71		BDL	BDL
M11	BDL	142.8	BDL	2637.9	ND	ND	2637.9	ND	ND	ND	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SE_T_LOAD1 grams/day	SE_T_LOAD3 grams/day	SE_D_LOAD1 grams/day	SE_D_LOAD2 grams/day	SE_D_LOAD3 grams/day	AG_T_LOAD1 grams/day	AG_T_LOAD2 grams/day	AG_T_LOAD3 grams/day	AG_D_LOAD1 grams/day	AG_D_LOAD2 grams/day	AG_D_LOAD3 grams/day
CC28	ND		ND	BDL		43.2	ND		BDL	BDL	
CC29	ND	ND	ND	ND	ND	0.1	ND	ND	BDL	ND	BDL
CC29a											
CC30	ND	ND	ND	ND	BDL	13.4	ND	ND	BDL	BDL	BDL
CC30	BDL	ND	BDL	ND	BDL	18.7	ND	ND	BDL	BDL	BDL
CC30d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC31	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC32	ND		ND	ND		BDL	ND		BDL	ND	
CC32d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC33	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC34	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC35	BDL		BDL	ND		1.5	ND		BDL	BDL	
CC36	BDL		BDL	ND		10.1	ND		BDL	BDL	
CC36d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC37	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	ND	0.055
CC37a							ND				
CC38	BDL	ND	BDL	ND	ND	0.2	ND	ND	BDL	ND	0.004
CC39	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC40	34.3		BDL	ND		270.6	ND		1.0	ND	
CC41	62.7		BDL	ND		71.6	ND		BDL	BDL	
CC42	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC43	BDL		BDL	BDL		BDL	ND		BDL	BDL	
CC44	BDL		BDL	ND		BDL	ND		BDL	BDL	
CC44d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC45	ND		ND	ND		BDL	ND		BDL	BDL	
CC46	BDL		BDL	ND		15.9	ND		BDL	BDL	
CC47	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC48	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC48-1	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
CC48-2	BDL		BDL	BDL		BDL	ND		BDL	11.7	
CC48-3	BDL		BDL			BDL			BDL		
CC48-4	BDL		BDL			11.1			BDL		
CC48d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CC49	BDL	ND	BDL	BDL	BDL	BDL	ND	ND	BDL	BDL	BDL
CC49d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M01	BDL	ND	BDL	ND	BDL	BDL	ND	ND	BDL	ND	BDL
M02	BDL	ND	BDL	ND	ND	0.6	ND	ND	0.5	ND	ND
M02a											
M02b											
M02c											
M03	BDL	ND	BDL	ND	BDL	0.2	ND	ND	BDL	ND	BDL
M03a											
M04	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M05	BDL	ND	BDL	BDL	ND	0.4	ND	ND	BDL	BDL	BDL
M06	ND		ND	ND		BDL	ND		BDL	BDL	
M07	ND		ND	ND		BDL	ND		BDL	BDL	
M07-1	BDL		BDL			BDL			BDL		
M08	BDL		BDL	ND		BDL	ND		BDL	BDL	
M09	ND		ND	ND		BDL	ND		BDL	BDL	
M10	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M11	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	ZN_T_LOAD1 grams/day	ZN_T_LOAD2 grams/day	ZN_T_LOAD3 grams/day	ZN_T_LOAD4 grams/day	ZN_D_LOAD1 grams/day	ZN_D_LOAD2 grams/day	ZN_D_LOAD3 grams/day	ZN_D_LOAD4 grams/day
CC28	86330.2	ND		69957.283	86330.2	115620.8		69957.283
CC29	93.4	ND	ND		84.3	ND	56.3	
CC29a				ND				131.991
CC30	58182.3	ND	ND	ND	58182.3	115718.6	25742.4	64358.547
CC30	56158.7	ND	ND	ND	52414.7	115718.6	25742.4	64358.547
CC30d	ND	ND	ND		ND	ND	ND	
CC31	40816.0	ND			40816.0	144964.2		
CC32	153.1	ND			144.1	ND		
CC32d	ND	ND	ND		ND	ND	ND	
CC33	33.7	ND			BDL	BDL		
CC34	32273.5	ND			29339.5	55287.3		
CC35	584.1	371.9			527.6	316.2		
CC36	33768.6	77661.9		ND	32417.9	76769.2		69477.426
CC36d	ND	ND	ND		ND	ND	ND	
CC37	254.5	ND	ND	ND	244.7	ND	680.8	381.732
CC37a				ND				11.746
CC38	534.4	ND	ND		534.4	ND	25.4	
CC39	47153.7	ND	ND	75261.890	47153.7	186852.9	27563.0	88072.424
CC40	7536.8	ND			3425.8	ND		
CC41	43884.5	ND			42988.9	155428.5		
CC42	364.1	ND			297.4	235.3		
CC43	48910.9	130111.9		ND	48910.9	130111.9		67030.182
CC44	145.4	ND			145.4	305.4		
CC44d	ND	ND	ND		ND	ND	ND	
CC45	198.7	ND			198.7	146.0		
CC46	52544.7	140183.7		ND	52544.7	141852.6		70221.070
CC47	52806.3	ND	ND	ND	50694.0	119274.1	22817.8	69699.859
CC48	60194.2	164316.1	34069.6	91542.270	57712.0	164316.1	34069.6	86281.220
CC48-1	30452.9	166493.9	36705.0	88385.640	30452.9	162382.9	36705.0	83124.590
CC48-2	48426.1	167903.4			48426.1	167903.4		
CC48-3	39729.5				36117.7			
CC48-4	55571.4				54459.9			
CC48d	ND	ND	ND		ND	ND	ND	
CC49	44194.3	145762.9	31125.8		41818.3	145762.9	29828.9	
CC49d	ND	ND	ND		ND	ND	ND	
M01	BDL	ND	3.1		BDL	ND	1.3	
M02	221991.8	ND	ND	23735.900	221991.8	ND	ND	23735.900
M02a				ND				5637.888
M02b				ND				3083.220
M02c				ND				905.390
M03	1288.3	ND	429.4		1288.3	ND	439.0	
M03a				ND				333.526
M04	33812.6	ND	ND	26902.318	33812.6	75220.8	17385.9	26902.318
M05	34194.4	56623.6	16884.3	25194.312	34194.4	56623.6	16884.3	24049.116
M06	211.6	ND			170.2	1195.3		
M07	22140.5	54029.8			22140.5	51680.6		
M07-1	44755.6				44033.8			
M08	132.3	ND			132.3	472.4		
M09	18.2	ND			14.7	8.8		
M10	299.8	548.1	360.4		275.8	548.1	257.4	
M11	22421.9	ND	ND	ND	21102.9	75318.7	17133.9	22610.280

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

AS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SEGMENT	SUB_SEG	SITE	FLOW1 cfs	FLOW2 cfs	FLOW3 cfs	FLOW4 cfs	DATE1	DATE2	DATE3	DATE4	PH1	PH2	PH3	PH4
Mineral	adit blw beaver ponds	M11a				0.380				21-Jul-93				5.70
Mineral	Mineral abv Browns	M11b				38.230				21-Jul-93				5.63
Mineral	Browns	M12	0.315	2.900	0.080	0.410	09/05/91	06/23/92	14-Oct-92	21-Jul-93	3.85	4.70	3.55	3.36
Mineral	Browns Gl adit	M12a				0.024				21-Jul-93				3.75
Mineral	Browns abv adit	M12b				0.320				21-Jul-93				5.21
Mineral	Mineral	M13	7.630	66.800	4.650	31.370	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.31	6.65	6.2	5.22
Mineral	Filtered Dup.	M13d	7.630				09/05/91				ND			
Mineral	Mineral trib	M14	0.146	3.860			09/05/91	06/23/92			3.22	3.70		
Mineral	MF Mineral	M15	0.341	6.700	0.265		09/05/91	06/23/92	14-Oct-92		6.34	6.87	7.52	
Mineral	Filtered Dup.	M15d	0.341				09/05/91				ND			
Mineral	MF Mineral	M16	0.500	0.700	0.690		09/05/91	06/23/92	14-Oct-92		4.12	5.58	5.51	
Mineral	Filtered Dup.	M16d	0.500				09/05/91				ND			
Mineral	MF Mineral	M17	2.500	19.900	2.660		09/05/91	06/23/92	14-Oct-92		5.60	6.80	7.7	
Mineral	MF Mineral trib	M18	0.808	6.980			09/05/91	06/23/92			3.55	4.11		
Mineral	MF Mineral	M19	5.380	31.300			09/05/91	06/23/92			4.48	5.74		
Mineral	MF Mineral	M20	5.470	40.750		19.090	09/05/91	06/23/92		21-Jul-93	4.30	5.82		4.96
Mineral	Filtered Dup.	M20d	5.470				09/05/91				ND			
Mineral	MF Mineral-Bonner	M21	0.030	0.090	0.023	0.019	09/05/91	06/23/92	14-Oct-92	21-Jul-93	3.30	3.22	3.55	3.33
Mineral	MF Mineral adit	M21a				0.033				21-Jul-93				3.33
Mineral	MF Mineral	M22	5.880	42.060	3.090	17.490	09/05/91	06/23/92	14-Oct-92	21-Jul-93	4.10	5.72	3.55	5.19
Mineral	SF Mineral	M23	6.730	56.500			09/05/91	06/23/92			7.00	7.10		
Mineral	SF Mineral-Bandora	M24	0.050	0.023			09/05/91	06/23/92			6.40	7.04		
Mineral	SF Mineral	M25	8.420	67.780			09/05/91	06/23/92			6.90	7.13		
Mineral	SF Mineral-Clear Cr	M26	5.680	50.300			09/05/91	06/23/92			7.85	7.25		
Mineral	Mineral	M27	14.610	95.300	11.670		09/05/91	06/23/92	14-Oct-92		4.46	6.40	4.55	
Mineral	SF Mineral	M28	23.710	161.300	11.440	102.610	09/05/91	06/23/92	14-Oct-92	21-Jul-93	7.66	7.35	6.85	7.29
Mineral	Mineral	M29	42.310	283.600			09/05/91	06/23/92			6.71	6.95		
Mineral	Filtered Dup.	M29d	42.310				09/05/91				ND			
Mineral	Bear	M30	2.020	26.440			09/05/91	06/23/92			7.92	7.00		
Mineral	Mineral-N Star	M31	0.926	0.992	1.250	0.964	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.26	6.60	6.74	6.92
Mineral	Mineral	M32	36.900	ND	14.970	157.610	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.18	6.72	6.43	7.12
Mineral	Mineral	M33	37.750	ND	12.520	200.000	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.39	6.65	6.59	7.09
Mineral	Mineral Gaging Stn	M34	117.500	350.000	32.000	175.000	09/07/91	06/23/92	14-Oct-92	20-Jul-93	7.10	7.20	6	7.40
Mineral	Mineral Gaging Stn	M34-1	33.900	334.000	31.000	175.000	09/05/91	06/24/92	15-Oct-92	21-Jul-93	6.17	7.20	6.1	6.75
Mineral	Mineral Gaging Stn	M34-2	108.200	340.000			09/10/91	06/25/92			7.40	7.10		
Mineral	Mineral Gaging Stn	M34-3	112.210				09/09/91				6.75			
Mineral	Mineral Gaging Stn	M34-4	89.300				09/06/91				6.67			
Mineral	Mineral	M35	0.060	0.100		0.257	09/05/91	06/23/92		21-Jul-93	6.52	7.00		6.97
Mineral	Filtered Dup.	M35d	0.060				09/05/91				ND			
Mineral	Mineral adit	M36	0.135	0.037			09/05/91	06/23/92			6.59	7.14		
Mineral	Mineral adit	M37	0.035	0.080	0.037	05.580	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.47	6.83	7.34	7.04
Mineral	Mineral	M38	40.150	312.000	14.880	157.450	09/05/91	06/23/92	14-Oct-92	21-Jul-93	6.13	7.30	6.62	6.78
							32	29	16	19				

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TEMP1 deg C	TEMP2 deg C	TEMP3 deg C	TEMP4 deg C	COND1 umhos	COND4 umhos	AL_TOT1 ug/l	AL_TOT2 ug/l	AL_TOT3 ug/l	AL_TOT4 ug/l	AL_DIS1 ug/l	AL_DIS2 ug/l	AL_DIS3 ug/l	AL_DIS4 ug/l	CD_TOT1 ug/l	CD_TOT2 ug/l	CD_TOT3 ug/l	CD_TOT4 ug/l
M11a				9.94		557				ND				760.00				ND
M11b				11.28		159				ND				BDL				ND
M12	13.00	9.10	5	8.61	440	383	5800.0	ND	ND	ND	5800.0	1100.0	11000.0	3000.00	12.00	4.80	25.00	ND
M12a				7.22		687				ND				1900.00				ND
M12b				8.83		149				ND				1100.00				ND
M13	14.50	9.40	9	11.17	300	164	640.0	ND	ND	ND	66.0	BDL	61.0	BDL	5.00	ND	ND	ND
M13d	0.00				0		ND				110.0				ND			
M14	10.50	11.00			460		18000.0	ND			17000.0	2700.0			1.20	ND		
M15	12.22	7.00	9.5		199		1600.0	ND	ND		870.0	62.0	1200.0		BDL	ND	ND	
M15d	0.00				0		ND				1000.0				ND			
M16	12.78	0.00	5		0		21000.0	ND	ND		19000.0	9300.0	13000.0		0.50	BDL	ND	
M16d	0.00				0		ND				21000.0				ND			
M17	10.56	0.00	5.5		1180		6100.0	ND	ND		BDL	180.0	2800.0		0.50	ND	ND	
M18	19.44	5.60			0		52000.0	ND			52000.0	9500.0			3.70	ND		
M19	20.00	7.40			0		13000.0	ND			13000.0	1200.0			0.80	ND		
M20	10.00	10.30		9.50	950	425	14000.0	ND		ND	10000.0	370.0		2000.00	0.80	ND		ND
M20d	0.00				0		ND				10000.0				ND			
M21	4.00	5.30	5	5.40	805	809	5600.0	ND	ND	ND	5000.0	4700.0	8000.0	5000.00	10.00	ND	ND	ND
M21a				4.40		658				ND				4200.00				ND
M22	11.50	11.20	6	9.00	930	426	12000.0	ND	ND	ND	9500.0	2200.0	11000.0	1900.00	0.90	0.36	0.96	ND
M23	9.00	0.00			167		220.0	ND			BDL	BDL			BDL	ND		
M24	13.00	65.00			476		170.0	ND			140.0	BDL			34.00	ND		
M25	10.10	0.00			170		160.0	ND			130.0	BDL			0.50	ND		
M26	10.10	0.00			126		BDL	ND			BDL	BDL			BDL	ND		
M27	11.00	9.00	2		626		4800.0	ND	ND		4300.0	140.0	5200.0		4.00	1.60	2.90	
M28	12.70	12.00	5	7.60	217	125	280.0	ND	ND	ND	87.0	77.0	61.0	98.00	BDL	BDL	BDL	ND
M29	9.50	11.00			360		2000.0	ND			BDL	53.0			1.40	ND		
M29d	0.00				0		ND				BDL				ND			
M30	6.80	66.00			162		BDL	ND			BDL	BDL			BDL	ND		
M31	14.00	65.50	6	8.00	580	807	480.0	ND	ND	ND	BDL	79.0	BDL	BDL	2.70	5.20	2.40	ND
M32	14.00	61.50	6	6.20	260	168	2000.0	ND	ND	ND	BDL	82.0	250.0	ND	1.10	0.71	1.20	ND
M33	14.00	64.50	6.5	5.10	270	169	1800.0	ND	ND	ND	BDL	BDL	ND	ND	1.30	ND	ND	ND
M34	7.00	8.00	3	6.50	225	173	1400.0	ND	ND	ND	71.0	BDL	BDL	BDL	0.80	0.74	1.40	0.430
M34-1	13.00	7.00	6.5	12.00	240	195	2200.0	ND	ND	ND	BDL	BDL	BDL	BDL	1.30	0.90	1.30	0.570
M34-2	9.85	4.00			207		1200.0				75.0				0.60			
M34-3	5.80				220		900.0				BDL				0.80			
M34-4	9.50				270		3000.0				670.0				1.20			
M35	18.00	20.80		13.60	235	394	180.0	ND		ND	130.0	130.0		100.00	1.00	ND		ND
M35d	0.00				0		ND				130.0				ND			
M36	7.00	12.40			210		52.0	ND			BDL	BDL			0.50	0.74		
M37	9.10	13.00	6.5	9.50	500	914	500.0	ND	ND	ND	BDL	72.0	BDL	120.00	1.10	ND	ND	ND
M38	10.50	15.30	10	10.30	235	205	1900.0	ND	ND	ND	BDL	60.0	BDL	BDL	1.10	0.66	1.20	ND

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_DIS1 ug/l	CD_DIS2 ug/l	CD_DIS3 ug/l	CD_DIS4 ug/l	CHROM_T_1 ug/l	CHROM_D_1 ug/l	COPPER1TOT ug/l	COPPER2TOT ug/l	COPPER3TOT ug/l	COPPER4TOT ug/l	COPPER1DIS ug/l	COPPER2DIS ug/l	COPPER3DIS ug/l	COPPER4DIS ug/l
M11a				1.210						ND				8.00
M11b				1.280						ND				29.00
M12	12.00	4.30	23.00	11.000	BDL	BDL	100.0	42.0	240.0	ND	100.0	42.0	230.0	110.00
M12a				20.000						ND				540.00
M12b				0.390						ND				8.00
M13	5.00	2.60	5.50	1.550	BDL	BDL	300.0	ND	ND	ND	190.0	34.0	140.0	27.00
M13d	5.00				ND	BDL	ND				190.0			
M14	1.20	0.39			BDL	BDL	180.0	ND			170.0	38.0		
M15	BDL	BDL	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
M15d	BDL				ND	BDL	ND				BDL			
M16	0.30	BDL	BDL		BDL	BDL	BDL	0.0	ND		BDL	BDL	BDL	
M16d	BDL				ND	BDL	ND				BDL			
M17	0.30	BDL	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
M18	3.70	0.87			BDL	BDL	30.0	ND			30.0	9.0		
M19	0.80	0.37			BDL	BDL	8.0	ND			7.0	BDL		
M20	0.80	0.25		0.300	BDL	BDL	6.0	ND		ND	5.0	BDL		4.00
M20d	0.80				ND	BDL	ND				5.0			
M21	10.00	5.90	15.00	9.540	BDL	BDL	58.0	ND	ND	ND	50.0	52.0	170.0	75.00
M21a				1.580						ND				65.00
M22	0.90	0.39	1.00	0.360	BDL	BDL	10.0	0.0	12.0	ND	9.0	4.0	BDL	4.00
M23	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
M24	32.00	62.00			BDL	BDL	99.0	ND			94.0	17.0		
M25	0.50	BDL			BDL	BDL	BDL	ND			BDL	BDL		
M26	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
M27	3.20	1.60	2.90		BDL	BDL	200.0	72.0	120.0		190.0	34.0	100.0	
M28	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
M29	1.40	0.66			BDL	BDL	82.0	ND			31.0	10.0		
M29d	1.40				ND	BDL	ND				30.0			
M30	BDL	BDL			BDL	BDL	BDL	ND			BDL	BDL		
M31	2.20	4.90	2.10	4.630	BDL	BDL	120.0	250.0	130.0	ND	BDL	42.0	10.0	28.00
M32	1.00	0.64	1.20	ND	BDL	BDL	60.0	26.0	47.0	ND	8.0	10.0	19.0	ND
M33	1.20	0.58	1.20	ND	BDL	BDL	60.0	ND	ND	ND	9.0	7.0	20.0	ND
M34	0.80	0.75	1.30	0.420	BDL	BDL	58.0	8.0	55.0	35.00	BDL	8.0	16.0	BDL
M34-1	1.30	0.77	1.30	0.430	BDL	BDL	80.0	29.0	54.0	16.00	10.0	7.0	16.0	BDL
M34-2	0.60				BDL	BDL	31.0				BDL			
M34-3	0.60				BDL	BDL	25.0				5.0			
M34-4	1.10				BDL	BDL	93.0				25.0			
M35	0.90	0.82		0.390	BDL	BDL	32.0	ND		ND	23.0	15.0		15.00
M35d	0.90				ND	BDL	ND				22.0			
M36	0.40	0.55			BDL	BDL	33.0	52.0			5.0	BDL		
M37	0.90	30.00	3.00	18.000	BDL	BDL	32.0	ND	ND	ND	BDL	76.0	BDL	26.00
M38	1.10	0.76	1.20	0.430	BDL	BDL	63.0	23.0	47.0	ND	5.0	5.0	10.0	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	IRON_TOT1 ug/l	IRON_TOT2 ug/l	IRON_TOT3 ug/l	IRON_TOT4 ug/l	IRON_DIS1 ug/l	IRON_DIS2 ug/l	IRON_DIS3 ug/l	IRON_DIS4 ug/l	LEAD_TOT1 ug/l	LEAD_TOT2 ug/l	LEAD_TOT3 ug/l	LEAD_TOT4 ug/l	LEAD_DIS1 ug/l	LEAD_DIS2 ug/l	LEAD_DIS3 ug/l
M11a				ND				10000.00				ND			
M11b				ND				22.00				ND			
M12	1300.0	1200.0	1700.0	ND	1100.0	ND	ND	580.00	23.0	BDL	24.0	ND	12.0	BDL	25.0
M12a				ND				11000.00				ND			
M12b				ND				140.00				ND			
M13	920.0	ND	ND	ND	150.0	ND	ND	22.00	53.0	ND	ND	ND	7.0	BDL	BDL
M13d	ND				210.0				ND				11.0		
M14	3900.0	ND			3700.0	ND			BDL	ND			BDL	BDL	
M15	1700.0	ND	ND		980.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
M15d	ND				1100.0				ND				BDL		
M16	69000.0	54000.0	ND		69000.0	ND	ND		BDL	BDL	ND		BDL	BDL	BDL
M16d	ND				69000.0				ND				BDL		
M17	17000.0	ND	ND		17000.0	ND	ND		BDL	ND	ND		BDL	BDL	BDL
M18	70000.0	ND			69000.0	ND			BDL	ND			BDL	BDL	
M19	23000.0	ND			23000.0	ND			BDL	ND			BDL	BDL	
M20	20000.0	ND		ND	16000.0	ND		6000.00	BDL	ND		ND	BDL	BDL	
M20d	ND				15000.0				ND				BDL		
M21	13000.0	ND	ND	ND	12000.0	ND	ND	13000.00	26.0	ND	ND	ND	26.0	22.0	28.0
M21a				ND				11000.00				ND			
M22	19000.0	4200.0	23000.0	ND	14000.0	ND	ND	5800.00	BDL	BDL	BDL	ND	BDL	BDL	BDL
M23	39.0	ND			10.0	ND			BDL	ND			BDL	BDL	
M24	31.0	ND			15.0	ND			BDL	ND			BDL	BDL	
M25	70.0	ND			52.0	ND			BDL	ND			BDL	BDL	
M26	18.0	ND			BDL	ND			BDL	ND			BDL	BDL	
M27	5700.0	2100.0	9500.0		4200.0	ND	ND		31.0	6.0	18.0		23.0	BDL	13.0
M28	600.0	160.0	1100.0	ND	330.0	ND	ND	130.00	BDL	BDL	BDL	ND	BDL	BDL	BDL
M29	2400.0	ND			1300.0	ND			12.0	ND			BDL	BDL	
M29d	ND				1300.0				ND				BDL		
M30	640.0	ND			70.0	ND			BDL	ND			BDL	BDL	
M31	3800.0	5500.0	4700.0	ND	12.0	ND	ND	1200.00	30.0	20.0	14.0	ND	BDL	BDL	BDL
M32	2500.0	840.0	4700.0	ND	750.0	ND	ND	ND	10.0	BDL	8.5	ND	BDL	BDL	BDL
M33	2400.0	ND	ND	ND	670.0	ND	ND	ND	9.0	ND	ND	ND	BDL	BDL	BDL
M34	2600.0	190.0	4800.0	910.00	440.0	130.0	3400.0	400.00	12.0	BDL	9.3	BDL	BDL	BDL	BDL
M34-1	2900.0	970.0	4500.0	900.00	900.0	ND	3100.0	280.00	13.0	7.0	7.4	BDL	BDL	BDL	BDL
M34-2	1600.0				500.0				6.0				BDL		
M34-3	1400.0				610.0				5.0				BDL		
M34-4	4400.0				1400.0				19.0				BDL		
M35	33.0	ND		ND	BDL	ND		BDL	BDL	ND		ND	BDL	BDL	
M35d	ND				BDL				ND				BDL		
M36	810.0	1100.0			51.0	ND			BDL	BDL			BDL	BDL	
M37	3800.0	ND	ND	ND	22.0	ND	BDL	52.00	BDL	ND	ND	ND	BDL	BDL	ND
M38	2500.0	820.0	4500.0	ND	760.0	ND	3100.0	320.00	11.0	BDL	7.1	ND	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	LEAD_DIS4 ug/l	MN_TOT1 ug/l	MN_TOT2 ug/l	MN_TOT4 ug/l	MN_DIS1 ug/l	MN_DIS2 ug/l	MN_DIS3 ug/l	MN_DIS4 ug/l	NICKEL1TOT ug/l	NICKEL1DIS ug/l	SE_TOT_1 ug/l	SE_TOT_3 ug/l	SE_DIS1 ug/l	SE_DIS2 ug/l	SE_DIS3 ug/l	SILVER1TOT ug/l
M11a	BDL			ND				ND								
M11b	BDL			ND				ND								
M12	7.00	3600.0	ND	ND	3600.0	ND	6700.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M12a	14.00			ND				ND								
M12b	BDL			ND				ND								
M13	BDL	380.0	ND	ND	370.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M13d		ND			360.0				ND	BDL	ND		ND			ND
M14		720.0	ND		690.0	ND			22.0	20.0	BDL		BDL	ND		BDL
M15		130.0	ND		120.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
M15d		ND			120.0				ND	BDL	ND		ND			ND
M16		5600.0	ND		5600.0	4500.0	5500.0		BDL	BDL	BDL	ND	BDL	BDL	ND	0.20
M16d		ND			5600.0				ND	BDL	ND		ND			ND
M17		1500.0	ND		1500.0	ND	ND		BDL	BDL	ND	ND	ND	ND	ND	BDL
M18		1800.0	ND		1700.0	ND			31.0	28.0	BDL		BDL	ND		BDL
M19		1300.0	ND		1300.0	ND			BDL	BDL	ND		ND	ND		BDL
M20	BDL	1100.0	ND	ND	1100.0	ND		ND	BDL	BDL	BDL		BDL	ND		BDL
M20d		ND			1100.0				ND	BDL	ND		ND			ND
M21	19.00	2700.0	ND	ND	2400.0	1900.0	ND	ND	BDL	BDL	ND	ND	ND	BDL	ND	BDL
M21a	BDL			ND				ND								
M22	BDL	1200.0	ND	ND	1200.0	240.0	1300.0	ND	BDL	BDL	BDL	ND	BDL	BDL	ND	BDL
M23		28.0	ND		26.0	ND			BDL	BDL	ND		ND	ND		BDL
M24		250.0	ND		240.0	ND			BDL	BDL	ND		ND	ND		BDL
M25		27.0	ND		24.0	25.0			BDL	BDL	ND		ND	BDL		BDL
M26		BDL	ND		BDL	ND			BDL	BDL	ND		ND	ND		BDL
M27		700.0	ND		700.0	ND	860.0		BDL	BDL	BDL	BDL	BDL	ND	BDL	BDL
M28	BDL	18.0	ND	ND	18.0	9.0	24.0	ND	BDL	BDL	ND	ND	ND	BDL	ND	BDL
M29		290.0	ND		290.0	ND			BDL	BDL	BDL		BDL	ND		BDL
M29d		ND			290.0				ND	BDL	ND		ND			ND
M30		7.0	ND		4.0	ND			BDL	BDL	BDL		BDL	ND		BDL
M31	BDL	2200.0	ND	ND	2100.0	ND	2200.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M32	ND	260.0	ND	ND	260.0	ND	370.0	ND	BDL	BDL	ND	ND	ND	ND	ND	BDL
M33	ND	310.0	ND	ND	310.0	ND	ND	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M34	BDL	180.0	ND	ND	170.0	74.0	410.0	ND	BDL	BDL	ND	ND	ND	BDL	ND	BDL
M34-1	BDL	330.0	ND	ND	330.0	ND	420.0	110.00	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M34-2		170.0			160.0				BDL	BDL	ND		ND			BDL
M34-3		150.0			150.0				BDL	BDL	ND		ND			BDL
M34-4		260.0			250.0				BDL	BDL	BDL		BDL			BDL
M35	BDL	1400.0	ND	ND	1300.0	ND		ND	BDL	BDL	ND		ND	ND		BDL
M35d		ND			1300.0				ND	BDL	ND		ND			ND
M36		130.0	ND		120.0	ND			BDL	BDL	1.0		BDL	ND		BDL
M37	BDL	10000.0	ND	ND	10000.0	ND	8100.0	ND	BDL	BDL	BDL	ND	BDL	ND	ND	BDL
M38	BDL	290.0	ND	ND	290.0	ND	400.0	ND	BDL	BDL	BDL	ND	BDL	ND	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SILVER2TOT ug/l	SILVER3TOT ug/l	SILVER1DIS ug/l	SILVER2DIS ug/l	SILVER3DIS ug/l	ZINC_TOT1 ug/l	ZINC_TOT2 ug/l	ZINC_TOT3 ug/l	ZINC_TOT4 ug/l	ZINC_DIS1 ug/l	ZINC_DIS2 ug/l	ZINC_DIS3 ug/l	ZINC_DIS4 ug/l
M11a									ND				400.00
M11b									ND				340.00
M12	ND	ND	BDL	BDL	BDL	2500.0	700.0	5700.0	ND	2500.0	700.0	5600.0	2200.00
M12a									ND				7300.00
M12b									ND				61.00
M13	ND	ND	BDL	BDL	0.23	1500.0	ND	ND	ND	1500.0	490.0	1700.0	360.00
M13d			BDL			ND				1500.0			
M14	ND		BDL	BDL		100.0	ND			100.0	22.0		
M15	ND	ND	BDL	BDL	BDL	19.0	ND	ND		15.0	BDL	20.0	
M15d			BDL			ND				15.0			
M16	ND	ND	0.20	BDL	0.25	600.0	450.0	ND		600.0	450.0	580.0	
M16d			BDL			ND				600.0			
M17	ND	ND	BDL	BDL	BDL	170.0	ND	ND		170.0	25.0	230.0	
M18	ND		BDL	BDL		330.0	ND			330.0	110.0		
M19	ND		BDL	BDL		170.0	ND			170.0	83.0		
M20	ND		BDL	BDL		160.0	ND		ND	150.0	31.0		57.00
M20d			BDL			ND				150.0			
M21	ND	ND	BDL	BDL	BDL	2200.0	ND	ND	ND	2100.0	1100.0	2500.0	1900.00
M21a									ND				240.00
M22	ND	ND	BDL	BDL	BDL	190.0	48.0	210.0	ND	180.0	47.0	210.0	68.00
M23	ND		BDL	BDL		13.0	ND			13.0	BDL		
M24	ND		BDL	BDL		7900.0	ND			7700.0	18000.0		
M25	ND		BDL	BDL		95.0	ND			95.0	45.0		
M26	ND		BDL	BDL		BDL	ND			BDL	BDL		
M27	ND	ND	BDL	BDL	0.28	920.0	340.0	860.0		920.0	340.0	840.0	
M28	ND	ND	BDL	BDL	BDL	13.0	12.0	19.0	ND	9.0	11.0	17.0	10.00
M29	ND		BDL	BDL		420.0	ND			420.0	120.0		
M29d			BDL			ND				420.0			
M30	ND		BDL	BDL		BDL	ND			BDL	13.0		
M31	ND	ND	BDL	BDL	BDL	660.0	840.0	580.0	ND	490.0	770.0	500.0	800.00
M32	ND	ND	BDL	BDL	BDL	330.0	120.0	370.0	ND	300.0	110.0	380.0	ND
M33	ND	ND	BDL	BDL	BDL	340.0	ND	ND	ND	320.0	110.0	350.0	ND
M34	ND	ND	BDL	BDL	BDL	240.0	94.0	400.0	120.00	220.0	110.0	390.0	160.00
M34-1	ND	ND	BDL	BDL	BDL	390.0	150.0	390.0	120.00	360.0	120.0	370.0	100.00
M34-2			BDL			200.0				180.0			
M34-3			BDL			180.0				160.0			
M34-4			BDL			330.0				280.0			
M35	ND		BDL	BDL		120.0	ND		ND	110.0	81.0		67.00
M35d			BDL			ND				110.0			
M36	ND		BDL	BDL		90.0	110.0			57.0	65.0		
M37	ND	ND	BDL	BDL	BDL	1200.0	ND	ND	ND	900.0	4000.0	850.0	2800.00
M38	ND	ND	BDL	BDL	BDL	350.0	130.0	350.0	ND	320.0	110.0	340.0	95.00

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AS_DIS1 ug/l	AS_DIS2 ug/l	AS_TOT3 ug/l	AS_DIS3 ug/l	AS_TOT4 ug/l	AS_DIS4 ug/l	CYANIDE1 mg/l	CYANIDE2 mg/l	CYANIDE3 mg/l	CYANIDE4 mg/l	ALK1 mg/l	ALK2 mg/l	HARD1 mg/l	HARD2 mg/l	HARD3 mg/l	HARD4 mg/l
M11a					ND	ND				ND						186
M11b					ND	ND				ND						53
M12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	166.63	47.0	259.96	118
M12a					ND	ND				ND						306
M12b					ND	ND				ND						59
M13	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	129.47	44.0	212.35	55
M13d	ND						ND				ND		ND			
M14	ND	ND					ND	ND			ND	ND	72.22	18.0		
M15	ND	ND	ND	ND			ND	ND	ND		ND	ND	41.82	14.0	60.35	
M15d	ND						ND				ND		ND			
M16	BDL	BDL	ND	ND			ND	ND	ND		ND	ND	995.88	970.0	ND	
M16d	ND						ND				ND		ND			
M17	ND	ND	ND	ND			ND	ND	ND		ND	ND	423.50	100.0	571.73	
M18	ND	ND					ND	ND			ND	ND	218.19	62.0		
M19	ND	ND					ND	ND			ND	ND	365.27	110.0		
M20	ND	ND			ND	ND	ND	ND		ND	ND	ND	255.27	110.0		171
M20d	ND						ND				ND		ND			
M21	ND	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	161.40	ND	ND	223
M21a					ND	ND				ND						169
M22	BDL	1.20	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	325.27	110.0	447.61	171
M23	ND	ND					ND	ND			ND	ND	49.93	29.0		
M24	ND	ND					ND	ND			ND	ND	125.88	ND		
M25	ND	BDL					ND	ND			ND	ND	52.11	31.0		
M26	ND	ND					ND	ND			ND	ND	47.76	22.0		
M27	BDL	ND	2.70	BDL			BDL	ND	ND		ND	ND	195.51	63.0	337.04	
M28	ND	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	61.05	48.0	132.35	51
M29	ND	ND					ND	ND			ND	ND	134.81	51.0		
M29d	ND						ND				ND		ND			
M30	ND	ND					ND	ND			ND	ND	56.64	43.0		
M31	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	307.61	ND	415.84	386
M32	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	134.81	52.0	204.69	
M33	BDL	ND	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND	156.05	50.0	204.69	
M34	ND	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.0	74.88	57.0	204.69	71
M34-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL	ND	ND	148.11	54.0	204.69	71
M34-2	ND						ND				ND		82.88			
M34-3	ND						ND				ND		102.58			
M34-4	BDL						ND				ND		123.58			
M35	ND	ND			ND	ND	ND	ND		ND	ND	ND	151.69	ND		152
M35d	ND						ND				ND		ND			
M36	BDL	ND					ND	ND			ND	ND	165.88	ND		
M37	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	405.27	ND	ND	402
M38	BDL	ND	ND	BDL	ND	ND	BDL	ND	ND	ND	ND	ND	115.64	51.0	204.69	64

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	TSS_1 mg/l	TSS_2 mg/l	TSS_3 mg/l	TSS-4 mg/l	HG_1 ug/l	HG_2 ug/l	HG_3 ug/l	HG_4 ug/l
M11a								ND
M11b								ND
M12					ND	ND	ND	ND
M12a								ND
M12b								ND
M13					ND	ND	ND	ND
M13d					ND			
M14					ND	ND		
M15	BDL				ND	ND	ND	
M15d					ND			
M16	BDL				ND	ND	ND	
M16d					ND			
M17					ND	ND	ND	
M18					ND	ND		
M19					ND	ND		
M20	BDL				ND	ND		ND
M20d					ND			
M21					ND	ND	ND	ND
M21a								ND
M22					ND	BDL	ND	ND
M23					ND	ND		
M24					ND	ND		
M25					ND	ND		
M26					ND	ND		
M27					BDL	ND	BDL	
M28					ND	BDL	ND	ND
M29					ND	ND		
M29d					ND			
M30					ND	ND		
M31					ND	ND	ND	ND
M32					ND	ND	ND	ND
M33	BDL				BDL	ND	ND	ND
M34				BDL	ND	BDL	ND	ND
M34-1	18.0				ND	ND	ND	BDL
M34-2					ND			
M34-3					ND			
M34-4					ND			
M35	BDL				ND	ND		ND
M35d					ND			
M36					ND	ND		
M37					ND	ND	ND	ND
M38			21		BDL	ND	BDL	ND

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	AL_T_LOAD1 grams/day	AL_T_LOAD3 grams/day	AL_T_LOAD4 grams/day	AL_D_LOAD1 grams/day	AL_D_LOAD2 grams/day	AL_D_LOAD3 grams/day	AL_D_LOAD4 grams/day	CD_T_LOAD1 grams/day	CD_T_LOAD2 grams/day	CD_T_LOAD3 grams/day	CD_T_LOAD4 grams/day	CD_D_LOAD1 grams/day	CD_D_LOAD2 grams/day
M11a			ND				706.694				ND		
M11b			ND				BDL				ND		
M12	4470.7	ND	ND	4470.7	7805.9	2153.36	3009.810	9.2	34.1	4.89	ND	9.2	30.5
M12a			ND				111.583				ND		
M12b			ND				861.344				ND		
M13	11949.2	ND	ND	1232.3	BDL	694.09	BDL	93.4	ND	ND	ND	93.4	425.0
M13d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M14	6430.7			6073.5	25502.6			0.4	ND			0.4	3.7
M15	1335.1	ND		726.0	1016.5	778.15		BDL	ND	ND		BDL	BDL
M15d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M16	25693.5	ND		23246.5	15930.0	21949.59		0.6	BDL	ND		0.6	BDL
M16d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M17	37316.8	ND		BDL	8765.2	18225.26		3.1	ND	ND		3.1	BDL
M18	102813.2			102813.2	162260.6			7.3	ND			7.3	14.9
M19	171143.2			171143.2	91909.3			10.5	ND			10.5	28.3
M20	187391.3		ND	133850.9	36894.6		93426.460	10.7	ND		ND	10.7	24.9
M20d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M21	411.1	ND	ND	367.1	1035.1	450.25	232.465	0.7	ND	ND	ND	0.7	1.3
M21a			ND				339.154				ND		
M22	172660.3	ND	ND	136689.4	226425.8	83173.53	81316.257	12.9	37.1	7.26	ND	12.9	40.1
M23	3623.0			BDL	BDL			BDL	ND			BDL	BDL
M24	20.8			17.1	BDL			4.2	ND			4.2	3.5
M25	3296.6			2678.5	BDL			10.3	ND			10.3	BDL
M26	BDL			BDL	BDL			BDL	ND			BDL	BDL
M27	171603.2	ND		153727.9	32647.9	148493.75		143.0	373.1	82.81		143.0	373.1
M28	16245.1	ND	ND	5047.6	30392.0	1707.61	24606.494	BDL	BDL	BDL	ND	BDL	BDL
M29	207065.1			BDL	36780.4			144.9	ND			144.9	458.0
M29d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M30	BDL			BDL	BDL			BDL	ND			BDL	BDL
M31	1087.6	ND	ND	BDL	191.8	BDL	BDL	6.1	12.6	7.34	ND	6.1	11.9
M32	180588.6	ND	ND	BDL	ND	9157.90	ND	99.3	ND	43.96	ND	99.3	ND
M33	166273.7	ND	ND	BDL	ND	ND	ND	120.1	ND	ND	ND	120.1	ND
M34	402531.5	ND	ND	20414.1	BDL	BDL	BDL	230.0	633.8	109.63	184.137	230.0	642.3
M34-1	182497.3	ND	ND	BDL	BDL	BDL	BDL	107.8	735.6	98.61	244.088	107.8	629.3
M34-2	317718.5			19857.4	ND			158.9	ND			158.9	ND
M34-3	247120.1			BDL				219.7				219.7	
M34-4	655551.3			146406.5				262.2				262.2	
M35	26.4		ND	19.1	31.8		62.888	0.1	ND		ND	0.1	0.2
M35d	ND	ND		ND	ND	ND		ND	ND	ND		ND	ND
M36	17.2			BDL	BDL			0.2	0.1			0.2	.049
M37	42.8	ND	ND	BDL	14.1	BDL	1638.511	.001	ND	ND	ND	.001	.059
M38	186669.4	ND	ND	BDL	45807.8	BDL	BDL	108.1	503.9	43.69	ND	108.1	580.2

