

2011 Taos Water Quality Sampling Report – Rio Hondo, Rio Fernando and Rio Pueblo de Taos

Lead: Sentinels-Rios de Taos

Support: Amigos Bravos

Abstract: Surface water quality sampling was conducted in the Taos NM area in May, July, and September 2011. Samples were collected from 6 sites in the Rio Hondo, 7 sites in the Rio Pueblo de Taos, and 4 sites in the Rio Fernando de Taos. Water quality standards were exceeded in both the Rio Fernando de Taos and Rio Pueblo de Taos. For the parameters that were tested, no exceedances of water quality standards were detected in the Rio Hondo.

On all three sampling dates there were sites in both the Rio Fernando and Rio Pueblo de Taos that did not meet standards for dissolved oxygen and electrical conductivity. The lower site in the Rio Fernando (at Fred Baca Park) did not once meet dissolved oxygen or electrical conductivity standards. An upper Rio Fernando site (Divisadero trailhead parking) exceeded E.coli standards in May, as did the lower Rio Fernando site (Fred Baca Park). In July the upper most Rio Fernando site sampled (Near Valle Escondido turnoff) had E.coli levels above the standard. In May one site in the Rio Pueblo de Taos (P1A) had very high *E. coli* levels.

Three sites were added on the Rio Pueblo in 2011 to monitor the impact of the Taos wastewater treatment plant on the Rio Pueblo and on a small perennial unnamed stream that flows from the wastewater treatment plant. The results indicate some serious water quality issues in the perennial unnamed stream below the wastewater treatment plant. Specifically there were exceedances of water quality standards for E.coli, ammonia, dissolved oxygen, and conductivity. Another site in the Rio Pueblo de Taos in the Los Cordovas area was also added to the sampling this year. This site had one E.coli exceedance and one conductivity exceedance.

2011 sampling confirms the recommendation from previous sampling reports to list the Rio Fernando de Taos and the Rio Pueblo de Taos as impaired for *E. coli* and the Rio Fernando de Taos as impaired for dissolved oxygen. The sampling results confirm the New Mexico Environment Department's previous listing of the Rio Fernando de Taos for electrical conductivity. In addition, 2011 sampling results indicate that the unnamed arroyo below the wastewater treatment plant should be listed as impaired for ammonia, E.coli, dissolved oxygen and electrical conductivity. The 2011 results indicate that middle portion of the Rio Pueblo de Taos should be listed as impaired for electrical conductivity. The 2011 data confirms sampling results from the past 4 years at the Rio Fernando de Taos sampling site at Fred Baca Park, which has had consistently high levels of E.coli, and conductivity and low dissolved oxygen levels.

Introduction: This sampling project was initiated by Sentinels – Rios de Taos due to a concern that inadequate data were available to accurately assess the health of the Rio Hondo, Rio Fernando, and Rio Pueblo de Taos watersheds. Sentinels- Rios de Taos

contacted Amigos Bravos in 2005 with concerns about water quality in local watersheds. Specifically, there was some concern about nutrient loading in the upper Rio Hondo. With Amigos Bravos' assistance Sentinels-Rios de Taos identified sampling locations and developed a monitoring plan. Sentinels-Rios de Taos contacted Rivers and Birds in Arroyo Seco to invite them and the youth that they work with to participate in the project. National representatives from Sierra Club's Water Sentinels program traveled to Taos and gave several trainings to the Sentinels-Rios de Taos' volunteers. Sentinels- Rios de Taos initiated sampling first in February of 2007 with assistance from Amigos Bravos. Four previous sampling reports have been prepared for sampling that occurred in 2007, 2008, 2009, and 2010 respectively. This report covers the sampling that occurred in 2011.

Methods: Surface water quality samples were collected from 6 sites in the Rio Hondo, 7 sites in the Rio Pueblo de Taos and 4 sites in the Rio Fernando de Taos (Appendix A and Appendix C). All samples were kept on ice until they were processed by Sangre de Cristo labs in Alamosa Colorado. Laboratory samples were collected for, *E. coli*, and total dissolved solids for all samples. For some samples nitrates, ammonia and BOD were also analyzed. All laboratory samples were collected and processed within an 8hr holding time. EPA approved methods and holding times were used to analyze the samples (Appendix B). Field measurements for pH, temperature, dissolved oxygen and conductivity were conducted (Appendix B).

