National Pollutant Discharge Elimination System Stormwater Program

MS4 Permit 2023 Annual Report

Reporting Period – July 1, 2022 – June 30, 2023

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Annual Report Format

National Pollutant Discharge Elimination System Stormwater Program
MS4 Annual Report Form

Check box if you are submitting an individual Annual Report with cooperative program elements ☒

Check box if you are submitting an individual Annual Report with individual program elements ☐

Check box if this is a new name, address, etc. ☐

1. MS4(s) Information

Village of Los Ranchos de Albuquerque
Name of MS4

Maida | Rubin | Director, Planning & Zoning Dept.
Name of Contact Person (First) | (Last) | (Title)

(505) 344-6582 | mrubin@losranchosnm.gov
Telephone (including area code) | E-mail

6718 Rio Grande Blvd. NW
Mailing Address

Los Ranchos | NM | 87107
City | State | ZIP code

What size population does your MS4(s) serve? 5,900 NPDES number

What is the reporting period for this report? (mm/dd/yyyy) From 07/01/2022 to 06/30/2023

2. Water Quality Priorities

A. Does your MS4(s) discharge to waters listed as impaired on a state 303(d) list? ☒ Yes ☐ No

B. If yes, identify each impaired water, the impairment, whether a TMDL has been approved by EPA for each, and whether the TMDL assigns a wasteload allocation to your MS4(s). Use a new line for each impairment, and attach additional pages as necessary.

Impaired Water	Impairment	Approved TMDL	TMDL assigns WLA to MS4
Rio Grande	E-Coli	☒ Yes ☐ No	☒ Yes ☐ No
Rio Grande	Temperature	☐ Yes ☒ No	☐ Yes ☐ No
Rio Grande	PCBs	☐ Yes ☒ No	☐ Yes ☐ No
Rio Grande	Dissolved Oxygen	☐ Yes ☒ No	☐ Yes ☐ No

2. B. Continued

Impaired Water	Impairment	Approved TMDL		TMDL assigns WLA to MS4	
Rio Grande	Mercury	☐ Yes	☒ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No
		☐ Yes	☐ No	☐ Yes	☐ No

C. What specific sources contributing to the impairment(s) are you targeting in your stormwater program?

Animal waste, household hazardous waste, automotive fluids, FOG, pesticides, fertilizers

D. Do you discharge to any high-quality waters (e.g., Tier 2, Tier 3, outstanding natural resource waters, or other state or federal designation)? ☐ Yes ☒ No

E. Are you implementing additional specific provisions to ensure their continued integrity? ☐ Yes ☒ No

3. Public Education and Public Participation

A. Is your public education program targeting specific pollutants and sources of those pollutants? ☒ Yes ☐ No

B. If yes, what are the specific sources and/or pollutants addressed by your public education program?

Animal Waste, household hazardous waste, automotive fluids, FOG, pesticides, fertilizers

C. Note specific successful outcome(s) (e.g., quantified reduction in fertilizer use; NOT tasks, events, publications) fully or partially attributable to your public education program during this reporting period.

Approx. 4,725 lbs of dog waste collected in stations throughout the village and 20 CY of sediment and debris from street sweeper.

D. Do you have an advisory committee or other body comprised of the public and other stakeholders that provides regular input on your stormwater program? ☒ Yes ☐ No

4. Construction

A. Do you have an ordinance or other regulatory mechanism stipulating:

- Erosion and sediment control requirements? ☒ Yes ☐ No
- Other construction waste control requirements? ☒ Yes ☐ No
- Requirement to submit construction plans for review? ☒ Yes ☐ No
- MS4 enforcement authority? ☒ Yes ☐ No

B. Do you have written procedures for:

- Reviewing construction plans? ☒ Yes ☐ No
- Performing inspections? ☒ Yes ☐ No
- Responding to violations? ☒ Yes ☐ No

C. Identify the number of active construction sites ≥ 1 acre in operation in your jurisdiction at any time during the reporting period. 1

D. How many of the sites identified in 4.C did you inspect during this reporting period? 1

E. Describe, on average, the frequency with which your program conducts construction site inspections.

On average inspections took place once every seven days.

F. Do you prioritize certain construction sites for more frequent inspections? ☐ Yes ☒ No

If Yes, based on what criteria? [ ]

G. Identify which of the following types of enforcement actions you used during the reporting period for construction activities, indicate the number of actions, or note those for which you do not have authority:

☐ Yes	Notice of violation	0	No Authority	☐
☐ Yes	Administrative fines	0	No Authority	☐
☐ Yes	Stop Work Orders	0	No Authority	☐
☐ Yes	Civil penalties	0	No Authority	☐
☐ Yes	Criminal actions	0	No Authority	☐
☐ Yes	Administrative orders	0	No Authority	☐
☐ Yes	Other			

H. Do you use an electronic tool (e.g., GIS, data base, spreadsheet) to track the locations, inspection results, and enforcement actions of active construction sites in your jurisdiction? ☐ Yes ☒ No

I. What are the 3 most common types of violations documented during this reporting period?

No violations were noted this year

J. How often do municipal employees receive training on the construction program? As needed

5. **Illicit Discharge Elimination**

A. Have you completed a map of all outfalls and receiving waters of your storm sewer system? ☒ Yes ☐ No

B. Have you completed a map of all storm drain pipes and other conveyances in the storm sewer system? ☒ Yes ☐ No

C. Identify the number of outfalls in your storm sewer system. 1

D. Do you have documented procedures, including frequency, for screening outfalls? ☒ Yes ☐ No

E. Of the outfalls identified in 5.C, how many were screened for dry weather discharges during this reporting period?

1

F. Of the outfalls identified in 5.C, how many have been screened for dry weather discharges at any time since you obtained MS4 permit coverage? 1

G. What is your frequency for screening outfalls for illicit discharges? Describe any variation based on size/type.

We have one outfall which we inspect quarterly during the dry season.

H. Do you have an ordinance or other regulatory mechanism that effectively prohibits illicit discharges? ☒ Yes ☐ No

I. Do you have an ordinance or other regulatory mechanism that provides authority for you to take enforcement action and/or recover costs for addressing illicit discharges? ☒ Yes ☐ No

J. During this reporting period, how many illicit discharges/illegal connections have you discovered? 0

K. Of those illicit discharges/illegal connections that have been discovered or reported, how many have been eliminated?

L. How often do municipal employees receive training on the illicit discharge program? As needed

6. Stormwater Management for Municipal Operations

A. Have stormwater pollution prevention plans (or an equivalent plan) been developed for:

	Yes	No
All public parks, ball fields, other recreational facilities and other open spaces	☐	☒
All municipal construction activities, including those disturbing less than 1 acre	☐	☒
All municipal turf grass/landscape management activities	☐	☒
All municipal vehicle fueling, operation and maintenance activities	☐	☒
All municipal maintenance yards	☐	☒
All municipal waste handling and disposal areas	☐	☒

Other

B. Are stormwater inspections conducted at these facilities? ☐ Yes ☒ No

C. If Yes, at what frequency are inspections conducted?

D. List activities for which operating procedures or management practices specific to stormwater management have been developed (e.g., road repairs, catch basin cleaning).

None

E. Do you prioritize certain municipal activities and/or facilities for more frequent inspection? ☐ Yes ☒ No

F. If Yes, which activities and/or facilities receive most frequent inspections?

G. Do all municipal employees and contractors overseeing planning and implementation of stormwater-related activities receive comprehensive training on stormwater management? ☒ Yes ☐ No

H. If yes, do you also provide regular updates and refreshers? ☒ Yes ☐ No

I. If so, how frequently and/or under what circumstances? One Certified Floodplain Manager on staff, keeps up with continuing education requirements as needed.

7. Long-term (Post-Construction) Stormwater Measures

A. Do you have an ordinance or other regulatory mechanism to require:

	Yes	No
Site plan reviews for stormwater/water quality of all new and re-development projects?	☒	☐
Long-term operation and maintenance of stormwater management controls?	☒	☐
Retrofitting to incorporate long-term stormwater management controls?	☐	☒

B. If you have retrofit requirements, what are the circumstances/criteria?

C What are your criteria for determining which new/re-development stormwater plans you will review (e.g., all projects, projects disturbing greater than one acre, etc.)?

We review all plans but place special stormwater emphasis on projects disturbing greater than one acre.

D. Do you require water quality or quantity design standards or performance standards, either directly or by reference to a state or other standard, be met for new development and re-development? ☒ Yes ☐ No

E. Do these performance or design standards require that pre-development hydrology be met for:

Flow volumes	☒ Yes	☐ No
Peak discharge rates	☐ Yes	☒ No
Discharge frequency	☐ Yes	☒ No
Flow duration	☐ Yes	☒ No

F. Please provide the URL/reference where all post-construction stormwater management standards can be found.

City of Albuquerque Design Process Manual: https://documents.cabq.gov/planning/development-process-manual/DPM-2020-06-02_signed.pdf

G. How many development and redevelopment project plans were reviewed during the reporting period to assess impacts to water quality and receiving stream protection? 8

H. How many of the plans identified in 7.G were approved? 8

I. How many privately owned permanent stormwater management practices/facilities were inspected during the reporting period? None in this reporting period.

J. How many of the practices/facilities identified in I were found to have inadequate maintenance? 0

K. How long do you give operators to remedy any operation and maintenance deficiencies identified during inspections? Varies

L. Do you have authority to take enforcement action for failure to properly operate and maintain stormwater practices/facilities? ☒ Yes ☐ No

M. How many formal enforcement actions (i.e., more than a verbal or written warning) were taken for failure to adequately operate and/or maintain stormwater management practices? 0

N. Do you use an electronic tool (e.g., GIS, database, spreadsheet) to track post-construction BMPs, inspections and maintenance? ☐ Yes ☒ No

O. Do all municipal departments and/or staff (as relevant) have access to this tracking system? ☐ Yes ☐ No

P. How often do municipal employees receive training on the post-construction program? As needed

8. Program Resources

A. What was the annual expenditure to implement MS4 permit requirements this reporting period? $7,500

B. What is next year's budget for implementing the requirements of your MS4 NPDES permit? $7,900

C. This year what is/are your source(s) of funding for the stormwater program, and annual revenue (amount or percentage) derived from each?

Source	Amount $	OR %
General Fund		100

D. How many FTEs does your municipality devote to the stormwater program (specifically for implementing the stormwater program; not municipal employees with other primary responsibilities)? 0

E. Do you share program implementation responsibilities with any other entities? ☒ Yes ☐ No

Entity	Activity/Task/Responsibility	Your Oversight/Accountability Mechanism
Storm Water Quality Team	Public Education and Outreach	Memo of Understanding and Financial Commitment
Storm Water Quality Team	Technical exchange and knowledge sharing	Memo of Understanding
Compliance Monitoring Cooperative	Perform all monitoring requirements	Memo of Understanding and Financial Commitment

9. Evaluating/Measuring Progress

A. What indicators do you use to evaluate the overall effectiveness of your stormwater management program, how long have you been tracking them, and at what frequency? These are not measurable goals for individual management practices or tasks, but large-scale or long-term metrics for the overall program, such as macroinvertebrate community indices, measures of effective impervious cover in the watershed, indicators of in-stream hydrologic stability, etc.

Indicator	Began Tracking (year)	Frequency	Number of Locations
Example: E. coli	2003	Weekly April–September	20
Various (EPA approved analyte list)	2016	Qualifying Events (up to 7)	2

B. What environmental quality trends have you documented over the duration of your stormwater program? Reports or summaries can be attached electronically, or provide the URL to where they may be found on the Web.

2023 Stormwater Outcomes Report attached.

10. Additional Information

Please attach any additional information on the performance of your MS4 program, including information required in Parts I.C and III.B. If providing clarification to any of the questions on this form, please provide the question number (e.g., 2C) in your response.

Certification Statement and Signature

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

☒ Yes ☐ No

Federal regulations require this application to be signed as follows: **For a municipal, State, Federal, or other public facility**: by either a principal executive or ranking elected official.

Signature [signature]

Donald T. Lopez, Mayor
Name of Certifying Official, Title

11/28/2023
Date (mm/dd/yyyy)

Outcome Report

for Fiscal Year 2022–2023

(July 1, 2022 to June 30, 2023)

MID RIO GRANDE STORMWATER QUALITY TEAM

Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) • City of Albuquerque • Bernalillo County • Town of Bernalillo • Village of Corrales • Ciudad Soil and Water Conservation District • Eastern Sandoval County Arroyo Flood Control Authority (ESCAFCA) • Village of Los Ranchos de Albuquerque • Department of Transportation (NMDOT) • City of Rio Rancho • Sandoval County • Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

PRESENTED BY

SUNNY505

Introduction

The outcomes report is designed to illustrate the collective successes of the Middle Rio Grande Stormwater Quality team. In fiscal year 2022–2023, the Storm Team reached over 100,000 individuals in the Albuquerque Metro area through special events, educational efforts, as well as digital promotions via various social media and the website.

The Storm Team is a collaborative organization made of of the following: The Albuquerque Metropolitan Arroyo Flood Control Authority, the City of Albuquerque, Bernalillo County, the City of Rio Rancho, Ciudad Soil and Water Conservation District, the New Mexico Department of Transportation, the Southern Sandoval County Arroyo Flood Control Authority, the Town of Bernalillo, the Village of Corrales and the Village of Los Ranchos.

Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) • City of Albuquerque • Bernalillo County • Town of Bernalillo • Village of Corrales • Ciudad Soil and Water Conservation District • Eastern Sandoval County Arroyo Flood Control Authority (ESCAFCA) • Village of Los Ranchos de Albuquerque • Department of Transportation (NMDOT) • City of Rio Rancho • Sandoval County • Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)

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Bernalillo County

Public Outreach and Education Tracking

FY2023: July 1, 2022 – June 30, 2023

Date	Location	Event Topic	Description of Education/Outreach Event Program/Materials	NRS Programs	Partner Organizations	Parti-cipants	Source for Participant Count
QI							
7/9, 7/30, 8/27, 9/10, 9/24/2022	Tijeras Creek Remediation Project	Volunteer work days, 3 hrs each	Working on watershed restoration by addressing erosion, removing invasive plants, addressing tree health (pruning dead/broken branches), had watering	Water Conservation, Stormwater	Ciudad SWCD, TCWC organization members	27	attendance
7/22/2022	ABCWUA water bill insert	Residential rainwater harvesting PSA	Water bill insert on residential rainwater harvesting that included benefits, steps you can take, and link to more resources.	Water Conservation, Stormwater	Arid LID Coalition	210,000	Total printed copies of insert
8/13/2022	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Drip Irrigation Repair for Homeowners Workshop	Hands-on workshop for homeowners on drip irrigation repair.	Water Conservation	ABCWUA	17	Headcount at event. 24 registered per Cervis.
9/14/2022	GovDelivery Email	News Bulletin	News Bulletin advertising Water Fair and Well Owner Workshop	Water Conservation, Hydrogeology, Review and Permitting		1,345	Unique recipients for Water Conservation, Hydrogeology, and Review and Permitting email lists
9/25/2022	Los Vecinos Community Center (478 NM-333, Tijeras, NM 87059)	East Mountain Celebration	Natural Resources Services table in Bernalillo County tent. Provided information to educate County residents on stormwater quality, water conservation methods and incentive programs, and groundwater monitoring program.	Water Conservation, Stormwater, Hydrogeology, Review and Permitting		2,300	BernCo Office of Community Engagement and Outreach
9/25/2022	Los Vecinos Community Center (478 NM-333, Tijeras, NM 87059)	Water Fair	Provided staff support for NMDOH/NMED Water Fair at East Mountain Celebration. Included mail out of flyer advertising water fair to 600 Carnuel residents.	Hydrogeology, Review and Permitting	NMDOH, NMED	51	NMDOH count of water samples analyzed

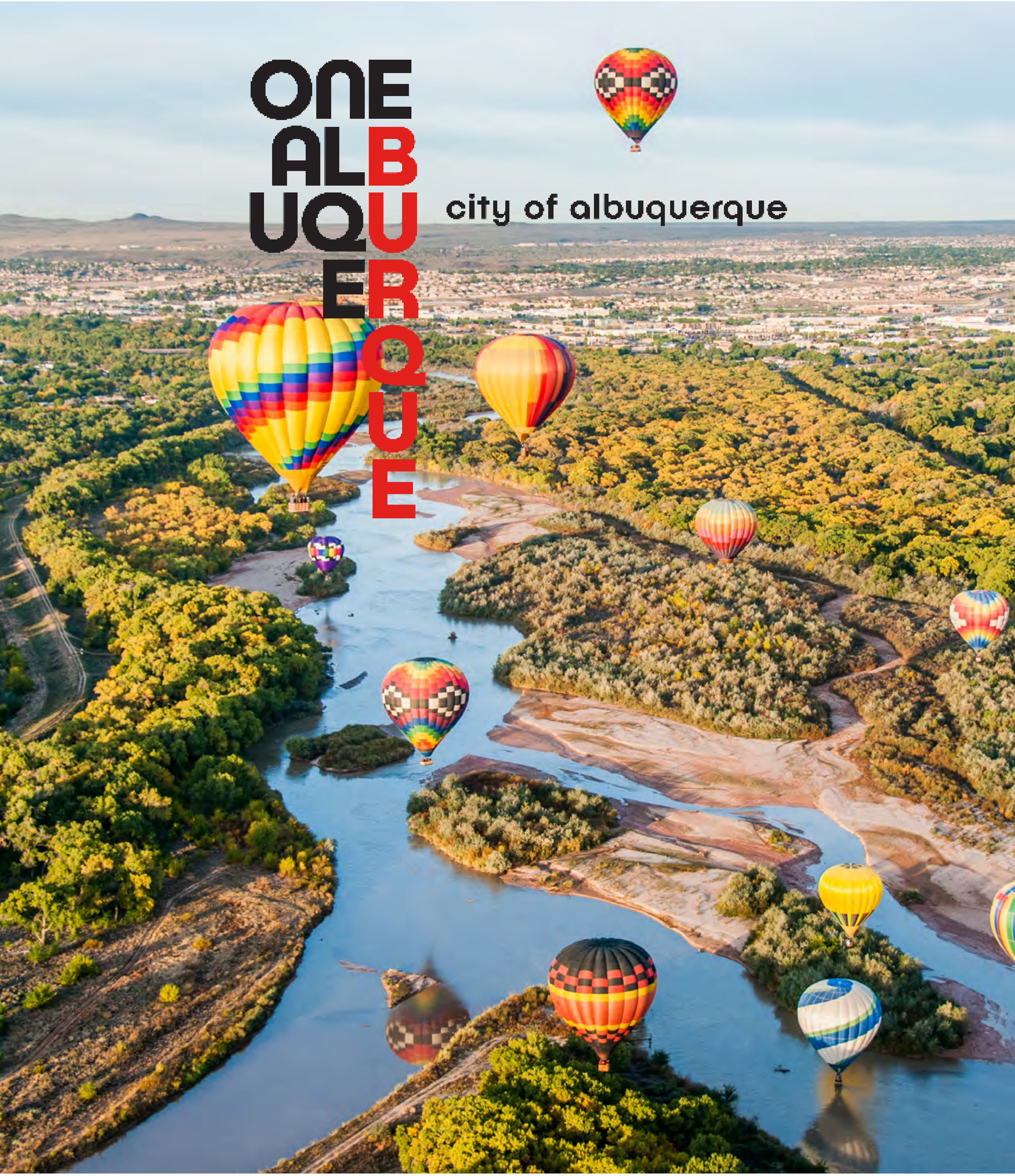
Q2							
10/8/2022	Polk Middle School (2220 Raymac Rd SW, Albuquerque NM 87105)	Household Hazardous Waste (HHW) Collection Event`	HHW weekend collection event	Stormwater, Review & Permitting		16	Count
10/15/2022	James McGrane Public Safety Complex (48 Public School Rd, Tijeras, NM 87059)	Well Owner Workshop	3 hour presentation on water quality testing, drinking water contaminants, water rights, well permiting and tagging, East Mountain groundwater resources, financial incentives for water conservation.	Water Conservation, Stormwater, Hydrogeology, Review and Permitting	NMDOH, NMED, OSE	29	NMDOH
11/16/2022	Albuquerque Open Space Visitors Center (6500 Coors Blvd NW, Albuquerque, NM 87120)	Green Stormwater Infrastructure Maintenance Training through ABCWUA WaterSmart Academy	Cofacilitated training with MRWM Landscape Architects on arid-adapted green stormwater infrastructure maintenance for an audience of landscape professionals.	Stormwater, Water Conservation	ABCWUA, MRWM Landscape Architects	8	attendance
11/18/2022	Expo New Mexico	STEAM Discovery Fair	6 hour event for middle school students highlighting Natural Resources as a STEAM career. Worked with the Enviroscapes model to disscuss hydrology, pollution prevention and water conservation.	Water Conservation, Stormwater, Hydrogeology, Review and Permitting	Big Brothers Big Sisters of Central New Mexico	1,506	attendance
12/10/2022	Tijeras Creek Remediation Project	Volunteer work days, 3 hrs each	Working on watershed restoration by addressing erosion, removing invasive plants, addressing tree health (pruning dead/broken branches), had watering	Water Conservation, Stormwater	Ciudad SWCD, TCWC organization members	5	attendance
12/14/2022	Bernco PROS	GSI/LID Standards Lunch & Learn	Lunch and a presentation about the new Bernalillo County Green Stormwater Infrastructure / Low Impact Development (GSI/LID) Standards for staff that work on Bernalillo County public and private development projects.	Stormwater / Review & Permitting		9	attendance
Q3							
2/1/2023	Albuquerque Open Space Visitors Center (6500 Coors Blvd NW, Albuquerque, NM 87120)	Green Stormwater Infrastructure Maintenance Training through ABCWUA WaterSmart Academy	Cofacilitated training with MRWM Landscape Architects on arid-adapted green stormwater infrastructure maintenance for an audience of landscape professionals.	Stormwater, Water Conservation	ABCWUA, MRWM Landscape Architects	16	attendance

3/1 – 3/3/2023	Hybrid conference (virtual and in-person at Indian Pueblo Cultural Center at 2401 12th St NW, Albuquerque, NM 87104)	Land and Water Summit	Professional conference that provides 2-days of presentations and 1-day tour of local Green Stormwater Infrastructure projects. 2023 conference theme: Communities, Collaboration, & Climate Change, higlighting local, collaborative responses to climate change. BernCo is a conference sponsor and BernCo staff sit on conference Planning Committee.	Water Conservation, Stormwater Quality, Hydrogeology	Ciudad Soil and Water Conservation District, Arid LID Coalition	378	Whova (virtual conference platform) report
3/11/2023	Tijeras Creek Remediation Project	Volunteer work days, 3 hrs each	Working on watershed restoration by addressing erosion, removing invasive plants, addressing tree health (pruning dead/broken branches), had watering	Water Conservation, Stormwater	Ciudad SWCD, TCWC organization members	5	attendance
3/18/2023	Valle de Oro Backyard Refuge (7851 2nd St SW, Albuquerque, NM 87105)	"Incorporating Passive Rainwater Harvesting into Your Backyard Refuge" presentation at Backyard Refuge Day	Presentation addressed steps to designing, constructing, and maintaining residential passive rainwater harvesting features, drawing contect from residential passive rainwater harvesting video series at bernco.gov/rainwater.	Water Conservation, Stormwater Quality	Friends of Valle de Oro Refuge	54	Friends of Valle de Oro Refuge count
3/20/2023	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Hands-on Training on Drip Irrigation Installation for Grow the Growers Farm Training Program	Hands-on instruction on installation of drip irrigation systems for 2023 Grow the Growers trainees. Workshop included installation of irrigation main lines in Gutierrez Hubbell House Medicinal Garden.	Water Conservation		5	Workshop headcount
3/14/2023, 3/17/2023, 4/7/2023	GovDelivery Email	News Bulletin	News Bulletins advertising Backyard Refuge Day, Irrigation Efficiency Exhibit and workshops	Water Conservation, Stormwater Quality, Hydrogeology		1,502	GovDelivery report
2/23/2023, 2/28/2023, 3/9/2023, 3/16/2023	Mountain View Community Center	GSI Maintenance Training for BernCo Land Management, Drainage Maintenance, and Clean Team staff	Education for landscape maintenance staff for understanding what Green Stormwater Infrastructure is, how to maintain GSI facilities, and how to maintain plants in and around these facilities.	Water Conservation, Stormwater Quality	Arid LID Coalition	60	headcount at training

Q4							
4/1/2023 – 5/27/2023	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Irrigation Efficiency Exhibit	Exhibit based on content from Water Authority's Irrigation Efficiency Guide. Addresses how to efficiently water different types of landscapes, using drip irrigation, spray irrigation, hose watering, flood irrigation, and rainwater harvesting. Includes hands-on elements to demystify irrigation systems. In English and Spanish.	Water Conservation, Stormwater Quality	Water Authority, Middle Rio Grande Conservancy District, Arid LID Coalition, Groundwork Studio	704	Individual and group visitor counts per Open Space (Dave Ottaviano)
4/8/2023	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Tree Irrigation Workshop	Hands-on workshop on how to install drip irrigation for trees. Workshop attendees installed new drip lines to trees in Gutierrez Hubbell House Medicinal Garden.	Water Conservation	Water Authority, Middle Rio Grande Conservancy District, Arid LID Coalition, Groundwork Studio	16	Workshop headcount
4/13/2023	TransCon, Las Cruces, NM	Panel: Why GSI? Green Stormwater Solutions for Transportation Insfrastructure	Panel presenation regarding GSI in transportation projects	Water Conservation/ Stormwater	BHI, NMDOT, PLAND Collaborative	40	Estimate
4/15/2023	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Perennial Irrigation Workshop	Hands-on workshop on how to install drip irrigation for perennials and grasses. Workshop attendees installed new drip lines to perennials in Gutierrez Hubbell House Medicinal Garden.	Water Conservation	Water Authority, Middle Rio Grande Conservancy District, Arid LID Coalition, Groundwork Studio	10	Workshop headcount
4/17/2023	Bernalillo County Alvarado Square	NRS Earth Day Lunch and Learn – Bioremediation in GSI Features	Presentation from this year's Land and Water Summit by Reese Baker of the RainCatcher. After hearing the talk you'll understand why we can't stop talking about GSI and that there are simple solutions all around us to improve water quality and the urban environment.	Water Conservation, Stormwater Quality	Reese Baker, RainCatcher	22	attendance
4/19/2023	Bernalillo County Alvarado Square	IDDE training	Training for Bernalillo County Zoning Enforcement staff for illicit discharge detection and elimination	Stormwater Quality		8	attendance
4/22/2023, 6/10/2023, 6/24/2023	Tijeras Creek Remediation Project	TCRP workday, 3 hrs each	Working on watershed restoration by addressing erosion, removing invasive plants, addressing tree health (pruning dead/broken branches), had watering	Water Conservation, Stormwater Quality	Ciudad SWCD, TCWC organization members	19	attendance

4/23/2023	Westside Community Center	South Valley Pride Day	Natural Resources Services table in Bernalillo County tent. Provided information to educate County residents on stormwater quality, water conservation methods and incentive programs, and groundwater monitoring program.	Water Conservation, Stormwater Quality		4,000	Estimate
4/26/2023	Albuquerque Open Space Visitors Center (6500 Coors Blvd NW, Albuquerque, NM 87120)	Green Stormwater Infrastructure Maintenance Training through ABCWUA WaterSmart Academy	Cofacilitated training with MRWM Landscape Architects on arid-adapted green stormwater infrastructure maintenance for an audience of landscape professionals.	Stormwater, Water Conservation	ABCWUA, MRWM Landscape Architects	4	attendance
4/29/2023	Gutierrez Hubbell House (6029 Isleta Blvd SE, Albuquerque, NM 87105)	Drip Irrigation Fundamentals Workshop	Hands-on workshop on how to build a drip irrigation system that attaches to a hose bib and how to make the most common repairs to a drip system.	Water Conservation	Water Authority, Middle Rio Grande Conservancy District, Arid LID Coalition, Groundwork Studio	16	Workshop headcount
5/13/2023	James McGrane Public Safety Complex (48 Public School Rd, Tijeras, NM 87059)	Tablazon Groundwater	Presentation to Tablazon Water Users Association on Updates to the Groundwater Program, Sandia Basin Closure update, East Mountain and Tablazon water level trends.	Hydrogeology		30	TWUA sign in sheet
5/18/2023	GovDelivery Email	News Bulletin	News Bulletin advertising new Passive Rainwater Harvesting Guide, Next Generation Water Summit, changes to Water Conservation Incentive Program	Water Conservation, Stormwater Quality		1,972	GovDelivery report
5/25/2023	Online	Tijeras Creek Natural Resources Cluster Meeting	Tijeras Creek Watershed Restoration Project discussion and solicitation of ideas for project; watershed planning for the Upper Tijeras Creek Watershed	Stormwater Quality	Ciudad Soil and Water Conservation District, Bernco OS, City OS	11	meeting headcount
6/3/2023	Paradise Hills Community Center	Day in Paradise community event	Evening in Paradise – District focused general community event	Water Conservation, Stormwater Quality		1,700	
6/8/2023	Los Vecinos Community Center (478 NM-333, Tijeras, NM 87059)	Comprehensive Plan Community Update – South Valle	Comprehensive Plan community meeting, Staff offered general support for Q&A for environmental issues	Stormwater/ Water Conservation / Hydrogeology / Review & Permitting		30	Estimate
6/13/2023	Westside Community Center	Comprehensive Plan Community Update - South Valley	Comprehensive Plan community meeting, Staff offered general support for Q&A for environmental issues	Stormwater/ Water Conservation / Hydrogeology / Review & Permitting		40	Estimate

6/17/2023	TCRP, Carlito Springs	Master Naturalist presentation re: stormwater and watershed restoration; geology and hydrogeology	Stormwater, watershed restoration, invasive plant species; geology and hydrogeology of the Sandia Mtns	Stormwater/ Hydrogeology	Ciudad SWCD, TCWC organization members	25	Estimate
6/22/2023	Raymond G. Sanchez Community Center	Comprehensive Plan Community Update – North Valley and District 4	Comprehensive Plan community meeting, Staff offered general support for Q&A for environmental issues	Stormwater/ Water Conservation / Hydrogeology / Review & Permitting		40	Estimate
6/23/2023	Alvarado Square	Comprehensive Plan Community Update – Business Community	Comprehensive Plan community meeting, Staff offered general support for Q&A for environmental issues	Stormwater/ Water Conservation / Hydrogeology / Review & Permitting		40	Estimate
6/27/2023	Online	Comprehensive Plan Community Update - All areas Hybrid Meeting	Comprehensive Plan community meeting, Staff offered general support for Q&A for environmental issues	Stormwater/ Water Conservation / Hydrogeology / Review & Permitting		40	Estimate


ONE ALBUQUERQUE
city of albuquerque

City of Albuquerque
Public Participation Numbers

The City of Albuquerque has provided the following in support of the MS4 permit in fiscal year 2023:

City of Albuquerque MS4 Training:
SWPPP: 148 employees
SPCC: 184 employees

COA Parks and Open Space
Planting Numbers for this fiscal year
Groups: 30
Estimated – 50 Classes that made up the groups
RiverXChange Numbers for this year:
Youth: 1,044
Pre-Lesson Students Served: 914
Classrooms: 45
Classrooms: 45
Adults: 271
Pole Planting Students Served: 886
Pole Planting Adults Served: 152
Pole Planting Trees: 482

Visitor Services Projects
(annual projects, Saturday volunteer days and scout groups)
156 youth and 567 adults = 723
Total hours = 3,615

Visitor Center
Total Volunteers: 881
Total Volunteer hours = 6,069 (does not include clean-up)

NMDA Conference – 1,060 attendees
Materials distributed:
- 150 Reduce Pollution at Home Brochures/Rack Cards
- 100 Fog Brochures
- 150 New Pet Brochures
- 60 Poop Fairy Rack Cards
- 100 Oval Poop Stickers
- 100 KeeptheRioGrand Bumper Stickers
- 20 Old Version Scoop the Poop Bumper Stickers
- 50 Dogs w Poop bags
- 100 City of ABQ water drops
- 75 Poop Emoji Masks

COA Solid Waste Department
Community Volunteer Events
- Fixit Clinic – 47 participants, 15 volunteers
- Company's Comin' – 662 participants (13.5 tons of trash collected)
- One Albuquerque Cleanup Day – 718 participants (18.02 tons of trash collected)
- Junk Jog – 75 participants, 9 volunteers (4.74 tons of trash collected)
- HHW Collection Event – 22,191 lbs. of HHW (and 4,691.66 lbs. of non-regulated solid waste) from 309 residents
- Treecycling – 48.5 tons or 6,461 trees
- Recyclothes – 4.2 tons of clothing collected

Social Media Outreach

(X, formerly Twitter)
178,434 impressions, 4,321 engagements

Facebook
126,786 impressions, 9,165 engagements

Instagram
124,871 impressions, 4,267 engagements

Planting Numbers for 2021–2022

Trees Planted

Date	School	Adults	Students	Trees
12.15.22	Bel Air	5	37	18
12.16.22	Mission Avenue	3	31	25
1.12.23	Zia	10	38	25
1.13.23	Puesta del Sol	3	32	8
1.19.23	North Valley Academy	6	29	14
1.20.23	Puesta/North Valley	7	44	17
1.24.23	Holy Ghost 5th and 6th grades	Cancelled–to be rescheduled		
1.25.23	Puesta del Sol	4	39	16
1.26.23	Seven Bar	6	41	16
1.27.23	Seven Bar	4	28	12
2.2.23	San Antonio	12	48	13
2.3.23	John Baker	11	42	10
2.9.23	San Antonio/ Chaparral	11	51	11
2.10.23	Monte Vista	12	45	19
2.11.23	UNM Peace Corps	23	4	29
2.15.23	Holy Ghost 7th and 8th grades	Cancelled–to be rescheduled		
2.16.23	Valle Vista	5	40	25
2.17.23	Chaparral	10	51	16
2.18.23	Sandia Civitans	18	4	38
2.22.23	Cottonwood Classic High	Cancelled–to be rescheduled		
2.23.23	Maggie Cordova Elementary	5	44	18
2.24.23	Maggie Cordova Elementary	5	45	16

Date	Group	Adults	Students	Trees
3.2.23	La Mesa	5	38	40
3.3.23	La Mesa	4	33	44
3.8.23	Holy Ghost 5th and 6th grades	3	33	17
3.9.23	Cochiti	15	35	43
3.10.23	Lavaland/Monte Vista	5	37	41
3.11.23	UNM/ Peace Corps	46	22	46
3.12.23	Jewish Community	15	8	14
3.14.23	John Baker Elementary	Cancelled–to be rescheduled		
3.16.23	Martin Luther Kink	4	58	35
3.17.23	Martin Luther Kink	Cancelled–to be rescheduled		
3.29.23	Cottonwood Classic High	3	20	14
3.30.23	Holy Ghost 7th and 8th grades	2	32	100
3.31.23	John Baker Elementary	9	35	14
TOTALS		-	-	-

Groups: 30 Estimated – 50 Classes that made up the groups
Youth 1,044, Adults 271

Trees 754 (Cottonwood and Black Willow)
Trees Remaining in troughs – 54

RiverXChange Numbers Specifically:
Pre-Lesson Students Served: 914
Classrooms: 45
Pole Planting Students Served: 886
Pole Planting Adults Served: 152
Pole Planting Trees: 482

Mid Rio Grande Stormwater Quality Team

Total Waste Diverted

FY22 Total HHW (lbs) Diverted from Landfill

Recycled Waste

Calendar Year	Month	Reuse Center	RC0014 Waste Oil	RC5056 Motor Fluids	RC0016 Lead Acid Batteries	RC6006 Mercury	ACT15687 Household Paint, xylene, tolulene etc	RC0011 Aerosols	RC7485 Alkaline Batteries	RC7486 Lithium Batteries	RC6254 NiCad Batteries	ACT46232 Compact Bulbs, CFL	ACT46233 HID Lamps	ACT46235 4 Foot Lamps	RC7658 8 Foot Lamps	ACT50491 Non PCB Ballast	ACT58121 Fire Extinguisher	ACT58246 Fertilizer
2021	Jul	2,250		26,721	2,100	26		2,932	1,128			321		54		300		
	Aug	1,530		15,085				1,414	322		164	120		116	30			
	Sep	1,134		11,197				1,775	200	245	450	120		155	71			
	Oct	1,530		24,741				1,189	455			240		120	46		100	
	Nov	1,290	180	12,866	2,000			1,980	1,100			180		62				
	Dec	798		11,210				550		300				40				
MID YEAR		8,532	180	101,820	4,100	26	0	9,840	3,205	545	614	981	0	547	147	300	100	0
2022	Jan	1,128		7,680				550	300			120		20				
	Feb	1,206		9,150					300	250				64	31			
	Mar	1,866		18,340	1,200			2,500	800	500		100		41	25	250	200	
	Apr	2,250		16,530			1,630	1,200			275	100		59			250	
	May	2,472		19,465	480		550	1,550				260					180	
	Jun	3,012		20,265			5,950	1,000								250	150	
TOTAL (lbs)		20,466	180	193,250	5,780	26	8,130	16,640	4,605	1,295	889	1,561	0	731	203	800	880	0

* Misc = Compact Bulbs, 4 ft lamps, Ballast, PCB Capacitors, Carbides, Phosphides, Fertilizers, CO2 Cylinders, etc...

TOTAL	345,540
TOTAL Recycled Waste	227,832
% Recycled	65.9%

PO Amount:	$1,000,500.00
Paid Amount:	$954,466.81
Amount left on PO:	$46,033.19

~~PO# DSW0016901~~
PO# DSW0022306

* Information on this report is gathered from the Reuse forms sent by mail from ACT and the breakdown of items processed list sent by email monthly by Nicole Gwash

Sent for Destruction

RC0012 Acids	RC0013 Bases	RC0015 Flamables Toxics Incenerated	RC6002 Toxic-Solid (Poisons)	RC7129 Compressed Gas	RC7182 Oxidizers	ACT145226 Pesticides Liquid Toxic	Misc*	TOTAL
1,119	2,407	137	1,209			2,261		42,965
1,646	10,985		930	362		1,547		34,251
1,985	860		816	180		1,414		20,602
2,858	8,838		600	100		3,904		44,721
3,160	7,190		710	110		1,700		32,528
1,260	1,230					2,400		17,788
12,028	31,510	137	4,265		0		0	192,855
2,085	3,500					1,050		16,433
1,200	1,903		1,000	233		1,000		16,337
980	390		500	100		1,500		29,292
580	180		550			550		24,154
2,375	705		950			1,100		30,087
1,855	850		1,100			1,950		36,382
21,103	39,038	137	8,365		0		0	345,540

	Total Pounds Recycled	Tons Recycled	Total Destroyed	Amount Paid
July	35,832	17.92	3.57	$105,924.00
August	18,781	9.39	7.74	$91,903.31
September	15,347	7.67	2.63	$86,831.00
October	28,421	14.21	8.15	$85,161.75
November	19,658	9.83	6.44	$72,841.00
December	12,898	6.45	2.45	$59,653.00
January	9,798	4.90	3.32	$66,513.25
February	11,001	5.50	2.67	$47,311.00
March	25,822	12.91	1.74	$64,536.25
April	22,294	11.15	0.93	$83,559.75
May	24,957	12.48	2.57	$86,074.75
June	30,627	15.31	2.88	$104,157.75
	255,436	127.72	34.32	$954,466.81

City of Albuquerque and Bernalillo County: Public Participation Numbers

Household Hazardous Waste Collection Participation											
July 2021- June 2022											
Month	Participants w/Unknown Location or Not Enough Info to Geocode	Total	Orphaned waste at facility	City Participants (City + No Match or Not Enough Info)	County Participants	Out of County	Out of County Breakdown	County Percentage	Monthly Cost	Light Bulbs (add on to monthly cost)	Total Cummulative Cost
Jul-22	141	1465	0	1271	191	3	3-Sandoval County	13.0%	$95,225.00	$2,146.75	$97,371.75
Aug-22	128	1344	0	1162	178	4	4-Sandoval County	13.2%	$87,360.00	$2,537.75	$89,897.75
Sep-22	136	1248	0	1083	163	2	2-Sandoval County	13.1%	$81,120.00	$891.50	$82,011.50
Oct-22	143	1101	0	954	146	1	1-Sandoval County	13.3%	$71,565.00	$2,788.75	$74,353.75
Nov-22	90	865	0	751	110	4	4-Sandoval County	12.7%	$56,225.00	$503.25	$56,728.25
Dec-22	115	820	0	705	115	0	-	14.0%	$53,300.00	$1,469.50	$54,769.50
Jul-Dec 2022	753	6843	0	5,926	903	14		13.2%	$444,795.00	$10,337.50	$455,132.50
Jan-23	76	833	0	710	121	2	2-Sandoval County	14.5%	$54,145.00	$1,065	$55,210.00
Feb-23	169	718	0	624	94	0	-	13.1%	$46,670.00	$1,475	$48,145.25
Mar-23	288	1014	0	913	101	0	-	10.0%	$65,910.00	$6,000	$71,910.00
Apr-23	378	1232	0	1115	117	0	-	9.5%	$80,080.00	$1,286	$81,366.00
May-23	404	1359	0	1223	136	0	-	10.0%	$88,335.00	$1,158	$89,492.75
Jun-23	476	1532	0	1,371	161	0	-	10.5%	$99,580.00	$1,446	$101,026.00
Jan-Jun 2023	1,791	6,688	0	5,956	730	2		10.9%	$434,720.00	$12,430	$447,150.00
FY23 Total	2,544	13,531	0	11,882	1,633	16		12.1%	$879,515.00	$22,768	$902,282.50
				Participant Total (other than orphaned)			13,531			$22,768	
Monthly Average	1128										

Participant Fee	$	65.00
FY23 Budget	$	1,000,000.00
Remaining Balance	$	97,717.50

	Participants	Percentage	Cost
BERNCO Participation to date	1,633	12.1%	$106,145
Unknown or Not Enough Info to Geocode (costs absorbed by COA)	2,544	18.80%	$165,360

All information in this report comes from ACT—Nichole Gwash (NGwash@ACTEnviro.com) by email. She will send an invoice, a list of residents (which must then be sent to Ben Sanborn for geocoding), a list of items processed, and any logs for drums and light bulbs & tubes.

