2019 Water Sentinels Rios de Taos Water Quality Sampling Report

Rio Hondo, Rio Fernando, Red River, Rio Pueblo de Taos, and the Rio Grande

Introduction:

This sampling project was initiated by the Sierra Club group 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. In 2012 four sites in the Red River were also monitored. Twelve previous sampling reports have been prepared for sampling that occurred in 2007 - 2018. This report covers the sampling conducted in 2019.

Methods:

Surface water quality sampling was conducted in the Taos NM area in June, August and September, 2019. Samples were collected from 5 sites in the Rio Hondo, 4 sites in the Rio Pueblo de Taos, 4 sites in the Rio Fernando de Taos, 4 sites in the Red River, and 1 site in the Rio Grande. (Appendix A and Appendix C). All samples were kept on ice until they were processed by Sangre de Cristo labs in Alamosa Colorado. IDEXX Laboratory samples were collected for *E. coli* and processed at the Amigos Bravos lab. For some samples, nitrates, phosphates, hardness, or aluminum were also analyzed. All laboratory samples were collected and processed within an 8-hour 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 that were analyzed for aluminum (Appendix B).

Nitrates and phosphates are measured at many of the sites. Segment specific criteria for Nitrate are not set. There are numeric criteria for Nitrate for Drinking Water Supply use only and that limit is 10mg/L. In surface water however, lower levels of nitrates contribute to algae blooms and lower the pH of the water. These effects start around 3ppm. Nitrogen compounds can be as high as 0.5mg/L in rainfall. Other sources include fertilizers (agriculture and lawn types), animal waste, and human waste. Nitrate levels above 3 mg/L (equivalent to PPM) are indicative of pollution running off the land and into aquatic habitats.

The concentration of aluminum in natural waters can vary significantly depending on various physicochemical and mineralogical factors. Dissolved aluminum concentrations in waters with near-neutral pH values usually range from 1 - 50 µg/L but rise to 500–

1000 µg/L in more acidic waters or water rich in organic matter. At the extreme acidity of waters affected by acid mine drainage, dissolved aluminum concentrations of up to 90,000 µg/L have been measured. The current New Mexico Water Quality Standards provide a table for maximum aluminum values, which are now dependent on hardness following the 2010 updates. They provide values for both acute and chronic criteria (see (3) Table of Selected Values, pg. 49-50 of the NM Standards for Interstate and Intrastate Surface Waters). For a hardness of 100, a common value here, the standards are: 3,421 ug/l acute; 1,370 ug/l chronic . For a hardness of 200 the standards are: 8,838 acute; 3,541 chronic ug/l.

Acute criteria is for toxicity involving a stimulus severe enough to induce a response in 96 hours of exposure or less. Compliance with acute water quality criteria is determined from the analytical results of a single grab sample and cannot be exceeded. Chronic criteria effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease, and reduced reproduction. Compliance with chronic water quality criteria is determined from the arithmetic mean of the analytical results of samples collected using the appropriate protocols. Chronic criteria cannot be exceeded more than once every three years.

Results:

Water quality standard exceedences and interesting trends for each sampling date and river are discussed below. Streamside readings of temperature, DO, pH, and electrical conductivity are taken at all sites. Parameters analyzed by the lab vary and are described for each site and date. A list of the full sampling results for 2019 can be found in Appendix C.

Rio Hondo:

June 4, 2019: Data were collected from 4 sites in the Rio Hondo (H2B, H2C, H2E, and H6). *E. coli*, phosphate, nitrate and ammonia were also measured at all sites. Ammonia levels were <0.02 at all sites. Nitrate levels were elevated to 0.53mg/L at H2B (Lake Fork Creek by the Bavarian Inn), and 0.43mg/L at H2E by the children's center. Electrical conductivity at H6 and H2B were above standards, indicating construction activity impacts at that time.

August 22, 2019: Data were collected from the same 4 sites in the Rio Hondo (H2B, H2C, H2E, and H6). *E. coli*, Phosphate, nitrate and ammonia were also measured at all sites. Nitrate levels were only slightly elevated at H2B at a value to 0.28mg/L (Lake Fork Creek by the Bavarian Inn), and non-detectable elsewhere. Electrical conductivity at H2C, H2B and H2E were above standards, indicating construction activity impacts at that time.

September 23, 2019: Data were collected from the same 4 sites in the Rio Hondo (H2B, H2C, H2E, and H6), with H2B3 being added. All 5 samples were analyzed in the lab for *E. coli*, phosphate, nitrate and ammonia. Nitrate levels were elevated at H2E, H2B, H2B3, and H2C. Electrical conductivity at H2B, H2B3, and H2C were above standards,

indicating construction activity impacts at that time. The level of pH at H2B was just over the limit at 8.81.