Results:

A list of the full sampling results for 2011 can be found in Appendix C.

Rio Hondo:

May 25, 2011: Laboratory samples were collected from 5 sites in the Rio Hondo. These samples were analyzed for *E. coli*, nitrate, and TDS. Field readings for temperature, pH, conductivity, and dissolved oxygen were also taken at these three locations. No water quality standard exceedences were recorded for the tested parameters during this period (Appendix C)

July 13, 2011: Laboratory samples were collected from 4 sites in the Rio Hondo. These samples were analyzed for *E. coli*, nitrate, and TDS. Field readings for temperature, pH, conductivity, and dissolved oxygen were also taken at these three locations. No water quality standard exceedences were recorded for the tested parameters during this period (Appendix C)

September 14, 2011: Laboratory samples were collected from 4 sites in the Rio Hondo. These samples were analyzed for *E. coli* and TDS. Field readings for temperature, pH, conductivity, and dissolved oxygen were also taken at these four locations. No water quality standard exceedences were recorded for the tested parameters during this period (Appendix C)

Rio Pueblo:

May 25, 2011: Laboratory samples were collected from 4 sites in Rio Pueblo de Taos and analyzed for *E. coli*, nitrate, and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. At P1A, which is a small perennial spring that feeds into the Rio Pueblo near the intersection of Upper Ranchitos and Ranchito Rds., *E.coli* was measured at 1336 colonies/100ml which is well above the 235 standard. In addition electrical conductivity was measured at 490 microsiemens/cm, which is slightly above the standard of 400mg/L. At PS2, which is the unnamed arroyo directly below the Taos wastewater treatment plant whose non storm related flow is typically 100% effluent, had high levels of *E.coli* (576 colonies/100ml); very high electrical conductivity (1010 microsiemens/cm); and low dissolved oxygen (4.5 ppm) No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

July 13, 2011: Laboratory samples were collected at 5 sites in the Rio Pueblo de Taos and analyzed for *E. coli*, and TDS. Two of these sites (P1A and PS2) were also analyzed for nitrate and ammonia and one of these two sites (PS2) was analyzed for BOD as well. Field readings for temperature, pH, DO, and conductivity were also taken with the exception of PS3 where biting insects made it impossible to do these field readings. Electrical conductivity was above standards at 3 of the 4 sites for which readings were collected (P1A, P2A, and PS2). *E.coli* levels were slightly above standards at P2A which is located on the mainstem of the Rio Pueblo in Los Cordovas. Ammonia levels in the unnamed arroyo below the wastewater treatment plan (PS2) were extremely high (13.9 mg/L and well above the chronic aquatic life water quality standard of 5.37mg/L. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

September 14, 2011: Laboratory samples were collected at 5 sites in the Rio Pueblo de Taos and analyzed for *E. coli*, TDS and 5-day BOD. Laboratory samples for ammonia and total recoverable chlorine (TRC) were collected at one site (PS2). Field readings for temperature, pH, DO, and conductivity were also taken. Electrical conductivity was above standards at 3 of the 5 sites for which readings were collected (P2A, PS2, and PS3). At PS2 (the unnamed arroyo below the wastewater treatment plant), water quality standards for dissolved oxygen and *E.coli* were not met. Dissolved oxygen was at 4ppm (the standard is 6ppm or greater) and *E.coli* was measured at 660 colonies/100ml, which is above the standard of 235 colonies/100ml. TRC levels at PS2 were 2.4 mg/L. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Rio Fernando:

May 25, 2011: Laboratory samples were collected at 3 sites in the Rio Fernando and analyzed for *E. coli* and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. Dissolved oxygen was measured at 3 mg/L at F4, which is located at Fred Baca Park. The applicable water quality standard is ≥ 6 mg/L. Electrical

conductivity was measured at 810 microsiemens/cm which is above the standard of 500 microsiemens/cm. *E.coli* levels were above water quality standards at 2 of the 3 tested sites (F1 and F4), the Divisidero trailhead and Fred Baca Park respectively. *E.coli* levels at F1 were at 268 colonies/100ml and at F4 they were measured at 388 colonies/100ml, both of which are above the 235 colonies/100ml standard. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

July 13, 2011: Laboratory samples were collected at 3 sites in the Rio Fernando and analyzed for *E. coli* and TDS. Field readings for temperature, pH, DO, and conductivity were also taken. One of the sites F1A (near Valle Escondido), had *E.coli* levels of 368 colonies/100 ml, which is above the standard of 235 colonies/100ml. The conductivity level at F1B (just downstream of Shady Brook) of 510 microsiemens/cm slightly exceeded the applicable water quality standard of ≤ 500 . The conductivity level at F4 of 680 microsiemens/cm exceeded the applicable water quality standard of ≤ 500 . In addition, the dissolved oxygen level of 2ppm at F4 was very low and did not meet the standard of ≥ 6 ppm. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

September 14, 2011: Laboratory samples were collected at 3 sites in the Rio Fernando and analyzed for *E. coli*, TDS, and 5-day BOD. Field readings for temperature, pH, DO, and conductivity were also taken. Water quality standards for dissolved oxygen and conductivity were not met at the upper site (F1 – near Divisidero Trailhead) nor the lower site (F4 – near Fred Baca Park). The conductivity level at F1 (Divisidero Trailhead) of 530 microsiemens/cm exceeded the applicable water quality standard of ≤ 500 microsiemens/cm. The dissolved oxygen level of 5ppm at F1 (Divisidero Trailhead) did not meet the applicable standards of ≤ 6 ppm. The conductivity level at F4 (Rio Fernando at Fred Baca Park) of 700 microsiemens/cm exceeded the applicable water quality standard of ≤ 500 . Dissolved oxygen was measured at 2 mg/L at F4. The applicable water quality standard is ≥ 6 mg/L. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Discussion:

Rio Fernando

Over the 5 years of sampling, F4, the Fred Baca Park Site on the Rio Fernando has had the most consistent problems with *E.coli*, conductivity and dissolved oxygen. These results, especially the high *E.coli* results, are of considerable concern since the site is located about 20 yards from a public children's playground area.

Sampling in the upper Rio Fernando also is often high for *E.coli*. This is consistent with sampling done by the U.S. Forest Service and by the New Mexico Environment Department in the upper Rio Fernando above F1A where high levels of *E.coli* have been recorded. Both livestock and wildlife have been identified as possible sources of this contamination and there are local landowners that are very concerned about livestock management in the upper portions of the watershed.

Rio Pueblo de Taos

Sampling was initiated at P1A, a spring that feeds into the Rio Pueblo de Taos near intersection of Upper and Lower Ranchitos, in 2010. Sample results in 2011 continue to show high levels of *E.coli* in this spring. NMED staff visited this site during 2011 and indicated that due to soil types they did not believe that the contamination was from septic tanks. Instead they thought that land use activities upstream may be contributing to the high levels of *E.coli*.

A number of new sampling locations were added on the Rio Pueblo in 2011. One site was added in the Los Cordovas area (P2A). On the two occasions that this site was sampled in 2011 conductivity standards were exceeded. In addition, during the July sampling event *E.coli* levels were slightly above the applicable water quality standard. The Rio Grande del Rancho which is located about 1 mile upstream from this site is impaired for conductivity and could be having an impact on this stretch of the Rio Pueblo.

Three other sites were added in the Rio Pueblo in 2011. One site on the mainstem of the river above the perennial arroyo with flow from the wastewater treatment plant (PS1); one site in the unnamed perennial arroyo (PS2); and one site on the mainstem downstream from the unnamed perennial arroyo (PS3). While we were not able to coordinate sampling to get samples from the two sites on the mainstem in the same sampling event, we did see considerable water quality problems in the unnamed arroyo where the flow consists entirely of discharge from the wastewater treatment plant. These water quality standard exceedances (of *E.coli*, dissolved oxygen, ammonia, and conductivity) were reported to NMED and to EPA during the wastewater treatment plant permit renewal process. The Town of Taos has recently completed an upgrade to the wastewater treatment facility which didn't go online until after 2011 sampling. Some of the high levels of contaminants found in the arroyo in 2011 could have been related to disrupted treatment during the construction of the new system. It will be important to observe if water quality has improved during the 2012 sampling season.