Silt/Trash/Debris/Vegetation Removed from Arroyos & Catch Basins

Silt/Trash/Debris/Vegetation Removed from Arroyos & Catch Basins

Cerro Colorado Landfill

2022 ▶	July	August	September	October	November	December	**2023 ▶**	January	February	March	April	May	June				
	Trips	Trips	Trips	Trips	Trips	Trips		Trips	Trips	Trips	Trips	Trips	Trips		Trips		Qty.
Tandem	13	7	15	7	6	7		9	4	26	14	8	16	TOTAL	132		1,320.0 cubic yards
Bobtail	0	15	1	0	0	0		0	0	4	5	0	2	TOTAL	27		162.0 cubic yards
																TOTAL	1,482.0 cubic yards
TOTALS	13	22	16	7	6	7		9	4	30	19	8	18	TOTAL	159		

One (1) Tandem Load is approximated to equal: 9.0 cubic yards

One (1) Bobtail Load is approximated to equal: 6.0 cubic yards

Southwest Landfill

2022 ▶	July	August	September	October	November	December	**2023 ▶**	January	February	March	April	May	June				
	Trips	Trips	Trips	Trips	Trips	Trips		Trips	Trips	Trips	Trips	Trips	Trips		Trips		Qty.
Tandem	0	0	0	0	0	0		0	0	0	0	0	0	TOTAL	0		0.0 cubic yards
Bobtail	0	0	0	0	0	0		0	0	0	0	0	0	TOTAL	0		0.0 cubic yards
																TOTAL	0.0 cubic yards
TOTALS	0	0	0	0	0	0		0	0	0	0	0	0	TOTAL	0		

TOTAL For Fiscal Year 2023 Both Landfills: 1,482.0 cubic yards

FY-2022 Cubic Yardage Totals Reported: 3,712.0 cubic yards

City of Albuquerque Department of Municipal Development Street Maintenance Division

* Began New Data Entry As Of CY2012 Report

Fiscal Year 2023

Data Entered has been acquired from Supervisors' Section Spreadsheets which are based on Landfill Ticket Data

Reported In Calendar Year	Reporting Month	Reporting Section City East Side Sweeping Tons	Reporting Section City East Side Sweeping Cubic Yards	Reporting Section City West Side Sweeping Tons	Reporting Section City West Side Sweeping Cubic Yards	Reporting Section City Trouble Shooters Tons	Reporting Section City Trouble Shooters Cubic Yards	Reporting Section ***Storms & Arroyos Sections** Tons	Reporting Section ***Storms & Arroyos Sections** Cubic Yards
2022	July	297.65	240.00	242.29	260.00	11.65	52.00	94.23	130.00
2022	August	177.61	180.00	286.41	270.00	17.51	58.00	98.28	160.00
2022	September	161.12	170.00	167.63	200.00	24.52	52.00	150.56	156.00
2022	October	209.20	220.00	168.18	190.00	9.89	48.00	63.02	70.00
2022	November	160.19	240.00	191.58	270.00	35.97	46.00	21.45	60.00
2022	December	264.59	370.00	223.55	330.00	20.80	50.00	45.68	70.00
2023	January	160.47	200.00	306.71	330.00	78.99	94.00	72.32	90.00
2023	February	150.00	180.00	121.94	190.00	6.39	70.00	9.22	40.00
2023	March	228.56	230.00	223.69	250.00	20.81	60.00	282.40	284.00
2023	April	184.11	200.00	153.66	210.00	4.83	36.00	113.84	170.00
2023	May	196.56	250.00	176.50	230.00	10.73	58.00	94.48	80.00
2023	June	204.82	220.00	103.76	156.00	34.68	98.00	94.72	172.00

Section's Totals For FY2023 ▶	City East Side Sweeping		City West Side Sweeping		City Trouble Shooters		***Storms & Arroyos Sections**	
	Tons	Cubic Yards	Tons	Cubic Yards	Tons	Cubic Yards	Tons	Cubic Yards
	2,394.88	2,700.00	2,365.90	2,886.00	276.77	722.00	1,140.20	1,482.00
	$71,846.40		**$70,977.00**		**$8,338.50**		**$34,206.00**	

			Cost Paid Per Ton	Total Paid FY-2023
COA / DMD / SMD Trouble Shooters & East & West Side Sweeper Section's Combined Total Tons Reported for Fiscal Year 2023:	5,037.55	Tons	$30.00	**$151,126.50**
COA / DMD / SMD Trouble Shooters & East & West Side Sweeper Section's Combined Total Cubic Yards Reported for Fiscal Year 2023:	6,308.00	Cubic Yards		

			Cost Paid Per Ton	Total Paid FY-2023
COA / DMD / SMD Storm & Arroyo Maintenance Section's Combined Total Tons Reported for Fiscal Year 2023:	1,140.20	Tons	$30.00	**$34,206.00**
COA / DMD / SMD Storm & Arroyo Maintenance Section's Combined Total Cubic Yards Reported for Fiscal Year 2023:	1,482.00	Cubic Yards		

			Cost Paid Per Ton	Total Paid FY-2023
All Four Reporting Sections Combined Total Tons Reported for Fiscal Year 2023:	**6,177.75**	**Tons**	$30.00	**$185,332.50**
All Four Reporting Sections Combined Total Cubic Yards Reported for Fiscal Year 2023:	**7,790.00**	**Cubic Yards**		

1. Household Hazardous Waste Program Background

Stormwater discharges in Bernalillo County are regulated under the Clean Water Act. Bernalillo County is authorized to discharge stormwater under the National Pollutant Discharge Elimination System (NPDES) Watershed-Based Municipal Separate Storm Sewer System (MS4) General Permit No. NMR04A00 (Permit) for the Middle Rio Grande Watershed (MRG), which was issued on December 22, 2014. The purpose of the permit is to protect and improve stormwater quality in the MRG. Under Part 1.D.5.e(iv) of the Permit, the permittee is required to develop, update, and implement a household hazardous waste collection program. In cooperation with the City of Albuquerque (COA), Bernalillo County and the COA established the Household Hazardous Waste (HHW) Collection Program, which meets this requirement. This report summarizes fiscal year 2023 (FY23) HHW collection events and the HHW overall program.

Each calendar year the County's zoning enforcement department identifies neighborhoods for clean ups and residential collection events based on field observations and records of complaints regarding trash and abandoned waste. As part of the residential waste collection event planning process, the Bernalillo County Solid Waste section drafts and distributes a proposed schedule of events to the Zoning, Solid Waste, and Natural Resource Services (NRS) sections. Approximately 20 events are scheduled for spring, summer, and fall each year.

The NRS section selects on average eight to ten residential waste collection events to provide HHW collection and disposal opportunities; in FY23 NRS was able to host six events. Once the HHW collection event schedule is finalized, the county coordinates logistics with the HHW contractor. Only residential HHW is accepted at these events, no commercial HHW is accepted. Sharps, biological waste, and tires are not accepted at these events. A list of accepted HHW items can be found on the county's website here: https://www.bernco.gov/public-works/public-works-services/trash-recycling/household-hazardous-waste. Selection of residential waste collection event locations including HHW collection and disposal are based on previous years data regarding the amount of waste, number of participants, and frequency of HHW events conducted in the area. Number and frequency of illicit discharge complaints by geographic area may also be used to determine location of an HHW event.

Bernalillo County has operated an HHW program since 1992, prior to issuance of the NPDES Stormwater Discharge Permit. In 2015 the NRS section took over management of the HHW collection event program. The annual budget for this program is $46,844. However, this budget is not fully allotted to the HHW collection program as it also includes costs to address abandoned or orphaned waste in unincorporated Bernalillo County.

The Bernalillo County NRS contract for a HHW contractor went out to bid during FY23 through a formal Request for Proposal (RFP) process. The HHW contract terms were amended during this RFP process to alleviate mobilization costs for the HHW contractor. The contract was updated to include a flat compensation of $1,950 per event, plus a $65 per customer charge after 20 customers have used the HHW services. The county received bids from two contractors – ACT Environmental (ACT) and Clean Harbors Inc. Clean Harbors was selected as the low bidder through the RFP evaluation process and awarded a four-year contract to serve as the contractor for HHW clean-up events as well as the on-call contractor to respond to incidents of illegal dumping and illicit discharge of potentially hazardous materials. Transition to the new contractor for these services occurred during FY23.

Prior to an HHW collection event, NRS staff coordinate with the HHW contractor. One to two county NRS employees are present at the event to collect information regarding HHW disposal and to provide educational materials to residents. Information collected prior to FY 2020 included resident address, general type and amount of waste, and screening for non-permissible or commercial waste. In FY 2021 the information collected changed to only include name, license plate number, and address. A copy of the educational materials provided to residents is included in **Appendix A**. Following the event, NRS staff provide the number of event participants to the HHW contractor staff for billing purposes. HHW contractor staff sort and assemble the HHW material for proper disposal and provide a copy of the provisional waste manifest(s) to the County. Following disposal of the HHW, the contractor sends the final manifest to the County, including an adjusted invoice based on the mobilization fee and the number of participants. **Appendix B** provides a contact list for the NRS HHW collection program. **Appendix C** is a summary of clean-up events for FY23.

Outside of the HHW collection events, ACT Environmental provides a permanent drop-off site for hazardous waste year-round for both the City of Albuquerque and Bernalillo County residents. This facility is located at 6137 Edith Blvd NE, where ACT accepts waste on Mondays, Wednesdays, and Fridays from 8:30 am to 4:30 pm and Saturdays from 8 am to 3 pm. The City of Albuquerque maintains the contract with ACT, and through an Intergovernmental Service Agreement (ISA) with Bernalillo County, allows unincorporated County residents to utilize the ACT disposal and recycling facility. Via the ISA, the County contributes $90,000 per year for 2,000 county resident uses per year. Additional uses by residents of the unincorporated county, above this number, are charged to the County by the City at a pre-negotiated rate (typically $65 to $70 per use.) The number of allowed uses under the lump sum annual charge, and the per additional use costs, are subject to annual contract negotiations between the City and the County.

Resident address and zip code information collected at the ACT facility is used to determine the amount of the annual reimbursement requested by the COA. The weights of materials dropped off by residents of the unincorporated county is not explicitly tracked. For report purposes, the annual number of unincorporated County residents utilizing the facility as reported by ACT has been provided (**Appendix D**). The total weight of HHW materials disposed of at the ACT facility by unincorporated county residents is estimated by multiplying the total weight of all HHW materials for FY23 by the percentage of customers from the unincorporated county.

2. Summary of FY23 Household Hazardous Waste Collection Events

In FY23, Bernalillo County hosted six HHW weekend collection events in association with the general waste collection events. During the six events, 184 individuals participated and 10,289 pounds of HHW were collected (Table 1). FY23 HHW collection events consisted of two events held in the South Valley, one event in the North Albuquerque Acres area and three events in the East Mountains (Figure 1). Participation rates at these events ranged from 8 to 58 individuals and an average of 30.7 participants per event and 1,715 pounds of HHW materials per event. A sample NRS data collection sheet is included in **Appendix E.**

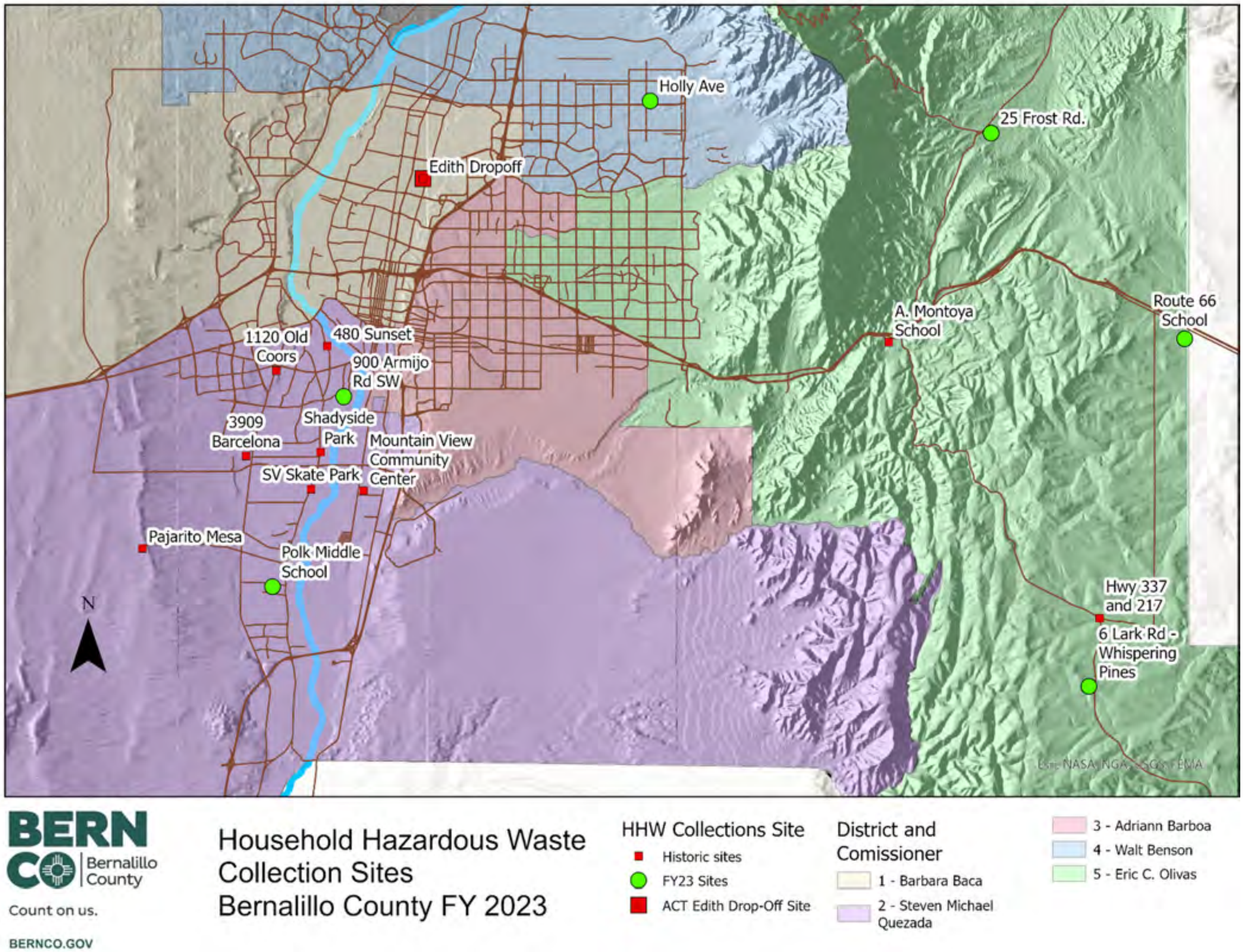
In FY23, ACT reported 13,531 residents using its services to dispose of HHW at their permanent facility at 6137 Edith Blvd NE. Of the total residents, 1,633 reported as living in the unincorporated county, making up 12.1% of all users, at a cost of $106,145 ($65/user). Total waste accepted at the ACT facility for FY23 was 345,540 pounds for all users. The estimated weight of HHW material contributed by county residents is 41,810 pounds (Figure 6).

County of Bernalillo
State of New Mexico
Natural Resource Services

Table 1. FY2022 Household Hazardous Waste Collection Event Summary

Event Location	Event Date	Number of Participants	NON RCRA Haz Waste (Bulbs)	NON DOT Regulated (CF Bulbs)	Corrosive liquids (HCL, H3PO4)	Corrosive liquids	Aerosols	Batteries (Wet Non spillable)	Mercury	Latex paint	NON DOT Regulated Material (Soap, Oil, Antifreeze)	Pesticides (liquid)	Paint Related Material	Oxidizing solid (Ca Hypochlorite)	Pesticides (Solid)	Batteries (Dry Sealed)	Flammable liquids	Lithium Batteries	Total HHW (pounds)
25 Frost Rd Sandia Park	7/9/22	58	15	--	15	35	140	65	--	800	1400	--	--	65	135	119	400	7	3196
6 Lark Rd. Tijeras	7/23/2022	17	7	--	25	--	65	--	--	--	750	35	--	9		75	400	5	1371
2220 Raymac Rd SW Albuquerque	10/8/2022	16	--	--	--	--	250	15	--	--	--	--	--	--	--	--	50	--	315
900 Armijo Rd. SW Albuquerque	4/22/2023	8	--	--	--	--	1	282	--	--	197	45	264	2	--	226	--	--	1017
10401 Holly Ave NE Albuquerque	5/20/2022	56	15	34	23	74	136	29	5	813	468	326	564	4	98	45	--	--	2634
805 Barton Rd. Edgewood	6/24/2023	29	33	--	8	--	15	261	--	--	917	185	337	--	--	--	--	--	1756
Total (pounds)		*184*	*70*	*34*	*71*	*109*	*607*	*652*	*5*	*1613*	*3732*	*591*	*1165*	80	233	465	850	12	10289

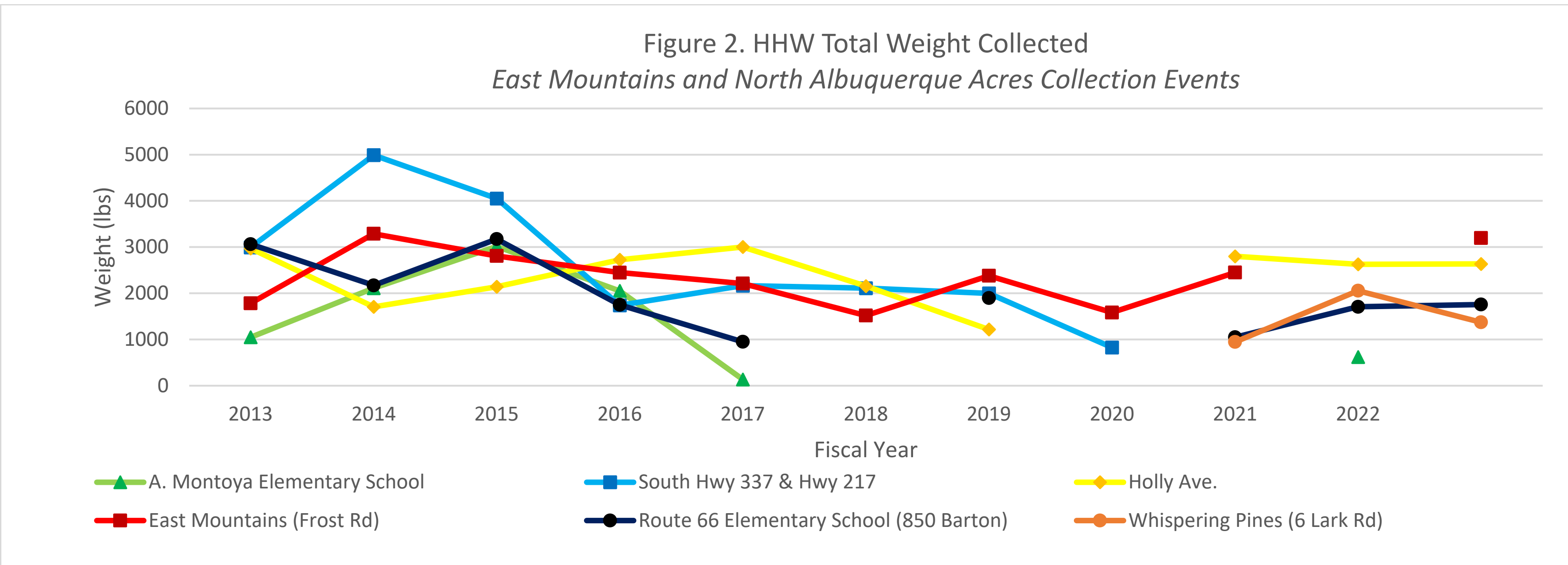
Figure 1 Location of HHW collection events. FY23 HHW event locations are represented by green circles; red circles indicate past HHW event locations. The permanent HHW collection site managed by ACT is shown by the red square.



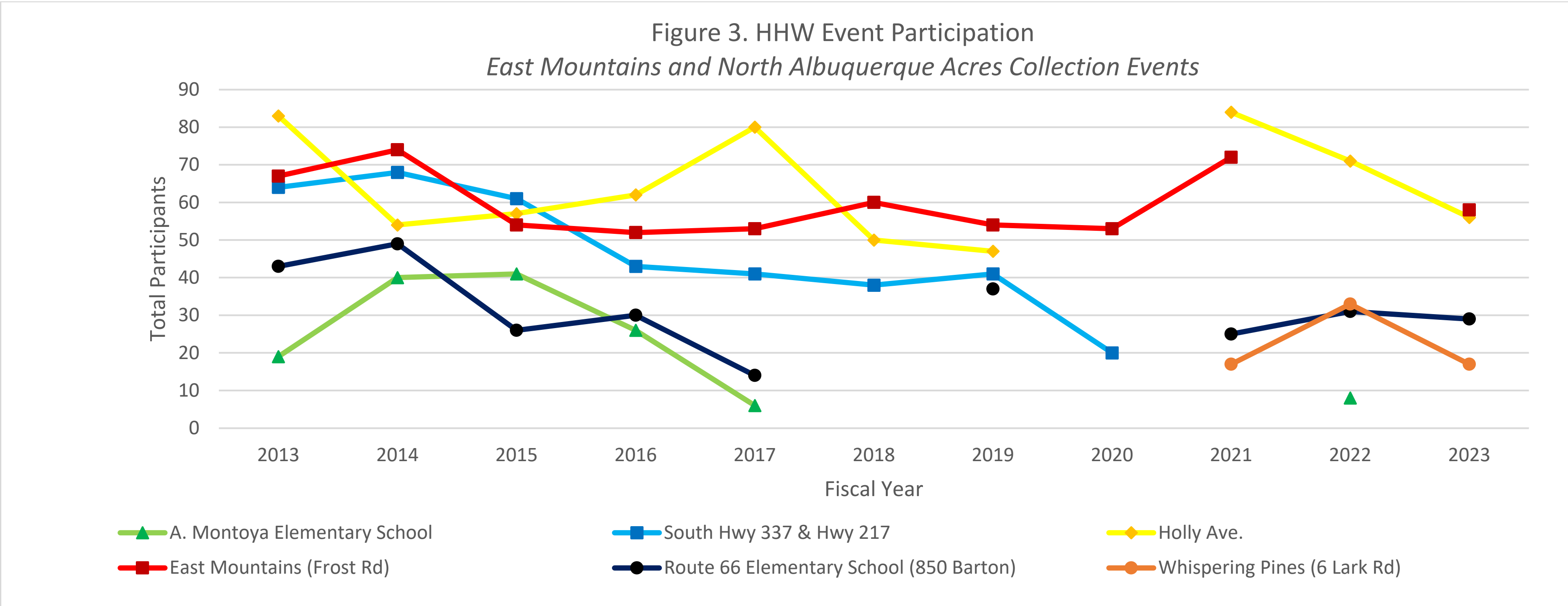
3. HHW Historical Trend Analysis

Data analysis for fiscal years 2013-2023 is provided in **Figures 2-5**. Collection data prior to 2013 is not available. **Figures 2** and **3** present HHW total weight and participation for events conducted at East Mountain locations and North Albuquerque Acres. **Figures 4 and 5** present HHW total weight and participation for events held in the South Valley.

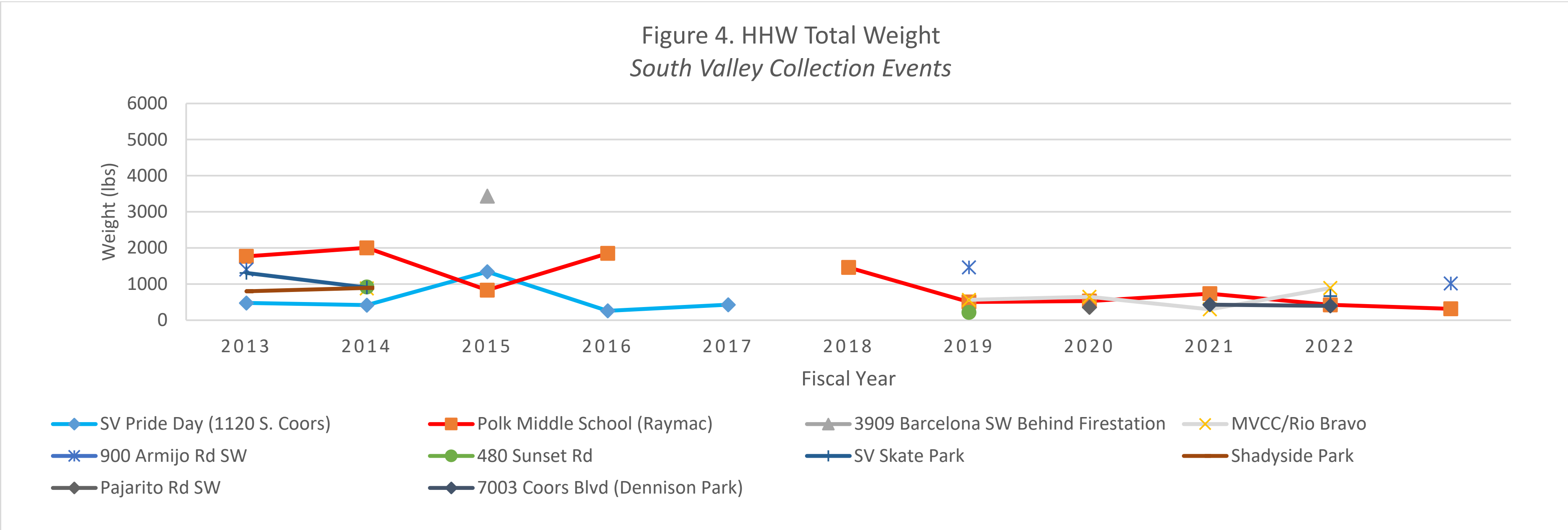
Events conducted in the East Mountains area and North Albuquerque Acres generally have greater participation rates and volume of waste collected, justifying focus of collection efforts in these areas. Events in the South Valley generally are not as well attended. Additional outreach and education efforts in the South Valley may be needed to increase participation rates.



County of Bernalillo
State of New Mexico
Natural Resource Services



County of Bernalillo
State of New Mexico
Natural Resource Services



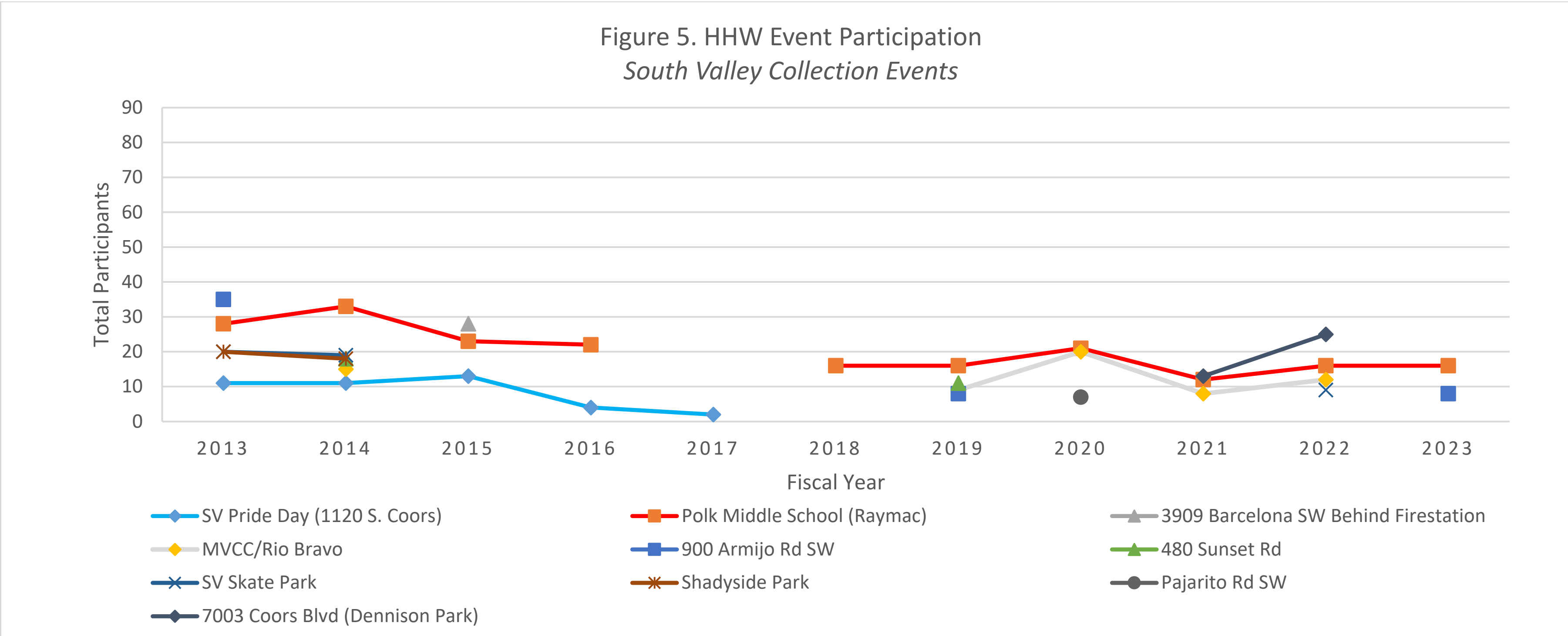
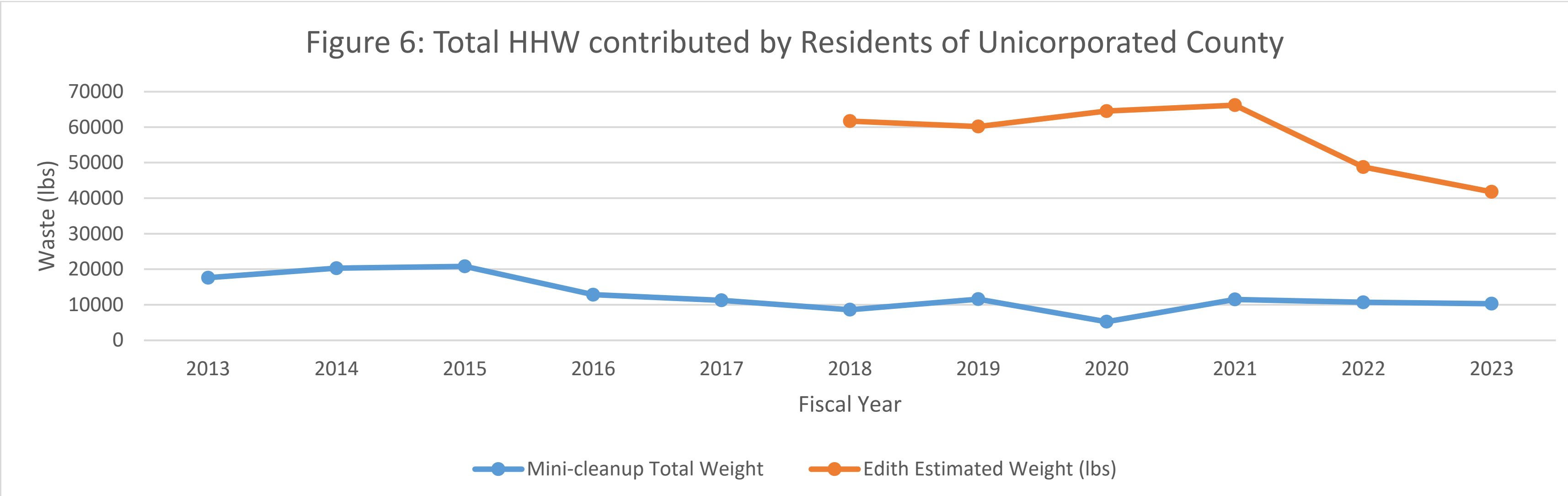


Figure 5. HHW Event Participation
South Valley Collection Events
Total Participants
90
80
70
60
50
40
30
20
10
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Fiscal Year
SV Pride Day (1120 S. Coors)
Polk Middle School (Raymac)
3909 Barcelona SW Behind Firestation
MVCC/Rio Bravo
900 Armijo Rd SW
480 Sunset Rd
SV Skate Park
Shadyside Park
Pajarito Rd SW
7003 Coors Blvd (Dennison Park)

Figures 6 and **7** present total collection weight and participation data for all the HHW mini collection events since 2013 and from the permanent ACT HHW drop-off site since 2014.



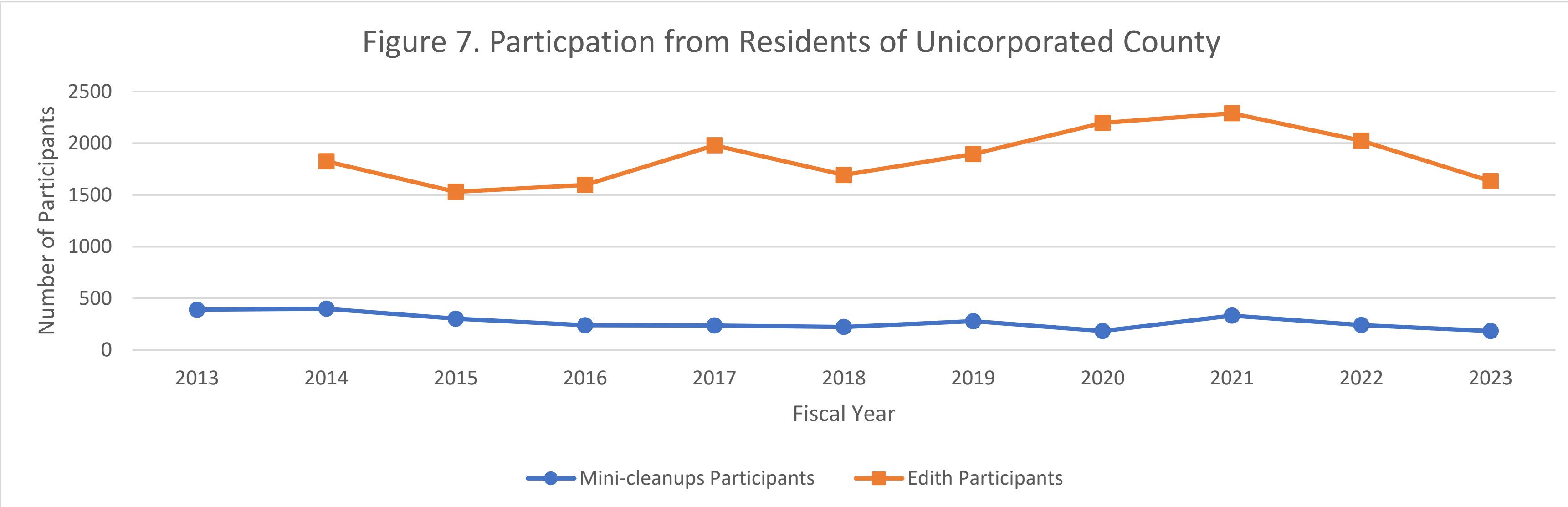
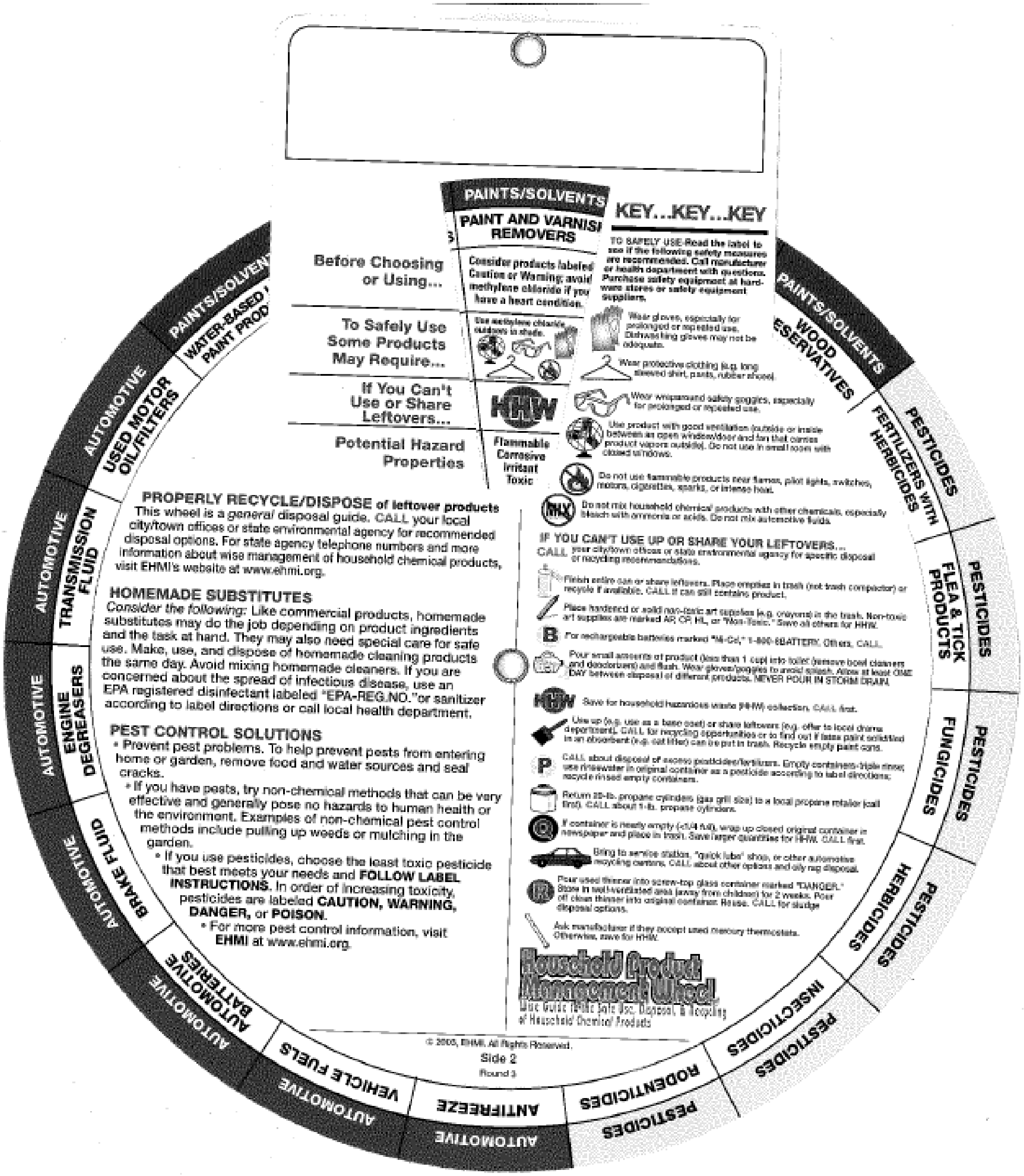


Figure 7. Particpation from Residents of Unicorporated County
Number of Participants
2500
2000
1500
1000
500
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Fiscal Year
Mini-cleanups Participants
Edith Participants

Appendix A

Educational Materials

County of Bernalillo
State of New Mexico
Natural Resource Services



PAINTS/SOLVENTS
PAINT AND VARNISH REMOVERS
Before Choosing or Using...
Consider products labeled Caution or Warning; avoid methylene chloride if you have a heart condition.
To Safely Use Some Products May Require...
Use methylene chloride outdoors in shade.
If You Can't Use or Share Leftovers...
HHW
Potential Hazard Properties
Flammable Corrosive Irritant Toxic
KEY...KEY...KEY
TO SAFELY USE-Read the label to see if the following safety measures are recommended. Call manufacturer or health department with questions. Purchase safety equipment at hardware stores or safety equipment suppliers.
Wear gloves, especially for prolonged or repeated use. Dishwashing gloves may not be adequate.
Wear protective clothing (e.g. long sleeved shirt, pants, rubber shoes).
Wear wraparound safety goggles, especially for prolonged or repeated use.
Use product with good ventilation (outside or inside between an open window/door and fan that carries product vapors outside). Do not use in small room with closed windows.
Do not use flammable products near flames, pilot lights, switches, motors, cigarettes, sparks, or intense heat.
Do not mix household chemical products with other chemicals, especially bleach with ammonia or acids. Do not mix automotive fluids.
IF YOU CAN'T USE UP OR SHARE YOUR LEFTOVERS...
CALL your city/town offices or state environmental agency for specific disposal or recycling recommendations.
Finish entire can or share leftovers. Place empties in trash (not trash compactor) or recycle if available. CALL if can still contains product.
Place hardened or solid non-toxic art supplies (e.g. crayons) in the trash. Non-toxic art supplies are marked AP, CP, HL, or "Non-Toxic." Save all others for HHW.
B For rechargeable batteries marked "Ni-Cd," 1-800-8BATTERY. Others, CALL.
Pour small amounts of product (less than 1 cup) into toilet (remove bowl cleaners and deodorizers) and flush. Wear gloves/goggles to avoid splash. Allow at least ONE DAY between disposal of different products. NEVER POUR IN STORM DRAIN.
HHW Save for household hazardous waste (HHW) collection. CALL first.
Use up (e.g. use as a base coat) or share leftovers (e.g. offer to local drama department). CALL for recycling opportunities or to find out if latex paint solidified in an absorbent (e.g. cat litter) can be put in trash. Recycle empty paint cans.
P CALL about disposal of excess pesticides/fertilizers. Empty containers-triple rinse; use rinsewater in original container as a pesticide according to label directions; recycle rinsed empty containers.
Return 20-lb. propane cylinders (gas grill size) to a local propane retailer (call first). CALL about 1-lb. propane cylinders.
If container is nearly empty (<1/4 full), wrap up closed original container in newspaper and place in trash. Save larger quantities for HHW. CALL first.
Bring to service station, "quick lube" shop, or other automotive recycling centers. CALL about other options and oily rag disposal.
Pour used thinner into screw-top glass container marked "DANGER." Store in well-ventilated area (away from children) for 2 weeks. Pour off clean thinner into original container. Reuse. CALL for sludge disposal options.
Ask manufacturer if they accept used mercury thermostats. Otherwise, save for HHW.
Household Product Management Wheel
Wise Guide to the Safe Use, Disposal, & Recycling of Household Chemical Products
PROPERLY RECYCLE/DISPOSE of leftover products
This wheel is a general disposal guide. CALL your local city/town offices or state environmental agency for recommended disposal options. For state agency telephone numbers and more information about wise management of household chemical products, visit EHMI's website at www.ehmi.org.
HOMEMADE SUBSTITUTES
Consider the following: Like commercial products, homemade substitutes may do the job depending on product ingredients and the task at hand. They may also need special care for safe use. Make, use, and dispose of homemade cleaning products the same day. Avoid mixing homemade cleaners. If you are concerned about the spread of infectious disease, use an EPA registered disinfectant labeled "EPA-REG.NO."or sanitizer according to label directions or call local health department.
PEST CONTROL SOLUTIONS
• Prevent pest problems. To help prevent pests from entering home or garden, remove food and water sources and seal cracks.
• If you have pests, try non-chemical methods that can be very effective and generally pose no hazards to human health or the environment. Examples of non-chemical pest control methods include pulling up weeds or mulching in the garden.
• If you use pesticides, choose the least toxic pesticide that best meets your needs and FOLLOW LABEL INSTRUCTIONS. In order of increasing toxicity, pesticides are labeled CAUTION, WARNING, DANGER, or POISON.
• For more pest control information, visit EHMI at www.ehmi.org.
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Side 2
Round 3
PAINTS/SOLVENTS WOOD PRESERVATIVES
PESTICIDES FERTILIZERS WITH HERBICIDES
PESTICIDES FLEA & TICK PRODUCTS
PESTICIDES FUNGICIDES
PESTICIDES HERBICIDES
PESTICIDES INSECTICIDES
PESTICIDES RODENTICIDES
AUTOMOTIVE ANTIFREEZE
AUTOMOTIVE VEHICLE FUELS
AUTOMOTIVE AUTOMOTIVE BATTERIES
AUTOMOTIVE BRAKE FLUID
AUTOMOTIVE ENGINE DEGREASERS
AUTOMOTIVE TRANSMISSION FLUID
AUTOMOTIVE USED MOTOR OIL/FILTERS
PAINTS/SOLVENTS WATER-BASED PAINT PROD...