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	CD_D_LOAD3 grams/day	CD_D_LOAD4 grams/day	CR_T_LOAD1 grams/day	CR_D_LOAD1 grams/day	CU_T_LOAD1 grams/day	CU_T_LOAD2 grams/day	CU_T_LOAD3 grams/day	CU_T_LOAD4 grams/day	CU_D_LOAD1 grams/day	CU_D_LOAD2 grams/day	CU_D_LOAD3 grams/day	CU_D_LOAD4 grams/day
M11a		1.125						ND				7.439
M11b		119.742						ND				2712.915
M12	4.50	11.036	BDL	BDL	77.1	298.0	46.98	ND	77.1	298.0	45.02	110.360
M12a		1.175						ND				31.713
M12b		0.305						ND				6.264
M13	62.58	118.982	BDL	BDL	5601.2	ND	ND	ND	3547.4	5557.6	1593.00	2072.585
M13d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M14			BDL	BDL	64.3	ND			60.7	358.9		
M15	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
M15d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M16	BDL		BDL	BDL	BDL	BDL	ND		BDL	BDL	BDL	
M16d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M17	BDL		BDL	BDL	BDL	ND	ND		BDL	BDL	BDL	
M18			BDL	BDL	59.3	ND			59.3	153.7		
M19			BDL	BDL	105.3	ND			92.2	BDL		
M20		14.014	BDL	BDL	80.3	ND		ND	66.9	BDL		186.853
M20d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M21	0.84	0.444	BDL	BDL	4.3	ND	ND	ND	3.7	11.5	9.57	3.487
M21a		0.128						ND				5.249
M22	7.56	15.407	BDL	BDL	143.9	BDL	90.73	ND	129.5	411.7	BDL	171.192
M23			BDL	BDL	BDL	ND			BDL	BDL		
M24			BDL	BDL	12.1	ND			11.5	1.0		
M25			BDL	BDL	BDL	ND			BDL	BDL		
M26			BDL	BDL	BDL	ND			BDL	BDL		
M27	82.81		BDL	BDL	7150.1	16790.3	3426.78		6792.6	7928.8	2855.65	
M28	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND	BDL	BDL	BDL	BDL
M29			BDL	BDL	8489.7	ND			3209.5	6939.7		
M29d	ND		ND	ND	ND	ND	ND		ND	ND	ND	
M30			BDL	BDL	BDL	ND			BDL	BDL		
M31	6.42	10.922	BDL	BDL	271.9	606.9	397.64	ND	BDL	102.0	30.59	66.049
M32	43.96	ND	BDL	BDL	5417.7	ND	1721.68	ND	722.4	ND	696.00	ND
M33	36.76	ND	BDL	BDL	5542.5	ND	ND	ND	831.4	ND	612.73	ND
M34	101.80	179.855	BDL	BDL	16676.3	6851.6	4306.72	14987.875	BDL	6851.6	1252.86	BDL
M34-1	98.61	184.137	BDL	BDL	6636.3	23701.6	4096.28	6851.600	829.5	5721.1	1213.71	BDL
M34-2			BDL	BDL	8207.7	ND			ND	ND		
M34-3			BDL	BDL	6864.4				1372.9			
M34-4			BDL	BDL	20322.1				5462.9			
M35		0.245	BDL	BDL	4.7	ND		ND	3.4	3.7		9.433
M35d	ND		ND	BDL	ND	ND	ND		ND	ND	ND	
M36			BDL	BDL	10.9	4.7			1.7	BDL		
M37	00.27	245.777	BDL	BDL	02.7	ND	ND	ND	BDL	014.9	BDL	355.011
M38	43.69	165.670	BDL	BDL	6189.6	17559.7	1711.33	ND	491.2	3817.3	364.11	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	FE_T_LOAD1 grams/day	FE_T_LOAD2 grams/day	FE_T_LOAD3 grams/day	FE_T_LOAD4 grams/day	FE_D_LOAD1 grams/day	FE_D_LOAD2 grams/day	FE_D_LOAD3 grams/day	FE_D_LOAD4 grams/day	PB_T_LOAD1 grams/day	PB_T_LOAD2 grams/day	PB_T_LOAD3 grams/day	PB_T_LOAD4 grams/day	PB_D_LOAD1 grams/day
M11a				ND				9298.600				ND	
M11b				ND				2058.074				ND	
M12	1002.0	8515.6	332.79	ND	847.9	ND	ND	581.897	17.7	BDL	4.7	ND	9.2
M12a				ND				646.008				ND	
M12b				ND				109.626				ND	
M13	17177.0	ND	ND	ND	2800.6	ND	ND	1688.773	989.5	ND	ND	ND	130.7
M13d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M14	1393.3	ND	ND		1321.9	ND			BDL	ND			BDL
M15	1418.5	ND	ND		817.7	ND	ND		BDL	ND	ND		BDL
M15d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M16	84421.5	92496.6	ND		84421.5	ND	ND		BDL	BDL	ND		BDL
M16d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M17	103997.5	ND	ND		103997.5	ND	ND		BDL	ND	ND		BDL
M18	138402.3	ND			136425.1	ND			BDL	ND			BDL
M19	302791.8	ND			302791.8	ND			BDL	ND			BDL
M20	267701.8	ND		ND	214161.4	ND		280279.380	BDL	ND		ND	BDL
M20d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M21	954.3	ND	ND	ND	880.9	ND	ND	604.409	1.9	ND	ND	ND	1.9
M21a				ND				888.261				ND	
M22	273378.8	432267.4	173908.29	ND	201437.0	ND	ND	248228.574	BDL	BDL	BDL	ND	BDL
M23	642.3	ND			164.7	ND			BDL	ND			BDL
M24	3.8	ND			1.8	ND			BDL	ND			BDL
M25	1442.3	ND			1071.4	ND			BDL	ND			BDL
M26	250.2	ND			BDL	ND			BDL	ND			BDL
M27	203778.8	489718.1	271286.66		150152.8	ND	ND		1108.3	1399.2	514.0		822.3
M28	34811.0	63152.2	30793.05	ND	19146.1	ND	ND	32641.267	BDL	BDL	BDL	ND	BDL
M29	248478.2	ND			134592.3	ND			1242.4	ND			BDL
M29d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M30	3163.5	ND			346.0	ND			BDL	ND			BDL
M31	8610.5	13350.8	14376.13	ND	27.2	ND	ND	2830.690	68.0	48.5	42.8	ND	BDL
M32	225735.8	ND	172168.47	ND	67720.7	ND	ND	ND	902.9	ND	311.4	ND	BDL
M33	221698.2	ND	ND	ND	61890.7	ND	ND	ND	831.4	ND	ND	ND	BDL
M34	747558.5	162725.5	375859.20	389684.750	126509.9	111338.5	266233.60	171290.000	3450.3	BDL	728.2	BDL	BDL
M34-1	240564.6	792779.1	341356.50	385402.500	74658.0	ND	235156.70	119903.000	1078.4	5721.1	561.3	BDL	BDL
M34-2	423624.6	ND			132382.7	ND			1588.6	ND			BDL
M34-3	384409.0				167492.5				1372.9				BDL
M34-4	961475.2				305923.9				4151.8				BDL
M35	4.8	ND		ND	BDL	ND		BDL	BDL	ND		ND	BDL
M35d	ND	ND	ND		ND	ND	ND		ND	ND	ND		ND
M36	267.6	99.6			16.8	ND			BDL	BDL			BDL
M37	325.5	ND	ND	ND	61.9	ND	BDL	710.022	BDL	ND	ND	ND	BDL
M38	245617.6	626040.5	163851.12	ND	74667.8	ND	112875.22	123289.648	1080.7	BDL	258.5	ND	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	PB_D_LOAD2 grams/day	PB_D_LOAD3 grams/day	PB_D_LOAD4 grams/day	MN_T_LOAD1 grams/day	MN_T_LOAD2 grams/day	MN_T_LOAD4 grams/day	MN_D_LOAD1 grams/day	MN_D_LOAD2 grams/day	MN_D_LOAD3 grams/day	MN_D_LOAD4 grams/day	NI_T_LOAD1 grams/day	NI_D_LOAD1 grams/day
M11a			BDL			ND				ND		
M11b			BDL			ND				ND		
M12	BDL	4.9	7.023	2774.9	ND	ND	2774.9	ND	1311.59	ND	BDL	BDL
M12a			0.822			ND				ND		
M12b			BDL			ND				ND		
M13	BDL	BDL	BDL	7094.8	ND	ND	6908.1	ND	ND	ND	BDL	BDL
M13d		ND		ND	ND		ND	ND	ND		ND	ND
M14	BDL			257.2	ND		246.5	ND			7.9	7.1
M15	BDL	BDL		108.5	ND		100.1	ND	ND		BDL	BDL
M15d		ND		ND	ND		ND	ND	ND		ND	ND
M16	BDL	BDL		6851.6	ND		6851.6	7708.1	9286.37		BDL	BDL
M16d		ND		ND	ND		ND	ND	ND		ND	ND
M17	BDL	BDL		9176.3	ND		9176.3	ND	ND		BDL	BDL
M18	BDL			3558.9	ND		3361.2	ND			61.3	55.4
M19	BDL			17114.3	ND		17114.3	ND			BDL	BDL
M20	BDL		BDL	14723.6	ND	ND	14723.6	ND		ND	BDL	BDL
M20d		ND		ND	ND		ND	ND	ND		ND	ND
M21	4.80	1.6	0.883	198.2	ND	ND	176.2	418.4	ND	ND	BDL	BDL
M21a			BDL			ND				ND		
M22	BDL	BDL	BDL	17266.0	ND	ND	17266.0	24701.0	9829.60	ND	BDL	BDL
M23	BDL			461.1	ND		428.2	ND			BDL	BDL
M24	BDL			30.6	ND		29.4	ND			BDL	BDL
M25	BDL			556.3	ND		494.5	4146.4			BDL	BDL
M26	BDL			BDL	ND		BDL	ND			BDL	BDL
M27	BDL	371.2		25025.5	ND		25025.5	ND	24558.58		BDL	BDL
M28	BDL	BDL	BDL	1044.3	ND	ND	1044.3	3552.3	671.85	ND	BDL	BDL
M29	BDL			30024.4	ND		30024.4	ND			BDL	BDL
M29d		ND		ND	ND		ND	ND	ND		ND	ND
M30	BDL			34.6	ND		19.8	ND			BDL	BDL
M31	BDL	BDL	BDL	4985.0	ND	ND	4758.4	ND	6729.25	ND	BDL	BDL
M32	ND	BDL	ND	23476.5	ND	ND	23476.5	ND	13553.69	ND	BDL	BDL
M33	ND	BDL	ND	28636.0	ND	ND	28636.0	ND	ND	ND	BDL	BDL
M34	BDL	BDL	BDL	51754.1	ND	ND	48878.8	63377.3	32104.64	ND	BDL	BDL
M34-1	BDL	BDL	BDL	27374.6	ND	ND	27374.6	ND	31859.94	47104.750	BDL	BDL
M34-2	ND			45010.1	ND		42362.5	ND			BDL	BDL
M34-3				41186.7			41186.7				BDL	BDL
M34-4				56814.4			54629.3				BDL	BDL
M35	BDL		BDL	205.5	ND	ND	190.9	ND		ND	BDL	BDL
M35d		ND		ND	ND		ND	ND	ND		ND	ND
M36	BDL			42.9	ND		39.6	ND			BDL	BDL
M37	BDL	ND	BDL	856.5	ND	ND	856.5	ND	733.37	ND	BDL	BDL
M38	BDL	BDL	BDL	28491.6	ND	ND	28491.6	ND	14564.54	ND	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	SE_T_LOAD1 grams/day	SE_T_LOAD3 grams/day	SE_D_LOAD1 grams/day	SE_D_LOAD2 grams/day	SE_D_LOAD3 grams/day	AG_T_LOAD1 grams/day	AG_T_LOAD2 grams/day	AG_T_LOAD3 grams/day	AG_D_LOAD1 grams/day	AG_D_LOAD2 grams/day	AG_D_LOAD3 grams/day
M11a											
M11b											
M12	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M12a											
M12b											
M13	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	2.617
M13d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M14	BDL		BDL	ND		BDL	ND	ND	BDL	BDL	
M15	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M15d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M16	BDL	ND	BDL	BDL	ND	0.2	ND	ND	0.2	BDL	0.422
M16d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M17	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M18	BDL		BDL	ND		BDL	ND		BDL	BDL	
M19	ND		ND	ND		BDL	ND		BDL	BDL	
M20	BDL		BDL	ND		BDL	ND		BDL	BDL	
M20d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M21	ND	ND	ND	BDL	ND	BDL	ND	ND	BDL	BDL	BDL
M21a											
M22	BDL	ND	BDL	BDL	ND	BDL	ND	ND	BDL	BDL	BDL
M23	ND		ND	ND		BDL	ND		BDL	BDL	
M24	ND		ND	ND		BDL	ND		BDL	BDL	
M25	ND		ND	BDL		BDL	ND		BDL	BDL	
M26	ND		ND	ND		BDL	ND		BDL	BDL	
M27	BDL	BDL	BDL	ND	BDL	BDL	ND	ND	BDL	BDL	7.996
M28	ND	ND	ND	BDL	ND	BDL	ND	ND	BDL	BDL	BDL
M29	BDL		BDL	ND		BDL	ND		BDL	BDL	
M29d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M30	BDL		BDL	ND		BDL	ND		BDL	BDL	
M31	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M32	ND	ND	ND	ND	ND	BDL	ND	ND	BDL	ND	BDL
M33	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	ND	BDL
M34	ND	ND	ND	BDL	ND	BDL	ND	ND	BDL	BDL	BDL
M34-1	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M34-2	ND		ND	ND		BDL	ND		BDL	ND	
M34-3	ND		ND			BDL			BDL		
M34-4	BDL		BDL			BDL			BDL		
M35	ND		ND	ND		BDL	ND		BDL	BDL	
M35d	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M36	0.3		BDL	ND		BDL	ND		BDL	BDL	
M37	BDL	ND	BDL	ND	ND	BDL	ND	ND	BDL	BDL	BDL
M38	BDL	ND	BDL	ND	BDL	BDL	ND	ND	BDL	BDL	BDL

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

ANIMAS RIVER BASIN STUDY: Colorado Department of Health Nonpoint Source Unit: Sampling conducted in Sept 91 (1), June 92 (2), Oct 92 (3), and July 93 (4)

SITE	ZN_T_LOAD1 grams/day	ZN_T_LOAD2 grams/day	ZN_T_LOAD3 grams/day	ZN_T_LOAD4 grams/day	ZN_D_LOAD1 grams/day	ZN_D_LOAD2 grams/day	ZN_D_LOAD3 grams/day	ZN_D_LOAD4 grams/day
M11a				ND				371.944
M11b				ND				31806.595
M12	1927.0	4967.4	1115.8	ND	1927.0	4967.4	1096.3	2207.194
M12a				ND				428.714
M12b				ND				47.765
M13	28005.9	ND	ND	ND	28005.9	80095.2	19343.5	27634.460
M13d	ND	ND	ND		ND	ND	ND	
M14	35.7	ND			35.7	207.8		
M15	15.9	ND	ND		12.5	BDL	13.0	
M15d	ND	ND	ND		ND	ND	ND	
M16	734.1	770.8	ND		734.1	770.8	979.3	
M16d	ND	ND	ND		ND	ND	ND	
M17	1040.0	ND	ND		1040.0	1217.4	1497.1	
M18	652.5	ND			652.5	1878.8		
M19	2238.0	ND			2238.0	6357.1		
M20	2141.6	ND		ND	2007.8	3091.2		2662.654
M20d	ND	ND	ND		ND	ND	ND	
M21	161.5	ND	ND	ND	154.2	242.3	140.7	88.337
M21a				ND				19.380
M22	2733.8	4940.2	1587.9	ND	2589.9	4837.3	1587.9	2910.266
M23	214.1	ND			214.1	BDL		
M24	966.6	ND			942.1	1013.1		
M25	1957.4	ND			1957.4	7463.6		
M26	BDL	ND			BDL	BDL		
M27	32890.6	79287.7	24558.6		32890.6	79287.7	23987.5	
M28	754.2	4736.4	531.9	ND	522.2	4341.7	475.9	2510.867
M29	43483.7	ND			43483.7	83276.3		
M29d	ND	ND	ND		ND	ND	ND	
M30	BDL	ND			BDL	841.1		
M31	1495.5	2039.0	1774.1	ND	1110.3	1869.1	1529.4	1887.126
M32	29797.1	ND	13553.7	ND	27088.3	ND	13920.0	ND
M33	31407.2	ND	ND	ND	29559.8	ND	10722.8	ND
M34	69005.4	80506.3	31321.6	51387.000	63255.0	94209.5	30538.6	68516.000
M34-1	32351.8	122594.7	29584.2	51387.000	29863.2	98075.8	28067.1	42822.500
M34-2	52953.1	ND			47657.8	ND		
M34-3	49424.0				43932.5			
M34-4	72110.6				61184.8			
M35	17.6	ND		ND	16.2	19.8		42.135
M35d	ND	ND	ND		ND	ND	ND	
M36	29.7	10.0			18.8	5.9		
M37	102.8	ND	ND	ND	77.1	783.0	77.0	38231.928
M38	34386.5	99250.3	12744.0	ND	31439.1	83981.0	12379.9	36601.614

ND = No Data; BDL = Below Colorado Department of Health Laboratory detection limits.

APPENDIX B

EPA Data Validation Requirements

PB95-963525
EPA540/R-94/083

LABORATORY DATA VALIDATION

FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES

Prepared for the

HAZARDOUS SITE EVALUATION DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

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July 1, 1988

Environmental Protection Agency

Solid Waste and Emergency Response

PB95-963525
December 1994

Superfund

EPA

LABORATORY DATA VALIDATION FUNCTIONAL GUIDELINES FOR EVALUATING INORGANICS ANALYSES

EPA540.76

LABORATORY DATA VALIDATION FUNCTIONAL
GUIDELINES FOR EVALUATING INORGANICS
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INTRODUCTION

This document is designed to offer guidance in laboratory data evaluation and validation. In some aspects, it is equivalent to a Standard Operating Procedure (SOP). In other, more subjective areas, only general guidance is offered due to the complexities and uniqueness of data relative to specific samples. These Guidelines have been updated to include all requirements in the 7/87 Statement of Work (SOW) for Inorganics, Amendment 1 and December 1987 Revisions.

Those areas where specific SOPs are possible are primarily areas in which definitive performance requirements are established. These requirements are concerned with specifications that are not sample dependent; they specify performance requirements on matters that should be fully under a laboratory's control. These specific areas include blanks, calibration standards, calibration verification standards, laboratory control standards, and interference check standards. In particular, mistakes such as calculation and transcription errors must be rectified by resubmission of corrected data sheets.

This document is intended for technical review. Some areas of overlap between technical review and Contract Compliance Screening (CCS) exist; however, determining contract compliance is not intended to be a goal of these guidelines. It is assumed that the CCS is available and can be utilized to assist in the data review procedure.

At times, there may be an urgent need to use data which do not meet all contract requirements and technical criteria. Use of these data does <u>not</u> constitute either a new requirement standard or full acceptance of the data. Any decision to utilize data for which performance criteria have not been met is strictly to facilitate the progress of projects requiring the availability of the data. A contract laboratory submitting data which are out of specification may be required to rerun or resubmit data even if the previously submitted data have been utilized due to urgent program needs; data which do not meet specified requirements are never fully acceptable. The only exception to this requirement is in the area of requirements for individual sample analysis; if the nature of the sample itself limits the attainment of specifications, appropriate allowances must be made. The overriding concern of the Agency is to obtain data which are technically valid and legally defensible.

All data reviews must have, as a cover sheet, the Inorganic Regional Data Assessment (IRDA) form. (A copy is attached at the end of this document.) If mandatory actions are required, they should be specifically noted on this form. In addition, this form is to be used to summarize overall deficiencies requiring attention, as well as general laboratory performance and any discernible trends in the quality of the data. (This form is not a replacement for the data review.) Sufficient supplementary documentation must accompany the form to clearly identify the problems associated with a Case. The form and any attachments must be submitted to the Contract Laboratory Program Quality Assurance Coordinator (CLP QAC), the Regional Deputy Project Officer (DPO), and the Environmental Monitoring Systems Laboratory in Las Vegas (EMSL/LV).

It is the responsibility of the data reviewer to notify the Regional DPO concerning problems and shortcomings with regard to laboratory data. If there is an urgent requirement, the DPO may be contacted by telephone to expedite corrective action. It is recommended that all items for DPO action be presented at one time. In any case, the Inorganic Regional Data Assessment form must be completed and submitted.

PRELIMINARY REVIEW

In order to use this document effectively, the reviewer should have a general overview of the Case at hand. The exact number of samples, their assigned numbers, their matrix, and the number of laboratories involved in their analysis are essential information. Background information on the site is helpful but often this information is very difficult to locate. The site project officer is the best source for answers or further direction.

CCS is a source of a large quantity of summarized information. It can be used to alert the reviewer of problems in the Case or what may be sample-specific problems. This information may be utilized in data validation. If CCS is unavailable, those criteria affecting data validity must be addressed by the data reviewer.

Cases routinely have unique samples which require special attention by the reviewer. Field blanks, field duplicates, and performance audit samples need to be identified. The sampling records should provide:

1. Project Officer for site
2. Complete list of samples with notations on
   - a) sample matrix
   - b) blanks*
   - c) field duplicates*
   - d) field spikes*
   - e) QC audit sample*
   - f) shipping dates
   - g) labs involved

   *. If applicable

The chain-of-custody record includes sample descriptions and date of sampling. Although sampling date is not addressed by contract requirements, the reviewer must take into account lag time between sampling and shipping while assessing sample holding times.

INORGANICS PROCEDURE

The requirements to be checked in validation are listed below. ("CCS" indicates that the contractual requirements for these items will also be checked by CCS; CCS requirements are not always the same as the data review criteria.)

I. Holding Times (CCS - Lab holding times only)

II. Calibration

- o Initial (CCS)
- o Initial and Continuing Calibration Verification (CCS)

III. Blanks (CCS)

IV. ICP Interference Check Sample (CCS)

V. Laboratory Control Sample (CCS)

VI. Duplicate Sample (CCS)

VII. Matrix Spike Sample (CCS)

VIII. Furnace Atomic Absorption QC (CCS)

IX. ICP Serial Dilution (CCS)

X. Sample Result Verification (CCS - 10%)

XI. Field Duplicates

XII. Overall Assessment of Data for a Case

I. HOLDING TIMES

A. Objective

The objective is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis.

Note: The holding time is based on the date of collection, rather than verified time of sample receipt, and date of digestion/distillation. It is a technical evaluation rather than a contractual requirement.

B. Criteria

Technical requirements for sample holding times have only been established for water matrices. The following holding time and preservation requirements were established under 40 CFR 136 (Clean Water Act) and are found in Volume 49, Number 209 of the Federal Register, page 43260, issued on October 26, 1984.

METALS:	6 months; preserved to pH < 2
MERCURY:	28 days; preserved to pH < 2
CYANIDE:	14 days; preserved to pH > 12

C. Evaluation Procedure

Actual holding times are established by comparing the sampling date on the EPA Sample Traffic Report with the dates of analysis found in the laboratory raw data (digestion logs and instrument run logs). Examine the digestion and/or distillation logs to determine if samples were preserved at the proper pH.

Analyte Holding Time (Days) = Analysis Date - Sampling Date

D. Action

1. If 40 CFR 136 criteria for holding times and preservation are not met, qualify all results > Instrument Detection Limit (IDL) as estimated (J) and results < IDL as estimated (UJ).

2. If holding times are exceeded, the reviewer must use professional judgment to determine the reliability of the data and the effects of additional storage on the sample results. The expected bias would be low and the reviewer may determine that results < IDL are unusable (R).

3. Due to limited information concerning holding times for soil samples, it is left to the discretion of the data reviewer whether to apply water holding time criteria to soil samples. If the data are qualified when water holding time criteria are applied to soil samples, it must be clearly documented in the review.

II. CALIBRATION

A. Objective

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of the analysis run, and continuing calibration verification documents that the initial calibration is still valid.

B. Criteria

1. Initial Calibration

Instruments must be calibrated daily and each time the instrument is set up.

a. ICP Analysis

A blank and at least one standard must be used in establishing the analytical curve.

b. Atomic Absorption Analysis (AA)

1) A blank and at least three standards, one of which must be at the Contract Required Detection Limit (CRDL), must be used in establishing the analytical curve.

2) The correlation coefficient must be ≥0.995.

Note: The correlation coefficient of 0.995 is a technical criterion and not contractual.

c. Mercury Analysis

1) A blank and at least four standards must be used in establishing the analytical curve.

2) The correlation coefficient must be ≥0.995.

d. Cyanide Analysis

1) A blank and at least three standards must be used in establishing the analytical curve.

2) A midrange standard must be distilled.

3) A correlation coefficient ≥0.995 is required for photometric determination.

2. Initial and Continuing Calibration Verification (ICV and CCV)

a. Analysis results must fall within the control limits of 90 -110 percent Recovery (%R) of the true value for all analytes except mercury and cyanide.

b. Analysis results for mercury must fall within the control limits of 80-120%R.

c. Analysis results for cyanide must fall within the control limits of 85-115%R.

C. Evaluation Procedure

1. Verify that the instrument was calibrated daily and each time the instrument was set up using the correct number of standards and blank.

2. Verify that the correlation coefficient is ≥0.995

3. Check the distillation log and verify that the midrange CN standard was distilled.

4. Recalculate one or more of the ICV and CCV %R per type of analysis (ICP, GFAA, etc.) using the following equation and verify that the recalculated value agrees with the laboratory reported values on Form IIA. Due to possible rounding discrepancies, allow results to fall within 1% of the contract windows (e.g., 89-111%).

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where,

Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution

True = concentration (in ug/L) of each analyte in the ICV or CCV source

D. Action

1. If the minimum number of standards as defined in section B were not used for initial calibration, or if the instrument was not calibrated daily and each time the instrument was set up, qualify the data as unusable (R).

2. If the correlation coefficient is <0.995, qualify results > IDL as estimated (J), and results < IDL as estimated (UJ).

Note: For critical samples, further evaluation of the calibration curve may be warranted to determine if qualification is necessary.

3. If the midrange CN standard was not distilled, qualify all associated results as estimated (J).

4. If the ICV or CCV %R falls outside the acceptance windows, use professional judgment to qualify all associated data. If possible, indicate the bias in the review. The following guidelines are recommended:

   a. If the ICV or CCV %R falls outside the acceptance windows but within the ranges of 75-89% or 111-125% (CN, 70-84% or 116-130%; Hg, 65-79% or 121-135%), qualify results > IDL as estimated (J).

   b. If the ICV or CCV %R is within the range of 111-125% (CN, 116-130%; Hg, 121-135%), results < IDL are acceptable.

   c. If the ICV or CCV %R is 75-89% (CN, 70-84%; Hg, 65-79%), qualify results < IDL as estimated (UJ).

   d. If the ICV or CCV %R is <75%, (CN, <70%; Hg, <65%), qualify all positive results as unusable (R).

   e. If the ICV or CCV %R is >125%, (CN >130%; Hg >135%), qualify results > IDL as unusable (R); results < IDL are acceptable.

III. BLANKS

A. Objective

The assessment of blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks applies to any blank associated with the samples. If problems with any blank exist, all data associated with the Case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the Case, or if the problem is an isolated occurrence not affecting other data.

B. Criteria

No contaminants should be in the blank(s).

C. Evaluation Procedures

Review the results reported on the Blank Summary (Form III) as well as the raw data (ICP printouts, strip charts, printer tapes, bench sheets, etc.) for all blanks and verify that the results were accurately reported.

D. Action

Action in the case of unsuitable blank results depends on the circumstances and origin of the blank. Sample results > IDL but <5 times the amount in any blank should be qualified as (U).

Any blank with a negative result whose absolute value is > IDL must be carefully evaluated to determine its effect on the sample data.

Note: The blank analyses may not involve the same weights, volumes, or dilution factors as the associated samples. In particular, soil sample results reported on Form I will not be on the same basis (units, dilution) as the calibration blank data reported on Form III. The reviewer may find it easier to work from the raw data when applying 5X criteria to soil sample data/calibration blank data.

In instances where more than one blank is associated with a given sample, qualification should be based upon a comparison with the associated blank having the highest concentration of a contaminant. The results must not be corrected by subtracting any blank value.

IV. ICP INTERFERENCE CHECK SAMPLE (ICS)

A. Objective

The ICP Interference Check Sample verifies the contract laboratory's interelement and background correction factors.

B. Criteria

1. An ICS must be run at the beginning and end of each sample analysis run (or a minimum of twice per 8 hour working shift, whichever is more frequent).

2. Results for the ICS solution AB analysis must fall within the control limits of ± 20% of the true value.

C. Evaluation Procedure

1. Recalculate from the raw data (ICP printout) one or more of the recoveries using the following equation (%R) and verify that the recalculated value agrees with the laboratory reported values on Form IV.

$$\text{ICS } \%R = \frac{\text{Found Solution AB}}{\text{True Solution AB}} \times 100$$

Where,

Found Solution AB = concentration (in ug/L) of each analyte measured in the analysis of solution AB

True Solution AB = concentration (in ug/L) of each analyte in solution AB

2. Check ICS raw data for results with an absolute value > IDL for those analytes which are not present in the ICS solution.

D. Action

1. For samples with concentrations of Al, Ca, Fe, and Mg which are comparable to or greater than their respective levels in the Interference Check Sample:

   a. If the ICS recovery for an element is >120% and the sample results are < IDL, this data is acceptable for use.

   b. If the ICS recovery for an element is >120% and the sample results are > IDL, qualify the affected data as estimated (J).

   c. If the ICS recovery for an element falls between 50 and 79% and the sample results are > IDL, qualify the affected data as estimated (J).

   d. If sample results are < IDL, and the ICS recovery for that analyte falls within the range of 50-79%, the possibility of false negatives may exist. Qualify the data for these samples as estimated (UJ).

   e. If ICS recovery results for an element fall <50%, qualify the affected data as unusable (R).

   Note: If possible, indicate the bias for the estimated results in the review.

2. If results > IDL are observed for elements which are not present in the EPA provided ICS solution, the possibility of false positives exists. An evaluation of the associated sample data for the affected elements should be made. For samples with comparable or higher levels of interferents and with analyte concentrations that approximate those levels found in the ICS (false positives), qualify sample results > IDL as estimated (J).

3. If negative results are observed for elements that are not present in the EPA ICS solutions, and their absolute value is > IDL, the possibility of false negatives in the samples may exist. If the absolute value of the negative results is > IDL, an evaluation of the associated sample data should be made. For samples with comparable or higher levels of interferents, qualify results for the affected analytes < IDL as estimated (UJ).

4. In general, the sample data can be accepted if the concentrations of Al, Ca, Fe and Mg in the sample are found to be less than or equal to their respective concentrations in the ICS. If these elements are present at concentrations greater than the level in the ICS, or other elements are present in the sample at >10 mg/L, the reviewer should investigate the possibility of other interference effects by using Table 2 given on page D-22 of the 7/87 SOW. These analyte concentration equivalents presented in the Table should be

considered only as estimated values, since the exact value of any analytical system is instrument specific. Therefore, estimate the concentration produced by an interfering element. If the estimate is >2X CRDL and also greater than 10% of the reported concentration of the affected element, qualify the affected results as estimated (J).

V. LABORATORY CONTROL SAMPLE (LCS)

A. Objective

The laboratory control sample serves as a monitor of the overall performance of all steps in the analysis, including the sample preparation.

B. Criteria

1. All aqueous LCS results must fall within the control limits of 80-120%R, except Sb and Ag which have no control limits.

2. All solid LCS results must fall within the control limits established by the EPA. This information is available from EMSL/LV.

C. Evaluation Procedure

1. Review Form VII and verify that results fall within the control limits.

2. Check the raw data (ICP printout, strip charts, bench sheets) to verify the reported recoveries on Form VII. Recalculate one or more of the recoveries (%R) using the following equation:

$$\text{LCS \%R} = \frac{\text{LCS Found}}{\text{LCS True}} \times 100$$

Where,

LCS Found = concentration (in ug/L for aqueous; mg/kg for solid) of each analyte measured in the analysis of LCS solution

LCS True = concentration (in ug/L for aqueous; mg/kg for solid) of each analyte in the LCS source

D. Action

1. Aqueous LCS

a. If the LCS recovery for any analyte falls within the range of 50 - 79% or >120%, qualify results > IDL as estimated (J).

b. If results are < IDL and the LCS recovery is greater than 120%, the data are acceptable.

c. If results are < IDL and the LCS recovery falls within the range of 50-79%, qualify the data for the affected analytes as estimated (UJ).

d. If LCS recovery results are <50%, qualify the data for these samples as unusable (R).

2. Solid LCS

a. If the solid LCS recovery for any analyte falls outside the EPA control limits, qualify all sample results > IDL as estimated (J).

b. If the LCS results are higher than the control limits and the sample results are < IDL, the data are acceptable.

c. If the LCS results are lower than the control limits, qualify all sample results < IDL as estimated (UJ).

VI. DUPLICATE SAMPLE ANALYSIS

A. Objective

Duplicate analyses are indicators of laboratory precision based on each sample matrix.

B. Criteria

1. Samples identified as field blanks cannot be used for duplicate sample analysis.

2. A control limit of ± 20% (35% for soil) for the Relative Percent Difference (RPD) shall be used for sample values >5X CRDL.

3. A control limit of ±CRDL (±2X CRDL for soil) shall be used for sample values <5X CRDL, including the case when only one of the duplicate sample values is <5X CRDL.

C. Evaluation Procedure

1. Review Form VI and verify that results fall within the control limits.

2. Check the raw data and recalculate one or more RPD using the following equation to verify that results have been correctly reported on Form VI.

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where,

S = First Sample Value (original)
D = Second Sample Value (duplicate)

3. Verify that the field blank was not used for duplicate analysis.

D. Action

1. If duplicate analysis results for a particular analyte fall outside the appropriate control windows, qualify the results for that analyte in all associated samples of the same matrix as estimated (J).

2. If the field blank was used for duplicate analysis, all other QC data must be carefully checked and professional judgment exercised when evaluating the data.

Note: This information must be included on the IRDA form.

VII. MATRIX SPIKE SAMPLE ANALYSIS

A. Objective

The matrix spike sample analysis provides information about the effect of each sample matrix on the digestion and measurement methodology.

B. Criteria

1. Samples identified as field blanks cannot be used for spiked sample analysis.

2. Spike recovery (%R) must be within the limits of 75-125%. However, spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of 4 or more.

C. Evaluation Procedure

1. Review Form V and verify that results fall within the specified limits.

2. Check raw data and recalculate one or more %R using the following equation to verify that results were correctly reported on Form V.

$$\%R = \frac{(SSR-SR)}{SA} \times 100$$

Where,

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Verify that the field blank was not used for spike analysis.

D. Action

1. If the spike recovery is >125% and the reported sample results are < IDL, the data is acceptable for use.

2. If the spike recovery is >125% or <75% and the sample results are > IDL, qualify the data for these samples as estimated (J).

3. If the spike recovery falls within the range of 30-74% and the sample results are < IDL, qualify the data for these samples as estimated (UJ).

4. If spike recovery results fall <30% and the sample results are < IDL, qualify the data for these samples as unusable (R).

5. If the field blank was used for matrix spike analysis, all other QC data must be carefully checked and professional judgment exercised when evaluating the data.

Note: This information must be included on the IRDA form.

Note: If the matrix spike recovery does not meet criteria (except in Ag), a post digestion spike is required for all methods except furnace, but this data is not used to qualify sample results. However, this information must be included in the IRDA report.

VIII. FURNACE ATOMIC ABSORPTION QC

A. Objective

Duplicate injections and furnace post digestion spikes establish the precision and accuracy of the individual analytical determinations.

B. Criteria

1. For sample concentrations > CRDL, duplicate injections must agree within ±20% Relative Standard Deviation (RSD), (or Coefficient of Variation (CV)), otherwise the sample must be rerun once (at least two additional injections).

2. Spike recovery must be ≥85% and ≤115%.

3. The Furnace Atomic Absorption Scheme must be followed as described in the 7/87 SOW, p. E-15.

C. Evaluation Procedure

1. Check raw data to verify that duplicate injections agree within ±20% RSD (or CV) for sample concentrations > CRDL.

2. Review Furnace AA raw data to verify that the Furnace Atomic Absorption Scheme has been followed.

D. Action

1. If duplicate injections are outside the ±20% RSD (or CV) limits and the sample has not been rerun once as required, qualify the data as estimated (J).

2. If the rerun sample results do not agree within ±20% RSD (or CV), qualify the data as estimated (J).

3. If the post digestion spike recovery is <40%, qualify results > IDL as estimated (J).

4. If the post digestion spike recovery is ≥10%, but <40%, qualify results < IDL as estimated (UJ).

5. If the post digestion spike recovery is <10%, qualify results < IDL as unusable (R).

6. If sample absorbance is <50% of the post digestion spike absorbance then:

   a. If the furnace post digestion spike recovery is not within 85-115%, qualify the sample results > IDL as estimated (J).

   b. If the furnace post digestion spike recovery is not within 85-115%, qualify the sample results < IDL as estimated (UJ).

7. If Method of Standard Additions (MSA) is required but has not been done, qualify the data as estimated (J).

8. If any of the samples run by MSA have not been spiked at the appropriate levels, qualify the data as estimated (J).

9. If the MSA correlation coefficient is <0.995, qualify the data as estimated (J).

IX. ICP SERIAL DILUTION

A. Objective

The serial dilution determines whether significant physical or chemical interferences exist due to sample matrix.

B. Criteria

If the analyte concentration is sufficiently high (concentration in the original sample is minimally a factor of 50 above the IDL), an analysis of a 5-fold dilution must agree within 10% Difference (%D) of the original results.

C. Evaluation Procedures

1. Check the raw data and recalculate the %D using the following equation to verify that the dilution analysis results agree with results reported on Form IX.

$$\%D = \frac{|I-S|}{I} \times 100$$

Where,

I = Initial Sample Result
S = Serial Dilution Result (Instrument Reading x 5)

2. Check the raw data for evidence of negative interference, i.e., results of the diluted sample are significantly higher than the original sample.

D. Action

1. When criteria are not met, qualify the associated data as estimated (J).

2. If evidence of negative interference is found, use professional judgment to qualify the data.

X. SAMPLE RESULT VERIFICATION

A. Objective

The objective is to ensure that the reported quantitation results are accurate.

B. Criteria

Analyte quantitation must be calculated according to the appropriate SOW.

C. Evaluation Procedures

The raw data should be examined to verify the correct calculation of sample results reported by the laboratory. Digestion and distillation logs, instrument printouts, strip charts, etc. should be compared to the reported sample results.

1. Examine the raw data for any anomalies (i.e., baseline shifts, negative absorbances, omissions, legibility, etc.).

2. Verify that there are no transcription or reduction errors (e.g., dilutions, percent solids, sample weights) on one or more samples.

3. Verify that results fall within the linear range of the ICP (Form XIII) and within the calibrated range for the non-ICP parameters.

4. Verify that sample results are >5X ICP IDL, if ICP analysis results are used for As, Tl, Se, or Pb.

Note: When the laboratory provides both ICP and furnace results for an analyte in a sample and the concentration is > ICP IDL, the results can assist in identifying quantitation problems.

D. Action

If there are any discrepancies found, the laboratory may be contacted by the designated representative to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, the reviewer may determine qualification of the data is warranted.

XI. FIELD DUPLICATES

A. Objective

Field duplicate samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than lab duplicates which measure only lab performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field samples.

B. Criteria

There are no review criteria for field duplicate analyses comparability.

GLOSSARY A

Data Qualifier Definitions

For the purposes of this document the following code letters and associated definitions are provided.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

C. Evaluation Procedures

Samples which are field duplicates should be identified using EPA Sample Traffic Reports or sample field sheets. The reviewer should compare the results reported for each sample and calculate the Relative Percent Difference (RPD), if appropriate.

D. Action

Any evaluation of the field duplicates should be provided with the reviewer's comments.

XII. OVERALL ASSESSMENT OF DATA FOR A CASE

It is appropriate for the data reviewer to make professional judgments and express concerns and comments on the validity of the overall data for a Case. This is particularly appropriate when there are several QC criteria out of specification. The additive nature of QC factors out of specification is difficult to assess in an objective manner, but the reviewer has a responsibility to inform the user concerning data quality and data limitations in order to assist that user in avoiding inappropriate use of the data, while not precluding any consideration of the data at all. If qualifiers other than those used in this document are necessary to describe or qualify the data, it is necessary to thoroughly document/explain the additional qualifiers used. The data reviewer would be greatly assisted in this endeavor if the data quality objectives were provided. The cover form and supplementary documentation must be included with the review.

Field Duplicate	A duplicate sample generated in the field, not in the laboratory.
Holding Time	The time from sample collection to laboratory analysis.
ICB	Initial Calibration Blank - first blank standard run to confirm the calibration curve.
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICV	Initial Calibration Verification - first standard run to confirm the calibration curve.
Initial Calibration	The establishment of a calibration curve with the appropriate number of standards and concentration range. The calibration curve plots absorbance or emission versus concentration of standards.
IRDA	Inorganic Regional Data Assessment
LCS	Laboratory Control Sample - supplied by EPA
MS	Matrix Spike - introduction of a known concentration of analyte into a sample to provide information about the effect of the sample matrix on the digestion and measurement methodology.
MSA	Method of Standard Addition
Post digestion Spike	The addition of a known amount of standard after digestion. (Also identified as analytical spike, or spike, for furnace analyses.)
QAC	Quality Assurance Coordinator
RPD	Relative Percent Difference
RSCC	Regional Sample Control Center
RSD	Relative Standard Deviation
Serial Dilution	A sample run at a specific dilution to determine whether any significant chemical or physical interferences exist due to sample matrix effects. (ICP only)

GLOSSARY B

Additional Terms

Associated Samples	Any sample related to a particular QC analysis. For example: - For ICV, all samples run under the same calibration curve. - For duplicate RPD, all SDG samples digested/distilled of the same matrix.
AA	Atomic Absorption
Calibration Curve	A plot of absorbance versus concentration of standards
Case	A finite, usually predetermined number of samples collected in a given time period for a particular site. A Case consists of one or more Sample Delivery Groups.
CCB	Continuing Calibration Blank - a deionized water sample run every ten samples designed to detect any carryover contamination.
CCS	Contract Compliance Screening - process in which SMO inspects analytical data for contractual compliance and provides EMSL/LV, laboratories, and the Regions with their findings.
CCV	Continuing Calibration Verification - a standard run every ten samples designed to test instrument performance.
CLP	Contract Laboratory Program
CRDL	Contract Required Detection Limit
CV	Coefficient of Variation
DPO	Deputy Project Officer
EMSL/LV	Environmental Monitoring System Laboratory/ Las Vegas (P.O. Box 15027, Las Vegas, Nevada 89114)
Field Blank	Field blanks are intended to identify contaminants that may have been introduced in the field. Examples are trip blanks, travel blanks, rinsate blanks, and decontamination blanks.

SDG	Sample Delivery Group - defined by one of the following, whichever occurs first: - case of field samples - each twenty field samples in a Case - each 14-day calendar period during which field samples in a Case are received, beginning with receipt of the first sample in the SDG.
SMO	Sample Management Office
SOP	Standard Operating Procedure
SOW	Statement of Work

APPENDIX C

UPPER ANIMAS WATER QUALITY CLASSIFICATION AND STANDARDS PROPOSAL

Water Quality Control Division
July, 1994

EXHIBIT 3
UPPER ANIMAS WATER QUALITY CLASSIFICATION
AND STANDARDS PROPOSAL

Water Quality Control Divison
July 1994

INTRODUCTION

The Animas River is located in the southwest corner of Colorado. San Juan and La Plata counties make up the 1000 thousand square mile part of the basin in Colorado. Part of the Southern Ute Indian Reservation is located at the southern end of the basin between Durango and the New Mexico stateline. Durango is the major population center in La Plata county. Silverton is the only incorporated town in San Juan county in the Upper basin. The Animas River, one of the larger rivers in Colorado, has a mean annual flow of 984 cubic feet second at the gage at Cedar Hill, New Mexico. Most of the runoff is from the Animas headwaters area. The Florida River which joins the Animas on the Southern Ute Reservation is a major tributary. Although the entire Animas Basin in Colorado has been noticed for the hearing, the Division has focused on the heavy metals issue that originates in the Animas headwaters area.

The headwaters of the Animas River, including the Cement Creek and Mineral Creek watersheds, have been mined for base and precious metals since the late 1800's. A 1980 survey by the Colorado Mined Land Reclamation Division (Division of Minerals and Geology) documented 316 acres of land disturbed due to mining and counted 307 adits or shafts, 78 of which were reported as actively draining. Although the last active mine in the area, the Sunnyside Mine, ceased operations in the early 1990's, heavy metals issuing from multiple sources in the area continue to be transported downstream at least 27 miles to Baker's bridge north of Durango.

Water quality use classifications and standards for the Animas River basin were most recently established in July 1982. Although they have been periodically modified through the triennial review process, no substantial new data had been collected since 1982. Several streams in the upper basin are not classified for aquatic life uses owing to poor water quality resulting from the area's mining history. Moreover, some of the same waters have limited water quality standards that do not include metals.

The Water Quality Control Division began a study of the upper Animas basin in 1991 with the objectives to:

> characterize the current chemical, biological, and physical conditions in the Animas River and its major tributaries above Elk Creek;

quantify the areas of highest metal loadings and determine the potential for water quality improvement sufficient to support naturally reproducing trout populations in the Animas River, particularly below Elk Creek; and

prioritize sites for remedial projects based on relative loading, environmental impact, feasibility, and cost/benefits.

The data from that study has been used for the 1994 water quality classification and standards triennial review to identify the existing uses and water quality goals that may reasonably be achieved through restoration of disturbed sites. Projections for additional uses and standards that could be achieved through remediation have been made. Water quality standards to protect aquatic life are usually the most stringent, thus most of the following discussion will focus on classifications and standards for aquatic life.

The Division has four major water quality recommendations for the 1994 triennial review based on chemical, physical, and biological data collected from the upper Animas basin between 1991 and 1993:

(1) Establish an aquatic life classification and water quality standards which will protect the resident aquatic life found in the Animas River between Maggie Gulch and Cement Creek, segment 3a.

(2) Establish water quality standard for Mineral Creek between South Mineral Creek and the Animas River, segment 9b, so that it will meet its existing classifications.

(3) Establish water quality standards for the Animas River between Mineral Creek and Elk Creek, segment 4a, that are protective of brown trout.

(4) Establish water quality standards for the Animas headwaters, Cement Creek, and the headwaters of Mineral Creek, segments 2, 7, and 8 respectively, so that goals two and three may be realized.

The Divison recognizes that achievement of full aquatic life uses throughout the basin is probably not possible. There are, however, opportunities to reduce metal loads within these watersheds that will improve the water quality for aquatic life in parts of Mineral Creek and the mainstem of Animas River between Maggie Gulch and Elk Creek. The Division's proposal reflects this goal.

DESCRIPTION OF THE AREA

The Upper Animas River basin includes the area from the headwaters to Elk Creek about seven miles downstream of Silverton. Significant metal loading occurs in the three watersheds, shown in Exhibit 4, that converge near Silverton: the Animas headwaters, Cement Creek, and Mineral Creek. The mainstem of the Animas above Elk Creek, Mineral Creek from its headwaters to the confluence with South Mineral Creek, and the entire Cement Creek watershed lack the aquatic life classification and water quality standards for metals. Several tributaries to the Animas and Mineral Creek also lack the aquatic life classification and standards.

The study found that few tributary streams have ambient water quality for all metals better than TVS. Dissolved aluminum, copper, iron, and zinc are the major metals causing impairment. Dissolved cadmium and lead concentrations are highest near the major sources. In spite of high metal concentrations, brook trout were found in the mainstem of the Animas River between Maggie Gulch and Cement Creek. Moreover, people fish the Animas River for brook trout in this reach.