Conclusion/Recommendations:

- Levels of *E. coli* above the applicable water quality standard were found in both the most upstream reach and the most downstream reach of the Rio Fernando in 2011. Over the 4 years of sampling, F4 has had the most consistent problems with *E.coli* exceedances, which is a concern since the site is located about 20 yards from a public children's playground area. Further study should be conducted to determine the source of the water quality problems at F4.
- The new site below the wastewater treatment facility (PS2) shows some serious water quality problems. A new wastewater treatment system has been installed and gone online since 2011 samples were collected. This site should be closely monitored in 2012 to determine if water quality has improved now that the new system is online.

- 2011 sampling results confirm the recommendation from previous sampling reports to list the Rio Fernando de Taos and the Rio Pueblo de Taos as impaired for *E. coli* and the Rio Fernando de Taos as impaired for dissolved oxygen.
- 2011 sampling results indicate that the Rio Pueblo de Taos from the Arroyo del Alamo to the Rio Grande del Rancho should be listed as impaired for electrical conductivity.
- The sampling results confirm the New Mexico Environment Department's previous listing of the Rio Fernando de Taos for electrical conductivity.
- Sampling done in the Rio Hondo for the past three years has not shown any water quality exceedances. Perhaps the problem observed in 2007 and 2008 has been fixed or our sampling events are not occurring at the times when levels are high.
- High *E.coli* results in the Upper Rio Fernando in 2011 combined with previous year's sampling results and with monitoring results from other parties (NMED and USFS), point to a problem in the upper watershed. Cattle grazing and wildlife use on Forest Service land has been suggested as a source of contamination. Efforts to improve land management and grazing practices should be made.
- Results from the small spring that feeds into the Rio Pueblo near the intersection of Ranchitos and Upper Ranchitos indicate that there is an ongoing *E.coli* contamination source. Further investigation should be done to determine why, now that the leaking septic tank has been fixed, the *E.coli* problem still exists.

APPENDIX A

SENTINELS-RIOS de TAOS WATER SAMPLING SITES

ON THE RIO FERNANDO

- F1A Above Shadybrook Development, about 5 miles east of Taos, by bridge on road to Valle Escondido
N 36 22' 19.76"
W 105 23' 07.75" (GE)
- F1B About 200 meters downstream from Shadybrook, by NF La Sombra campground.
N 36 22' 10.45"
W 105 28' 08.51" (GE)
- F 1 About 10 yards downstream from the west bridge by the USFS parking lot at the Divisidero/South Boundary trailhead. On the north bank.
N 36 22' 32.56"
W 105 32' 49.92"
- F2 About 10 yards upstream from Paseo del Pueblo Sur, across street from ABC Lock.
On the north bank. We'll usually use this site only when a storm is in progress.
N 36 23' 54.99"
W 105 34' 38.76" (GE)
- F3 About 25 yards downstream from Paseo del Pueblo Sur, by ABC Lock. On the south bank, by a concrete bar.
N 36 23' 55.02"
W 105 34' 39.25" (GE)
- F4 Fred Baca Park, about 50 yards downstream from the footbridge at the bend. On northwest side. of stream.
N36 23' 56.8"
W105 35' 23.2"

F4G

ON THE RIO PUEBLO

- P 1 About 27 yards downstream from the stop sign on Upper Ranchitos Road at Paseo del Pueblo Norte. On north side of stream by the car wash.
N36 25' 13"
W105 34' 23"
- P1A Perennial spring about 100 feet from where it feeds into Rio Pueblo de Taos. Right where spring comes out of culvert that goes under Upper Ranchitos Rd about 200 feet from intersection with Ranchitos Rd.