As stormwater flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants. Stormwater can flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water. Polluted runoff is the nation's greatest threat to clean water.

By practicing healthy household habits, homeowners can keep common pollutants like pesticides, pet waste, grass clippings, and automotive fluids off the ground and out of stormwater. Adopt these healthy household habits and help protect lakes, streams, rivers, wetlands, and coastal waters. Remember to share the habits with your neighbors!

Healthy Household Habits for Clean Water

Vehicle and Garage

- Use a commercial car wash or wash your car on a lawn or other unpaved surface to **minimize** the amount of dirty, soapy water flowing into the storm drain and eventually into your local waterbody.

- Check your car, boat, motorcycle, and other machinery and equipment for leaks and spills. Make repairs as soon as possible. Clean up **spilled fluids** with an absorbent material like kitty litter or sand, and don't rinse the spills into a nearby storm drain. Remember to properly dispose of the absorbent material.
- **Recycle** used oil and other automotive fluids at participating service stations. Don't dump these chemicals down the storm drain or dispose of them in your trash.

Lawn and Garden

- Use pesticides and fertilizers **sparingly**. When use is necessary, use these chemicals in the recommended amounts. Avoid application if the forecast calls for rain; otherwise, chemicals will be washed into your local stream.
- Select **native plants and grasses** that are drought- and pest-resistant. Native plants require less water, fertilizer, and pesticides.
- **Sweep up** yard debris, rather than hosing down areas. Compost or recycle yard waste when possible.
- Don't overwater your lawn. Water during the **cool** times of the day, and don't let water run off into the storm drain.
- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. **Vegetate** bare spots in your yard to prevent soil erosion.

Home Repair and Improvement

- Before beginning an outdoor project, locate the nearest storm drains and **protect** them from debris and other materials.
- **Sweep up** and properly dispose of construction debris such as concrete and mortar.
- Use hazardous substances like paints, solvents, and cleaners in the **smallest amounts possible**, and follow the directions on the label. Clean up spills immediately, and dispose of the waste safely. Store substances properly to avoid leaks and spills.
- Purchase and use **nontoxic**, **biodegradable**, **recycled**, and **recyclable** products whenever possible.
- **Clean** paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused paint to local organizations.
- **Reduce** the amount of paved area and increase the amount of vegetated area in your yard. Use native plants in your landscaping to reduce the need for watering during dry periods. Consider directing downspouts away from paved surfaces onto lawns and other measures to increase infiltration and reduce polluted runoff.

Household Stormwater
Pollution Prevention

Keep the Rio GRAND

Pet Waste

- **ALWAYS** pick up and properly dispose of pet waste
- Bacteria from pet waste, specifically E. coli, can be transported to the river via stormwater. It is one of the biggest concerns in the Rio Grande.

Vehicle and Garage

- Inspect vehicles and repair leaks **IMMEDIATELY**
- Clean up spilled fluids with an absorbent and sweeping – not hosing
- Recycle automotive fluids – **NEVER** pour down storm drains*

Lawn and Garden

- Only use fertilizers and pesticides as needed – **NEVER** exceed manufacturer application rates – sweep up spills
- Select native plants to reduce water, fertilizer, and pesticide/herbicide use
- Yard waste and applied chemicals should **NEVER** enter ditches, streets, or storm drains*

Home Activities

- **NEVER** pour grease down drains – it can cause clogged lines, septic system issues, and surfacing sewage
- Septic systems should be inspected every 3 years, and pumped every 3-5 years
- Use nontoxic, biodegradable, and recycled/recyclable products
- Properly dispose of used paint, solvents, cleaners, fertilizers, pesticides, etc.*

BERNALILLO COUNTY STATE OF NEW MEXICO

*See Back of Pamphlet


Recycling and Disposal of
Household Waste
Household Hazardous Waste Collection Center
6137 Edith Blvd NE / (505) 349 – 5220
Most household hazardous waste is accepted, including:
Used Oil
Antifreeze
Fuel
Degreasers
Batteries
Paint
Fertilizers
Pesticides
Herbicides
Fluorescent Bulbs
PAINT
Solid Waste Disposal Centers
Don Reservoir Convenience Center – 117 114th SW / (505) 836 – 8757 (No trailers)
Eagle Rock Convenience Center – 6301 Eagle Rock NE / (505) 857 – 8318
East Mountain Transfer Station – 711 NM-333 / (505) 281-9110
Montessa Park Convenience Center – 3512 Los Picaros SE / (505) 873 – 6607
Southwest Landfill – 6201 Escarpment Rd SW / (505) 242-2020
For a minimal fee (call for details) will accept most:
Yard Waste
Excess Trash
Large Trash Items

Appendix B

HHW Contacts

Name	Agency	Role	Number	Email
Bobby Mullin	BernCo NRS	Coordinator	(505) 468-1357	rmullin@bernco.gov
Kali Bronson	BernCo NRS	Manager	(505) 364-3532	kbronson@bernco.gov
Melanie Thornton	ACT	Manager	(505) 445-9400	MThornton@ACTEnviro.com
Gabriel Villescas	BernCo O&M	Coordinator	(505) 220-4475	gvillescas@bernco.gov
Chris Miller	Clean Harbors	Manager	(602) 462-2309	Miller.Christopher3@cleanharbors.com

Appendix C

FY23 Mini Cleanup Event Schedule

FY 2023 Bernalillo County Community Clean-up Events	
Date	**Location**
July 9, 2022	25 Frost Rd. Sandia Park, NM – Bernalillo County Fire Station 46
July 23, 2022	6 Lark Rd. Tijeras, NM – Whispering Pines Senior Meal Center
Oct 8, 2022	2220 Raymac Rd SW. – Polk Middle School
April 22, 2023	900 Armijo Rd SW Albuquerque
May 20, 2023	10401 Holly Ave. NE, Albuquerque
June 24, 2023	805 Barton Rd. Edgewood - Rt. 66 Elementary

County of Bernalillo
State of New Mexico
Natural Resource Services

Appendix D

Participation Rates at ACT HHW Drop-Off Facility at 6137 Edith NE Albuquerque, NM

Household Hazardous Waste Collection Participation

July 2022- June 2023

Month	Participants w/Unknown Location or Not Enough Info to Geocode	Total	Orphaned waste at facility	City Participants (City + No Match or Not Enough Info)	County Participants	Out of County	Out of County Breakdown	County Percentage	Monthly Cost	Light Bulbs (add on to monthly cost)	Total Cummulative Cost
Jul-22	141	1465	0	1271	191	3	3-Sandoval County	13.0%	$95,225.00	$2,146.75	$97,371.75
Aug-22	128	1344	0	1162	178	4	4-Sandoval County	13.2%	$87,360.00	$2,537.75	$89,897.75
Sep-22	136	1248	0	1083	163	2	2-Sandoval County	13.1%	$81,120.00	$891.50	$82,011.50
Oct-22	143	1101	0	954	146	1	1-Sandoval County	13.3%	$71,565.00	$2,788.75	$74,353.75
Nov-22	90	865	0	751	110	4	4-Sandoval County	12.7%	$56,225.00	$503.25	$56,728.25
Dec-22	115	820	0	705	115	0	-	14.0%	$53,300.00	$1,469.50	$54,769.50
Jul-Dec 2022	**753**	6843	**0**	**5,926**	**903**	**14**		13.2%	**$ 444,795.00**	**$10,337.50**	$444,795.00
Jan-23	76	833	0	710	121	2	2-Sandoval County	14.5%	$54,145.00	$1,065	$55,210.00
Feb-23	169	718	0	624	94	0	-	13.1%	$46,670.00	$1,475	$48,145.25
Mar-23	288	1014	0	913	101	0	-	10.0%	$65,910.00	$6,000	$71,910.00
Apr-23	378	1232	0	1115	117	0	-	9.5%	$80,080.00	$1,286	$81,366.00
May-23	404	1359	0	1223	136	0	-	10.0%	$88,335.00	$1,158	$89,492.75
Jun-23	476	1532	0	1,371	161	0	-	10.5%	$99,580.00	$1,446	$101,026.00
Jan-Jun 2023	**1,791**	**6,688**	**0**	**5,956**	**730**	**2**		10.9%	**$434,720.00**	**$12,430**	**$434,720.00**
FY23 Total	**2,544**	**13,531**	**0**	**11,882**	**1,633**	**16**		**12.1%**	**$879,515.00**	**$22,768**	**$902,282.50**
				Participant Total (other than orphaned)			13,531			$22,768	

Monthly Average	**1127.583333**
Participant Fee	$ 65.00
FY23 Budget	**$ 1,000,000.00**
Remaining Balance	**$ 97,717.50**

	Participants	Percentage	Cost
BERNCO Participation to date	1,633	12.1%	$106,145

Unknown or Not Enough Info to Geocode (costs absorbed by COA)	2,544	18.80%	$165,360

Appendix E

NRS Data Collection Forms

HHW – Event Name: ____________________ Date:______________________

NAME	LICENSE #	ADDRESS

Appendix F

Bernalillo County Solid Waste Outreach

- Eleven (11) community area cleanups were hosted throughout the county, with 307.06 tons of trash collected.
- There were 312 illegal dumpsites reported and cleaned up by County Solid Waste staff

Bernallilo County conducted outreach at the following community events, reaching an estimated 8,500 county residents:

- East Mountain Celebration September 25, 2022
- South Valley Pride Day April 23, 2022
- Evening in Paradise June 3, 2023

Handouts included but were not limited to:

- 2,000 Carlos Coyote Books, teaching local youth on importance of preventing illegal dumping, recycling and littering
- 500 Keep BernCo Beautiful coloring books and Pecils
- 500 re-usable tote bags.

The County continues it's outreach marketing campaigns through the following actions:

Marketing Campaigns				
Dates of Campaign	Type of Media (Radio, Print, Digital, Television)	Call to Action	Estimated Audience	Cost
September 3-18 and October 8-23, 2022	KRQE Brand Builder	Illegal Dumping	450,000	$ 3,390
March 1-14 and April 16-30, 2023	KRQE Brand Builder	Illegal Dumping	450,000	$ 4,940
April 1 -May 28, 2023	Digital Billboards, TV advertising, & Digital advertising	Illegal dumping, large item pick-up	1,632,000	$ 30,654.88
April 15 - June 11, 2023	Digital Billboards, TV advertising, & Digital advertising	Scrap tire recycling	1,632,000	$ 30,180.78
May 29-July 9, 2023	Digital Billboards, Movie Theater Advertising, & Digital advertisng	Illegal dumping, large item pick-up, and scrap tire recycling	4,689,702	$ 32,440.29
May 12-June 30, 2023	Broadcast TV	Recycle by numbers	992,000	$ 4,315.39
May 12-June 30, 2023	Hulu and YouTube video ads	Recycle by numbers	272,000	$ 4,999
			Total	**Total**
			9,667,702	**$107,530.34**

Mid Rio Grande Stormwater Quality Team

In fiscal year 2023, the Stormwater Quality Team attended the annual Corrales Harvest Festival, a rural community just north of Albuquerque, the Doggie Dash and Dawdle, an event that fundraises on behalf of the local Animal Humane.

Additionally, the group attended a number of community events in Albuquerque's South Valley and West Side. During each event educational rack cards and various promotional products were distributed.

The team also produced a Spanish section of the KeepTheRioGrand.com website.

And finally, the team created custom content and posts on Facebook.

Village of Corrales

The Village of Corrales has no municipal storm sewer system. To handle stormwater flows from development, engineered grading and drainage (G & D) plans are required prior to any residential construction that will disturb more than 1,000 square feet. Engineers may design berms, swales, retention ponds and other aspects to keep new impervious surface (roofed or paved) stormwater flows on the subject property and not running into streets or adjacent properties.

Within the Commercial zone, stormwater retention areas must be built into Site Development Plan drawings before those applications can be heard by the Planning and Zoning Commission.

In FY23, the Village saw 21 residential grading and drainage plans prior to issuing building permits. There were four Commercial Site Plans that incorporated drainage (primarily retention ponding) into their designs. One was the Village of Corrales administration complex, which added a new swale on the north side of the property along with the two existing retention areas.

This fiscal year, the Corrales Bosque Advisory Commission in conjunction with the Corrales Fire Department continued their efforts to encourage dog waste pick-up along popular pedestrian areas into the Bosque and elsewhere in the Village. There are nine waste bag stations and trash receptacles located at Bosque access gates, Camino de la Tierra (entrance to popular Sand Dunes walking area) and at Quirks Lane. CBAC provided approximately 8,500 dog poop bags in/near the Bosque, and an additional 500 bags at the other location, greatly reducing the amount of dog waste otherwise in danger of polluting the acequias, canals or Rio Grande.

The glass recycling area continues to be amazingly successful. From April of 2022 through August 14, 2023, the Village has recycled 93.63 TONS of glass.

The Village is continuing the twice-a-year (spring and fall) community “Clean-Up” days, accepting non-hazardous and yard waste. Approximately 200 households per year participate. Our Code Enforcement Officer works with citizens throughout the year to have them remove trash, non-functional vehicles and other items that could leak fluids into the groundwater. There is no municipal water system; all structures are serviced by wells.

Every year during the Corrales Harvest Festival, which is attended by folks from throughout the metro, a Stormwater Team booth educates the public on the importance of keeping waste, oils, floatables and other items out of the river.

This year it was reported to the Village that a vehicle had leaked a significant amount of fluid along a public right-of-way, Tierra Encantada. Public Works used absorbents to clean up as much as possible.

Village of Los Ranchos

Los Ranchos does not have a municipal storm sewer system. Grading and drainage plans are required for most residential and commercial construction within the Village, and Site Development Plans are additionally required for major subdivisions and new commercial construction. Permeable pavement elements have been incorporated throughout the Fourth Street redevelopment area in Los Ranchos, which provide multiple benefits such as reducing flooding and erosion and enhancing groundwater recharge. The next phase of the Fourth Street Project, from Pueblo Solano Rd NW to Ortega Rd NW, will include elements that address stormwater and drainage concerns within that phase. Our Code Enforcement Officer regularly works with citizens throughout the year to address trash removal and inoperable vehicle issues, which helps reduce harmful fluid runoff entering the groundwater. This year, staff participated in educational outreach activities as part of the Stormwater Quality Team, including distributing materials at the Pueblo of Isleta Safety Fair. Educational materials are available year-round at Village Hall.

San Isidro Day Blessing of the Waters, Los Ranchos

Rio Rancho

Drainage Facility Clean-up Schedule

Cleanup takes place during December, January, and February every year.
Schedule is based on a 5 day work week (Monday thru Friday), schedule also accounts for City Observed Holidays.

ID	District	Name	Location	Current Condition	Date of Last Inspection	Compliance Resolution	Actual Start	Actual Completion
73	6	Fire Station 7 Channel	641 Rockaway Blvd NE	Fair; Less than 1 large garbage bag of trash; lots of tree's, 5 bunches together; approx. 12-18in depth of sediment buildup, partially submerged with sediment.	6/14/2022	Remove Trees and trash	12/1/2022	12/5/2022
630	6	U17, Blk 153, Lot 9 Pond	924 Saratoga DR NE	Good; Trace amounts of trash; excessive weeds; 0-6in depth of sediment buildup.	6/27/2022	Remove weeds, trash and debris	12/8/2022	12/9/2022
629	6	U17, Blk 67, Lot 9 Pond	917 Saratoga DR	Good; Traces amounts of trash; a few trees; 0-6in depth of sediment buildup.	6/27/2022	Remove Trees, trash and debris	12/8/2022	12/9/2022
54	2	NH14, Blk 6, PAR B east Pond	9999 Cherry Rd NE	Fair; Trace amounts of trash; approx. 12-18in depth of sediment buildup, fully submerged with sediment.	6/13/2022	Remove accumulated sediment	12/12/2022	12/16/2022
631	3	U17, Blk 63, Lot 13 Libra	5153 Libra Rd NE	Good; Trace amounts of trash; approx. 3 large mature trees; approx. 0-6in depth of sediment buildup.	6/27/2022	Remove Trees and trash	12/19/2022	12/19/2022
624	1	WAPR, Blk B, PAR A Wallen Park	109 Landing Trail NE	Good; Less than 1 large garbage bag of trash; A few mature trees; approx. 0-6in depth of sediment buildup.	6/27/2022	Remove Trees, trash and debris	12/20/2022	12/21/2022
611	4	LM, Blk 8, PAR C1 Park Pond	400 Colorado Mountain Rd NE	Good; Less than 1 large garbage bag of trash; +10 mature trees; More than 50% full(water); approx. 0-6in depth of sediment buildup, fully submerged in water.	6/27/2022	Remove Trees, trash and debris	12/21/2022	1/18/2023
596	3	2501 King Blvd Det Pond	2501 King Blvd NE	Fair; Trace amounts of trash; a couple mature trees, and a few juvenile trees; approx. 0-6in depth of sediment buildup.	6/24/2022	Remove Trees	1/19/2023	1/19/2023
177	4	CG, Blk 2, TR B1 Pond	3397 St. Andrews DR SE	Good; Trace amounts of trash; A few trees and bushes; approx. 6-12in depth of sediment buildup.	6/23/2022	Remove Trees and Bushes, trash and debris	1/20/2023	1/20/2023

Rio Rancho

ID	District	Name	Location	Current Condition	Date of Last Inspection	Compliance Resolution	Actual Start	Actual Completion
85	3	CR, Blk 1, PAR B Ret Pond	4900 Chaco Loop NE	Less than 1 large garbage bag of trash; minor juvenile trees in bottom; Washed-out.	6/7/2022	Remove Trees and trash; Back-fill wash-out.	1/20/2023	1/20/2023
81	3	CCCEH, Blk E, PAR D Pres	3791 NM Highway 528 NE	Poor; More than 3cu of trash; excessive trees; approx. 6-12in depth of sediment buildup; partially submerged with sediment.	6/14/2022	Remove Trees, trash and debris	1/27/2023	2/1/2023
1098	3	HAWK, PAR 5A1 Main Pond	4601 Patriot Rd NE	Fair; Less than 1 large garbage bag of trash; excessive trees; partially submerged with sediment.	6/24/2022	Remove Trees, trash and debris	1/31/2023	2/9/2023
620	3	HGHR, Blk 5, PAR B Corner	3973 Rancher Loop NE	Fair; Less than 1 large garbage bag of trash; excessive brushes.	6/24/2022	Remove Bushes, trash and debris	1/23/2023	1/24/2023
186	2	U21, Blk 12 PAR BB Pond	1501 Wilpet Ave NE	Good; Trace amounts of trash; partially submerged with sediment; erosion; approx. 6-12in depth of sediment buildup. Partially submerged with sediment.	6/24/2022	Slope Erosion.	1/24/2023	1/24/2023
29	4	CHR, Blk 1, PAR C1 Pond	3501 High Resort Blvd SE	Good; Approx. 0-6in depth of sediment buildup.	6/9/2022	Remove Trash and debris.	1/24/2023	1/25/2023
140	2	NMED16, Blk 7, PAR C Pond	9999 King Blvd NE	Fair; Trace amounts of trash; approx. 0-6in depth of sediment buildup; partially submerged with sediment.	6/16/2022	Remove Trash and debris.	1/24/2023	1/24/2023
155	3	ECD, PAR PD4 Encantado Channel	5905 Kennard Rd NE	Fair; Trace amounts of trash; excessive bushes; approx. 6-12in depth of sediment buildup; partially submerged with sediment.	6/21/2022	Remove Trash and debris.	2/22/2023	2/24/2023
36	1	SPW, Blk 1, PAR A Pond	9999 Wexford Rd SE	Fair; Less than 1 large garbage bag; trees blocking inlet/outlets; erosion by inlet ;0-6in depth of sediment buildup; partially submerged with sediment.	6/9/2022	Remove Trees, trash and debris, backfill.	12/5/2022	12/15/2022

Rio Rancho

Litter Control and Recycling Activities

Date	Activity Name	Location of Area Cleaned: Roadside, Waterway, Green Space, Mainstreet, Community-wide (Green Space = parks, natural areas, hiking areas, etc)	# of Miles Cleaned	Lbs of Trash Collected (to Landfill)	Lbs of Recycling Diverted	Lbs of Glass Diverted	Lbs of Electronics Diverted	Lbs of Compost Diverted	Lbs of Cigarette Butts Diverted	Lbs of Additional Waste Diverted	Detail Additional Waste Diverted	Entity which Diverted Waste
7/1-6/15/23	Staff Illegal Dumpsite Cleanup	Multiple Mesa/Open Space spots roadways - 11 acres	7	3316000	0	0	0	0	0	0		
7/1-6/15/23	City facility recycling	City Hall and Fire stations 1-6	0	0	11,400	0	0	0	0	0		Waste Management to MRF
7/1 - 5/30/23	WM At Your Door Collection	Multiple Residences/ residential waste	0	0	0	0	31908	0	0	27943	Residential Hazardous Waste	Waste Management
7/1-5/30/23	Monthly WM Free Res Landfill	NA	0	2371240	0	0	0	0	0	0		
7/16/2022	HP Illegal Dumpsite Cleanup	Multiple Mesa/Open Space spots roadways - 3 acres	3	32000	0	0	0	0	0	0		
9/24/2022	Rally in the Desert Cleanup	Multiple Mesa/Open Space spots roadways - 12	4	78000	0	0	0	0	0	0		
12/26-1/9/23	Tree Cycling	NA	0	0	0	0	0	0	0	14,300	mulched Christmas trees	PNM mulched/Citizens took mulch
Mar-Apr/2023	Clean Campus Contest	Puesta del Sol Elementary School - 22 acres	0	320	0	0	0	0	0	0		
4/18-4/19/23	HP Earth Week Cleanup	Areas and road around City Center - 5 acres	2.5	960	0	0	0	0	0	0		
5/13/2023	Great American Cleanup	Multiple roadways (14)	14	8000	0	0	0	0	0	0		

Total Number of Miles Cleaned	Total Single Stream Diverted	Total Glass Diverted	Total Electronics Diverted	Total Compost Diverted	Total Cigarettes Diverted	Total Additional Waste Diverted
30.5	**11400**	**0**	**31908**	**0**	**0**	**42243**

Total Waste Collected (lbs)
5892071

Total Waste to Landfill (lbs)	Total Waste Diverted from the Landfill (lbs)
5806520	**85551**

Litter Control and Recycling Infrastructure

# of Trash Receptacles	# of Recycling Receptacles	# of Cigarette Ash Receptacles	# of Pet Waste Receptacles	# of Sharps Disposal Receptacles	# of Additional Receptacles	Detail Additional Receptacles
0	16	0	0	0	0	

Total # of Receptacles
16

Illegal Dumping

# of Illegal Dumping Sites Reported	# of Illegal Dumping Sites Cleared	# of Tires Collected
82	69	42

Children's Water Festival

Rio Rancho, 2022

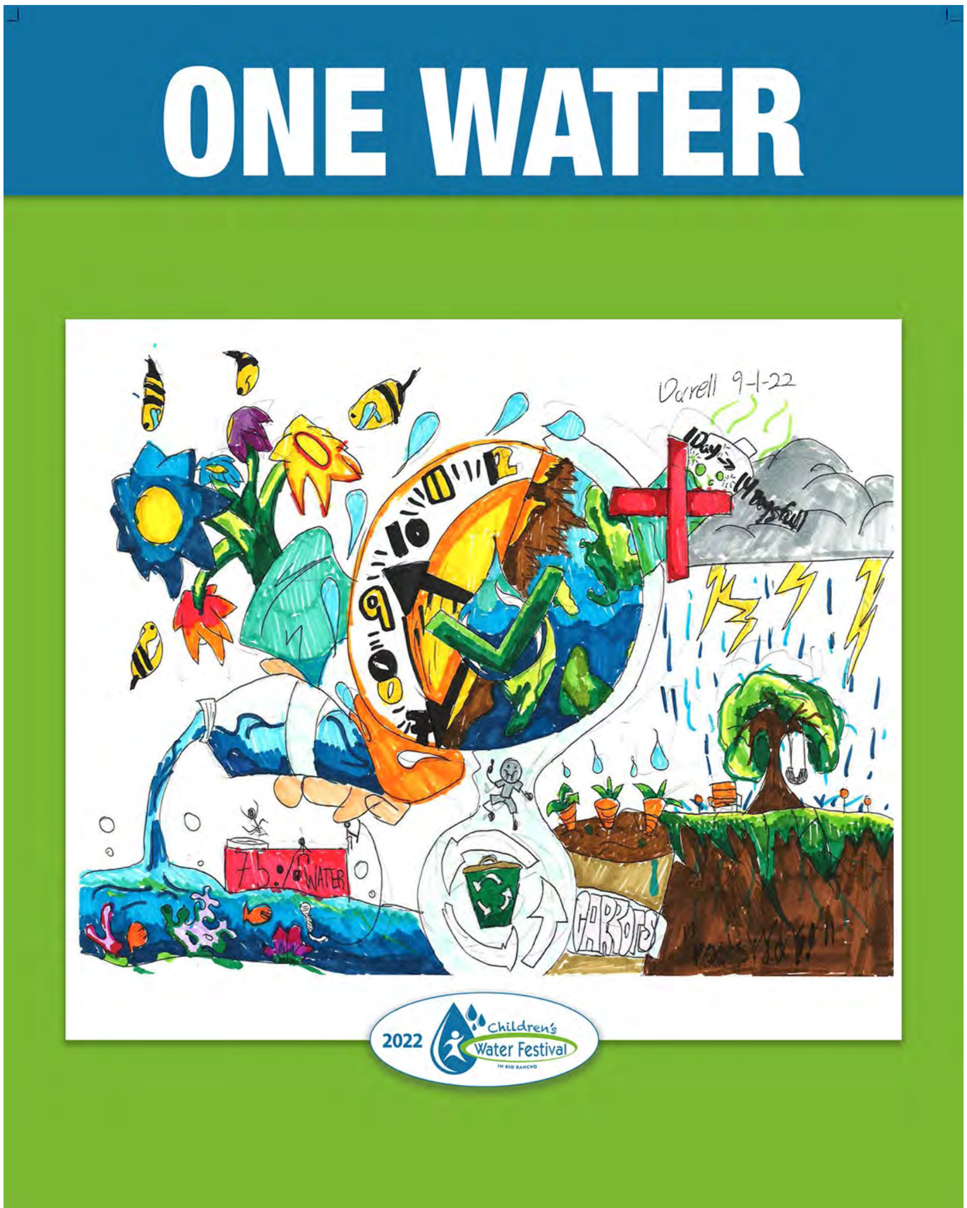


Table of Contents

Executive Summary

The 2022 Children's Water Festival (Festival) was held on Monday, October 24th and Tuesday, October 25th at the Rio Rancho Events Center in Rio Rancho. Due to the pandemic, this was the first time that the Festival had been held since 2019. Changes were made to the size and structure of the Festival to better accommodate the students and to give them a better all-around experience. Historically, fourth grade students attended the Festival. This year, a decision was made to invite fifth grade students as the Festival curriculum better fit into the schools' science learning objectives. Additionally, students from one-half of the Rio Rancho elementary schools students attended, and the other half of the Rio Rancho elementary schools will attend in 2023. Over 505 students from 21 classrooms, from Maggie Cordova, Martin Luther King, Puesta del Sol, Rio Rancho and Joe Harris elementary schools participated. Each class attend three 30-minute presentations. Twelve hands-on presentations taught water-related ideas and concepts to the students.

The Festival had 49 presenters/associates and 16 volunteers to guide the classes to the assigned activity.

The twelve presentations represented sixteen professional organizations that ranged from federal, state, regional governments, and private industry. The organizations all have water interests and focused on subjects such as the water cycle, water quantity and conservation, water distribution, and water quality/pollution.

Students were evaluated on basic water knowledge after the Festival. There were eight questions asked of the students and they averaged 61% to 88% correct on the questions. A more detailed breakdown is found in Student Post-test Scores section.

The Festival costs an estimated $23,000 each year. The City of Rio Rancho contributed $10,000 to the Festival and additional funding was raised through Ciudad Soil & Water Conservation District. Festival sponsors include: Jacobs, Waste Management, Southern Sandoval County Arroyo Flood Control Authority, Carollo, Resource Wise, Bohannon Huston, AUI, and RMCI.

Introduction

The Children's Water Festival (Festival) has been held in Rio Rancho since 2007. The 2010 Festival was the first event hosted by the City of Rio Rancho's Water Conservation Office. This report is for the 2022 Festival; the eleventh event hosted by the Water Conservation Office. There was a two-year hiatus because of the Covid-19 Pandemic. As in years past, the Festival was held at the Rio Rancho Event Center and about 505 students attended from 21 fifth grade classrooms from Rio Rancho Public Schools. The event was held on Monday, October 24th and Tuesday, October 25th.

Purpose and Intent

The principal focus of the Festival is to educate fifth grade school children about water and its relationship to humans, animals and other natural resources in a fun and interactive atmosphere. The Festival's vision is to:

- Introduce students and teachers to new ideas, options, and solutions so they will conserve and protect water for the future,
- Lay the foundation for further learning, and
- Reach as many students and teachers as possible.

Public participation is essential to successful water conservation, and educating the public promotes better water conservation planning and implementation. Early education influences the future acceptance of water conservation concepts. This early education experience also has shown that training efforts affected behavioral changes and improved water use practices. Water conservation goals are only as effective as water users' willingness to adopt and implement appropriate water conservation measures. Through special training activities, water users are taught proper water use practices and techniques. Efficient use of water supplies decreases waste and prevents degradation of water quality leading to healthier ecosystems for fish and wildlife, including locally listed endangered species, such as, the Rio Grande Silvery Minnow (*Hybognathus amarus)* and the Southwestern Willow Flycatcher (*Empidonax traillii extimus*).

The Festival was designed specifically to introduce and explain new and unfamiliar water management tools to present and future water users and managers. Research concerning water conservation education indicates the targeted group of the Festival, fifth grade students, is ideal for achieving long-term goals. Through sharing water conservation and water quality tools at home and with extended family, the estimated 505 participants (students, teachers, and chaperones) represent a potential audience of 10,000 to 15,000 people for the Festival program.

A series of activities that cover a wide range of core curriculum areas were presented at the Festival. These activities included language arts, mathematics, science, social studies, visual arts, and health/wellness; all of which are tied to water conservation, water quality, and water quantity in the arid Southwest desert.

The 2020 update to the Water Resources Management Plan (Plan), details water efficiencies and water conservation measures to be taken by the City to better manage the existing water supplies. Policy E.4 of the Plan sets forth this initiative: "Continue consulting with and improving the partnership with Rio Rancho Public Schools to implement a robust water resources educational curriculum."

Additionally, the City of Rio Rancho Strategic Plan was formally adopted by the City of Rio Rancho Governing Body on March 25, 2009, updated August 2017, and amended October 2019. One important element of the Infrastructure Strategies section of the Strategic Plan pertains to water sustainability and conservation to support growth and development of the City.

Funding

Festival Cost

The Festival costs are listed in the table below. Please note that the cost for the Rio Rancho Events Center is only for the personnel time, including two police officers per day for security. The pipe and drape for the booth setup was bought by the Festival so there is no pipe and drape rental. A new bus company was used this year because there has been issues in the past with buses not arriving at the schools on time to pick up the students and deliver them to the Festival.

Cost Description	**Amount**
Rio Rancho Events Center	$3,080.25
Catering for volunteers & presenters	$3,435.70
Buses (Herrera Coaches)	$9,659.30
T-shirts with art/logos (550 shirts)	$4,990.00
Thank you cards	168.00
Fiscal Administration	$1,000.00
Committee members thank you gifts	$200.00
Total	**$22,533.25**

Sponsorships

Through its fiscal partner, Ciudad Soil & Water Conservation District, the City of Rio Rancho was able to secure several sponsors to fund the Festival. Additionally, the City sponsored $10,000 for the Festival.

A heartfelt "thank you" to these valuable Festival partners!

Steering Committee

The Festival was directed by a diverse steering committee. The core group contained members from:

- City of Rio Rancho's Water Conservation Office
- City of Rio Rancho's Parks Department
- Sandoval County Master Gardeners
- New Mexico Environment Department – Surface Water Quality Bureau
- Citizen volunteers

Design of Festival

Students attended four presentations at the Water Festival.

Pre-Festival Activities

- Each school provides a lead fifth grade teacher who confirms their commitment to participate, provides the number and names of the teacher/classes and the number of anticipated students for each.
- Elementary schools are provided the information on how to participate in the student T-shirt artwork project; student art work is submitted to the Water Conservation Office and a winner is selected.
- Teachers received resource kit materials that included the T-shirts and miscellaneous items donated by our sponsors (e.g., pens, rulers.).

Rio Rancho Children's Water Festival Event

Students at the "Rio Grande Bosque Water Cycle" activity.

- The Water Festival was held from 9:45 a.m. through 11:55 a.m.
- Students attending the Festival boarded buses at 9:15 a.m. at their school.

- Each class was met by a guide/timekeeper who escorted them to each of their four assigned presentations.
- Presentations lasted 30 minutes and topics included: water quality, water conservation, water cycle, wastewater, ecosystems, and built water infrastructure.
- All students received a Festival T-shirt. Darell Montoya from Mr. Bales's class at Rio Rancho Elementary, was the winner of the T-shirt student artwork contest. His design was displayed on the front of the T-shirt and Festival sponsor logos were on the back.

Darell Montoya– T-shirt artwork winner from Mr. Bales's
Rio Rancho Elementary class

Post-Festival Activities

- Teachers will receive a copy of this report.

All aspects of the Festival planning and implementation were created with the *Big Water Questions* in mind. Each presentation addressed at least one of the *Big Water Questions*, as well as the Festival's mission and objectives. The long-term outcome goal is that all elementary school students will be able to provide reasonable answers to these questions by the time they reach middle school.

Big Water Questions

- Why is water so important to life?
- How do all living things depend on each other?
- What is the water cycle?
- What is a watershed?
- Where does my drinking water come from?
- What makes water dirty?
- How much water does my family use?
- Who are the other water users in our society?
- How can ***I*** protect our water?
- Where does my wastewater go?

Schools Attending the Festival

The following table outlines which schools attended.

Elementary School	**Number of Classes**
Maggie Cordova Elementary	4
Martin Luther King Elementary	4
Puesta del Sol Elementary	5
Rio Rancho Elementary	4
Joe Harris Elementary	4
Totals	**21**

Festival Presentations

“Leaky Faucet” activity. Students learn about how much water can be wasted due to unrepaired leaks.

Each year the Festival relies on numerous professionals who volunteer their expertise and presentation time. These professionals represent federal, state and regional government entities, local engineering firms, and the school district. They choose presentations that represent their missions or specialties. A description of all the presentations, the presenters and their contact information has been provided in Appendix A.

Volunteers

The Festival could not be held without the assistance of a number of volunteers, presenters, and steering committee members. Volunteers were required to use the City’s on-line application process to have their background checked prior to interaction with the students.

Lessons Learned

Steering Committee Comments from the Festival

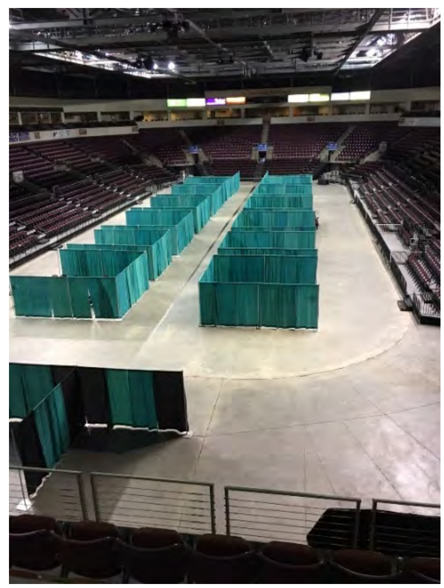
There were only a few comments from the steering committee including:

Event Aspect	Overall Performance	Areas of Improvement
Communication/coordinating with schools	Could have been better	Need to prioritize meetings with the teachers to give them an overview of the Festival.
Transportation	Went great	Need to know right away if any child needs ADA access.
Presentations	Presenters were enthusiastic	Make sure presenters are aware of the time commitment. Go over the key words/concepts. Give presenters the schedule ahead of time. Presenters should have enough material (or filler) to engage the students so they don't finish too early. Think about a "treasure map" for the kids.
Transition between presentations	Average – could have been better	More detailed trainings for guides. The guides need to stand out (maybe dress more festive or wear vests). Kids should stay at current stations until end of allotted time.
Food	Good overall	Fewer breakfast burritos on Monday and more on Tuesday.
Logistics (Public safety, RREC)	Good overall	Need sign in sheets for Master Gardeners. Utilize the facility more and make it more festive (colors/lights/sound-system). Have more water stations.
Break (20 minutes)	Good idea but a little confusing to guides	Maybe get one more presenter next time so we can stagger the breaks. Maybe shorten the break to 10 minutes.
T-shirts	Above average	Order more mediums and fewer smalls next year. Get logos to the printer early next year.