Rio Pueblo:
June 4, 2019: Laboratory samples were collected from five sites in the Rio Pueblo de Taos and analyzed for *E. coli (P1, P1A, PS2,PS3, P4).* Nitrate, phosphate and ammonia amounts were analyzed for all five sites. Phosphate, nitrate, and ammonia levels were elevated at PS2, the Taos Waste Water Treatment Plant Effluent. The phosphate level of 1.35mg/L is 13.5 times over the standard. While there is not a nitrate standard, the finding of 1.63 approaching the 3.0mg/L level that encourages algal blooms. The ammonia level of 1.66 is above the World Health Organization threshold odor concentration for ammonia of approximately 1.5 mg/L. Conductivity at P1, P4, PS2, and PS3 were all elevated and above the standard where the standard applies. It is important to note that there are no official standards for phosphate, or electrical conductivity at PS2 and PS3.

August 22, 2019: Laboratory samples were collected at P1, P1A, and PS2 sites in the Rio Pueblo de Taos and analyzed for *E. coli*. Phosphate and nitrate levels were elevated at PS2, the Taos Waste Water Treatment Plant effluent. The phosphate level of 2.46mg/L is 24.6 times over the standard. Nitrate levels grew along with the phosphate to 2.09mg/L. PS3 (just downstream of the effluent) exceeded conductivity standards at 1,921us/cm, while PS2 was lower at 523uS/cm. Merris spring (P1A), a location that empties into the Rio Pueblo and the Rio Fernando depending on how the acequia is used, was at a level of 344.8CFU/ml, above the 235 standard.

September 23, 2019: Nitrate, phosphate, ammonia, and *E. coli* were analyzed at 5 sites (P1, P1A, PS2, PS3, P4*).* Streamside readings for temperature, pH, DO, and conductivity were taken. Nitrate, phosphate, and ammonia levels at PS2 were less concerning this time than the last two sample dates, at 0.22 for nitrate, 0.22 for phosphate, and <.10 for ammonia. Electrical conductivity at PS2 was just above the standard that applies to the neighboring river segments. Merris spring, a location that empties into the Rio Pueblo and the Rio Fernando depending on how the acequia is used, was found to have *E. coli* at a level of 920.8CFU/ml, double the level in August and about 4 times above the 235 standard.

Rio Fernando de Taos:
June 4, 2019: Laboratory samples were collected at four sites (FLJ, FRE, F1, F4) in the Rio Fernando and analyzed for *E. coli*. *E. coli* levels were above the standard at a level of 344.8 CFU/100ml at the Riparian Pasture, site FRE. This sample data is when the cattle are present in and around that site.

August 22, 2019: Laboratory samples were collected at the same four sites in the Rio Fernando and analyzed for *E. coli*. *E. coli* levels were maxed out at the highest our equipment can measure (>2,419.6CFU/100ml) in the La Jara grazing pasture (FLJ). Electrical conductivity was above the standard at El Nogal trailhead (F1) and Fred Baca

Park (F4). The pH level at El Nogal trailhead exceeded standards at 8.93 and at F4 at a very high level of 9.9.

September 23, 2019: Laboratory samples were collected at the same four sites in the Rio Fernando and analyzed for *E. coli.* Electrical conductivity measurements were above the standard at F1, and F4. Fred Baca Park displayed high *E. coli* levels at 1,203.3CFU/100ml, site FLJ continued to exceed standards at 1,732.9CFU/100ml, and site FRE was at the maximum measured value of >2419.6 CFU/100ml. The pH standard was again exceeded at Fred Baca Park at a very high level of 9.95.

Red River:
June 4, 2019: Laboratory samples were collected at three sites in the Red River (RR1, RR2 and RR3) and analyzed for *E. coli,* and total recoverable aluminum. Streamside samples were taken at all sites along with hardness values. All three sites exceeded both chronic and acute criteria for aluminum. This year RR3 exceeded chronic and acute criteria at an alarming level of 10,050ug/L. Hardness levels were higher than usual in 2018 (120-400) but we back to normal levels this year when measured streamside(60-120).

August 22, 2019: Laboratory samples were collected at two sites (RR3 and RR4) in the Red River and analyzed for *E. coli,* nitrates, phosphates, ammonia, and total recoverable aluminum. Streamside samples were taken at all sites along with hardness values. Nitrate levels were detectable at 0.22mg/L while phosphate and ammonia were non-detectable at both sites. Aluminum levels were much lower at RR3 at a level of 1600ug/L.