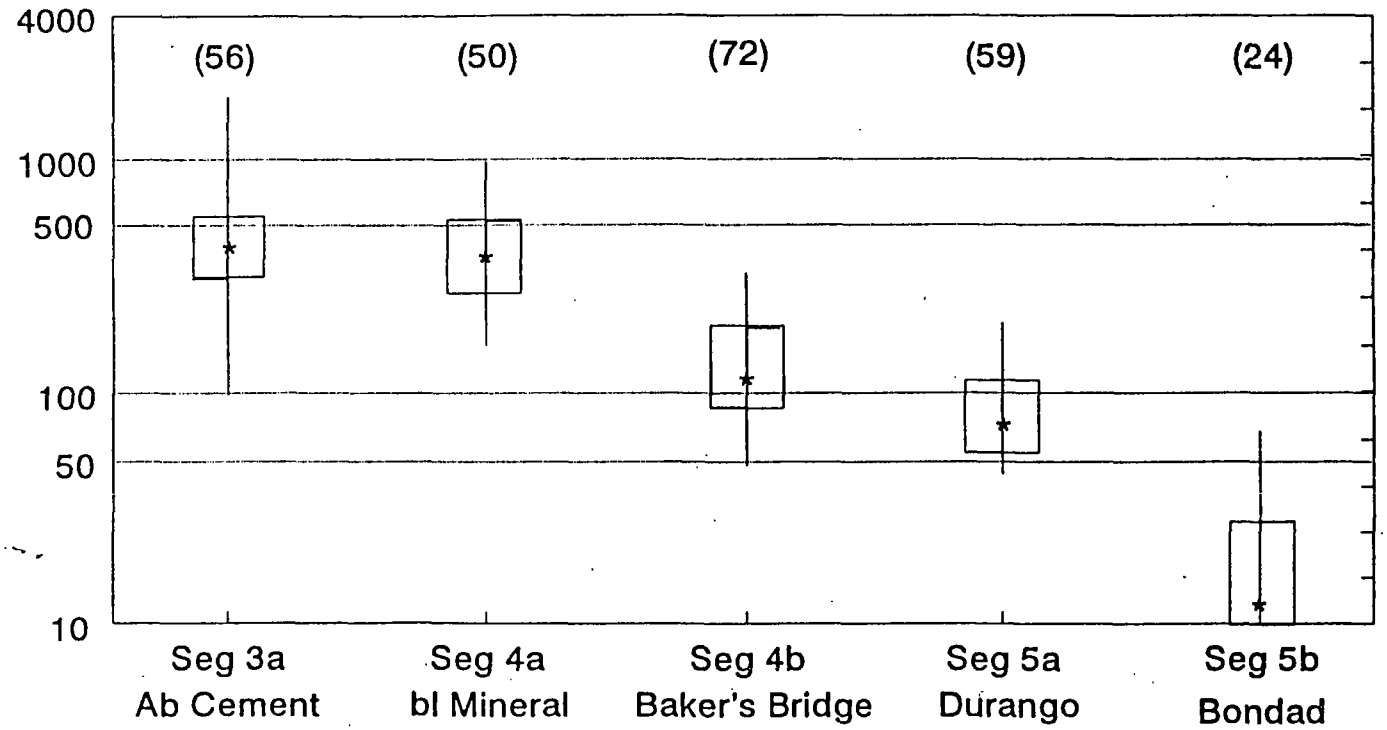
The nature of the metals problem in each of the three watersheds is somewhat different. Mineral Creek has relatively few areas that contribute metals. Zinc is the most persistent toxic metal in Mineral Creek. Acid water mobilizes aluminum and iron from several areas to degrade water quality.

Cement Creek has the poorest water quality. Low pH water throughout the watershed, in the range of 3.0 to 5.5, mobilizes aluminum, cadmium, copper, iron, manganese, and zinc. Aluminum, copper, and iron are readily precipitated, forming bottom deposits as the stream pH increases. Most of the zinc loading is from the upper part of the watershed, but high concentrations of zinc are found throughout Cement Creek.

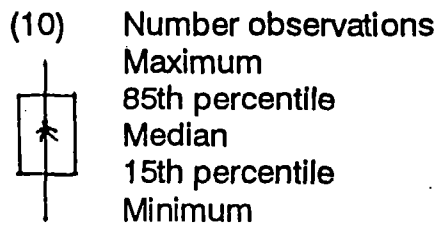
The headwaters of the Animas above Cinnamon Creek have high levels of aluminum, manganese, and zinc. While the concentration of dissolved aluminum drops between Cinnamon Creek and Maggie Gulch, the zinc concentration remains relatively high. In contrast to Cement Creek, the pH of the Animas below Maggie Gulch ranges between 6.5 and 7.8. The Animas River has a self sustaining population of brook trout downstream of Maggie Gulch. Aluminum, copper, iron and zinc from Cement and Mineral Creeks degrade the quality of the Animas at Silverton. The dissolved zinc concentration continually decreases from Mineral Creek to Durango, Figure 1. The 85th percentile zinc level at Baker's bridge, 27 miles downstream, still exceeds TVS. All metals criteria for aquatic life are met when the Animas River enters New Mexico.

FIGURE 1

Dissolved Zinc Concentrations for Animas River Segments with Aquatic Life Classification



All concentrations expressed in micrograms per liter (ug/l)



FACTORS AFFECTING WATER QUALITY

The concentration of dissolved metals and their toxicity to aquatic life is affected by varying streamflow, i. e. dilution, and chemical factors. Shifts in pH cause the metals to dissolve or change into the particulate form as precipitates or through adsorption to colloids. The toxicity of several metals including cadmium, copper, lead, and zinc are a function of water hardness which in turn varies with streamflow.

The flow rate and concentration of a particular metal is also used to identify areas of loading to the stream system. Load is the product of flow times concentration. The load may remain constant or it may change with respect to time and space, thus it is important to understand whether the load is influenced by flow or concentration and how if it changes over the year or longitudinally through the stream system. First approximations of these factors have been made to determine if the proposed water quality goals are realistic.

This section provides a brief overview of the hydrologic and some of the chemical factors that affect the concentration and toxicity to aquatic life of the various metals in the upper basin.

Hydrology

Most of the runoff in the upper Animas Basin comes from snow that accumulates from November to April. Runoff occurs in May and June. Occassional thunderstorms during the late summer may produce a second runoff peak. The low flow period usually lasts from November through March. Although there is little flow variation during this time period, lowest flows are usually reached during January and February.

The Colorado Division of Water Resources operates a stream gage on the Animas River at Howardsville. Richter and others (1984) calculated several flow statistics for the period 1936 to 1982, Table 1, for the Howardsville gage. The flows shown in Table 1 are the annual flood peak or bankfull flow, the average flow, and several low period flows. The bankfull flow has a recurrence interval of about 1.5 years, and normally occurs during the spring snowmelt period. The mean annual flow is the sum of daily flows divided by 365 (366) and averaged for the period of record. CPDS discharge permits are usually based on the average 30-day low flow that occurs on average once in three years (30-E-3). The seven day 2-year and 10-year, and 30-E-3 (biological based) recurrence low flows are shown for comparative purposes. In absolute terms, there is not a large difference between the low flow statistics.

Table 1
Selected Flow and Hardness Statistics for
Upper Animas River Watersheds
flow values in cubic feet per second
hardness values in milligrams per liter as CaCO3

	Recurrence Interval				
	Annual peak	Mean	7-Q-2 low	7-Q-10 low	30-E-3 low
Animas River @ Howardsville	751	102	13	11	11
Animas River ab Cement Creek	783 (40)	106 (88)	14 (178)	12 (204)	12 (204)
Cement Creek	343 (42)	47 (202)	6 (727)	5 (1050)	5 (1050)
Mineral Creek	714 (29)	97 (94)	13 (241)	11 (320)	11 (320)
Animas River bl. Mineral Creek	1961 (36)	266 (112)	35 (293)	30 (380)	30 (380)

Roughly 0.2% of the flow days exceed the annual flood flow and 0.2% of the flow days are less than the 7-Q-10. Seventy percent of the flow days are between the mean annual and the 7-Q-2 flows. Twenty-five percent of the flow days exceed the mean annual flow whereas only five percent of the flow days are less than the 7-Q-2 flow value.

Stream gages operated at two locations on the Animas (A68 and A72), Cement Creek (CC48) and Mineral Creek (M34) over the course of the study improves our ability to evaluate the impact of each of the three watersheds on the Animas River and at various points within the watersheds. Streamflow is highly correlated with watershed area, thus the proportion of streamflow contributed by each of the three subbasin to Animas River below Mineral Creek (A-72 and RPS 82) is proportional to each subbasins watershed area. The Animas mainstem comprises 48%, Cement Creek 14%, and Mineral Creek 36% of the area. There is a small drainage area below the gages on the three watersheds which also must be included in the total. Comparison of streamflow during the project period indicate that the, Animas Cement, and Mineral Creeks contribute 40%, 18%, and 36% of the flow, respectively (total does not add to 100% because of flow from areas below the gages. The long term record for the Howardsvilles gage was used to estimate the statistics for the Animas above Cement Creek, Cement Creek, Mineral Creek, and the Animas below Mineral Creek shown in Table 1.

Table 2
Chronic Table Value Standards in micrograms per liter for Representative Water Hardness Found in the Upper Animas Watershed

	Hardness as CaCO3 in milligrams per liter								
	25	50	75	100	150	200	250	300	400
Cadmium	0.4	0.7	0.9	1.1	1.6	2.0	2.3	2.7	3.4
Copper	4	7	9	12	17	21	26	30	39
Lead	1	1	3	4	7	10	14	18	28
Zinc	33	59	83	106	149	191	230	269	343

The waters of the Animas and Mineral Creek are moderately hard with a mean hardness, expressed as CaCO3, of 119 and 136 mg/l, respectively. The mean hardness of Cement Creek is 282 mg/l. Water hardness is very highly correlated with streamflow at all four monitoring locations. Estimated hardness values that correspond to the flow statistics are shown in parenthesis in Table 1. Hardness of the Animas River decreases between Silverton and Durango, but near the stateline the average hardness reaches about 200 mg/l.

The toxicity of cadmium, copper, lead and zinc vary with water hardness. Table 2 compares the table value standards for these metals for the range of water hardness found in the Animas River drainage. Hardness toxicity equations developed by the U. S. E. P. A. are considered valid between hardnesses of 25 and 400 mg/l.

It is also useful to know the relationship between the concentrations of metals and streamflow. The flow versus hardness relationship tells us that lower concentrations of cadmium, copper, and zinc are toxic to aquatic life at high flow whereas at low flow higher concentrations may be tolerated. Other metals, including aluminum, iron, and manganese if correlated with flow may exhibit certain times of the year that are more toxic than others.

The concentration of dissolved aluminum and zinc decrease as discharge increases in Cement Creek (CC48) while copper appears to increase with increasing discharge. Dissolved zinc is the only metal to correlate with discharge on Mineral Creek (M34); the shape of the curve is similar to Cement Creek. There is no relationship between the concentration of any of the metals and discharge for the Animas River above Silverton (A68). The only downstream station for which paired flow and concentration data are available in the Colorado River Watch Station at Durango. None of the metals correlate with discharge at Durango.

pH

Dilution is one factor to affect the concentration of aluminum, copper, iron, and zinc. Increasing the stream pH shifts metals from the dissolved to the particulate phase through precipitation and/or adsorption to colloidal particles. The efficiency of this process is affected in part by the initial concentration of the metal. Iron precipitates at the lowest pH followed in order by aluminum, copper, zinc, and cadmium. The pH of the Animas River is high enough to significantly lower the concentration of dissolved iron, aluminum, and copper. Zinc removal through adsorption is highly variable over the pH range observed in the Animas. Most of the Cement Creek watershed has a pH that is low enough to retain aluminum, copper, and zinc in the dissolved state. They act as conservative substances, thus their concentrations appear to be flow related. The pH of Mineral Creek is more variable than the other two streams, but in general dissolved zinc appears to act as a conservative metal in this stream. Because aluminum, iron, and copper rapidly convert from the dissolved to the particulate phase, water quality problems related to these three metals generally remain in the Silverton area.

A primary objective of the Upper Animas study was to evaluate the level of water quality improvement necessary to enhance the Animas River below Silverton as a fishery. Jointly considering the effect of streamflow and concentration of the different metals and the level of acid water in the various tributaries indicates that it may be possible to meet proposed water quality goals for Mineral Creek without achieving the goal for the Animas below Silverton. Water quality improvements in the Animas headwaters area and/or Cement Creek will be required to meet the goals below Silverton as well.

The Division's proposal for water quality classifications and standards has identified major areas of loading of several metals. After the water quality goals have been established, feasibility studies directed toward specific sources are the next step. Feasibility studies should include the technical measures required to reduce sources of acid and metal loading and methods to finance the controls. Feasibility may be limited in some cases by physical and legal access to some of the sources. The Division recognizes there may be difficulties remediating some of the sites owing to steep rugged terrain, and the high elevation which limits the time of year in which work can be done.

ECOREGIONS

Although the geochemistry affecting water quality of the Upper Animas River is unique, other factors such as climate, topography, land cover, land use and ownership, and types of fish and aquatic invertebrates are similar to other areas in Colorado. This section presents a brief discussion of the ecoregions of the Animas River basin which may be used to make inferences about water quality conditions not related to the metals problem based on our knowledge of ecoregions and water quality in other parts of the state.

Omernik (1987) provided a framework for interpreting spatial data by grouping similar geographic patterns of ecosystems into ecoregions. Naturally occurring biotic assemblages, as components of the ecosystem, are expected to differ among ecoregions, but be relatively similar within an ecoregion. Omernik's ecoregions use regional patterns in land-surface form, soil, potential natural vegetation, and land-use. Numerous studies have shown that the distribution patterns of fish communities correspond with ecoregions as defined a priori by Omernik. This implies that use classifications and water quality standards should be the same throughout a given ecoregion.

Omernik divided Colorado into six ecoregions and fifteen sub-ecoregions. The Colorado portion of the Animas Basin includes two ecoregions--the Southern Rockies and Arizona/New Mexico Plateau and seven sub-ecoregions. Omernik's descriptions of the sub-ecoregions does not provide information for water chemistry, aquatic life, or recreational uses of water. This information has been added as a result of the Division's assessment of the Animas Basin, and from other available data for the basin.

Southern Rockies (21)

21-1 High Elevation Tundra

The climate of this subregion is cold. Average annual precipitation ranges from 25 to 60 inches, most of which occurs as snow. Treeline in the Basin begins around 11000 feet and relief locally extends to over 14000 feet. Vegetation of this subregion is comprised of low shrubby willows, grasses, and forbs. Soils belong to the Umbrept soil group and formed from crystalline rocks. Landuse of this subregion is limited by accessibility during most of the year as the snow free period lasts from mid-June through October. Wildlife habitat and recreation are the major uses although in a few areas there are summer sheep grazing allotments. Much of the mining is located in this subregion. Land in this subregion is a combination of BLM, San Juan National Forest and private ownership.

Streams in this sub-ecoregion are small and shallow first and second order stream which are extremely cold limiting their use for

class 1 recreation. Fecal coliform bacteria concentrations are significantly less than class 1 recreational standards and typically are of nonhuman origin.

Cutthroat and brook trout are the principal fish found in this sub-ecoregion.

21-2 Cool and Moist Forests of the Middle to High Elevations

This sub-ecoregion begins at around 9000 to 9500 feet and extends to the tundra. It is comprised of dense forest dominated by Englemann spruce and subalpine fir with locally dense stands of aspen. Forest understory is sparse. The climate of this subregion is cold. Average annual precipitation ranges from 25 to 60 inches, much of which occurs as snow. Locally the relief is very steep and often inaccessible. Soils belong to the Boralf group which are weathered from a variety of crystalline and sedimentary materials. Land use is primarily wildlife habitat and recreation.

Most of the land in this sub-ecoregion is a part of the San Juan National Forest or is administered by the BLM. Domestic livestock grazing is limited because of lack of forage vegetation and inaccessibility due to steep relief.

Stream channels in this sub-ecoregion are comprised of gravel, cobbles, and boulders. Most of the runoff occurs in response to melting snow during May, June, and July. Low flow occurs between November and March, and smaller streams may have portions that are entirely frozen during the winter.

Waters in this sub-region are generally too cold to support class 1 recreational uses.

Brook and rainbow trout are the main fish species found in this sub-ecoregion. Some brown trout may be found larger, slower rivers. The dominant taxon of benthos is mayflies.

21-3 Warm and Dry Forests of the Middle to Low Elevations

This subregion begins around 8000 feet and extends upward to the 21-2 subregion. Average annual precipitation is from 12 to 25 inches, about half of which is snow. Soils are borolls and boralfs derived from crystalline and sedimentary rocks under a variety of conditions. Local relief can be steep. A variety of plant communities are represented by this subregion. Pinon pine-juniper woodlands, gamble oak, douglas fir, ponderosa pine, and lodgepole pine are found in this sub-region. These forests are more open than those in the 21-2 sub-region, and support an herbaceous understory that may be grazed by both domestic livestock, usually during the summer, and wildlife.

Most of the land in this subregion is administered by the San Juan National Forest, however along the larger stream valleys ownership tends to be private.

Stream channels are comprised mainly of gravel and cobble. Runoff in this sub-ecoregion comes mainly from snowmelt during May, June, and early July. Low flow occurs between November and March.

The Animas River is large enough to support class 1 recreation in this sub-ecoregion. It is used both commercially and privately for rafting, kayaking, and canoeing.

The fish composition in this sub-ecoregion is dominated by brown trout.

21-4 Low to Middle Elevation Semi-Desert Shrublands

Topographically this subregion is only a few hundred feet lower in elevation than the 21-3 subregion, however the average annual precipitation ranges from 8 to 12 inches resulting in more arid conditions. Relief is moderate. Soils are from the Boroll group, derived from a variety of sedimentary and crystalline rocks. The overstory vegetation is dominated by sagebrush, four-winged saltbush, and greasewood. Understory is grasses. Cottonwood, alders, and willows grow along riparian corridors. Grazing is the primary use of the land in this subregion.

Landownership in this sub-ecoregion is a mixture of state, national forest, and private lands interspersed within the sub-ecoregion.

Perennial streams in this sub-ecoregion have their headwaters outside of the sub-region. The number of water diversions to support irrigation of hay meadows increase in this sub-ecoregion, resulting in the seasonal dewatering of many streams.

The fish composition in this sub-ecoregion is dominated by brown trout and rainbow trout, however numbers and biomass of bluehead suckers, flannelmouth suckers, and white suckers increase.

Arizona/New Mexico Plateau (22)

22-1 Shrublands

The Arizona/New Mexico Plateau Shrubland sub-ecoregion is slightly more arid than the 21-4 subregion. Relief ranges from moderate to flat plains. Soils are from the Orthid and Argid groups, with plant communities dominated by big rabbitbrush, winterfat, and big sagebrush. Greasewood is found in low lying moist areas. A grass understory is common. Low density grazing is the chief land use. Land ownership is mostly federal, administered by the Bureau of Land Management. The Southern Ute Indian Reservation is also located in this sub-ecoregion.

First and second order streams in this sub-ecoregion do not have sufficient depth or flow to support recreation 1 uses.

The fish numbers and biomass are dominated by rainbow trout, brown trout, bluehead, flannelmouth, and white suckers. Fathead minnows are also found.

22-2 Irrigated Flatlands

Irrigated lands in the Animas basin are generally alluvial stream valleys adjacent to uplands in the 21-4, 22-1 and are irrigated native hay and pasture lands. Soils are mostly from the Argid group. These lands are flood irrigated from early June through mid-October, depending on the local availability of water from adjacent streams, and yield one to two cuttings of hay.

None of the streams in this sub-ecoregion, except the Animas mainstem, has sufficient flow to support boating uses.

Fish include brown trout, rainbow trout, common carp, suckers and fathead minnows.

FIELD METHODS

Colorado's water quality classification system considers aquatic life, recreation, domestic water supply, and agriculture as the uses for which water quality standards are established. This section describes data collection procedures used to document use classifications and ambient water quality.

Water Chemistry

The Division was assisted by many federal, state, and local entities in collecting data for the Upper Animas Study. In addition to data collected for the study, data from the Colorado River Watch Program and three RPS stations on the Animas River operated by the Division are included in the evaluation.

The emphasis of the Upper Animas data collection program was on heavy metals (aluminum, cadmium, copper, iron, lead, manganese, and zinc) and related water quality constituents. No data were collected for the following antidegradation parameters: dissolved oxygen, ammonia, nitrates, or fecal coliform as they are not issues in this area. Limited data is available for these at RPS or River Watch stations, and they are discussed where appropriate. Water samples were analyzed for arsenic, cyanide, nickel, dissolved silver, total mercury, and dissolved selenium. All samples were less than the lowest reportable values and are not discussed further. The data for these parameters is a part of Division Exhibit 5.

All water samples were "grabs," taken from the main current of the stream. Temperature and pH were measured in the field. Water samples for metals analyzed as dissolved were filtered through a .45 micron filter in the field prior to acidification. Except for the field parameters, samples were cooled and shipped to the Colorado Department of Health Laboratory Chemistry Section in Denver for analysis.

Macroinvertebrates

Macroinvertebrates were collected and processed in accordance with procedures described in: Rapid Bioassessment Protocols For Use In Streams and Rivers--Rapid Bioassessment Protocol III--Benthic Macroinvertebrates. Protocol III focuses on the riffle/run habitat as the most productive habitat available in stream systems.

Two riffle samples were collected at each station: one from an area of fast current velocity and one from an area of slower current velocity. A kick net (mesh size 500 um) was used to collect the sample from an approximately 1 square meter area. Samples from each kick net were separately field processed for future laboratory analysis. Collected material was preserved in 90% alcohol.

The macroinvertebrate samples were processed according to the subsampling procedure recommended in the Rapid Bioassessment Protocols. Subsamples were processed sufficient to characterize the entire sample and totaling a minimum of 100 organisms plus or minus 10 percent. Sorted samples were preserved in 90% alcohol and labeled by station, habitat (i.e. fast riffle/slow riffle), and date of collection.

All benthic macroinvertebrates in the subsample were identified to the lowest positively identified taxonomic level. Summary graphs of the macrobenthic data are contained in Divison Exhibit 6.

Fish

Fish were sampled in accordance with requirements of the Scientific Collecting Permits issued by the Colorado Division of Wildlife. All fish were obtained by electrofishing with a backpack shocker. Data for larger portion of the Animas River was obtained from the Colorado Division of Wildlife.

Electrofishing started at the downstream end of the station and worked upstream collecting the stunned fish in dip nets. First pass fish were held in a large crib until completion of the second pass. The Seber LeCren two pass method was used for population estimates.

Collected fish were identified to species and measured to the nearest half centimeter (total length). Five fish per size class and per species were weighed to the nearest gram using spring loaded scales. Average weight per individual per size class was assigned to individuals in each size class to estimate biomass. Individuals of doubtful taxonomy were preserved in the field and referred to appropriate specialists. Results of the fishery surveys are shown in Division Exhibit 7.

Habitat

Habitat evaluation protocol for the Upper Animas River basin assessment followed modified qualitative field scoring procedure described in Habitat Assessment and Physicochemical Parameters (Rapid Bioassessment Protocols, May 1989). The habitat assessment form was modified by the Colorado Nonpoint Assessment Project because oftentimes metrics were judged confusing or inappropriate when applied to the Southern Rocky Mountain ecoregion. A habitat evaluation was done at each biological sampling location. Division Exhibit 8 is summary table of habitat scores.

USE DESIGNATION

Colorado's Basic Standards and Methodologies for Surface Waters provide that waterbodies may be designated as Outstanding Waters (OW) or Use Protected. The distinction between the two

designations is that OW may not have their quality degraded under any circumstance. Use protected waters may use the full assimilative capacity of the receiving water for adopted standards. Waters not designated are subject to antidegradation review for new water quality impacts, and may be degraded only after certain tests have been met demonstrating that the discharge is significant and that the new or increased load to the segment is important socially and economically to the area; and that there are no alternatives to additional degradation.

OW designation may be applied to waters in wilderness areas or gold medal trout streams, for example. Use protected waters include those classified aquatic life, warm or cold, class 2; waters subject to significant existing point source discharges; or water whose ambient quality for at least three constituents is worse than TVS.

CLASSIFICATIONS

Aquatic Life

Aquatic life is classified as warm or cold and as class 1 or class 2. Cold water aquatic life class 1 streams have the physical characteristics (i. e. substrate, cover, flow conditions, and temperature) to support a wide variety of cold water biota. These are typically trout streams in Colorado. The distinction between class 1 and 2 is the suitability of habitat and water quality. Streams that have insufficient flow or whose water quality is either naturally impaired or irreparably impaired by anthropogenic causes may also be classified aquatic life 2.

Recreation

The goal of the federal Clean Water Act is to achieve "fishable-swimmable" waters wherever possible. Recreation class 1 waters are used for activities in or on the water when the ingestion of small quantities of water is likely to occur. They include, but are not limited to waters used for swimming, rafting, kayaking, and water skiing. Class 2 waters are suitable for use on or about the water such as fishing and other streamside or lakeside activites. Most waters in Colorado are too small and/or too cold to support recreational class 1 uses.

Water quality standards for class 1 and class 2 recreations waters are distinguished by the standard for fecal coliform. Recreation class 2 waters have a fecal coliform standard of 2000/100ml whereas class 1 waters have a standard of 200/100ml. Most class 2 waters have quality much better than the class 1 standard. The Water Quality Control Commission and U. S. Environmental Protection Agency have agreed to classify waters recreation 1 only when they are used for recreation in or on the water. The class 1 standard for fecal coliform, however, will be adopted for class 2 waters

that meet the 200/100ml standard unless existing point source discharges would incur substantial costs to meet the 200/100ml standard.

Water Supply

Waters classified for domestic water supply are suitable for potable water after receiving standard treatment. The water supply classification is applied if a public surface water supply is located on the segment or if the quality is suitable for that use.

Agriculture

Livestock watering is the only agricultural use of water in the upper basin. Irrigation and stock watering are common uses in the lower basin. Specific agricultural standards are recommended only if an identified use may be threatened or impaired.

WATER QUALITY STANDARDS

"The Basic Standards and Methodologies for Surface Water" provide three approaches for establishing numeric water quality standards. Table Value Standards (TVS) are applied to protect applicable classified uses when ambient quality is better than TVS for the most restrictive use.

Ambient quality based standards may be adopted where natural or irreversible man-induced ambient water quality levels are higher than the specified chronic TVS, but are determined to protect the classified use(s). The data presented in the tables is the 85th percentile of the available and representative data the 15th and 85th percentiles are used for pH.

Site-specific standards, acute or chronic, may be used for aquatic life segments where factors other than water quality substantially limit the diversity and abundance of species present. Site specific standards require that a bioassay and habitat assessment be completed to support such standards.

The Basic Standards and Methodologies also allow the Commission to establish narrative standards (Section 3.1.7(1)). This provision has been used for several segments.

This section of the Rationale provides specific information about the uses, water quality, and any identified problems associated with segments 2 through 9b, inclusive, of the Animas River basin. Although the entire basin has been noticed, no new information has been obtained nor are descriptions provided for the following segments:

Segment 1	Those portions of the Animas River within the Weminuche Wilderness area.
Segment 10	Headwaters of the Florida River
Segment 11	Portions of the Florida River
Segment 12a	Several tributaries to the Animas River south of Elk Creek
Segment 12b	Lemon Reservoir
Segment 13a	Portions of Junction Creek
Segment 13b	Tributaries to the Animas River south of Hermosa Creek
Segment 14	Lightner Creek
Segment 15	Purgatory, Cascade, and several tributaries

SEGMENT 2

Mainstem of the Animas River, including all tributaries, lakes, and wetlands, from the source to immediately above the confluence with ~~Elk Creek~~ Maggie Gulch, except for specific listings in segments 1. ~~and 5 through 8a and 8b~~

Classifications:

Recreation 2
Agriculture

Recommendation: Add the agriculture classification. Adopt the narrative standard: that concentration of aluminum, cadmium, copper, iron, and zinc that is directed toward maintaining and achieving water quality standards established for segments 3a, 4a, and 4b. Adopt temporary modifications for aluminum, cadmium, copper lead, manganese, and zinc which are based on the 85 percentile of the ambient data. The temporary modifications shall expire on October 1, 1997. Adopt the 200/100ml fecal coliform standard. Adopt an ambient pH standard of 5.8.

Description of the segment:

This segment is the headwaters of the Animas River, Exhibit 2. Most of the segment is within the 21-1 and 21-2 sub-ecoregions. Tributaries are first and second order streams, while the mainstem below California Gulch is a third order stream. The Bureau of Land Management administers most of the land in the watershed, however there are many patented mining claims.

Uses

Aquatic life: Electrofishing California Gulch, the Animas below Burrows Gulch, Eureka Gulch, and the Animas mainstem above Eureka Gulch found no fish in 1992. Cadmium, copper, and zinc concentrations are chronically toxic to brook trout in the Animas mainstem (A-14). Aluminum, cadmium, and zinc, concentrations are acutely toxic to brook trout in Burrows Gulch and California Gulch. The copper concentration is chronically toxic to brook trout in Burrows Gulch, California Gulch, and Burns Gulch. An aluminum precipitate covers the substrate of the Animas River for a short distance below Burrows Gulch. The mean relative abundance of macroinvertebrates was low, ranging from one organism to forty five organisms per square meter. Aquatic habitat on the mainstem between Eureka Gulch and Minnie Gulch is seriously degraded. The channel is braided and there is very little riparian vegetation owing to tailings washed onto the flood plain.

Recreation: No class 1 recreational uses were identified on the segment. The segment is expected to meet the 200/100 ml fecal coliform criterion.

Table 3
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in Animas River Segment 2

	pH ssu.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS		73	87	0.9	9	2	1000	0.1	17	0.04	90
Animas River A-14	4.1 to 6.7	58	750	5	21	6	2700	0	0	0	1700
Animas River A-40	6.9 to 7.3	68	100	2.9	16	0	800	0	0	0	700
Burrows Gulch A-7	4.6 to 5.4	37	5800	17	56	8	2700	0	0	0	2700
California Gulch A-10	6.0 to 7.2	72	1000	7	29	0	3700	0	0	0	2000
Burns Gulch A-27	7.1 to 7.7	49	76	6	27	5	54	0	0	0	920
Eureka Gulch A-34	6.4 to 7.5	137	94	3.5	11	0	760	0	0	0	1300

Water supply: There are no public domestic sources on the segment. Manganese and iron exceed the water supply criteria.

Agriculture: Sheep are grazed on portions of the the watershed on BLM allotments and are watered from streams in this segment.

Water Quality:

Water chemistry was monitored at 32 locations on the segment, Exhibit 4. The mainstem of the Animas, California Gulch, Placer Gulch, and Burns Gulch have elevated concentrations of dissolved aluminum, cadmium, copper, manganese, and zinc, Table 3. High concentrations of cadmium, lead, and zinc are found in several tributaries, especially near draining adits and wastepiles. Dissolved lead was found near several of the draining adits, but not in the mainstem. California Gulch and Burrows Gulch have the highest concentrations aluminum, cadmium, copper, and zinc. Burns Gulch, which drains from the east, contributes cadmium, copper, and zinc. Eureka Gulch contributes some cadmium and zinc. These four tributaries account for the most of the metal loading to the mainstem above Minnie Gulch.

Problems and Issues:

The Terry Tunnel, a permitted point source, discharges to Eureka Gulch. Inactive and abandoned adits, mill tailings, and waste rock are found throughout the segment. Preliminary analysis suggests that reducing anthropogenic sources of acid water and metal loads from several sites within the segment may improve water quality in several downstream segments. Application of point and nonpoint source controls, however, are not expected to achieve aquatic life uses within the segment.

SEGMENT 3a

ainstem of the Animas River from a point immediately above the onfluence with Maggie Gulch ~~Elk Creek~~ to the confluence with Cement ~~Junction~~ Creek.

lassifications:

Aquatic life cold 1
Recreation 2
Agriculture

ecommendation: Add cold water aquatic life 1 and agriculture lassifications. Adopt table value standards for all metals except issolved cadmium and zinc. Adopt ambient standards for cadmium 1.7 ug/l) and zinc (540 ug/l). Add standards for Al (ac/ch) =TVS nd Fe = ug/l (ambient quality). Adopt the 200/100ml fecal oliform standard.

escription of the segment:

his segment is currently a part of Animas River segment 2. xhibit 2 shows the segment and water quality monitoring locations. t is located in the cool forest sub-ecoregion (21-2). There are everal mill sites and reclaimed mill tailings sites near owardsville. The mainstem is a third order stream and flow from he Animas above Cement Creek accounts for about 40 percent of the l[illegible]n the Animas below Silverton.

ses

quatic life: Electrofishing in 1992 found brook trout at several ocations in the Animas River between Maggie Gulch and Cement reek, Exhibits 7. Brook trout represented multiple age and size lasses suggesting that they are self-reproducing. The mean elative abundance of macroinvertebrates ranged from 153 to 1305 rganisms per square meter, Exhibit 6.

ecreation: No class 1 recreational uses were identified on the egment. However the segment is expected to meet the 200/100 ml ecal coliform criterion.

ater supply: There are no public domestic sources on the segment. nganese and iron exceed the water supply criteria.

griculture: Several BLM grazing allotments extend to the mainstem f the Animas, thus the river is available to water livestock.

Table 4
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in Animas River Segment 3a

TVS	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu Ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
		88	87	1.0	11	3	1000	0.1	17	0.06	95
Animas River A-45	7.0 to 7.4	90	68	2.1	7	0	320	0	0	0	450
Animas River A-55	6.0 to 7.7	92	75	1.8	7	0	210	0	0	0	340
Animas River A-65	6.5 to 7.6	87	52	1.7	5	0	400	0	0	0	430
Animas River CRW A-68	7.2 to 7.7	115		2.1	12	0	700				632
Animas River A-68	6.5 to 7.8	92	93	1.8	7	0	560	0	0	0	420
Combined	6.7 to 7.7	119	72	1.8	11	0	690	0	0	0	540

Water quality:

Water quality was monitored at approximately 10 mainstem locations in the segment. More intensive data were collected at the gage (site A-68) and this was further supplemented by data collected through the Colorado River Watch Program at the same location.

Metal loading to the mainstem of the Animas River between Maggie Gulch and Cement Creek from surface sources is relatively small. Dissovled metal concentrations, except cadmium and zinc are less than TVS. The water is moderately hard and hardness is strongly correlated with streamflow. Dissoved aluminum, cadmium, copper, and zinc concentrations are independent of the streamflow rate. The pH of the Animas in segment 3a is typically between 7.0 and 8.0. The pH of the river is high enough to cause precipitation of aluminum, copper, and iron. Within the observed pH range, the ambient dissolved zinc concentration may be regulated by adsorption to collodial particles.

Colorado River Watch data indicates the 85th percentile zinc concentration is higher than observed during the Nonpoint Source study. Five observations of cadmium, copper, manganese and zinc concentrations obtained between late March 1993 and early May 1993 were three to four times higher than the rest of the data set. The reasons for the unusually high concentrations are not known.

ovled cadmium exceeds chronic TVS and dissolved zinc exceeds and chronic TVS. The 85th percentile zinc is lower than riterion for brook trout at mean hardness. Preliminary alculations indicate that a moderate effort to reduce the cadmium oncentration should enable the segment to consistently meet all etals criteria for brook trout. Reductions of cadmium and zinc oads in the range of 50 percent and 90 percent, respectively, ould be required to meet rainbow trout criteria.

roblems and Issues

o permitted point sources discharge to the segment. Mine and mill ailings have been reclaimed at several sites along the mainstem. ther opportunities to improve water quality depend on reducing etal loads from segment 2.

SEGMENT 3b

Mainstem of the Animas River from immediately below the confluence with Cement Creek to immediately above the confluence with Mineral Creek

Classifications:

Recreation 2

Recommendation: Adopt temporary modifications for pH, aluminum, cadmium, copper, iron, and zinc based on ambient quality. Adopt the narrative standard described in Exhibit 2 which is based on meeting the water quality goal for segment 4a.

Description of the segment:

This segment is currently a part of Animas River segment 2. Approximately thirty percent of the flow in this segment is from Cement Creek which degrades the water quality of this short two mile reach of the Animas. Most of the segment is within Silverton.

Uses

Aquatic life: Although not sampled by the Division, mass balance calculations between the Animas and Cement Creek indicate that dissolved aluminum, copper, and iron could significantly limit brook trout, the most tolerant species. The segment also has poor physical habitat as reflected in the braided channel and sparse riparian vegetation, further limiting the ability of the segment to support aquatic life. Although some improvement in water chemistry from either or both Cement Creek and the upper Animas will be required to meet the water quality goal proposed for downstream segment 4a, elevated concentrations of aluminum, copper, and iron make it unlikely that aquatic life can be established in this segment.

Recreation: No class 1 recreation uses were identified on the segment.

Water supply: There are no public domestic sources on this segment. Iron and manganese exceed the water supply criteria and they are not likely to be met by controlling point and nonpoint sources.

Agriculture: No agricultural was identified. The Forest Service and BLM grazing allotments do not extend to this reach of the Animas River.

quality:

water quality data were collected for the segment, however mass alancing the 85th percentile concentrations for aluminum, cadmium, copper, and zinc for the segments 3a and 7 indicates that acute and chronic TVS criteria are exceeded. The 85th percentile zinc concentration is lower than the brook trout criterion, but is higher than what could support more sensitive species.

Problems and Issues

Silverton WWTP discharges to this segment immediately above the confluence with Mineral Creek. The design capacity for the facility is 0.425 mgd, which at a 30-E-3 of 17 cfs results in a dilution ratio of 27:1. The 200 fecal coliform criterion would be slightly exceeded at the low flow without additional treatment to reduce the fecal coliform density below the presently permitted level.

SEGMENT 4a

Mainstem of the Animas River from the confluence with Mineral Creek to Elk Creek.

Classifications:

Aquatic life cold 1 GOAL
Recreation ~~2~~ 1

Recommendation: Adopt the aquatic life cold 1 classification as a goal; adopt the recreation 1 classification; adopt table value standards for metals except for cadmium and zinc. Adopt an ambient standard for cadmium and a standard of 225 ug/l for zinc that will protect brown trout. Adopt a temporary modification for dissolved zinc (400 ug/l) based on the 85th percentile of the data.

Description of the segment:

This segment is currently part of segment 2. The new segment begins south of Silverton, and is located in both the cool forest (21-2) and warm dry forest (21-3) sub-ecoregions. It is a fourth order stream. Access to the river is generally limited to travel by foot or the Durango and Silverton Narrow Gage Railroad.

Stream flow from gages on the Animas headwaters (segment 3a), Cement Creek (segment 7), and Mineral Creek (segment 9b) account for about 94 percent of the flow at the upstream end of the segment. Although Cement Creek accounts for about 17.5 percent of the flow it is the largest contributor of aluminum, cadmium, copper, iron, manganese, and zinc to the segment. The upper Animas and Mineral Creek are substantial contributors of cadmium and zinc.

Uses

Aquatic life: An important goal of the Animas River study was to work toward the establishment of an improved fishery resource of the Animas River. The WQCD found no fish below Mineral Creek above station A-72. A few brook trout were present at the lower end of the segment above Elk Creek (A-73). The mean relative abundance of macroinvertebrates ranged from 20 to 83 organisms per square meter at A-72 and A-73, respectively. The abundance and diversity of both fish and macroinvertebrates is lower in this segment than in segment 3a, Exhibits 6 and 7. The habitat for both fish and macrobenthos is impaired by a reddish precipitate that coats the substrate fo the Animas between Mineral Creek and Elk Creek. Water chemistry indicates that the quality is better than that required for brook trout and an evaluation of physical habitat, other than the embedded substrate indicates that habitat should not be limiting for aquatic life.

Table 5
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in Animas Basin Segment 4a

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
		112	87	1.2	13	5	1000	0.1	17	0.09	117
Animas River A-72	6.4 to 7.4	141	52	1.7	8	0	940	0	0	0	510
Animas River A-73	6.7 to 7.4	104		1.2	0	0		0	0	0	270
RPS 82	6.7 to 7.5	147		1.7	9	0	840	0	0	0	470
Combined	6.7 to 7.4	120	77	1.6	7	0	880	0	0	0	400

Recreation: This segment is popular with advanced whitewater kayakers.

Water supply: There are no public domestic sources on this segment. The manganese criterion for water supply is exceeded and is not likely to be met by controlling point and nonpoint sources.

Agriculture: Neither the Forest Service nor Bureau of Land Management grazing allotments extend to the mainstem of the Animas in this segment. No identified agriculture uses are present. The quality is better than all criteria for livestock watering.

Water quality:

Water quality was monitored about one-half mile below Mineral Creek, station A-72. The Division RPS station 82 has dissolved data for this site beginning in 1989. Water chemistry data was also collected above Elk Creek (A-73) during the Animas River study.

The upstream end of the segment has elevated concentrations of cadmium, manganese, and zinc, Table 5. The pH of the segment is typically between 6.7 and 7.5. Water hardness, manganese and zinc concentrations correlate with streamflow. Water chemistry data indicate that cadmium slightly exceeds TVS for aquatic life, but zinc is nearly four times higher than TVS. The ambient concentration of zinc, however is less than the criterion for brook trout.

Problems and Issues

This segment would be the major beneficary of water quality improvements made on the upper Animas, Cement, and Mineral Creeks.

The Colorado Divsion of Wildlife (Pat Davies, personnel communication) has conducted studies on brown trout and acclimated rainbow trout. He has suggested that they are more tolerant to zinc than unacclimated rainbow trout but less tolerant than brook trout. Although results of the studies have not been published, Davies has suggested a zinc criterion in the range of 225 ug/l as protective of brown trout.

SEGMENT 4b

Mainstem of the Animas River, including wetlands, from immediately below the confluence with Elk Creek to the confluence with Junction Creek.

Classifications:

Aquatic life cold 1
Recreation ~~2~~ 1
Water supply
Agriculture

Recommendations: Add the recreation 1 classification. Adopt TVS for aquatic life, with a temporary modification for zinc (160 ug/l) based on the ambient quality. Adopt the fecal coliform standard of 200mpn/100ml. Adopt an ambient standard for manganese (250 ug/l)

Description of the segment:

The upper reach of this segment is within the Animas River Canyon, and is generally accessible only by foot, horseback, or the Durango and Silverton Railroad. The lower end to the segment includes the Animas Valley north of Durango. The segment ends at Junction Creek in Durango. The segment is located in the 21-3, 21-4, and 22-2 sub-ecoregions. Land ownership is a mixture of San Juan National Forest and private holdings.

Uses

Aquatic life: Electrofishing of the Animas River by the CDOW found both brook and rainbow trout in the canyon above Cascade Creek in 1992. CDOW stocks catchable size rainbow trout in Durango. Large brown trout, bluehead suckers, and white suckers are also found in the Durango reach of the segment. The mean relative abundance of macroinvertebrates was a rather low 23 organisms per square meter above Cascade Creek. The Division is not aware of macrobenthic data in the Durango area. Physical habitat in the Animas Valley portion of the segment is impacted by several sand and gravel mining operations, some of which use the active channel during low water periods.

Recreation: The river is heavily used for rafting and kayaking by private and commercial interests from north of Durango to the end of the segment.

Water supply: The city of Durango uses water from this segment as an emergency source. Manganese exceeds the the criterion for water supply.

Agriculture: Water from the river is used to irrigate crops and to water livestock.

Table 6
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in the Animas Basin Segment 4b

	pH s.u.	Hard mg/l	Fecal coli.	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS	6.5 to 9.0	150	200	1.6	17	7	1000	.010	17	0.15	149
Baker's Bridge CRW	7.6 to 8.3	131		0.7	10	0	210				233
Trimble Lane CRW	7.1 to 7.8	169		0.7	7	0	130				185
Durango Gage CRW	7.7 to 8.2	164		0.3	6	0	91				115
RPS-81	7.1 to 8.0	135	5	0.6	6	0	250	0	0	0	160
Combined	7.1 to 8.2	150	5	0.6	7	0	210	0	0	0	182

Water quality:

The Division has a long term water quality monitoring station, RPS 81 at Baker's Bridge near Rockwood at the north end of the Animas River Valley. The Colorado River Watch Program monitors water quality at Baker's Bridge, Trimble Lane, and in Durango at the gaging station. The 85th percentile manganese exceeds the water supply criterion and zinc slightly exceeds TVS for aquatic life at mean hardness.

PROBLEMS AND ISSUSES

Several small wastewater treatment facilities discharge to this segment of the Animas. Within the Animas River Valley there are several mining operations that remove gravel from the channel of the river.

SEGMENT 5a

Mainstem of the Animas River, including wetlands, from the confluence with Junction Creek to the ~~Colorado/New Mexico~~ Southern Ute Indian Reservaton border.

Classifications:

Aquatic life cold 1
Recreation ~~2~~ 1
Water supply
Agriculture

Recommendations: Add the recreation 1 classification and adopt TVS based on dissolved metals.

Description of the segment:

This segment begins in the City of Durango and extends about four miles south of the city where the river enters the Southern Ute Indian Reservation.

Uses

Aquatic life: The Colorado Division of Wildlife has conducted several fish surveys on the segment. Rainbow trout, brown trout, bluehead sucker, flannelmouth sucker, mottled sculpin, white sucker, and common carp are reported in the segment. The Division is not aware of any data for macrobenthos in the segment.