Training of guides/teachers, etc.	Could be better	No students should be by themselves. They need to be accompanied by teachers.
General		Clean up the VIP list ahead of next year's Festival. Have a media person help with medial release. Have a Water Festival webpage (need to discuss with city management). Need a "thank you" banner for the sponsors.

Action Items:

- Do a teacher survey
- Administer post-test (GoogleDocs)
- Need to replenish the supply of SWAG – bags, fans, etc.



Festival layout.

Festival Event

The two days of the Festival ran very smoothly. A new bus company was used because of the issues with RRPS buses the past several years.

We did not have a dedicated photographer this year and there was a low return of the photo release forms from the parents. Because of this, we did not take very many photos. Many of the photographs of students in Appendix C are from prior years.

Appendix A - Working Timeline

The following was used to ensure that steps of the Festival preparation were completed in a timely manner.

- June 30 - Ask for sponsors
- July 30 - Update VIP list
- July 30 – Design poster with the theme
- July 30 – Reach out to presenters
- August 1 – PO for RR Sponsorship
- August 1 – PO for Buses
- August 8 – RR schools starts
- August 20 - Email teachers about CWF date and artwork delivery
- August 22 – Drop off artwork paperwork, poster, photo release forms
- September 6 – Email volunteers
- September 6 - Email reminder to teachers including schedule
- September 6 – Pick up artwork, photo release forms
- September 13 – Meeting to select the winner
- September 13 – Artwork to Rio Rancho T Shirts
- September 15 - Update VIP list and mail invitations
- September 20 - Meet with RREC about food, etc.
- October 11 – Pick up T Shirts
- October 15 - Email layout to RREC
- October 18 – Meeting to pack bags
- October 18 – Drop off bags this week
- October 24th and 25th – Water Festival
- October 28 – Remind teachers about post-test pickup
- November 30 - Pick up post-tests

Appendix B – Festival Presentations

This appendix lists all of the Festival presentations and contacts. For each section, there is the name of the presentation, a brief description of the activity, the correlation of the presentation with the Next Generation Science Standards (NGSS), the contact information of the presenter and if available, where the teacher can locate a similar presentation if they would like to teach it in the classroom.

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Basic Surface Water Treatment

Students learn about processes used to clean water in a contemporary water treatment facility through an interactive process. This activity teaches children about the importance of water quality for drinking water.

Carollo Engineers
Rob Buss   rbuss@carollo.com

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Flash Flooding

For the 2022 water festival our activity was to demonstrate several ways flash flooding can occur utilizing our flood model. We allowed the kids to use a pitcher of water to demonstrate rainfall and how rain-rate affects flash flooding. The model used sponges to show how the ground can soak up a lot of that rainwater but eventually it runs off into the streams, arroyos and eventually rivers. If the ground or sponge is saturated, then all the rainfall runs off into the drainage areas. We had toy houses to show what happens to houses in flood prone areas and how to build levees to protect structures. We could change out the sponges or ground for a flat plexiglass surface to represent concrete. We could show how the "concrete" does not catch any rainfall and it immediately runs off causing flooding. We also demonstrated by moving our rain catcher how flooding changes with moving storms or how it changes with the speed of storms. These demonstrations let us have conversations with the kids and teachers about flood safety and preparedness.

National Oceanic & Atmospheric Administration, National Weather Service
Kerry Jones (505) 243-0702 kerry.jones@noaa.gov

****

Incredible Journey

During this activity, students become water molecules and move through the water cycle. They learn about the movement and distribution of water – as well as pollution – on the earth.

NM Environment Department, Surface Water Quality Bureau
Heidi Henderson heidi.henderson@state.nm.us

A similar activity found on web: Incredible Journey, Project WET
http://files.dnr.state.mn.us/education_safety/education/project_wet/sample_activity.pdf

****

Keep the Rio Grande

Keep the Rio Grande Activity is an interactive game where the students become an arroyo supplying stormwater to the Rio Grande. The stormwater picks up a variety of items as the flow increases creating a flood of raindrops, trash, pet waste, bacteria, and plastics as the students pass the items down to the river. The students learn about stormwater quality and the impact we have on water in our neighborhoods and town. After the rain has stopped, students discuss the water and debris on the ground around them and at the end of the line the river. Then they are tasked with sorting all of the items to bins labeled: trash, compost, recycle and rain.

Middle Rio Grande Stormwater Quality Team
Xavier Pettes (505) 891-5045 xpettes@rrnm.gov

****

Leaky Faucet

Students create a water leak and scientifically measure the leak using graduated cylinders over three tests. The students then compute the average milliliters of water leaked over one minute to the number of gallons of water leaked and wasted over one year.

Rio Rancho Public Schools
Lou Cusimano (505) 975-0326 lou.cusimano@rrps.net

A similar activity found on web: Leaky Faucet, Utah Education Network http://www.uen.org/Lessonplan/preview.cgi?LPid=27247

****

Let's Settle This Outside

Students become wastewater operators and learn how the wastewater treatment plant cleans dirty water. They then create wastewater using everyday materials and clean the wastewater by sorting it into three stations: water, sludge, and trash.

Jacobs		
Bill Jaquez	(505) 891-5024	billy.jaquez@jacobs.com
Wendell McCall	(505) 891-5017	wmccall@rrnm.gov

A similar activity found on web:
Wastewater: We Treat it Right, City of Boise
http://bee.cityofboise.org/media/216580/43385_Wastewater.pdf

****

New Mexico Past and Present

Students learn where water comes from (the water cycle), where water is today in New Mexico, and what they can do to protect and conserve water. The students then become detectives using fossils to discover where water occurred in the past in New Mexico.

New Mexico Museum of Natural History and Science		
Mike Sanchez	(505) 841-2583	michael.sanchez1@state.nm.us

****

Rio Grande Bosque Water Cycle

In the semi-arid climate of New Mexico, our scarce precipitation limits the quantity of water available for use by plants, animals and humans. Students become water molecules traveling through a water cycle. The presentation emphases, with evidence and cause and effect, why we need to consider all water users when making water-use decisions.

Rio Grande Nature Center
Tanja George (505) 344-7240 Tanja.George@state.nm.us

A similar activity found on web: Incredible Journey, Project WET
http://files.dnr.state.mn.us/education_safety/education/project_wet/sample_activity.pdf

****

Stormwater and Watersheds

Students learn about watersheds by examining and manipulating watershed models. They learn that a watershed is the land area that drains to a water body such as a river or lake. They see for themselves how watersheds can influence water quality.

Sandia National Laboratories
John Kay (505) 344-7240 jtkay@sandia.gov

A similar activity found on web: Protecting Our Water Resources, Midwest Research Institute (See Level 2) http://www.stormwater.ucf.edu/toolkit/vol3/Contents/pdfs/Student%20Activities/student_activities.pdf

****

Sustainable Tomorrow

WM of New Mexico hosted a giant pong game designed to help students learn how to Reduce, Reuse and Recycle as ways to help conserve water and other natural resources. Following a short interactive presentation, students stepped up to a collection of mini basketballs labeled with different materials such as Plastic Water Bottle, Cardboard Box, Blue Jeans, etc. The object of the game was to get the material (noted on the basketball) into the correct bucket – either Recycle, Reuse or Reduce. In action, the game offered the dual challenge of learning what the greenest option for different materials was and then getting the bouncing ball into the right 3-gallon bucket.

Waste Management
Laila Amerman lamerman@wm.com

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Water Jeopardy

Students learn basic concepts and differences about groundwater vs. surface water supply for potable drinking water. The concepts are reinforced by participation in a Jeopardy game where students compete to determine the correct water "question" for a series of given "answers" (like the TV show).

Bohannon Huston, Inc.
Nathan Roberts (505) 823-1000

nroberts@bhinc.com

A similar activity found on web: The Water Cycle Jeopardy, Super Teacher Tools (online Flash game for up to 5 teams) http://www.superteachertools.com/jeopardy/usergames/Jan201205/game1327973751.php

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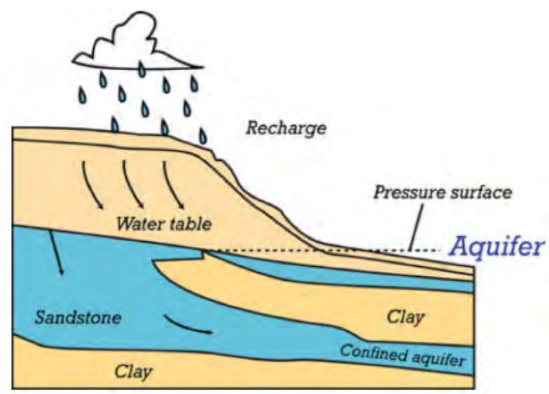
Appendix C - Post Test

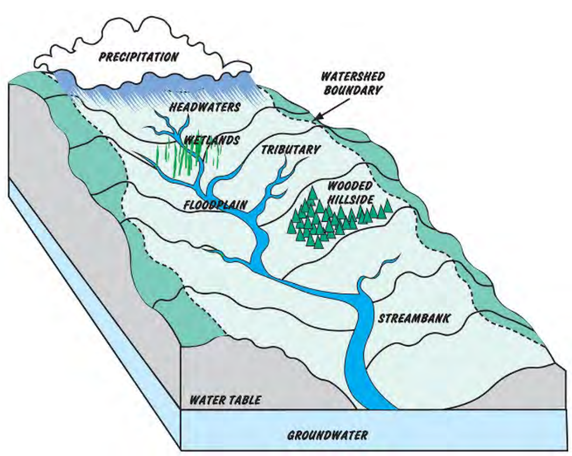
The Festival steering committee rewrote the student test in 2017; diagrams and pictures were added to help the students visualize the concepts. In 2019, Google Forms was used with the Rio Rancho students to take the tests. These tests were without diagrams and pictures.

Unfortunately, with staff changes, we were unable to access the Google Forms test so paper Post tests were sent to the schools. The tests were written in Google Forms to be used next year and diagrams and pictures were added.

1. Many substances and objects can make river water dirty. Which of the following items can make the Rio Grande dirty?
   a) Trash
   b) Dog poop
   c) Leaky cars
   d) All the above

2. An **aquifer** is a layer of water-saturated porous rock. It lies below the water table. Most people who live in New Mexico get drinking water from a well drilled into an aquifer. If you live in Rio Rancho, is the water coming from your faucet from an aquifer?
   a) True
   b) False



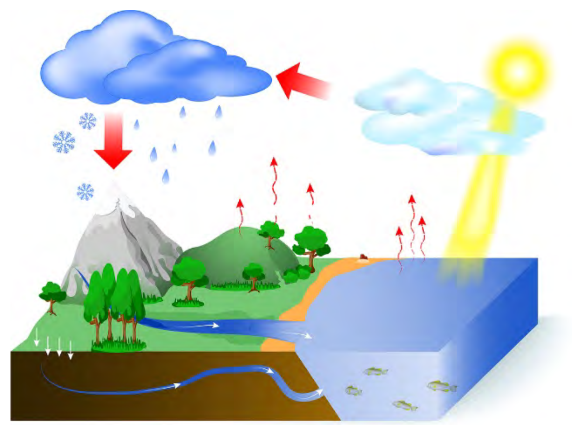


3. A **watershed** is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. Is the following statement true or false: We all live in a watershed?
   a) False
   b) True

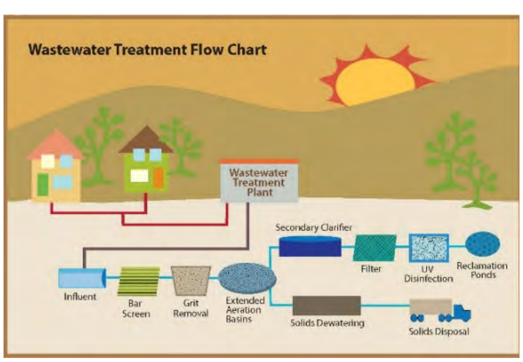
4. Everyone in Rio Rancho uses, on average, about 65 gallons of water per person per day. If you have four people in your home, what is your family's daily average water use?
   a) 260 gallons of water per day
   b) 200 gallons of water per day
   c) 2,600 gallons of water per day

5. Water users in our state include plants, animals, and people. Why is water so important to life?
   a) People need it to survive
   b) Plants need it to survive
   c) The river needs it to support nature
   d) All the above

6. The **water cycle** happens as the earth is warmed by the sun and water circulates between the earth's oceans, atmosphere, and land. Which of the following are terms associated with the water cycle?
   a) Pumping, Treatment, Delivery
   b) Evaporation, Condensation, Precipitation
   c) River, stream, aquifer



7. How can we protect our water?
   a) Litter
   b) Tell your parents when you see a leak
   c) Pour chemicals on the ground



8. **Wastewater** (or sewer water) is the used water from toilets, showers, and clothes washers and it is too dirty to go straight into the river or into the ground. Septic tanks and wastewater treatment plants clean the water before it goes to the river or into the ground.
   a) True
   b) False

Appendix D – Student Post-Tests Scores

The following table shows the percentage of correct answers on both the pre and post-test. Because most of the answers were provided using Google Forms, there was no way to distinguish answers by class or school. Not every teacher from every school provided pre and post-tests. The questions are in the same order as in Appendix C.

Question	Elementary School Name					
	Cordova	Puesta del Sol	ML King	Joe Harris	Rio Rancho	Average
Makes river dirty	73	74	61	74	84	73
Where DW comes from	75	77	71	78	77	76
Watershed	69	68	86	65	48	67
How much water	77	68	75	83	87	78
Water important to life	87	75	82	83	85	82
Water cycle	47	48	71	78	60	61
Protect water	95	84	93	83	86	88
Wastewater	78	78	68	87	78	78

As in year's past, the students do not have a good understanding of what a watershed is or the fact that we all live in a watershed. They also had problems with what is the water cycle.

CIUDAD SOIL & WATER CONSERVATION DISTRICT

Ciudad Soil & Water Conservation District

Non RX Stormwater Presentations 2022

Date	Times	RR or ES	Event	Presenter(s)	Visitors
4.23.2022	9:00am–12:00pm	RR	RiverXchange Community Day	Erin, Steve, Salema	10
6.4.2022	9:00am–12:00pm	RR	BernCo Master Naturalist Presentation	Steve, Erin	25
6.11.2022	9:00am–12:00pm	RR	GHH	BernCo OSD	12
6.13.2022	9:00am–12:00pm	RR	Shady Lakes	Erin, Steve, Jaren (Nature Niños)	45
6.18.2022	9:00am–12:00pm	RR	Phil Chacon Park	COA OSD – Nature in Your Neighborhood	did not attend
6.13.2022	10:00am–1:00pm	RR	Shady Lakes: Nature Niños Summer Camp	Steve, Jaren, Saleema (Nature Niños)	40
6.23&25.2022	6:00–7:30pm 9:00–11:00am		Residential Rainwater Harvesting 2.0 (Online & In-person at GHH)	Jim	45
6.30.2022	10:00am–1:00pm	RR	Shady Lakes: Nature Niños Summer Camp	Steve, Jaren, Saleema	75
7.16.2022	9:00am–12:00pm	RR	Alamosa Community Center	Erin, Steve (COA OSD – Nature in Your Neighborhood)	35
7.25.2022	10:00am–1:00pm	RR	Shady Lakes: Nature Niños Summer Camp	Erin, Steve	75
7.30.2022	9:00am–2:00pm	RR	Isleta Environmental Fair	Steve Glass, Tom Allen Jaren Peplinski	75
8.22 & 24.2022	10:00am–2:00pm & 9:00am–11:00pm	RR	UNM Welcome Back Days	Kolt, Thomas, Steve, Erin	100
8.27.2022	9:00am–12:00pm	ES	TBD	COA OSD- Nature in Your Neighborhood	
8.27.2022	9:00am–1:00pm	RR	Santa Ana Environmental Fair	Jaren, Theresa	
9.24.2022	9:00am–12:00pm	RR	TBD	Erin, Steve (COA OSD – Nature in Your Neighborhood)	

Mid Rio Grande Stormwater Quality Team

3rd Quarter Report 2022-2023
January- March
Submitted by: Education Manager
Erin Blaz

The RiverXchange Team: Erin Blaz, Theresa Aragon, Astrid Mooney

Participating Schools:

FUNDER	MRGSQT		SSCAFCA	
	SCHOOL - Number of classes	Number of Students	SCHOOL - Number of classes	Number of Students
*Title 1 school	La Mesa* - 4	58	MLK* - 4	113
	Valle Vista* - 2	43	Maggie Cordova* - 4	100
	Seven Bar* - 3	45		
	John Baker- 2	41		
	Zia*- 2	40	OUTDOOR EQUITY FUND	
	Monte Vista - 3	48	Puesta del Sol* - 5	105
	Cochiti* - 2	47		
	North Valley Academy - 3	50		
	Mission Ave*- 2	54		
	Bel-Air* - 2	46		
	Lavaland* - 1	20		
	San Antonito - 3	71		
	Chaparral* - 3	87		
TOTALS	32	650	13	318
RX Total Classes	45	RX Total Students	968	

Summary:

3rd Quarter: January- March are typically very active months for RiverXchange participants and staff. Pole planting with CABQ OSD occurs weekly, presentations are in full swing and this year, teachers were provided with a six week-long action project support campaign via weekly emails that contained summaries of each stage of the Earth Force process and resources. Theresa Aragon also developed and taught a new Agriculture lesson for APS classes since RiverXchange still has not found a partner with the capacity to serve the number of APS classes enrolled. The lesson focused on food waste, virtual water, and water conservation and was very much enjoyed by the classes. By the end of March, all but 2 RRPS classes had completed all the field trips. These field trips are rescheduled for May in partnership with Talking Talons Youth Leadership EPA field trips at the Tijeras Bio-Zone Education Center, along with Backyard Refuge and includes a stewardship component to help restore the Tijeras Creek riparian zone.

Mid-year: The 2nd quarter activities focused on scheduling and confirming presentations and the field trips; tracking presentations and scheduling reminder emails; and organizing the Earth Force *environmental action civics* process into an online classroom format on Canvas for teachers.

RiverXchange® remains focused on building meaningful watershed experiences for New Mexico students this year and has returned to a fully in person program for 2022-2023.

The agreement with the Middle Rio Grande Stormwater Quality Team (MRGSQT), including the contributions from Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA), provides funding for 38 classes this year. At the suggestion by SSCAFCA, Ciudad Soil and Water Conservation District (SWCD) applied for additional funds to support RiverXchange this year through the Outdoor Equity Fund Grant, and Ciudad SWCD was

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Mid-year: Staff are working on guidance and criteria for awards to be released in January.

Task 12: Collect and analyze teacher feedback.

Complete by May 2023. **Status: approaching**

Staff will revise the teacher feedback form and offer it to teachers by the end of April.

Task 13: Create, print and mail thank you cards to in-kind partners and certificates of recognition to teachers.

Complete during June 2023. **Status: approaching**

We will maintain correspondence with our in-kind partners throughout the school year and send thank you notes as needed.

Task 14: Reporting to sponsors.

3rd quarter report by April 2023. Final report by June 2023.

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Additionally, the Outdoor Equity Grant experienced some hold-ups in the procedure around securing the agreement for the grant, so one school - Puesta del Sol, only came on just at the end of September once we were able to confirm the grant. Around late September most schools had fully confirmed their participating classrooms in RiverXchange, with two schools confirming classes that still did not have a teacher. The other teachers at these schools desired for those students to participate in the program and offered to support those classes until they were assigned a teacher.

Of the 16 schools participating this year, 6 are completely new schools to RiverXchange - Bel Air, Mission Ave., Lavaland, San Antonito, Chaparral and Puesta del Sol.

Task 2: Review and revise curriculum.

Complete by September 2022. **Status:** **completed.**

RiverXchange staff are proud of this program's continued ability to meet the unique needs of 5th grade teachers in our region. Many elementary teachers suggest that they are the least comfortable teaching science subjects and others reflect that the district purchased science curriculum doesn't provide the same quality of experiences as RiverXchange. One of our most long-standing RiverXchange teachers shared with us that their school consistently scored higher than average on science testing scores and accounts that to their participation in RiverXchange.

This year the RiverXchange website was significantly updated in effort to improve participating teachers familiarity with, understanding of, and successful use of the RiverXchange curriculum, which is unlike many standard curricula as it blends outside presenters and field experiences with project-based learning. The RiverXchange website now reflects how the curriculum is broken down into 3 areas of study (and the comparative activities and associated leaders of those activities): Understanding a Watershed (Teacher-led, ensures the foundation of understanding a watershed with a Shower Curtain Watershed lesson or similar activity), Water in Our Society (Presentations with various agencies and presenters) and The River Ecosystem (Pre-lesson and field trip hosted by City of Albuquerque Open Space). These study areas have been defined in RiverXchange for many years through the Big Water Questions, which are suggested reflection prompts for students throughout the program. Using these three areas of study proved to be helpful in introducing RiverXchange to new teachers and refreshing experienced ones.

Most importantly, linking these 3 areas of study together is the Action Project. Using Project-based learning as a means to support student engagement in meaningful action in their watershed, the Action Project is a critical element of the RiverXchange curriculum. In its second year of delivery, previously called the capstone project, The Action Project aims to become a significant professional development opportunity for teachers as a means to deliver high quality STEM and civic engagement through project-based learning in their classroom. Students will benefit from the Action Project by acquiring a multitude of skills that are required to take meaningful action for watershed health. From interviewing stakeholders, collecting data, researching history, policy and practices around an issue, to reporting on and advocating for change through action, the Action Project will build on the core content of RiverXchange and help students understand what it takes to inspire, demand or be a leader for effective change.

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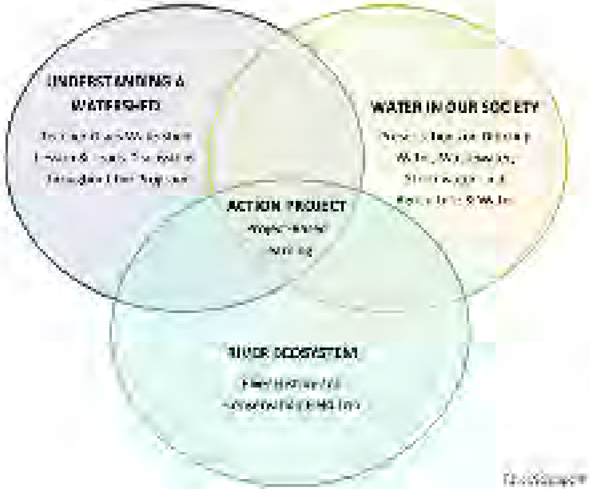

Task 3: Set teacher workshop dates and locations, review training agenda, order curriculum materials, and conduct workshops.

Complete by October 2022. **Status: completed.**

Two teacher workshops were held this year on September 23 and September 30 at the Open Space Visitor Center, with a total of 31 teachers in attendance. Teachers from Chaparral, San Antonito and Puesta del Sol were unable to attend due to late registration to the program, however staff met with these teachers outside of the workshop to train them on the program and schedule their presentations.

This year's workshops featured BEMP educators Laura Pages and Annie Montes, who facilitated an activity called "Dabbling in Data." In this activity, groundwater table data is recorded on graphs for multiple years to see seasonal trends and observe periods of drought or heavier than normal snowmelt or precipitation as a means to discuss the relationship between weather patterns, groundwater and ecosystem health. Highlighting BEMP as a collaborative partner with Ciudad SWCD and RiverXchange was helpful for teachers to see how our program fits into the larger landscape of watershed education in our community and how students will eventually build on RiverXchange in future outdoor and environmental education experiences.

The workshop also focused on the framework for The Action Project with teachers, with discussion in small groups on how to implement the project in the classroom. Reflections from that discussion was shared in the larger group, and while feedback was positive and enthusiastic,

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it demonstrated the need for even more clear and direct guidance on the framework, which was helpful for staff to understand so we can find a way to meet that need.

Task 4: Review Action Project format and reporting system.

Goal: Complete by September 2022. **Status:** **in process**

3rd quarter: With around half of the teachers present on the CANVAS platform to explore and utilize the Earth Force process, it was decided to do a six week email campaign to encourage teacher participation in the Action Project, continuing to use the Earth Force process as the guide. These emails also served as a reminder for the deadline to submit summaries of the action projects, along with guiding questions for submissions, and the award prizes (pizza party gift certificates for the first 10 classes to submit). Submissions were due March 17 before spring break and 10 teachers submitted videos or recordings of their students answering questions about their projects.

Mid-year: In October, Erin Blaz attended the North American Association of Environmental Education's national conference in Tucson, AZ. At this conference, Ms. Blaz was introduced to Earth Force and their "Environmental Action Civics" process. This process is a fully developed framework for completing an action project and aligns with the RiverXchange Action Project Framework that was in development on our end. Earth Force freely shares its process for educational purposes and the integration of this process into RiverXchange has been discussed with their team. While our original framework for the Action Project included 5 steps and guiding questions, the Earth Force process has 6 steps with adjoining lesson plans, videos, activity templates, and helpful tips for each step. An overview of the Earth Force Resources can be found here.

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The project reporting system is in development. We are using a free online learning management system called Canvas to post the Earth Force Learning Process, much like an online class for teachers to follow and implement the process. Canvas allows teachers to upload content such as media files, which we are hoping to obtain for the Children's Radio Hour show which will feature RiverXchange classes for their Earth Day segment.

Task 5: Review, update and distribute pre-survey to all classes before presentations begin and track completion.

Begin August 2022. On-going through Dec 2023. **Status: completed.**

This year's survey was updated slightly with a change to the possible answers being narrowed to mostly True, False or I haven't learned this yet. Rather than allowing students to only show a scaled response that either shows correct or incorrect knowledge, we are attempting to offer "I haven't learned this yet" as a strategy to show authentic learning in post-survey.

The Pre-Survey can be viewed from : www.riverxchange.com/Survey

Task 6: Monitor, coordinate and provide support to teachers for Action Projects.

Begin December 2022. On-going through May 2023. **Status: approaching.**

3rd Quarter: As stated above, a six week email campaign was delivered to all teachers; each week focused on one of the six stages of the Earth Force process with supporting resources. As the Earth Force process is new to RiverXchange, we wanted to present the resources in a few different ways to increase access, while also being cautious of overwhelming teachers with emails and information. Additionally, RiverXchange staff meet with Earth Force representatives to discuss best practices for delivering Earth Force and getting action project reports or

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summaries by students and teachers. RiverXchange staff was also invited to participate in the Earth Force Train the Trainer program in June, which offers a $500 stipend for participation and demonstration of Earth Force implementation.

Mid year: Staff is making every effort to ensure teachers have easy access to the Earth Force materials as guidance for the Action Project. On November 30, staff hosted an Action Project Discussion on Zoom to review the Earth Force process, orient teachers to the Canvas classroom and show how to upload recordings of students reporting on their projects. Sixteen teachers attended this discussion and 19 teachers have joined the Canvas classroom.

Task 7: Coordinate field trips.

Begin September 2022. On-going through May 2023. **Status: in process.**

Field trip coordination is in progress with our main point person, Ellie Althoff, from CABQ-OSD. Ellie will continue to offer a field trip pre-lesson this year, focused on the River of Change from the Bosque Education Guide. Ellie is coordinating the field trips so that she will offer the pre-lesson the same week as the pole planting field trip. This is an exciting addition to the program as students will be taking immediate action by pole planting native trees after they learn about the impacts of flood control measures on the Bosque and riparian ecosystem of the Rio Grande. Field trips will begin in December and run through March on Thursdays and Fridays.

3rd Quarter: This year the pole planting took place in two locations. For January and February we planted at the Shining River Open Space, just south of Paseo del Norte on the east side of the

Rio Grande. For March we moved to Gabaldon, just north of the 1-40 and east of the river. This location change was unique, and reflected new staffing at CABQ-OSD, however the desire to ensure a positive experience for everyone was consistent with prior years. The Shining River planting location was extremely challenging for students, adults and staff. The holes were extremely sandy, which meant they were hard to dig out with the hand augers and collapsed often. Most students struggled to get one tree in over the course of the field trip. Although it was challenging, it was possibly even more rewarding once they finished that one, hard-earned tree. Classes that planted in March still voiced an equal number of complaints over the hard work, even though they were able to get up to 4 trees in the ground per group! It goes to show that it is less about the number of trees they get and more about teaching perseverance with the students. It was also noticeable that many classes came to the pole planting with increased understanding of the flood control and management strategies that impact the Bosque ecosystem which informed why they were there, due to the pre-field trip lesson with CABQ-OSD.

Mid-year: Two field trips took place in December in the Bosque off of Paseo del Norte and Rio Grande. 68 students attended and 43 cottonwoods were planted. This site has been confirmed for January plantings, but Open Space is still evaluating the best location for Feb and March plantings. This is unique as most years OSD confirms all pole planting locations at once. Bus costs have increased significantly and staff is working on finding the best vendors to service the field trips.

Task 8: Coordinate classroom guest speakers.

Begin September 2022. On-going through May 2023. **Status:** **in process.**

With the program moving to in-person presentations this year, coordinating and getting presenters back on board took a little extra effort as some had not presented for the last two years as they offered a video recording of the presentation instead (i.e. Rio Rancho Utilities, Sandia Labs). Additionally, both APS and RRPS required different levels of background checks. Ample notice was given to those presenters in order to complete those requirements.

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Field Trips and Pre-Lesson, Ellie Althoff and Kyle Bality of CABQ-OSD

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Drinking Water and Wastewater Presenters - Ellie Garcia. ABCWUA educators generously offered to cover RRPS this year, as the CoRR Utility dept was not yet ready due to new staff and capacity issues.

Stormwater - John Stomp and Andy Edmondson at SSCAFCA

Agriculture- Steve Lucero and Rachel Zweig, Sandoval County Coop Ext.

Field Trips and Pre-Lesson, Ellie Althoff and Kyle Bality of CABQ-OSD

3rd quarter: As is common with such a busy time of presentations, coordination of reschedules between presenters and classes probably happens the most during the 3rd quarter. Theresa Aragon managed these communications smoothly, while also designing a new agriculture + water lesson and teaching it to every APS class in RiverXchange. This was possible due to field

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trip leader funds that weren't utilized now that all pole planting field trips are for two classes at a time, rather than some being for one class only, which reduces the number of total field trips.

Mid-year: All presentations, except Agriculture for APS have been scheduled and confirmed with presenters and classrooms. RiverXchange staff are exploring options to present the Agriculture themselves, as it may be more efficient time and budget wise than seeking new partnerships with little time left to schedule.

Task 9: Review and track Action Project progress

Begin December 2022. On-going through May 2023. **Status:** **in process.**

3rd quarter: While the initial CANVAS participation by teachers in the 2nd quarter was encouraging, staff have only had one teacher upload any action project recording information on this platform. With Theresa visiting many classes in APS for the Agriculture Presentation and supporting the Pre-Lesson in RRPS, she was able to talk to teachers directly to encourage submissions and take videos herself to submit to the Children's Radio Hour. We were able to gather videos and voice recordings from 10 classes. This is definitely an area that needs evaluation and improvement, as it is difficult to retrieve details about each classroom's project as we are not really there to capture their work.

Mid-year: Staff have shared with teachers the importance of documenting the action projects along the process and have designated a place to upload recordings, documents or pictures to the Canvas classroom. The Canvas platform became accessible to teachers at the end of November and with December being a busy month, we expect to see more to report on in the 3rd quarter.

Task 10: Distribute post-survey to classes after they complete presentations and field trip, complete metrics evaluation and review.

Begin February 2023. On-going through April 2023. **Status:** **approaching.**

3rd quarter: A few classes have completed their presentations and post-surveys are being distributed.

Task 11: Review Action Projects for RiverXchange Excellence and award winners.

April 2023. **Status:** **approaching.**

3rd quarter: This year, in collaboration with the Children's Radio Hour, we are featuring students discussing their Action Projects on the Earth Day show in April. Our initial intention was to incentivize the classes with a feature on the Children's Radio Hour as an award for teachers to submit their projects. However, as a result of few audio and video submissions received, we separated the pizza party awards and radio feature to boost overall project submissions by the deadline. In addition to the awards incentive, teachers were given the opportunity to submit their progress gradually and were encouraged to seek assistance from RiverXchange staff throughout each step of the Earth Force process. The weekly Earth Force email campaign was key in reinvigorating participation in sharing class's Action Projects and delivering specific criteria to the teachers with the flexibility of incorporating their own process.

While presentations in the classroom began, students started making connections to the big water questions and how it relates to problems they were noticing in their own community. Many students jumped into action and started brainstorming their Action Projects by interviewing staff and students about the environmental issues they are trying to solve.

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Mid-year: Staff are working on guidance and criteria for awards to be released in January.

Task 12: Collect and analyze teacher feedback.

Complete by May 2023. **Status:** **approaching**

Staff will revise the teacher feedback form and offer it to teachers by the end of April.

Task 13: Create, print and mail thank you cards to in-kind partners and certificates of recognition to teachers.

Complete during June 2023. **Status:** **approaching**

We will maintain correspondence with our in-kind partners throughout the school year and send thank you notes as needed.

Task 14: Reporting to sponsors.

3rd quarter report by April 2023. Final report by June 2023.

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Mid-year Report 2022-2023
October-December
Submitted by: Education Manager
Erin Blaz

The RiverXchange Team: Erin Blaz, Theresa Aragon, Astrid Mooney

Participating Schools:

FUNDER	MRGSQT		SSCAFCA	
	SCHOOL - Number of classes	Number of Students	SCHOOL - Number of classes	Number of Students
*Title 1 school	La Mesa* - 4	58	MLK* - 4	113
	Valle Vista* - 2	43	Maggie Cordova* - 4	100
	Seven Bar* - 3	45		
	John Baker- 2	41		
	Zia*- 2	40	OUTDOOR EQUITY FUND	
	Monte Vista - 3	48	Puesta del Sol* - 5	105
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TOTALS	32	650	13	318
RX Total Classes	45	RX Total Students	968	

Summary:

Mid-year: The 2nd quarter activities focused on scheduling and confirming presentations and the field trips; tracking presentations and scheduling reminder emails; and organizing the Earth Force *environmental action civics* process into an online classroom format on Canvas for teachers.

RiverXchange® remains focused on building meaningful watershed experiences for New Mexico students this year and has returned to a fully in person program for 2022-2023.

The agreement with the Middle Rio Grande Stormwater Quality Team (MRGSQT), including the contributions from Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA), provides funding for 38 classes this year. At the suggestion by SSCAFCA, Ciudad Soil and Water Conservation District (SWCD) applied for additional funds to support RiverXchange this year through the Outdoor Equity Fund Grant, and Ciudad SWCD was successfully awarded the full request of $9,650.00 to support additional classes. The Outdoor Equity Funding also supports a review of practices for equity and inclusion in our program as well as the strengthening of those practices. In total, by the end of September the final numbers are 45 classes, with 968 students participating. Twelve out of the sixteen schools are designated Title I.

Additionally, during the 1st quarter Ciudad SWCD employed Jessica "Saleema" Robinson as an Education Assistant to support our education programs. During the first quarter Saleema supported curriculum development for RiverXchange. Due to other opportunities, Saleema's time with Ciudad was short lived. However we were able to hire Theresa Aragon, a biologist and educator, to fulfill a role as Education Coordinator. Theresa has provided direct

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coordination and planning support for RiverXchange and remains employed with Ciudad SWCD.

Task 1: Recruit and select NM classes.

Complete by September 2022. **Status: completed.**

This year's recruitment for RiverXchange was met with a few obstacles. We found this year that many teachers' positions were changed at the beginning of the semester and in some schools all members of the prior 5th grade teaching cohort were in new positions. This made it difficult to predict how many classes from some schools would be joining RiverXchange, and if some schools would return at all. Colinas del Norte and Sandia Vista, both of whom have been with RiverXchange for at least 4 or more years and had significant teacher turnover, did not respond to our invitations to the program. As a result of the teacher scramble that ensued at the beginning of the year, RiverXchange staff reached out to presenters to see if they had contacts with schools that would be good candidates for RiverXchange. This proved to be a worthy effort because we were met with great interest, and only had to put two schools on the waitlist. Additionally, the Outdoor Equity Grant experienced some hold-ups in the procedure around securing the agreement for the grant, so one school - Puesta del Sol, only came on just at the end of September once we were able to confirm the grant. Around late September most schools had fully confirmed their participating classrooms in RiverXchange, with two schools confirming classes that still did not have a teacher. The other teachers at these schools desired for those students to participate in the program and offered to support those classes until they were assigned a teacher.

Of the 16 schools participating this year, 6 are completely new schools to RiverXchange - Bel Air, Mission Ave., Lavaland, San Antonito, Chaparral and Puesta del Sol.

Task 2: Review and revise curriculum.

Complete by September 2022. **Status: completed.**

RiverXchange staff are proud of this program's continued ability to meet the unique needs of 5th grade teachers in our region. Many elementary teachers suggest that they are the least comfortable teaching science subjects and others reflect that the district purchased science curriculum doesn't provide the same quality of experiences as RiverXchange. One of our most long-standing RiverXchange teachers shared with us that their school consistently scored higher than average on science testing scores and accounts that to their participation in RiverXchange.

This year the RiverXchange website was significantly updated in effort to improve participating teachers familiarity with, understanding of, and successful use of the RiverXchange curriculum, which is unlike many standard curricula as it blends outside presenters and field experiences with project-based learning. The RiverXchange website now reflects how the curriculum is broken down into 3 areas of study (and the comparative activities and associated leaders of those activities): Understanding a Watershed (Teacher-led, ensures the foundation of understanding a watershed with a Shower Curtain Watershed lesson or similar activity), Water in Our Society (Presentations with various agencies and presenters) and The River Ecosystem (Pre-lesson and field trip hosted by City of Albuquerque Open Space). These study areas have been defined in RiverXchange for many years through the Big Water Questions, which are suggested reflection prompts for students throughout the program. Using these three areas of study proved to be helpful in introducing RiverXchange to new teachers and refreshing experienced ones.

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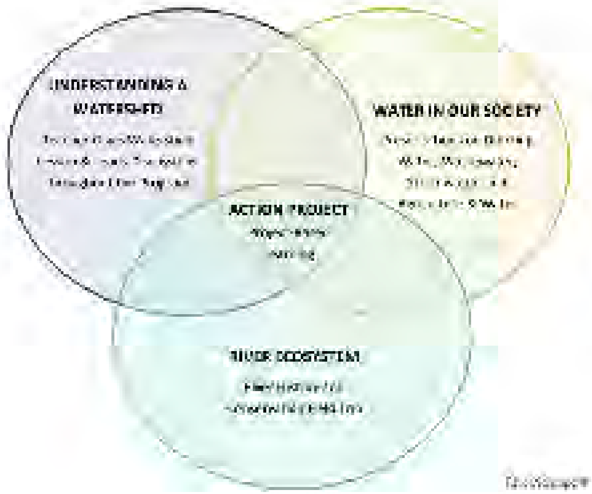

Most importantly, linking these 3 areas of study together is the Action Project. Using Project-based learning as a means to support student engagement in meaningful action in their watershed, the Action Project is a critical element of the RiverXchange curriculum. In its second year of delivery, previously called the capstone project, The Action Project aims to become a significant professional development opportunity for teachers as a means to deliver high quality STEM and civic engagement through project-based learning in their classroom. Students will benefit from the Action Project by acquiring a multitude of skills that are required to take meaningful action for watershed health. From interviewing stakeholders, collecting data, researching history, policy and practices around an issue, to reporting on and advocating for change through action, the Action Project will build on the core content of RiverXchange and help students understand what it takes to inspire, demand or be a leader for effective change.

Task 3: Set teacher workshop dates and locations, review training agenda, order curriculum materials, and conduct workshops.

Complete by October 2022. **Status: completed.**

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The workshop also focused on the framework for The Action Project with teachers, with discussion in small groups on how to implement the project in the classroom. Reflections from that discussion was shared in the larger group, and while feedback was positive and enthusiastic, it demonstrated the need for even more clear and direct guidance on the framework, which was helpful for staff to understand so we can find a way to meet that need.

Task 4: Review Action Project format and reporting system.
Goal: Complete by September 2022. **Status:** **in process**

Mid-year: In October, Erin Blaz attended the North American Association of Environmental Education's national conference in Tucson, AZ. At this conference, Ms. Blaz was introduced to Earth Force and their "Environmental Action Civics" process. This process is a fully developed framework for completing an action project and aligns with the RiverXchange Action Project Framework that was in development on our end. Earth Force freely shares its process for educational purposes and the integration of this process into RiverXchange has been discussed with their team. While our original framework for the Action Project included 5 steps and guiding questions, the Earth Force process has 6 steps with adjoining lesson plans, videos, activity templates, and helpful tips for each step. An overview of the Earth Force Resources can be found here.