N 36 24' 16.01"
W 105 35' 53.35

- P1B Ranchitos Rd. Near bridge by Callegon Rd and SR 240 (near Hacienda de los Martinez). Mile Marker 4.
N 36 24' 1.30"
W 105 36' 25.71"
- P1C Ranchitos Rd near mile marker 13 go down dirt road to the left by road to Blackstone Ranch.
N36 23' 34.6"
W 105 37' 26.4"
- P 2 About 15 yards downstream from bridge (right near turn to Los Cordovas Rd) at Ranchitos Road and Culebra Road. On north side of stream by survey sign.
N 36 23' 23.74
W105 37' 50.46"
- P2A Brad Hockmeyer and Janet Gauthier's property on the Rio Pueblo de Taos. Take Los Cordovas Rd. south towards the wastewater treatment facility. Take a right at number 118C. Take this drive all the way to the end making a sharp right at the Webber's property to continue onto the geodesic domes. Park at the domes and walk down to the river from here.
N 36 23' 11.78"
W 105 39' 03.37"
- PS1 mainstem of Rio Pueblo de Taos about 200 yards upstream from the town of Taos wastewater effluent discharge arroyo. Valerie Graves is the property owner. Sample on rocky point bar in the middle of her property.
N 36 22' 50.47"
W105 39' 44.30"
- PS2 Perennial effluent dependent arroyo (town of Taos wastewater discharge). Turn right onto Thomas Romero Rd and then an immediate right onto Paintbrush Rd. Sample immediately after the gate (which is usually left open) in the arroyo.
N 36 22' 32.05"
W 105 39' 25.36"
- PS3 Rio Pueblo de Taos about a quarter mile downstream from the confluence of the town of Taos wastewater arroyo and the Rio Pueblo. Drive on Thomas Romero Rd, past the open gravel pit on right until you reach the small subdivision. The road is usually gated past this point. Take a right at the subdivision and then your first right (on small dirt road) at the large map sign then take your first right again onto a small two track that crosses a couple of rough patches and then winds down to the river. Park on grassy open area upstream from the gazebo.
N 36 22' 41.26"
W 105 40' 05.63"
- P 3 About 10 yards upstream from the road barrier from the parking lot on the northeast corner of Taos Junction Bridge area. On east bank of stream.

N 36 20' 19.63"
W 105 43' 47.36" (GE)

ON THE RIO HONDO

- H 1 Above Phoenix Restaurant, which is upstream from the Bavarian Inn
N 36 34' 30.67"
W 105 26' 20.47" (GE)
- H 2A Rio Hondo just upstream from where the branch coming from Bavarian Inn
(after going through the culvert under the trail) empties into the Rio Hondo.
N 36 34' 41.38"
W 105 26' 25.62 (GE)
- H2B Branch coming from Bavarian Inn just before it empties into the main Rio
Hondo.
N 36 34' 41.90"
W 105 26' 25.88" (GE)
- H 2C About 10 yards upstream from the bridge near the day care center in the Ski
Village. On the north bank.
N 36 35' 47.23
W 105 27' 15.19" (GE)
- H2C2 Directly above Taos Ski Valley Effluent Pipe
N 36 35' 46.85"
W 105 27' 41.76" (GE)
- H2D Just above the Riverside property, about 175 yards downstream from the stop
sign at the intersection of the Village of TSV maintenance road and Route 150.
North bank.
N 36 35' 41.78"
W 105 28 16.37" (GE)
- H2E Rio Hondo directly downstream of effluent pipe
N36 35' 47"
W105 27' 43"
- H2F Taos Ski Valley effluent pipe
N 36 35' 46.77"
W 105 27' 42.29" (GE)
- H 3 Cuchilla Campground, just downstream from entrance road. North bank.
N 36 32' 32.08
W 105 33' 22.90 (GE)
- H 4 Kaufman Property. About 20 yards downstream from footbridge. South bank.
N 36 32' 14.8"
W 105 38' 43.4"
- H4A Just downstream from Route 522 Bridge, north bank.