Recreation: The river is heavily used by private and commercial interests for kayaking and rafting from Junction Creek to the Southern Ute Indian reservation.

Water supply: There are no public domestic water sources on the segment.

Agriculture: Water from the segment is used for irrigation and livestock watering.

Water quality:

The Division operated a water quality monitoring station near the New Mexico state line, RPS 66, through 1993. The Colorado River Watch Program collects data at Bodo, near the upper end of the segment. Dissolved mangangese slightly exceeds the dringking water criterion. All other parameters are less than TVS.

Table 7
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS
for Selected Locations in the Animas Basin Segment 5a

	pH s.u.	Hard mg/l	Fecal coli.	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS	6.5 to 9.0	200	200	2.0	21	10	50	0.01	17	0.25	191
Bodo	7.8 to 8.2	195		0.13	6	0	96	0	0	0	105
RPS-66	7.6 to 8.4	210	22	0.3	5	0	70	0	0	0	48
Combined	7.6 to 8.4	200	22	0.3	5	0	80	0	0	0	96

Problems and Issues

The City of Durango WWTP discharges to this segment.

SEGMENT 5b

Mainstem of the Animas River from the Southern Ute Indian Reservation boundary to the New Mexico stateline.

Classifications:

Aquatic life cold 1
Recreation 2
Water supply
Agriculture

Recommendation: No changes to the classifications or standards for portions of the Animas River located on Southern Ute lands.

SEGMENT 6

Mainstems, including all tributaries, wetlands, lakes, and reservoirs of the Animas River to the outlet of Denver Lake, Cinnamon Creek, Grouse Creek, Picayne Gulch, Minnie Gulch, Maggie Gulch, Cunningham Creek, Boulder Creek, Whitehead Gulch, and Molas Creek from their sources to the Animas River.

Classifications:

Aquatic life cold 1
Recreation 2
Water supply
Agriculture

Recommendation: Retain existing standards and classification. Add the mainstem of the Animas from the source to the outlet of Denver Lake to the segment. Adopt the fecal coliform standard of 200mpn/100ml.

Description of the segment:

These are small first and second order tributary streams to the Animas River, and are located in the 21-1 and 21-2 sub-ecoregions. They are not contaminated by metals. The locations of these tributaries are shown in Exhibit 4.

Uses

Aquatic life: No data were collected, however based on an evaluation of watwer chemistry, full aquatic life uses are currently being achieved in these streams.

Recreation: These streams are not known to support recreation 1 uses, however they are expected to be significantly better than the 200/100 ml fecal coliform criterion.

Water supply: Silverton obtains a portion of its domestic source from Boulder Creek. Data indicates that the quality meets all water supply criteria.

Agriculture: Livestock graze the watersheds of several of these streams thus they may be used for stock watering. All agricultural criteria are met.

Table 8
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in the Animas Basin Segment 6

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS	6.5 to 9.0	75	87	0.9	9	3	50	0.01	10	0.05	83
Animas River A-01	5.4 to 7.0	30	71	0.6	2	0	85	0	0	0	81
Cinnamon Creek A-24	7.7 to 7.8	50	56	0	0	0	0	0	0	0	0
Grouse Creek A-25	7.7 to 8.2	83	50	0	0	0	0	0	0	0	0
Picayne Gulch A-26	6.7 to 8.5	125	67	0	0	0	9	0	0	0	14
Minnie Gulch A-42	7.5 to 7.9	72	0	0	0	0	11	0	0	0	9
Maggie Gulch A-43	7.8 to 7.8	94	88	0	0	0	15	0	0	0	13
Cunningham Creek A-48	6.6 to 7.4	94	0	0	0	0	0	0	0	0	24
Boulder Creek A-62	6.8 to 7.4	49	0	0.5	5	0	290	0	0	0	100

Water quality:

Although the 85th percentile of manganese and zinc are somewhat elevated on several streams, water quality of these streams is generally better than table value standards.

Problems and Issues

No permitted point sources discharge to any of these streams.

SEGMENT 7

Mainstem of Cement Creek, including all tributaries, wetlands, lakes, and reservoirs, from the source to the confluence with the Animas River.

Classifications:

Recreation 2
Agriculture

Recommendation: Add the agriculture classification. Adopt the narrative standard: that concentration of aluminum, cadmium, copper, iron, and zinc that is directed toward maintaining and achieving water quality standards established for segments 4a and 4b. Adopt temporary modifications for aluminum, cadmium, copper lead, manganese, and zinc which are based on the 85 percentile of the ambient data. The temporary modifications shall expire on October 1, 1997. Adopt the 200/100ml fecal coliform standard.

Description of the segment:

Cement Creek is a twenty square mile watershed located in the alpine tundra (21-1) and cool moist forest (21-2) sub-ecoregions. Elevation ranges from about 9300 feet at Silverton to over 13000 feet. Cement Creek contributes about 17.5 percent of the flow to the Animas River at station A-72 (below Mineral Creek). The Cement Creek basin has been extensively mined generally from Prospect Gulch to the headwaters. Most of the watershed is administered by the Bureau of Land Management.

Uses

Aquatic life: Ambient concentrations of aluminum, cadmium, copper, manganese, and zinc preclude the ability of aquatic life to survive in Cement Creek. Deposits of oxides of iron and aluminum on the channel substrate limits the ability of macroinvertebrates to survive. Electrofishing at two sites on Cement Creek in 1992 failed to produce any fish, Exhibit 7. Macroinvertebrate mean relative abundance per square meter was one organism, Exhibit 6.

Recreation: Class 1 recreational uses have not been identified on the segment, however it is expected that the 200/100ml fecal coliform criterion will be met.

Water supply: The are no public domestic sources on Cement Creek. Iron and manganese exceed the water supply criteria.

Agriculture: Headwaters of the Cement Creek watershed in the tundra sub-ecoregion are grazed by sheep on Bureau of Land Management grazing allotments.

Table 9
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in the Animas Basin Segment 7

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS		200	87	2.0	21	10	1000	0.1	17	0.25	191
Headwater Cement CC-01	5.9 to 6.3	65	300	9	170	0	650	0	0	0	1600
North Fork Cement Creek CC-05	3.5 to 4.2	80	3000	15	520	11	890	0	0	0	3700
South Fork Cement Creek CC-17	6.0 to 6.4	194	910	2.9	28	0	1700	0	0	0	700
Prospect Gulch CC-26	3.4 to 7.1	54	19000	7	310	110	800	0	0	0	1500
Ohio Creek CC-40	2.9 to 3.8	80	18000	5.4	330	180	530	0	0	0	1000
Cement Creek CC-39	4.0 to 5.5	342	4100	5.3	170	26	1800	0	0	0	1100
Cement Creek CC-48	4.4 to 5.1	282	4300	5.4	110	20	1500	0	0	0	930

Water quality:

Water quality monitoring locations in the Cememt Creek basin are shown in Exhibit 4. The concentration of aluminum, cadmium, copper, iron, manganese, and zinc are high from near the headwaters of the watershed to the mouth in Silverton, Table 9. Most of the metal loading occurs from Prospect Gulch to the headwaters. The low pH of the water throughout the watershed causes several of the metals to remain in solution.

Problems and Issues

The Sunnyside Mine has a permitted point source discharge to Cement Creek via the American Tunnel. The Cement Creek basin has numerous areas of acid water and metal loading owing to natural sources and in-active mines. Major areas include the Cement Creek headwaters, North Fork of Cement Creek, Prospect Gulch, and Ohio Gulch.

Several important steps have been taken in recent years to reduce the metal loadings from Cement Creek. Treatment of the Sunnyside Mine's American Tunnel discharge, beginning around 1987, has

reduced the zinc concentration from 75 mg/l to less than 0.75 mg/l. A second major source of loading, a large tailings pile located near the mouth of the South Fork of Cement Creek, was moved in 1991.

Preliminary estimates suggest that large reductions of aluminum, cadmium, and copper would be required to meet chronic criteria for brook trout in the segment. Removal of some metals and or increasing the pH of Cement Creek through elimination of acid sources will most likely be required to meet the use classification goal and water quality standards proposed for segment 4a.

SEGMENT 8

Mainstem of Mineral Creek, including all tributaries and wetlands, from the source to a point immediately above the confluence with South Mineral Creek except for the specific listing in segment 9a ~~8a~~.

Classifications:

Recreation 2
Agriculture

Recommendations: Retain the existing classifications. Adopt the narrative standard: that concentration of aluminum, cadmium, copper, iron, and zinc that is directed toward maintaining and achieving water quality standards established for segments 4a, 4b, and 9b. Adopt temporary modifications for aluminum, cadmium, copper lead, manganese, and zinc which are based on the 85 percentile of the ambient data. The temporary modifications shall expire on October 1, 1997. Adopt the 200/100ml fecal coliform standard.

Description of the segment:

Mineral Creek begins near Red Mountain Pass and generally parallels U. S. Highway 550 to the confluence with the Animas. Although there are several mining claims in the basin, most of the land is a part of the San Juan National Forest. The watershed is located in the 21-1 and 21-2 sub-ecoregions. Several in-active mines located near the headwaters on Red Mountain Pass contaminate Mineral Creek to the confluence with South Mineral Creek. The Middle Fork of Mineral Creek adds a significant quantity of aluminum and iron to the stream.

Uses

Aquatic life: The Division electrofished the segment at two locations in 1992. No fish were found, Exhibit 7. Macroinvertebrate mean relative abundance per square meter on the mainstem ranged from 1.5 to 3.5 organisms. Mean relative abundance per square meter was 133.5 organisms at the headwaters of the Middle Fork, Exhibit 6.

Recreation: No class 1 recreation uses were identified, however the segment is expected to meet the 200/100 ml fecal coliform criterion.

Water supply: There are no public domestic sources on the segment. Manganese and iron exceed water supply criteria.

Agriculture: Portions of the watershed are grazed by sheep. All agricultural criteria for livestock watering are met.

Table 10
Comparison of Ambient Quality to Aquatic Life Cold Chronic TVS for Selected Locations in Animas Basin Segment 7

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS		84	87	1.0	10	3	1000	0.1	17	0.06	91
Mineral trib M-02	2.6 to 3.0	257	85000	810	82000	300	26000	0	0	0	230000
Mineral Creek M-05	3.0 to 3.9	52	12000	100	9900	29	3600	0	0	0	30000
Middle Fork Mineral Creek M-22	3.6 to 5.7	263	11000	0.9	9	0	1300	0	0	0	210
Browns Gulch M-12	3.4 to 4.7	148	11000	23	230	25	6700	0	0	0	5600
Mineral Creek M-13	5.2 to 6.7	110	66	5.5	190	150	370	0	0	0	1700
Mineral Creek M-27	4.5 to 6.4	199	5200	3.2	190	23	860	0	0	0	920

Water quality:

Mineral Creek is contaminated by cadmium, copper, and zinc from near the headwaters (M-05) to the confluence with South Mineral Creek (M-27). The segment has low pH, high dissolved aluminum, and high dissolved iron concentrations. Most of the dissolved aluminum and iron are from the Middle Fork of Mineral Creek (M-22), and Browns Gulch (M-12). Cadmium and zinc are high at the headwaters of Mineral Creek and in Browns Gulch. The Middle Fork also adds some dissolved copper.

Problems and Issues

No permitted point sources discharge to the segment. Remediation at several sites could result in measureable water quality improvemnts in Mineral Creek and benefit the Animas River.

SEGMENT 9a

Mainstem of South Mineral Creek, including all tributaries, wetlands, lakes, and reservoirs from the source to the confluence with Mineral ~~Clear~~ Creek; mainstems, including all tributaries, wetlands, lakes, and reservoirs of Mill Creek and Bear Creek from their sources to the confluence with Mineral Creek; and all lakes and reservoirs in segments ~~7 through 9~~.

Classifications:

Aquatic life cold 1
Recreation 2
Water supply
Agriculture

Recommendation: Retain the existing classifications and adopt TVS.

Description of the segment:

This segment describes the South Mineral Creek watershed plus several tributaries to Mineral Creek which are not impacted by metals. The segment is located in the 21-1 and 21-2 sub-ecoregions. Most of the watershed is a part of the San Juan National Forest.

Uses

Aquatic life: Electrofishing four sites in South Mineral Creek in 1992 found rainbow and brook trout. Production ranged from around 14 pounds per acre to nearly 85 pounds per acre in the headwaters. Macroinvertebrate relative mean abundance per square meter ranged from 94.5 to 1725 organisms.

Recreation: No class 1 recreational uses were identified on the segment, however the segment is expected to meet the 200/100 ml fecal coliform criterion.

Water supply: Bear Creek is the primary domestic source of water for Silverton. All water supply criteria are met.

Agriculture: Portions of the watersheds are grazed by sheep of Forest Service allotments. All water quality criteria for livestock are met.

Water quality:

These streams are minimally affected by acid waters or metals. There appear to be some minmal water quality problems near the headwaters, however in general table value standards are met for all constituents met at the ambient hardness.

Table 11
Comparison of Ambient Quality fo Aquatic Life Cold Chronic TVS for Selected Locations in Animas Basin Segment 8

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS		50	87	0.7	7	1	1000	0.1	17	0.02	59
South Mineral Creek M-25	6.9 to 7.1	41	130	0.5	0	0	25	0	0	0	95
South Mineral Creek M-28	6.9 to 7.7	73	98	0	0	0	24	0	0	0	17
Clear Creek M-26	7.2 to 7.8		0	0	0	0	0	0	0	0	0
Mill Creek M-10	6.8 to 7.5		0	0	0	0	20	0	0	0	40
Bear Creek M-30	7.0 to 7.9	50	0	0	0	0	4	0	0	0	13

Problems and Issues

No permitted point sources discharge to any of these streams.

SEGMENT 9b

~~Mainstem of South Mineral Creek, including all tributaries, wetlands, from a point immediately above the confluence with Clear Creek to the confluence with Mineral Creek and the m~~Mainstem of Mineral Creek from immediately above the confluence with South Mineral to the confluence with the Animas River.

Classifications:

Aquatic life cold 1
Recreation 2
Agriculture

Recommendations: Retain the existing classifications and adopt table value standards, based on dissolved metals, for all constituents. Adopt temporary modifications for cadmium (1.6 ug/l), copper (57 ug/l) and zinc (544 ug/l) based on the ambient quality. Adopt the 200 fecal coliform standard.

Description of the segment:

This segment is a continuation of segment 8. The segment is located in the 21-2 sub-ecoregion, and is within the San Juan National Forest. Mineral Creek contributes about 36 percent of the flow to the Animas River at station A-72.

Uses

Aquatic life: The Division electrofished the segment in 1992 near the confluence with the Animas River. No fish were found, Exhibit 7. Macroinvertebrate mean relative abundance per square meter at one site was four organisms, Exhibit 6. Aquatic life in this segment is limited by poor water quality.

Recreation: There are no class 1 recreation uses the segment, however it is expected to meet the 200/100 ml fecal coliform criterion.

Water supply: There are no public domestic sources from the segment. Manganese and iron exceed the water supplly criteria.

Agriculture: Portions of the watersheds of these streams are grazed by sheep on Forest Service grazing allotments. All water quality criteria for livestock are met.

Table 12
Comparison of Ambient Quality to Aquatic Live Cold Chornic TVS
for Selected Locations in Animas Basin Segment 9b

	pH s.u.	Hard mg/l	Al ug/l	Cd ug/l	Cu ug/l	Pb ug/l	Mn ug/l	Hg ug/l	Se ug/l	Ag ug/l	Zn ug/l
TVS		135	87	1.4	15	7	1000	0.1	17	0.15	137
Mineral Creek M-29	6.7 to 7.0	93	53	1.4	31	0	290	0	0	0	420
Mineral Creek Colo. Riv. Watch	5.0 to 7.4	148	-	1.7	60	0	464	-	-	-	556
Mineral Creek M-34	6.0 to 7.4	102	71	1.3	16	0	410	0	0	0	390
Combined	6.0 to 7.4	136	71	1.7	57	0	460	0	0	0	544

Water quality:

The water quality of this segment is affected by dissolved aluminum, cadmium, copper, iron, and zinc. Dissolved aluminum exceeds criteria for both brook and rainbow trout for a short distance below South Mineral Creek. Copper is the only metal to exceed chronic criteria for brook trout at the confluence with the Animas. Cadmium, copper, and zinc exceed chronic criteria for rainbow trout at the confluence with the Animas. All of the metals except iron are from upstream segment 8. There are several sources of iron loading to the segment near the Animas River.

Problems and Issues

No permitted point sources discharge to the segment. Remediation opportunities may exist that could restore full aquatic life uses in Mineral Creek and enhance the water quality of the Animas River because most of the loads of aluminum, cadmium, copper, and zinc can be attributed to two areas: the summit of Red Mountain Pass and the Middle Fork of Mineral Creek.

APPENDIX D

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Water Quality Control Commission

Draft Final Action
January 31, 1995

For Gavitte

ORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
ter Quality Control Commission

M E M O R A N D U M

Parties to the Animas River Basin
Other Interested Persons

M: Paul Frohardt PAF

E: January 31, 1995

JECT: Draft Final Action Documents

enclose for your information and review, a final draft of isions to the classifications and numeric standards for the mas River Basin and a final draft Statement of Basis, Specific tutory Authority, and Purpose. These documents have been i to reflect the preliminary final determinations reached by mission at its January 9, 1995 meeting. In addition, this ft incorporates revisions on the two issues remaining to be olved by the Commission--the specific formulation of ambient-lity standards for segments 2, 3b, 7 and 8; and the water supply ndards for segment 4b. I also enclose a memorandum from Mely ting explaining the basis for these latter revisions.

you know, the record for this proceeding is now closed. ever, if you believe that the enclosed documents do not urately reflect the Commission's preliminary decision, please me know at your earliest convenience. The Commission is eduled to consider final action regarding this matter at its ruary 13, 1995 regular meeting. Should you have any questions arding the preceding, please feel free to call me at 692-3526.

Water Quality Control Commission

RECEIVED
FEB 17 1995
HAZARDOUS MATERIALS
AND WASTE MANAGEMENT

Stream Segment Descri[illegible]			and BIOLOGICAL	m[illegible]		ug/l			
1. All tributaries [illegible] Animas River and [illegible]ida River, including all wetlands, lakes and reservoirs, which are within the Weminuche Wilderness Area.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	[illegible]0.002 [illegible]=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
2. Mainstem of the Animas River, including all tributaries and wetlands, from the outlet of Denver Lake to a point immediately above the confluence with Maggie Gulch, except for specific listings in Segment 1.	UP	Recreation 2 Agriculture	pH = 5.8-9.0 F.Coli=200/100ml			Effective until March 2, 1998: Existing ambient quality for all metals as of February 14, 1995. Effective as of March 2, 1998: The concentration of dissolved aluminum, cadmium, copper, iron, lead, manganese, and zinc that is directed toward maintaining and achieving water quality standards established for segments 3a, 4a, 4b, and 9b.			Temp mod effective for 3 years beginning 3/2/98: existing ambient quality for all metals.
3a. Mainstem of the Animas River, including wetlands, from a point immediately below the confluence with Maggie Gulch to immediately above the confluence with Cement Creek.		Aq Life Cold 1 Recreation 2 Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75	Al(ac/ch)=TVS As(ac)=100(Trec) Cd(ac/ch)=1.7 CrIII(ac/ch)=TVS CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe=132(dis) Pb(ac/ch)=TVS Mn(ch)=1000 Hg(ch)=0.01(tot)	Se(ac/ch)=TVS Ni(ac/ch)=TVS Ag(ac)=TVS Zn(ac/ch)=540	
3b. Mainstem of the Animas River, including wetlands, from a point immediately above the confluence with Cement Creek to a point immediately above the confluence with Mineral Creek.	UP	Recreation 2	pH = 6.0-9.0 F.Coli=2000/100ml			Effective until March 2, 1998: Existing ambient quality for all metals as of February 14, 1995. Effective as of March 2, 1998: The concentration of dissolved aluminum, cadmium, copper, iron, lead, manganese, and zinc that is directed toward maintaining and achieving water quality standards established for segments 3a, 4a, 4b, and 9b.			Temp mod effective for 3 years beginning 3/2/98: Zn(ch)=657.
4a. Mainstem of the Animas River, including wetlands, from a point immediately above the confluence with Mineral Creek to the confluence with Elk Creek.	Eff until 3/2/98: UP	Recreation 1 Eff until 3/2/98: Aq Life Cold 2 Eff as of 3/2/98: Aq Life Cold 1*	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75	Al(ac/ch)=TVS As(ch)=100(Trec) Cd(ac/ch)=1.6 CrIII(ac/ch)=TVS CrVI(ac/ch)=TVS Effective until March 2, 1998: Fe(ch)=2000(Trec); Zn(ch)=520 Effective as of March 2, 1998: Fe(ch)=1000(Trec); Zn(ch)=225	Cu(ac/ch)=TVS Fe(ch)=390(dis) Pb(ac/ch)=TVS Mn(ch)=1000	Hg(ch)=0.01(tot) Ni(ch)=TVS Se(ac/ch)=TVS Ag(ch)=TVS	Temp mod effective for 3 years beginning 3/2/98: Zn(ch)=520 *Goal
4b. Mainstem of the Animas River, including wetlands, from the confluence with Elk Creek to the confluence with Junction Creek.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ch)=50 Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac/ch)=TVS CrVI(ac/ch)=TVS Effective until March 2, 1998: Zn(ch)=182 Effective as of March 2, 1998: Zn(ch)=TVS	Cu(ac/ch)=TVS Fe(ch)=300(dis) Fe(ch)=1509(Trec) Pb(ac/ch)=TVS Mn(ch)=210	Hg(ch)=0.01(tot) Ni(ch)=TVS Se(ch)=10 Ag(ac)=TVS Ag(ch)=TVS(tr)	Temp mod effective for 3 years beginning 3/2/98: Zn(ch)=182
5a. Mainstem of the Animas River, including wetlands, to the Southern Ute Indian Reservation boundary.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ch)=50 Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Hg(ch)=0.01(tot) Ni(ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	

**SEE STATEMENT OF BASIS AND PURPOSE

5b.	Mainstem of the [illegible]s River, including wetlands, from the Southern Ute Indian Reservation boundary to the Colorado/New Mexico border.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ch)=50 Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Hg(ch)=0.01(tot) Ni(ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
6.	Mainstem, including all tributaries, wetlands, lakes and reservoirs, of Cinnamon Creek, Grouse Creek, Picayne Gulch, Minnie Gulch, Maggie Gulch, Cunningham Creek, Boulder Creek, Whitehead Gulch, and Molas Creek from their sources to their confluences with the Animas River. Mainstem of the Animas from the source to the outlet of Denver Lake.		Aq Life Cold 1 Recreation 2 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
7.	Mainstem of Cement Creek, including all tributaries, wetlands, lakes, and reservoirs, from the source to the confluence with the Animas River.	UP	Recreation 2 Agriculture	pH = 3.7-9.0 F.Coli=200/100ml			Effective until March 2, 1998: Existing ambient quality for all metals as of February 14, 1995. Effective as of March 2, 1998: The concentration of dissolved aluminum, cadmium, copper, iron, lead, manganese, and zinc that is directed toward maintaining and achieving water quality standards established for segments 3a, 4a, 4b, and 9b.			Temp mod effective for 3 years beginning 3/2/98: existing ambient quality for all metals.
8.	Mainstem of Mineral Creek, including all tributaries and wetlands, from the source to a point immediately above the confluence with South Mineral Creek except for the specific listing in Segment 9a.	UP	Recreation 2 Agriculture	pH = 4.5 - 9.0 F.Coli=200/100ml			Effective until March 2, 1998: Existing ambient quality for all metals as of February 14, 1995. Effective as of March 2, 1998: The concentration of dissolved aluminum, cadmium, copper, iron, lead, manganese, and zinc that is directed toward maintaining and achieving water quality standards established for segments 3a, 4a, 4b, and 9b.			Temp mod effective for 3 years beginning 3/2/98: existing ambient quality for all metals.
9a.	Mainstem of South Mineral Creek including all tributaries, wetlands, lakes and reservoirs from the source to a point immediately above the confluence with Mineral Creek; mainstems, including all tributaries, wetlands, lakes and reservoirs of Mill Creek and Bear Creek from sources to confluence with Mineral Creek; all lakes and reservoirs in the drainage areas described in Segments 7 through 9.		Aq Life Cold 1 Recreation 2 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
9b.	Mainstem of Mineral Creek, including wetlands, from immediately above the confluence with the South Fork to the confluence with the Animas River.	UP	Aq Life Cold 1 Recreation 2 Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l F.Coli=200/100ml Eff until 3/2/98: pH = 6.2 - 9.0 Eff as of 3/2/98: pH = 6.5 - 9.0	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05	Al(ac/ch)=TVS As(ch)=100(Trec) Cd(ac)=TVS(tr) CrIII(ac/ch)=TVS Effective until March 2, 1998: Cd(ch)=1.7 Zn(ch)=544 Effective as of March 2, 1998: Cd(ch)=TVS Zn(ch)=TVS	CrVI(ac/ch)=TVS Cu(ac)=TVS Pb(ac/ch)=TVS Mn(ch)=1000 Cu(ch)=57	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac)=TVS Fe(ch)=5515(Trec) Fe(ch)=1000(Trec)	Temp mod effective for 3 years beginning 3/2/98: pH=6.2-9.0 Cu=57 Fe=3415(dis) Zn=544

**SEE STATEMENT OF BASIS AND PURPOSE

REGION: 9 BASIN: ANIMAS AND FLORIDA RIVER Stream Segment Description	Desig	Classifications	NUMERIC STANDARDS PHYSICAL and BIOLOGICAL	INORGANIC mg/l		METALS ug/l			TEMPORARY MODIFICATIONS AND QUALIFIERS
10. Mainstem of the Florida River from the boundary of the Weminuche Wilderness Area to the Florida Farmers Canal Headgate, except for the specific listings in Segment 12b.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O.=6.0 mg/l D.O.= 7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/cu)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Mn(ch)=1000(Trec) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
11. Mainstem of the Florida River from the Florida Farmers Canal Headgate to the confluence with the Animas River.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec Pb(ac/ch)=TVS Mn(ch)=50(dis) Mn(ch)=1000(Trec) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
12a. All tributaries to the Animas River, including all lakes and reservoirs from a point immediately above the confluence with Elk Cr. to a point immediately below the confluence with Hermosa Cr. except for specific listings in Segment 15. All tributaries to the Florida River including all lakes and reservoirs from the source to the outlet of Lemon Reservoir except the specific listing in Segment 1. Mainstems of Red and Shearer Creeks from their sources to their confluences with the Florida River.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Mn(ch)=1000(Trec) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
12b. Lemon Reservoir.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10.02 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=50(dis) Mn(ch)=1000(Trec) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
13a. Mainstem of Junction Creek, and including all tributaries, from U.S. Forest Boundary to confluence with Animas River.	UP	Aq Life Cold 2 Recreation 2 Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=2000/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05	As(ch)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac/ch)=TVS CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ch)=1000(Trec) Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS	Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
13b. All tributaries to the Animas River, including all lakes and reservoirs, from a point immediately below the confluence with Hermosa Creek to the Southern Ute Indian Reservation boundary except for the specific listings in Segments 10, 11, 12a, 12b, 13a and 14; all tributaries to the Florida River, including all lakes and reservoirs, from the outlet of Lemon Reservoir to the confluence with the Animas River, except for specific listings in Segment 12a.	UP	Aq Life Cold 2 Recreation 2 Agriculture	D.O. - 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=2000/100ml						

**SEE STATEMENT OF BASIS AND PURPOSE

REGION: 9 BASIN: ANIMAS AND FLORIDA RIVER Stream Segment Description	Desig	Classifications	NUMERIC STANDARDS PHYSICAL and BIOLOGICAL	INORGANIC mg/l		METALS ug/l			TEMPORARY MODIFICATIONS AND QUALIFIERS
13c. All tributaries to the Animas River, including all lakes and reservoirs, from the Southern Ute Indian Reservation boundary to the Colorado/New Mexico border, except for the specific listings in Segments 10, 11, 12a, 12b, 13a and 14; all tributaries to the Florida River, including all lakes and reservoirs, from the outlet of Lemon Reservoir to the confluence with the Animas River, except for specific listings in Segment 12a.	UP	Aq Life Cold 2 Recreation 2 Agriculture	D.O. - 6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=2000/100ml						
14. Mainstem of Lightner Creek from the source to the confluence with the Animas River.		Aq Life Cold 1 Recreation 1 Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS MN(ch)=50(dis) Mn(ch)=1000(Trec) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ch)=10(Trec) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
15. Mainstem of Purgatory Creek from source to Cascade, Cascade Creek, Soulding Creek from the source to Elbert Creek, and Nary Draw from the source to Naviland Lake.	UP	Aq Life Cold 2 Recreation 2 Water Supply Agriculture	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=2000/100ml	CN=0.2 S=0.05 NO_2=1.0	NO_3=10 Cl=250 SO_4=250	As(ch)=50 Cd(ch)=10 CrIII(ch)=50 CrVI(ch)=50	Cu(ch)=1000 Fe(ch)=0.3(dis) Pb(ch)=50 Mn(ch)=50	Hg(ch)=2(tot) Se(ch)=10 Ag(ch)=50 Zn(ch)=5000	All metals are Trec unless otherwise noted.

**SEE STATEMENT OF BASIS AND PURPOSE

3.4.15 STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY, AND PURPOSE; SEPTEMBER 12, 1994 HEARING:

The provisions of 25-8-202(1)(a), (b) and (2); 25-8-203; 25-8-204; and 25-8-402 C.R.S. provide the specific statutory authority for adoption of these regulatory amendments. The Commission also adopted in compliance with 24-4-103(4), C.R.S., the following statement of basis and purpose.

BASIS AND PURPOSE

A. BACKGROUND

Between 1991 and 1993 the Water Quality Control Division, in cooperation with several federal, state, local and private interests conducted an intensive water quality investigation of the Animas River and its tributaries from Elk Creek to the headwaters. The objectives of the study were to characterize the current chemical, biological, and physical conditions of the Animas River and selected tributaries above Elk Creek and to quantify the areas of highest metal loadings and determine the potential for water quality improvement sufficient to allow naturally reproducing trout populations; and to prioritize sites for remedial projects based on relative loading, environmental impact, feasibility, cost, and benefits.

The water quality of this area is extensively impacted by heavy metals which are attributed to both natural and anthropogenic factors. The results of the investigation have been used to identify the beneficial uses and water quality that are currently being achieved or that may reasonably be achieved within a twenty year period through restoration of disturbed sites.

B. OVERVIEW

The starting point for the Commission's analysis is a conclusion that appears to be shared by most, if not all, of the participants in this rulemaking proceeding: current water quality in the Animas River Basin can and should be improved. For example, quoting from the Statement of the Animas River Stakeholders' Group:

> All stakeholders agree that current water quality can and should be protected from any further degradation; all agree that there are opportunities to make improvements, and that improvement is desirable even if it were not mandated; all agree that the task before us now is to identify the sources of significant human-caused loadings and find ways to remediate them.

Beyond this starting point, there was considerable debate in the hearing, and among Commission members in its initial deliberations, regarding the most appropriate and constructive way to encourage and stimulate the desired water quality improvement. One perspective offered was that the Commission should adopt underlying

numerical and narrative standards for the critical segments in question that would establish goals for water quality improvement, tempered by temporary modifications that recognize current water quality. An alternative perspective suggested that adopting such goals as legally effective standards before the feasibility of specific clean-up projects had been determined--and the achievable improvement quantified--may hinder the cooperative, community-based effort that has been evolving to identify, prioritize and acquire funding for remediation projects.

Following extensive discussion and debate, the Commission has decided to adopt a hybrid result that consists of two components. First, the set of proposals advanced by the Water Quality Control Division staff, based on the promulgation of underlying goal-based numerical and narrative standards for the critical segments, is adopted by the Commission with a three-year delayed effective date. The Commission finds that the evidence submitted in the hearing provides a sound scientific basis for the adoption of the Division's proposal, with the caveat that three-year temporary modifications almost certainly will not provide an adequate period in which to achieve water quality improvement that will attain the underlying standards. The issue of temporary modifications is discussed further below.

The second component of the action being taken by the Commission is the adoption of ambient quality-based standards that will be in place for the critical segments until the effective date of the goal-based standards described above. The purpose of taking this step, as opposed to adopting the goal-based standards with an immediate effective date, is to encourage the cooperative, community-based effort toward water quality improvement that has begun in the basin, unencumbered by the potential implications of the goal-based standards being in effect. This action is an experiment, intended to assess the ability of a cooperative process to achieve meaningful progress toward water quality improvement without the underlying improvement goal being reflected in currently effective, legally binding water quality standards.

If substantial progress toward water quality improvement--through the identification, prioritization and implementation of remediation projects--is achieved within the next three years, and if it appears three years from now that the lack of legal effectiveness of the goal-based standards will provide the best stimulus for further progress, further delay in the effective date of the goal-based standards can be considered by the Commission at that time. Of course, such progress could also demonstrate that the identified goals are achievable, or that they should be refined in some manner.

If, however, substantial and diligent progress toward water quality improvement is not achieved over the next three years, it is the intent of the Commission that the goal-based standards should and

will be allowed to go into effect at that time to stimulate further progress. In a new rulemaking hearing, the burden should be on those that have argued that clean-up will be more successful with a cooperative effort working toward a goal, without that goal being reflected in currently effective water quality standards, to demonstrate the success of this experiment.

The Water Quality Control Commission expects that the cooperative effort will be successful and is attempting by this action to send that message to all stakeholders. To those concerned about the potential impacts on property owners of goal-based standards being in effect, the message is that the Commission wants to encourage this locally-driven, cooperative watershed improvement initiative by demonstrating as much flexibility as possible. To federal agencies or others with potential resources to devote to water quality improvement efforts, the message is that working toward such improvement in this basin is an extremely high priority for the State of Colorado. To the Water Quality Control Division and those that supported their proposal in this rulemaking proceeding, the message is that the Commission has been persuaded--based on the unprecedented level of monitoring and analysis that has occurred in this basin--that a sound scientific justification has been provided for the adoption of goal-based water quality standards, and that these standards should be allowed to go into effect unless it is demonstrated that the pending experiment in cooperative watershed management can succeed without this legal impetus. To all of the residents of the Animas River Basin, the message is that the Commission is concerned about water quality in your basin and is willing to work with you to explore whatever options appear most likely to facilitate progress toward water quality improvement in the least disruptive and most expeditious manner.

In summary, the Commission's action in revising the Animas River Basin water quality classifications and standards should in no way be interpreted as a sanctioning of the status quo. To repeat, current water quality in the Animas River Basin can and should be improved. The purpose of the Commission's action is to establish a clear goal of attaining such improvement, while providing regulatory flexibility intended to encourage cooperative efforts toward such improvement.

C. IMPLICATIONS OF THE HYBRID ACTION

Because of the unorthodox nature of the hybrid action being taken, the Commission believes that it may be important to clarify its understanding regarding the implications of this action for various activities or decisions that will need to be undertaken by others during the next three years.

For any existing point source discharge permit that may come up for renewal during the next three years, or for any new-wastewater discharge permit issued during this period, the Commission intends

that the permit would be written based on the ambient quality-based standards then in effect, along with other applicable effluent quality restrictions. The Commission also understands that ambient quality-based standards would require the continuation of current treatment levels for permit renewals, to assure that further degradation of water quality does not occur.

To the extent that general or individual storm water permits may be required for some sites in the basin, the Commission understands that the water quality standards now being adopted are not likely to affect the content of the first round of any such permits, which are anticipated to be based principally on the implementation of best management practices (BMPs). Such initial BMPs are not likely to be significantly different whether they are deemed to be technology-based or water quality-based.

Finally, as discussed above, the Commission intends this action to provide a clear message to other agencies, entities and persons involved with potential nonpoint source clean-up projects that the Animas River Basin is in fact a high priority for such efforts. The delayed effective date for goal-based standards should not be interpreted to in any way lessen the priority of this basin; rather, as discussed above, this hybrid action is intended to provide flexibility for the cooperative, community-based efforts toward clean-up while at the same time clarifying that improvement is the goal.

D. DELAYED CLASSIFICATIONS AND STANDARDS

This portion of this statement describes the basis for the goal-based standards that are scheduled to go into effect three years after the effective date of this action.

The upper Animas water quality study found that the Animas River and several tributaries above Maggie Gulch (segment 2), the Animas River from Cement Creek to Mineral Creek (segment 3b), Cement Creek and its tributaries (segment 7), and Mineral Creek above the confluence with South Mineral Creek (segment 8) do not support diverse forms of aquatic life owing to poor water quality and limited physical habitat. The imposition of effluent limits required under the Federal Act for point sources and cost-effective and reasonable best management practices (BMP's) for nonpoint sources are not likely to lead to the establishment of aquatic life in these segments. Additionally, federal regulation (40 C.F.R. 131.10) allows excluding an aquatic life classification where naturally occurring pollutant concentrations prevent the attainment of the use and/or human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place. Therefore, an aquatic life classification is not being adopted for these segments. Downstream use classifications, however, depend on maintaining or improving the water quality in these segments. The

Commission has therefore, determined that narrative standards for metals based on the application of BMP's to nonpoint sources and the continuation of current treatment levels for existing point sources for these segments establish an appropriate goal for water quality in these segments. Narrative (and for zinc in segment 3b, numerical) temporary modifications have been adopted based on current ambient quality in these segments, to assure no additional degradation of downstream segments.

The Commission recognizes that even with aggressive clean-up efforts, it may take many years to achieve in-stream quality that attains the underlying goal-based standards. Three-year temporary modifications are being adopted in an attempt to avoid conflict with the current EPA policy that temporary modifications are variances that can not be extend for longer than three years without being readopted. The Commission anticipates that many, if not all, of the temporary modifications being adopted in this proceeding will need to be extended beyond three years to attain the underlying standards, even considering the delayed effective date of that portion of the action that includes temporary modifications.

The Commission has further determined that the Animas River between Maggie Gulch and Cement Creek (segment 3a) supports a population of brook trout that appears to be naturally reproducing in that it consists of multiple age classes. The segment also contains a diversity of macrobenthos and possesses physical habitat similar to other streams in the Southern Rocky Mountain ecoregion. Although the concentration of several metals, especially cadmium and zinc, are higher than what is required to protect the most sensitive aquatic life species, they are lower than the chronic toxic criteria for brook trout. Therefore a cold water aquatic life class 1 classification is being established to protect the resident aquatic life found in this segment. Ambient standards for cadmium and zinc are adopted to ensure that downstream use classifications and standards are not jeopardized. The imposition of effluent limits required under the Federal Act for point sources and cost-effective and reasonable best management practices for nonpoint sources are not likely to lead to the establishment of the most sensitive aquatic life species in this segment. However, consistent with its prior practice, the Commission has determined that the <u>most</u> sensitive species need not be present to find that a segment is "capable of sustaining a wide variety of cold water biota, including sensitive species", warranting a cold water class 1 classification. Section 3.1.7(1)(b)(ii) authorizes ambient standards where natural or irreversible man-induced ambient levels are higher than TVS but are adequate to protect the classified uses.

Mineral Creek between South Mineral Creek and the Animas River, renumbered segment 9b, was already classified aquatic life cold water class 1, with total recoverable table value standards. The

upper Animas water quality study showed that pH, aluminum, copper, iron, and zinc greatly exceed TVS in this segment and that both fish and macroinvertebrates are absent from the segment. The physical habitat assessment, however, found it comparable to other habitats within the Southern Rocky Mountain ecoregion. Because most of the aluminum, copper, iron, and zinc are contributed from two areas, there may be a potential to reduce loading from either or both of these areas. The Commission chose not to remove the aquatic life classification until it has been demonstrated that sources cannot be remedied within a twenty year period or would cause more environmental damage than to leave it in place. The Commission adopted TVS for segment 9b, together with temporary modifications for aluminum, copper, iron, and zinc based on ambient quality until the feasibility of remediation has been established. A use-protected designation has been added to this segment based on four key parameters with existing quality worse than table values.

The Animas River between Mineral Creek and Elk Creek, renumbered segment 4a, has not previously had an aquatic life classification. The upper Animas water quality study found that the water quality below Mineral Creek is suitable for brook trout and has physical habitat similar to other aquatic life streams in the Southern Rocky Mountain ecoregion. Some improvement in water quality from Cement Creek, Mineral Creek, and/or the Upper Animas may enable the water quality of the segment to support brown trout. However, the imposition of effluent limits required under the Federal Act for point sources and cost-effective and reasonable best management practices for nonpoint sources are not likely to lead to the establishment of aquatic life uses including the most sensitive species in this segment. The Commission adopted the aquatic life cold class 1 classification as a goal and TVS for this segment, except for the zinc standard which is based on the chronic toxic criterion for brown trout. Consistent with its prior practice, the Commission has determined that the <u>most</u> sensitive species need not be present or attainable to find that a segment is or may become "capable of sustaining a wide variety of cold water biota, including sensitive species", warranting a cold water class 1 classification. A temporary modification for zinc, based on the ambient quality, has been adopted until the feasibility for load reduction has been established.

E. AMBIENT QUALITY-BASED STANDARDS

This portion of this statement describes the basis for the ambient quality-based standards that are adopted for the three-year period starting with the effective date of this action.

For segments 2, 3b, 7 and 8, the Commission has adopted a narrative standard based on existing ambient quality for all metals to be applicable for the next three years. For segments 4a, 4b, and 9b, for this same time period the Commission has adopted ambient-quality based numerical standards for specific metals for which

ambient quality currently is higher (worse than) table values. These standards are intended to protect the aquatic life that is currently in place in these segments until the goal-based standards go into effect. As discussed above, the primary basis for adopting these numerical and narrative ambient quality-based standards is to provide maximum regulatory flexibility to encourage the cooperative, community-based effort toward clean-up to proceed. This approach provides time in which additional information can be developed regarding the feasibility of specific remedial efforts that will result in water quality improvement.

Having ambient standards in place for the next three years means that any point source permits issued or renewed during this period will be based on those ambient standards, along with other applicable effluent quality restrictions, rather than being based on the more stringent goal-based standards. At the same time, the ambient standards should help assure that no additional degradation in water quality occurs for these segments in the next three years while clean-up actions are being examined and initiated.

For segment 4a, the aquatic life cold class 2 classification and the use-protected designation proposed by Sunnyside have been adopted for the next three years, since this classification and designation appear to be more consistent with the ambient standards applicable during that period. As discussed above, at the end of three years the use-protected designation would expire and the aquatic life classification would become cold water class 1.

For segment 9b, the currently applicable class 1 aquatic life classification has been left in place, even though ambient standards proposed by Sunnyside have been adopted for the next three years. The Commission believes that a downgrading of the classification of this segment is premature, pending additional analysis of clean-up opportunities. As noted above, the use-protected designation proposed by the Division and several parties has also been adopted.

F. OTHER ISSUES

The above discussion, like the evidence submitted at the hearing, focuses principally on appropriate aquatic life classifications and associated water quality standards. In this hearing the Commission also added an agriculture classification to segments 2, 3a, and 7, based on evidence regarding the presence of grazing. In addition, the Commission changed the recreation classification from class 2 to class 1 for segments 4a, 4b, 5a, and 5b, based on evidence regarding the presence of primary contact recreation. Finally, fecal coliform standards for segments 2 and 3a were changed from 2,000 to 200/ml, to provide additional protection that better reflects current ambient conditions. There are no affected point sources on these segments.

February 1, 1995

M E M O R A N D U M

TO: Water Quality Control Commission

FROM: Amelia S. Whiting
Assistant Attorney General

RE: Animas Rulemaking Hearing

Last January, the Commission voted to give final approval to most of the provisions of the November 22, 1994 alternative proposal package for the upper Animas Basin. The Commission left two issues to be decided at their February meeting. One issue is the appropriate numeric ambient values to be adopted for segments 2, 3b, 7 and 8. The other issue is the appropriate water quality standards for the water supply classification in segment 4b.

Ambient Standards for Segments 2, 3b, 7 and 8

The Commission requested Sunnyside and the Division to get together and come up with an agreed set of numeric ambient values for these segments. The Division has met with Sunnyside to try to come up with a resolution. Based on those meetings, it has become clear that attempting to establish numeric values in these segments will only result in delay.

Consistent with the Basic Standards requirements for ambient standards, the numeric values proposed by the Division are based on a simple calculation of the 85th percentile of all the data in the record before the Commission. The Division thought that all the available water quality data for this basin had already been submitted. After three years of cooperative data collection efforts, and the Commission's prehearing order directing submittal by August of 1994, the Division's belief was justified.

During discussions over the Division's proposed numeric ambient values, Sunnyside announced that it has additional data for these segments which has not been previously submitted and is not part of the record. Sunnyside disagrees with the Division's proposed numeric values because they do not take into account the additional data.