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Discussion on Zoom to review the Earth Force process, orient teachers to the Canvas classroom and show how to upload recordings of students reporting on their projects. Sixteen teachers attended this discussion and 19 teachers have joined the Canvas classroom.

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Tracking and reporting will begin in December.

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Task 10: Distribute post-survey to classes after they complete presentations and field trip, complete metrics evaluation and review.

Begin February 2023. On-going through April 2023. **Status:** approaching.

Post- surveys will be distributed as soon as classes finish their presentations and field trip.

Task 11: Review Action Projects for RiverXchange Excellence and award winners.

April 2023. **Status:** approaching.

This year, in collaboration with the Children's Radio Hour, we are hoping to feature students discussing their Action Projects on the Earth Day show in April.

Mid-year: Staff are working on guidance and criteria for awards to be released in January.

Task 12: Collect and analyze teacher feedback.

Complete by May 2023. **Status:** approaching

Staff will revise the teacher feedback form and offer it to teachers by the end of April.

Task 13: Create, print and mail thank you cards to in-kind partners and certificates of recognition to teachers.

Complete during June 2023. **Status:** approaching

We will maintain correspondence with our in-kind partners throughout the school year and send thank you notes as needed.

Task 14: Reporting to sponsors.

Midyear report by January 31, 2023. Final report by June 1, 2023.

CIUDAD SOIL & WATER CONSERVATION DISTRICT

RIVERXchange

www.ciudadswcd.org
505-225-7487

Meaningful Watershed Education
5th grade

2023 Report

Presented by:

Ciudad Soil & Water Conservation District

Erin Blaz, Education Manager

Theresa Aragon, Education Coordinator

July 2022-June 2023

CONTENTS

SUMMARY

This year, funding enabled 45 NM classes in 16 schools (1012 students and 49 teachers) to participate in the *completely in-person* RiverXchange® program. 38 classes were funded by MRSGSQT and SSCAFCA for the program and 5 classes were funded by the Outdoor Equity Fund. Twelve of the sixteen schools we served were Title 1. All program costs and coordination are provided free of charge to teachers. The program required a total of $65,622 in cash ($57,950 from MRGSQT in cash and $7,672 from Outdoor Equity Fund in cash) and generated a total match valued at $140,673.00 in the form of in-kind contributions including teacher workshop attendance, presenter time and travel, as well as volunteer time from students and adults on the field trips to plant 473 trees in the bosque. Student Action Projects reached a total of 6,239 (last year was 3,090) community members about stormwater and watershed health related topics. Since 2007, we have served over 20,166 students!

MS4 Permit Compliance

The RiverXchange program meets a number of education and public engagement requirements set forth in the EPA Municipal Separate Storm Sewer System Permit No. NMR04A000.

<u>Summary of Education and Outreach requirements met:</u>
- Proper Disposal of Oil, Household Hazardous Waste ✓
- Proper Disposal of Pesticides, Herbicides, and Fertilizers ✓
- Impaired Waters in the city/state ✓
- Pet Waste Management ✓
- Watershed Management ✓

<u>Classroom Education on Stormwater</u>
- Distributes educational materials to schools. ✓
- Provides classes, seminars, and workshops for schools to participate in municipal-sponsored storm water educational training. ✓
- Sponsors stormwater workshops for teachers. ✓
- Awards certificates and give other types of recognition to schools that participate in municipal-sponsored stormwater workshops or events. ✓

- Earth Day Event ✓
    - Children’s Radio Hour Earth Day show featuring RiverXchange students

2022-2023 PROGRAM OVERVIEW

I. Program Management and Financial Support

The program timeframe was July 1, 2022 through June 30, 2023. All components including fundraising, design, planning, implementation, and analysis were carried out by employees and contractors of Ciudad Soil & Water Conservation District, including:

Erin Blaz
Jenny Lloyd-Strovas
Astrid Hueglin
Saleema Robinson
Theresa Aragon

SPONSORS

- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)
- Middle Rio Grande Stormwater Quality Team (MRGSQT)
- Outdoor Equity Fund, New Mexico Outdoor Recreation Division

Sponsors provided a total of $65,622.61.00 in cash.
MRGSQT - $39,650.00 | SSCAFCA - $18,300.00 | Outdoor Equity Fund - $7,672.61

Program expenses included:

- Technology services
- Office and educational supplies
- Teacher workshop materials and food
- Coordination services (planning, implementing and assessing all program components)
- Bus funding
- Substitute funding

This year, the program featured the following components:

- Optional standards-based curriculum including hands on science, math, and social studies lessons, as well as writing assignments
- Teacher training on curriculum and Action Project implementation
- Ongoing Action Project implementation support and Action Project monitoring
- End of year teacher survey

- Pre and post student surveys
- Coordination of at least four guest speakers into the classroom
- Coordination of an in person field trip to the local river or important watershed feature
- Field trip leadership and activity planning with City of Albuquerque Open Space

IN-KIND PARTNERS

- Albuquerque Water Utility Authority
- City of Albuquerque – Open Space Division
- Sandia Labs
- Sandoval County Cooperative Extension
- SSCAFCA

In-Kind contributions totaled $140,673.00

In-kind contributions included teacher attendance at the teacher training, guest speaker travel, prep and presentation times. The City of Albuquerque continued offering a pre- field trip lesson presentation to classrooms. Additionally, in-kind match was able to return to a pre-2020 range due to the allowance of pole planting field trips, where student and adult time and trees are counted as match through volunteer time and materials.

PARTICIPANT SELECTION

All 45 participating NM classes were fifth grade classes, distributed as follows:

FUNDER	MRGSQT		SSCAFCA	
	SCHOOL - Number of classes	**Number of Students**	**SCHOOL - Number of classes**	**Number of Students**
*Title 1 school	La Mesa* - 4	77	MLK* - 4	115
	Valle Vista* - 2	43	Maggie Cordova* - 4	100
	Seven Bar* - 3	45		
	John Baker- 2	41		

	Zia*- 2	40	**OUTDOOR EQUITY FUND**	
	Monte Vista - 3	71	Puesta del Sol* - 5	105
	Cochiti* - 2	47		
	North Valley Academy - 3	50		
	Mission Ave*- 2	54		
	Bel-Air* - 2	46		
	Lavaland* - 1	20		
	San Antonito - 3	71		
	Chaparral* - 3	87		
TOTALS	**32**	**692**	**13**	**320**
RX Total Classes	**45**	**RX Total Students**	**1012**	

II. Program Components

Mission

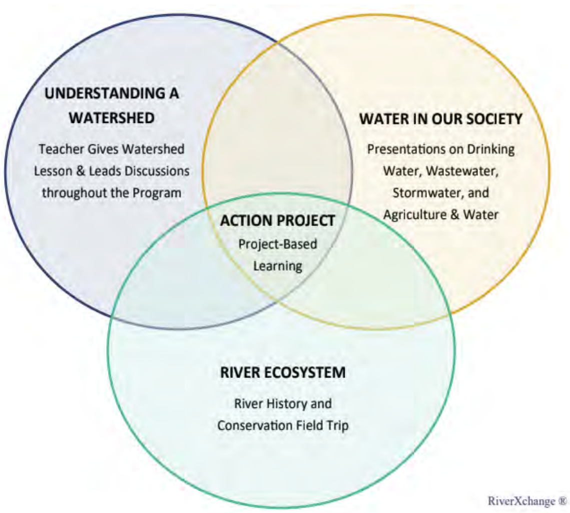
The mission of RiverXchange is to deepen students' and teachers' understanding and appreciation for their local river ecosystem and watershed, motivate participants to protect local water resources by conserving water and keeping their source water clean, and to provide a high quality, high impact outreach opportunity for funders and in-kind contributors.

Curriculum

The core curriculum of RiverXchange® is delivered through a series of in-class presentations provided by our partner agencies that are guided by the "Big Water Questions" that aim to build an understanding of watershed health. Additionally the field trip, in partnership with City of Albuquerque Open Space, has remained a core component of our program by offering students the opportunity to participate directly in a restoration project to understand the value of action and stewardship as a community effort. The conservation field trip also offers an opportunity for participating students, who come from diverse backgrounds and have varied relationships with the outdoors, a chance to connect with an important, local watershed feature and build a connection to their local river. Furthermore, beyond the core components of RiverXchange®, the program also supports a more robust understanding of watershed health through teacher facilitation of the Action Projects and other additional lessons that are demonstrated at the teacher workshop.

In the summer of 2022, the RiverXchange website was updated to reflect the current program framework, teacher resources and expectations, and the Action Project guidelines. The framework is aligned with the Big Water Questions and is broken down as such:

(1) Understanding a Watershed: Teacher-led lesson introduces the concept of a watershed; a lesson is provided for teachers to implement on their own in their classroom ideally before any presentations start.



(2) Water in Our Society: The in-class presentations on drinking water, wastewater, stormwater and agriculture and water provide a foundation for understanding water use, resources concerns and conservation practices in our society.

(3) River Ecosystem: The field trip pre-lesson and conservation field trip help students build a relationship to the Rio Grande as a riparian ecosystem that has been disrupted by flood control management and understand local actions to remediate those impacts.

The Big Water Questions

The Big Water Questions help students to meet the RiverXchange® learning objectives and demonstrate competency in the science standards, but ultimately they are the foundation for becoming critical thinkers, problem solvers and water protectors!

Understanding a Watershed

- Is every place in the world part of a watershed?
- Where does your community's stormwater go?
- How can surface water become polluted?
- How does the water cycle relate to weather?
- How are groundwater and surface water connected?
- How can groundwater become polluted?
- What actions can all of us take to keep water clean?

Water in Our Society

- In what ways does our society use water?
- Where does your community's drinking water come from?
- Does everyone have the right to use as much water as they want?
- Where does your community's wastewater go?
- What actions can all of us take to conserve water?

River Ecosystem

- How does water affect living things in an ecosystem?
- What role do forests play in a watershed?
- What role do wetlands play in a watershed?
- What are some of the ways scientists can determine the health of a river, lake, bay or ocean?
- What actions can all of us take to improve the health of our ecosystem?

III. Deliverables

A review of this year's program delivery follows.

A. TEACHER WORKSHOP

Two teacher workshops were held this year on September 23 and September 30 at the Open Space Visitor Center, with a total of 31 teachers in attendance. Teachers from Chaparral, San Antonito and Puesta del Sol were unable to attend due to late registration to the program, however staff met with these teachers outside of the workshop to train them on the program and schedule their presentations.

This year's workshops featured BEMP educators Laura Pages and Annie Montes, who facilitated an activity called "Dabbling in Data." In this activity, groundwater table data is recorded on graphs for multiple years to see seasonal trends and observe periods of drought or heavier than normal snowmelt or precipitation as a means to discuss the relationship between weather patterns, groundwater and ecosystem health. Highlighting BEMP as a collaborative partner with Ciudad SWCD and RiverXchange was helpful for teachers to see how our program fits into the larger landscape of watershed education in our community and how students will eventually build on RiverXchange in future outdoor and environmental education experiences.

The workshop also focused on the framework for The Action Project with teachers, with discussion in small groups on how to implement the project in the classroom. Reflections from that discussion was shared in the larger group, and while feedback was positive and enthusiastic, it demonstrated the need for even more clear and direct guidance on the framework, which was helpful for staff to understand.

B. CORE PROGRAM

<u>PARTNER AGENCY PRESENTATIONS</u>

Drinking Water, Wastewater, Stormwater, and Agriculture & Water

APS

Rhea Trotman and Ellie Garcia from the Albuquerque Bernalillo County Water Utility Authority provided the drinking water (leaky faucet) and wastewater (what scientists do with #1 and #2) presentations. A team of Sandia Labs employees provided the stormwater presentation (non-point source enviroscape). Bernalillo County Cooperative Extension was unable to serve the total number of APS classes this year for the agriculture presentation. Although they offered to do up to 8, it was determined that RiverXchange staff would be the best to fill in this year and cover all the classes to reduce the logistics and provide cohesive lessons. This year the agriculture presentation focused on food waste and water conservation and was very well-received by students and teachers alike (lesson plan in Appendix XX).

RRPS

Rhea Trotman and Ellie Garcia from the Albuquerque Bernalillo County Water Utility Authority also provided the drinking water (leaky faucet) and wastewater (what scientists do with #1 and #2) presentations for RRPS. John Stomp and Andy Edmondson from SSCAFCA provided the stormwater presentation (non-point source enviroscape). Steve Lucero, Nicole Lujan and Rachel Zweig of Sandoval County Cooperative Extension provided the agriculture presentation.

FIELD TRIP

Field Trip Pre-lesson

City of Albuquerque Open Space Division Educator Ellie Althoff provided significant support to students understanding the "why" behind planting cottonwoods and willows in the Bosque by offering the Bosque Education Guide's River of Change presentation. This lesson explores a storyline of the Rio Grande History by discussing the pre-settlement ecology of the Middle Rio Grande; flood control impacts due to colonization and non-native settlement of the Middle Rio Grande Valley; and finally restoration and mitigation strategies for flood control impacts on the ecosystem.

Pole Planting

A total of 886 students and 152 adults attended pole planting field trips from APS and RRPS. With the support of Albuquerque Open Space, 473 total trees were planted in an area of the Bosque at two locations in the Bosque- Shining River and Gabaldon Trailhead. Images of students pole planting are in Appendix XXXX. The Shining River location was extremely sandy and students had a very difficult time digging out the pre-drilled holes with the hand augers, as the holes frequently collapsed with sand. As a result, some student groups only planted one tree a day. The general standard is 2-4 trees per day per student group. Regardless, it was an extremely successful year with all classes participating in a field trip on, and only 2 being rescheduled to a non-pole planting event.

Tijeras Bio-Zone Education Center (TBEC)

Our last pole planting field trip was scheduled with MLK for March 17, but due to a spring snow storm school was canceled for MLK. Since there were no longer any pole planting dates available, MLK was offered to participate in another field trip experience Ciudad SWCD was taking part in with Talking Talons Youth Leadership's EPA Watershed Stewards grant. This event was in May and students took part in learning about the Albuquerque Backyard Refuge Program, doing a habitat study on site, a rolling river presentation, reptile presentation and nature hike.

PRESENTATION TOTALS

Program presentations were completed as follows:

Agriculture: 45/45
Stormwater: 45/45
Wastewater: 45/45
Drinking Water: 45/45
Pre-field Trip Lesson: 45/45

Field Trips by class
Pole Planting: 43/43
Tijeras Bio-Zone Education Center: 2/2

C. ACTION PROJECT

This concludes the second year the RiverXchange has implemented the Action Project component to support meaningful connections between RiverXchange students, their greater community and watershed health. The Action Projects continue to provide a fun and engaging opportunity for students to learn about and advocate for their watershed. To reach this goal, students and teachers work together to create a project that includes aspects of conservation and stewardship in their local community. Building off of last year's "Capstone Project" framework, RiverXchange staff created a 5 step framework for taking action, with each step having specific guidance on how to accomplish each step. The steps were (1) Identify a Problem, (2) Develop a Plan, (3) Take Action, (4) Reflect and (5) Celebrate.

The Action Project Framework was introduced at the teacher workshop, with time for teachers to work in groups to determine an initial plan of how they would accomplish each step. During their group presentations on planning for the action project, it was clear to RiverXchange staff their were going to be diverse methods and approaches, varying from the depth of the process (minimal to extensive), engagement of students in the design process (none to extensive), and level of impact (classroom only to school wide). This was valuable information and was especially pertinent to Erin Blaz at the NAAEE (North American Association of Environmental Education) National Conference in October 2022 when she was introduced to EarthForce, a national program that support "Environmental Action Civics (EAC)" through an action project framework similar to what RiverXchange staff were newly implementing. Earth Force is a highly-regarded nation-wide program and as recently as 2016 Albuquerque hosted an Earth Force representative. The program's civic process for taking environmental action has been implemented, updated and practiced since 1989. The Earth Force mission is also to support educators like RiverXchange staff in reaching more teachers and providing effective training. Since December of 2022, RiverXchange staff have met with Earth Force program managers bi-monthly to discuss how to best implement the Earth Force process into RiverXchange. In June 2023, RiverXchange staff took an Earth Force training and will work with a cohort of similar educators and programs to work on bringing best practices in environmental action civics to participating teachers.

The Earth Force process (6 Steps) is very similar to the Action Project Guidelines (5 Steps) RiverXchange teachers were trained on at the teacher workshop. RiverXchange staff introduced the Earth Force EAC process to teachers in November, and used a variety of methods to share Earth Force resources and engage teachers with EarthForce throughout the school year. We provided a (1) short 30 minute online live training session over zoom that was recorded and shared (16 teachers attended), (2) we created a Canvas (a learning management system) classroom with RiverXchange specific documents for each step of the Earth Force EAC process that paired with our core curriculum, and (3) we sent weekly emails across six weeks starting in January with these resources as well. The Canvas website was intended to be a place where teachers could upload progress on their action projects and connect with other teachers, and ultimately a place where RiverXchange staff could track progress and completed action projects. To entice classrooms to take part in the action project in a timely manner, RiverXchange staff created an awards system for projects with the first 10 classes who met the criteria for submissions to receive a pizza party.

In January, RiverXchange staff developed and shared Action Project Awards criteria, listed below, to encourage submissions of Action Project document:

- Submissions must be received by MARCH 17 to be considered for the pizza party (we will still allow for submission past this date and encourage everyone to share no matter when they are turned in)
- Submissions should at minimum describe the project and have some reflection on the process.Please use the questions on the next page to prompt student reflection on their action project.
- At least one audio or video recording is submitted.

CHILDREN'S RADIO HOUR

An unique opportunity was presented to teachers this year to have their classes featured on our locally produced Children's Radio Hour, which is broadcasted on 140 stations worldwide. The goal was to have students featured discussing their action projects. Approximately 6 classes were featured on the and the broadcasting was aired on Earth Day 2022 with a focus on rivers. A recording of the broadcast can be found at: https://www.childrenshour.org/earth-day-rivers/. Student recordings were sourced from teachers and taken by RiverXchange staff when in contact with the classes at field trips or presentations. RiverXchange staff will continue to find ways to acknowledge students' work on the action projects through local publications and media.

D. Justice, Equity, Diversity and Inclusion

The Outdoor Equity Funding received this year included support to implement best equity practices into the program, with the goal to better understand and value individual and cultural relationships to nature and the outdoors as a means to improve our program's pedagogy. RiverXchange takes a scientific and factual approach to discussing water resource topics, but the field of environmental education continues to emphasize the importance of cultural and relational values in outdoor learning. In other words, our work isn't just about getting students outside, but how we relate to them in the program and relate them to the outdoors. Two approaches were taken to meet our goal of implementing best practices for equity in the outdoors - the implementation of the Earth Force process and staff professional development in a Justice Equity, Diversity and Inclusion (JEDI) 101 course offered by the SouthEast Environmental Education Association. Cultural responsiveness and environmental justice is built throughout the Earth Force's Process of 'Environmental Action Civics.' From the start students and teachers are prompted to take a community inventory and discuss strengths and areas of concern in their community relating to watershed health. As students progress, they work in committees based on their interests and skills, meet with stakeholders and/or potential collaborators and are pushed to reflect deeply to determine the best course of action before they even begin to take action or make a request for change. These are skills that are critical for making informed decisions to solve problems of today and tomorrow, as they are rooted in community knowledge and resources. We look forward to seeing how the integration of the Earth Force process improves the depth to which students can take meaningful action within the RiverXchange program.

The JEDI 101 course that staff participated in was a series of six zoom sessions with a cohort from across the US paired with homework assignments. The course was aimed at building a foundation for justice, equity, diversity and inclusion within an organization and challenged participants to see and define the way current forms of oppression (i.e. ideological, institutional, interpersonal, internal) are present in everyday systems all around us and how we can disrupt these systems in the field of environmental education in order to improve. It concluded with an action step, which for our staff was to discuss creating definitions with our board of supervisors for important terms related to JEDI in order to create future policies and guidelines for our education, outreach and programs.

EVALUATION

I. TEACHER FEEDBACK

Teacher feedback is an invaluable resource for program evaluation and it continues to help us understand how RiverXchange® helps teachers reach their goals and provide feedback on ways to better support their classroom objectives. This year's feedback continues to reinforce that RiverXchange® remains relevant and impactful in curriculum and content. Feedback demonstrates the RiverXchange program is highly valued by teachers for its ability to provide hands-on and experiential activities that introduce students to local watershed issues, reconnect them to the natural world, and demonstrate career opportunities in the science and conservation fields. RiverXchange® continues to be an evolving and beneficial curriculum that teachers use to stimulate the personal and collective growth of their students by encouraging them to use teamwork, adaptability, and communication skills to engage in and build an understanding in complex and new topics.

In addition, the Action Project has provided an additional opportunity for teachers and students to engage their greater school community in environmental civic action to improve learning that occurs in the program through education, research, and community service. Feedback also demonstrates the RiverXchange® continues to be valued for its ability to bring community science in the classroom and teach about water resources issues, while addressing specific changes in environmental problems students wish to improve.

Additionally, when asked to share what successes teachers and the students had with integrating the Action Project, teachers reported that students really enjoyed creating deeper connections to water issues through direct action. Teachers described how their students used the action project to educate others about environmental issues, organize campus-wide clean-ups, and build interactive models to demonstrate key watershed science concepts. Some teachers noted they used the Action Project to assess if students achieved the NM Stem Ready/Next Generation Science Standards and 62% of teachers say RiverXchange is very effective in helping students achieve these standards.

Lastly, when asked how RiverXchange® could be improved to support teachers in future years, some teachers reported difficulty implementing the Earth Force process as an additional objective in their curriculum. Teachers also indicated that they would benefit from more direct education on how the pole planting field trip ties into their water conservation efforts prior to the trip.

Below are a few highlights from the teachers:

What are the greatest learning outcomes for your class as participants in RiverXchange®?

Students understood that they have a part in our planet’s future. They feel empowered to make changes when they see injustice.- Ryan, Lavaland ES

My students were able to write letters to politicians explaining why our water resources were so important in Albuquerque, and they were able to share ideas for solving these problems. - Wicks, Bel-Air ES

The successes we had in completing our action project was honoring student voices. Students were able to be active participants/leaders in creating the project. - Martinez, Valle Vista ES

Our entire school felt the impact of our trash pick up project. Our class was recognized on a nearly weekly basis for our contribution to our school's overall environment. - Rogers, North Valley Academy ES

It was very beneficial and all the presentations were informative and engaging! - Agena, Puesta del Sol ES

Students and staff really enjoy learning about where we live and how what we choose to do or not do can affect our environment. - Beer, Cochiti ES

This was an outstanding experience and my class and I loved every minute of it. Erin and her helpers were all amazing leaders and patient with all of the requirements our large classes put on them. Loved the field experience, loved the push-in lessons, and loved all the supplemental lessons we were provided. Well-done Xchange peeps!!!!! - Cordova, Chaparral ES

This was a great program and one of the few times my students worked together. - Deschenie, Monte Vista ES

Please share any feedback you have concerning your experience with the program this year.

It was great this year--the presentations were engaging and fun! - Harness, Monte Vista ES

I really enjoyed how easy it was to follow. - Gallegos, Maggie Cordova ES

I really feel that everyone at RiverXchange went above and beyond to provide us with a quality environmental education. I know this may be asking a lot, but I feel that regular check-ins would be beneficial to build a stronger connection between students and their environmental gurus at RiverXchange. - Rogers, North Valley Academy ES

I think it is great that there are programs that help students be advocates for their environment. - Ryan, Lavaland ES

I think the first year is challenging to keep up with all the presentations and project. I believe now that I know what to expect, next year will be easier. - Lopez, Chaparral ES

Overall RiverXchange is helpful in engaging ways for students to learn valuable lessons. - Martinez, Valle Vista ES

I do not have any suggestions at this time :) y'all are awesome! - Butler, Zia ES

II. ACTION PROJECT ENGAGEMENT

In RiverXchange, our goal is that students not only understand their local watershed but that they use their voice to advocate for conservation and proper management of watershed health in their community.

However documenting and evaluating teacher and students success in this process has its challenges since staff are not working alongside the classes throughout their action project. Therefore we rely on teachers to provide us updates and documentation (pictures, audio, and videos) of this process in their classroom. To improve documentation of action projects staff created what we hoped to be a manageable set of criteria and guidance for providing that documentation to our team. Staff communicated to teachers that there were multiple ways to share this documentation: (1) via the Canvas site online (2) through our email communication (3) thumb drives and (4) through project descriptions on the teacher feedback form. As the school year progressed, we found that teachers were not very active on Canvas. However the weekly Earth Force email campaign in January helped reinvigorate participation in the Action project and deliver specific guidance to the teachers with the flexibility of incorporating their own process into their curriculum.

During the month of March 10 teachers submitted documentation of their action projects and met the criteria for a RiverXchange Excellence award and pizza party. These projects all identified a need for change and addressed this issue with considerations of the community inventory (step 1 of Earth Force) and involved some collaboration outside of their classroom (i.e. school admin, other grades, whole school). The submissions demonstrated various kinds of participation in the process based on teacher and student interest and capacity. The method of asking for change ranged from delivering presentations to other classes, informational posters, announcements, letters to local businesses and campus-wide, grade-level or weekly campus clean ups.

Beyond the impact to the students, the projects engaged the local community. When asked who in the community the class Action Project reached, teachers shared that often entire grade levels, students' families, and in some cases the whole school were reached during the course of the project. Students also expressed wanting to increase their reach to the greater public outside the school community. In total, teachers reported reaching 6,239 additional community members with their projects.

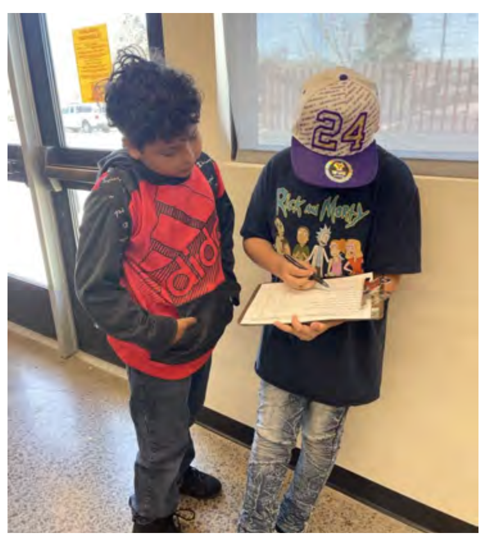
The challenging circumstances of obtaining consistent participation in the action project process, especially from teachers new to RiverXchange, has allowed us a valuable opportunity to adjust our teacher workshop materials next year. Many teachers found it difficult to incorporate the new Earth Force process after they already planned out their yearly curriculum and viewed the Action Project as an addition to their lesson plans. Next year, we will focus on helping teachers integrate the Earth Force Action Projects into their lessons to make more meaningful connections while exceeding national standards in all school subjects.

Overall, the majority of teachers appreciated the hands-on and outdoor education focus of the Action Project criteria and felt their students gained meaningful experiences in the process.

Action Project Images

Campus Clean Up & Poster Campaign- La Mesa Elementary

Food Waste study with all grade levels- Lavaland Elementary



III. STUDENT SURVEYS

A key component of RiverXchange is its measurable goals relating to student performance. We collected quantitative data on student performance by way of a pre and post survey and qualitative data by observing the work submitted via the Action Projects. The survey includes questions that relate to environmental attitudes and behaviors as well as knowledge gained relating to our learning objectives.

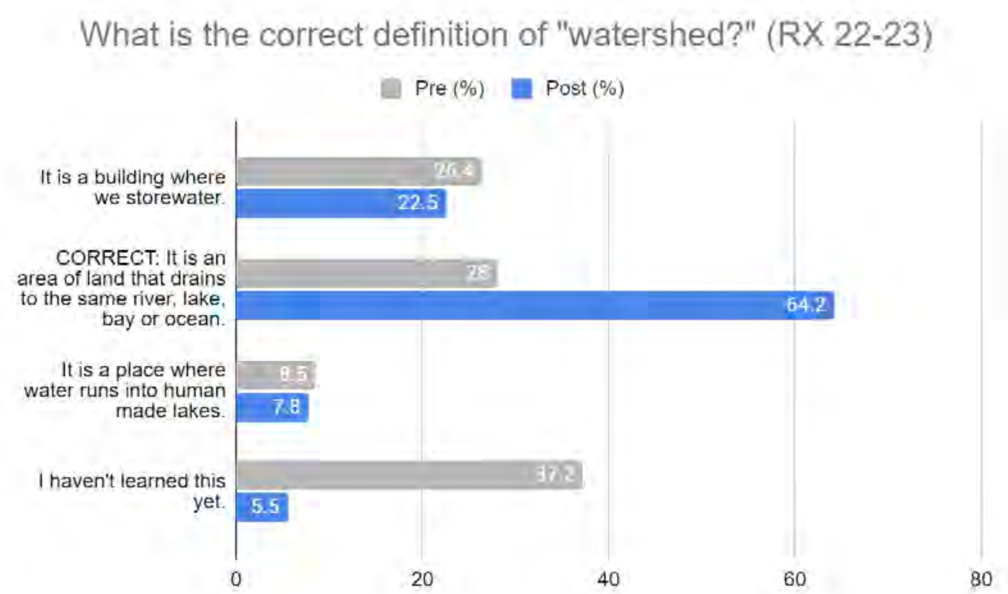
Pre/Post Program Survey

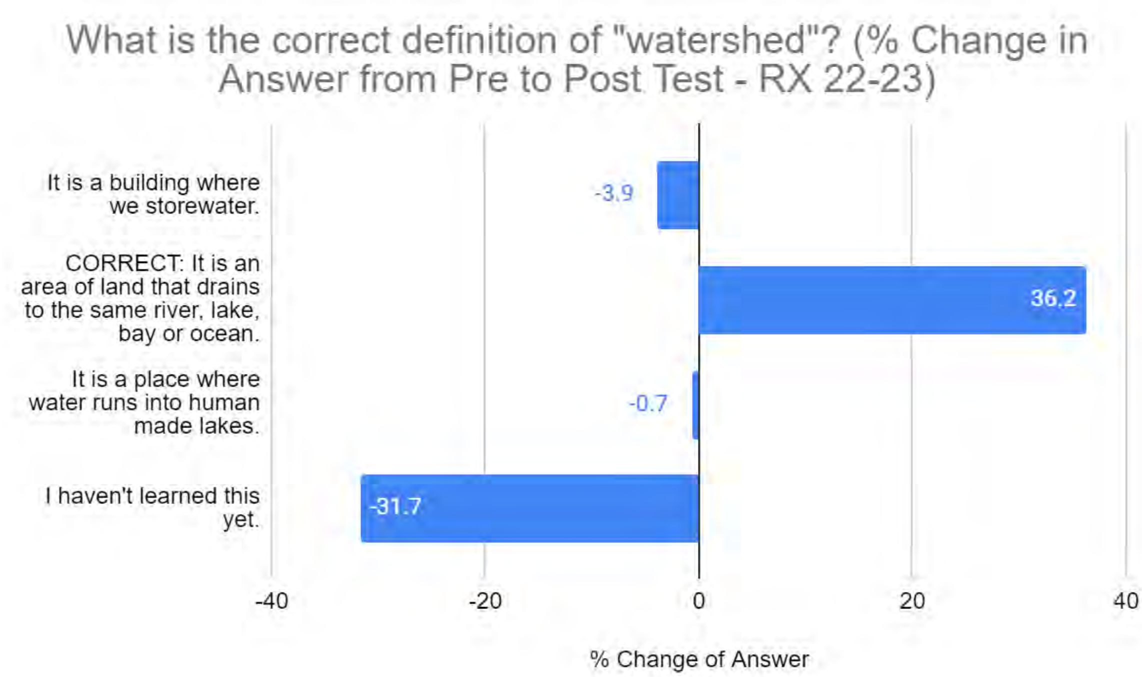
This year, 826 students completed the pre-survey and 587 completed the post-survey. We continue to refine the survey and our programming year after year based on teacher feedback and metrics gathered from these surveys.

This year's metrics demonstrate an improvement in student understanding of watershed health topics post the RiverXchange program; specifically:

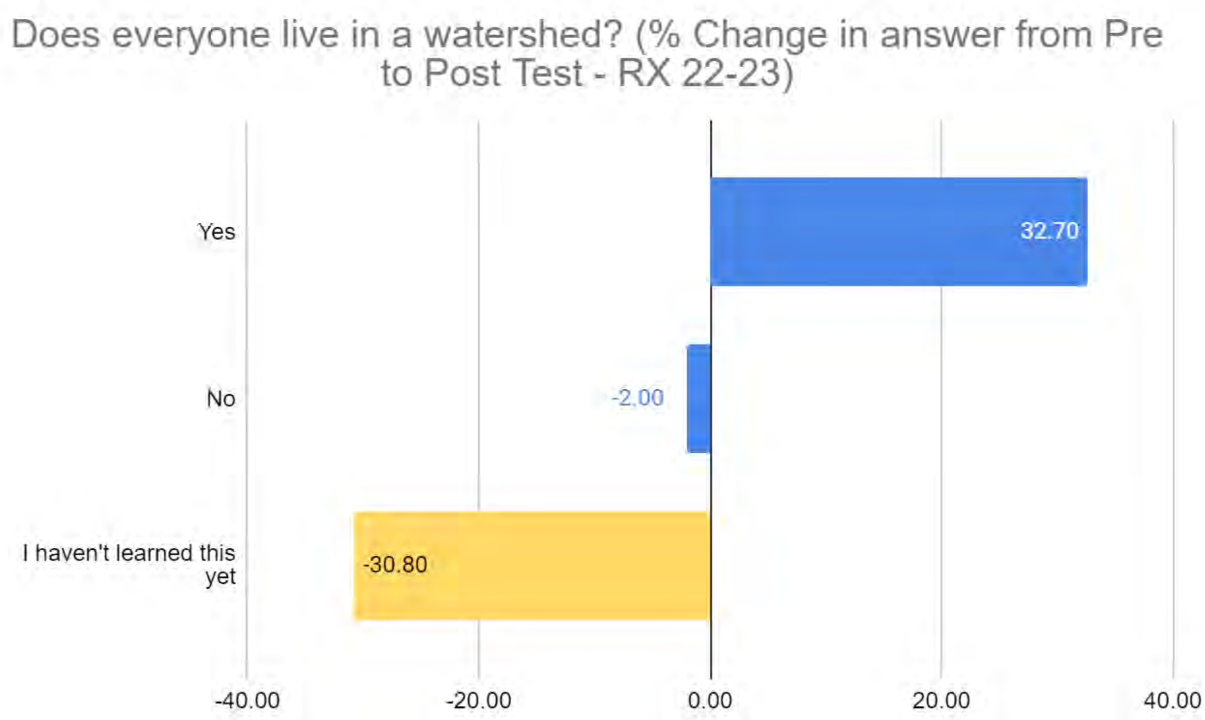
- **36.2%** more students can correctly define a watershed, with a total of 64% of students correctly defining a watershed after the program.
- **32%** more students know that "everyone lives in a watershed" after the program.
- **19%** more students understand that stormwater is polluted by human activities; a total of 75% of students agree that stormwater is polluted by human activities after the program.
- **28.8%** of students can correctly define stormwater after the program.
- **63%** of all students identify picking up dog poop as highly impactful for improving watershed health.
- **24%** more students correctly identify that pesticides, herbicides, and fertilizers are a concern in stormwater.

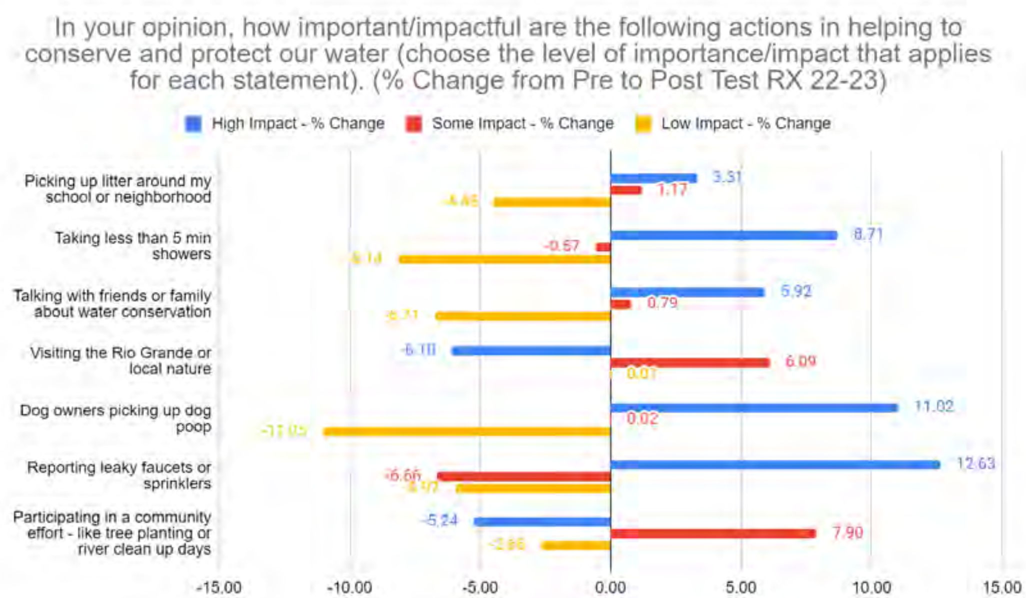
2022-2023 Evaluation / Metrics Results & Percent Change Graphs

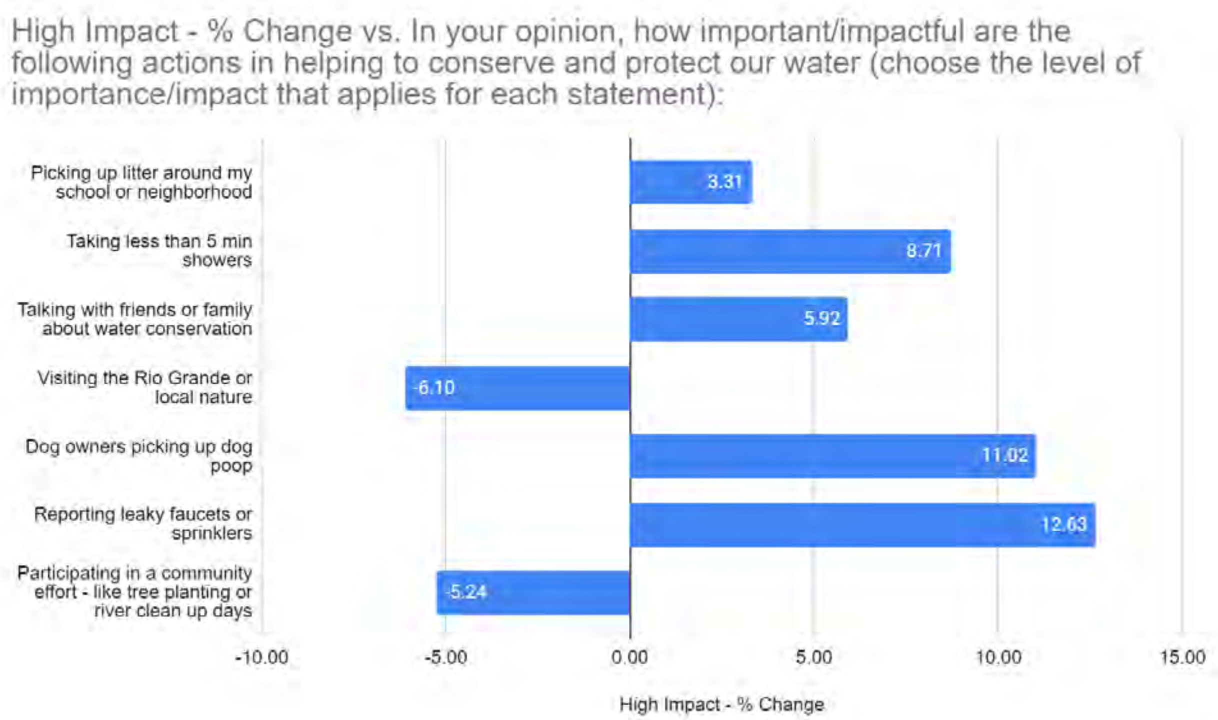


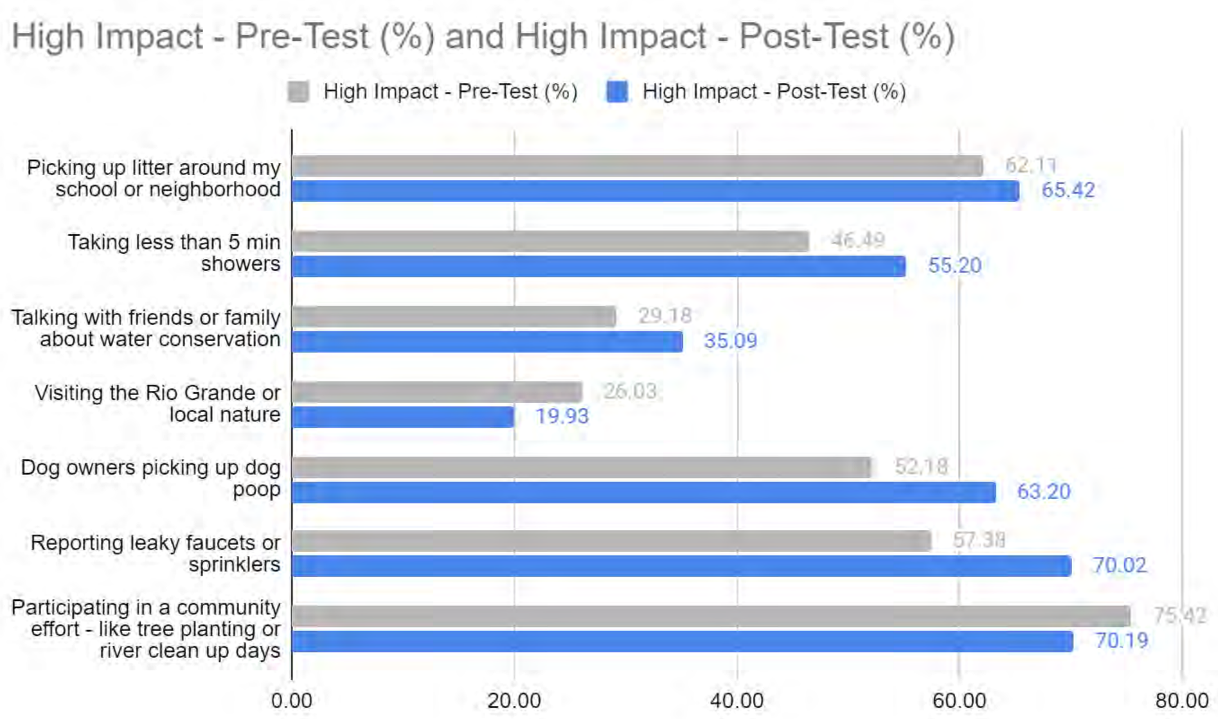


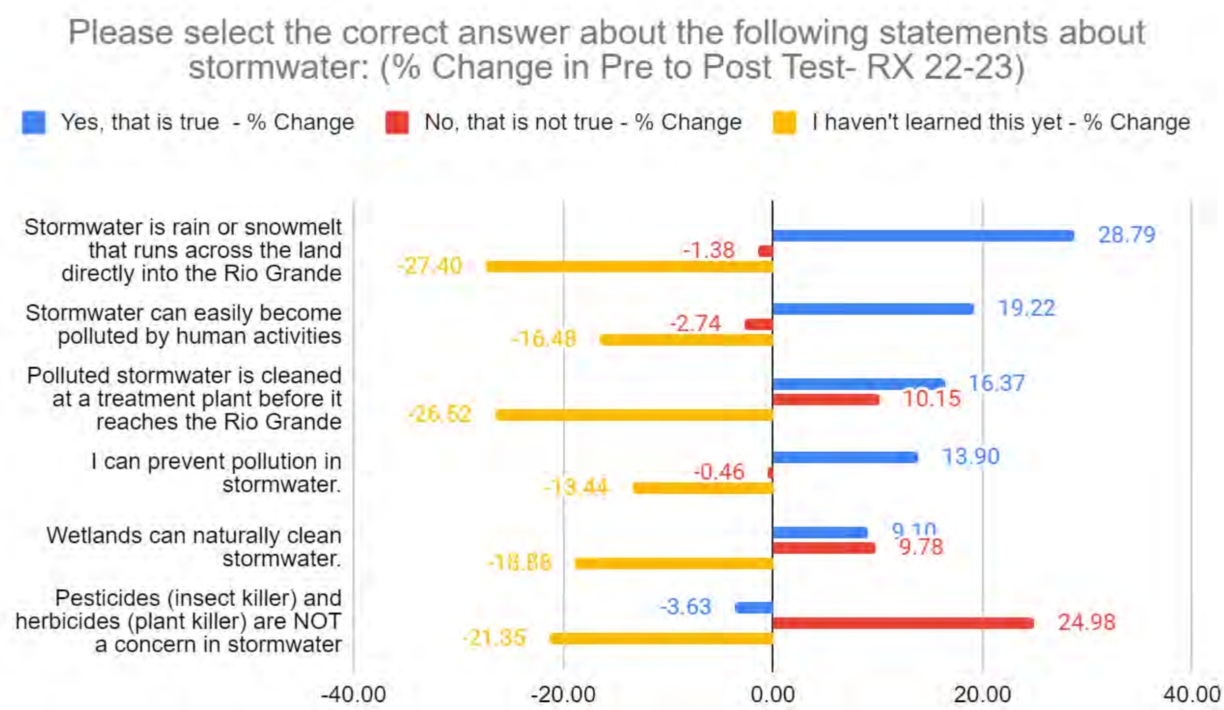
Teachers were given a shower curtain lesson to make a watershed. It was noted on the website and broken down in the curriculum description so the teachers understood that it was a requirement. 51% of teachers who responded on the teacher feedback survey said they did an introductory watershed lesson, 40% said they used the shower curtain lesson provided by RiverXchange.