N 36 32' 07.1"
W 105 40' 02.7"

H 5 About 20 yards upstream from bridge in Lower Arroyo Hondo, just before the road crosses the Rio Hondo and goes uphill towards New Buffalo. North ban
N 36 31' 58.62"
W 105 40' 55.43"

H 6 About 10 yards upstream from confluence with Rio Grande.
N 26 32' 02.12
W 105 42' 27.26" (GE)

HVB N 36 31' 58.5"
W 105 35' 04.0"

HVG 5 M downstream from bridge on lane to Jackie Garcia property
N 36 32' 07.6"
W 105 34' 12.2".

APPENDIX B

SENTINELS--RIOS de TAOS

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Project Description

The goal of the Sentinels--Rios de Taos water monitoring project is to provide additional water quality data to local, state, and federal decision makers, as well as the public at large. This project was initiated due to a concern that inadequate data was available to accurately assess the health of the Rio Hondo, Rio Fernando, and Rio Pueblo de Taos watersheds. The cumulative impact of point and nonpoint sources of pollution will be characterized by collecting data on those parameters that are basic indicators of water quality and watershed health. Surface water samples collected by volunteer monitors will be analyzed for some or all of the following constituents:

- Nitrates
- Phosphorous
- Total Dissolved Solids
- E. Coli
- pH
- Conductivity
- Dissolved Oxygen
- Temperature
- Biological Oxygen Demand (BOD)

Sampling Locations

Sampling sites may change in attempt to identify sources of pollution. Some identified sampling sites include:

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W 105 35' 04.0"

HVG 5 M downstream from bridge on lane to Jackie Garcia property
N 36 32' 07.6"
W 105 34' 12.2".

Testing results will be sent to Region 6 of the Environmental Protection Agency (EPA), the State of New Mexico Environmental Department's Surface Water Quality Bureau, Amigos Bravos, and local newspapers and publications. Sampling results will be stored in the Sierra Club Sentinels--Rios de Taos database.

Project Organization

Project Coordinator Contact information:

Eric E. Patterson
Box 334
Valdez, NM 87580
505-776-2833
eepatt@gmail.com

The project coordinator ensures all components of the project identified by this QAPP are completed in an efficient and timely manner. This includes oversight on sample collection, delivery, analysis, and reporting.

Sample Collector Contact Information

Eric E. Patterson, contact person (see above)

Mary Pickett	Nora Patterson	Rachel Conn
Gary Grief	Dorothy Wells	Betsy Wolf
Annouk Ellis	Jeanne Green	Moira O'Hanlon
Roberta Salazar	Flowers Espinosa	

Sample collectors will conduct sample collection activities according to the methods identified by this QAPP. Responsibilities include:

- Calibration, maintenance and utilization of field equipment for analysis of dissolved oxygen (DO), temperature, pH, and conductivity.
- Obtaining needed sample containers and preservatives for sampling events.

- Following quality assurance procedures for sample collection identified by this QAPP.
- Filling out chain of custody (COC) forms.

Sample Transport Contact Information

Eric E. Patterson (see above)

Sample Transport will ensure that water samples are delivered to Sangre de Cristo Laboratory, Inc., Alamosa, CO, or another EPA certified laboratory, in a secure and timely manner.

Responsibilities include:

- Keeping samples secure between sampling site and the laboratory.
- Maintaining COC document according to procedures identified.
- Delivering samples within specified holding times.

Sample Analysis/Laboratory Contact Information:

Sangre de Cristo Laboratory, Inc., an EPA certified laboratory
Tierra del Sol Industrial Park
2329 Lava Lane
Alamosa, CO 81101

Sample Analysis Staff will ensure that samples are analyzed in a manner that provides the most accurate data possible. Responsibilities include:

- Analyzing samples according the methods identified in Standard Operating Procedures (SOPs).
- Analyzing samples within established holding times.
- Reporting results to Project Coordinator

Data Reporting Contact Information

Rachel Conn, Amigos Bravos Clean Water Circuit Rider and Policy Analyst
Box 238
Taos, NM 87571
505-758-3874
rconn@amigosbravos.org

Data reporting will ensure the data collected by the project is stored appropriately and disseminated to interested parties. Responsibilities include:

- Organization of final report on data collected by the project.
- Dissemination of report to specified local, state and federal agencies.
- Dissemination of report to newspapers and other local news media and presentation of project information to the public upon request.
- Entering data into Sierra Club's Water Sentinel database.

