2012 Taos Water Quality Sampling Report – Rio Hondo, Rio Fernando and Rio Pueblo de Taos

Lead: Sentinels-Rios de Taos
Support: Amigos Bravos

Summary: Surface water quality sampling was conducted in the Taos NM area in June, July, and September 2012. Samples were collected from 3 sites in the Rio Hondo, 6 sites in the Rio Pueblo de Taos, 4 sites in the Rio Fernando de Taos, and 4 sites in the Red River. Water quality standards were exceeded for at least one parameter in all four rivers. All sites were monitored for dissolved oxygen, temperature, electrical conductivity, pH, and E.coli. Several sites near the Taos Wastewater Treatment Facility were also monitored for nutrients. Sites on the Red River were monitored for hardness and total Aluminum.

On all three sampling dates there were sites in the Rio Fernando that did not meet standards for dissolved oxygen and electrical conductivity. In addition, all 4 sites in the Rio Fernando did not meet dissolved oxygen standards on at least one of the three sampling dates. The lower site in the Rio Fernando (at Fred Baca Park) did not once meet dissolved oxygen or electrical conductivity standards. For the first time since sampling by Sentinels-Rios de Taos and Amigos Bravos began in 2007, there were no E.coli exceedances in the Rio Fernando. There was an E.coli result that was close to the standard at the Upper Rio Fernando site during the July sampling event.

In 2012 we continued 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 from the perennial unnamed wastewater stream showed an improvement in water quality from 2011, though this unnamed perennial stream was the only site in the Rio Pueblo to not meet dissolved oxygen standards. Most notably, the ammonia levels were substantially lower in 2012. This unnamed perennial wastewater stream also had the highest conductivity readings of all the sites in all rivers sampled (though there is not an electrical conductivity standard for the unnamed perennial stream). High pH levels were recorded at the lower Rio Pueblo site on 2 of the 3 sampling events.

Four sites in the Red River were added in 2012. Samples from the Red River were analyzed for total Aluminum and hardness in addition to the other suite of field parameters. Except for one exceedance of electrical conductivity on the lower Red River site during the September sampling event, water quality standards were met in Red River samples. Alumimun was generally highest in the middle and lower sites on the Red River.

The sampling results confirm the New Mexico Environment Department's previous listing of the lower segment of the Rio Fernando de Taos for electrical conductivity. In addition, 2012 sampling results indicate that the Rio Fernando from the USFS boundary upstream to Tienditas Creek should also be listed as impaired for electrical conductivity. 2012 sampling results confirm 2011 results that indicated that the unnamed arroyo below the wastewater treatment plant should be listed as impaired for dissolved oxygen. While there were limited samples taken from the upper segment of Rio Pueblo de Taos, results indicate that middle

portion (Rio Grande del Rancho to Rio Fernando) of the Rio Pueblo de Taos should be listed as impaired for electrical conductivity. The 2012 data confirms sampling results from the past 5 years as well as the New Mexico Environment Department's impairment listing at the Rio Fernando de Taos sampling site at Fred Baca Park, which has had consistently high 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. 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. This year (2012) four sites in the Red River were also monitored. Five previous sampling reports have been prepared for sampling that occurred in 2007, 2008, 2009, 2010 and 2011 respectively. This report covers the sampling that occurred in 2012.

Methods: Surface water quality samples were collected from 3 sites in the Rio Hondo, 6 sites in the Rio Pueblo de Taos, 4 sites in the Rio Fernando de Taos, and 4 sites in the Red River. (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,* for most sample. For some samples nitrates, ammonia, BOD, or Aluminum 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. Field measurements of hardness were collected for all samples for which laboratory samples for aluminum were collected (Appendix B).

Results:
A list of the full sampling results for 2012 can be found in Appendix C.

Rio Hondo:

June 14, 2012: Laboratory samples were collected from 3 sites in the Rio Hondo. These samples were analyzed for *E. coli*. Field readings for temperature, pH, conductivity, and dissolved oxygen were also taken at these three locations. The lower Rio Hondo site (near the confluence with the Rio Grande) had a slight exceedance of the pH standard (Appendix C).