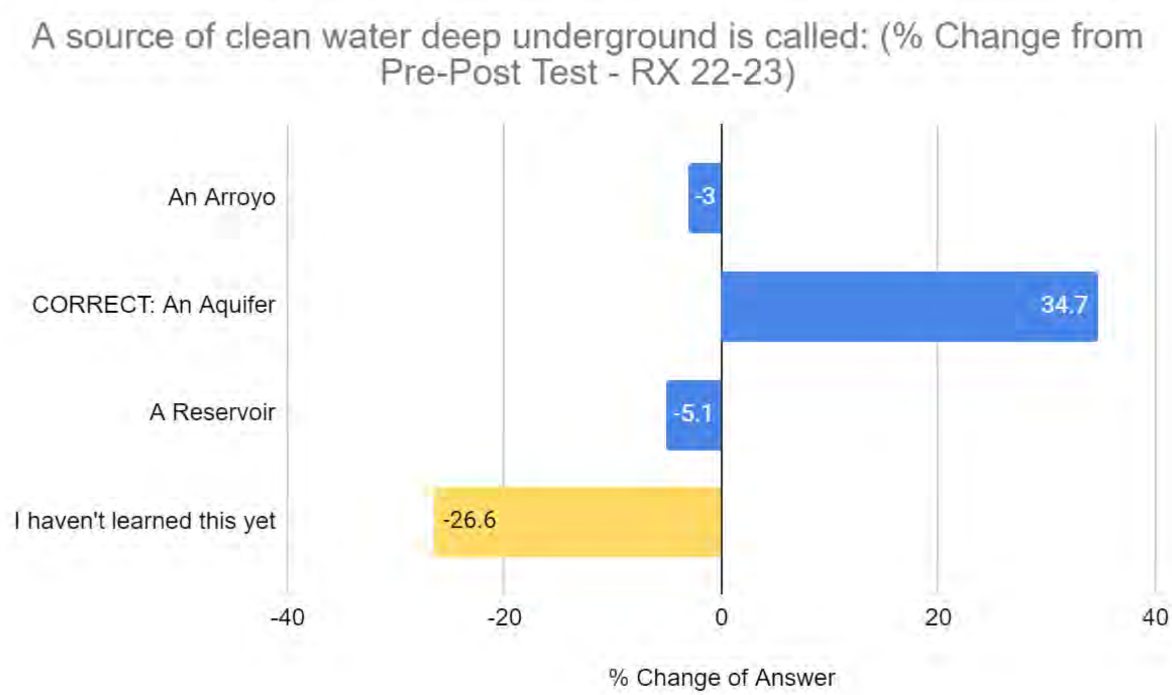

Does everyone live in a watershed? (% Change in answer from Pre to Post Test - RX 22-23)
Yes
No
I haven't learned this yet
32.70
-2.00
-30.80
-40.00
-20.00
0.00
20.00
40.00

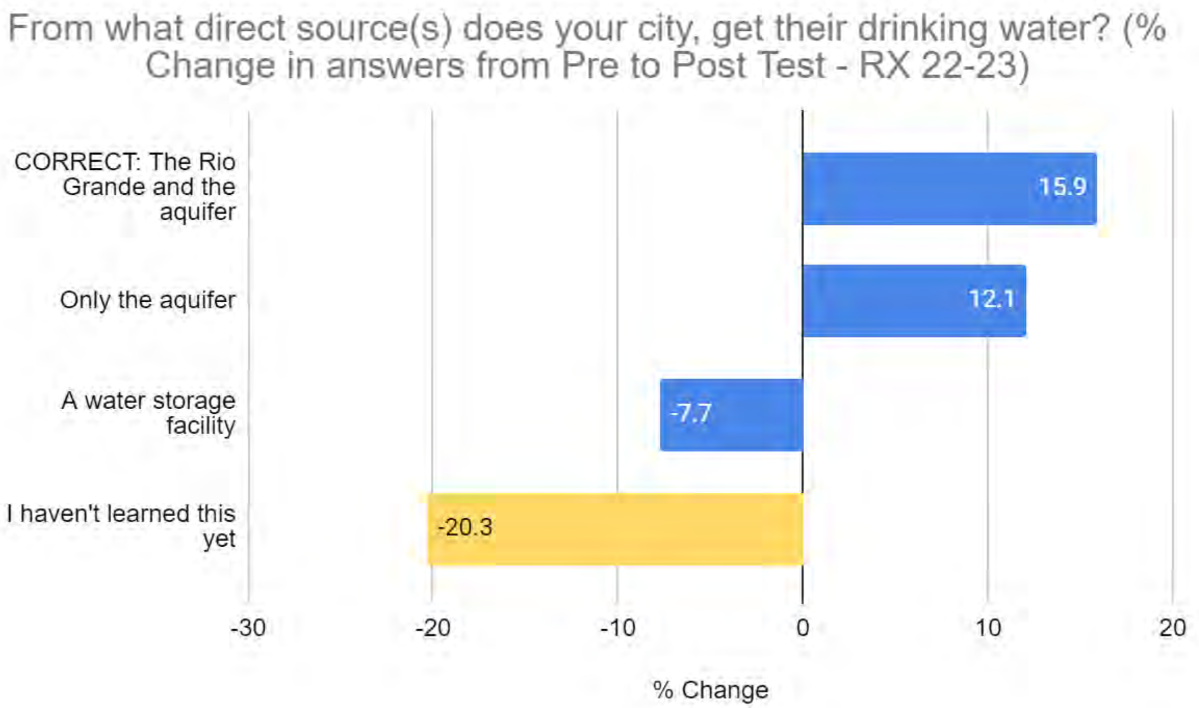

In your opinion, how important/impactful are the following actions in helping to conserve and protect our water (choose the level of importance/impact that applies for each statement). (% Change from Pre to Post Test RX 22-23)
High Impact - % Change
Some Impact - % Change
Low Impact - % Change
Picking up litter around my school or neighborhood
Taking less than 5 min showers
Talking with friends or family about water conservation
Visiting the Rio Grande or local nature
Dog owners picking up dog poop
Reporting leaky faucets or sprinklers
Participating in a community effort - like tree planting or river clean up days
3.31
1.17
8.71
-0.57
5.92
0.79
-6.71
6.09
0.01
11.02
0.02
12.63
-6.66
-5.24
7.90
-15.00
-10.00
-5.00
0.00
5.00
10.00
15.00

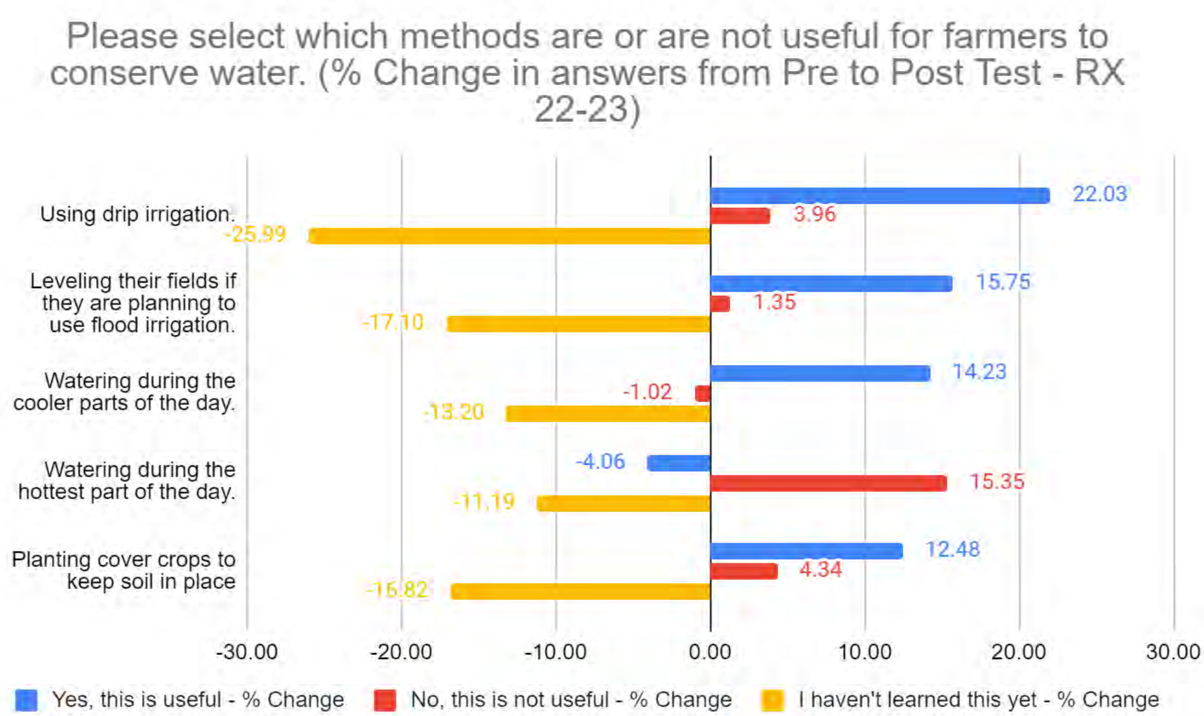

High Impact - % Change vs. In your opinion, how important/impactful are the following actions in helping to conserve and protect our water (choose the level of importance/impact that applies for each statement):
Picking up litter around my school or neighborhood
Taking less than 5 min showers
Talking with friends or family about water conservation
Visiting the Rio Grande or local nature
Dog owners picking up dog poop
Reporting leaky faucets or sprinklers
Participating in a community effort - like tree planting or river clean up days
3.31
8.71
5.92
-6.10
11.02
12.63
-5.24
-10.00
-5.00
0.00
5.00
10.00
15.00
High Impact - % Change

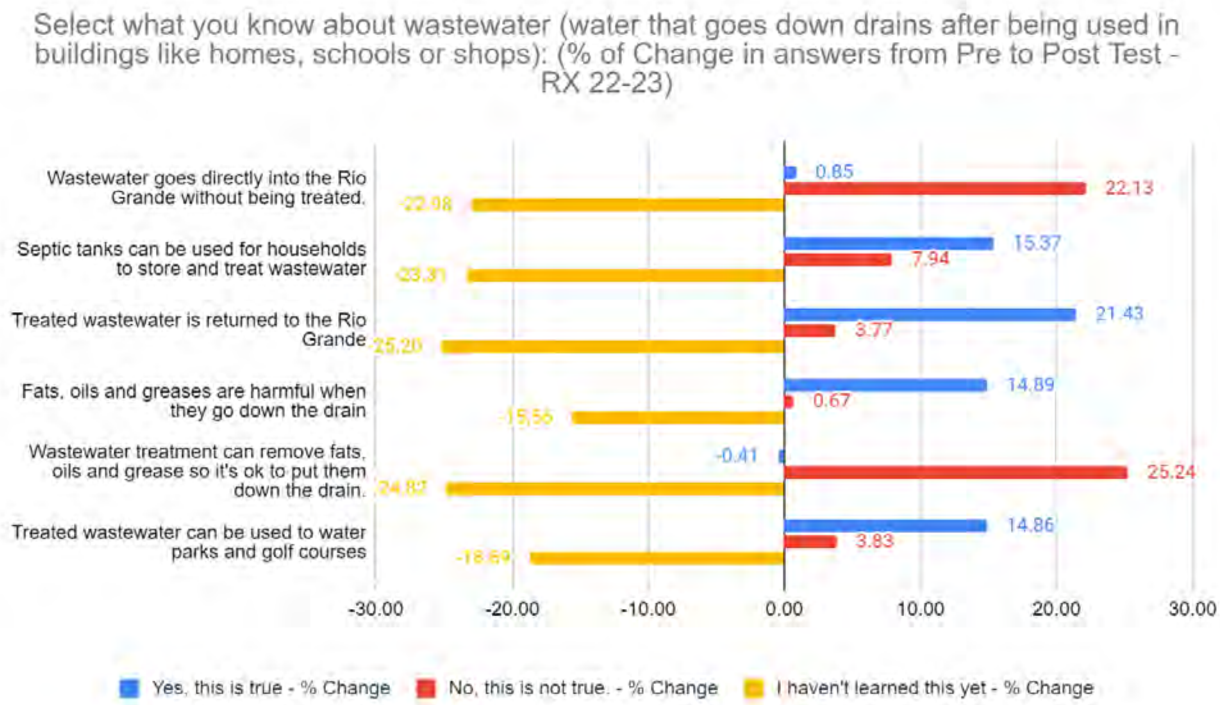

High Impact - Pre-Test (%) and High Impact - Post-Test (%)
High Impact - Pre-Test (%)
High Impact - Post-Test (%)
Picking up litter around my school or neighborhood
Taking less than 5 min showers
Talking with friends or family about water conservation
Visiting the Rio Grande or local nature
Dog owners picking up dog poop
Reporting leaky faucets or sprinklers
Participating in a community effort - like tree planting or river clean up days
62.11
65.42
46.49
55.20
29.18
35.09
26.03
19.93
52.18
63.20
57.38
70.02
75.42
70.19
0.00
20.00
40.00
60.00
80.00

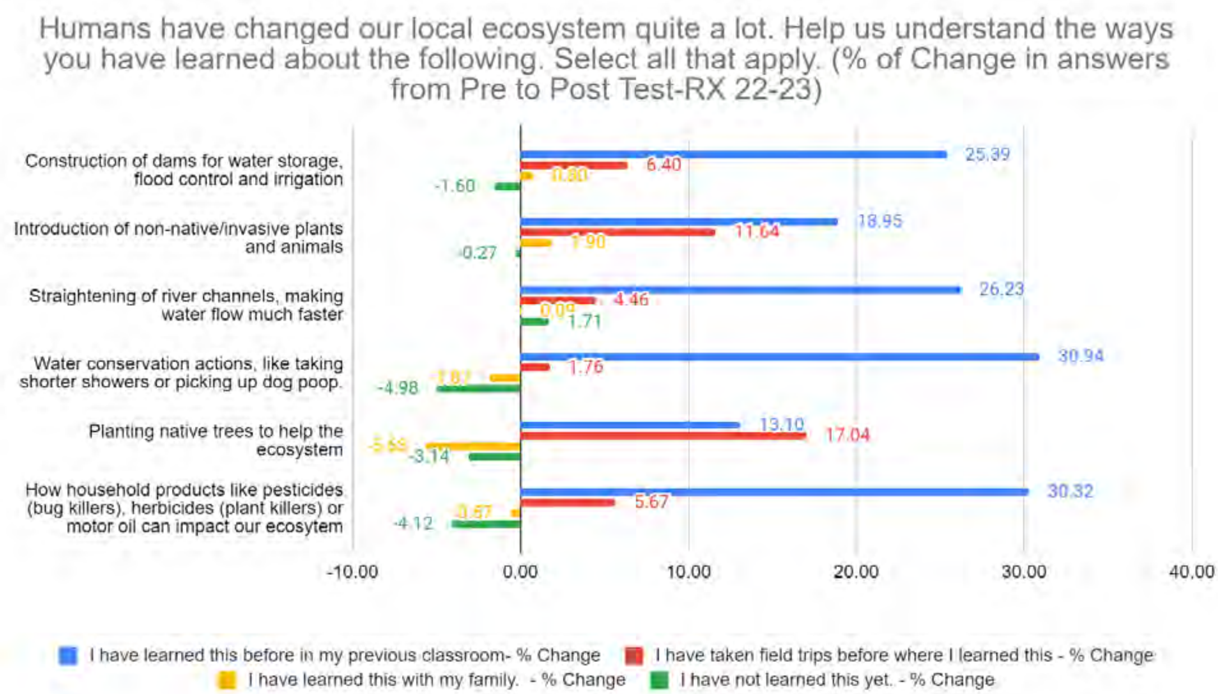

Please select the correct answer about the following statements about stormwater: (% Change in Pre to Post Test- RX 22-23)
Yes, that is true - % Change
No, that is not true - % Change
I haven't learned this yet - % Change
Stormwater is rain or snowmelt that runs across the land directly into the Rio Grande
28.79
-1.38
-27.40
Stormwater can easily become polluted by human activities
19.22
-2.74
-16.48
Polluted stormwater is cleaned at a treatment plant before it reaches the Rio Grande
16.37
10.15
-26.52
I can prevent pollution in stormwater.
13.90
-0.46
-13.44
Wetlands can naturally clean stormwater.
9.10
9.78
-18.88
Pesticides (insect killer) and herbicides (plant killer) are NOT a concern in stormwater
-3.63
24.98
-21.35
-40.00
-20.00
0.00
20.00
40.00

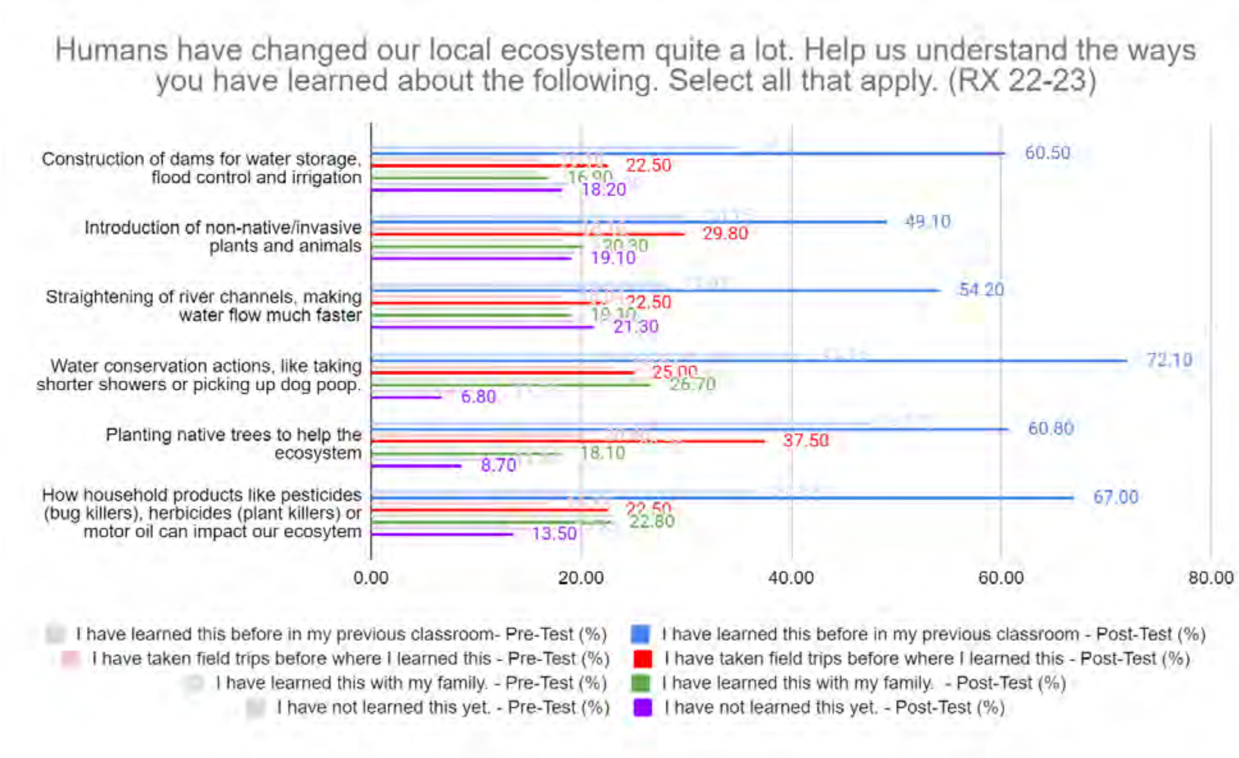

A source of clean water deep underground is called: (% Change from Pre-Post Test - RX 22-23)
An Arroyo
-3
CORRECT: An Aquifer
34.7
A Reservoir
-5.1
I haven't learned this yet
-26.6
-40
-20
0
20
40
% Change of Answer

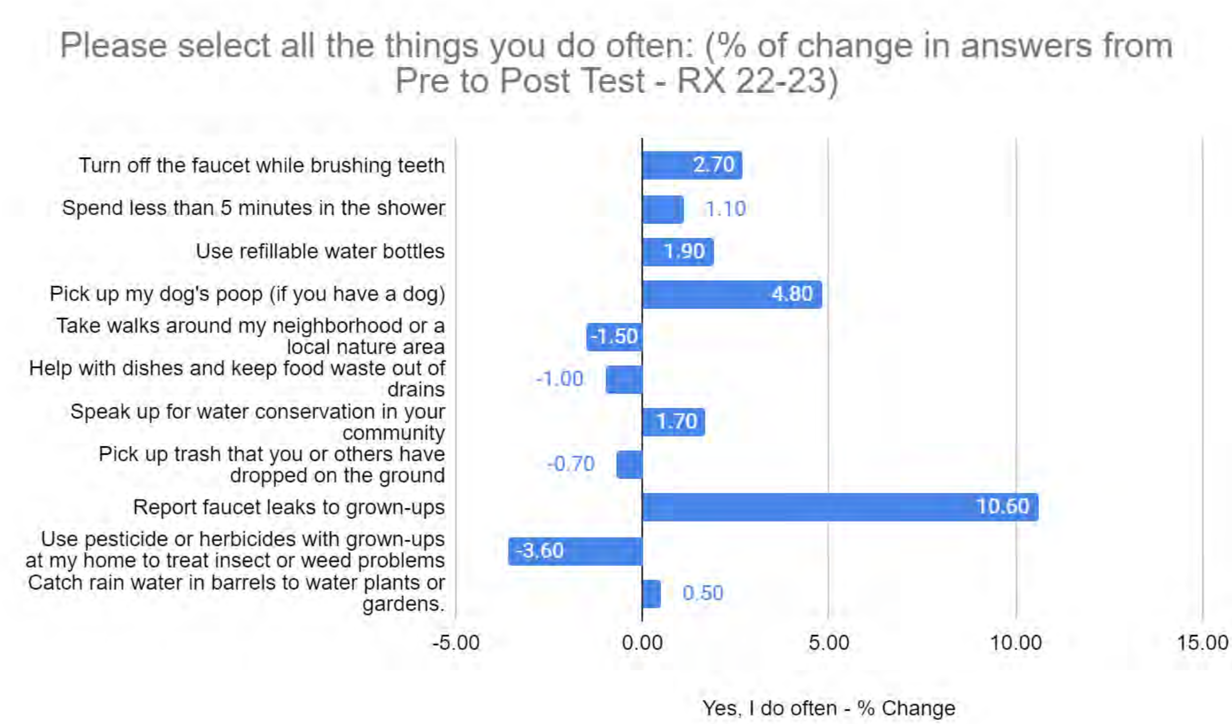

From what direct source(s) does your city, get their drinking water? (% Change in answers from Pre to Post Test - RX 22-23)
CORRECT: The Rio Grande and the aquifer
15.9
Only the aquifer
12.1
A water storage facility
-7.7
I haven't learned this yet
-20.3
-30
-20
-10
0
10
20
% Change

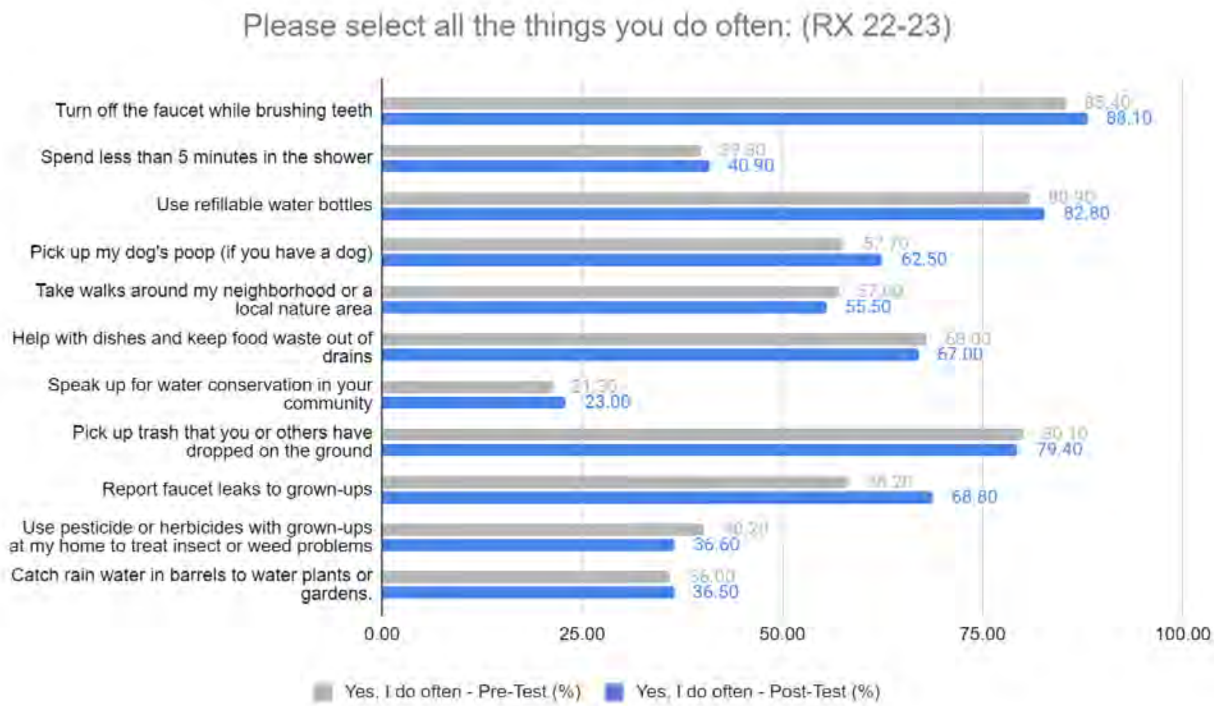

Please select which methods are or are not useful for farmers to conserve water. (% Change in answers from Pre to Post Test - RX 22-23)
Using drip irrigation.
22.03
3.96
-25.99
Leveling their fields if they are planning to use flood irrigation.
15.75
1.35
-17.10
Watering during the cooler parts of the day.
14.23
-1.02
-13.20
Watering during the hottest part of the day.
-4.06
15.35
-11.19
Planting cover crops to keep soil in place
12.48
4.34
-16.82
-30.00
-20.00
-10.00
0.00
10.00
20.00
30.00
Yes, this is useful - % Change
No, this is not useful - % Change
I haven't learned this yet - % Change

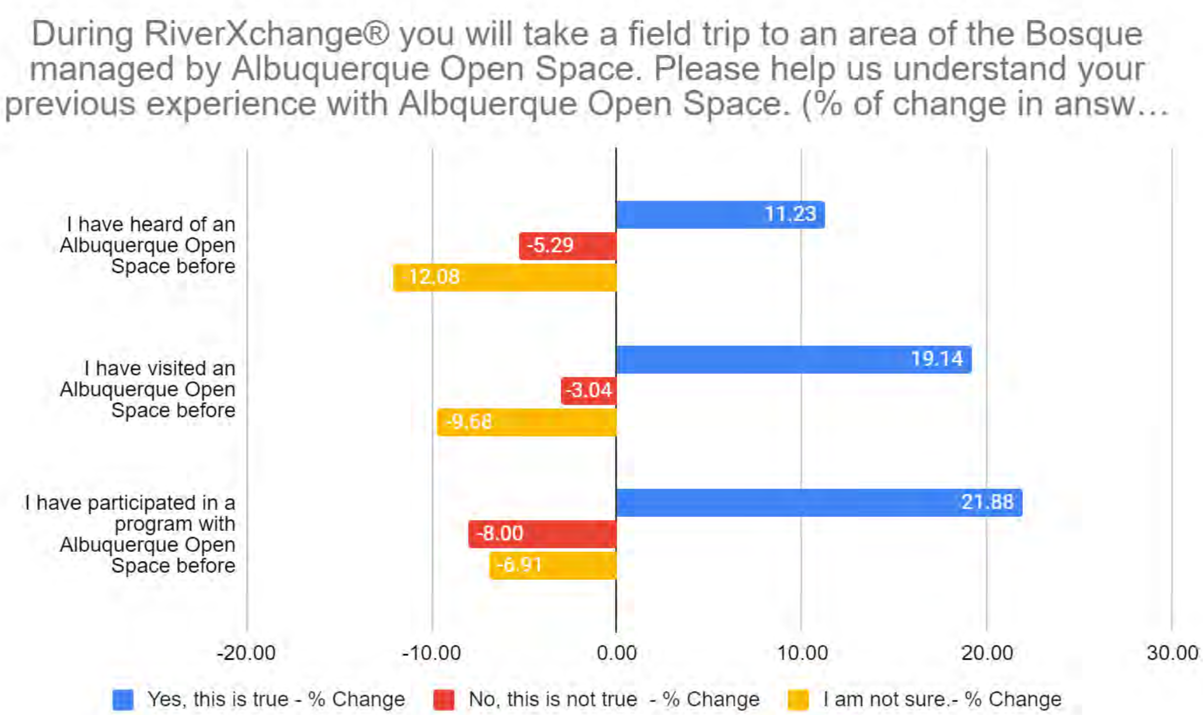

Select what you know about wastewater (water that goes down drains after being used in buildings like homes, schools or shops): (% of Change in answers from Pre to Post Test - RX 22-23)
Wastewater goes directly into the Rio Grande without being treated.
Septic tanks can be used for households to store and treat wastewater
Treated wastewater is returned to the Rio Grande
Fats, oils and greases are harmful when they go down the drain
Wastewater treatment can remove fats, oils and grease so it's ok to put them down the drain.
Treated wastewater can be used to water parks and golf courses
0.85
22.13
-22.98
15.37
7.94
-23.31
21.43
3.77
-25.20
14.89
0.67
-15.56
-0.41
25.24
-24.82
14.86
3.83
-18.69
-30.00
-20.00
-10.00
0.00
10.00
20.00
30.00
Yes, this is true - % Change
No, this is not true. - % Change
I haven't learned this yet - % Change


Humans have changed our local ecosystem quite a lot. Help us understand the ways you have learned about the following. Select all that apply. (% of Change in answers from Pre to Post Test-RX 22-23)
Construction of dams for water storage, flood control and irrigation
Introduction of non-native/invasive plants and animals
Straightening of river channels, making water flow much faster
Water conservation actions, like taking shorter showers or picking up dog poop.
Planting native trees to help the ecosystem
How household products like pesticides (bug killers), herbicides (plant killers) or motor oil can impact our ecosytem
25.39
6.40
0.80
-1.60
18.95
11.64
1.90
-0.27
26.23
4.46
0.09
1.71
30.94
1.76
-4.98
13.10
17.04
-3.14
30.32
5.67
-4.12
-10.00
0.00
10.00
20.00
30.00
40.00
I have learned this before in my previous classroom- % Change
I have taken field trips before where I learned this - % Change
I have learned this with my family. - % Change
I have not learned this yet. - % Change


Humans have changed our local ecosystem quite a lot. Help us understand the ways you have learned about the following. Select all that apply. (RX 22-23)
Construction of dams for water storage, flood control and irrigation
60.50
22.50
16.90
18.20
Introduction of non-native/invasive plants and animals
49.10
29.80
20.30
19.10
Straightening of river channels, making water flow much faster
54.20
22.50
19.10
21.30
Water conservation actions, like taking shorter showers or picking up dog poop.
72.10
25.00
26.70
6.80
Planting native trees to help the ecosystem
60.80
37.50
18.10
8.70
How household products like pesticides (bug killers), herbicides (plant killers) or motor oil can impact our ecosytem
67.00
22.50
22.80
13.50
0.00
20.00
40.00
60.00
80.00
I have learned this before in my previous classroom- Pre-Test (%)
I have learned this before in my previous classroom - Post-Test (%)
I have taken field trips before where I learned this - Pre-Test (%)
I have taken field trips before where I learned this - Post-Test (%)
I have learned this with my family. - Pre-Test (%)
I have learned this with my family. - Post-Test (%)
I have not learned this yet. - Pre-Test (%)
I have not learned this yet. - Post-Test (%)


Please select all the things you do often: (% of change in answers from Pre to Post Test - RX 22-23)
Turn off the faucet while brushing teeth
2.70
Spend less than 5 minutes in the shower
1.10
Use refillable water bottles
1.90
Pick up my dog's poop (if you have a dog)
4.80
Take walks around my neighborhood or a local nature area
-1.50
Help with dishes and keep food waste out of drains
-1.00
Speak up for water conservation in your community
1.70
Pick up trash that you or others have dropped on the ground
-0.70
Report faucet leaks to grown-ups
10.60
Use pesticide or herbicides with grown-ups at my home to treat insect or weed problems
-3.60
Catch rain water in barrels to water plants or gardens.
0.50
-5.00
0.00
5.00
10.00
15.00
Yes, I do often - % Change


Please select all the things you do often: (RX 22-23)
Turn off the faucet while brushing teeth
Spend less than 5 minutes in the shower
Use refillable water bottles
Pick up my dog's poop (if you have a dog)
Take walks around my neighborhood or a local nature area
Help with dishes and keep food waste out of drains
Speak up for water conservation in your community
Pick up trash that you or others have dropped on the ground
Report faucet leaks to grown-ups
Use pesticide or herbicides with grown-ups at my home to treat insect or weed problems
Catch rain water in barrels to water plants or gardens.
85.40
88.10
40.90
80.90
82.80
57.70
62.50
57.00
55.50
68.00
67.00
21.30
23.00
80.10
79.40
68.80
36.60
36.00
36.50
0.00
25.00
50.00
75.00
100.00
Yes, I do often - Pre-Test (%)
Yes, I do often - Post-Test (%)


During RiverXchange® you will take a field trip to an area of the Bosque managed by Albuquerque Open Space. Please help us understand your previous experience with Albquerque Open Space. (% of change in answ…
I have heard of an Albuquerque Open Space before
11.23
-5.29
12.08
I have visited an Albuquerque Open Space before
19.14
-3.04
-9.68
I have participated in a program with Albuquerque Open Space before
21.88
-8.00
-6.91
-20.00
-10.00
0.00
10.00
20.00
30.00
Yes, this is true - % Change
No, this is not true - % Change
I am not sure.- % Change

Appendix A: Background

As producers of children's water festivals and other grade K12 water resources outreach in NM since 2007, the RiverXchange program creators observed early on that NM elementary teachers rarely incorporated water concepts in the classroom beyond what is required by the state (e.g., water cycle), and that most elementary teachers considered "water" strictly as a science topic. While teachers personally acknowledged the importance of conserving water and keeping source water clean, they continued to find that upper elementary students had little or no understanding of major water resources topics unless the teacher specifically integrated a wide range of water topics into the curriculum. For this reason, as well as successful festival work with upper elementary students, this age level was selected as the focus for the RiverXchange program.

RiverXchange was created to provide a free program that is fun, interesting, and easy to integrate into the normal curriculum. The hope was to motivate participants to explore water resources topics in depth. The program was originally designed to be carried out over eight months so that students spend more time developing a sense of pride and personal connection to their own river ecosystem, as well as a personal connection to a distant river ecosystem and the students who live near it. Today RiverXchange runs over the course of 3-4 months, as a response to the challenges of implementing a year-long curriculum with the ongoing demands on teachers and students time and requirements for testing and other curriculum.

RiverXchange began in 2007 as a pilot project of Experiential EE, LLC (under a services agreement with the New Mexico Water Conservation Alliance) and the National Great Rivers Research and Education Center, featuring partnerships between two fourth grade classes in Albuquerque, NM, and two fifth grade classes in Godfrey, IL. A curriculum was developed, a field trip to the river was coordinated, and partner classes "met" three times during the year via video tele-conferencing to present what they had learned.

After the pilot project, RiverXchange transitioned to a web-based technology called a wiki. This enabled the program to overcome limitations such as the high cost, availability, and time zone logistical issues associated with video teleconferencing – and easily involve more classes. The curriculum was updated to incorporate the writing component and classroom guest speakers were introduced to reduce teacher workload and bring up-to-date technical information into the classroom. In 2017, the program switched to a blogging platform called Kidblog and in 2021 Kidblog rebranded to Fanschool. Due to the inundation of technology from virtual learning in the global pandemic and the continued barriers to connecting classes on Kidblog/Fanschool, RiverXchange piloted integrating a Capstone Project into the program instead of the blog in 2021-2022.