In light of Sunnyside's position, pursuing numeric ambient standards will significantly delay final action in this hearing. The data offered by Sunnyside is not in the record and, therefore, cannot be accepted by the Commission without reppening the record and providing all parties an additional opportunity to comment. This will result in postponement of final action for at least another month, with the risk of loosing key commissioners, including the hearing Chair, whose last scheduled hearing is in February.

After considering the options, the Division withdraws its numeric ambient standards proposal and recommends the adoption of a modified ambient narrative standard proposal. The Division proposed numeric ambient standards in an effort to prevent further deterioration and future arguments over quantification of the narrative ambient standard. To prevent further deterioration, the Division recommends that the narrative ambient standard proposed in the Commission's November 22, 1994 alternative proposal be modified as follows:

> "Existing ambient quality for all metals **AS OF FEBRUARY 14, 1995.**"

Consistent with the alternative proposal, this narrative ambient standard would be effective until March 2, 1998, unless further extended by the Commission.

The Division has discussed this proposal with Sunnyside and the Four Corners Action Coalition, Taxpayers for the Animas River, Friends of the Animas River and San Juan Citizens Alliance. It is the Division's understanding that these parties do not object to this proposal.

<u>Water Supply Standards for Segment 4b</u>

The Division has reviewed the record and has found a discrepancy between the Division's proposal in Exhibit 2 and the table of standards and classifications before the Commission. In Exhibit 2, the Division recommended to "retain the water supply classification and all applicable standards" for segment 4b, with the exception of manganese, for which the Division recommended an ambient standard of 210 ug/l. This proposal did not get translated into the table of standards and classifications before the Commission.

The Division recommends that the table be corrected as follows:

* Reinstate the following inorganics standards:

NO3	=	10
Cl	=	250
SO4	=	250

* Reinstate the following metals standards:

As	=	50	(Trec)
Se	=	10	(Trec)

The reinstatement of these water quality standards is necessary to protect the water supply classification of segment 4b. The Division understands that these changes are not objectionable to any party.

cc: All parties to the Animas Rulemaking Hearing
J. David Holm

ATTACHMENTS

I 404(B)(1) EVALUATION

II SUMMARY TABLES

Part A Water Supply/Area Served 1980 and Present
Part B 1980 FES Plan Compared to Proposed Plan, Phase I, Stage A
Part C 1980 FES Plan Compared to Proposed Plan, Phase I, Stage B
Part D 1980 FES Plan Compared to Proposed Plan, Phase II

III DRAFT BIOLOGICAL OPINION

IV MEMORANDUM OF UNDERSTANDING RE NATIVE AMERICAN GRAVES REPATRIATION AND PROTECTION ACT

ATTACHMENT I

404 (b)(1) EVALUATION

ANIMAS LA-PLATA PROJECT

404(b)(1) Evaluation

FINAL DRAFT

January 19, 1996

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SECTION 1 INTRODUCTION

1.1 BACKGROUND

This evaluation under Section 404(b)(1) of the Clean Water Act has been prepared to analyze and describes the potential impacts from proposed discharges of dredged or fill material into the waters of the United States as a result of the construction and operation of the proposed Animas-La Plata Project in Colorado and New Mexico. The 404(b)(1) evaluation was prepared in support of the requirements of Section 404 of the Clean Water Act (PL92-500, as amended), and the Environmental Protection Agency Guidelines (40 CFR Part 230 et seq). Specifically, the 404(b)(1) evaluation was also prepared to meet the requirements of Section 404(r) of the Clean Water Act.

Previous 404(b)(1) evaluations were prepared to accompany Environmental Impact Statements on the Project in 1980 and the draft supplement to the EIS in 1992. The current 404(b)(1) evaluation was prepared to reflect proposed changes in the project since 1980, and revised National Environmental Policy Act (NEPA) documentation which was also prepared.

1.2 404(B)(1) GUIDELINES

The 404(b)(1) Guidelines, found at Title 40 of the code of Federal Regulations, Part 230, are the criteria used in evaluating discharges of dredged or fill material in waters of the United States under Section 404 of the Clean Water Act and are applicable to all 404 permit decisions. The Guidelines were developed by the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army acting through the Chief of Engineers and have the full force and effect of law. The Guidelines are consistent with policies expressed in the Clean Water Act and are intended to implement those policies. The Guidelines are weighted toward restoring and maintaining the chemical, physical, and biological integrity of U.S. waters by controlling discharges. Basic to the Guidelines is an understanding that dredged or fill material should not be discharged into such waters unless it is demonstrated that such discharges would not have unacceptable adverse impacts either individually or in combination with existing and/or probable impacts of other activities affecting the environment. A Section 404 evaluation is intended to demonstrate compliance with the Guidelines.

A number of critical items must be evaluated for each project. These include project purposes, practicable alternatives, cumulative effects, and mitigation, as well as the factual determinations. Key issues must be decided in arriving at a determination of compliance or noncompliance. The project must not cause or contribute to significant degradation of U.S. waters, and appropriate and practicable measures for minimizing potential adverse impacts of the discharge on the aquatic ecosystem must be taken.

Further, there must be no other practicable alternative which is less damaging to the aquatic environment, unless that alternative would have other significant adverse environmental consequences. This is a technical analysis based on many factors in light of the purpose and need for the proposal under review, including:

Subpart B of the Guidelines (Section 230.10) requires that the project comply with State water quality standards, the Endangered Species Act (ESA), and other pertinent statutory provisions.

Section 230.11 of the Guidelines sets forth the factual determinations used in deciding compliance, which are as follows:

- Physical substrate determinations;
- Water circulation, fluctuation, and salinity determinations;
- Suspended particulate/turbidity determinations;
- Contaminant determinations;
- Aquatic ecosystem and organism determinations;
- Proposed disposal site determinations (mixing zone);
- Determinations of cumulative effects on the aquatic ecosystem; and
- Determinations of secondary effects on the aquatic ecosystem.

Subparts C through F of the Guidelines evaluate the potential impacts of the fill activity on physical and chemical characteristics of the aquatic ecosystem, biological characteristics of the aquatic ecosystem, special aquatic sites, and human use characteristics, respectively. Subpart G of the Guidelines sets forth evaluation and testing procedures to provide information necessary to reach the determinations in Subpart B. Subpart H of the Guidelines lists actions to minimize adverse effects of the discharge.

The following sections discuss definition of project purpose and need, the alternative selection process, and the Subparts B-H evaluations.

SECTION 2 PRACTICABLE ALTERNATIVES ANALYSIS

2.1 INTRODUCTION

The U.S. EPA 404(b)(1) Guidelines are the substantive environmental criteria used in evaluating activities which discharge dredged or fill material into the "waters of the United States." Section 230.10(a) of the Guidelines states that:

> *"...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."*

The hierarchical structure of the Guidelines encourages activities which avoid discharges. The alternative analysis required by 230.10(a) is designed to achieve the basic project purpose with the minimal adverse environmental impact.

For the 404(b)(1) Evaluation for the Animas La-Plata Project, these are the steps that have been used in the 230.10(a) process to review potential alternatives:

- Project purpose and need were defined;
- A range of project alternatives was identified;
- Level 1 Screening was undertaken to identify practicable alternatives;
    - Criteria to screen out those alternatives that were not practicable are established;
    - A determination was made of which alternatives were practicable (i.e., available and capable of being done after taking into consideration cost, existing technology, and logistics);
- Level 2 Screening was undertaken;
    - The environmental impacts of practicable alternatives were identified,
    - The impacts to the aquatic ecosystem of practicable alternatives were compared, and

- A determination was made if any of the alternatives have other significant adverse environmental consequences.

2.2 DETERMINATION OF BASIC PROJECT PURPOSE AND NEEDS

Properly defining project purpose is essential to an adequate 404(b)(1) evaluation. The project purpose also drives the definition and evaluation of alternatives.

The Project Purpose for the Animas-La Plata project is:

<u>Purpose</u> **Provide an assured long-term water supply capable of meeting Project needs in the Project area, which includes portions of the Animas, La Plata, and Mancos River Basins.**

Further, the underlying needs that would be met by fulfilling this project purpose include the following:

- Meet Colorado Ute tribal water needs as defined in PL 100-585, the 1988 Colorado Ute Indian Water Rights Settlement Act; and

- Provide a dependable long-term water supply for neighboring Indian and non-Indian community water needs, including the Animas-La Plata Water Conservancy District, the La Plata Water Conservancy District, the San Juan Water Commission, and the Navajo Nation at Shiprock, New Mexico.

See Table 2-1 for specific water needs for each of these water users.

2.3 POTENTIAL WATER SOURCES

Project Alternatives were developed using a "bottom-up" approach, starting with the identification of water supplies that were potentially available in the river basins in and near to the project area. Water allocations to meet project needs were defined, and an evaluation of water supplies to meet these allocations was made.

2.3.1 Sources Considered

Information was evaluated, where available, on quantities of water that would be available from these types of sources:

- Potential for developing groundwater supplies;

- Potential for making volumes available through water conservation;
- Potential for developing surface water supplies; and
- Potential of purchasing water rights.

In addition, other information was gathered where available for the following areas:

- Reliability of water supply;
- Location of water supply;
- Water quality;
- Costs of developing water supply, storage, and/or conveyance; and
- General environmental concerns.

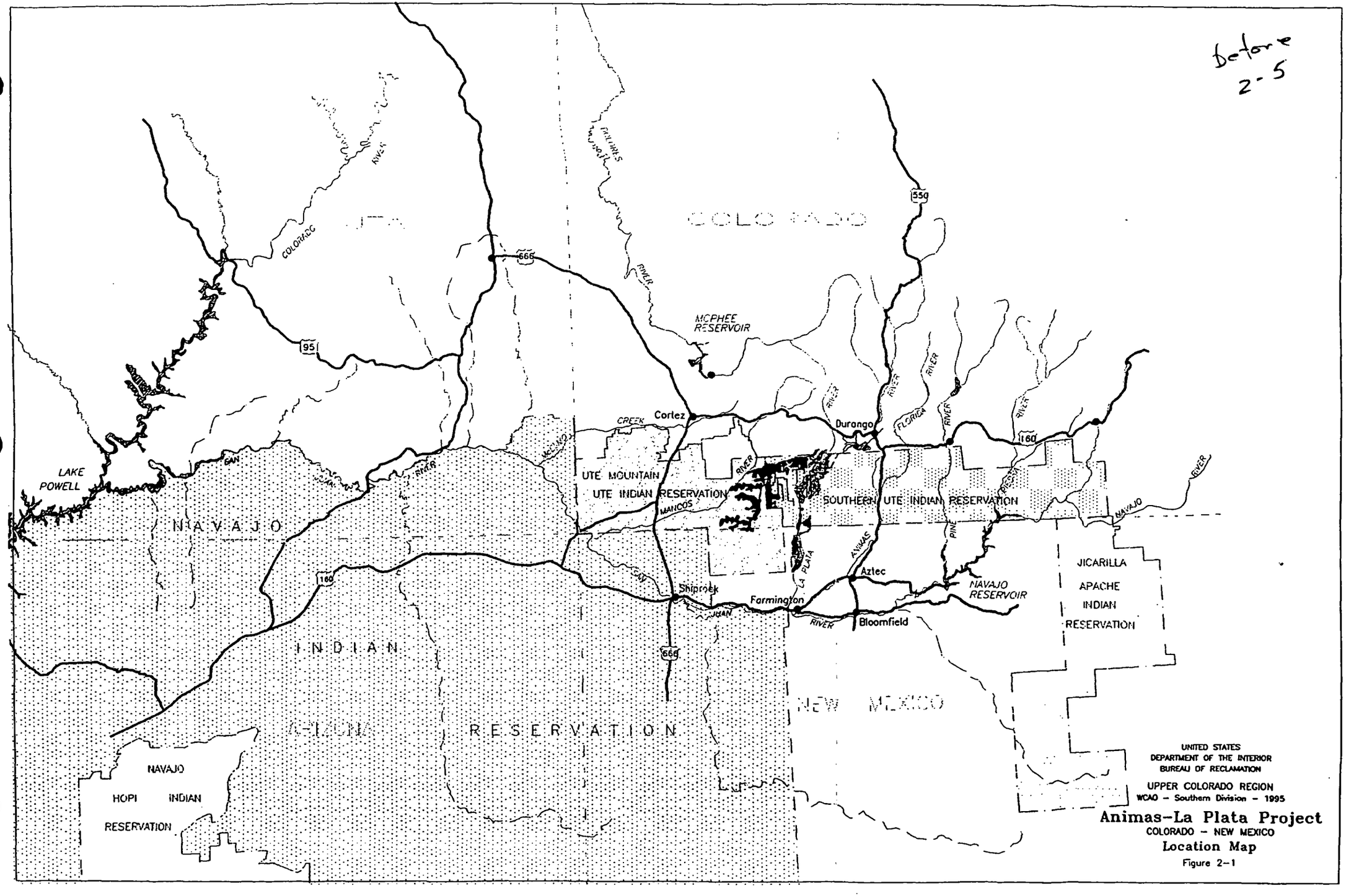
The following potential sources of water in the project area were evaluated (see Figure 2-1):

- Animas River Basin;
- Dolores River Basin;
- Florida River Basin;
- La Plata River Basin;
- Mancos River Basin;
- Piedra River Basin;
- Pine River Basin; and
- San Juan River Basin.

The potential for using water from the Colorado River to meet part of the Indian water requirements as specified in the Settlement Act was considered. Under this scenario, the rights to 32,500 AF of water stored in either Lake Mead or Lake Powell would be made available to the Utes for their use, sale, or lease to entities off tribal lands. This option, while technically feasible, is specifically addressed and restricted under Section 5(b) provisions in the Settlement Agreement, as follows:

> None of the waters from the Animas-La Plata...Projects may be sold, exchanged, leased, used, or otherwise disposed of into or in the Lower Colorado River Basin unless water within the Colorado River Basin held by non-Federal, non-Indian holders of that water pursuant to any water rights could be so sold, exchanged, leased, used, or otherwise disposed of under State law, Federal law, interstate compacts, or international treaty pursuant to a final, nonappealable order of a Federal court or pursuant to an agreement of the seven States signatory to the Colorado River Compact.

before 2-5



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER COLORADO REGION
WCAO – Southern Division – 1995

Animas–La Plata Project
COLORADO – NEW MEXICO
Location Map
Figure 2–1

However, there is a provision for tribes to sell, exchange, lease, water in the Settlement Agreement off their reservations in Colorado, but fully subject to state and federal laws (Section 5(c)). The tribes have indicated that they wish to keep their options open until basic project regulatory questions are resolved and the intent of the settlement agreement to represent their interests is being implemented. Therefore, this is not a desirable use for them at this time.

Without changing either the Settlement Act or existing state and federal water laws, use of this potential water supply would be constrained. Therefore, this alternative was considered not practicable and was not considered further.

2.3.2 Water Demand

Water allocation demands developed in the 1986 Indian Water Rights Settlement Agreement and 1986 Cost Sharing Agreement were affected by the 1991 Biological Opinion of the U.S. Fish and Wildlife Service and are used as the basis for three levels of water allocation for the 404(b)(1) evaluation. The recipients of water and volumes demanded under these three different water allocations are shown in Table 2-1, as follows:

- 80,100 acre-feet, serving Indian and non-Indian M & I project water demands;
- 173,100 acre feet, serving 80,100 acre-feet of Indian and non-Indian M & I project water needs and 93,000 acre-feet of Indian and non-Indian irrigation needs; and
- 196,640 acre-feet, serving 80,100 acre-feet of Indian and non-Indian M & I project water needs and 116,540 acre-feet of Indian and non-Indian irrigation needs.

The settlement and water demand level (1) of 80,100 AF is based on the total water available under the depletion restrictions of 57,100 AF as contained in the USFWS Reasonable and Prudent Alternative (RPA), with water being made available only to M & I users. Water allocations to 173,100 AF would be developed using federal funds under the cost sharing agreement, companion to the Indian Water Rights Settlement Agreement; these facilities and volumes are described as water demand level (2). This cost sharing agreement, which specified a phasing of facilities and cost responsibility, also provided for private and state funding to develop additional water supplies, up to a total of 196,640 AF (i.e., water demand level (3)).

Table 2-1
Three Levels of Water Demand
Animas-La Plata Project

Entity	Volumes Acre-Feet
Water Demand #1	
Colorado M&I Water	
Animas-La Plata Water Conservation District	
City of Durango	2,500
Durango Rural Water Users	2,000
La Plata Rural Water Users	2,000
Animas Valley future development	2,700
Southern Ute Indian Tribe	26,500
Ute Mountain Ute Indian Tribe	6,000
Subtotal	41,700
New Mexico M&I Water	
San Juan Water Comm	
City of Farmington	18,900
City of Bloomfield	6,700
City of Aztec	5,200
Navajo Nation Shiprock Area	7,600
Subtotal	38,400
Total Water Demand #1	80,100
Water Demand #2	
Total Water Demand #1	80,100
Colorado/New Mexico Irrigation	
Ute Mountain Ute Indian Tribe	26,300
Southern Ute Indian Tribe	3,400
Animas-La Plata Water Conservation District	55,200
La Plata Water Conservation District	8,100
Subtotal	93,000
Total Water Demand #2	173,100
Water Demand #3	
Total Water Demand #2	173,100
Colorado/New Mexico Irrigation	
Ute Mountain Ute Indian Tribe	0
New Mexico (not under settlement)	900
Southern Ute Indian Tribe	0
Animas-La Plata Water Conservation District	18,240
La Plata Water Conservation District	4,400
Subtotal	23,540
Total Water Demand #3	196,540

The settlement agreement includes water for the Ute Mountain Ute and Southern Ute tribes from several sources, including 29,900 acre-feet of water designated for the Southern Utes and 32,300 acre-feet for the Ute Mountain Utes from the Animas La-Plata Project. These are shown by tribe in Levels 1 and 2. It does not include other water for the tribes from the Dolores Project and other sources which are also addressed in the Settlement Agreement. Non-Indian M & I and irrigation water allocations are based on needs for agricultural water by water users, and quantity of irrigable lands in the project area as determined by Reclamation (see table 2-1 for details).

Non-Indian M & I needs are based, in part, on population growth projections and projected M & I needs in urban areas. Growth projections of 2.1 to 2.7 percent per year for the period 1990-2000 and 1.2 to 2.1 percent per year for the period 2000-2020 were calculated by the Reclamation. Total project area population is projected to increase from 140,781-149,904 in 1990 to 212,254-272,268 in 2020 (USBR, Social Economic Assessment, 1995). The allocation of water to non-Indian M & I users is based on these projections of growth and future water demand, and is shown in Table 2-1.

The 1991 Biological Opinion and the Colorado Ute Indian Water Rights Settlement Agreement each play a critical role in determining both the final level of water allocation from the project and who is the recipient of those allocations. For every acre foot beyond the 80,100 acre-feet diversion, water for endangered species will compete with water for M & I and agricultural uses. The amount of water allocated to each will turn in part upon a showing of the timing and scope of need. Moreover, how the water is allocated at 80,100 acre-feet and beyond will be influenced by the need to comply with the tribal water allocations described in the Colorado Ute Indian Water Rights Settlement Agreement.

2.3.3 Water Availability

Information on potential yields was then used to identify those system alternatives which would provide sufficient water to meet the project water allocation needs. Table 2-2 summarizes the potentially available water supplies in the Animas-La Plata Project area, including potential groundwater supplies in areas that are not over-appropriated, water that might be available from conservation measures and purchasing of water rights, and non-allocated surface water from river systems. These numbers are based on existing data in Reclamation files, the City of Durango, and related project documents.

2.3.3.1 Potential Groundwater Supplies

The potential of meeting part of the Project water supply by using available groundwater supplies was evaluated for each river basin. Deep groundwater, while it exists, has not been shown to be of adequate quality in the project area to provide either irrigation or M & I water project needs. However, there is a potential for shallow groundwater in the project area of acceptable or marginal quality. (Appendix A provides additional details).

Information on this shallow groundwater resource was obtained from the Colorado State Water Resources Division and the New Mexico State Engineers Office, Water Rights Division. River basins were delineated, surface areas determined, aquifers were identified and their thickness, total storage, volume and removable storage were estimated. Water quality for each of the aquifers was evaluated from these references, and the recharge potential of the aquifers was estimated. Aquifers were located in several different rock types, including the Dakota, Morrison, Animas, Fruitland, Entrada, Burro Canyon, and Granitic Rocks.

To the extent of available information, a total of 23,100 acre-feet of groundwater is potentially available within the studied river drainage areas. However, if "negligible" recharge potential areas are eliminated, a total recoverable groundwater potential of 19,285 acre-feet is available in the Animas, Mancos, and Piedra River Basins. The La Plata and Dolores River Basins are classified as overappropriated by the State of Colorado. Limited domestic use of groundwater is taking place. The water quality, however, is poor, and quantity is limited, and no available groundwater was identified on the La Plata.

No available groundwater potential was identified in either the Florida or Pine River Basins. No appreciable groundwater was identified within tribal land boundaries. Further, the Ute Mountain Ute Indians have indicated that water supplies from groundwater sources on tribal lands are not acceptable to meet water needs under the settlement agreement. They view this source of water as already owned by them, and does not meet the terms of the settlement agreement in providing new water supplies.

The amount of recoverable groundwater potential in the project area, however, does not necessarily represent a sustainable yearly yield. Areas of "small" recharge potential may allow only minor groundwater removal on a long-term extraction program.

A second problem involves potential well yield from producing formations. Tests, as completed by the USGS, indicate average well yields from studied aquifers of 1 to 15 gpm with a median value estimated at near 8 gpm. This suggests that a large number of wells would be required to pump this defined groundwater reserve. Additional information on groundwater potential in the project area is attached as Appendix A.

Conclusion

Although groundwater is being used in the Animas Basin, and additional volumes are potentially available, in general groundwater potential does not represent a sustainable yearly yield in sufficient volumes to meet most project water allocation needs. Potential volumes from non-overappropriated groundwater supplies represent only a small portion of the needed water allocation volumes.

In addition to the problem that groundwater supplies in general are limited, the selective use of groundwater to supplement other water sources is not generally feasible due to the scattered location of these supplies. For example, there are significant available volumes of groundwater in the Piedra Basin (13,680 AF), but these are far from the project area and not readily available for use. Water quality, technical feasibility, and cost are additional significant impediments to the use of groundwater on a wide-scale basis.

However, the use of up to 2,752 AF of potentially adequate quality groundwater to provide part or all of Durango's M & I water needs may be a feasible alternative. An alternative which includes this limited use of groundwater has been developed for the City of Durango.

2.3.3.2 Water Conservation

The potential of meeting part or all of the Project Purpose and Needs by implementing water conservation measures was evaluated based on knowledge of the current and potential water usage methods in each river basin. These methods include conversion of flood irrigation methods to sprinkler irrigation, lining of irrigation canals, and/or replacing open canals with pipelines or other closed systems. For municipal and industrial use areas, installation of water meters, adoption of inverted rate structures, and public education programs are options.

Irrigation Conservation
Water conservation opportunities in the La Plata River Basin involve converting existing flood irrigation to sprinkler irrigation. Although sprinkler systems have higher efficiencies and lower water losses, in order to operate effectively, they would require about 1.56-2.75 acre-feet per acre. Any water volume savings would be consumed by present allocation in this water-short basin, resulting in no net increase in volumes.

Water conservation improvements of irrigation systems on the Mancos River would yield about 850 acre-feet. There is some opportunity for water conservation on portions of the Montezuma Valley Irrigation Company (MVIC) system in the Dolores River Basin, which could yield 24,000-25,000 AF. Further, conversion to sprinkler irrigation on the Dolores is complicated by both the loss of wetlands that would be involved and by high soil salinity in some lands that could receive irrigation waters. No information is available on the Piedra and San Juan Basins.

Many of the irrigation distribution systems on the Pine River were constructed in the early 1900s or before. Although the operating entities have made repairs and improvements as funding has allowed, much of the system is in disrepair. Many opportunities exist to improve the efficiency of the existing distribution system including combining and lining canals, and replacing canals and laterals with pipes to provide gravity sprinkler pressure to areas of irrigated lands. Based on deliver system and on-farm efficiencies of new systems of this type, the diversion requirement could be reduced from approximately 3.0 acre-feet

per acre to 2.2 acre-feet per acre. This could make about 40,000 acre-feet available in the Pine River Basin, of which about 9,500 acre-feet would be allocated to the Southern Ute Tribe and would not be considered excess and available to meet ALP water needs. The 29,500 acre feet remaining would potentially be available to be diverted to the Animas and La Plata basins via the Florida River.

However, irrigation system water conservation improvements and the division of saved water on the Pine River would also result in a reduction of 20 percent in return flows into the Navajo Project (currently 200,000 acre-feet flows out of the Pine River at the state line into the Navajo Reservoir), which would affect water allocation from the Navajo and San Juan fishery flows. Also, irrigation water conservation measures on the Pine River would eliminate or adversely impact nearly 50,000 acres of irrigation induced wetlands in the Pine River Basin.

M & I Conservation

Water conservation for Durango from the Florida and Animas River Basins is possible, but would result in only a minor amount of "new" water being made available. An inverted rate structure and public education programs would yield an estimated 242 acre-feet. Irrigation system improvements which could yield about 300 acre-feet. Potential yields from M & I water conservation for the Florida total 1,246 acre-feet.

Although municipal conservation measures have been implemented in Aztec, Bloomfield, and Farmington, no additional volumes from water conservation have been identified.

Conclusion

Wetland and riparian losses from irrigation water conservation measures could be significant, especially on the Pine River, and would create more impacts than water conservation would reduce.

Potential volumes from implementation of M & I water conservation measures represent a portion of the needed water allocation volumes to meet either M & I or irrigation needs. Indeed, irrigation conservation is planned to provide 5,000 acre-feet of water for proposed water supply. However, water conservation would not provide sufficient volumes to meet more than a portion of the project water needs.

2.3.3.3 Surface Water

Because of surface water volumes varying from season-to-season, a diversion and conveyance system alone would not meet project purpose goals of an assured long-term water supply. The low flow discharge volumes of Table 2-2 show the potential available surface water in low flow years. A storage system in conjunction with diversion and conveyance is required to help ensure water supplies in dry years.

Sufficient supplies of surface water (based on average yields and non-allocated water) to meet all three water allocations from one basin are available only in the Animas River Basin of the eight river basins evaluated. However, all the water allocation needs could also be completely met by using available surface water flows from several other basins in conjunction with Animas River Basin water.

The potential of using groundwater aquifers for storage of water in a "conjunctive use" mode is also an alternative, as a potential method of storage in lieu of surface reservoirs. In general, the features that make conjunctive use feasible (i.e., adequate porosity, impervious aquifer boundaries, sufficient area for spreading grounds if this method of recharge is used, and acceptable water quality) would appear to be limited in the project area. There may be some potential for limited conjunctive use operations to meet part of the non-Indian M & I needs, but this has not been demonstrated from a technical or economic perspective. Further, the attendant environmental impacts with spreading ground use have not been evaluated.

Conclusion

Only surface water supplies create firm yields in amount large enough to satisfy a significant portion of the project needs. further, all such surface water supplies will require the development of one or more reservoirs as a major storage facility. Among the most viable reservoir alternatives, Animas River surface supplies are the most feasible. Conjunctive use of surface and groundwater do not create significant firm supply options. Moreover, costs and environmental impacts associated with such conjunctive use alternatives suggest the use of more reliable surface supplies. In addition, some alternatives have been developed using a combination of surface water supplies from the other basins in the project area. Conjunctive use of groundwater aquifers for storage has not been identified, and no alternatives including this method of storage have been developed.

2.3.3.4 Willing Purchase or Condemnation of Water Rights

The willing purchase or condemnation of water rights was considered, and a portion of water needed to meet project purposes could be realized from such purchases or condemnation. However, many of the water rights are senior to project rights (e.g., MVIC on the Dolores) and would not necessarily be readily available. For example, only a relatively small amount of water (7,200 acre-feet) is sought to provide fishery releases on the Dolores River (see Table 2-2). It would not result in new water being delivered to the project area, nor would it be feasible in terms of total volumes that would be realized. The La Plata River Basin, in particular, is an area of over utilization of available water, and there simply is not enough water to supply either Indian or non-Indian needs now.

January 15, 1996

Table 2-2
POTENTIALLY AVAILABLE WATER SUPPLIES
BY RIVER BASIN
ANIMAS-LA PLATA PROJECT
Annual Acre-Feet

River Basin	Existing Water Use	Surface Water Low Flows Discharge	Surface Water Potential Available	Surface Water Average Discharge	Surface Water Potential Available	Ground Water Recoverable	Water Conservation Potential	Avail Water Rights	Comments
Animas	189,200	205,400	16,200	564,800	375,600	3,752	unk	unk	Measured at Durango Diversion. Low flows from 1977
Dolores	349,799	87,000	(262,799)	352,500	2,701	0	25,000	0	Low flows from 1977. 7,200AF fishery releases sought
Florida	74,320	30,900	(43,420)	80,000	5,680	0	1,246	2,292	Measured at Durango Diversion
La Plata	33,600	26,600	(7,000)	39,900	6,300	0	0	0	Net totals below use area
Mancos	9,221	17,390	8,169	37,350	28,129	1,853	850	unk	Measured at Towaoc. Low flows from 1991.
Piedra	84,118	68,040	(16,078)	262,076	177,958	13,680	unk	unk	Water use includes conditional water rights.
Pine	140,305	165,469	25,164	202,400	62,095	0	3,660	600	Low flows from 1934
San Juan	308,720	145,100	(163,620)	482,162	173,442	unk	unk	unk	Low flows from 1977. Does not include NIIP
Totals	1,189,283	745,899	(443,384)	2,021,188	831,905	19,285	30,756	2,892	

Unk = water supply not quantified, unknown volumes

On the other river basins considered, the potential amount of water that might be available through either willing purchase or condemnation of water rights is also not feasible primarily due to the small amount of water that could be realized by such actions and the price that would have to be paid for it.

Conclusion

Meeting water allocation needs through willing purchase or condemnation of water rights is not feasible because of senior water rights, cost and procedural problem.

2.4 DEVELOPMENT AND SCREENING OF ALTERNATIVES

2.4.1 Alternatives Identification Process

Congress authorized the Animas La-Plata Project in 1968, including several project features. Beginning in 1974, a process was begun by the U.S. Bureau of Reclamation (Reclamation) to identify other potential alternative features to meet the basic project function of providing M & I and irrigation water to lands of the Ute Mountain Ute and Southern Ute Indian Tribes (Utes), and to the Animas La Plata Water Conservancy District and the Southwestern Water Conservation District (Water Districts).

Approximately 60 alternative sites and facilities, and various combinations thereof, were considered by an Advisory Team, with public input (see Appendix B and Figure 2-2). The public alternatives process involved an Advisory Team consisting of representatives of all of the entities potentially interested in receiving water from the Project and environmental groups such as the Sierra Club and the San Juan Ecological Society. Groundwater alternatives were not considered by the Advisory Team, since the State of Colorado's position was that all groundwater was tributary to the streams, and not available as an independent source of water.

Between 1974 and 1977, the Advisory Team evaluated alternatives by comparing critical items; alternatives were eliminated until plans that best met these critical items were identified. Critical items included: storage capacity, availability of embankment material for construction, construction costs, operation costs, salinity, water conservation, visual degradation, wildlife habitat, river flows for rafting and fishery resources, power usage, recreation, and impact on National Historic Monuments. Alternatives with flood and sprinkler irrigation were formulated to compare water conservation alternatives. All lands were evaluated for their salinity contribution to the Colorado River, and alternatives were developed to minimize the impacts.

Since 1977, the process of identifying and evaluating alternatives and combinations of alternatives has continued, including alternatives suggested by outside parties. On September 27, 1994, for example, the City of Durango released its "Water Supply Study for

the City of Durango" which evaluated 10 potential sites for M & I water supply augmentation (Gronning Report). Alternate water supplies, reservoir sites and water conservation were evaluated for Aztec, Farmington and Bloomfield (Black & Veatch, 1981).

The water supply and facility information developed by the Advisory Team, and the two city water supply studies was evaluated for completeness and validity, in light of the water supply information developed above (see Table 2-2). The various storage and conveyance facilities identified by the Advisory Team and the two city reports, as well as the information established on groundwater, water conservation, and water rights, were all considered in developing alternatives which would meet the project purpose and needs.

The suggestion of the Sierra Club Legal Defense Fund in their December 14, 1992 comment letter to the Draft Supplement to the FES and their October 8, 1995 Alternatives study (Hydrosphere, 1995) are examples of an approach to meet some or all of project water needs by a combination of non-structural, smaller facilities and alternate applications.

The Sierra Club 1992 proposed alternative would include some or all of the following elements: development of a small (4,000-5,000 acre-feet) reservoir on the Mancos River system designed to capture flows for irrigation of Ute Mountain Ute tribal lands adjacent to the lower reaches of that river and to provide recreational opportunities; development of new and existing direct-flow rights on the San Juan, Piedra, Florida, and Animas Rivers to meet current and projected municipal and industrial water needs of the Southern Ute Indian Tribe; development of an irrigation supply for Ute Mountain Ute lands south and west of Cortez, Colorado, by using groundwater development; purchase of Dolores Project water, or purchase of non-federal Dolores River water for delivery through existing facilities; development of enhanced recreation and tourist facilities on the Southern Ute and Ute Mountain Ute Indian reservations by using local groundwater supplies and existing surface water rights; upgrading existing domestic supplies on the Southern Ute and Ute Mountain Ute Indian reservations by providing treatment, storage, and transmission systems needed to serve present and projected users; rehabilitation of existing non-Indian irrigation and domestic water systems to provide more efficient use of the water currently decreed; with the cooperation of the Navajo Nation, integration of the resources of the Navajo (Indian Irrigation) Project with the water needs of prospective Animas-La Plata water users to maximize existing available supplies; using the Animas River rather than the proposed Ridges Basin and Southern Ute reservoirs to deliver water to New Mexico users; and upgrading the City of Durango's existing municipal raw water sources from the Florida River and other systems.

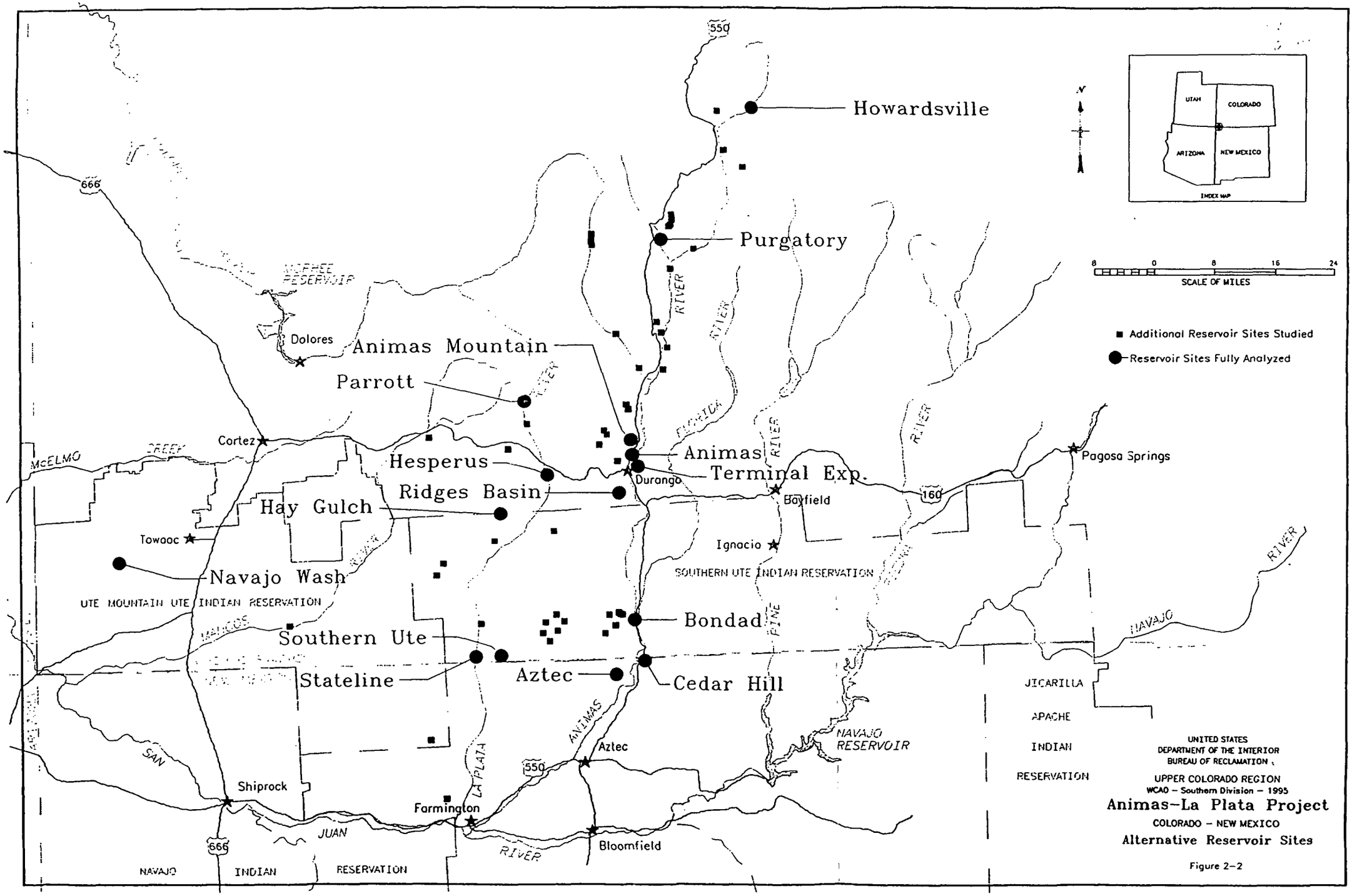

Howardsville
Purgatory
Animas Mountain
Parrott
Dolores
Cortez
Hesperus
Ridges Basin
Hay Gulch
Animas
Terminal Exp.
Durango
Bayfield
Ignacio
Pagosa Springs
Towaoc
Navajo Wash
UTE MOUNTAIN UTE INDIAN RESERVATION
SOUTHERN UTE INDIAN RESERVATION
Bondad
Southern Ute
Stateline
Aztec
Cedar Hill
Shiprock
Farmington
Bloomfield
NAVAJO RESERVOIR
JICARILLA APACHE INDIAN RESERVATION
NAVAJO INDIAN RESERVATION
McELMO CREEK
LA PLATA
ANIMAS
SAN JUAN RIVER
NAVAJO RIVER
PINE RIVER
FLORIDA RIVER
666
550
160
N
SCALE OF MILES
8 0 8 16 24
Additional Reservoir Sites Studied
Reservoir Sites Fully Analyzed
UTAH
COLORADO
ARIZONA
NEW MEXICO
INDEX MAP
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER COLORADO REGION
WCAO – Southern Division – 1995
Animas–La Plata Project
COLORADO – NEW MEXICO
Alternative Reservoir Sites

Figure 2–2

The Sierra Club released an Alternatives Study in 1995 (Hydrosphere, 1995) which included further discussion of non-structural water supplies and a specific alternative to the Animas-La-Plata Project with fewer facilities and lower costs; environmental impacts, however, were not evaluated by the Sierra Club. This alternative would provide 103,500 acre-feet of water annually, "equivalent to the full supply of Animas La-Plata water currently designated for all Indian-related purposes and for non-Indian M & I purposes." There would be two primary components of this alternative, including diversion of water from the Animas River at Durango and storage in a 15,000 acre-feet Ridges Basin Reservoir, and a component on the Dolores River. The additional water on the Dolores River would be made available through water conservation by conversion to sprinkler irrigation on Montezuma Valley Irrigation Company (MVIC) lands, making a total of 27,246 acre-feet per year available. This water would be stored in the McPhee Reservoir, and additional water would be taken from the inactive pool at McPhee, and made available to Indian lands through the Towaoc Canal and a 15,000 acre-feet terminal reservoir at Navajo Wash. Pumping stations, laterals and irrigation delivery systems would be constructed to deliver water to both the Ridges Basin and the Navajo Wash facilities. The reliable delivery of 103,500 acre-feet of water annually for all Indian-related purposes and for non-Indian M & I purposes, however, does not include all the non-Indian M & I water needs as included in Reclamation's alternatives. For example, under the Sierra Club Alternative, no M & I water would be provided for La Plata rural or Durango rural water users. This 404(b)(1) considers the Sierra Club 1995 alternative in Section 2-4.

The Southern Ute Grassroots Committee also proposed alternatives to the Animas-La Plata project in a February 21, 1995 paper. The paper urged "...an alternative water rights settlement..." and consideration of "...workable ALP alternatives...". Alternatives included: 1) water for specific tribal needs, including water storage in groundwater aquifers, development of direct flow rights on the San Juan, Piedra, Florida, and Animas Rivers, and enlargement of Lemon and/or Vellecito Reservoirs; 2) water for minimum stream flows, including the possibility that "if the tribe dedicated a portion of its water rights to stream flows, could that water be recaptured and marketed by the Tribe from Lake Powell?"; 3) water to lease, from Navajo or Glen Canyon; 4) a tribal power distribution company as an alternative settlement; and 5) alternative economic development funding, to facilitate development of the tribe's coal reserves. Other alternatives for the other ALP participants were also suggested.

Many of the suggestions of the Southern Ute Grassroots Committee, including alternative reservoir sites, use of groundwater, and Colorado River water, were considered in the process used by the Reclamation to identify and evaluate alternatives to the Animas-La Plata Project. No specific alternatives, however, were identified for further consideration in the Level 1 and 2 screening process.

The Inspector General's report noted that "there may be a possibility of using a portion of the Dolores Project's developed water supply to meet some of the ALP's commitments", "Up to 10,300 acre-feet of unused Dolores Project water may be available to meet other purposes,

including Indian water rights", and "...the Bureau should work with the Tribes to determine whether the Dolores Project could supply a greater share of the water supply committed under the Settlement Act." These statements were evaluated in light of current unsuccessful Reclamation efforts to secure an additional 7,200 acre-feet for fishery releases on the Dolores River. Since the smaller amount has not been forthcoming to date, there seems little likelihood that an additional amount of "unused Dolores Project water" will be identified.

The information developed on potential water sources from surface water, groundwater, water conservation, and water rights acquisition was also factored into the alternatives identification process.

Sources of water (identified in Table 2-2) were evaluated in light of water allocation needs for each of the water users (as shown in Table 2-1), and facilities to store and deliver water to each of these water users separately were identified. These need-specific alternatives are shown in Table 2-3, and reflect both the amount of water that would be available in low flow years as well as average flow years, and the sizing alternatives for each storage site based on the need to carry water over in low flow years to meet water needs. If sizes did not match, then that reservoir alternative was rejected for that particular need. While conveyance facilities were not specified, if conveyance, with or without pumping, was generally feasible to convey water from the reservoir location to the water needs location, then the reservoir was included; if not feasible because of geography or other limiters, it was not included.

Table 2-4 is a matrix used in the decision process to help identify those reservoirs that would meet more than one water need at the same time. The general philosophy driving this exercise is that it would be more efficient, less costly, and create fewer environmental impacts to have the fewest number of reservoirs constructed. While individual water needs can indeed be met by a number of smaller storage reservoirs and conveyance systems, the overall impact in terms of operation efficiency, cost, and environmental impacts were felt to be greater than if fewer, larger reservoirs were used. For example, impacted wetlands generally occur in what becomes the bottom of the reservoir. Reducing the reservoir size often does not translate into a proportional wetlands impacts reduction.

The purpose of the 404(b)(1) Act is to minimize the adverse impacts on aquatic resources in fulfilling the project's purpose and need. Therefore, this alternative analysis compares the environmental impacts of a variety of alternatives for fulfilling these purposes and needs (i.e., providing long-term water supply). The alternatives analyzed incorporate components that serve some portion of the total project needs. These components cannot be considered individually as alternatives in their own right since they would not meet project needs.