July 25, 2012: Laboratory samples were collected from 3 sites in the Rio Hondo. These samples were analyzed for *E. coli*. Field readings for temperature, pH, conductivity, and dissolved oxygen were also taken at these three locations. One site (at the bridge near

New Buffalo) had a slight exceedance of the electrical conductivity standard (Appendix C).

September 12, 2012: Laboratory samples were collected from 3 sites in the Rio Hondo. These samples were analyzed for *E. coli*. 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:

June 14, 2012: Laboratory samples were collected from 4 sites in Rio Pueblo de Taos and analyzed for *E. coli*. Three of these sites were also analyzed for nitrate, 5 Day BOD and residual chlorine. Field readings for temperature, pH, DO, and conductivity were taken. At P1A, which is a small perennial spring that feeds into the Rio Pueblo near the intersection of Upper Ranchitos and Ranchito Rds., electrical conductivity was measured at 531 microsiemens/cm which is above the standard (<=400 microsiemens/cm). In addition pH at PS3 (mainstem below wastewater treatment) measured at 8.98, which is slightly above the standard 8.8. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C). Though it is important to note that there is no standard for nitrate, 5-Day BOD, or residual chlorine. In addition there aren't standards for electrical conductivity for the three lower sites in the Rio Pueblo. All samples in these lower sites were well above the standard of <=500 or <=400 that applies to other sample sites in the four rivers that were monitored.

July 25, 2012: Laboratory samples were collected at 4 sites in the Rio Pueblo de Taos and analyzed for *E. coli*. Two of these sites (PS2 and PS3) were also analyzed for ammonia. Field readings for temperature, pH, DO, and conductivity were also taken. Electrical conductivity was high at 3 of the 4 sites (P2, PS2, and PS3), though because there is no electrical conductivity standard that applies to PS2 and PS3, the standard was only exceeded at P2 (near the los cordovas bridge). PH at PS3 (mainstem below wastewater treatment) measured at 9.0, which is above the standard 8.8. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

September 12, 2012: Laboratory samples were collected at 3 sites (P1, P2 and PS2)in the Rio Pueblo de Taos and analyzed for *E. coli*. Laboratory samples for ammonia were collected at one site (PS2). Field readings for temperature, pH, DO, and conductivity were also taken. Electrical conductivity was high at 2 of the 3 sites (P2, and PS2,), though because there is no electrical conductivity standard that applies to PS2 and PS3, the standard was only exceeded at P2 (near the los cordovas bridge). No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Rio Fernando:

June 14, 2012: Laboratory samples were collected at 4 sites (F1, F1A, FlB, and F4) in the Rio Fernando and analyzed for *E. coli*. Field readings for temperature, pH, DO, and conductivity were also taken. Dissolved oxygen was measured at 4 mg/L at F4, (Fred Baca Park), the applicable water quality standard is >=6 mg/L. Electrical conductivity exceeded the standard of 500 microsiemens/cm at 3 of the 4 sites (F1, F1B, and F4). No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

July 25, 2012: Laboratory samples were collected at 4 sites (F1, F1A, F1B, F4) in the Rio Fernando and analyzed for *E. coli*. Field readings for temperature, pH, DO, and conductivity were also taken. Dissolved oxygen at F1A (near Valle Escondido) was measured at 4 mg/L, the applicable water quality standard is >=6mg/L. Dissolved oxygen at F4 (Fred Baca Park) was measured at 3 mg/L, the applicable water quality standard is >=6mg/L. Electrical conductivity readings exceeded the standard of 500 microsiemens/cm at 3 of the 4 sites (F1, F1B, and F4). E.coli at F1A (near Valle Escondido) was measured at 228 colonies/100ml which is close, though not exceeding, the standard of 235 colonies/100ml. No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

September 12, 2012: Laboratory samples were collected at 4 sites in the Rio Fernando (F1, F1A, F1B, F4) and analyzed for *E. coli*. Field readings for temperature, pH, DO, and conductivity were also taken. Water quality standards for dissolved oxygen and conductivity were not met at the lower site (F4 – at Fred Baca Park). Electrical conductivity levels were also above standards at F1 (Divisidero Trailhead) and F1B (below Shadybrook). No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Red River:
On June 14, July 25 and September 25 2012, samples were collected from 4 sites (RR1, RR2, RR3 and RR4) on the Red River. In addition a sample was collected from RR3 on November 2, 2012. On September 25 the electrical conductivity standard was exceeded at the lowest site RR4 (xxxx). No other tested parameters, either in the laboratory samples or field samples, were above water quality standards (Appendix C).