September 23, 2019: Laboratory samples were collected at site RR3 only and analyzed for *E. coli,* total recoverable aluminum and hardness. Aluminum was reduced again compared to the past two samples to a level of 522ug/L. Hardness was recorded at 259.03 by Sangre de Cristo laboratory.

Rio Grande:

Samples were taken at one location on the Rio Grande on June 4th and September 23th. This site is just downstream of the confluence of the Rio Hondo and the Rio Grande. pH was at 9.02 in June, above the standard. In June the electrical conductivity was 1,147uS/cm, about twice the standard applied to other rivers in the area. In September the electrical conductivity continued to be high at 3.77 times the standard applied to other rivers at 1,887uS/cm.

Conclusions/Recommendations:

- Sampling done in the Rio Hondo for the past nine years has not shown major or recurring water quality exceedances. Nitrate levels were elevated at some sites in 2018 and were again elevated at Lake Fork creek at the Bavarian Inn, on the Hondo near the Children's center, and below the Taos Ski Valley Waste Water Treatment plant in 2019. Electrical conductivity was approximately 3 times over

the standard at those sites. These findings indicate that site H2B is being impacted by ski valley construction, which was prevalent in 2019. **Amigos Bravos suggests increased monitoring of Ski Valley construction activities to ensure proper construction mitigation.**

- Fred Baca Park continues to have serious water quality problems with *E. coli* and electrical conductivity. There was also a new finding, of very high pH values at this site (9.9 and 9.95 in August and September). Dissolved oxygen was improved from past years, which may be a function of the restoration of the Rio Fernando wetlands adjacent and upstream of this site at the Taos Land Trust. These efforts should also improve the *E. coli* and any pH problem over time.
- The upper Rio Fernando continues to be impacted by elevated levels of *E. coli* during and after the use of the FRE and FLJ pastures for cattle grazing in 2019. Amigos Bravos continues to work to further fence out the cattle in that area and restore the wetlands so that the stream is more resilient to cattle impacts. **We continue to invite any input/assistance from the NMED on how to mitigate cattle impacts in this area.**
- Site P1A (locally known as Merris Spring) has been known by the NMED and Amigos Bravos to have septic tank pollution for over two decades, with results confirmed by Amigos Bravos many times. The Rio Fernando 319 watershed based plan also studied this area intensely and found the problem to be on-going and alarming. Sources found with Microbial Source Tracking data were primarily from humans and birds. Findings in the winter indicate that direct human input is a major cause. **Amigos Bravos would like to work with the NMED to address the direct *E. coli* input at this location.**
- While some aspects of water quality have improved since 2011 in the perennial arroyo to the Rio Pueblo (PS2), which receives flow from the wastewater treatment plant, electrical conductivity, nitrates, and occasionally phosphates continue to greatly exceed the standards given to neighboring waterways. Ammonia levels in June were also alarming at 1.66mg/L, which is above the World Health Organization threshold odor concentration for ammonia of approximately 1.5 mg/L.. **We suggest that the NMED closely monitor the Waste Water Treatment plant outflow and hold them accountable to standards applied to neighboring rivers.**
- Site RR3 (Bridge by Hwy 522) on the Red River exceeded the chronic criteria for aluminum 4 years in a row from 2014 - 2017. While it did not exceed this standard in 2018, the hardness levels were extremely elevated that year compared to previous years. This year, it exceeded chronic and acute criteria in June at an extremely high value of 10,050ug/L. RR2, closer to the mine acid drainage was actually lower but still alarming at 5,440ug/L. **We suggest that the NMED again list this river as impaired for aluminum criteria.**
    - The huge difference between the Aluminum standard that applied to the Red River prior to 2010 and the current standard continues to be of concern. Many samples in 2013-2015 were above the 2010 standard and below the 2013 standard. More investigation should be done to determine if the current 2013 standard is actually protective of designated uses in the Red River.

APPENDIX A

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 each year in an attempt to identify sources of pollution. Sites sampled in 2018 are shown in **bold.**

SENTINELS-RIOS de TAOS WATER SAMPLING SITES

ON THE RIO FERNANDO

FLJ	**About 200 yards from the parking spot for La Jara Canyon off of Hwy 64, walk up Forest Road #5.** **N 36 25.160** **W 105 20.592**
FRE	**The riparian exclosure, just below the wooden sign for "Taos Canyon Riparian Pasture"** **N 36 24.231** **W 105 20.706**
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)
FAP1	Small stream . Sample upstream of Apache Canyon Road about 15 feet below fence line. N 36 23' 08.09" W 105 19' 33.43"
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"**
F5	Taos Land Trust Land, near office on La Posta Road. Location near road as you enter driveway

F6 Taos Land Trust Land, down past the shed near their office in wetland area.