Table 2-3
ANIMAS-LA PLATA PROJECT
Identification of Alternative Water Sources
and Storage Facilities
to meet Water Recipient Demands

Water Recipient Demand Location	Demand KAF	Water Source	Low KAF	Ave KAF	Res Site	Res Size KAF
Durango M&I	2.5	Animas	16.2	375.6	---	---
		Animas	16.2	375.6	Howardsville	78.0
		Animas	16.2	375.6	Animas Mt	17.0
		Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		Florida	0.0	5.7	Ridges	37.3
		Pine	25.2	62.1	Terminal Exp	1.9
		GW	3.8	3.8	Terminal Exp	1.9
Animas Valley M&I	2.7	Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Howardsville	78.0
		Animas	16.2	375.6	Animas Mt	17.0
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		Florida	0.0	5.7	Terminal Exp	1.9
		Pine	25.2	62.1	Terminal Exp	1.9
		Pine	25.2	62.1	Terminal Exp	1.9
Durango Rural M&I	2.0	La Plata	0.0	6.3	Hesperus	23.7
		La Plata	0.0	6.3	Mormon Exp	3.6
		La Plata	0.0	6.3	Parrott	9.6
		Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Howardsville	78.0
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		Animas	16.2	375.6	Animas Mt	17.0
La Plata Rural M&I	2.0	La Plata	0.0	6.3	Hesperus	23.7
		La Plata	0.0	6.3	Mormon Exp	3.6
		La Plata	0.0	6.3	Parrott	9.6
		Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		La Plata	0.0	6.3	Hay Gulch	26.8

Water Recipient Demand Location	Demand KAF	Water Source	Low KAF	Ave KAF	Res Site	Res Size KAF
Aztec M&I	5.2	Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Aztec	8.0
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		Animas	16.2	375.6	Cedar Hill	35.7
		Florida	0.0	5.7	Aztec	8.0
		Pine	25.2	62.1	Navajo	Existing
		San Juan	0.0	173.4	Navajo	Existing
Farmington M&I	18.9	Animas	16.2	375.6	Ridges	100.0
		Animas	16.2	375.6	Aztec	19.1
		Animas	16.2	375.6	Bondad	100.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	113.9
		Animas	16.2	375.6	Cedar Hill	101.5
		San Juan	0.0	173.4	Navajo	Existing
		La Plata	0.0	6.3	State Line	17.2
Bloomfield M&I	6.7	Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Aztec	8.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	41.3
		Animas	16.2	375.6	Cedar Hill	35.7
		Animas	16.2	375.6	Bondad	40.0
		San Juan	0.0	173.4	Navajo	Existing
Navajo Shiprock M&I	7.6	Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Aztec	8.0
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	41.3
		Animas	16.2	375.6	Cedar Hill	101.5
		San Juan	0.0	173.4	Navajo	Existing
		Mancos	8.0	28.0	Mancos	33.4
So Ute M&I	26.5	Animas	16.2	375.6	Ridges	100.0
		Animas	16.2	375.6	Bondad	100.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	113.9
		Animas	16.2	375.6	Cedar Hill	101.5
Ute Mt Ute M&I	6.0	Mancos	8.0	28.0	Mancos	33.4
		Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	41.3
		Animas	16.2	375.6	Cedar Hill	35.7

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Table 2-3, Con't
ANIMAS-LA PLATA PROJECT
Identification of Alternative Water Sources
and Storage Facilities
to meet Water Recipient Demands

Water Recipient Demand Location	Demand KAF	Water Source	Low KAF	Ave KAF	Res Site	Res Size KAF
So Ute Agricultural	3.4	Animas	16.2	375.6	Ridges	37.3
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	14.5
		Animas	16.2	375.6	Cedar Hill	35.7
		La Plata	0.0	6.3	Hesperus	23.7
		La Plata	0.0	6.3	So Ute	16.0
Ute Mt Ute Agricultural	26.3	Animas	16.2	375.6	Ridges	100.0
		Animas	16.2	375.6	Bondad	100.0
		Animas	16.2	375.6	Animas	100.0
		Animas	16.2	375.6	Purgatory	113.9
		Animas	16.2	375.6	Cedar Hill	101.5
		Mancos	8.0	28.0	Mancos	33.4
Non-indian Colo Ag	73.4	Animas	16.2	375.6	Ridges	190.0
		Animas	16.2	375.6	Bondad	289.4
		Animas	16.2	375.6	Purgatory	276.6
		Animas	16.2	375.6	Cedar Hill	101.5
		Animas	16.2	375.6	Animas	100.0
Non-indian NM Ag	12.5	Animas	16.2	375.6	Ridges	190.0
		Animas	16.2	375.6	Bondad	40.0
		Animas	16.2	375.6	Purgatory	113.9
		Animas	16.2	375.6	Cedar Hill	72.5
		Animas	16.2	375.6	Animas	100.0
		La Plata	0.0	6.3	So Ute	38.4

Table 2-4
ANIMAS-LA PLATA PROJECT
Matrix of Water Demands and Storage Facilities

Water Recipient Demands Location	Demand KAF	Storage Reservoirs																
		Howardsville	Animas Mt	Ridges Basin	Bondad	Animas	Purgatory	Terminal	Hesperus	Mormon	Parrott	Hay Gulch	Aztec	Cedar Hill	Navajo	State Line	Mancos	So Ute
Durango M&I	2.5	x	x	x	x	x	x	x										
Animas Valley M&I	2.7	x	x	x	x	x	x	x										
Durango Rural M&I	2.0	x	x	x	x	x	x		x	x	x							
La Plata Rural M&I	2.0			x	x	x	x		x	x	x	x						
Aztec M&I	5.2			x	x	x	x						x	x	x			
Farmington M&I	18.9			x	x	x	x						x	x	x	x		
Bloomfield M&I	5.2			x	x	x	x						x	x	x			
Navajo Shiprock M&I	7.6			x	x	x	x						x	x	x			
So Ute M&I	26.5			x	x	x	x							x				
Ute Mt Ute M&I	6.0			x	x	x	x							x			x	
So Ute Agricultural	3.4			x	x	x	x		x					x				x
Ute Mt Ute Agricultura	26.3			x	x	x	x							x			x	
Non-Indian Colo Ag	73.4			x	x	x	x							x				
Non-Indian NM Ag	12.5			x	x	x	x							x				x
River Basin		Animas	Animas	Animas	Animas	Animas	Animas	Animas	La Plata	La Plata	La Plata	Animas	Animas	Animas	Pine	La Plata	Mancos	La Plata

On the basis of this preliminary identification of alternatives and screening, Reclamation then developed alternatives which would meet as many of the water needs by construction of the fewest number and least impactive reservoirs. Key factors in this selection process were location and potential size of storage reservoirs, potential river basin yield, and technological impediments.

It is readily apparent that, of all the potential reservoir sites available to meet water needs, only a few of them would meet a large number of these needs at the same time. The Ridges Basin, Bondad, Animas, and Purgatory Reservoirs are all of sufficient size, and are in the correct geographical location to be able to meet most or all of the individual water needs.

Using this approach, 15 different alternatives were identified (see Table 2-5) which are combinations of storage and conveyance features and water supply options that appeared feasible (See Figure 2-2). These alternatives were reconfigured slightly according to which water need it was intended to meet (i.e., the reservoir sizes and inclusion of certain reservoirs in various alternatives varies with each of the three water needs). A more complete description of each alternative is included as Appendix C.

2.4.2 Level 1 Screening - Practicability

A combined alternatives identification and Level 1 screening of the alternatives was undertaken to determine which were practicable. Practicability is defined in 40 CFR 230.10(a)(2):

> *An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the project activity may be considered.*

Selection of alternatives and Level 1 Screening took into consideration these factors:

- Cost

  Cost was not considered to be a limiting factor in the identification of alternatives for the Level 1 Screening of alternatives due to overriding considerations imposed on the project by the Colorado Ute Indian Water Rights Settlement Act. The potential costs of constructing and operating the various identified alternatives were considered to be less than the potential costs that would be involved in litigation of project area water rights, were the obligations of the settlement act for "wet water" on the ground not met. The remaining need to develop some means of water delivery as a result of litigation would also need to be considered.

- Existing Technology

The availability of existing technology to construct the dams and conveyance facilities that would be part of each of the alternatives was considered. If technology is not available, then the particular alternative is not viewed as practicable.

- Logistics

The projected volumes of water that an alternative could provide, and the reliability of doing so, were considered under logistics.

Yield
Reclamation considered whether the total amount of water (acre-feet) that any of the alternatives could yield per year is sufficient to meet the requirements of the three water demand needs as shown in Table 2-1. Yield information was obtained from the 1979 Definite Plan Report, the 1980 FES, the 1992 Draft Supplement to the FES, and Reclamation files and studies. The potential annual yield was used as a factor in selecting alternatives and in Level 1 screening.

Reliability
Reclamation considered whether the water supply would be reliable, and the yield would be renewed annually by the hydrologic cycle. If the projected yield during low flow years indicated that this annual renewal would not likely take place, then low flows plus potential storage (sized at four times larger than what would be required in non-low flow conditions per standard engineering practice) was considered instead for each of the water sources and potential storage sites. If it was likely that the water supply would be sporadic or intermittent, and this shortage could not be compensated for by adequate storage, then that alternative was excluded from further consideration.

Reliability information was obtained from the 1979 Definite Plan Report, the 1980 FES, the 1992 Draft Supplement to the FES, and Reclamation files and studies. In the project area, a 5-6 year drought cycle is normal, which indicates that some small agricultural irrigation needs will not be met in some years. On the other hand, M & I needs are more critical, and reservoir/system sizing is done with that in mind. In general, the reservoir sizing rule of thumb was that the supply should provide for no more than a 50% shortage of water needs in any one year, no more than a 75% shortage in any two consecutive years, and no more than 100% shortage in any of ten consecutive years. If shortages exceed these, then a farmer would not be able to operate and stay in business. On the other hand, M & I needs are less flexible, and system sizing was done to meet these needs on an annual basis.

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Table 2-5
Alternatives
Three Levels of Water Demand
ANIMAS-LA PLATA PROJECT
Acre-Feet x 1,000

Alt #	Alternative Name	River Basin	Main Features	80,100AF Reservoir Size	173,100AF Reservoir Size	196,640AF Reservoir Size
1	Plan at Authorization	Animas	Teft Diversion & Canal	--	--	--
		Animas	Howardsville Res	60.0	78.0	134.6
		Animas	Animas Mt Res	17.0	17.0	17.0
		La Plata	Hay Gulch Res	26.8	53.0	53.0
		La Plata	Three Buttes Res	--	38.4	38.4
		La Plata	Ute Meadows Res	--	16.5	16.5
2	Teft Diversion	Animas	Teft Diversion & Canal	--	--	--
		Animas	Ridges Basin	23.0	100.0	190.0
		La Plata	Hay Gulch Res	26.8	53.0	53.0
3	Bondad	Animas	Bondad Res	100.0	289.4	289.4
		La Plata	Southern Ute	--	--	70.0
4	Ridges Basin	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	100.0	190.0	190.0
		La Plata	Southern Ute	--	--	70.0
5	Purgatory	Animas	Purgatory Diversion	--	--	--
		Animas	Purgatory	113.9	276.6	276.6
		La Plata	Southern Ute	--	--	70.0
6	Animas #1	Animas	Animas	100.0	100.0	100.0
		La Plata	Southern Ute	--	--	70.0
7	Animas #2	Animas	Animas Res	100.0	100.0	100.0
		Animas	Aztec Res	35.1	35.1	35.1
		La Plata	Parrott Res	32.7	32.7	32.7
8	Animas #3	Animas	Animas Res	100.0	100.0	100.0
		Animas	Aztec Res	35.1	35.1	35.1
		La Plata	Hesperus	23.7	23.7	23.7
9	Cedar Hill	Animas	Cedar Hill	35.7	101.5	101.5
		La Plata	Southern Ute	--	--	70.0
10	Ridges/Florida	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	37.3	100.0	190.0
		Animas	Aztec Res	35.1	35.1	35.1
		Florida	Terminal Res	1.9	1.9	1.9
		La Plata	Southern Ute	--	--	70.0
11	Ridges/GW	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	37.3	100.0	190.0
		Animas	Aztec Res	35.1	35.1	35.1
		La Plata	Southern Ute	--	--	70.0
12	Ridges/Pine	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	37.3	100.0	190.0
		Animas	Aztec Res	35.1	35.1	35.1
		Pine	Terminal Res	1.9	1.9	1.9
		La Plata	Southern Ute	--	--	70.0
13	Ridges/Mancos	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	37.3	100.0	190.0
		Animas	Aztec Res	35.1	35.1	35.1
		Mancos	Mancos Res	33.4	33.4	33.4
14	Ute Indian-Only	Animas	Durango Diversion	--	--	--
		Animas	Ridges Basin Res	100.0	190.0	190.0
15	Ridges/McPhee/ Navajo Gulch	Mancos	Navajo Gulch	15.0	15.0	15.0
		Animas	Ridges Basin Res	15.0	15.0	15.0
		Dolores	Water Conservation	27.2	27.2	27.2

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Available to Project Participants
The Reclamation evaluated whether the alternatives were so designed and located so that the project participants would be able to receive "wet water" on their lands for their defined needs (see Table 2-1).

- Regulatory Constraints

Although NEPA directs that applicants consider alternatives, including those that are not within the jurisdiction or control of the applicant (e.g. - land that is not leased or owned as a potential project site must still be considered if it is a reasonable alternative to meet project purposes), regulatory prohibitions or exclusions are sufficient reasons for eliminating an alternative. In the Animas La-Plata project area, there are lands which have been designated as wilderness areas under federal law. The building of dams, roads, and other facilities is not allowed within designated wilderness areas, and any of the alternatives that would fall within designated wilderness areas would be eliminated from consideration.

Further, non-compliance with the Endangered Species Act as expressed in the USFWS's Biological Opinion (BO) on endangered Colorado River fish, issued in 1991, is also grounds for elimination from consideration. However, since studies are ongoing under the BO which may provide a basis for revising the BO at some point if the future alternatives were not eliminated at Level 1 screening if there was an apparent conflict in the BO.

Results of Level 1 Screening

The 15 alternatives were subjected to Level 1 screening for the three levels of water demands. Results are portrayed in Tables 2-6, 2-7, and 2-8. Of the 15 alternatives, Alternative 5, the Purgatory Reservoir system, fails because the dam and a large portion of the reservoir would be in the designated Weminuche Wilderness area of the San Juan National Forest. The Ute Indian-only alternative (Alternative 14) and Alternative 15, the Ridges-McPhee-Navajo Gulch alternative, only partially met project non-Indian needs (e.g., Alternative 15 proponents state that "it would only reliably deliver 103,500 acre-feet of water annually...for all Indian-related M & I purposes) but is included with the other alternatives as having passed Level 1 screening to allow an evaluation of its potential environment impacts in Level 2 screening.

The remaining 14 alternatives met the screening criteria at Level 1, and were subjected to Level 2 screening in Section 2.4.3.

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Table 2-6
Level 1 Screening Summary - Practicability
80,100 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Meet Proj Needs?	Relative Cost	Existing Technology?	Sufficient Yield?	Reliable Supply?	Water Available?	Regulatory Constraints?	Pass?
1	a	Plan at Authorization	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
2	a	Teft Diversion	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
3	a	Bondad	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
4	a	Ridges Basin	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
5	a	Purgatory	Yes	N/A	Yes	Yes	Yes	Yes	Yes	No
6	a	Animas #1	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
7	a	Animas #2	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
8	a	Animas #3	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
9	a	Cedar Hill	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
10	a	Ridges/Florida	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
11	a	Ridges/Groundwater	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
12	a	Ridges/Pine	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
13	a	Ridges/Mancos	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
14	a	Ute Indian-Only	No	N/A	Yes	Yes	Yes	Yes	No	Yes
15	a	Ridges - McPhee - Navajo Gulch	Partially	N/A	Yes	Yes	Yes	Yes*	No	Yes

* must buy water rights from MVIC at McPhee

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Table 2-7
Level 1 Screening Summary - Practicability
173,100 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Meet Proj Needs?	Relative Cost	Existing Technology?	Sufficient Yield?	Reliable Supply?	Water Available?	Regulatory Constraints?*	Pass?
1	b	Plan at Authorization	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
2	b	Teft Diversion	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
3	b	Bondad	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
4	b	Ridges Basin	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
5	b	Purgatory	Yes	N/A	Yes	Yes	Yes	Yes	Yes	No
6	b	Animas #1	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
7	b	Animas #2	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
8	b	Animas #3	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
9	b	Cedar Hill	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
10	b	Ridges/Florida	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
11	b	Ridges/Groundwater	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
12	b	Ridges/Pine	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
13	b	Ridges/Mancos	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
14	b	Ute Indian-Only	No	N/A	Yes	No	No	No	No	No
15	b	Ridges - McPhee - Navajo Gulch	No	N/A	Yes	No	No	No	No	No

* see discussion on ESA in Section 2.4.2

Table 2-8
Level 1 Screening Summary - Practicability
196,640 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Meet Proj Needs?	Relative Cost	Existing Technology?	Sufficient Yield?	Reliable Supply?	Water Available?	Regulatory Constraints?*	Pass?
1	c	Plan at Authorization	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
2	c	Teft Diversion	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
3	c	Bondad	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
4	c	Ridges Basin	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
5	c	Purgatory	Yes	N/A	Yes	Yes	Yes	Yes	Yes	No
6	c	Animas #1	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
7	c	Animas #2	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
8	c	Animas #3	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
9	c	Cedar Hill	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
10	c	Ridges/Florida	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
11	c	Ridges/Groundwater	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
12	c	Ridges/Pine	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
13	c	Ridges/Mancos	Yes	N/A	Yes	Yes	Yes	Yes	No	Yes
14	c	Ute Indian-Only	No	N/A	Yes	No	No	No	No	No
15	b	Ridges - McPhee - Navajo Gulch	No	N/A	Yes	No	No	No	No	No

* see discussion on ESA in Section 2.4.2

2.4.3 Level 2 Screening - Environmental Impacts

For those alternatives determined to be practicable under Level 1 Screening, additional screening was undertaken to compare their relative environmental impacts in relation to one another (See 230.10(a)(4)). These elements were considered:

- Impacts to active residential areas, measured in terms of relative relocation required because of the construction and flooding of reservoirs and/or the construction of conveyance facilities.

- Relocation and impacts to commercial operations measured in impacts to retail sales operations, manufacturing operations, oil and gas operations, farming, and other operations.

- Relocation of transportation elements, including roads, pipelines, and power lines.

- Potential impacts to known historical and cultural resources.

- Impacts to the aquatic environment and fisheries, measured primarily in terms of inundation or miles of flow reduction in streams and an associated reduction in available habitat to fishery populations.

- Impacts to wildlife, measured in relative loss of habitat or conversion of habitat.

- Impacts to threatened and endangered species, primarily impacts to listed fisheries species from depletions in streamflows, which ultimately affect flows in the San Juan River.

- Impacts to wetlands and vegetated areas, expressed in acreage loss or acreage converted to non-wetland areas.

- Impacts to established or designated recreation areas, including impacts to white water rafting on project streams.

- Aesthetic and visual impacts, for example, to sides on the Silverton narrow gauge railroad (e.g., flooding or dewatering of Animas River) or flooding of the La Plata Canyon and Parrott.

- Impacts to downstream water quality, primarily from inundation of mines or other sources of heavy metals, or other toxic materials.

Depending on the relative water needs for each of the twelve alternatives subjected to Level 2 screening, there were often different features and different relative impacts. Level 2 screening resulted in different results depending on the level of water need. For example,

the Bondad alternative (#3) includes the Southern Ute Reservoir only in the 196,640 acre-feet water needs level. As a result, the overall relative impacts were less for the 80,100 acre-feet level needs than the other two level needs, because of impacts to wetlands and cultural features that would accompany the construction of the Southern Ute Reservoir.

A numerical weighting was applied for each of the impact elements for each of the alternatives, scores were summed, and then alternatives were ranked. A weighting of 0 indicates no impacts, 1 indicates few impacts, 2 represents a medium level of impacts, and 3 represents high, or very high, levels of impacts. Table 2-9 illustrates the weighting system used.

The top two alternatives that survived Level 2 screening were then subject to additional evaluation as specified in the EPA Guidelines (see Sections 3-13 following). Table 2-9 depicts the result of Level 2 screening for the 80,100 acre-feet water needs level.

Alternative number 4, the Ridges Basin Alternative, ranked the least impactive based on no active residences, businesses, or oil and gas operations having to be relocated, and one pipeline and one rural highway having to be relocated at the site of the Ridges Basin impoundment. Known cultural resource impacts in Ridges Basin are moderate as well as moderate impacts to wildlife habitat in the Basin. Additionally, aquatic impacts were low (1). Restructuring depletion of the Animas River to 57,100 acre-feet would result in little or no impacts to threatened and endangered species (2). The 121 acres of wetlands that would be impacted by inundation in the Ridges Basin Reservoir, plus additional wetlands that would be impacted by construction of conveyance facilities, resulted in a moderate (2) ranking for wetland impact in relation to potential wetland impacts of other alternatives. The potential for impacts to recreational rafting on the Animas River rated recreation a moderate (2) impact, and there were few, if any, significant impacts in terms of aesthetics and visual or water quality. Summations of rankings were 14, which was the lowest level degree of environmental impacts among the 12 alternatives at the 80,100 acre-feet demand level.

The second least impactive alternative would be Ridges/Aztec/Groundwater (#11), which combines a reduced Ridges Basin Reservoir with a smaller reservoir near Aztec for M & I water needs and the use of groundwater to meet Durango M & I users. Few residences would be relocated, but oil and gas wells located within the proposed Aztec Reservoir resulted in a moderate (2) rating for impacts to commercial and industrial facilities. The degree of impact for the remainder of the elements is the same as for the construction of the Ridges Basin Alternative. Overall ranking is number 2, with a summation score of 17 for this alternative.

Table 2-9
Level 2 Screening Criteria

	Weighting			
	0	**1**	**2**	**3**
Relative Impacts	**None**	**Few**	**Medium**	**High**
Elements				
Residential Relocation	None	1-5	5-10	10+
Commercial Relocation	None	1-2	2-5	5+
Road, Pipeline, Railroad Relocation	None	1	2	3+
Cultural/ Historical Resources	None	Low	Medium	High
Stream Inundation	None	<1 mile	1-5 miles	5+ miles
Wildlife Habitat Loss/ Degradation	None	Low <1,000 acres	Medium 1,000-5,000 acres	High 5,000+ acres
TES Impacts	None	Within RPA depletion	--	Exceed RPA depletion
Wetland Acreage Loss	None	<100 acres	100-500 acres	500+ acres
Recreation Impacts	None	Low	Medium	High
Visual Intrusion	None	Low	Medium	High
Water Quality Degradation	None	Meet state heavy metal standards		Exceed state standards for heavy metals

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Table 2-10
Level 2 Screening - Environmental Impacts
80,100 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Residential Relocation	Commercial Relocation	Transportation Relocation	Cultural	Aquatic	Wildlife	TES	Wetlands	Recreation	Aesthetics	Water Qual	Impact Totals	Rank	Selected
1	a	Plan at Authorization	3	0	2	3	3	3	1	2	3	3	3	26	7	No
2	a	Teft Diversion	2	0	2	1	2	3	1	3	3	3	3	23	5	No
3	a	Bonded	3	3	3	3	2	1	1	3	0	1	1	21	6	No
4	a	Ridges Basin	0	0	2	2	1	2	1	2	2	1	1	14	1	Yes
5	a	Purgatory	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	a	Animas #1	3	3	3	2	2	1	1	3	3	2	1	24	6	No
7	a	Animas #2	3	3	3	3	2	2	1	3	3	3	3	29	9	No
8	a	Animas #3	3	3	3	2	2	2	1	3	3	3	3	28	8	No
9	a	Cedar Hill	3	3	3	3	2	1	1	3	0	1	1	21	5	No
10	a	Ridges/Florida	2	2	2	2	2	2	1	2	2	1	1	19	3	No
11	a	Ridges/Groundwater	1	2	2	2	1	2	1	2	2	1	1	17	2	Yes
12	a	Ridges/Pine	2	2	2	2	2	2	1	2	2	1	1	19	3	No
13	a	Ridges/Mancos	1	2	2	3	2	2	1	2	3	3	1	22	4	No
14	a	Ute Indian-Only	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	a	Ricges-McPhee	--	--	--	--	--	--	--	--	--	--	--	--	--	--

The other alternatives all had a higher score (i.e., greater degree of potential environmental impact) and were not selected for further evaluation. For example, the two alternatives ranked #3 (19 points overall) would involve a smaller Ridges Basin plus alternative water sources, but would have higher impacts. Briefly, here are some of the more significant anticipated impacts for the other alternatives:

- Alternative 1--Plan at Authorization--Impacts to residences ranked very high with this alternative, with a requirement to relocate 40 or more homes at the Animas Mountain Reservoir, as well as two homes at the Hay Gulch site. Roads would have to be relocated at Howardsville Reservoir and the Animas Mountain and the Hay Gulch Reservoirs sites, resulting in a high rating. The Howardsville Historic Mining district and the old school house of Hay Gulch result in a high rating for historical and cultural resource impacts, and the flow reductions in the Animas River at the Teft Diversion, which results in a longer stretch of the Animas aquatic habitat, affected results and a high rating here. The construction of the Teft Canal from the Teft Diversion as well as the construction of the Hay Gulch Reservoir would result in a high level of impacts to wildlife. The inundation of wetlands at the Animas Mountain Reservoir, the Hay Gulch Reservoir, and the riparian wetlands at the Howardsville Reservoir would be a moderate impact. Construction of the Animas Mountain Reservoir, portions of the gorge on the Animas River, and the Howardsville historic area resulting in a high aesthetic impact, and finally the water quality impacts would be very high due to introduction of heavy metals from inundated mines at Howardsville into the system.

- Alternative 2--Teft Diversion--Many of the same environmental impact concerns would be associated with the Teft Diversion that were associated with the Plan at Authorization. Impacts would be lessened somewhat, because the construction of the Teft Diversion would be downstream from Howardsville and thus would be less impactive to aquatic habitat and water quality. However, the impacts associated with the construction of the Teft Diversion Canal would still impact residences, wetlands, and wildlife habitat.

- Alternative 3--Bondad--The Bondad Reservoir would require the relocation of a large number of homes and ranches, extensive oil and gas operations, Highway 550, and cultural/historical resources. In addition, the loss of ten miles of wetland riparian habitat along the Animas River would be significant.

- Alternatives 6, 7, and 8, the Animas #1, Animas #2, and Animas #3 alternatives, were all ranked relatively significant because of the impacts that would occur to residences, ranches, commercial facilities, transportation networks, and riparian wetlands in the Animas Valley if the main Animas Reservoir were constructed. In addition, construction of Animas #2 would involve inundation of oil and gas facilities at Aztec and would affect a highly scenic area with considerable wetland riparian habitat at the Parrott Reservoir. Animas #3 would have the same impacts

to Aztec Reservoir and would also have high levels of impacts to wetlands if the Hesperus Reservoir were constructed.

- Alternative No. 9--The Cedar Hill Reservoir--would have many of the same impacts as the Bondad Reservoir, through the flooding of six miles of river bottom and riparian habitat in the Animas River, and oil and gas operation, road, home, and business relocations.

- Alternatives 10, 12, and 13 make use of smaller Ridges Basin Reservoir in combination with supplemental supplies of water from the Florida, Pine, or Mancos Rivers. Many of the same previous impacts would be of concern here, in addition to the impacts which would be attendant with the upgrading and construction of a pipeline from the Florida River to the Pine River, aquatic habitat impacts of the Florida, Pine, and Mancos Rivers to roundtail chub, and potentially significant impacts to recreation and anesthetics to the construction of the Mancos Reservoir on the southern edge of the Mesa Verde National Monument.

- Alternative No. 15--The 1995 Sierra Club (Hydrosphere, 1995)--includes a smaller Ridges Basin Reservoir, water conservation and additional water use of the inactive pool at the McPhee Reservoir, and a storage reservoir at the end of the Towaoc Canal at Navajo Gulch. Construction of a smaller off-stream reservoir at Ridges Basin would impact, however, the same number of acres of wetlands as the other three-sized reservoirs and the other alternatives (23,000, 100,000 and 190,000 AF respectively). Also, wetlands impacted by construction of delivery facilities would be similar, and thus, there would be no environmental advantage to a smaller Ridges Basin Reservoir at 15,000 acre-feet of active capacity.

Groundwater of adequate quality and quantity for La Plata and Durango rural users is limited, and current users experience problems in both the quality and quantity available to them. the alternative of restoring project water to these non-Indian M & I users is not appropriate.

The facilities proposed on the Dolores River create additional water right and environmental problems which were not discussed in the Hydrosphere report. Any additional supplies of water made available through conversion of flood irrigation to sprinkler irrigation on the MVIC system would remain the property of the MVIC as non-project water. MVIC water rights are senior. Although 25-26,000 acre-feet is a reasonable estimate of possible conservation savings possible, it is likely that most or all of the water would be applied to existing MVIC lands. It is possible that some of this water could be purchased from MVIC for application to meet the requirements of the Colorado Ute Indian Water Rights Settlement Act, however, the price would be expected to be comparable to the price per acre-foot for M & I water in the area. The amount of wetlands losses through canal lining or conversion to a pressurized system on the MVIC system is expected to be extensive. For example,

in looking at this option in earlier studies, Reclamation estimated that 155 acres of wetlands would be lost through lining of 24 miles of canal in the area.

The use of a portion of the inactive pool at the McPhee Reservoir would not be practicable because of design constraints and water reliability concerns. The inactive pool is now used as a storage insurance for winter M & I use, for those periods when there has been an inadequate rainfall. McPhee fills only about one half of the time due to an inadequate watershed supply, and the inactive pool is the "insurance policy" to make sure that there is sufficient water for M & I needs in Cortez and surrounding communities. Further, the existing outlet structures would have to be modified or auxiliary pumping facilities installed, in order to feasibly draw down the inactive pool at McPhee for delivery to the Towaoc Canal. The additional diversion to the Towaoc Canal under this alternative would also have an adverse impact on whitewater rafting on the Dolores downstream of the McPhee Reservoir and would create extensive additional mudflats in the reservoir.

The location indicated on the Hydrosphere map for the Terminal Reservoir appears to be Aztec Gulch, rather than Navajo Gulch, and would provide water to irrigate lands just south of the Aztec Gulch area. Reclamation has already eliminated these lands as potential irrigable lands because of their high soil salinity. Other lands on the Ute Mountain Ute reservation to the west are now being proposed for irrigation. Also, a 15,000 acre-feet reservoir size at Navajo/Aztec Gulch would not be adequate for dry-year carryover; a 50-75,000 acre-feet reservoir would be required to provide dry-year carryover.

Evaluation of the same 12 alternatives with the addition of facilities to provide for irrigation waters to the Southern Ute Indian lands (either the Three Buttes Reservoir or the Southern Ute Reservoir) resulted in slightly different environmental impact scoring, but the same relative ranking in terms of the first and second ranked alternative. The results of Level 2 screening for the 173,100 and the 196,640 acre-feet levels of water need are shown in Tables 2-10 and 2-11, and also indicate preference for Alternatives #4 and #11.

The Guidelines also state that the degradation or destruction of special aquatic sites are considered to be among the most severe environmental impacts (230.10(a)(3)):

...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

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Table 2-11
Level 2 Screening - Environmental Impacts
173,100 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Residential Relocation	Commercial Relocation	Transportation Relocation	Cultural	Aquatic	Wildlife	TES	Wetlands	Recreation	Aesthetics	Water Qual	Impact Totals	Rank	Selected
1	b	Plan at Authorization	3	0	2	3	3	3	3	2	3	3	3	28	5	No
2	b	Teft Diversion	2	0	2	1	2	3	3	3	3	3	3	25	4	No
3	b	Bondad	3	3	3	2	2	1	3	3	3	1	1	25	4	No
4	b	Ridges Basin	0	0	2	2	1	2	3	2	2	1	1	16	1	Yes
5	b	Purgatory	--	--	--	--	--	--	--	--	--	--	--	--	--	No
6	b	Animas #1	3	3	3	2	2	1	3	3	3	2	3	28	5	No
7	b	Animas #2	3	3	3	3	2	2	3	3	3	3	2	30	8	No
8	b	Animas #3	3	3	3	2	2	2	3	3	3	3	2	29	6	No
9	b	Cedar Hill	3	3	3	3	2	1	3	3	2	1	1	25	4	No
10	b	Ridges/Florida	2	2	2	2	2	2	3	2	2	1	1	21	3	No
11	b	Ridges/Groundwater	1	2	2	2	1	2	3	2	2	1	1	19	2	Yes
12	b	Ridges/Pine	2	2	2	2	2	2	3	2	2	1	1	21	3	No
13	b	Ridges/Mancos	1	2	2	3	2	2	3	3	3	3	1	25	4	No
14	b	Ute Indian-Only	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	b	Ridges-McPhee	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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Table 2-12
Level 2 Screening - Environmental Impacts
196,640 Acre Feet Water Demand Level
ANIMAS-LA PLATA PROJECT

Alt #		Alternative Name	Residential Relocation	Commercial Relocation	Transportation Relocation	Cultural	Aquatic	Wildlife	TES	Wetlands	Recreation	Aesthetics	Water Qual	Impact Totals	Rank	Selected
1	c	Plan at Authorization	3	0	2	3	3	3	3	2	3	3	3	28	6	No
2	c	Teft Diversion	2	0	2	1	2	3	3	3	3	3	3	25	4	No
3	c	Bondad	3	3	3	3	2	1	3	3	3	1	1	26	5	No
4	c	Ridges Basin	0	0	2	3	1	2	3	3	2	1	1	18	1	Yes
5	c	Purgatory	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	c	Animas #1	3	3	3	3	2	1	3	3	3	2	3	29	7	No
7	c	Animas #2	3	3	3	3	2	2	3	3	3	3	2	30	8	No
8	c	Animas #3	3	3	3	2	2	2	3	3	3	3	2	29	7	No
9	c	Cedar Hill	3	3	3	3	2	1	3	3	2	1	1	25	4	No
10	c	Ridges/Florida	2	2	2	3	2	2	3	3	2	1	1	23	3	No
11	c	Ridges/Groundwater	1	2	2	3	1	2	3	3	2	1	1	21	2	Yes
12	c	Ridges/Pine	2	2	2	3	2	2	3	3	2	1	1	23	3	No
13	c	Ridges/Mancos	1	2	2	3	2	2	3	3	3	3	1	25	4	No
14	c	Ute Indian-Only	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	c	Ridges - McPhee	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Operation of the Dry Side Canal, would cause an approximate 37,300 acre-feet augmentation of La Plata River flow (USBR, 1995a). These substantial increases in La Plata flow would probably increase lateral and bottom scour in some areas, thereby increasing the quantity of suspended sediments. In general, the net effect of increased flows downstream from the diversion dam should represent a beneficial impact because the flows may restore a more natural fluvial-driven variability to channel substrates and possibly an expansion of wetland and riparian vegetation communities (USBR, 1995a).

Irrigation Laterals

These facilities would cross four perennial and 201 intermittent drainages. During construction of irrigation pipes across perennial and intermittent drainages, including several crossings of the La Plata River, adverse impacts from turbidity and suspended particulates are possible. The effects of the discharge on stream and riparian ecosystems downstream could be avoided or minimized by limiting construction to the dry season and through use of routine turbidity controls during construction. Directional boring for smaller laterals may also be feasible where riparian vegetation occurs. Turbidity control measures would be enforced under the State of New Mexico and Colorado NPDES Permits for the project.

La Plata Diversion Dam and Impoundment

The La Plata Diversion Dam and Impoundment may cause similar turbidity/suspended sediment impacts during construction activities as the Ridges Basin and Reservoir. However, because the construction time would be substantially shorter (no more than one year), the potential degree of impact would not be as great.

The effects of the discharge on stream and riparian ecosystems downstream could be avoided or minimized by construction of temporary diversion works during the dry season and through use of routine turbidity controls during construction. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Southern Ute Diversion Dam, Impoundment and Inlet Canal and Pumping Plant

The SUDD and impoundment may cause similar turbidity/suspended sediment impacts during construction activities as the Ridges Basin Dam and Reservoir. However, because the construction times would be substantially shorter (no more than one year), the potential degree of impact would not be as great. The effects of the discharges on stream and riparian ecosystems downstream could be avoided or minimized by construction of temporary diversion works during the dry season and use of routine turbidity control measures during construction. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Diversion of flows to the Southern Ute Dam and Reservoir would reduce flood volume, channel scour and related sediment transport in downstream reaches of the La Plata River.

Basin Creek is an intermittent drainage. Turbidity/suspended particulate-related damage to the ecosystems of the creek and to Animas River downstream would be avoided or minimized by construction of diversion works during the dry season, and by application of routine turbidity control measures during construction. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Soils within the completed Ridges Basin Reservoir and along the Ridges Basin conduit may be subject to slumping until a new landform equilibrium is attained. This process may be particularly prevalent along the northeast reservoir shoreline, where prevailing southwesterly winds would create wave action that would undercut shale slopes. Turbidity problems from this erosion process should be limited to localized portions of the reservoir and would occur primarily during the reservoir filling period (three to five years).

The proposed upgrading of the access road would affect two perennial and four intermittent drainage crossings. Turbidity impacts could be avoided through use of routine turbidity controls, as described above for the Durango Pumping Plant.

The Ridges Basin Dam and Reservoir would reduce flood volume, channel scour and related sediment transport downstream in the Animas River. A reduction in desirable levels of suspended particulates may alter beneficial fluvial processes in the reach of the Animas River downstream from Flora Vista where the river channel is not highly incised (USBR, 1995a). This reduction is expected to be relatively small and would not cause significant changes to riparian recruitment processes.

Durango M & I Pipeline

This pipeline would cross three intermittent drainages. For all of these crossings, all work would occur during the dry season so no turbid discharges would be likely. However, if any drainages have flow during construction, then routine turbidity controls, as described above for the Ridges Basin Inlet Conduit, would avoid adverse impacts to water quality. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project. The pipeline would be attached to an existing footbridge at the Animas River crossing, and no turbidity impacts would occur.

Dry Side Canal

The majority of the Dry Side Canal would cross uplands, however, it would also cross one perennial and 42 intermittent drainages. Where these facilities would cross perennial or intermittent drainages, potential discharges of turbidity and suspended sediments are likely during installation of diversion works and dewatering activities. Impacts of these discharges on stream and riparian ecosystems downstream would be avoided or minimized by limiting construction to the dry season and through use of routine turbidity controls during construction. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

3.2 SUSPENDED PARTICULATE/TURBIDITY (230.21)

This section examines impacts caused by suspended particulates and/or turbidity during construction or as a result of project operations.

3.2.1 Alternative 4c: Ridges Basin (196,640)

Durango Pumping Plant and Ridges Basin Inlet Conduit
Construction of the Durango Pumping Plant inlet structure may cause minor, short-term discharges of sediments during construction of the concrete pad and bottom vanes in the Animas River. With use of routine turbidity controls (e.g., turbidity screens, filter materials, temporary coffer dams, proper de-watering procedures), no adverse impacts from suspended particulates or turbidity are expected. The inlet conduit would also cross four intermittent drainages, resulting in potentially turbid discharges downstream. For all of these crossings, work would occur during the dry season so no turbid discharges would be likely. However, if any drainages flow during construction, then routine turbidity controls, as described above, would avoid adverse impacts to water quality. Moreover, all turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Shenandoah Pipeline
This pipeline would cross 6 intermittent drainages. For all of these crossings, all work would occur during the dry season so no turbid discharges would be likely. However, if any drainages have flow during construction, then routine turbidity controls, as described above for the Ridges Basin Inlet Conduit, would avoid adverse impacts to water quality. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Ridges Basin Dam and Reservoir
Fill material for the Ridges Basin Dam would consist of both impervious and pervious materials. Pervious fill materials would be primarily naturally-occurring materials with particle sizes larger than silt (e.g., gravel), and are not expected to be a substantial source of turbidity or suspended particulates. Impervious fill material (clays derived from the reservoir borrow area) would be a more likely source of turbidity and siltation.

Levels of turbidity and suspended particulates could increase downstream from the dam construction site as a result of dewatering activities and installation of temporary diversion works. Increased suspended sediment loads for an extended period of time could increase sedimentation along both Basin Creek and Animas River downstream, thereby altering fluvial biotic and abiotic processes. Suspended particulates for extended periods in the water column could also lower primary productivity, smother bottom dwelling organisms and reduce fisheries productivity.

Table 3-1
Summary of Substrate Impacts for Each Alternative

Impact	Alternative					
	4c	4b	4a	11c	11b	11a
1) Temporary disturbances of substrates within perennial and intermittent drainages for pipeline and canal crossings and other project features (number of crossings)	285	187	28	285	187	28
2) Permanent loss or alteration of potentially hydric substrates beneath reservoirs (number of acres)	124.5	121	121	124.5	121	121
3) Permanent loss of streambed substrates beneath reservoirs (miles)	3.3	3.3	3.3	3.3	3.3	3.3
4) Minor impacts on substrate fluvial processes in Animas River downstream from Flora Vista due to peak flow attenuation	YES	YES	NO	YES	YES	NO
5) Improvements in fluvial processes and related beneficial modifications of La Plata River substrates downstream from the La Plata Diversion Dam	YES	YES	NO	YES	YES	NO
6) Loss of hydric and streambed substrates or permanent inundation of substrates from diversion dam/impoundment construction (acres)	26	17	0	26	17	0
7) Significant modification of fluvial processes and substrate hydroperiods in the La Plata River downstream from the State line.	YES	NO	NO	YES	NO	NO
8) Loss of hydric soils within existing irrigation canals (acres)	292	215	0	292	215	0

true for Alternative 11a. Since Alternative 11a diverts less than 20 percent of the flow of Alternative 4c, a reasonable assumption would be that these minor substrate impacts would not occur or would be insignificant.

New project features, constructed under Alternative 11a would have the following impact:

Terminal Reservoir
The impacts associated with this feature would be the same as described for Alternative 11c.

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. At all crossings, work would occur during the dry season so diversion of flow would be unlikely. Trenching for pipeline or siphon installation would temporarily remove substrates. Following pipeline installation, the trenches would be backfilled with the native substrates, as described above for the Ridges Basin Inlet Conduit. The maximum zone of construction-related disturbance at any crossing would be 85-feet wide.

Aztec Reservoir
Reservoir effects on arroyo substrates would be the same as those described for Alternative 11c.

3.1.6 Alternative 11a: Ridges Basin - Groundwater Alternative (80,100 AF)

The following project features would have the same impacts as described under Alternative 4c:

- Durango Pumping Plant
- Ridges Basin Inlet Conduit
- Ridges Basin Pumping Plant
- Shenandoah Pipeline
- Electrical Transmission Facilities (as needed for project features to be constructed)
- Recreational Features (related to project features to be constructed)

The following project features would not be constructed under Alternative 11a and accordingly no impacts would occur:

- Dry Side Canal
- Long Hollow Tunnel
- Durango M & I Pipeline
- Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
- Southern Ute Dam and Reservoir
- La Plata Diversion Dam
- New Mexico Irrigation Canal
- Sprinkler Head Pumping Plants
- Irrigation Laterals
- Drains

The following project feature would have different impacts under Alternative 11a:

Ridges Basin Dam and Reservoir
Under Alternative 11a, the Ridges Basin Reservoir would be substantially smaller than under Alternative 4c (project water demands on the reservoir would be 37,300 acre-feet versus 190,000 acre-feet). However, all existing hydric substrates or other substrates of possible Waters of U.S. occur in the basin floor which would be fully inundated under both alternatives. Therefore, basin substrate impacts would be the same.

Because significantly less water would be diverted to the reservoir than under Alternative 4c, potential indirect impacts could be different. Potential hydrological effects of the diversion have not been modeled so changes to peak spring flows and groundwater drawdowns cannot be predicted. However, given the model-based predictions under Alternative 4c that indicate impacts to soil moisture regimes, hydroperiods and fluvial dynamics would be insignificant, it can be reasonably assumed that the same would hold

The following project features would have different impacts under Alternative 11b:

Ridges Basin Dam and Reservoir
Under Alternative 11b, the Ridges Basin Reservoir would be slightly smaller than under Alternative 4c. However, all existing hydric substrates or other substrates of possible Waters of U.S. occur on the basin floor which would be fully inundated under both alternatives. Therefore, basin substrate impacts would be the same.

Because significantly less water would be diverted to the reservoir than under Alternative 4c, potential indirect impacts to substrates could be different. Hydrological effects of the diversion have not been modeled so potential changes to peak spring flows and groundwater drawdowns cannot be predicted. However, given the model-based predications under Alternative 4c that indicates impacts to soil moisture regimes, hydroperiods and fluvial dynamics would be insignificant, it can be reasonably assumed that the same would hold true for Alternative 11b.

Dry Side Canal
Approximately two fewer miles of the Dry Side Canal would be constructed than under Alternative 4c, impacting the substrates of four fewer drainages.

Irrigation Laterals
Under Alternative 11b, fewer irrigation laterals would be constructed than under Alternative 4c, impacting a smaller area of substrates. Irrigation laterals would cross three perennial and 116 intermittent drainages under this alternative. Substrates restoration measures would be similar to those described for the Ridges Basin Inlet Conduit under Alternative 4c. For the perennial crossings, it may be possible to install the pipeline through directional boring techniques, thereby avoiding the disturbance altogether.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be the same as those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would be constructed. This would result in the disturbance of one less intermittent drainage.

The SUDD would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. These diversions would be compensated by approximately 11,800 acre-feet of additional flow from Dry Side Canal inputs, additional irrigation return flow and abandonment of existing irrigation canals. Average daily flows during the springtime would be increased by 28% downstream from the SUDD. Based on these factors, no adverse impacts to fluvial-driven substrate morphology or hydration would occur as a result of operation of the SUDD.

expansion. These substrates do not currently support any significant growth of wetland or riparian vegetation.

Aztec Reservoir
This relatively small reservoir (35,100 acre-feet) would store water diverted from the Animas River for the purposes of New Mexico M & I needs. It would be constructed in a dry arroyo which does not contain hydric soils. Reservoir effects on arroyo substrates would be similar to those described above for the Southern Ute Reservoir.