Discussion:

Rio Hondo
In 2012 The Rio Hondo continued to have good water quality. Only one exceedance of electrical conductivity and one pH exceedance was observed. These results are similar to the previous three years (2009-2011) of sampling in the Rio Hondo which have showed no exceedances of water quality standards. In 2007 and 2008 we did observe some high levels of E.coli in the lower sections of the Rio Hondo but these high E.coli levels have not been observed since 2008.

Rio Fernando

Over the 5 years of sampling the Fred Baca Park Site (F4) 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. While there were no E.coli exceedances in the Rio Fernando in the 2012 sampling events, the high levels in previous years sampling results remains a concern. Exceedances of dissolved oxygen and electrical conductivity were again observed in 2012 at this site demonstrating water quality issues continue.

Sampling in the upper Rio Fernando also is often historically high for E.coli. The highest E.coli levels in 2012 were found at F1A (near Valle Escondido), the most upgradient Rio Fernando sampling site. This sampling result reinforces historical concern with high E.coli levels in headwaters of the Rio Fernando.

Electrical conductivity was high throughout the Rio Fernando during all sampling events indicating a consistent source.

Rio Pueblo de Taos

While there is no standard electrical conductivity standard for the lower Rio Pueblo de Taos and therefore no exceedances of standards, the electrical conductivity readings in the lower Rio Pueblo were some of the highest recorded in the four river systems sampled. The levels were well above the standards that apply to similar river systems such as the Rio Hondo and Red River where the electrical conductivity standard is <=400 microsiemens/cm. The Rio Grande del Rancho which is located about upstream from the lower Rio Pueblo sites is impaired for conductivity and could be having an impact on this stretch of the Rio Pueblo.

Sampling in 2012 in the perennial arroyo with flow from the wastewater treatment plant (PS1) shows improvement in water quality from 2011. This could be a result of the recently completed upgrade to the wastewater treatment facility which went online at the end of 2011 (after the conclusion of our 2011 sampling).

There were two pH exceedances in the lower Rio Pueblo during 2012. In general all sites in all 3 of the river systems that were also sampled in 2011 had higher pH levels in 2012. Sampling equipment was changed at the beginning of the 2012 season and a different method of analyzing pH was used. This may be the cause of the change in pH levels.

Red River

2012 was the first year of sampling on the Red River. There was only one water quality standard exceedance recorded in the Red River for 2012. This was for electrical conductivity. While all aluminum results were below standards, in general the sample results below the Chevron mine were all higher than the samples above the mine. In addition to the mine there is also a lot of natural scaring in the drainages that feed into the Red River in this section of the river. The high aluminum levels could be coming from either or both of these sources. It is also important to note that 3 of the 4 sites sampled on June 14, 2012 had aluminum levels that were above the New Mexico Aluminum standard

of 750 ug/L that was in place prior to 2012. The new aluminum standard is lot less protective and therefore sampling results did not result in an exceedance of the new standard.

Conclusion/Recommendations:

- Electrical conductivity exceeded standards in both the upper section of the Rio Fernando and the lower section. Only the lower Rio Fernando is currently listed as impaired for electrical conductivity by the New Mexico Environment Department. 2012 sampling results indicate that the upper section should also be listed as impaired.
- A different method of analyzing pH was used during the 2012 sampling season. In general pH readings in 2012 were much higher than what had been recorded in previous sampling years. Meters were tested for accuracy before each sampling event. Further investigation into the meters accuracy should be conducted.
- 2012 sampling results confirm the New Mexico Environment Department's previous listing of the Rio Fernando de Taos for dissolved oxygen.
- 2012 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 four years has little to no 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.
- The high E.coli result in the Upper Rio Fernando in 2012 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.
- Electrical conductivity readings in the lower Rio Pueblo de Taos continue to be high, though standards are not exceeded since there is no standard applied to this section of the Rio Pueblo. Similar river systems such as the Rio Hondo and Red River have an electrical conductivity standard of <=400 microsiemens/cm. An electrical conductivity standard should be considered for the lower stretch of the Rio Pueblo de Taos during the 2014 Triennial Review process.
- Phosphate levels in the lower Rio Pueblo de Taos were high in 2012, though standards are not exceeded since there is no standard applied to this section of the Rio Pueblo. Similar river systems such as the Rio Hondo and Red River have a phosphate standard of .1mg/L An electrical conductivity standard should be considered for the lower stretch of the Rio Pueblo de Taos during the 2014 Triennial Review process.