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)
P4	**Keith and Cathy Black property. Just upstream from P2(bridge by Los Cordovas)**

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)**
H2B2	Across from Phoenix switch back @ culvert between two dirt roads. N 36 34' 33.14' W 105 26' 21.31" (GE)
H2B3	**Sutton Place Bridge, downstream by about 25 yards. This bridge is near the Stray Dog Cantina.** **GPS location not taken yet- new site to 2017**

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, approximately 10 miles east of Questa on HWY 38.**

N 36 42' 28.25"
W105 26' 04.92

RR2 **Goat Hill Campground, approximately 3 miles east of Questa on Hwy 38.**
N 36 41' 20.65"
W105 32' 27.73

RR3 **By the bridge at Hwy 522 in Questa.**
N 36 41' 33.69
W105 36' 44.50

RR4 **Below Red River Fish Hatchery, approximately 0.5 miles down the foot trail.**
N 36 40' 57.14"
W 105 39' 19.11"

ON THE RIO GRANDE DEL RANCHO

RGDR1 Right above bridge on Partrick Larkin's property.

ON THE RIO LUCERO

RL1 Rio Lucero, private land.

ON THE RIO GRANDE

RG2: Just above the confluence of the Rio Hondo and the Rio Grande, near H6.

RG3: In Pilar, NM just below the Rio Pueblo and Rio Grande confluence.

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.

APPENDIX B

Project Organization

Project Coordinator Contact information:

Eric E. Patterson
Box 334

Valdez, NM 87580
575-776-2833
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	Shannon Romeling

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 Projects Director
Box 238
Taos, NM 87571
575-758-3874
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 – tested dissolved oxygen

- Euteck Instruments PCTestr 35 from Oakton – tested 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	0º to 50º C	+/- 0.5º 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

Containers, Volumes, Preservatives, and Holding Times

Parameter	Optimum Volume	Container Type	Preservation Method	Holding Time
Total Nitrogen (Calculation: TKN + (NO2 + NO3 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**