3.1.5 Alternative 11b: Ridges Basin - Groundwater Alternative (173,100 AF)

The following project features would have the same impacts would as described under Alternative 4c:

- Durango Pumping Plant
- Dry Side Canal
- Ridges Basin Inlet Conduit
- Ridges Basin Pumping Plant
- Shenandoah Pipeline
- Long Hollow Tunnel
- New Mexico Irrigation Canal
- Electrical Transmission Facilities (as needed for project features to be constructed)
- Recreational Features (related to project features to be constructed)

The following project features would not be constructed under Alternative 11b, and accordingly no impacts would occur:

- Durango M & I Pipeline
- Southern Ute Dam and Reservoir
- La Plata Diversion Dam and Impoundment

New project features, constructed under Alternative 11b, would have the following impacts:

Terminal Reservoir
The impacts associated with this feature are the same as described for Alternative 11c.

Aztec Reservoir
Reservoir effects on arroyo substrates would be the same as those described for Alternative 11c.

The following new project feature, constructed under Alternative 4a, would have the following impacts:

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. At all crossings, work would occur during the dry season so diversion of flow would be unlikely. Trenching for pipeline or siphon installation would temporarily remove substrates. Following pipeline installation, the trenches would be backfilled with the native substrates, as described above for the Ridges Basin Inlet Conduit. The maximum zone of construction-related disturbance at any crossing would be 85-feet wide.

3.1.4 Alternative 11c: Ridges Basin - Groundwater Alternative (196,640 AF)

The following project features would have the same impacts as described under Alternative 4c:

- Durango Pumping Plant
- Ridges Basin Inlet Conduit
- Ridges Basin Pumping Plant
- Ridges Basin Dam and Reservoir
- Shenandoah Pipeline
- Dry Side Canal
- Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
- Southern Ute Dam and Reservoir
- Long Hollow Tunnel
- New Mexico Irrigation Canal
- Electrical Transmission Facilities (as needed for project features to be constructed)
- Recreational Features (related to project features to be constructed)

The following project feature would not be constructed under Alternative 11c, and accordingly no impacts would occur:

- Durango M & I Pipeline

New project features, constructed under Alternative 11c, would have the following impacts:

Terminal Reservoir
This feature would store groundwater for the City of Durango M & I supply within an expanded reservoir. Impacts to substrates of Waters of the U.S. would be limited to portions of the existing reservoir shoreline which would be excavated for reservoir

3.1.3 Alternative 4a: Ridges Basin (80,100 AF)

The following project features would have the same impacts as described under Alternative 4c:

- Durango Pumping Plant
- Durango M & I Pipeline
- Ridges Basin Inlet Conduit
- Ridges Basin Pumping Plant (reduced in size)
- Shenandoah Pipeline
- Electrical Transmission Facilities (as needed for project features to be constructed)
- Recreational Features (related to project features to be constructed)

The following project features would not be constructed under Alternative 4a, and accordingly no impacts would occur:

- Dry Side Canal
- Long Hollow Tunnel
- La Plata Diversion Dam and Impoundment
- Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
- Southern Ute Dam and Reservoir
- New Mexico Irrigation Canal
- Sprinkler Head Pumping Plants
- Irrigation Laterals
- Drains

The following project feature would have different impacts under Alternative 4a:

Ridges Basin Dam and Reservoir
Construction-related impacts to substrates would be the same as discussed under Alternative 4c. However, the effects of flow depletions on Animas River substrates would be substantially less because of significantly reduced flow diversions. Under Alternative 4a there would be no reduction in mean peak spring flows while Alternative 4c would produce a 17 percent flow reduction. During very dry years minimum bypass flows would maintain historic peak spring flows under both alternatives (see mitigation actions - Section 7), while during very wet years, no significant difference would occur between the two alternatives and historic peak flows. Under Alternative 4c, attenuation of peak flows is expected to cause minor reductions in scouring, sediment transport, and evulsive processes in Animas River substrates. These would be limited to the reach downstream from Flora Vista. Since no significant peak flow attenuation would occur under Alternative 4a, no such substrate impacts would be expected.

- Electrical Transmission Facilities (as needed for project features to be constructed)
- Recreational Features (related to project features to be constructed)

The following project features would not be constructed under Alternative 4b, and accordingly no impacts would occur:

- Southern Ute Dam and Reservoir
- La Plata Diversion Dam

The following project features would have different impacts under Alternative 4b:

Dry Side Canal
Approximately two miles less of the Dry Side Canal would be constructed than under Alternative 4c, impacting the substrates of four fewer intermittent drainages.

Irrigation Laterals
Under Alternative 4b, fewer irrigation laterals would be constructed than under Alternative 4c, impacting a smaller area of substrates. Irrigation laterals would cross three perennial and 116 intermittent drainages under this alternative. Temporary impacts to substrates and restoration measures would be similar to those described under Alternative 4c. For the perennial crossings, it may be possible to install the pipeline through directional boring techniques, thereby avoiding the disturbance altogether.

Irrigation Canal Abandonment
Fewer irrigation canals and ditches would be abandoned under Alternative 4b, impacting 215 acres of potentially hydric soils or soils with aquic moisture regimes.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be the same as those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would be constructed. This would result in the disturbance of one less intermittent drainage.

The SUDD would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. These diversions would be compensated by approximately 11,800 acre-feet of additional flow from Dry Side Canal inputs, additional irrigation return flow and abandonment of existing irrigation canals. Average daily flows during the springtime would be increased by 28% downstream from the SUDD. Based on these factors, no significant adverse impacts to fluvial-driven substrate morphology or hydration would occur as a result of operation of the SUDD.

impacts to substrates in Waters of the U.S. are expected provided that standard control measures for surface runoff are employed during extraction operations.

New Mexico Irrigation Canal
This project feature would cross four intermittent drainages. Impacts to substrates and restoration measures would be similar to those described above for the Ridges Basin Inlet Conduit, except that the maximum construction zone of impact would be 125-feet wide.

Irrigation Canal Abandonment
Abandonment of irrigation canals and ditches in the La Plata River Valley would impact about 292 acres of potentially hydric soils or soils with aquic moisture regimes. These soils would be subjected to much drier conditions following abandonment and would lose their ability to support hydric vegetation, although some low-lying areas may retain higher moisture conditions than the surrounding landscape.

Mancos River Corridor
Alternative 4c could cause a slight baseflow augmentation in the Mancos River due to increased irrigation return flows. The actual amount of irrigation return flows reaching the river under equilibrium conditions is unknown due to the distances of the irrigated areas from the river and the porosity of soils. Small baseflow increases are expected to cause a slight expansion in substrates subject to aquic moisture regimes.

Other Project Features
The following project features would occur entirely in uplands and would not directly or indirectly affect substrates associated with wetlands or other possible Waters of the U.S.: Ridges Basin Pumping Plant, sprinkler head pumping plants, electrical transmission facilities and all drains and recreational facilities. The Long Hollow Tunnel would be bored and would not, therefore, impact any such substrates.

3.1.2 Alternative 4b: Ridges Basin (173,100 AF)

The following project features would have the same impacts as described under Alternative 4c:

- Durango Pumping Plant
- Ridges Basin Inlet Conduit
- Ridges Basin Pumping Plant
- Ridges Basin Dam and Reservoir
- Shenandoah Pipeline
- Long Hollow Tunnel
- Durango M & I Pipeline
- New Mexico Irrigation Canal

augmentation and impoundment-caused hydroperiod increases may promote a significant increase in hydric or aquic moisture regime soils in the impoundment area, with a corresponding expansion of wetland and riparian vegetation. The total extent of such additional hydric soils development has not been modeled or estimated.

Downstream from the SUDD, river flows would be substantially reduced by the diversion of up to 375 cfs of flow to the Southern Ute Reservoir. An estimated 49 percent of spring mean daily flow would be diverted under average conditions, causing reductions in overbank flooding and related decreases in hydroperiods and substrate moisture conditions. These effects would be concentrated in low-lying terraces and channel banks downstream from Reach 3 where moisture conditions are primarily river flow-dependent, rather than dependent on aquifer seepage (USBR, 1995a; Bio/West, 1995).

Additionally, flow diversions could modify fluvial processes, causing changes in floodplain substrate aggradation and downcutting processes. Although the extent of such changes has not been successfully modeled, impacts to substrates would be expected (USBR, 1995a; Bio/West, 1995). In particular, a reduction in the establishment of newly-aggregated sediment deposits is probable due to the attenuation of peak spring runoff flows and mid/late-summer storm flows. When sediment deposit reductions are combined with reduced terrace moisture conditions, a 50 percent loss of cottonwood recruitment sites is projected (USBR, 1995a). These impacts would occur primarily in Reaches 3 and 6 which are upstream from major tributaries.. These reaches currently have minimal cottonwood recruitment potential because of the entrenched condition of the river (Bio/West, 1995).

Southern Ute Dam and Reservoir

The substrate of Cinder Gulch/McDermott Arroyo consists of unconsolidated sand, silt and clay deposits as well as gravel and cobbles. Approximately 0.2 acre of arroyo substrate would be permanently buried beneath the proposed Southern Ute Dam. Another seven acres of arroyo substrate would be covered by the reservoir resulting in a conversion of upland soils to permanently inundated soils and seasonally inundated/saturated soils around the reservoir edge. With the exception of an approximate four acre stockpond with associated wetlands, none of the arroyo contains hydric soils. Moreover, the arroyo is normally dry and does not remain sufficiently wet following storm events to support benthic or wetland biota. Therefore, the proposed reservoir would cause a net increase in hydric soils and/or aquic soil moisture regimes both within the reservoir and with the reservoir zone of influence upstream.

Fill materials for dam construction would be similar to the existing streambed and riparian substrates. Impervious fill materials would consist of the unconsolidated sand, silt and clay deposits taken from the reservoir basin borrow area. Pervious fill would be obtained from terrace and outwash gravel deposits taken from a borrow area 1.7 miles north of the damsite. These deposits are located entirely upon upland terraces and no direct or indirect

regime in the substrates, promoting permanently inundated soils under most of the impoundment and enhancing the ability of the substrates to support aquatic biota associated with submerged conditions. However, it would greatly reduce the substrate's ability to support hydric vegetation, except along the impoundment's edges where seasonally inundated and/or saturated soils would be promoted, likely causing hydric emergent and woody riparian vegetation to grow. A significant growth of such vegetation is considered likely because impoundment water levels would not fluctuate substantially.

Impervious fill materials for the diversion dam would be obtained from clay deposits adjacent to the La Plata River. These deposits are located entirely within upland terraces. Consequently, no direct or indirect impacts to substrates in waters of the U.S. are expected, provided that standard control measures for surface runoff are employed during extraction operations.

Indirect effects may occur to La Plata River substrates upstream from the impoundment where altered hydrological regimes within the impoundment zone of influence may promote hydric soil development (or soils subject to aquic moisture regimes) in low-lying terraces and banks that are now largely dry. The total extent of such additional hydric soils is likely to be insignificant given the small size of the impoundment.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
These facilities would permanently cover approximately one acre of La Plata River substrates with concrete, compacted fill, shoreline riprap and protective shoreline dikes. During construction, coffer dams would also temporarily disturb streambed substrates, which would be restored following coffer dam removal.

A 17 acre river section upstream from the SUDD would become ponded, including about 7.5 acres of substrates that currently support wetland and riparian vegetation. The effects of this ponding would be similar to those described above for the La Plata Diversion Dam. The inlet canal would cross 1 intermittent drainage.

Impervious fill materials for the diversion dam would be obtained from clay deposits adjacent to the La Plata River. These deposits are located entirely upon upland terraces. Consequently, no direct or indirect impacts to substrates in waters of the U.S. are expected provided that standard control measures for surface runoff are employed during extraction operations.

Indirect effects may occur to La Plata River substrates upstream from the impoundment where increased hydroperiods within the impoundment zone of influence may promote hydric soil development, or aquic soil moisture regimes in low-lying terraces and banks that are now largely dry. Hydric soil development would have also been enhanced by project flow augmentation (see *Dry Side Canal* above). The combined effects of project-caused flow

Operation of the Dry Side Canal, would cause about 15,100 acre-feet of water to be delivered from the Ridges Basin Reservoir to the La Plata River. This additional water, in combination with water derived from abandonment of existing irrigation canals and increased irrigation return flows, would result in an approximate 37,300 acre-feet augmentation of La Plata River flow (Errol Jenson, USBR, personal communication). Water surface elevations are expected to raised up to 1.5 feet for approximately five months during a typical water year in the reach between the Dry Side Canal and the Southern Ute Diversion Dam (SUDD). These substantial increases in La Plata flow would alter fluvial dynamics, increase surface stages and cause increases in hydroperiods within floodplain substrates. Water delivered from Ridges Basin will be "sediment hungry," causing increases in lateral scour where the channel bottom is currently armored. Such scouring should increase downstream sediment aggradation and channel meander (where bank material permit), resulting in altered channel substrate morphology. Hydroperiods would increase within lower-lying terraces and along channel banks promoting an expansion in hydric soil development, or at a minimum, soils with aquic moisture regimes.

Where the existing channel is not armored, the increased flows may cause an increase in channel downcutting, decreasing channel meander and causing a decrease in the portion of the floodplain subject to scour and aggradation processes. In general, however, the net effect of increased flows downstream from the Dry Side Canal should represent a beneficial impact because they may restore a more natural fluvial-driven variability to channel substrates, and possibly an expansion of wetland and riparian vegetation communities (USBR, 1995a).

Irrigation Laterals

These facilities would cross four perennial and 201 intermittent drainages. Maximum widths of stream crossings would be 85 feet. Impacts to substrates and restoration measures would be similar to those described above for the Ridges Basin Inlet Conduit. For the perennial crossings it may be possible to install the pipeline through directional boring techniques, thereby avoiding the disturbance altogether.

La Plata Diversion Dam and Impoundment

Substrates in the La Plata River consist largely of unconsolidated sand, silt, clay, gravel, and cobbles overlying shale and sandstone formations. The La Plata Diversion Dam would permanently cover approximately 0.5 acre of river substrates with concrete, compacted fill, shoreline riprap and protective shoreline dikes. During construction, coffer dams would also temporarily disturb streambed substrates, which would be restored following coffer dam removal.

A 7.5 acre section of the river floodplain, upstream from the La Plata Dam would become ponded between the shoreline dikes, including about four acres of substrates that currently support wetland and riparian vegetation. This ponding would cause a wetter hydrological

periods of groundwater depletion, even where maximum drawdowns may occur, are expected to be a short enough duration that hydric soils (or soils with aquic moisture regimes) would not be changed. Stage duration curves, coupled with conservative estimates of aquifer-river response gradients (i.e., estimate assumes 100 percent response of alluvial aquifers along the river discharge), suggest that the worst case periods of depletion were insufficient to adversely affect indicator hydric vegetation such as spike rush (USBR, 1995a). Because such indicator species rely on adequate soil moisture regimes no deeper than six inches below the surface, no significant alterations of aquic moisture regimes could be reasonably inferred.

The reaches of the Animas River upstream from Flora Vista are characterized by a well-incised channel. Active channel meander, scouring and aggradation processes are largely limited to peak flood events sufficient to cause overbank flooding. Based on stage-duration curves, the degree of peak flow attenuation caused by diversion to the Ridges Basin Dam would be insufficient to substantially impact these fluvial processes in the reach upstream from Flora Vista (USBR, 1995a). Therefore, impacts to substrates from fluvial changes in the upper reaches are likely to be negligible.

Downstream from Flora Vista, the Animas River flows through a more open floodplain in which active channel meander occurs. Attenuation of peak floodflows would probably reduce the scouring, sediment transport, and evulsive processes, although these reductions are expected to be minor (USBR, 1995a).

Durango M & I Pipeline
This pipeline would cross three intermittent drainages. It would also cross the Animas River where it would be attached to an existing footbridge. Impacts to substrates and restoration measures would be similar to those described above for the Ridges Basin Inlet Conduit.

Dry Side Canal
The majority of the Dry Side Canal would cross uplands, however, it would also cross one perennial and 42 intermittent drainages that are potentially Section 404 jurisdictional, causing temporary disturbances to aquatic and wetland substrates. For all of these crossings, the same type of substrate disturbance would occur. Coffer dam fill (required where flows occur) would temporarily bury substrates, and trenching for pipeline or siphon installation would temporarily remove substrates. Following pipeline/siphon installation, the coffer dams would be removed and the substrates beneath would be restored to pre-construction grades. Substrates in the trenches would be restored, as described above for the Ridges Basin Inlet Conduit. Restored substrates should be recolonized by streambed or wetland biota in areas with sufficient moisture conditions.

structures. In the adjacent reservoir, substrates within a 3.3-mile segment of Basin Creek and approximately 121 acres of adjacent wetlands would be either directly or indirectly altered. Direct alteration would occur where the creekbed and adjacent marshes and wet meadows would be excavated for use as borrow material and would later become permanently inundated beneath the reservoir. Additionally, some of the material excavated for the dam foundation would be deposited into the reservoir basin atop the existing substrate. The deposited material would consist of the same surficial clays as the existing substrate.

Creekbed and wetland substrates within those portions of the reservoir basin that would not be excavated or filled would nevertheless be permanently altered by the alternative due to inundation. These substrates, which have developed under seasonal inundation or soil saturation conditions, would become permanently inundated and would no longer be capable of supporting creek and wetland-associated biota.

Fill materials for the dam would be similar to the existing streambed and riparian substrates. Impervious fill materials would consist of the largely clayey deposits taken from the reservoir basin borrow area. Pervious fill would be obtained from gravel deposits in an existing quarry located along lower Basin Creek. This quarry operation will extract material from an upland terrace, and no direct or indirect impacts to substrates in Waters of the U.S. are expected provided that standard control measures for surface runoff are employed during extraction operations.

The proposed access road to the damsite would be upgraded. The road crosses two perennial and four intermittent drainages. Crossings would involve installing new culverts or replacing existing cross drainage culverts, causing temporary disturbance of drainage substrates, which would be subsequently restored to pre-project grades and contours.

Indirect effects may occur to Basin Creek substrates upstream from the reservoir where increased hydroperiods may promote hydric soil development or at least aquic soil moisture regimes in low-lying terraces and bank areas that are now largely dry. This could cause the colonization and expansion by hydric or riparian vegetation into currently barren or upland-vegetated substrates. The extent of such additional hydric soil development would depend on the seasonal zone of influence of reservoir fluctuations in the creek, and cannot be estimated at this time.

Downstream from the Durango Pumping Plant, maximum surface drawdowns of about one foot are expected in the lower reaches of the Animas River (USBR, 1995a). These drawdowns would be in zones immediately adjacent to the river where water tables are most closely linked to river flow rather than adjacent groundwaters. Because most reaches of the Animas River are considered gaining, due mostly to agricultural return flows, the drawdown effect would be much less than one foot along the majority of the river. The

SECTION 3 POTENTIAL IMPACTS ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART C)

3.1 SUBSTRATE (230.20)

This section examines impacts to the physical substrates of wetlands and other Section 404 jurisdictional Waters of the U.S.

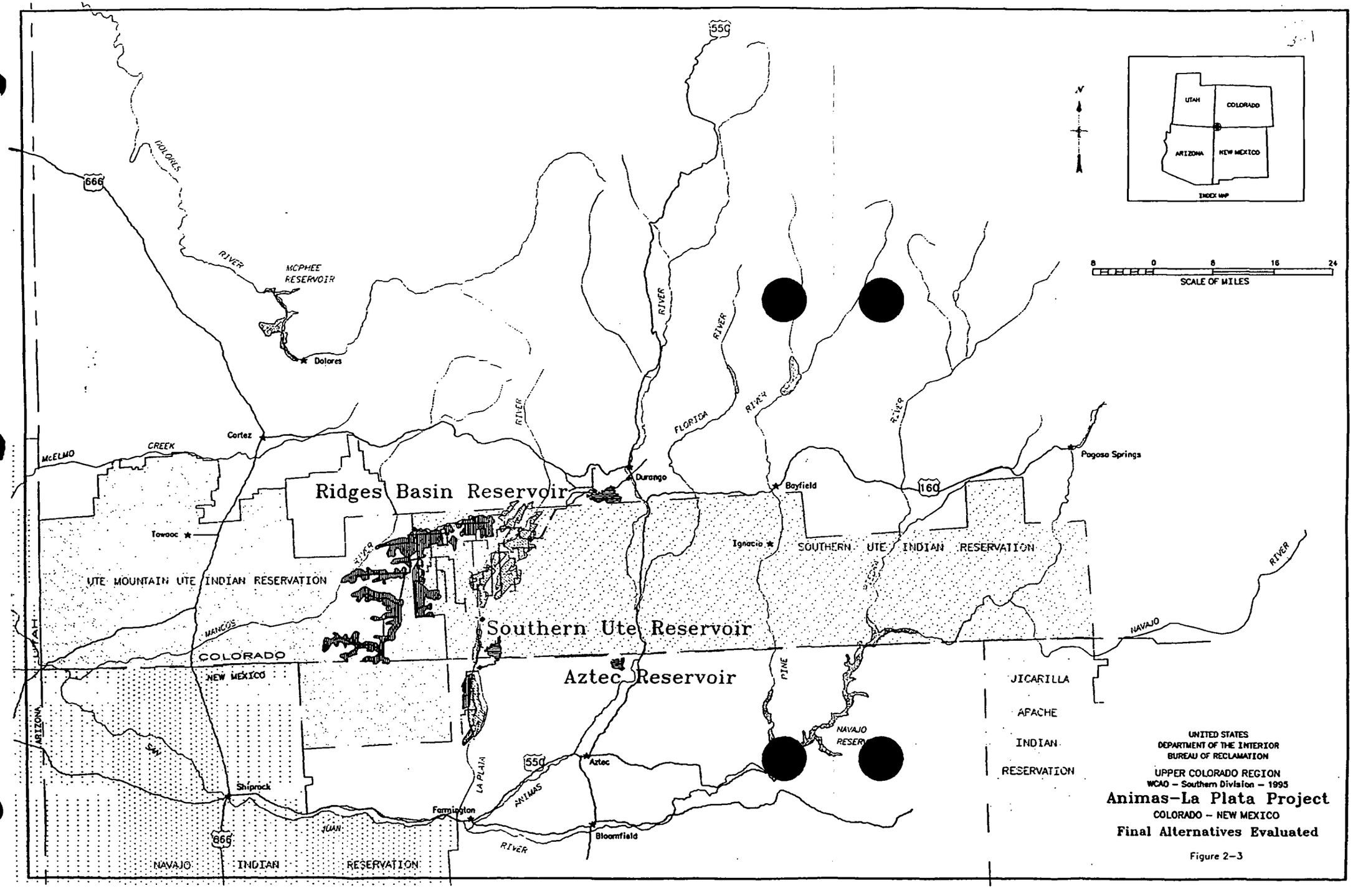
3.1.1 Alternative 4c: Ridges Basin (196,640 AF)

Durango Pumping Plant and Ridges Basin Inlet Conduit
The Durango Pumping Plant and inlet conduit would be constructed in uplands and would not cause any direct or indirect impacts to the physical substrates of wetlands or other Waters of the U.S., except where it would cross four intermittent drainages. The conduit would consist of an 8.5-foot diameter pipe buried about 5 to 10 feet below ground. Trenching for pipeline installation would temporarily remove drainage substrates. Following pipeline installation, the trenches would be backfilled with the native substrates and would be restored to pre-construction grades. Topsoils and lower strata would be restored to approximate pre-construction profiles. Restored substrates should be recolonized by streambed or wetland biota in crossings that currently have sufficient moisture conditions to support such biota. The maximum zone of construction-related disturbance at any crossing would be approximately 140-feet wide.

The pumping plant intake structure would enter the Animas River at a location with a narrow, vertical cutbank that is heavily armored. The concrete intake structure would cover a very small zone of hydric soils in the river (<0.05 acre). Following intake structure installation, bank substrates would be restored to pre-project slopes and re-armored to prevent erosion.

Shenandoah Pipeline
This pipeline would cross 6 intermittent drainages. At all crossings, work would occur during the dry season so diversion of flow would be unlikely. Trenching for pipeline or siphon installation would temporarily remove substrates. Following pipeline installation, the trenches would be backfilled with the native substrates, as described above for the Ridges Basin Inlet Conduit. The maximum zone of construction-related disturbance at any crossing would be 85-feet wide.

Ridges Basin Dam and Reservoir
Substrates in Basin Creek, which consists largely of impervious clayey deposits, would be replaced by compacted fill for construction of the Ridges Basin Dam and associated



UNITED STATES
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BUREAU OF RECLAMATION

UPPER COLORADO REGION
WCAO – Southern Division – 1995

Animas–La Plata Project
COLORADO – NEW MEXICO
Final Alternatives Evaluated

Figure 2–3

but more importantly, their scores in relation to potential impacts to the aquatic ecosystem and special aquatic sites were lower than the other 10 alternatives. The shaded columns in Tables 2-9, 2-10, and 2-11 highlight the three special aquatic impacts of concern—aquatic environment, wetlands, and water quality. The ranking of the 12 alternatives in relation to these three areas for the 80,100 acre-feet water demand level is shown in Table 2-12 below. Figure 2-3 shows these alternatives and their associated features.

Table 2-12
Ranking of Alternatives and their
Potential Impacts to Special Aquatic Sites

Alternative	Aquatic	Wetland	Water Quality	Total
#4 - Ridges Basin	1	2	1	4
#11 - Ridges/Aztec/GW	1	2	1	4
#12 - Ridges/Pine	2	2	1	5
#10 - Ridges/Florida	2	2	1	5
#13 - Ridges/Mancos	2	2	1	5
#3 - Bondad	2	3	1	6
#9 - Cedar Hill	2	3	1	6
#6 - Animas #1	2	3	1	6
#7 - Animas #2	2	3	2	7
#8 - Animas #3	2	3	2	7
#2 - Teft Diversion	2	3	3	8
#1 - Plan at Authorization	2	3	3	8

The relative ranking of impacts to special aquatic sites remains the same for the other two levels of water demands.

These two alternatives are discussed further in Chapters 3-13 that follow.

2.5 SELECTION OF ALTERNATIVES

It was determined prior to beginning Level 1 and Level 2 screening that no alternatives were practicable which would not involve the construction of a storage facility because of fluctuations in water supply volumes from year to year. As part of the Level 2 screening, the relative potential impacts to the aquatic ecosystem were compared and as reflected in the two criteria for wetlands and for aquatic habitat. Of the storage reservoirs and the conveyance systems considered, there are gradations in the degree of potential impacts to wetland systems, however, no alternative stands out as being clearly less impactive to aquatic ecosystems than any of the other alternatives. Further, none of the alternatives that are the least impactive have other significant adverse environmental consequences that would otherwise bar them from consideration as a practicable alternative.

The alternatives analysis has led to these conclusions:

- Project water needs can only be completely met through construction of a water storage facility; flows are not regular enough to allow for conveyance facilities alone.

- In selecting and evaluating reservoir sites, generally "on-stream" reservoirs are more environmentally impactive than "off-stream" reservoirs.

- The Animas River is the only source of water with sufficient, reliable volumes to meet the majority of project water needs.

- The requirements of the Colorado Ute Indian Water Rights Settlement are an integral part of the alternative analysis process.

Of the 12 alternatives which are deemed practicable, two have been identified as having potentially the least overall environmental impact, and not representing any significant adverse concerns in terms of impacts to the aquatic ecosystems. These two alternatives are:

- Alternative 4, the Ridges Basin assemblage, which includes the Durango Diversion and Pumping Facility, the Ridges Basin Reservoir, and, for the 173,100 and the 196,640 acre-feet water need levels, the Southern Ute Reservoir as well; and

- Alternative No. 11, which consists of a reduced Ridges Basin in combination with a smaller reservoir near Aztec, New Mexico, for M & I water needs, the use of groundwater to supply part of the City of Durango's M & I water needs, and (for the largest water needs levels) the addition of the Southern Ute Reservoir.

These two alternatives were selected for the additional evaluation steps of the 404(b)(1) process over the other 10 practicable alternatives because their overall scores were lower,

A reduction in suspended particulates may cause alterations to fluvial processes that rely on sediment transport and deposition. This could substantially reduce cottonwood recruitment opportunities downstream (see Section 5.2).

Southern Ute Dam and Reservoir
Fill material for the Southern Ute Dam would consist of both impervious and pervious materials. Pervious fill materials would be primarily naturally-occurring gravel with particle sizes larger than silt, and are not expected to be a substantial source of turbidity or suspended particulate. Impervious fill material (sand, silt, and clays derived from the reservoir borrow area) would be a more likely source of turbidity and siltation.

Levels of turbidity and suspended particulate would increase downstream from the dam construction site as a result of dewatering activities and installation of temporary diversion works. Increased suspended sediment loads for an extended period of time could increase sedimentation in the La Plata River downstream, thereby altering fluvial biotic and abiotic processes. Elevated suspended particulate levels for extended periods in the water column could also lower primary productivity, smother bottom dwelling organisms and reduce fisheries productivity.

Turbidity/suspended particulate-related damage to the La Plata River downstream could be avoided or minimized by construction of the diversion works in the dry season and use of routine turbidity control measures during construction. Turbidity control measures would be enforced under the State of New Mexico and Colorado NPDES Permits for the project.

The average yearly sediment inflow to the reservoir would be approximately 39 acre-feet and consist of 90 percent silt and clay (USBR, 1980). This could cause an increase in turbidity at the reservoir inlet because of a high percentage of small particles. This may limit light penetration in the reservoir during sediment inflow periods, which in turn should decrease the possibility of eutrophic conditions developing (see Section 3.3 below).

New Mexico Irrigation Canal
This project feature would cross four intermittent drainages. No direct turbidity or suspended particulate impacts to Waters of the U.S. are expected. Indirect impacts could potentially occur through turbid discharges to minor intermittent drainages that flow to waters of the U.S. However, with routine turbidity control measures during construction, such as those described for the La Plata Diversion Dam, adverse impacts could be avoided.

Other Project Features
The following project features would occur entirely in uplands and would not directly or indirectly cause turbidity or suspended particulates in Waters of the U.S.: Ridges Basin Pumping Plant, sprinkler head pumping plants, electrical transmission facilities and all project drainage and recreational facilities.

The Long Hollow Tunnel would be bored and would not have any effects on turbidity/suspended particulates, provided that proper turbidity controls are used during all dewatering work. Increased irrigation return flows to the Mancos River would not be expected to cause any effects upon and suspended particulate loads. Likewise, irrigation canal abandonment would have no relation to turbidity/suspended particulates.

3.2.2 Alternative 4b: Ridges Basin (173,100 AF)

Dry Side Canal
Approximately two miles less of the Dry Side Canal would be constructed than under Alternative 4c, impacting four fewer drainages. Potential turbidity/suspended particulate discharges would be avoided in the same manner as described in Alternative 4c.

Irrigation Laterals
Under Alternative 4b, fewer irrigation laterals would be constructed than under Alternative 4c. These laterals would cross three perennial and 116 intermittent drainages. Potential impacts from turbid discharges would be avoided in the same manner as described in Alternative 4c.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would be constructed. Potential impacts from construction would be the same as under 4c.

The SUDD would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built, and increased flows would be expected downstream from the SUDD (see discussion in Section 3.1.2) Based on these factors, no significant reductions in flood volume, channel scour, and related sediment transport is expected in downstream reaches of the La Plata River.

All other project features constructed under this alternative would have the same suspended sediment/turbidity impacts as described under Alternative 4c.

3.2.3 Alternative 4a: Ridges Basin (80,100 AF)

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. Impacts from turbidity would be the same as described for the Durango M & I Pipeline under Alternative 4c.

Ridges Basin Dam and Reservoir
Construction-related turbidity/suspended particulate impacts and controls would be the same as discussed under Alternative 4c. However, the effects of flow depletions on Animas River substrates would be substantially less due to significantly reduced flow diversions under Alternative 4a. No adverse impacts on sediment transport and evulsive processes are therefore expected.

All other project features constructed under this alternative would have the same suspended sediment/turbidity impacts as described under Alternative 4c.

3.2.4 Alternative 11c: Ridges Basin - Groundwater Alternative (196,640 AF)

Terminal Reservoir
This feature would store groundwater for City of Durango M & I purposes in an expanded reservoir. During reservoir expansion work, impacts to reservoir waters are possible. However, with the use of routine controls (see *Durango Pumping Plant* - Section 3.2.1) during construction, adverse impacts could be avoided. Localized problems could also occur as a result of shoreline slumping in the expanded reservoir area, until equilibrium conditions develop. Because the Terminal Reservoir is not connected to any other water body, problems would remain confined to the reservoir. Turbidity control measures would be enforced under the State of Colorado NPDES Permit for the project.

Aztec Reservoir
This relatively small reservoir (35,100 acre-feet) would store water diverted from the Animas River for the purposes of New Mexico M & I needs. Adverse impacts from turbidity/suspended particulates would be possible. The effects of the discharge on stream and riparian ecosystems downstream could be avoided or minimized by construction of the diversion works during the dry season and through use of routine controls during construction (see *Durango Pumping Plant* - Section 3.2.1). Control measures would be enforced under the State of New Mexico NPDES Permit for the project.

All other project features constructed under this alternative would have the same suspended sediment/turbidity impacts as described under Alternative 4c.

3.2.5 Alternative 11b: Ridges Basin - Groundwater Alternative (173,100 AF)

Terminal Reservoir
The impacts associated with this feature would be the same as described for Alternative 11c.

Aztec Reservoir
Turbidity/suspended particulate impacts would be the same as described for Alternative 11c.

Ridges Basin Dam and Reservoir
Flow depletions in the Animas River would be substantially less because of significantly reduced flow diversions. Under Alternative 11b, flow diversions would be substantially less than under Alternative 4c and adverse impacts on sediment transport and evulsive processes would be insignificant.

Dry Side Canal
Approximately two miles less of the Dry Side Canal would be constructed than under Alternative 4c, impacting four fewer drainages. Potential turbidity/suspended particulate discharges would be avoided in the same manner as described in Alternative 4c.

Irrigation Laterals
Under Alternative 11b, fewer irrigation laterals would be constructed than under Alternative 4c. These laterals would cross three perennial and 116 intermittent drainages. Potential impacts from turbid discharges would be avoided in the same manner as described in Alternative 4c.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would also be constructed. Potential impacts and controls would be the same as under Alternative 4c.

The SUDD would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. As per the discussion above in Section 3.2.2, no significant reductions in flood volume, channel scour and related sediment transport is expected in downstream reaches of the La Plata River.

All other project features constructed under this alternative would have the same impacts as described under Alternative 4c.

3.2.6 Alternative 11a: Ridges Basin - Groundwater Alternative (80,100 AF)

Terminal Reservoir
The impacts associated with this feature would be the same as described for Alternative 11c.

Aztec Reservoir
Turbidity/suspended particulate impacts would be the same as described for Alternative 11c.

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. Impacts from turbidity would be the same as described for the Durango M & I Pipeline under Alternative 4c.

Ridges Basin Dam and Reservoir
Construction-related turbidity/suspended particulate impacts and controls would be the same as discussed under Alternative 4c. Under Alternative 11a, flow diversions would be substantially less than under Alternative 4c and no adverse impacts on sediment transport and evulsive processes are expected.

All other project features constructed under this alternative would have the same suspended sediment/turbidity impacts as described under Alternative 4c.

Table 3-2
Summary of Turbidity/Suspended Particulate Impacts for Each Alternative

Impact	Alternative					
	4c	4b	4a	11c	11b	11a
1) Short term suspended sediment load increases in Basin Creek and Animas River	YES	YES	YES	YES	YES	YES
2) Potential short term turbidity discharge at drainage crossings (number of crossings)	285	187	28	285	187	28
3) Reservoir landform slumping of reservoir shorelines until equilibrium achieved (number of reservoirs)	2	1	1	4	3	3
4) Increased fluvial-driven variability and sediment aggradation downstream from the Dry Side Canal	YES	YES	NO	YES	YES	NO
5) Short term suspended sediment load increases in the La Plata River downstream from the SUDD	YES	NO	NO	YES	NO	NO

3.3 WATER (230.22)

This section examines impacts to water quality.

3.3.1 Alternative 4c: Ridges Basin (196,640 AF)

Durango Pumping Plant and Inlet Conduit
Construction of these facilities would be entirely in uplands except for the inlet structure in the Animas River and four intermittent drainage crossings by the conduit. Therefore, construction-related water quality impacts would occur almost exclusively as a result of groundwater dewatering discharges from construction excavations. Extensive well data has been collected at the pumping plant site since 1980 (USBR, 1992a). Early test data demonstrated elevated levels of trace elements and uranium in the groundwater southeast of a fault that bisects the site, apparently due to uranium mill tailings ponds that occupied

the site prior to their removal (USBR, 1992a). Although the tailings were removed from the site, residual groundwater contamination remains. The plant location was subsequently moved northwest of the fault line where better groundwater quality is found.

Well data and groundwater modeling suggest that uranium would no longer be a problem (USBR, 1995b). However, groundwater discharges from the current pumping plant location would have high concentrations of selenium (Se), iron (Fe) and manganese (Mn) as well as total dissolved solids (TDS) (USBR, 1992a; USBR, 1995b). All three trace elements could be three to five times higher than the State of Colorado water quality standards for the Animas River while TDS levels could be 15 to 20 times higher than the standard. Fe and Mn are not particularly toxic to river biota, however, Se is potentially problematic because it can be biomagnified to harmful or toxic levels in fish and waterfowl.

Despite the very poor groundwater quality, discharge from the construction does not appear to pose a significant hazard. The relative magnitude of flows in the Animas River versus dewatering discharge are so different (river flow is 5,000 times as great) that dilution quickly diminishes concentrations. Projected effects of the discharge in the river show that all parameters drop to levels below water quality standards even under worst case scenarios of maximum initial groundwater outflow and low river flows (USBR, 1995b). Nevertheless, groundwater discharges would be treated prior to discharge if necessary, and the plant would be designed to prevent infiltration of groundwaters during operation.

Flow diversions by the Durango Pumping Plant would decrease downstream flow by an average of 21 percent during the spring runoff high flow period (April to July), and an average of 44 percent during the remainder of the year (USBR, 1995c). The Animas River suffers from high trace element concentrations caused by historic mining activities upstream from Durango. Flow diversions could potentially affect these concentrations.

Mass balance estimates based on flows and contaminant concentrations for the period 1992 to 1994 suggested that an inverse relationship exists between TDS and flow discharge in the vicinity of the Durango Pumping Plant (i.e., decreased flow results in increased TDS levels), whereas a direct relationship exists between flow and trace elements (USBR, 1995b). These relationships reflect the sources and loadings up and downstream from the plant. Increases in TDS concentrations are normally expected downstream from the pumping plant under existing conditions. Flow diversions would not alter this pattern and would in fact cause slightly higher increases in TDS. However, these higher TDS levels are not significantly higher than background levels (USBR, 1995b).

Decreases in mercury (Hg), silver (Ag), arsenic (As), zinc (Zn) and Mn are predicted downstream from the plant under current conditions (USBR, 1995b). These decreases are related to the fact that the source of these contaminants lies upstream from Durango. Under flow diversions, this downstream reduction in trace metals would continue and would be

intensified for some metals. Copper (Cu), Zn, and Ag are predicted to have modest to fairly large decreases in concentrations downstream from the pumping plant, particularly under below-average flow conditions. This is consistent with the fact that the pumping plant would be situated closer to the upstream source and would, therefore, divert waters with higher concentrations of the contaminants, improving the quality of the remaining flow. Furthermore, downstream tributaries contribute additional diluting flows.

An exception to this effect is Se, for which increased concentrations are predicted downstream from the Durango Pumping Plant. This is consistent with existing conditions in the Animas River in which Se concentrations decrease in the vicinity of Durango and shows an increasing trend downstream.

Shenandoah Pipeline
This pipeline would cross 6 intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above.

Ridges Basin Dam and Reservoir
The primary water quality impacts associated with construction of Ridges Basin Dam would be potential sedimentation problems downstream in lower Basin Creek. These impacts are discussed in Section 3.2.1 above. A range of other potential water quality impacts may occur from filling and operation of the reservoir. These are summarized below.

The Ridges Basin Reservoir is expected to be a mesotrophic system, once it reaches long-term equilibrium conditions. Reservoir modeling suggests that nutrient loading would occur primarily during peak discharges in the Animas River. The level of nutrient input from the river would be relatively small and would probably sustain a moderate to low level of primary productivity (Terry and Adams, 1979; Baker and Adams, 1982). The Durango Wastewater Treatment Plant discharge is currently located upstream from the proposed intake site for the pumping plant and could be a source of extra nutrient input. Trace element toxicity effects may also inhibit algal growth. During the initial reservoir filling years (years three through eight), releases of nutrients from basin soils may cause short-term algal blooms (USBR, 1992a).

Limnological studies predicted no critical deep water oxygen depletion in the reservoir (Terry and Adams, 1979). This prediction is based on the relatively sparse vegetation biomass in the reservoir basin which would limit initial reduced oxygen conditions in the reservoir bottom. Dissolved oxygen levels in the epilimnion are expected to remain near saturation.

The reservoir is likely to be a temperate lake with spring and summer turnovers and accompanying increased levels of turbidity and suspended solids. Total dissolved solids are

not expected to significantly vary annually or seasonally from 230 mg/L. Sediment loads are expected to be 9,300 tons. These levels are not likely be harmful to aquatic biota nor would they affect human water use (USBR, 1980).

The Animas River suffers from high trace element concentrations caused by historic mining activities upstream from Durango. Although these concentrations have been decreasing in recent years, very high flows in combination with numerous tailing piles and acid mine drainage along the upper Animas Basin, could result in failure of tailing ponds, or other leaching of high concentrations of heavy metals (USBR, 1992a). Therefore, continued problems with metals are expected in reservoir inflows.

Se concentrations in Animas River inflows should normally range from 1 to 2 µg/L. This could potentially be problematic with respect to biomagnification in fish populations. For example, moderately-high levels of Se contamination in fish have been observed in Colorado River waters (1 to 4 µg/L) and in other large reservoirs with comparable Se concentrations as the Animas. Se concentration in fish in Colorado's large reservoirs often exceed the upper ranges of the USFWS national contaminants biomonitoring program (NCBP) in the range of 0.70 to 0.82 µg/L. However fish samples from the Animas River have generally been lower than the National Contaminant Biomonitoring Program (NCBP) 85th percentile (Finger, 1995). Concentrations exceeding this percentile are considered elevated but do not necessarily indicate physiological or toxicological problems.

Heavy metals from the Animas River should be retained by reservoir sediments rather than causing a toxicity problem in reservoir waters. Basin bedrock consists of marine shale formation that produces alkaline groundwater. Most heavy metals that enter the reservoir (Fe, Mn, Cu) would be in suspension rather than in solution. Heavy metals retention modeling of the reservoir suggests that the combination of alkalinity, suspended metals and limited oxygen depletions would cause metals to accumulate and precipitate in reservoir sediments (Terry and Adams, 1979; Baker and Adams, 1982).

If reducing conditions were to occur in the bottom strata of the reservoir, potential increases in dissolved Fe and Mn are likely. However, this would be an unlikely occurrence in the Ridges Basin Reservoir. Oxygen depletion in reservoirs is usually confined to the bottom sediments, which are invariably anoxic immediately below (≤ one cm) the sediment surface. The release of metals from the sediments typically occurs when the anoxia also occurs in the waters above the sediments (i.e., the "hypolimnion"), such as when reservoirs stratify.

Anoxia in the hypolimnion would not likely occur in Ridges Basin Reservoir because there would be a regular bottom inflow of water saturated (and possibly supersaturated) with oxygen. The source of this inflow would be the Ridges Basin Inlet Conduit which would enter the reservoir at an elevation equal to the top of the reservoir's inactive pool.

Given these oxygenated conditions in the hypolimnion, the migration of metals from sediments into the overlying water would be inhibited.

In addition to inflow sources, trace metals may also enter reservoir waters from existing alluvial substrates along the bottom of the basin. Alluvial soils in the reservoir have high concentrations of soluble Se (3.4 to 60 µg/L), well above acute toxic levels for aquatic life. Cr and As have been observed at 20 µg/L; Cu at 10 to 50 µg/L; and Cd at 0.3 to 0.6 µg/L. These soils constitute only about 10 percent of the soils on the basin floor, and are concentrated in the deepest portion of the proposed reservoir and would become permanently inundated. Thus, aerobic leaching would only occur briefly during initial inundation. After this initial period, the deeply inundated soils would not again react with overlying (oxygen-rich) water unless the reservoir were drained.

Under the reducing conditions of the deep reservoir bottom sediments, Se would not be mobilized into the water column due to anoxic, reducing conditions. Se takes the form of selenites or elemental Se under these conditions. Both forms have very low solubility. However, in the fluctuating water zones along the reservoir edges, leaching of Se would be probable, resulting in oxidation to soluble selenates on a short term seasonal basis. This phenomenon would occur primarily in the first few years of reservoir operation during the several weeks each spring that reservoir levels increases to ordinary high water levels. After a few weeks of inundation at or above ordinary high water, reducing sediment environments would occur, resulting in the formation of insoluble selenites and elemental Se. Moreover, this phenomenon is insignificant in comparison to the dilution potential of the reservoir and rapid bioassimilation (USBR, 1992a).