In 2012, ownership of RiverXchange transferred to Amy White of Orilla Consulting, LLC, who managed the program through July 2015. In August 2015, RiverXchange became part of the Ciudad Soil & Water Conservation District. In 2020, ownership and the trademark registration of RiverXchange® was transferred fully to Ciudad Soil and Water Conservation.
Since 2007, we have served over 20,166 students!

Appendix B: Photos

2022 Teacher Workshop at Open Space Visitor Center


Pole Planting Field Trips





Appendix C

Agriculture Presentation for 5th grade RiverXchange

1. What are we trying to teach students in this activity?

<u>Food waste is an immense contributor to water scarcity so we need to make changes in our habits of misuse of our food in order to reduce our water consumption.</u>

- The majority of freshwater (70% total) on Earth is used for agriculture. Agriculture is necessary and requires many natural resources to produce food and materials we need. The resources to produce the food we eat is very limited and most of what is wasted, ends up in the landfill.
  - How can we reduce our food waste and what other options do we have to prevent it from entering the landfill?

<u>If students understand the limited amount of water that is usable, their urgency for change will increase.</u>

- 97% of water on Earth is saltwater and unavailable for use by society. Students will learn about salinity and the difficulty of removing solvents from water to understand why the "Water World" has a limited source of usable water. Of all the water in the world only 0.003% of that water is available to use for drinking, hygiene, industry and agriculture and of that 0.003%, 70% of it is used for agriculture.

2. How can we tie this activity to our teaching goals:

Learning Objectives	**Methods (models, observations, visuals, discussions, activities)**
Only 3% of the water on Earth is freshwater and not all of that 3% is available to use.	Using models to demonstrate: ● 71% of Earth is water. 97% is saltwater. 3% is Freshwater Visuals/<u>Drop in the Bucket</u> Activity ○ Start with Earth's total water in Large cylinder (100%), Large cylinder (salt water in oceans -pour 97%), 2 Small cylinders (fresh water divide 2% (frozen in glaciers/ice caps-use globe, 1% in aquifers), pipette drop is the clean, usable water available to be shared with the world's plants/animals. ○ Show salinity and discuss the difficulty in separating salt from water.
Majority of usable water is used for agriculture. (70% of total usable water)	Discussion ● Introduce and define agriculture ● Farmers depend on the water cycle and climate for their crops. ● *What is Virtual Water?* - water we can't see that is used to create the items we consume, wear, use from start to finished product ● *How much food do we waste globally or in the U.S.?* 40% of food grown ends up in a landfill. ● Other precious resources are used in agriculture as well.
	Using models we aim to demonstrate:

Food waste is a major contributor to water waste and we don't see most of the water used to produce food.	● Creating a typical lunch using laminated cards with each food item to show how many gallons of virtual water is needed to create that lunch. ● Calculate with the students how much water was wasted when the food is not fully consumed. Ex: you only ate half your meal and threw out the leftovers. Discussion: ● Water is used to create the food we need to survive. Machines to process crops/ livestock, electricity, water/food to feed the animals, cleaning process of used water, transportation, etc all use water.
What are ways we can reduce food waste to help conserve water and other precious resources used for agriculture?	● Talk about the importance of being responsible about planning their meals to minimize food waste. ○ Meal planning ○ Work leftovers into meal planning ○ <u>Serving smaller portions with the option of adding more to prevent over serving and wasting.</u> ○ Consuming less meat (refer to : Practice "Meatless Mondays" ● Discuss the benefits of composting v. landfill

3. How can we tie this activity to standards?

Performance Expectation	Disciplinary Core Ideas
3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. **3-ESS2-2** Obtain and combine information to describe climates in different regions of the world.	**ESS2.C:** The roles of water in Earth's surface processes **ESS2.D:** Weather and climate
5-ESS3 Earth and Human Activity	**ESS3.C**: Human impact on Earth systems

What we do (Science and Engineering Practices)	How we think (Crosscutting Concepts)

Developing and Using Models Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations Engaging in Argument from Evidence	Patterns Cause and Effect Scale, Proportion and Quantity Structure and Function Systems and Systems Models Stability and Change

4. How should this activity be organized?

I. *(10 min)* **Introduction**
Hi everyone, I'm ------- with Ciudad SWCD and I'm here with the awesome program you are in this year called RiverXchange; a program where you get to learn about your local environment, our watershed and ways you can do to protect and conserve water (define conservation). Reference prior knowledge from RX presentations they have received to tie together and ask them about highlights/questions that arose during those presentations (Stormwater, Wastewater, Drinking water).

1. **Open Presentation/Assess Prior Knowledge -** Ask if they know where their water comes from and how much water we have to use.

2. "First let's get a discussion going…"
    - "How many of you used water before you came to school?(raise hands) How did you use it?"
        - Typical Answers: Drink with breakfast, brushed teeth, restroom, for the dog/plants, shower, wash hands, toilet
    - "Okay, you're thinking about physical water use and that's great! How did you get that water?"
        - Water bottle, faucet…
    - "In what other ways did you use water that you didn't get out of the faucet?" "Did you eat? Did you wear clothes today? Did you turn on your lights?"
        - "Yes, all of those things used WATER but not in the ways you might think. We call this Virtual Water."
    - Where do you think all this water comes from? Where do you get your water? How is it cleaned? Recall Wastewater, Stormwater presentations. Our local watershed provides freshwater to the Rio Grande. (Rio Rancho = Aquifer)
    - Can we all agree it is important to conserve our clean water for all plants and animals to use?

II. *(20 min)* **Drop in the Bucket Activity**
We are known as the water planet. So why are we always worried we are running out of water? Do you know how much water on Earth is usable?

Part A: *(5 minutes) Discussion.* We are going to learn about how the tiny amount of water available to us is used. Can this used water be reused again? Let's see how that looks…

1. **Review the Water Cycle - precipitation, evaporation, condensation**
    - Important to remember that water can't be created or destroyed. We are drinking the same water dinosaurs used! (If they have done Pole Planting, express that the soil we dug through is also years and years of layers as well).
    - We have to keep what we have clean.

2. **Introduce and Define Agriculture**
    - Out of all the water on Earth, only a drop of that in comparison is usable for humans. The majority of that drop is used in Agriculture. Agriculture is another word for farming, growing and harvesting crops and raising animals.

Part B: *(15 minutes) Presenter led-activity*

Drop in Bucket Activity

Supplies:

- Graduated cylinder set (250 ml, 50ml, 10ml)
- Pipette
- Blue food coloring (or other natural alt)
- Globe
- Salt
- Mason Jar
- Cinnamon
- printed/ laminated pie charts
- Water

<u>Learning Objectives:</u> Only 3% of the water on Earth is freshwater and not all of that 3% is available to use. Majority of usable water is used for agriculture. (70% of total usable water)

1. **Let's take a look at how much water a "drop" is when you compare all the water on Earth.**

Steps:

A. Display globe and spin around to point out where water is located. **"So, what's the problem? That doesn't seem like we're hurting for water with all that!"**
B. Take a straw and pretend to draw out all the water from the globe and then "transfer" that water from the straw to the largest, 250mL graduated cylinder and fill it up. **"Imagine that this jar is holding all of the water on Earth."**
C. Ask students, **"Now, has anyone ever gone for a swim in the ocean and tasted the water?" Why can't we drink this water? "The water in the ocean has too much salt for us to use."**
D. <u>Let's look at how much is ocean water and how much is fresh. *Pour 250mL with water up to 250 mL to represent the total water on Earth.</u>

E. Quickly demonstrate salinity by pouring water into two glasses and have a volunteer add a few sprinkles of salt to the water, stir. In the second glass, another student will add cinnamon to represent soil/dirt to water and stir.
F. Discuss solutions/ salinity with the jar of water and tell the kids we will look back later to see if we can separate the water and salt. -To conclude the presentation, students will observe the separation of the cinnamon and water compared to the dissolved salt in water.
G. Refer back and tell them the largest bodies of ocean water are not able to be used. Next, pour 7.5 mL into 10 ml graduated cylinder to represent all fresh water on Earth.**"Now this is what we have that is usable (the 7.5 mL of "freshwater" in the 10 mL cylinder. Where does this usable water come from again? Is any of it stuck where we can't access it?"**
H. Discuss glaciers, ice caps and aquifers using the globe (2% of total water on Earth). Pour 5mL of the 7.5 mL into the 50 mL cylinder. **"Now, this is not very much, right?** "**What if I told you we still can't use all of this water?? Where else do you think water might be stuck?"**
I. Pour 2.5 mL from the 5 mL (~1% of total water on Earth) into the 50 mL cylinder for aquifers, atmosphere/water cycle, organisms. **"Okay, now does THIS represent the amount of water we have to use for our food, clothes, necessities?"**
J. Pipette "the drop representing the total amount of freshwater available for use by humans" from the 50mL and remind students that this small amount is what we use for household/hygiene, car washes, yards, pools, our animals, etc PLUS, we share this amount with nature, big industries, energy companies, agriculture, etc. **"Look at what we have left. This is the tiny amount we have to share with each other;not in the US, not in Albuquerque; this is all of the entire WORLD for all our wants, needs, extras, please can I just haves… How does this make you feel?"**

2. **Introduce and define Agriculture. Briefly remind them of the basic water cycle model- call on students for answers**.
    a. Local farmers rely on precipitation (rain and snow pack that feeds the Rio Grande) and groundwater (charged by the Rio Grande) for crops and livestock.
    b. New Mexico producers grow a variety of crops. Crops grown in New Mexico are often exported. Food we eat here is often imported but still requires water from other regions and sources like the Colorado River. No matter where our food comes from it requires water to grow.

III. *(20 min)* **Food waste is water waste**

Part A *(5 min): Discussion*. The food we eat requires valuable and scarce water to produce. How much water is needed to make the food we eat (i.e. virtual water)? What goes into making our food - farm and livestock?

Learning Objective: Food waste is a major contributor to water waste and we don't see most of the water used to produce food.

1. **"When we need to eat, we go to the store, the farmer's market, maybe a restaurant, right? It's easy, it's convenient and it's ready for us to eat. What went into making the food we are buying?"**
   a) Student responses:
      i) Farmers use water to grow our fruits and vegetables as well as to power their tractors and equipment.
      ii) Ranchers feed their livestock and give them lots of water.
      iii) Machines to process the food into cereal, burger patties, soup, etc.
      iv) Trucks to deliver food to communities.
2. **Virtual Water is water that is used to produce the food we eat. For example, it takes 660 gallons of water to make one hamburger with bun, lettuce and tomato**

Part B: *(10 min) Group Activity.*

My Eyes are Bigger than My Stomach: Let's Build a Meal

Supplies:
- Laminated meal cards with virtual water quantities on back
- Pencils and paper for math

1. **"I'm going to let you build a meal that you would see in the cafeteria or your lunch box and we are going to calculate approximately how much water it takes to make that meal. Let's get into groups of 4."**
   A. Each group will pick ingredients from the tray to make a meal:
      a. Fruit/ Veggie Smoothie: 557 gallons of water
         i. Cucumber: 42, Leafy Greens: 28, Orange: 67, Banana: 95, Peach: 109, Mango: 216
      b. Burger and Fries
         i. Tomato: 26 gallons of water to make 1 pound, Lettuce: 28, Cheese: 381, Beef: 1,847, Potato: 34 *bun and oil?
      c. Chicken and Rice
         i. Cabbage: 28, Rice: 299, Chicken: 518 *water to clean/ cook
      d. Spaghetti with meatballs
         i. Tomato: 26 gallons of water to make 1 pound, Pasta (dry): 222, Cheese: 381, Beef: 1,847
      e. Veg Spaghetti

i. Tomato: 26 gallons of water to make 1 pound, Pasta (dry): 222, Cheese: 381

2. **"On the back of your ingredients, you will find how much water went into producing the meal for your group. Calculate how many gallons of water it took to grow or process that meal. What ingredients are missing from your cards?"** Discuss the oil, water, seasoning that goes into making the meal.
3. **In your groups, calculate how much water is WASTED if you only finish half your meal and throw the rest away.**
4. **Okay, now, raise your hand if you always finish everything you served yourself."**
   A. So what about the food we waste when we don't finish a meal or forget about the food to eat in the fridge?
   B. Where do you dispose of your leftovers?
   C. Has anyone used a compost or maybe you've heard of composting but aren't quite sure what it is or why it's used? Compost turns food waste into soil.

Part C**:** *(5 min) Discussion.*

Learning Objective: What are ways we can reduce food waste to help conserve water and other precious resources used for agriculture?

Discuss the build up of waste in our landfills and how we can reduce the pollution in our urban areas. What is the impact of ourselves as individuals? Take it further - think about other ways to have an impact… Packaging, processing, convenience.

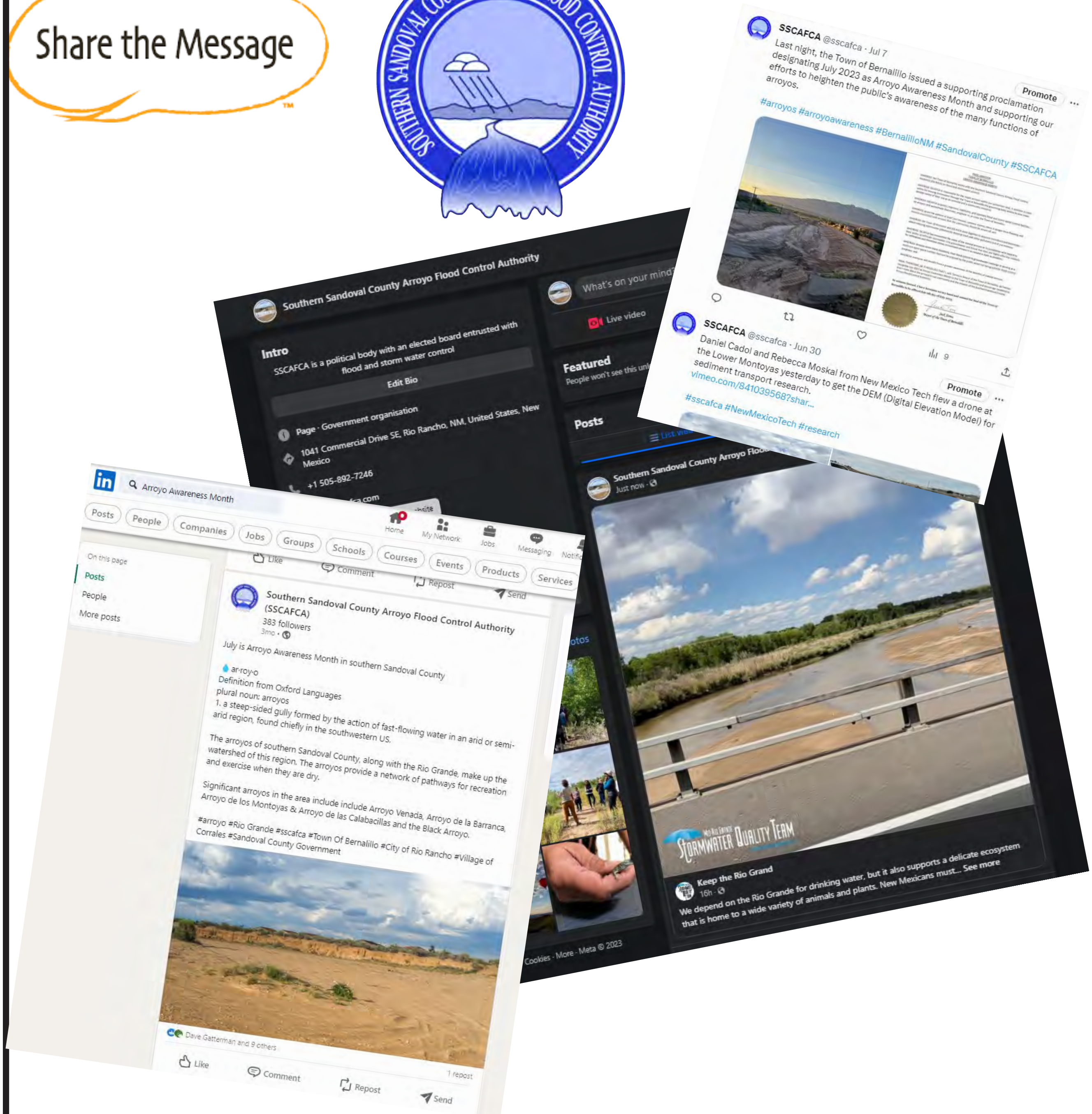
1. **What might be ways we could reduce food waste? What power do we have to create change?**
   A. By buying only what we need.
   B. Taking small portions
   C. Choosing meatless Mondays to reduce meat consumption.
   D. Creating a compost to prevent so much food going to the landfills.
   E. Buying directly from growers at farmer's markets, etc to reduce transportation and processing.
   F. Educating others like our families and communities.

IV. Conclusion (10min)

- What do you think this means for our environment and watershed - the Middle Rio Grande?

The water we drink comes from our watershed. Animals and plants also depend on this water. That's why it's important that we conserve what little water we have to use. We need to be responsible with the food that is not consumed so it doesn't end up in the landfill.

Share the Message



SSCAFCA shares social media messages from the Mid Rio Grande Stormwater Quality Team on our own Social Media pages. We also post and place our own Stormwater Quality Messaging on our social media pages.

KNOW YOUR ARROYOS

Arroyo Awareness Month
July, 2023

Heightening the public's awareness of the many functions of arroyos.


PROCLAMATION
TOWN OF BERNALILLO
ARROYO AWARENESS MONTH

WHEREAS: the Town of Bernalillo works with the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) on flood and stormwater control;

WHEREAS: SSCAFCA is responsible for the major arroyos within our jurisdiction and, in addition to their utility for moving stormwater through the Town of Bernalillo the governing body wishes to also make people aware of their use as an amenity and a community resource;

WHEREAS: SSCAFCA acquires, improves, maintains, and operates flood and storm water control facilities on arroyos and watersheds that enter, originate in, or cross the Town of Bernalillo;

WHEREAS: given the pattern of brief, but intense, summer storms, there is danger from flooding and erosion associated with arroyos that the community should be aware of; and

WHEREAS: the Town of Bernalillo and SSCAFCA work together to educate individuals and businesses about reducing stormwater pollution by keeping trash and other pollutants out of our arroyos;

WHEREAS: SSCAFCA has researched the value of the natural arroyos in its jurisdiction with regard to their ability to infiltrate stormwater into groundwater and found that they are highly effective conduits for infiltration and therefore strives to maintain arroyos in as natural a state as possible;

WHEREAS: Arroyos serve many functions, from flood control to groundwater recharge to serving as a multi-use open space corridor that can be enjoyed by the public when not being used for flood control purposes; and

WHEREAS: everyone will benefit from a greater awareness of the benefits of natural arroyos.

NOW, THEREFORE, BE IT RESOLVED THAT I, Jack Torres as Mayor of the Town of Bernalillo, do hereby recognize July 2023 as Arroyo Awareness Month in the Town of Bernalillo and encourage residents to learn more about the arroyos in our community and the mission of the Southern Sandoval County Arroyo Flood Control Authority.

In witness thereof, I have hereunto set my hand and caused the Seal of the Town of Bernalillo to be affixed this 6th day of July 2023.

Jack Torres
Mayor of the Town of Bernalillo


Office of the Mayor
City of Rio Rancho, New Mexico

ARROYO AWARENESS MONTH 2023

WHEREAS: Established in State Law in 1990, the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) acquire, improve, maintain, and operate flood and storm water control facilities on streams and watersheds that enter, originate in or cross its area of authority; and

WHEREAS: given the pattern of brief, but intense, summer storms, there is danger from flooding and erosion associated with arroyos that the community should be aware of; and

WHEREAS: Rio Rancho and SSCAFCA work together to educate individuals and businesses about reducing stormwater pollution by keeping trash and other pollutants out of our arroyos; and

WHEREAS: arroyos serve many functions, from flood control to groundwater recharge to serving as a multi-use open space corridor that can be enjoyed by the public when not being used for flood control purposes; and

WHEREAS: everyone will benefit from a greater awareness of the benefits of natural arroyos.

NOW, THEREFORE, BE IT RESOLVED THAT I, Greggory D. Hull, as Mayor of the City of Rio Rancho, do hereby recognize July as Arroyo Awareness Month in the City of Rio Rancho.

Greggory D. Hull, Mayor

June 2, 2023
Date


Southern Sandoval County Arroyo Flood Control Authority
1041 Commercial Drive SE • Rio Rancho, NM 87124
Ph (505) 892-RAIN (7246) • Fax (505) 892-7241

BOARD OF DIRECTORS
Ronald Abramson
John Chaney
Mark Conkling
Cassandra D'Antonio
James F. Fahey Jr.
EXECUTIVE ENGINEER
David Gatterman, P.E.

RESOLUTION 2023-05
DECLARATION OF ARROYO AWARENESS MONTH, JULY 2023

WHEREAS, authority is granted to the SSCAFCA Board of Directors to make and pass resolutions and orders on behalf of the Authority not repugnant to the provisions of the Southern Sandoval County Flood Control Act (72-19-1 to 72-19-103, NMSA 1978);

WHEREAS, the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) is an independent corporate political body with an elected board entrusted with flood and storm water control;

WHEREAS, SSCAFCA is responsible for the major arroyos within our jurisdiction and in addition to their use for moving stormwater through the drainage system wishes to also make people aware of their use as an amenity and a community resource;

WHEREAS, SSCAFCA acquires, improves, maintains, and operates flood and storm water control facilities on arroyos and watersheds that enter, originate in or across our area of authority;

WHEREAS, SSCAFCA works together with the communities within its jurisdiction to educate individuals and businesses about reducing stormwater pollution by keeping trash and other pollutants out of our arroyos;

WHEREAS, given the pattern of brief, but intense, summer storms, there is danger from flooding and erosion associated with arroyos that the community should be aware of;

WHEREAS, SSCAFCA has researched the value of the natural arroyos in its jurisdiction with regard to their ability to infiltrate stormwater into groundwater and found that they are highly effective conduits for infiltration;

WHEREAS, SSCAFCA wishes to maintain arroyos in their natural state, whenever possible, with little or no structural improvement, allowing infiltration; and

WHEREAS, everyone will benefit from a greater awareness of the benefits of natural arroyos.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY THAT


VILLAGE OF CORRALES

PROCLAMATION NO. 23-06

DESIGNATING JULY 2023 AS ARROYO AWARENESS MONTH IN THE VILLAGE OF CORRALES

WHEREAS, The Village of Corrales works with the Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA) on flood and stormwater control; and

WHEREAS, SSCAFCA is responsible for the major arroyos within our jurisdiction and, in addition to their utility for moving stormwater through the Village of Corrales, the Governing Body wishes to also make people aware of their use as an amenity and a community resource; and

WHEREAS, SSCAFCA acquires, improves, maintains, and operates flood and storm water control facilities on arroyos and watersheds that enter, originate in, or cross the Village of Corrales; and

WHEREAS, Given the pattern of brief, but intense, summer storms, there is danger from flooding and erosion associated with arroyos that the community should be aware of; and

WHEREAS, The Village of Corrales and SSCAFCA work together to educate individuals and businesses about reducing stormwater pollution by keeping trash and other pollutants out of our arroyos; and

WHEREAS, SSCAFCA has researched the value of the natural arroyos in its jurisdiction with regard to their ability to infiltrate stormwater into groundwater and found that they are highly effective conduits for infiltration and therefore strives to maintain arroyos in as natural a state as possible; and

WHEREAS, Arroyos serve many functions, from flood control to groundwater recharge to serving as a multi-use open space corridor that can be enjoyed by the public when not being used for flood control purposes; and

WHEREAS, Everyone will benefit from a greater awareness of the benefits of natural arroyos.

NOW, THEREFORE, I, James F. Fahey, Jr, Mayor of the Village of Corrales, do hereby recognize July 2023 as Arroyo Awareness month in the Village of Corrales and encourage residents to learn more about the arroyos in our community and the mission of the Southern Sandoval County Arroyo Flood Control Authority.

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EDUCATION OUTREACH & ENGAGEMENT

Tour of the HJC for members of the Meadowlark Senior Center

Talking to the Sandoval County Master Gardnerrs

Meeting with the Mariposa homeowners Association

EDUCATION OUTREACH & ENGAGEMENT

Stormwater Presentation

Multiple presentations at Rio Rancho Public Schools

Yard Signs available upon request

Clean, repair and deliver the Stormwater Kiosk to various locations

HARVEY JONES CHANNEL OUTFALL

A low-impact development project which leveraged treated wastewater effluent and stormwater to establish a wetland on the banks of the Rio Grande

Arroyo Classroom

Mid-year report 2022-2023

October-December

Submitted by: Education Manager
Erin Blaz

The Arroyo Classroom Team: Erin Blaz, Theresa Aragon, Astrid Mooney

Participating Schools:

	SCHOOL	Number of classes	Number of Students
Title I*	Enchanted Hills Elem.	6	126
	Martin Luther King Elem.*	5	100
	Sandia Vista Elem.	6	141
	Maggie Cordova Elem.*	6	119
	Cielo Azul Elem.*	5	108
	Puesta del Sol Elem.*	5	103
	Colinas del Norte*	5	107
	TOTALS	**38**	**804**

Task 1: Recruit and select classes.
Complete by September 2022. **Status: completed.**

Recruitment was exciting this year as all the schools we reached out responded with interest in the program, including Cielo Azul who did not participate in 2021-2022. Arroyo Classroom participants generally include the whole 3rd grade cohort, so offering the program to a school means that serving the whole grade level doesn't always line up exactly with the number of classes we target in our agreement with MRGSQT & SSCAFCA. This year, as class sizes and teachers shuffled around much like RiverXchange, we ended up with 38 classes and 804 students. Since this is 3 more classes than the 35 in our agreement with the funders and we compensate presenters for all 4 presentations in this program, Ciudad SWCD is working to figure out a solution to the budget increase for presentations that will need to be covered. Ciudad SWCD will propose solutions to the funders before any budget adjustments are made.

Task 2: Review and revise evaluation and curriculum.
Complete by September 2022. **Status: completed.**

The pre and post survey was revised, with a few slight changes to reflect our guest speakers program this year. The answer option "I haven't learned this yet" was also added to the Arroyo Classroom survey, as it was the RiverXchange survey.

Task 3: Coordinate classroom guest speakers.
Begin September 2022. On-going through May 2023. **Status: in process.**

All presentations are resuming in person programming this year. All presentations have been fully scheduled.

This year Hawks Aloft will be the only outside contractor for the program. Hawks Aloft is a great partner for this presentation as they have a team of educators and a variety of birds for the presentation. Unfortunately, they have informed us that in future years they will not be able to perform this service at the current compensation rate.

Justin Stevenson of RD Wildlife and our Bat presenter has confirmed he is unavailable this year, but hopes to resume involvement in the program in the future. Theresa Aragon, a biologist and educator, now formally employed with Ciudad SWCD, offered a Reptile/Arthropod presentation for Arroyo Classroom last year with Nature Matters and so she will be offering a similar presentation this year.

The Watershed presentation and Arroyo Walk/Field trip will be offered by Erin Blaz. Arroyo Walks have been scheduled in the fall this year to ensure they are completed (in case any pandemic related issues change school policies) and to explore if holding the walk first has any benefits on the following presentations.

Mid-year: All presentations have been scheduled. We met some challenges this year with scheduling the Bird presentations with Hawks Aloft. Once everything was scheduled and Hawks Aloft reviewed the schedule, they notified us that most of the presentation times would need to be moved to reduce the gaps between presentations as this was not ideal for the well-being of the birds, or the time required by staff. Theresa had to go back to these schools and move the times around, which proved to be difficult for some schools as their schedules are very limited in openings. Once everything was rescheduled, Hawks Aloft approved the final updated schedule. All other presentations are conducted by Ciudad education staff, so we are able to provide more flexibility with teachers' school schedules and gaps between presentation times.

During the second quarter, all 38 classes received their first presentation - which was either the Arroyo Walk or Watershed presentation (if weather was not good). 24 classes received the Bird presentation and 20 class received the Reptile presentation.

Task 4: Collect and analyze teacher feedback.
Complete by May 2022. **Status:** approaching.

Staff will revise teacher feedback form and submit to teachers at the end of the program.

Task 5: Reporting to sponsors.

Midyear report by January 31, 2022.
Final report by June 1, 2022.

Arroyo Classroom

2022-2023 Final Report

submitted by
Theresa Aragon & Erin Blaz, CSWCD
July 2022- June 2023

SUMMARY

The Arroyo Classroom program utilizes our natural arroyos as outdoor classrooms and brings local animals into the classroom to motivate 3rd graders to appreciate and protect the arroyos as important wildlife habitat. Orilla Consulting, LLC developed the program in 2012 and initially implemented the program for 7 classes at Maggie Cordova Elementary in Rio Rancho. In 2013, the program grew to serve 20 classes. On July 1st, 2015, Orilla Consulting, LLC transferred the program to Ciudad Soil and Water Conservation District as part of the larger education and outreach efforts throughout Bernalillo and Sandoval Counties. In the 2022-2023 school year, we served 38 classes within Rio Rancho Public Schools, reaching 39 teachers and approximately 804 students with 2,680 hours of program time.

Participating Schools

SCHOOL *Title 1 school	**Number of classes**	**Number of Students**
Enchanted Hills Elem.	6	126
Martin Luther King Elem.*	5	100
Sandia Vista Elem.	7	141
Maggie Cordova Elem.*	6	119
Cielo Azul Elem.*	5	108
Puesta del Sol Elem.*	5	103
Colinas Del Norte*	5	107
TOTALS	**39**	**804**

Sponsor

- Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA)

Sponsor provided a total of $22,050.00 in cash.

Deliverables:

All presentations were offered in person and completed.

- Watershed Presentations: 38:38
- Arroyo Walk: 38:38
- Bird Presentations: 37:38 (Teacher scheduling conflicts and cancellations prevented one presentation from being completed)
- Reptile & Arthropod Presentations: 38:38

Program Description

Essential Questions: What is a watershed and how does water move across it? What important functions do arroyos provide for humans and other creatures? In what ways can we enjoy arroyos safely and learn new things?

- Students characterize arroyos as ecosystems as well as drains
- Students identify arroyo features that support wildlife
- Students describe the plants, animals, birds, insects and other organisms that depend on the arroyo ecosystem
- Students explain the ways in which arroyos receive water, their benefits and the dangers of arroyos
- Students recite the rules for arroyo safety

The program consists of a four-part series of lessons, based on grade-level science standards and addressing areas of interest to SSCAFCA, such as reptiles, burrowing owls and other birds of prey, ATV use, pet waste, and arroyo safety. Erin Blaz and Theresa Aragon with Ciudad SWCD, delivered three of the lessons – an introductory lesson about watersheds, reptiles & arthropods as important wildlife in and around arroyos, and an arroyo walk that centered on native plants and animals.. Hawks Aloft provided bird presentations which included two birds of prey at each lesson and took careful consideration of cultural sensitivities to owls by partnering with staff in advance for each class.

This year the watershed lesson expounded on the water cycle and aimed for students to recognize how water moves across topographic maps. Students made predictions about how water falling on a raised land mass would travel differently than water on a flat plain and the path it will take.

Students used crumpled paper, multi-colored markers (representing water and pollutants) and a spray bottle to demonstrate how water moves through a watershed and carries pollutants along its path. In summary, this lesson introduced the concept of a watershed to students, demonstrated how surface water becomes polluted through various human impacts, and discussed the importance of keeping our arroyos clean. (Appendix A)

The arroyo walk this year began with a walk to an arroyo near the school to observe plants, animals, evidence of animals like scat and tracks, any visible human impacts and demonstrate the draining power of arroyos into the Rio Grande. We also observed tire tracks in the arroyos and talked about not using motorized vehicles in arroyos, as they are not permitted or allowed in the arroyos, and discussed the impacts of illegal dumping in arroyos. In the second part of the walking field trip we discussed desert plant adaptations and the desert climate. The lesson explored specific native plants in the arroyo habitat and how they cope with little surface water availability and precipitation, extreme temperatures (especially heat) and a windy, arid climate. We discussed the different types of adaptations plant leaves have as we observed the "hairs" on some, the thin leaf shapes and different leaf margins. Finally, using animal tracks and scat guides, the students enjoyed partnering in groups for a scavenger hunt to find evidence of different animals and shared their findings with the rest of the class.

Evaluation

Teachers overwhelmingly say they look forward to participating in Arroyo Classroom to teach about local ecology and conservation issues, incorporate more science in the classroom, to offer experiential learning opportunities and to offer learning opportunities within the community to their students. They find the presentations to be uniquely engaging and meaningful for their students. Teacher's find that Arroyo Classroom is complementary to other 3rd grade units of study such as life cycles and animal and plant adaptations. The animal presentations were a hit, as in years past. This year, the students were offered a hands-on animal presentation by having the opportunity to hold hatchling box turtles, live insects and insect collections. With in-person learning resuming this year, it was extremely encouraging to see how valued Arroyo Classroom was after a period away from field trips and in-person presentations.

Survey Summary

This is the sixth year that we have administered the pre and post-surveys for Arroyo Classroom. Based on feedback from last year, as well as the inclusion of arthropods and more reptiles in the presentations, we made some adjustments to the pre and post-surveys to reflect the content of the program. The survey questions included "Yes" and "No" questions as well as questions with three response options; "Yes, that is true," "No, that is not true," and "I have not learned that yet." This change allowed us to evaluate the growth in learning from the beginning of the program to the end, with students identifying by a large percentage that they felt confident in their responses by the end of the program.

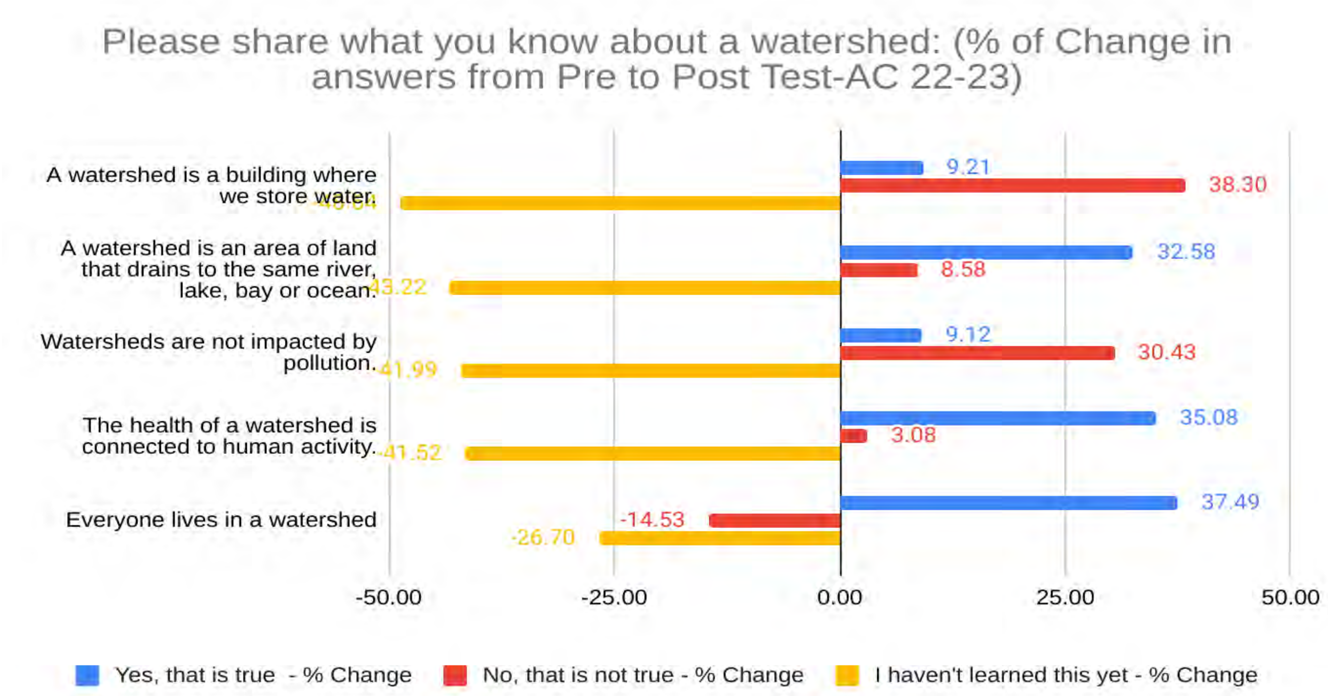
This year we had 555 pre-survey responses and 534 post-survey responses. We were pleased with the amount of responses as compared to previous years and the help of email reminders to teachers to have their students complete the surveys greatly improved participation. A brief summary of findings from the survey metrics tells us that after the Arroyo Classroom:

- 32.5% more students can correctly define a watershed
- 37% more students know that “everyone lives in a watershed”
- 35% more students say that the health of a watershed is connected to human activity
- 31% more students say that dog poop impacts arroyo health
- 23% more students identify that pesticides and herbicides impact arroyo health
- 23% more students correctly identify that natural arroyos are wildlife habitat

Survey Metrics:

Arroyo Classroom Metrics / Evaluation 2022-2023

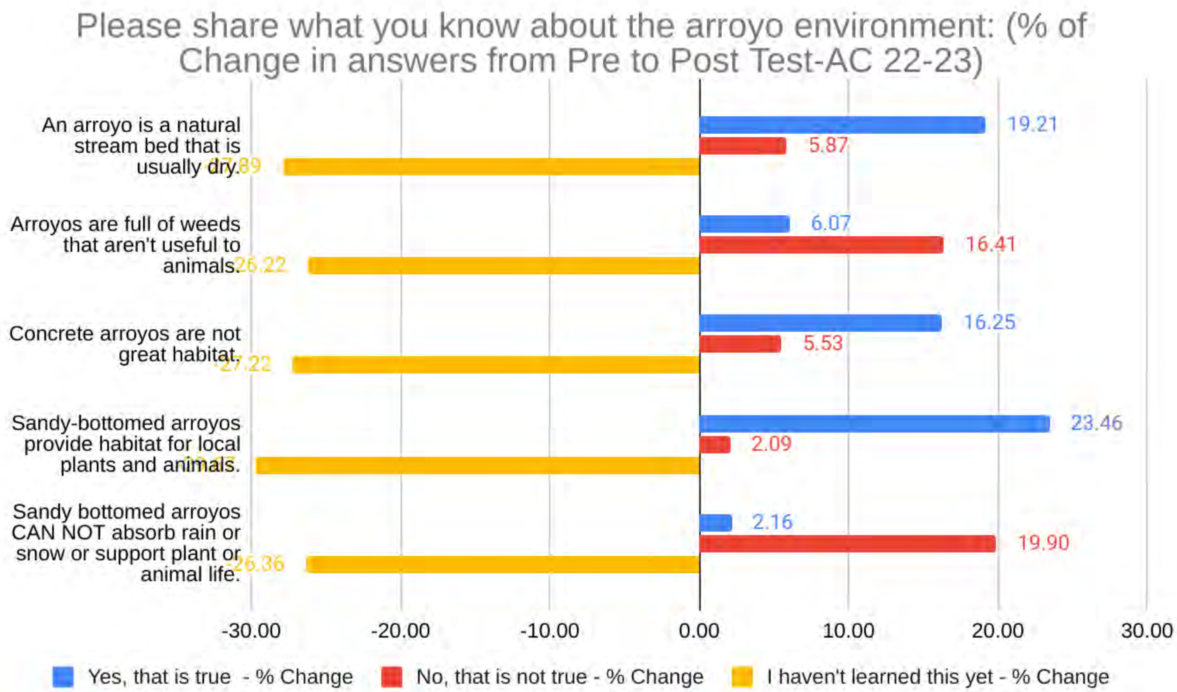
Item 1: Watersheds



The decrease in incorrect response “building where we store water” and an increase in correct response for “area of land that drains” had great responses to show that students can clearly define a watershed.