Quality Assurance of Field Analysis

Measurements will be made using the following equipment:

- CHEMets Dissolved Oxygen Kit, Model K-7512
- Fisher Alcohol Thermometer, Model 15021B
- Oakton Conductivity ECTester Meter, Model 5-0082
- LaMotte Wide Range pH Test Kit Model P-5985 Code 2119

PARAMETER	DETECTION LIMIT	ACCURACY
Dissolved Oxygen	1 to 12 mg/L	+/- 1 ppm
Temperature	-10° to 110° C	+/- 1° C
Conductivity	0 to 1990 µS/cm	+/-10 µS/cm
pH	5.0 to 8.5 ph units	+/-0.3 pH units

Field instruments will be calibrated according to manufacturers' instructions <24 hours prior to each sampling event. The conductivity meter will be calibrated using a known standard solution. Chemicals used for dissolved oxygen and pH analysis will be replaced according to expiration dates provided by the manufacturer. Samples will be collected using the containers, preservatives, volumes and holding times identified in Appendix A

Field Sample Collection Procedures

Samples will be collected:

- Midstream just below the water's surface.
- Facing upstream to avoid disturbances caused by the sample collector.
- Upstream of minor temporal or spatial impacts, such as bridges and campsites.
- Free of floating debris.
- Using appropriate sample containers and preservatives specified in Appendix A.

Samples will be tagged appropriately with identifying number/information and delivered to appropriate laboratory personnel accompanied by appropriately completed and signed Chain of Custody (COC) forms.

Quality Assurance of Laboratory Analysis

Quality assurance of laboratory methods is the sole responsibility of the sample analysis/laboratory coordinator previously identified. Samples will be analyzed using methods contained in the laboratory's Standard Operating Procedures. These are located at Sangre de Cristo Laboratory, Inc. and can be obtained from the sample analysis coordinator upon request.

METHODS FOR LABORATORY ANALYSIS		
MATRIX	PARAMETER	METHOD
Nonpotable water	Total Dissolved Solids	EPA 160.1
Nonpotable water	Nitrates	EPA 300.0
Nonpotable water	Total Phosphorus	EPA 365.2
Nonpotable water	E. Coli	EPA 10029
Nonpotable water	BOD	SM 5210B

Containers, Volumes, Preservatives, and Holding Times

Parameter	Optimum Volume	Container Type	Preservation Method	Holding Time
Total Nitrogen (Calculation: TKN + (NO ₂ + NO ₃ as N))	250 mL	Plastic, Glass	Cool	48 Hours
Total Phosphorus	250 mL	Plastic, Glass	Cool	24 Hours
Total Suspended Solids (also called Non Filterable Residue)	500 mL	Plastic, Glass	Cool	24 Hours
E. coli or Fecal Coliform	150 mL	Sterile Bottle	Cool	8 Hours
Dissolved Oxygen	Determined On-Site			None
Temperature	Determined On-Site			None
Conductivity	Determined On-Site			None