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 Cordovos 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 Pueble 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”.

ON THE RED RIVER

RR1	Junebug Campground
RR2	Goat Hill Campground
RR3	By the bridge at hwy 522
RR4	Below hatchery

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)
- Aluminum
- Hardness
- Residual Chlorine
- Ammonia

Sampling Locations

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

SENTINELS-RIOS de TAOS WATER SAMPLING SITES

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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"
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ON THE RED RIVER

RR1	Junebug Campground
RR2	Goat Hill Campground
RR3	By the bridge at hwy 522
RR4	Below hatchery

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 – tests dissolved oxygen
- Euteck Instruments PCTestr 35 from Oakton – tests pH, temperature, and electrical conductivity
- Hach Model 5-EP MG/L #1454-01 test kit – tests hardness (calcium carbonate)

PARAMETER	DETECTION LIMIT	ACCURACY
Dissolved Oxygen	1 to 12 mg/L	+/- 1 ppm
Temperature	0^{o} to 50^{o} C	+/- 0.5^{o} C
Conductivity	0 to 1999 µS/cm	+/-10 µS/cm
pH	0.00 to 14.00 ph units	+/-.001 pH units
Hardness	0 to 400 mg/L calcium carbonate	+/- 20 mg/L

Field instruments will be calibrated according to manufacturers' instructions <24 hours prior to each sampling event. Chemicals used for dissolved oxygen 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 10030
Nonpotable water	BOD	SM 5210B
Nonpotable water	Ammonia	4500NH3D
Nonpotable water	Residual Chlorine	300.5
Nonpotable water	Phosphate	420.1
Nonpotabe water	Aluminum	200.9