Durango M & I Pipeline
This pipeline would cross three intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above.

Dry Side Canal
The majority of the Dry Side Canal would cross uplands, however, it would also cross one perennial and 42 intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above. Operation of the Dry Side Canal would cause about 15,100 acre-feet of water to be delivered from the Ridges Basin Reservoir via the Dry Side Canal to the La Plata River. This additional water, in combination with abandonment of existing irrigation canals and increased irrigation return flows may result in numerous changes to water quality in the La Plata River.

Potential changes in water quality were projected based on calculated estimates of current water quality conditions, rather than observed water quality conditions because the

observed data are from a very limited period of record (two to three years) in the La Plata River (USBR, 1995b). Therefore, projected impacts of Alternative 4c on La Plata River water quality represent a relative effect with respect to water quality standards, rather than an absolute effect.

Projected changes in water quality were based in part on analysis that used estimated concentrations of trace metals and TDS in irrigation return flows (USBR, 1992a, 1992b). These data helped determine the likely extent of leaching with additional irrigation. Groundwater metal concentrations in the La Plata Valley were all below their respective standards, based on extensive sampling of seeps, springs and shallow wells in the La Plata Valley. Soil sample results showed Se to be in the range of 0.2 ppm which is normal for western soils (as above, one ppm is considered seleniferous).

Initial leaching of salts and trace elements from land that are currently unirrigated should increase loadings into the La Plata River. The average annual flow-weighted salinity in the river is projected to increase from 845 mg/L to 2,530 mg/L. Based on known concentrations of trace metals in soils, groundwater, and in La Plata drainage water, increased loadings of metals are also expected.

Following this initial leaching, the quality of return flows should be the same as from currently irrigated lands (USBR, 1992a). Moreover, additional irrigation should not increase the concentration of dissolved substances in return flow from existing irrigated lands. Therefore, although the project would increase the total volume of return flows and the total loading of dissolved substances, the relative concentrations of dissolved substances should remain more or less constant.

The specific impacts from operation of the La Plata Diversion Dam and related irrigation return flows increases would vary depending on the time of year and location downstream from the dam. During the high flow periods (e.g., May), an increase in TDS of 25 to 50 percent would be expected in the reach between the La Plata Diversion Dam and SUDD. However, the relative magnitude of increase should not be significant based on estimated baseline TDS levels (70 to 160 mg/L). During low flow periods (e.g., August, November), TDS levels are expected to decrease or remain constant.

Temporary flushes of metals would be probable, but would not cause problems due to high alkalinity and hardness conditions. These conditions should cause these metals to settle out and become biologically unavailable. During high flow periods, trace metals remain constant or are projected to have insignificant increases or decreases (tenths of μg/L), except for Se, As, Zn and Mn, all of which are expected to show increases near the SUDD. Larger increases are expected for low flow periods near the SUDD. Projected increases would not place a parameter above chronic water quality standards for this reach of the La Plata River. However, measured and estimated existing levels of Hg and Ag are already above the

chronic toxicity levels (projected increases are slight), and existing Se levels are within the range of concern with respect to potential bioaccumulation.

Results of fish tissue analysis studies show that bioaccumulation of Se in the La Plata is not a problem (USBR, 1992a). The lowest concentration known to cause fish reproductive problems is three ppm. In all waters that contain elevated levels of Se (5 to 11 µg/L), no fish tissue samples exceeded three ppm. Fish tissue analysis represents food chain biomagnification of Se due to long-term exposure to median or mean concentrations. Alternative 4c is not expected to significantly increase the mean or median concentrations of Se in irrigation return flows, and therefore would not represent a problem from either human consumption or aquatic predator standpoints.

Fish samples collected in 1992 showed that the NCBP Percentile was exceeded in trout, mottled sculpin, bluehead sucker, speckled dace, flannelmouth sucker, and fathead minnow specimens for As, Cd, Cu, Hg, Pb, Se and Zn. The metals that exceeded standards most frequently were Cu and As (USBR, 1992a). However, these levels are below the levels that are probably harmful to fish, and it is unlikely that increased return flow would have any effect on these tissue levels (USBR, 1992a). No Hg levels approached FDA guideline for fish consumption.

The presence of high Se may also act to reduce the toxicity of Hg because there is an antagonistic effect between Se and Hg (USBR, 1992b). Antagonism reduces the toxicity of either of two (or more) toxins to a level less than that of any of those substances acting alone. The potential level of reduced toxicity this effect could have in the La Plata system is unknown at this time. In any case, the Se/Hg antagonism may not extend to reproductive effects on fish (Susan Finger, NBS toxicologist, personal communication).

There are no documented cases of adverse bioaccumulation of Hg in flowing water, except behind low-head, run-of-the-river power dams (J. Yahnke, USBR, personal communication). Based on this observation, Hg bioaccumulation in the La Plata River could be a potential problem in impounded waters behind diversion dams.

As agricultural activities increase in the area, increases in grazing animals, fertilizer and pesticide runoff are probable, resulting in possible increases in coliform, nutrients and pesticides in the La Plata River. Sporadic growths of attached algae are also possible during low flow periods.

Irrigation Laterals

These facilities would cross four perennial and 201 intermittent drainages. The only potential water quality problems associated with drainage crossings is turbidity/sedimentation, which are addressed in Section 3.2.1 above.

La Plata Diversion Dam and Impoundment
Turbidity and sedimentation problems that may be associated with construction of this facility are discussed in Section 3.2.1 above.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Turbidity and sedimentation problems that would occur with construction of this facility are discussed in Section 3.2.1 above. Operation of the diversion dam would result in substantial flow diversion from the La Plata River. Indirect effects would include a substantial increase in return flow in the lower basin downstream from the dam, as a result of expanded irrigation.

Similar to the upper reaches discussed above, initial leaching of salts and trace elements from lands that are currently unirrigated should increase loadings into the La Plata and Mancos Rivers. Following this initial leaching, the quality of return flows should be the same as from currently irrigated lands (USBR, 1992a). Moreover, additional irrigation should not increase the concentration of dissolved substances in return flows from existing irrigated lands. Therefore, although the project would increase the total volume of return flows and the total loading of dissolved substances, the relative concentrations of dissolved substances should remain more or less constant.

The same water quality analysis procedures, discussed above for the La Plata Diversion Dam, were also applied to the reach of the river downstream from the SUDD (USBR, 1992a; 1992b; 1995b). Hg and Se levels in shallow groundwater from the New Mexico border exceed chronic aquatic life standards as do Hg levels in the La Plata River. However, soils are not the source of the Hg problems because soil samples showed relatively low total levels (<0.02 to 0.07 ppm).

Substantially different project impacts are projected for some parameters, although the same variability between high and low flow periods are likely. During high flows, TDS increases in the range of 16 percent to 38 percent are expected in the vicinities of the State line and near Farmington. However, the relative magnitude of increase is not considered significant based on estimated baseline TDS levels (160 to 213 mg/L). During low flow periods (e.g., August, November), TDS levels are expected to decrease or remain constant.

Temporary flushes of metals are not expected to be a problem due to high alkalinities and hardness which should cause these metals to settle out and become biologically unavailable. During high flow periods, trace metals would remain constant or would have insignificant increases or decreases (tenths of µg/L), between the SUDD and the State line. Cu, which shows a significant decrease from 12.5 to 8.8 µg/L and Mn (increase from 29 to 74 µg/L) are exceptions. In the Farmington area, several trace elements would have significant declines and none would have a significant increase.

During low flow periods, small decreases in TDS are expected at the State line and significant decreases are expected in the Farmington reach. Small increases are predicted for most trace metals at the State line but across-the board decreases are expected near Farmington. Projected increases would not place a parameter above chronic water quality standards for this reach of the La Plata River. However, measured and estimated existing levels of mean Hg and Ag levels are already above the chronic toxicity levels for Colorado and New Mexico (projected increases are slight ranging from 0.01 to 0.08 µg/L). Se levels are above the chronic toxicity level for New Mexico and are within the range of concern with respect to potential bioaccumulation (2.0 to 12.5 µg/L). Fish tissue sampling results (see discussion above for the Dry Side Canal) indicate that bioaccumulation should not increase trace metals to levels that are harmful to fish or humans.

The most likely explanation for projected improvements in water quality in the Farmington reach is that the primary source of water for this reach would be the Southern Ute Reservoir, which would be supplied from Ridges Basin Reservoir deliveries and higher quality, unappropriated spring runoff (USBR, 1995b). Additionally, increased flows should dilute trace metal concentrations.

Southern Ute Dam and Reservoir

The primary water quality impact associated with construction of the Southern Ute Dam and Reservoir would be potential and sedimentation problems down-drainage in Cinder Gulch/McDermott Arroyo and the La Plata River. These impacts are discussed in Section 3.2.1 above. A range of other potential water quality impacts may occur from filling and operation of the dam and reservoir. These are summarized below.

The Southern Ute Reservoir could potentially become a eutrophic system under the worst case scenario of increased nutrients levels in the La Plata River resulting from increased agricultural runoff (USBR, 1980). Periodic overgrowth by aquatic plants and algal bloom, as well as oxygen depletions, are likely if enrichment becomes a problem. The probable increased nutrient load has not been quantified, and may be mitigated by dilution of low-nutrient waters from Ridges Basin Reservoir. It may also be mitigated by decreased light penetration due to higher seasonal turbidity levels associated with an average yearly sediment inflow to the reservoir of approximately 39 acre-feet. Reclamation plans to establish a limnological monitoring program in the reservoir for water quality and aquatic biota. Program results would guide reservoir management and operations.

Baseline and predicted TDS and trace element concentrations in the La Plata River are discussed above for the La Plata Diversion Dam and SUDD. Based on predicted levels in the river, the average TDS in the reservoir is expected to be 670 mg/L, which is consistent with proposed agricultural and recreational uses of reservoir waters.

Trace metals from the La Plata River should be retained by reservoir sediments rather than causing a toxicity problem in reservoir waters. Most heavy metals that enter the reservoir would be in suspension rather than in solution. Based on expected water hardness and alkaline conditions (pH 7.3 to 8.4), metals should settle into reservoir sediments. Soluble trace element concentrations in reservoir soils are within water quality standards. Therefore, elevated trace element concentrations are not expected in reservoir waters as a result of releases from newly-inundated lands.

The Southern Ute Reservoir has a relatively strong potential to bioaccumulate Hg in fish. Hg levels in inflow waters would probably be above instream standards based on known levels in the La Plata River. These high inflow concentrations coupled with the reservoir's shallow waters, probable eutrophic conditions and algal populations should increase the methylation potential for Hg (USBR, 1992a). The extent of Hg bioaccumulation cannot be reliably predicted, but would probably range between 0.3 and 1.0 µg/g. This would be above the New Mexico public health standard (0.1 µg/g) for fish consumption, but would probably not exceed the FDA standard of 1.0 µg/g. Hg bioaccumulation could be of particular concern to raptors such as bald eagles that are expected to feed on fish from the reservoir.

New Mexico Irrigation Canal

This project feature would cross four intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above.

Mancos River Corridor

Operation of the project would increase irrigation return flows in the Mancos River. Water quality predictions for the Mancos River were conducted in the same manner as for the La Plata River discussed above (USBR, 1995b). Results indicate that TDS levels should decrease slightly but have a higher degree of variability. Trace metals (Se, As and Mn) are already high in the Mancos River and irrigation return flows may cause significant increases. However, the project would not be expected to cause any trace metal concentration to exceed State water quality standards, where existing concentrations are below State standards (USBR, 1995b). Trace metal increases may be partially related to trace element levels in Mancos Basin soils, which were found to have elevated Se concentrations (USBR, 1995b).

Other Project Features

The following project features would not directly or indirectly affect water quality: Ridges Basin Pumping Plant, sprinkler head pumping plants, Long Hollow Tunnel, electrical transmission facilities, all project drainage and recreational facilities and irrigation canal abandonment.

3.3.2 Alternative 4b: Ridges Basin (173,100 AF)

Ridges Basin Dam and Reservoir
Loadings of trace metals in reservoir sediments and in outflows would be slightly less under Alternative 4b than under Alternative 4c. For example, under Alternative 4b mean Se concentration in outflows would be 4.7 µg/L as compared to 5.0 µg/L under Alternative 4c. These differences are considered insignificant and would not change expected water quality impacts of Alternative 4c. Likewise the effects of reduced diversion under Alternative 4b do not significantly change the concentrations of trace metals expected in Animas River flows downstream from the Durango Pumping Plant.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would also be constructed. Potential construction-related water quality impacts and control measures would remain the same.

As discussed in Section 3.3.1, water quality improvement (in particular levels of Se and As) are projected in the La Plata River reach near Farmington because the primary source of water for this reach would be the Southern Ute Reservoir, and because increased river flows should dilute trace metal concentrations. Because Alternative 4b does not include the Southern Ute Reservoir, water quality improvements would be related to increased flow only. Projected improvements, particularly for Cu, Se, Ag and As are therefore not as great (USBR, 1995b).

All other project features constructed under this alternative would have the same water quality impacts as described under Alternative 4c.

3.3.3 Alternative 4a: Ridges Basin (80,100 AF)

Ridges Basin Dam and Reservoir
Average yearly outflow from the Ridges Basin Reservoir would be nearly 70% less under Alternative 4a than under 4c. Assuming that average pool sizes are roughly equivalent under the two alternatives, then residence time (ratio of average yearly outflow to pool size) should be more than three times longer under Alternative 4a. Longer residence times would allow longer settling times, and therefore a greater retention of trace metals in reservoir sediments. This phenomenon is reflected in USBR modeling of reservoir metals retention (USBR, 1995b). Model results for Alternative 4a shows lower outflow concentrations for Hg (mean is equivalent to 0.14 to 0.16 µg/L under Alternatives 4b and 4c; 0.07 under Alternative 4a); for Se (1.6 to 2.1 µg/L under Alternatives 4b and 4c versus 0.8 µg/L under

Alternative 4a); and As (14 to 15 µg/L under Alternatives 4b and 4c versus 7.0 µg/L under Alternative 4a).

Conversely, because Alternative 4a would divert far less flow than Alternatives 4b and 4c, it would also cause less improvement to water quality downstream in the Animas River with respect to trace metals. Flow diversions under the Alternatives 4b and 4c would result in modest to large decreases in Zn, Cu and Ag concentrations downstream. Under Alternative 4a, these reductions in concentration disappear or are substantially less (USBR, 1995b).

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above.

All other project features constructed under this alternative would have the same water quality impacts as described for Alternative 4c.

3.3.4 Alternative 11c: Ridges Basin - Groundwater Alternative (196,640 AF)

Terminal Reservoir
Expansion of the Terminal Reservoir would not be expected to cause any long-term water quality problems. Short-term turbidity problems can be prevented with routine turbidity control measures (see Section 3.2.4). Groundwater pumped into the reservoir would be from the same sources that the City of Durango currently uses for potable water supplies and no degradation in quality would be expected.

Aztec Reservoir
This relatively small reservoir (35,100 acre-feet) would store water diverted from the Animas River for the purposes of New Mexico M & I needs. This reservoir would share a number of features in common with the proposed Southern Ute Reservoir, including: exposure to a similar suite of water quality conditions, location in a similar dry arroyo, shallow depth, and relatively small size. Therefore, although the Aztec Reservoir has not been modeled for water quality conditions, it is reasonable to assume that it could be subject to the analogous water quality problems.

Similar to the Southern Ute Reservoir, the Aztec reservoir could potentially become a eutrophic system due to increased nutrient levels in the River resulting from domestic and agricultural return flow upstream (USBR, 1980). Moreover the Aztec Reservoir would be a much smaller reservoir (about half the size) than the Southern Ute Reservoir, and eutrophic conditions could develop faster. Periodic overgrowths by aquatic plants in

shallow waters and algal blooms throughout the reservoir, as well as oxygen depletions, are likely if enrichment becomes a problem.

Trace metals from the Animas River should be retained by reservoir sediments rather than causing a toxicity problem in reservoir waters. Most heavy metals that enter the reservoir would be in suspension rather than in solution. Assuming that water hardness and alkaline conditions prevail, metals should settle into reservoir sediments.

Like the Southern Ute Reservoir, the Aztec Reservoir would have a relatively strong potential to bioaccumulate Hg in fish. Additionally, Se bioaccumulation could be a problem. Both Hg and Se concentrations in the Animas River are predicted to be moderately high (0.13 and 4.0 under average annual flow conditions) in the Aztec area under this alternative (USBR, 1995b). These inflow concentrations coupled with the reservoir's shallow waters, probable eutrophic conditions and algal populations should increase the potential for mercury and Se bio-uptake. Hg/Se antagonism effects could mitigate these impacts.

All other project features constructed under this alternative would have the same water quality impacts as described for Alternative 4c.

3.3.5 Alternative 11b: Ridges Basin - Groundwater Alternative (173,100 AF)

Terminal Reservoir
The water quality impacts from reservoir expansion would be the same as described for Alternative 11c.

Aztec Reservoir
The reservoir would be subject to the same eutrophication potential and trace element problems as described under Alternative 11c.

Ridges Basin Dam and Reservoir
Average annual outflows under Alternative 11b would be roughly equivalent to outflows under Alternative 4a, because reservoir water demands would be the same under both alternatives. Therefore, assuming that average pool sizes would be equivalent, the same higher residence times and settling capacity for trace metals would be expected (see section 3.3.3). Possible water quality improvements downstream would also be the same as described under Alternative 11b.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canals would also be constructed. Potential turbidity impacts would be

no different because all adverse impacts can be avoided for all crossings by use of routine turbidity controls.

For the same reasons discussed above in Section 3.3.2, water quality improvement (in particular levels of Cu, Se, As and Ag) in the La Plata River downstream from Farmington are not expected to be as great under Alternative 11b.

All other project features constructed under this alternative would have the same water quality impacts as described for Alternative 4c.

3.3.6 Alternative 11a: Ridges Basin - Groundwater Alternative (80,100 AF)

Terminal Reservoir
The water quality impacts associated with this feature are described in Section 3.3.4.

Aztec Reservoir
The reservoir would be subject to the same eutrophication potential and trace element problems as described under Alternative 11c.

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. The only potential water quality problems associated with drainage crossings would be turbidity/sedimentation, which are addressed in Section 3.2.1 above.

Ridges Basin Dam and Reservoir
Under Alternative 11a, outflows would be much smaller than under any other alternative. Total pool size would also be expected to be substantially smaller, given the small project demands on the reservoir (Table 2-5). Assuming that average annual outflows would be a about a third of Alternative 11b, and that the pool size would be about half as large as under the other alternatives, then residence time would be the longest of any alternative. This would allow for long settling times for retention of trace metals in reservoir sediments. Although the probable trace metal concentrations have not been modeled for Alternative 11a, they can reasonably be assumed to be as low or lower than predicted for Alternative 4c.

Conversely, because Alternative 11a would divert far less flow than Alternative 4c, it would also cause less improvement to water quality downstream with respect to trace metals. Flow diversions under the Alternative 4c would result in modest to large decreases Zn, Cu and Ag concentration downstream. Under Alternative 11a, these reductions in concentration would probably not occur or are substantially less.

All other project features constructed under this alternative would have the same water quality impacts as described under Alternative 4c.

Table 3-3
Summary of Water Quality Impacts for Each Alternative

Impact	Alternative					
	4c	4b	4a	11c	11b	11a
1) Construction-related discharges of groundwater with high TDS, Se, Fe and Mn levels into the Animas River	YES	YES	YES	YES	YES	YES
2) Potential improvements in trace metal concentrations from flow diversions to Ridges Basin Dam	YES	YES	NO	YES	NO	NO
3) Potential Se and Hg biomagnification problems in reservoirs (number of reservoirs with strong potential)	1	0	0	2	1	1
4) Short term metal leaching from soils at reservoir bottom and in zones of fluctuating reservoir waters (number of reservoirs)	2	1	1	3	2	2
5) Increased loading of metals and salts to La Plata River during initial years of new irrigation	YES	YES	NO	YES	YES	NO
6) Potential bioaccumulation problems of Hg, As and Se in reservoir impoundments in the lower La Plata River	YES	YES	NO	YES	YES	NO
8) Possible reservoir eutrophication problems (number of reservoirs with strong eutrophication potential)	1	0	0	2	1	1
9) Possible reductions in trace metals in La Plata River near Farmington, New Mexico	YES	YES	NO	YES	YES	NO

3.4 CURRENT PATTERNS AND WATER CIRCULATION (230.23)

This section examines impacts to water currents, circulation patterns and related fluvial processes.

3.4.1 Alternative 4c: Ridges Basin (196,640 AF)

Durango Pumping Plant and Ridges Basin Inlet Conduit
Construction of the Durango Pumping Plant would have no effect upon water movement in the Animas River. Construction of the inlet conduit would cross four intermittent drainages. However, work would occur during the dry season when there would be no flow, and drainage channel bottoms would be fully restored, so no subsequent effect on seasonal flow would occur. Operation of the plant, in conjunction with operation of related project facilities (Ridges Basin Dam and Reservoir, Dry Side Canal) would involve diversion of flow from the river, which could cause impacts to fluvial processes in the Animas and La Plata Rivers. These impacts are discussed below.

Shenandoah Pipeline
This pipeline would cross 6 intermittent drainages. Work would occur during the dry season when there would be no flow, and following pipeline installation, drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation would be expected.

Ridges Basin Dam and Reservoir
Construction of the Ridges Basin Dam and Reservoir would require temporary re-routing of Basin Creek flow through a bypass channel until the dam and reservoir are completed. Following completion, flow in the Basin Creek would be permanently altered. Basin Creek's intermittent stream system and associated floodplain wetland area with seasonal floodplain dynamics would be replaced by a permanently-inundated deep water lacustrine system. Water circulation in the reservoir would be a function of active inflow pumping of river water (primarily in the spring runoff period), outflow as a result of Ridges Basin Pumping Plant operation, releases into the Ridges Basin Inlet Conduit, seasonal turnovers and wind-induced surface currents.

Flow in lower Basin Creek would largely be a result of dam releases as needed on an annual basis to provide sufficient Animas River flow to meet project demands downstream. This would be expected to average 20 to 25 cfs for periods of one to three months. Stream geomorphology in lower Basin Creek is currently influenced by very heavy and rapid short-term flows that heavily erode channel banks and have caused a deeply-incised channel. Given the deeply incised channel, the reservoir-managed flow regime would probably not cause appreciable change in lower Basin Creek channel morphology. However, existing

small stands of immature riparian trees growing on low terraces may be allowed to mature in the absence of heavy erosive flows.

Flow diversions to Ridges Basin Reservoir would cause a flattening of peak spring flood events in the Animas River. A peak spring flow reduction of roughly 17 percent is expected during normal water years (USBR, 1995c). This would not significantly affect river morphology because the Animas River is deeply-incised though much of its length upstream from Flora Vista. Active fluvial dynamics that create or shift point bars and scour zones play only a minor role along most of the river in this reach. Recruitment of riparian vegetation upstream from Flora Vista is largely limited to lower elevated terraces that are high enough to avoid scouring (USBR, 1995a). No significant changes to lower terrace wetting or creation processes are predicted.

Downstream from Flora Vista, a lower channel gradient and wider river floodplain allow more active fluvial processes to occur. Many areas of the floodplain are subject to channel meander, evulsive and aggradation processes. Flattening of peak spring flood flows in this reach may reduce the extent and frequency of flooding in some areas. This in turn may reduce the extent of channel scour, sediment transport and aggradation, which could reduce riparian vegetation recruitment opportunities (USBR, 1995a). However, given the relatively small change in peak discharges, these effects are not expected to be significant.

Normal fluvial processes that cause channel meander may destroy marsh vegetation in some areas and create new isolated oxbows and backwater areas in other areas suitable for colonization by marsh species. This process tends to maintain a rough overall equilibrium in the extent marsh vegetation. Flow depletions or changes in the magnitude of flood events in the reach downstream from Flora Vista could alter these fluvial processes and cause minor reductions in wetland habitat.

Ridges Basin Pumping Plant
Operation of the Ridges Basin Pumping Plant would create a withdrawal current in the Ridges Basin Reservoir that could export detrital matter and planktonic organisms into the Dry Side Canal. Given the expected mesotrophic nature of the reservoir, these Dry Side Canal exports would probably not be large enough to affect ecosystem metabolism in the La Plata River.

Durango M & I Pipeline
This pipeline would cross three intermittent drainages. Work would occur during the dry season when there would be no flow, and following pipeline installation drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation would be expected.

Dry Side Canal

Operation of the Dry Side Canal would cause about 15,100 acre-feet of water to be delivered from the Ridges Basin Reservoir to the La Plata River. This additional water, in combination with abandonment of existing irrigation canals and increased irrigation return flows, would result in an approximate 37,300 acre-foot flow augmentation in the La Plata River (USBR, 1995a). Water surface elevations are expected to be increased up to 1.5 feet for approximately five months during a typical water year in the reaches between the Dry Side Canal and the SUDD.

These substantial increases in La Plata flow would alter fluvial dynamics, increase surface stages and cause increases in hydroperiods within lower-lying terraces and along channel banks (see Section 3.2.1). These changes would promote an expansion in wetland and riparian areas. In general, the net effect of increased flows downstream from the Dry Side Canal should represent a beneficial impact because they may restore a more natural fluvial-driven variability to channel substrates, and a possible expansion of wetland and riparian vegetation communities (USBR, 1995a). These improvements could be particularly significant to the La Plata River ecosystem which is currently subject to excessive seasonal dry-downs due to agricultural withdrawals.

Irrigation Laterals

These pipelines would cross four perennial and 201 intermittent drainages. Work would occur during the dry season when there would be no flow, and following pipeline installation, drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation would be expected. Additionally, directional drilling may be used as an alternative for impact avoidance.

Project Drainage Facilities

Drainage facilities within expanded agricultural areas could intercept existing deep percolation patterns or lower groundwater tables, providing additional tributary flow to existing intermittent and perennial drainages. The extent of such additional flow has been included in estimates of La Plata River flow augmentation, discussed elsewhere in this analysis.

La Plata Diversion Dam and Impoundment

Construction of these facilities would occur during the dry season when there is little or no flow in the La Plata River. Minor temporary flow diversion may be required during construction.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant

Construction of these facilities would occur during the dry season when there is little or no flow in the La Plata River. Minor temporary flow diversion may be required during construction. Operation of the SUDD would cause substantial downstream flow reduction

by the diversion of up to 375 cfs of flow to the Southern Ute Reservoir. An estimated 49 percent of spring mean daily flow would be diverted under average conditions, causing modifications to fluvial processes such as substrate aggradation and downcutting (USFWS, 1992).

Reduction in overbank flooding would occur primarily in the reaches upstream from major tributaries (Reaches 3 and 6 *in* USBR, 1995a) where baseflow is particularly important. These reaches currently have minimal cottonwood recruitment potential because of the entrenched condition of the river (Bio/West, 1995). Overall SUDD flow diversions could cause significant alterations to floodplain fluvial-based morphological processes, and an estimated 50 percent reduction in cottonwood recruitment opportunities (USBR, 1995a). In the several mile reach downstream from the SUDD, flows required for channel maintenance may be substantially reduced, leading to a possible narrowing of the channel and riparian area and lowering of the water table (USBR, 1995a). This also could reduce riparian vegetation recruitment opportunities.

Southern Ute Dam and Reservoir
Cinder Gulch/McDermott Arroyo is an intermittent drainage system that has insufficient hydroperiods to support hydric or riparian vegetation. It is characterized by a dry channel bed that is highly downcut as a result of very intensive and rapid short-term flows. This system would be replaced by a permanently-inundated deep water lacustrine system. Water circulation in the lake would be a function of active inflow pumping of river water (primarily in the spring runoff period), outflow as a result of releases for project needs, and wind-induced surface currents.

New Mexico Irrigation Canal
This project feature would cross four intermittent drainages. Work would occur during the dry season when there would be no flow, and following completion of work drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation are expected.

Mancos River Corridor
Alternative 4c could potentially cause a slight flow augmentation in the Mancos River due to increased irrigation return flows, as discussed above in Section 3.1.1. Flow augmentation is not expected to cause significant alterations of current patterns or water circulation in the Mancos River.

Other Project Features
The following project features would not affect current patterns or water circulation in any water bodies: Long Hollow Tunnel, irrigation canal abandonment, Sprinkler Head Pumping Plants, electrical transmission facilities and recreational facilities.

3.4.2 Alternative 4b: Ridges Basin (173,100 AF)

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would also be constructed. Potential construction-related current pattern/water circulation impacts would remain the same.

This facility would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. Increased flows are expected downstream from the SUDD, as discussed above in Section 3.1.2. These flows would help alleviate the existing unnaturally low flow conditions in the river. Therefore, no significant adverse impacts to current pattern or water circulation would occur as a result of operation of the SUDD.

All other project features constructed under this alternative would have the same current/water circulation impacts as described under Alternative 4c.

3.4.3 Alternative 4a: Ridges Basin (80,100 AF)

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events resulting in minimal impacts to fluvial processes and cottonwood recruitment downstream from Flora Vista. This potential minor impact would be avoided under Alternative 4a because flow diversions would be significantly less than under 4c.

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. Work would occur during the dry season when there would be no flow, and following pipeline installation, drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation would be expected.

All other project features constructed under this alternative would have the same current/water circulation impacts as described under Alternative 4c.

3.4.4 Alternative 11c: Ridges Basin - Groundwater Alternative (196,640 AF)

Terminal Reservoir
Expansion of Terminal Reservoir could potentially affect water currents by creating a larger surface area for wind-induced surface currents. The impacts of this change are not expected to be adverse to the reservoir's existing potable water supply purposes.

Aztec Reservoir
This relatively small reservoir (35,100 acre-feet) would store water diverted from the Animas River for the purposes of New Mexico M & I needs. The amount of water diverted would be very small relative to Animas River flows and should not appreciably affect current pattern and water circulation in the river. The reservoir would alter seasonal flow in the dry arroyo within which it would be constructed. These impacts would be similar to the impacts described above (Section 3.3.1) for the Southern Ute Reservoir.

All other project features constructed under this alternative would have the same current/water circulation impacts as described under Alternative 4c.

3.4.5 Alternative 11b: Ridges Basin - Groundwater Alternative (173,100 AF)

Terminal Reservoir
The impacts associated with this feature would be the same as described for Alternative 11c.

Aztec Reservoir
The reservoir would have the same potential minor impacts on flows as described for Alternative 11c.

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events resulting in minimal impacts to fluvial processes and cottonwood recruitment downstream from Flora Vista. This potential minor impact would be even smaller under Alternative 11b because flow diversions would be substantially less than under 4c.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would be constructed. Potential construction-related current patterns/water circulation would remain the same.

This facility would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. As discussed above in Section 3.4.2, no significant adverse impacts to current patterns or water circulation would occur as a result of operation of the SUDD.

All other project features constructed under this alternative would have the same current/water circulation impacts as described under Alternative 4c.

3.4.6 Alternative 11a: Ridges Basin - Groundwater Alternative (80,100 AF)

Terminal Reservoir
The impacts associated with this feature would be the same as described for Alternative 11c.

Aztec Reservoir
The reservoir would have the same potential minor impacts on flows as described for Alternative 11c.

La Plata Rural Pipeline
This pipeline would cross 7 intermittent drainages. Work would occur during the dry season when there would be no flow, and following pipeline installation, drainage channel bottoms would be fully restored. Therefore, no impacts to current pattern or water circulation would be expected.

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events resulting in minimal impacts to fluvial processes and cottonwood recruitment downstream from Flora Vista. This potential minor impact would be avoided under Alternative 4a because flow diversions would be significantly less than under 4c.

All other project features constructed under this alternative would have the same current/water circulation impacts as described under Alternative 4c.

Table 3-4
Summary of Current Pattern/Water Circulation Impacts for Each Alternative

Impact	Alternative					
	1	2	3	4	5	6
1) Minor flattening of peak spring flows with attendant insignificant impacts to fluvial processes in the Animas River downstream from Flora Vista	YES	YES	NO	YES	NO	NO
2) Improvements in hydroperiods and fluvial processes downstream from the Dry Side Canal	YES	YES	NO	YES	YES	NO
3) Reductions in peak spring flow impacts on fluvial processes and riparian vegetation recruitment potential in the La Plata River downstream from the SUDD	YES	NO	NO	YES	NO	NO
4) Minor flow augmentation in the Mancos River	YES	YES	NO	YES	YES	NO

3.5 NORMAL WATER FLUCTUATIONS (230.24)

This section examines impacts to existing water fluctuation patterns in Waters of the U.S. affected by proposed project alternatives.

3.5.1 Alternative 4c: Ridges Basin (196,640 AF)

Durango Pumping Plant and Ridges Basin Inlet Conduit
Operation of the plant, in conjunction with operation of related project facilities (Ridges Basin Dam and Reservoir, Dry Side Canal) would involve diversion of flow from the river, which would cause changes to flow regimes in the Animas and La Plata Rivers. These are discussed below.

Shenandoah Pipeline
This facilities would cross 6 intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations would be expected.

Ridges Basin Dam and Reservoir
Water fluctuations in Basin Creek are characterized by spring/early summer peak flow periods, followed by a long annual period of minimal or no flow. Low flow periods are interrupted by occasional freshets provided by summer thunderstorms. Much of the channel bed is dry or has only shallow standing pools for the majority of the year. This annual water fluctuation would be permanently altered by Alternative 4c. Within the reservoir, water levels would fluctuate based on inflow pumping of river water and outflow as needed to meet project user needs. Inflow pumping would occur throughout the year but most water would be pumped during the spring runoff period. Based on average daily elevations, the reservoir would be at its maximum level during May and June and would be expected to reach maximum capacity (273,127 acre-feet) in roughly five of every 10 years. Based on expected demand, the average annual drawdown would reach a maximum of 20 feet annually and would typically occur in September.

The annual reservoir fluctuations would be expected to promote a seasonally-inundated littoral area that may promote aquic soil conditions and support hydric vegetation depending on sideslope steepness and period of inundation. The fluctuations would also create a reservoir zone of influence upstream in Basin Creek where the normally dry creekbed may be subject to seasonal inundation or saturation.

Flow in lower Basin Creek would largely be a result of dam releases as needed on an annual basis to provide sufficient Animas River flow to meet project demands downstream. This is expected to average 20 to 25 cfs for periods of one to three months. Given the deeply incised channel, the reservoir-managed flow regime would probably not cause appreciable change in lower Basin Creek channel morphology or cause significant expansions in hydric vegetation. However, existing small stands of immature riparian trees growing on low terraces may be allowed to mature in the absence of heavy erosive flows.

Flow diversions to Ridges Basin Dam would reduce overall flows in the Animas River by about 27 percent annually. However, because flows would be diverted rather than regulated, the overall hydrograph shape would not be substantially changed, although minor flattening of spring floods would occur. A peak spring flow reduction of roughly 16 percent is expected during normal water years (USBR, 1995c). These reductions are not expected to significantly affect river morphology because the Animas River is deeply-incised though much of its length upstream from Flora Vista.

Downstream from the Durango Pumping Plant, diversions would cause a maximum surface drawdowns of about one foot in the lower reaches of the Animas River (USBR, 1995a). Because most reaches of the Animas River are considered gaining, due mostly to agricultural return flows, the drawdown effect would much less than one foot along the majority of the river. These drawdowns would cause minor reductions to the extent of inundation and the duration of hydroperiods in the Animas River. The potential impacts of these reductions are discussed in Sections 3.1 and 3.2.

Durango M & I Pipeline

This pipeline would cross three intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations are expected.

Dry Side Canal

Operation of the Dry Side Canal would cause about 15,100 acre-feet of water to be delivered from the Ridges Basin Reservoir to the La Plata River. This additional water, in combination with abandonment of existing irrigation canals and increased irrigation return flows would result in an approximate 37,300 acre-foot flow augmentation in the La Plata River (USBR, 1995a). Water surface elevations are expected to increase up to 1.5 feet for approximately five months during a typical water year in the reaches between the Dry Side Canal and the SUDD. These substantial increases in La Plata flow would cause increases in hydroperiods in lower-lying terraces and along channel banks, causing an expansion in hydric soil development, or at a minimum, soils with aquic moisture regimes. The existing water fluctuation regime in the La Plata River is largely driven by seasonal diversions of water for agricultural purposes and much of the river is completely dry by late summer. Therefore, natural water fluctuations no longer occur. The net effect of increased flows downstream from the Dry Side Canal should push water fluctuations in the direction of more natural conditions, improving fluvial-driven variability to floodplain morphology, and possibly expanding wetland and riparian vegetation communities (USBR, 1995a).

Irrigation Laterals

These facilities would cross 4 perennial and 201 intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations are expected. Additionally, directional drilling would be used as an alternative for impact avoidance, where feasible.

La Plata Diversion Dam and Impoundment

The diversion dam impoundment would permanently inundate a 7.5 acre segment of the river channel and floodplain. The existing intermittent channel/riparian area would be replaced by a shallow water lacustrine system with minor annual fluctuations in water levels. The impacts of impoundment fluctuations on soils and wetlands are discussed in Sections 3.1 and 5.2.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Operation of the SUDD would cause downstream flow reduction by the diversion of up to 375 cfs of flow to the Southern Ute Reservoir. An estimated 49 percent of spring mean daily flow would be diverted under average conditions, causing reductions in overbank flooding and related decreases in hydroperiods and substrate moisture conditions. Reductions in the water table may be sufficient to affect substrate moisture conditions in locations where aquifer seepage is not the primary source of water. Reductions in hydroperiod are not projected to be enough to alter hydric vegetation in most locations, but some declines in riparian and wetland habitats are predicted (USBR, 1995a; Bio/West, 1995). Reductions in overbank flooding may cause a reduction in terrace moisture conditions. In the several mile reach downstream from the SUDD, flows required for channel maintenance may be substantially reduced, leading to a possible narrowing of the channel and riparian area and lowering of the water table (USBR, 1995a). Impacts of these potential changes are discussed in Section 5.2.

The diversion dam impoundment would permanently inundate a 7.5 acre segment of the river channel and floodplain. The existing intermittent channel/riparian area would be replaced by a shallow water lacustrine system with minor annual fluctuations in water levels.

Southern Ute Dam and Reservoir
Cinder Gulch/McDermott Arroyo is normally dry with very intensive and short-duration seasonal flows. This system would be replaced by a permanently-inundated deep water reservoir with water levels that would fluctuate based on inflow pumping of river water and outflow as needed to meet project user needs. Inflow pumping would occur primarily during the spring runoff period. The reservoir would normally be maintained at approximately one-half capacity during average years, attaining its maximum capacity (70,000 acre-feet) only during high runoff years. Annual high water levels would typically be in June with annual lows in March when the level would drop an average of eight feet.

The annual reservoir fluctuations may promote a seasonally-inundated littoral area that may produce aquic soil conditions and support hydric vegetation depending on sideslope steepness and period of inundation. The fluctuations would also create a reservoir zone of influence upstream in the arroyo where the normally dry channel bed may be subject to seasonal inundation or saturation.

New Mexico Irrigation Canal
This project feature would cross four intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations are expected.

Mancos River Corridor
Although Alternative 4c could cause a slight flow augmentation in the Mancos River due to increased irrigation return flows, no significant changes to the river hydrograph are expected.

Other Project Features
The following project features would not affect water fluctuations in any water bodies: La Plata Rural and Shenandoah Pipelines, Durango M & I Pipeline, Long Hollow Tunnel Irrigation Laterals, New Mexico Irrigation Canal, irrigation canal abandonment, Ridges Basin Pumping Plant, Sprinkler Head Pumping Plants, electrical transmission facilities and all project drainage and recreational facilities.

3.5.2 Alternative 4b: Ridges Basin (173,100 AF)

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal (that would be abandoned under Alternative 4c) would also be constructed. This facility would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. As discussed above in Section 3.1.2, increased flow would be expected downstream from the SUDD. Therefore, no significant adverse impacts to water fluctuations would occur as a result of operation of the SUDD.

All other project features constructed under this alternative would have the same water fluctuation impacts as described under Alternative 4c.

3.5.3 Alternative 4a: Ridges Basin (80,100 AF)

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events. This potential minor impact would be largely avoided under Alternative 4a because of substantially reduced diversions.

La Plata Rural Pipeline
This facilities would cross 7 intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations would be expected.

All other project features constructed under this alternative would have the same water fluctuation impacts as described under Alternative 4c.

3.5.4 Alternative 11c: Ridges Basin - Groundwater Alternative (196,640 AF)

Terminal Reservoir
Expansion of the existing Terminal Reservoir may alter existing reservoir stage fluctuations but the impacts of this change are not expected to be adverse to the reservoir's existing use for potable water purposes.

Aztec Reservoir
The amount of water diverted for the Aztec Reservoir would be minuscule relative to Animas River flow and should not appreciably affect current water fluctuation in the river. The reservoir would alter seasonal flow in the dry arroyo within which it would be constructed. These impacts would be similar to the impacts described above (Section 3.5.1) for the Southern Ute Reservoir.

All other project features constructed under this alternative would have the same water fluctuation impacts as described under Alternative 4c.

3.5.5 Alternative 11b: Ridges Basin - Groundwater Alternative (173,100 AF)

Terminal Reservoir
The impacts from this feature would be the same as described for Alternative 11c.

Aztec Reservoir
The reservoir would have the same potential minor impacts on water fluctuations as described under Alternative 11c.

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events. This potential minor impact would be avoided under Alternative 11b because of substantially smaller diversions.

Southern Ute Diversion Dam, Impoundment, Inlet Canal and Pumping Plant
Construction-related impacts would be similar to those described for Alternative 4c, except that only 2.7 miles of the inlet canal would be constructed and an additional 2.7 miles of interim irrigation canal would also be constructed. Potential construction-related current pattern/water circulation would remain the same. This facility would be diverting far less water than under Alternative 4c because the Southern Ute Dam would not be built. As discussed above in Section 3.5.2, no significant adverse impacts to water fluctuations would occur as a result of operation of the SUDD.

All other project features constructed under this alternative would have the same water fluctuation impacts as described under Alternative 4c.

3.5.6 Alternative 11a: Ridges Basin - Groundwater Alternative (80,100 AF)

Terminal Reservoir
The impacts from this feature would be the same as described for Alternative 11c.

Aztec Reservoir
The reservoir would have the same potential minor impacts on water fluctuations as described for Alternative 11c.

La Plata Rural Pipeline
This facilities would cross 7 intermittent drainages. Work would occur during the dry season when there would be no flow, and no impacts to seasonal water fluctuations would be expected.

Ridges Basin Dam and Reservoir
Flow diversions to Ridges Basin Dam under Alternative 4c would cause a flattening of peak spring flood events. This potential minor impact would be avoided under Alternative 11a because of substantially reduced diversions.

All other project features constructed under this alternative would have the same water fluctuation impacts as described under Alternative 4c.

Table 3-5
Summary of Water Fluctuation Impacts for Each Alternative

Impact	Alternative					
	1	2	3	4	5	6
1) Minor flattening of peak spring flows and reductions in hydroperiod in the Animas River	YES	YES	NO	YES	NO	NO
2) Restoration of more natural water fluctuations in the La Plata River	YES	YES	NO	YES	YES	NO
3) Reductions in overbank flooding and attendant reductions in seasonal hydroperiods in the lower La Plata River	YES	NO	NO	YES	NO	NO

3.6 SALINITY GRADIENTS (230.25)

"Salinity gradients," as used in 33 CFR 230.25 refers to gradients derived from the mixing of ocean waters and freshwaters in estuarine systems. This section is, therefore, not applicable to the proposed project. The effects of the proposed project on salinity (TDS) levels is discussed in Section 3.3 (Water).

SECTION 12 FINDINGS OF COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

Alternatives 4a and 11a would comply with the requirements of the EPA guidelines (Subparts B through G). Alternative 4a is less environmentally impactive and is preferred over Alternative 11a.

Construction and operation of the Animas La-Plata Project as proposed under Alternatives 4c, 4b, 11c, and 11b would not comply with the final biological opinion of the U.S. Fish and Wildlife Service in that they would jeopardize the continued existence of listed species (see Section 7). Further, the proposed disposal sites for the discharge of dredged or fill material do not comply with all of the requirements of the EPA guidelines (Subparts C through G), since the proposed discharge will result in significant degradation of the aquatic ecosystem under Section 230.10(b).

The U.S. Bureau of Reclamation concludes that the Alternatives 4a and 11a will comply with the 404(b)(1) guidelines and that Alternative 4a is the environmentally preferred alternative. The Bureau of Reclamation also concludes that construction of Alternatives 4c, 4b, 11c, or 11b would not meet the requirements of Section 230.10(b)(3) and, therefore, do not comply with the 404(b)(1) guidelines.