APPENDIX C.
2011 DATA

SAMPLE #	DATE	COLLECTION TIME	REC'D BY LAB	TEMP, C.	pH	DISSOLVED	ELECTRICAL	NITRATE	TOTAL DISS	E. COLI	5-Day BOD	NITRATE	AMMONIA	PHOSPHATE	TRC
						OXYGEN	CONDUCTIVITY	mg/L	SOLIDS	COLONIES/100ML		mg/L	mg/L	mg/L	mg/L
						ppm	microsiemens/cm	mg/L							
STANDARD						<=20	6.6-8.8	>=6	<=500		235				
F1	5/25/11	9:55 AM	2:28 PM	9	7.5	9	8	7	390	7	268				
F1A	5/25/11	10:25 AM	2:28 PM	8	7.5	6	280	186	52						
F4	5/25/11	11:10 AM	2:28 PM	11	7	3	810	588	388						
STANDARD						<=20	6.6-8.8	>=6	<=400		235				
P1A	5/25/11	9:15 AM	2:28 PM	9	7.5	9	490	318	1336						
P2	5/25/11	9:55 AM	2:28 AM	9	7.5	7	300	187	49						
PS1	5/25/11	10:45 AM	2:28 AM	10	7.5	8	350	230	65						
PS2	5/25/11	10:10 AM	2:28 AM	13	7.5	4.5	1010	637	576						
STANDARD						<=25	6.6-8.8	>=6	300-500		410				
H3	5/25/11	9:30 AM	2:28 PM	4	7.2	4	130	86	1						
HVB	5/25/11	9:50 AM	2:28 PM	5	7	8	150	105	7						
H4	5/25/11	2:28 PM	2:28 PM	8	7.5	8	180	120	3						
H5	5/25/11	10:13 AM	2:28 PM	12	7.5	7	330	230	20						
H6	5/25/11	10:35 AM	2:28 PM	11	7.5	8	340	237	6						
STANDARD						<=20	6.6-8.8	>=6	<=500		235				
F1A	7/13/11	9:42 AM	1:00 PM	16	7.5	7	350	232	368						
F1B	7/13/11	10:06 AM	1:00 PM	13	7.5	7	510	349	44						
F4	7/13/11	10:36 AM	1:00 PM	15	6.5	2	680	466	200						
STANDARD						<=20	6.6-8.8	>=6	<=400		235				
P1	7/13/11	11:00 AM	1:00 PM	16	7.5	6	230	153	25						
P1A	7/13/11	9:05 AM	1:00 PM	15	7.5	7	520	346	228			ND	<.1	ND	
P2A	7/13/11	9:45 AM	1:00 PM	14	7.5	9	620	414	240						
PS2	7/13/11	10:05 AM	1:00 PM	17	7	4	900	606	96	16	<.16	13.9	0.67		
PS3	7/13/11	10:30 AM	1:00 PM					428	68						
STANDARD						<=25	6.6-8.8	>=6	300-500		410				
H2E	7/13/11	11:42 AM	1:00 PM	10	7.2	7.5	120	106	0			0.3	0.11	ND	
H4	7/13/11	10:31 AM	1:00 PM	13	7.5	7	210	143	7						
H5	7/13/11	11:10 AM	1:00 PM	14	7.5	7	350	242	183						
H6	7/13/11	9:45 AM	1:00 PM	14	7.5	7	350	241	56						
STANDARD						<=20	6.6-8.8	>=6	<=500		235				
F1	9/14/11	11:00 AM	3:07 PM	10.2	7.5	5	530	387	36	3					
F1A	9/14/11	9:50 AM	3:07 PM	10	7.5	6	330	247	54	7					
F4	9/14/11	11:40 AM	3:07 PM	10.4	7	2	700	575	10	19					
STANDARD						<=20	6.6-8.8	>=6	<=400		235				
P1	9/14/11	10:40 AM	3:07 PM	12	7.5	6	240	166	92	3					
P2	9/14/11	10:32 AM	3:07 PM	13	7.75	8	370	259	61	5					
P2A	9/14/11	10:12 AM	3:07 PM	13	7.5	8	490	325	74	6					
PS2	9/14/11	9:35 AM	3:07 PM	16	7	3	1010	664	660	12			3.68		2.4
PS3	9/14/11	10:15 AM	3:07 PM	12	7.5	8	510	346	66	6					
STANDARD						<=25	6.6-8.8	>=6	300-500		410				
H3	9/14/11	10:10 AM	3:07 PM	8	7.5	7.5	160	103	3	3					
H4	9/14/11	10:30 AM	3:07 PM	12	7.5	6	230	148	48	3					
H5	9/14/11	9:45 AM	3:07 PM	13	7.5	7	400	254	60	6					
H6	9/14/11	10:25 AM	3:07 PM	13	7.5	7	390	252	42	8					