APPENDIX C.
2012 DATA

SAMPLE #	DATE	COLLECTION TIME	REC'D BY LAB TIME	TEMP, C.	pH	DISSOLVED OXYGEN	ELECTRICAL CONDUCTIVITY	PHOSPHATE	E. COLI	5-Day BOD	NITRATE	AMMONIA	Resid Chlorine	Hardness	Aluminum(total)
						ppm	microsiemens/cm	mg/L	COLONIES/100ML	mg/L	mg/L	mg/L	mg/L	ppm	ug/L
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=500**	**<0.1**	**235**						
F1	6/14/12	10:24 AM	1:50 PM	12.7	8.66	6	599		0						
F1A	6/14/12	9:45 AM	1:50 PM	14.9	8.75	6	371		0						
F1B	6/14/12	10:05 AM	1:50 PM	10.6	8.63	6	516		0						
F4	6/14/12	10:55 AM	1:50 PM	17.7	8.17	4	750		0						
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						
P1A	6/14/12	8:52 AM	1:50 PM	14	8.39	7	531		14						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**No Standard**	**No Standard**	**235**						
P2A	6/14/12	10:10 AM	1:50 PM	16	8.75	7	610		0	5	0.03		0.02		
PS2	6/14/12	9:45 AM	1:50 PM	17.8	8.6	7	716		0	4	0.06		0.02		
PS3	6/14/12	9:25 AM	1:50 PM	15.6	8.98	10	615		0	6	0.04		0.02		
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**410**						
H3	6/14/12	9:45 AM	1:50 PM	8	8.43	7.5	151		0						
H5	6/14/12	10:10 AM	1:50 PM	14.7	8.65	8	388		0						
H6	6/14/12	10:26 AM	1:50 PM	15.1	8.85	8	387		0						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						
RR1	6/14/12	8:58 AM	1:50 PM	7	8.5	9	229		0					120	790
RR2	6/14/12	9:27 AM	1:50 PM	9.2	7.83	7	243		0					140	433
RR3	6/14/12		1:50 PM	11.9	7.35	7	272		0					120	1614
RR4	6/14/12	10:23 AM	1:50 PM	13.4	7.88	8	336		0					160	818
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=500**	**<0.1**	**235**						
F1	7/25/12	9:22 AM	2:30 PM	8.36	6.97	6	619		33						
F1A	7/25/12	8:40 AM	2:30 PM	8.84	8.78	4	392		228						
F1B	7/25/12	9:05 AM	2:30 PM	8.32	6.95	6	582		0						
F4	7/25/12	9:50 AM	2:30 PM	20.2	6.18	3	817		42						
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						
P1	7/25/12	11:30 AM	2:30 PM	18	8.42	7	278		48						
P2	7/25/12	9:25 AM	2:30 PM	16.7	8.7	6	466		30						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**No Standard**	**No Standard**	**235**						
PS2	7/25/12	9:55 AM	2:30 PM	21.2	8.28	5.5	840	4.35	10			0.03			
PS3	7/25/12	10:15 AM	2:30 PM	20.1	9		650	0.54	22			0.05			
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**410**						
H3	7/25/12	10:05 AM	2:30 PM	12.7	8.7	9	177.5		0						
H5	7/25/12	10:35 AM	2:30 PM	17.8	8.36	8	402		0						
H6	7/25/12	10:45 AM	2:30 PM	18.2	8.75	8	394		0						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						
RR1	7/25/12	9:09 AM	2:30 PM	11.8	8	8	261							140	0.219
RR2	7/25/12	9:39 AM	2:30 PM	12.2	7.78		298								0.263
RR3	7/25/12	10:07 AM	2:30 PM	14.1	7.32	7	324							160	0.692
RR4	7/25/12	10:29 AM	2:30 PM	16.5	7.7	7	390		20					180	0.814
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=500**	**<0.1**	**235**						
F1	9/12/12	8:55 AM	3:39 PM	14.5	8.57	6	598		138						
F1A	9/12/12	9:30 AM	3:39 PM	12.7	8.62	6.5	367		9						
F1B	9/12/12	9:15 AM	3:39 PM	11.8	8.55	6	516		0						
F4	9/12/12	10:15 AM	3:39 PM	16.8		5	703		4						
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						

APPENDIX C.
2012 DATA

SAMPLE #	DATE	COLLECTION	REC'D BY LAB	TEMP, C.	pH	DISSOLVED	ELECTRICAL	PHOSPHATE	E. COLI	5-Day BOD	NITRATE	AMMONIA	Resid Chlorine	Hardness	Aluminum(total)
P1	9/12/12	9:15 AM	3:39 PM	13.7	8.3	7	299		1						
P2	9/12/12	9:40 AM	3:39 PM	14.9	8.5	7	436		8						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**No Standard**	**No Standard**	**235**						
PS2	9/12/12	9:55 AM	3:39 PM	20	8.1		812	0.72	14			0.02			
STANDARD				**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**410**						
H3	9/12/12	10:15 AM	3:39 PM	9.4	8.03	7	167		0						
H5	9/12/12	9:45 AM	3:39 PM	13.8	8.02	8	380		38						
H6	9/12/12	9:30 AM	3:39 PM	14	8.34	6.5	381		2						
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**						
RR1	9/12/12	9:11 AM	3:39 PM	11.3	8.53	7	284		8					160	0.003
RR2	9/12/12	9:54 AM	3:39 PM	11.7	8.43	8	320							180	0.14
RR3	9/12/12	10:24 AM	3:39 PM	13.5	8.01	8	348							180	0.814
RR4	9/12/12	10:52 AM	3:39 PM	14.8	8.42	7	420		9					180	ND
STANDARD				**<=24**	**6.6-8.8**	**>=6**	**<=400**		**235**						
RR3	11/2/12	11:37 AM		6.6	7.89	9	400							160	