SAMPLE #	DATE	COLLECTION TIME	TEMP, C.	pH	DISSOLVED OXYGEN	ELECTRICAL CONDUCTIVITY	PHOSPHATE	E. COLI	NITRATE	AMMONIA	HARDNESS	ALUMINUM
-	-	-	-	-	ppm	microsiemens/cm	mg/L	COLONIES/100ML	mg/L	mg/L	ppm	(total)µg/L
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=500**	**<0.1**	**235**	**None**	**None**	**None**	**Hardness = 100: 3,421 acute; 1,370 chronic ug/l**
Rio Fernando												
F1	6/4/19	10:12 AM	9.6	8.38	-	431.00	-	14.6	-	-	-	-
F1	8/22/19	10:08 AM	11.3	8.93	9	645.00	-	25.3	-	-	-	-
F1	9/23/19	10:12 AM	7.7	8.71	10	628.00		2			-	-
F4	6/4/19	10:32 AM	11.4	8.35	-	448.00	-	59.4	-	-	-	-
F4	8/22/19	10:34 AM	12.2	9.9	7	756.00	-	127.4	-	-	-	-
F4	9/23/19	10:44 AM	8.5	7.95	6	708.00		1203.3				-
FLJ	6/4/19	9:17 AM	6.8	8.12	-	227.00	-	12.2	-	-	-	-
FLJ	8/22/19	9:05 AM	8.1	8.1	8.41	8.00	449	>2419.6	-	-	-	-
FLJ	9/23/19	9:10 AM	8.41	8.55	11	477.00		1732.9				-
FRE	6/4/19	9:35 AM	9	8.05	-	420.00		344.8	-	-	-	-
FRE	8/22/19	9:35 AM	449	10.3	8.39	9.00	419	119.8	-	-	-	-
FRE	9/23/19	9:31 AM	4.1	8	9	304.00		>2419.6				-
Rio Pueblo												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**	**None**	**None**	**None**	**None**
P1	8/22/19	11:20 AM	13.9	8.06	?	227.00	ND		<.20	ND	-	-
P1	9/23/19	11:35 AM	10.8	8.15	8	202.00		58.3			-	-
P1	6/4/19	10:26 AM	8.6	8.12	9	1,001.00	<.20	13.4	<.20	<.02	-	-
P4	8/22/19	10:36 AM	15.8	8.5	9.5	342.00	ND	107.1	<.20	ND	-	-
P4	6/4/19	9:50 AM	11.1	8.05	8	1,515.00	<.20	139.6	<.20	<.02	-	-
P4	9/23/19	11:00 AM	11.4	8.45	9.5	298.00		69.7			-	-
PS3	6/4/19	9:25 AM	10.8	8.14	-	1,921.00	<.20	365.4	<.20	<.02	-	-
PS3	8/22/19	10:14 AM	16.2	8.65	8	440.00	<.20	117.8	<.20	ND	-	-
PS3	9/23/19	10:35 AM	19,4	8.02	8.5	523.00		62			-	-
P1A	9/23/19	11:15 AM	11.4	7.84	7	304.00		920.8			-	-
P1A	8/22/19	11:03 AM	15.4	7.88	6.5	440.00	ND	344.8	<.20	ND	-	-
P1A	6/4/19	10:09 AM	15.5	7.79	-	642.00	<.20	161.6	<.20	<.02	-	-
Rio Pueblo												
STANDARD	**-**	**-**	**<=24**	**6.6-8.8**	**>=6**	**No Standard**	**No Standard**	**235**	**None**	**None**	**None**	**None**
PS2	9/23/19	10:15 AM	19.4	8.02	8.5	523.00		13.2			-	-
PS2	8/22/19	9:52 AM	19.8	7.9	6	523.00	2.46	7.5	2.09	ND	-	-
PS2	6/4/19	9:10	15.2	7.86	8	640.00	1.35	21.3	1.63	1.66	-	-
Rio Hondo												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**410**	**None**	**None**	**None**	**None**
H2B	6/4/19	9:12 AM	3.8	7.50	8.5	12,890.00	<.20	<1	0.53	<.02	-	-
H2B	8/22/19	9:17 AM	7,6	7.94	7.5	1,627.00	ND	3	0.29	ND	-	-
H2B	9/23/19	9:38 AM	4.6	8.81	9	165.50	ND	2	<.20	ND	-	-
H2B3	9/23/19	10:15 AM	6.4	8.66	9	1,574.00		<1			-	-
H2C	6/4/19	9:55 AM	4.4	8.01	8.5	1,289.00	<.20	<1	0.35	<.02	-	-
H2C	8/22/19	10:10 AM	8	8.16	9	1,552.00	ND	9.8	<.20	ND	-	-
H2C	9/23/19	10:50 AM	7.7	8.48	-	1,590.00	ND	2	<.20	ND	-	-
H2E	8/22/19	10:32 AM	10	8.17	9	1,708.00	ND	6.1	<.20	ND	-	-
H2E	6/4/19	10:13 AM	5.5	Aug-00	7.5	1,492.00	<.20	<1	0.43	<.02	-	-
H2E	9/23/19	10:38 AM	7.4	8.55	9	159.00					-	-
H6	6/4/19	11:07 AM	9.4	8.17	9.5	130.60	<.20	40.2	<.20	<.02	-	-
H6	8/22/19	11:32 AM	17.9	8.54	7	327.00	ND	151.6	<.20	ND	-	-
H6	9/23/19	5:49 PM	13.6	8.77	-	313.00	ND	20.6	<.20	ND	-	-
Red River												
STANDARD	**-**	**-**	**<=23**	**6.6-8.8**	**>=6**	**<=400**	**<0.1**	**235**	**None**	**None**	**None**	**Hardness = 220: 10,071 acute; 4,035 chronic ug/l**
RR1	6/4/19	10:04 AM	9.3	8	9	144.00	-	21.6	-	-	60	2.230
RR2	6/4/19	10:45 AM	8.5	7.93	8	196.00	-	27.5	-	-	120	5.440

RR3	6/4/19	11:18 AM	9	7.83	10	205.00	-	25.3	-	-	120	0.005
RR3	9/23/19	2:18 PM	11	8.3	8	488.00						1.600
RR3	8/22/19						ND		0.22	ND		0.005
RR4	8/22/19						ND		0.22	ND		1.920
Rio Grande												
STANDARD	**-**	**-**	**<=24**	**6.6-8.8**	**>=6**	**None**	**None**	**235**	**None**	**None**	**None**	**None**
RG2	9/23/19	12:00 PM	14.1	8.63	8	1,887.00	-	1	-	-	-	-
RG2	6/4/19	11:21`	14.8	8.21	7	1,147.00	-	55.6	-	-	-	-