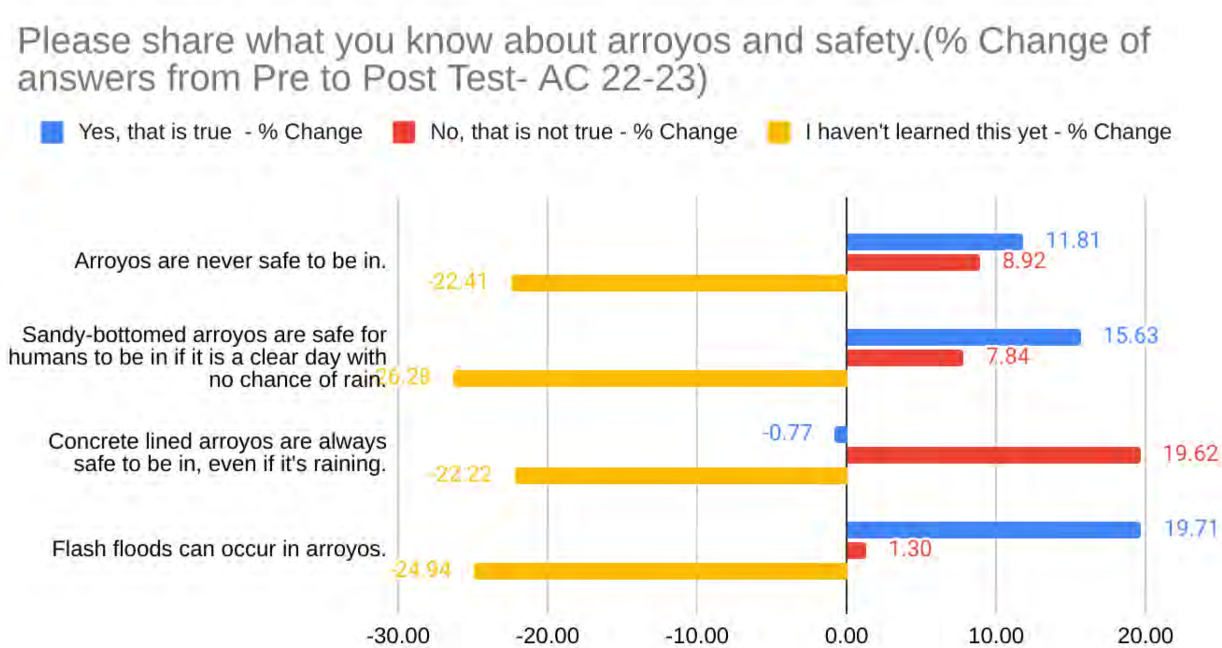
The small increase for the incorrect response for Watersheds are not impacted by pollution” was not as expected, however, there may have been confusion with the wording of the question. We will consider rephrasing “human impact on watershed” next year. Students did show an understanding of human impact in the next question of the “health of a watershed connected to human activity.”

Item 2: Arroyo Environment



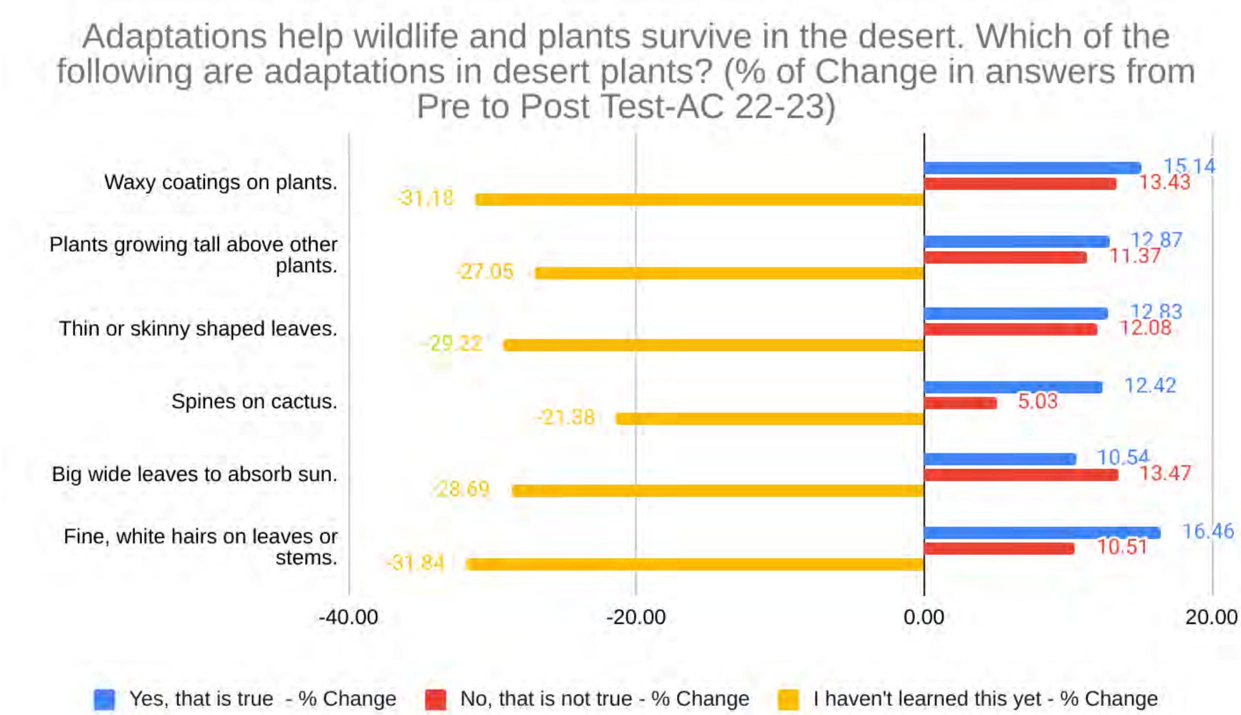
Students shifted from many “I haven’t learned this yet” responses to having a much better understanding of what an arroyo is and the huge benefits of natural, sandy arroyos in their environment. There was a lot of positive growth in learning about arroyos.

Item 3: Arroyo Safety



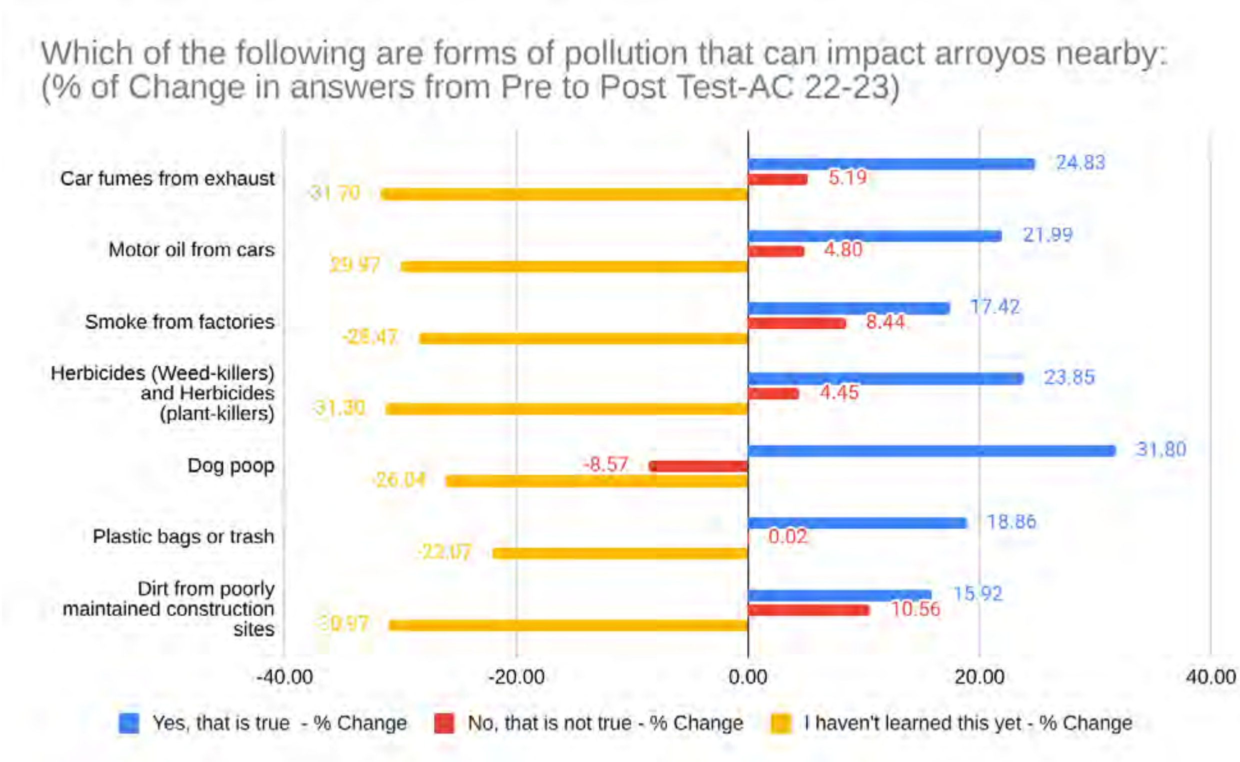
The % of change from pre-survey “I haven’t learned this yet” to the post-survey responses and an increase in correct responses are great indicators of growth in all areas of arroyo safety. The “Arroyos are never safe to be in” may have been confusing and we will consider rewording this question to specify what type of arroyos are safe and under what conditions are they safe. The correct answer is clearly understood by the students since their response to safety in sandy arroyos was that it is safe under good weather conditions. While there was a greater increase in “True-Arroyos are never safe” responses, this may also demonstrate family safety practices and behaviors that aren’t swayed easily by education.

Item 4: Adaptations to desert



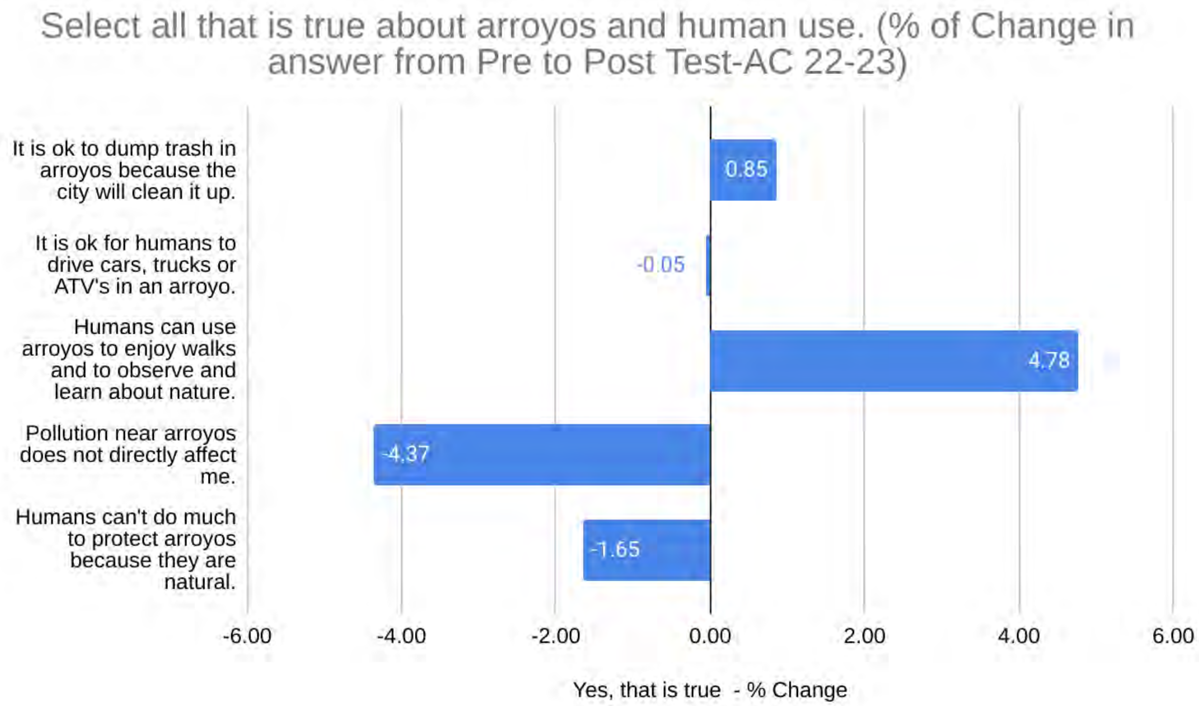
Although there is a large percentage of change from “I haven’t learned this yet,” the students seem divided on whether or not the correct response is true or false.
It’s great that the students recalled that the fine “hairs” on plants are adaptations to deserts since many of the students asked about this when they were observing plants during their Arroyo Walk field trips! There is opportunity to provide more directed lessons next year on plant adaptations based on the close true and false answers.

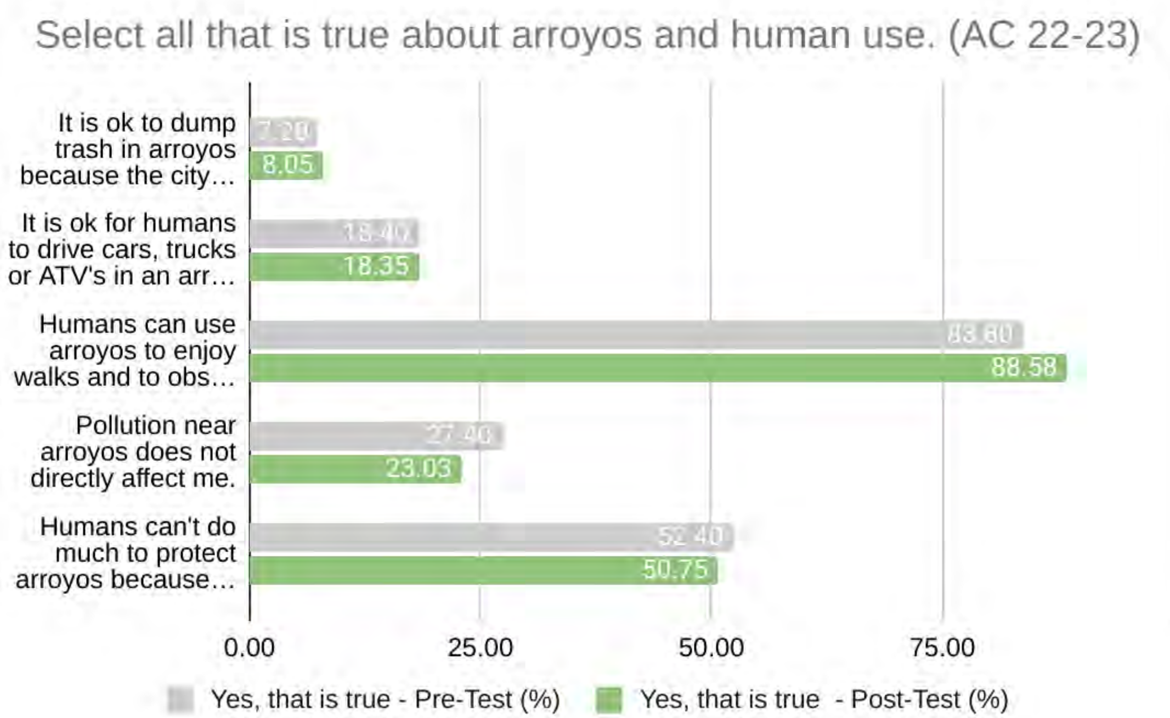
Item 5:Pollution



There is such positive growth in understanding how pollution impacts arroyos. Rather than thinking of arroyos as just another place trash piles up and relating that to need to only do a litter pick up, they are making connections between the health of our overall watershed by what lands in the arroyos.

Item 6: Human Use





Approximately ⅕ of students (Both pre and post-survey) believe it is okay to drive through arroyos but that might be due to the high number of people doing it without a lot of discussion around why that may impact the wildlife who use these areas as habitat and space.

Although there is a slight increase in the percentage of change of students who think the city will clean up the trash in the arroyos, the actual number started low at only 40/ 555 students and increased by 3 total students.

Including a more direct discussion of how to share our space responsibly is a consideration for next year.

Activity Guide for 3rd Grade – Building a Watershed

1. What are we trying to teach students in this activity?
A watershed is an area of land where all the water flows (or sheds) into a common body of water. We live in the Middle Rio Grande watershed. As water moves downhill, it carries sediments and other materials to the river. Water is a precious resource and we can help improve the quality of the river by picking up after our pets and not littering or throwing trash on the ground.

2. How can we tie this activity to our teaching goals:

Our Goals	Where we can relate our goals to this activity
We all live in a watershed	Use a model to show an understanding of the term "watershed"
Water moves downhill and can carry pollution as it moves across a landscape	Demonstrate the movement of water with the model.
Picking up after our pets and minimizing our trash, and the trash on the ground helps keep our river clean	Talk about the importance of being responsible and how caring for the watershed in this way not only protects the water, but also helps the people and plants and animals that depend on the water as well.

Supplies:

- Copy paper
- Washable markers (blue, red, brown, black)
- Disposable roasting trays
- NM relief map
- Role cards
- We All Live in a Watershed poster
- whiteboard markers
- squirt bottles
- ABCWUA aquifer poster

3. **How can we tie this activity to standards?**
   - Earth's features are constantly changed by a combination of slow and rapid processes that include erosion and weathering
   - Living things cause changes to their environment, some detrimental, some beneficial
   - Defining a behavioral, structural challenge and generating possible solutions

NGSS

3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*

2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.

NM Social Studies Standards

Theme 4. Geography 11.
3.23. Identify and use a variety of digital and analog mapping tools to locate places.

Them 4. Geography 12.
3.25. Identify the components of the Earth's biosystems and their makeup.

4. How should this activity be organized?

I. Pre-activity (10-15 minutes)

- <u>How many of you used water before you came to school? How did you use it? Where do you think all this water comes from?</u>
- <u>Has anyone heard of the term "watershed" before?</u> Highlight that it is a compound word. What do you think when you hear this word? Have them give an example of "shed" as a verb. *A watershed is an area of land where all the water sheds into the same body of water, like a river, lake, bay or ocean.*
- <u>Where does the water come from in nature?</u> *Rain or snow*
- Pull out the NM relief map. Discuss the purpose of a map. Introduce concept of a "key". Have them help you find ABQ on the map and the Rio Grande. Talk with students about the map/model. Point out the Rio Grande Watershed through the middle of the NM relief map. Where are there mountains and hills? Where do you see rivers and lakes?
- <u>What would happen if we sprayed water on the mountain peaks, what will happen to it?</u> *It will flow downhill.* Let's find out by making our own model/map, similar to the relief map.
- Introduce water cycle. A water cycle happens on a watershed

II. Build A Watershed Activity (25 min)

Part A: 10 min

- Demonstrate activity while students are sitting.
  - With your imagination, imagine that this piece of paper is a piece of land.
  - Crumple up the piece of paper and then smooth it back out most of the way. Leave it a bit crumpled, showing small ridges (high points) and valleys (low points).
  - Find the ridgelines (tops of the fold lines). Use the blue marker to color along the ridgelines on your "land". Identify the ridges.
- Pair students (groups of 2), with teachers help. Assign each a number 1-2. Write roles on a whiteboard:

- 1 - Crumpler / Drawer
- 2 - Sprayer / Disposer

- Gathered around their trays, ask students to crumple their paper and draw their ridgelines. Once they are complete - Hands on their hand so we know they are ready for the next step. Announce that students have 30 more seconds when it seems that each group has enough ridgelines.
- <u>What do you think will happen to your land when it “rains”? What will happen to the blue ridge lines? Where will the “rainwater” travel? How does the water cycle happen on your watershed?</u>
- Model for students the distance we want them to aim from as they spray (i.e. the length of your elbow to hand, vertically placed on the tray). And 5 full sprays. (idea: Students can be drill sergeants about the three sprays, acknowledge that sometimes the spray bottles act funny but that we are trusting our classmates to count for themselves to do only five full sprays...).
- Altogether, sprayers squirt your model a few times to create a “rainstorm” over your land. Observe what happens.As your rainfall accumulates, watch the pathways where the excess “rainfall” travels.
- With teachers, walk around to ask each pair to explain what the water is doing and show you rivers and streams in their model.
- Have teachers help pick up all the spray bottles, and ask everyone to place their hands on their head and have a small group discussion about their observations.

Part B: 15 min

- Have pairs switch roles, “disposers” can throw out previous model. Tell students they will keep the same number assigned earlier and tell them what role they will be playing.
  - 1 - Sprayer / Disposer
  - 2 - Crumpler / Drawer

III. What’s In the Water?

Experiment with how “pollutants” might travel through their watersheds.

- With a new piece of “land”, imagine this represents the City of Rio Rancho or the Rio Grande Watershed. Show one of the Watershed posters and point out all the human activity that happens in a watershed (driving cars, making things (manufacturing), farming, walking our dogs, etc.)
- <u>What might be on this land that we wouldn’t want in our water? What is pollution? Have you ever seen it? What does it look like?</u>
- As students share, note the types of pollution on a poster or white board and create a key for groups to use. (Roads/Cars - black, Trash - Green, Dog poop-brown (and/or orange if you have more groups than markers)) Depending on the group, you could also identify Factories - Red
- Before crumpling, have drawers (with their support drawers) mark their papers with the brown, red and black marker to represent farms, factories, houses, streets, dog poop and trash.
- Announce that students have 30 more seconds when it seems that each group has drawn enough. Then ask all students to put their hands on their head. Then have crumplers -crumple paper and then partially smooth it out. Altogether, have sprayers spray the piece of paper.

- What happened to the pollution when it rained? Describe what happened at the highest and lowest point in your watershed. How quickly did it spread? Are there any places on the land where it didn't go?

V. Conclusion (10min)

- What do you think this means for our watershed - the Middle Rio Grande?

The water we drink comes from our watershed. Animals and plants also depend on this water. That's why it's important that we try not to pollute either the water or the land. Anything that pollutes the land will eventually wind up in the water.

- What might be ways we could reduce pollution in our watershed?

By picking up trash and picking up dog poop if we have dogs.

Activity Guide for 3rd Grade – Arroyo Walk (Animal and Plant Adaptations)

1. What are we trying to teach the students in this activity?
Arroyos are cool places where animals live, animals and plants are adapted to live in the desert.

2. How can we tie this activity to our teaching goals:

Our Goals	**Where we can relate our goals to this activity**
Animals live in arroyos	Look for evidence of animals.
We should visit arroyos carefully	Talk about when it is safe.
Picking up dog poop keeps germs out of our river	We'll probably see poop, talk about how it can make animals sick.

Supplies:
- Thermometers
- Clipboards
- Poster of leaf adaptations
- Wax paper
- Paper towels
- Tape

3. How can we tie this activity to standards?
- Measure energy (temperature change)
- Posing a question, using numerical data, various methods to display results
- Animals and plants have adaptations that improve chances of survival
- Classifying animals and plants
- Living things cause changes to their environment, some detrimental, some beneficial

5. How should this activity be organized?

I. Pre-activity (10 minutes)
- Do you ever visit/play in arroyos? What do you do?
- What are arroyos for? Managing storm water to keep our town from flooding when we get a heavy rain. **Show first flush video.**
- Talk about arroyo saftey – don't go into arroyos when you see clouds in the sky.
- Because our arroyos are natural, with sandy sides and bottom, they are safer.
- In Albuquerque, the arroyos have concrete sides and water travels so fast, it is really dangerous to ever go in arroyos. Some arroyos come from the canyon where it might be raining but you can't see.
- Our arroyos are home to all kinds of animals and plants, so they are a wonderful place to enjoy nature. What kinds of animals do you think might live in the arroyo?
- Walk out to arroyo

II. Lizard activity (15 min)
- 5min Look for evidence of animals. What kind of evidence? Scat, tracks, holes.
- What kind of animals live in holes (besides snakes)?
- What do you think makes it difficult to live out here? Heat, sunburn, not much water, cold at night. Animals and plants have special **adaptations** (special things about their bodies) that make it easier for them to live in this habitat.

- How do they get water? From plants, from condensation under rocks.
- How could they avoid heat? Stay in burrows or shade during the day, active at night.
- Some animals love the heat, though! Lizards are cold-blooded, which doesn't mean they are actually cold. It means their body temperature is determined by the environment. They need to absorb heat from their surroundings to function.
- Each student take a thermometer. This is a lizard, and it needs to maintain its body temperature at a certain level: fence lizard 35C (95F), whiptail 38.6C (101F). How can it keep from getting too hot? How can it keep from getting too cold? Lizards regulate their body temperature through behavior.
- Plants do kind of the same thing – hold one palm out flat, one sideways. Which feels hotter? Prickly pear cactus pads grow sideways instead of flat to keep themselves cool!

IV. Plant activity (15 min)
- What do plants need in order to survive? Water, sunlight, air, soil
- What makes it difficult for plants in the desert? It's so hot and there's so little rain.
- How do plants get water? **Show evapotranspiration diagram.** It's kind of like when we're hot, we sweat. But if we lose too much water from sweating we get dehydrated.
- How do they keep cool? Remember prickly pear? **Show pictures of hedgehog and prickly pear cacti.** Desert plants can shade themselves! Hedgehog cactus has lots of spines that shade the surface and also blocks the wind.
- The leaves of many desert plants are **adapted** so that they don't lose too much water.
- Show leaf adaptations poster (fuzzy, small, curled, waxy, green stems but no leaves)

If weather is ok:
- Out in arroyo, we'll do an investigation.
- How many of the plants we see will have these adaptations? Hypothesize.
- To be fair, we can't just pick the plants we like. Standing in one spot, collect the first 6 *different* leaves you see.
- Draw each one, and describe what adaptation it has.
- How many of your 6 leaves have one of the adaptations listed?
- Why don't all have it? Some plants avoid the heat by just growing and producing seed really fast before the weather gets hot, and then they just die off and leave their seeds to grow next year!
- Search for seeds.

If windy, inside activity:
- Let's investigate one way they keep water. **Dab water on board, cover one spot with paper towel, one spot with wax paper.** Which do you think will evaporate faster?
- **Show prickly pear picture.** Make model of prickly pear pad: paper towels with wax paper taped around the outside. **Show cut prickly pear pad.**
- Maybe do experiment: soak wax-covered and non wax-covered leaves in water and time how long they take to dry.

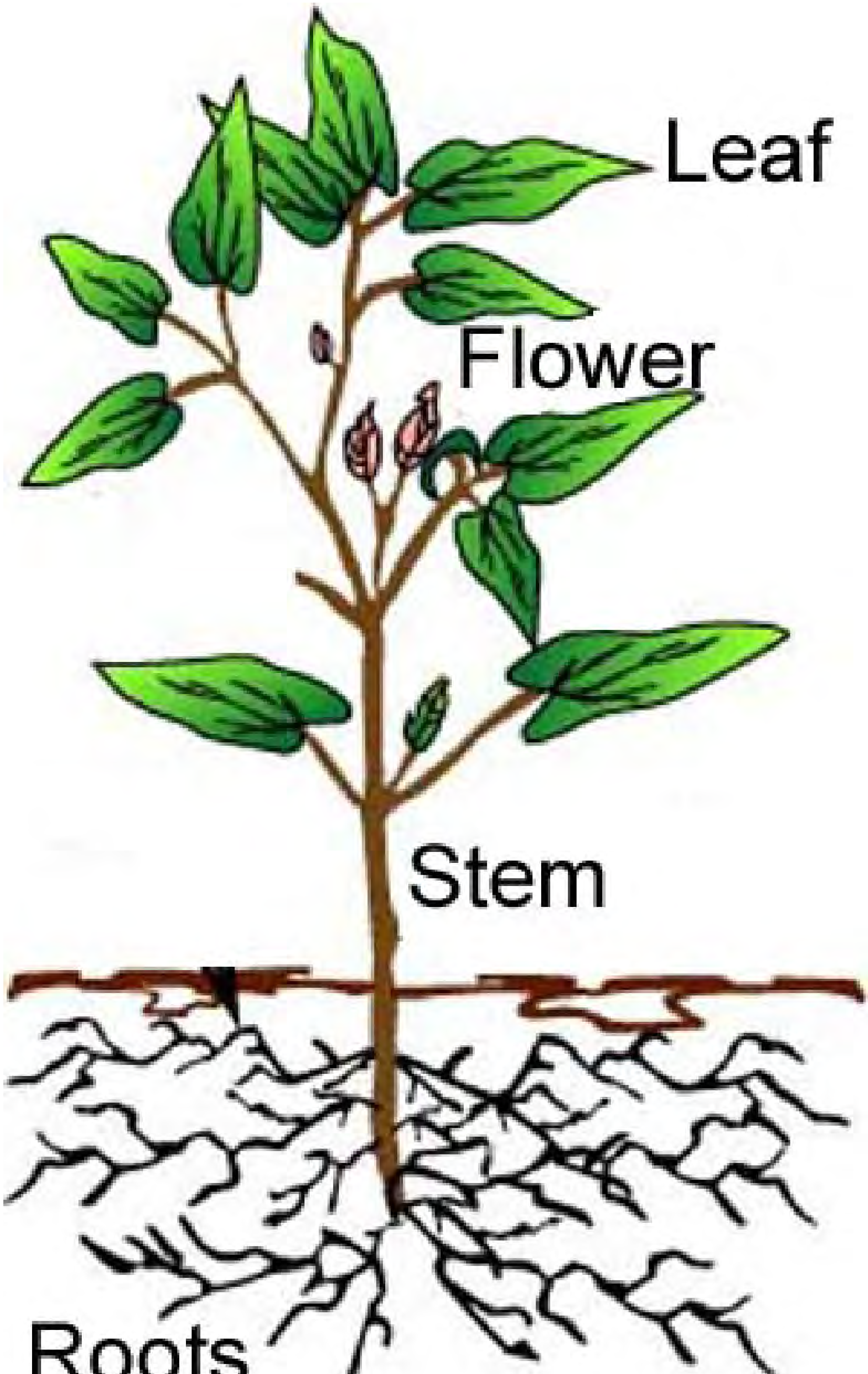
V. Conclusion (10min)
- Arroyos are for flood control, and we shouldn't play in them when clouds are in the sky.
- But they are cool places where animals and plants live, and we can visit when it's clear weather.
- Animals and plants are adapted to live in the desert climate.
- What we do in arroyos affects the plants, and animals' habitats. Should we ride ATVs up the sides? That's something humans do to change our environment for the worse.

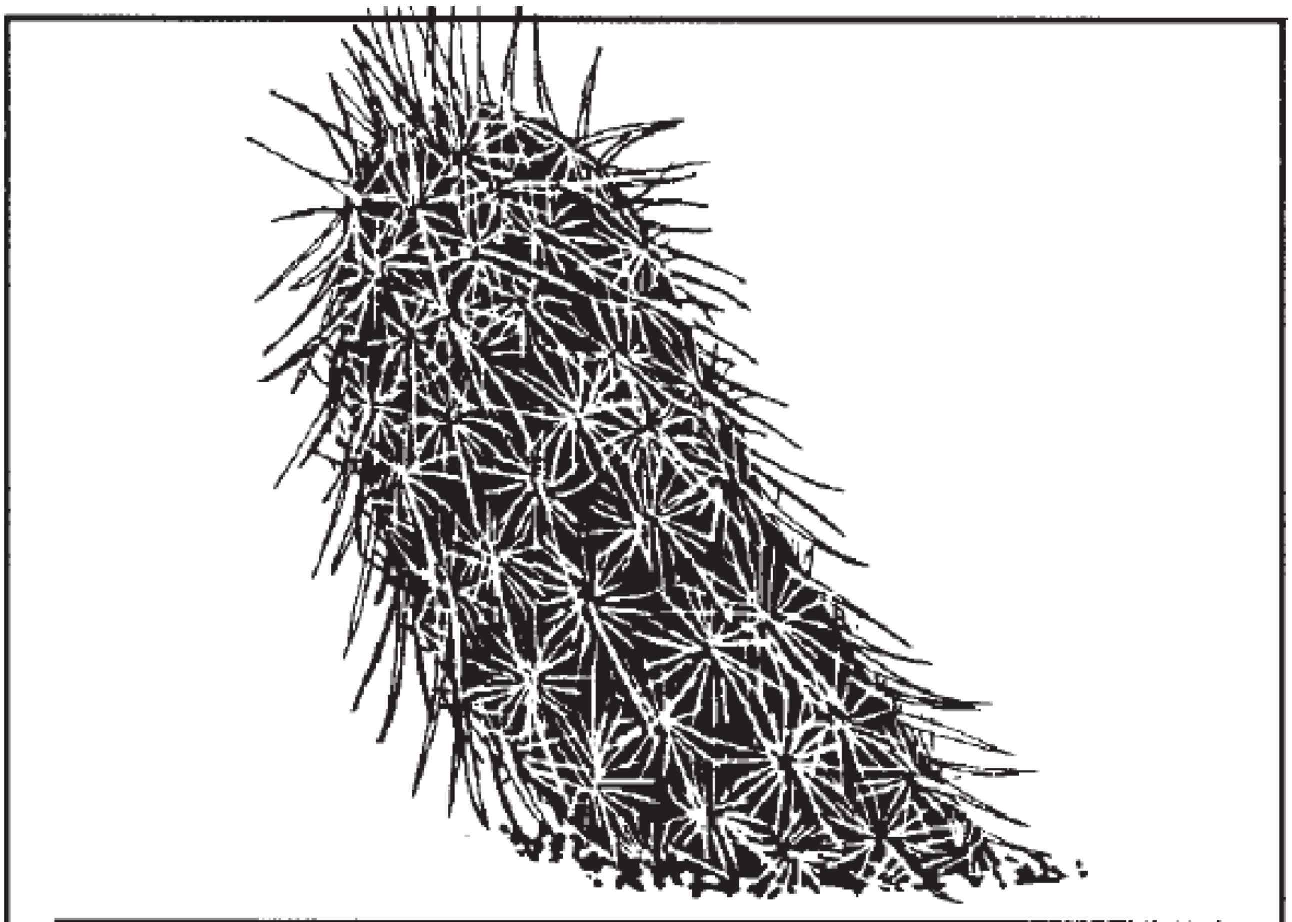
- Picking up dog poop is important because it can make animals sick. Where does the water go when it flows down the arroyo? The Rio Grande! Keeping dog poop out of the river is one way humans can change our environment for the better.
- Walk back to classroom

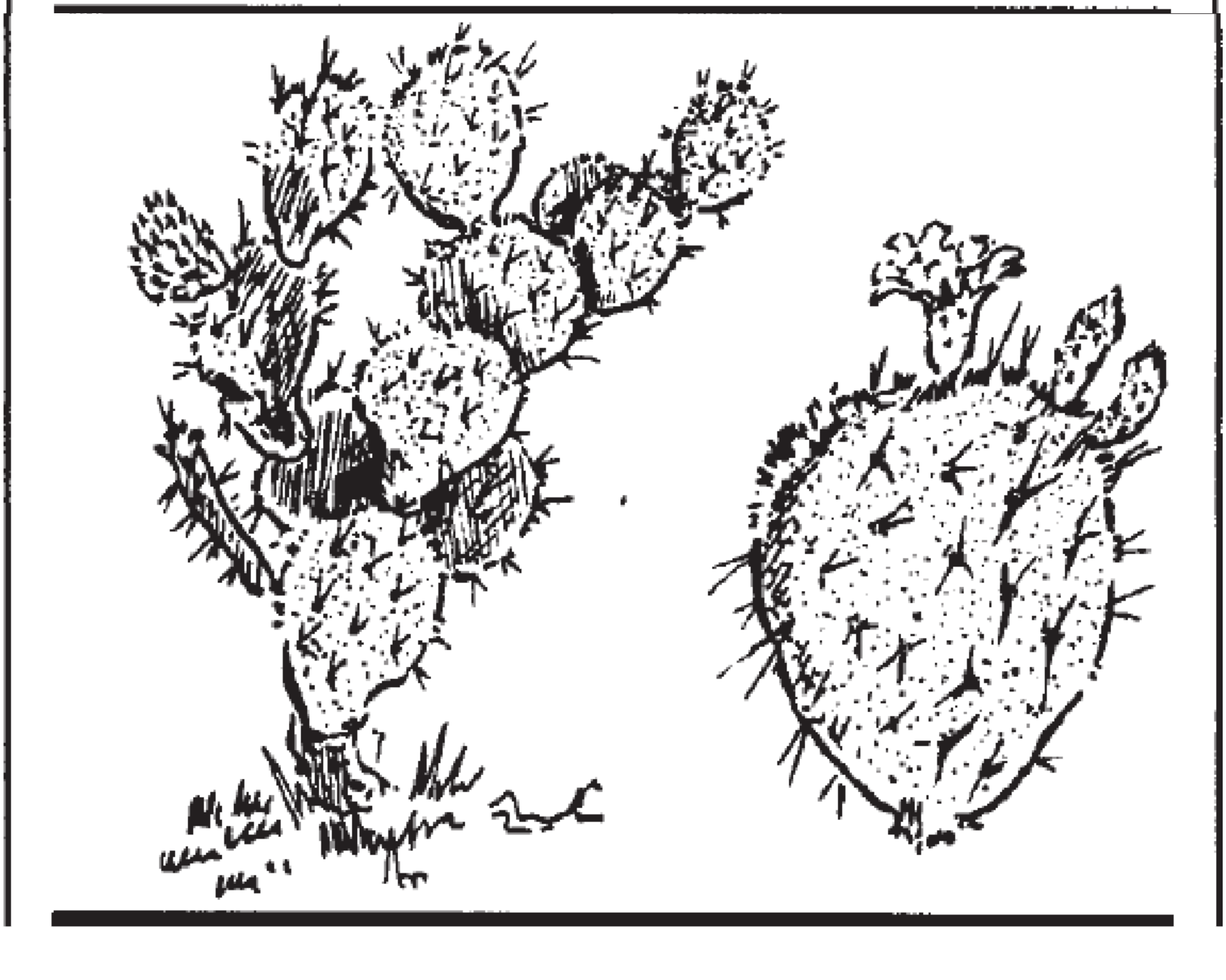
Leaf Adaptations

1. **Fuzzy leaves or lots of spines**
2. **Small leaves**
3. **Curled leaves**
4. **Waxy leaves**

5. **Green stems but no leaves!**


Leaf
Flower
Stem
Roots





Town of Bernalillo
"The City of Coronado"

From May 2023 to current, the Town of Bernalillo has hosted the educational stormwater kiosk with approximately .5 visitors per day.

In addition, we have distributed stormwater brochures from our of the Planning Department Office and Town Hall reception desk. Approximately 30.

We have also produced newsletter articles in support of stormwater to include the promotion of the kiosk and fats, oils and greases.

THE UNIVERSITY OF NEW MEXICO

BEMP

Bosque Ecosystem Monitoring Program

BOSQUE SCHOOL

Challenging Education

Mid Rio Grande Stormwater Quality Team

Bosque **E**cosystem **M**onitoring **P**rogram in coordination with the Mid Rio Grande Stormwater Quality Team.

2022 Annual Stormwater Quality Team Technical Report

Submitted December 21, 2022

WORK COMPLETED BY:
Bosque Ecosystem Monitoring Program (BEMP)

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Bosque School 4000 Bosque School Road NW Albuquerque, NM 87120

REGARDING BEMP PROFESSIONAL SERVICES AGREEMENT
FOR: Mid Rio Grande Stormwater Quality Team

DATE SUBMITTED:
21 December 2022

Key personnel and contact information:
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Introduction

Staff from the Bosque Ecosystem Monitoring Program (BEMP) collected data from eight (seven in January) sample locations from north to south along the Rio Grande. Sampling occurred quarterly in 2022 during the months of January, April, July and October. Monitoring objectives were to:

1. Assess *Escherichia coli* concentrations in the river; to see how these levels change flowing into, through, and out of Albuquerque; and how these levels fluctuate temporally over the year.
2. Obtain levels of dissolved oxygen (DO), turbidity, conductivity, temperature, and pH to assist in water quality interpretation and to see how various river inputs may affect these parameters.

Escherichia coli standards

Escherichia coli is a bacteria that has been used as an indicator of fecal contamination of surface water. The presence of *E. coli* in high concentrations can cause human health issues and can also indicate the presence of other harmful pathogens.

The EPA and the State of New Mexico recognize an upper limit for *E. coli* presence in primary contact water as 410 MPN/100 mL. However, limits set by the Pueblo of Isleta, a community just south of Albuquerque, are 88 MPN/100mL due to special usages and hereafter is referred to as the "desired limit" and is the ideal upper limit of *E. coli* concentration for sampled locations.

Sampling strategy

Quarterly sampling took place at eight (seven in January) river sites spanning approximately 26 miles (Table 1, Figure 1). Sampling for seven of the eight locations occurred along the west bank of the Rio Grande. An eighth location, State Land Office (SLO), was collected on the east bank of the Rio Grande across from the Los Padillas site (Table 1, Figure 1). The northernmost site, Willow Creek, is located on the south side of HWY 550 in northern Rio Rancho and was selected to show the quality of the water entering Albuquerque (Table 1, Figure 1). The southernmost sites, Los Padillas and SLO, are located west of the Valle de Oro National Wildlife Refuge, and below Albuquerque's Southside Wastewater Reclamation Plant, in southern Albuquerque (Table 1, Figure 1). These sites are used to represent the quality of the water leaving Albuquerque. Quarterly sampling occurred upstream to downstream during the months of January*, April, July, and October.

**In January sampling did not occur at the SLO site as this site had not yet been added to the contract.*

Table 1. Sampling location from north to south.

Site Name	**Latitude and Longitude**	**Nearby landmark**
Willow Creek	35.295546, -106.581921	South of the HWY 550 Bridge, west riverbank
Corrales	35.208357, -106.622984	Across and slightly downstream of the North Diversion Channel
Bobcat	35.196928, -106.643422	South of Alameda Bridge, west riverbank
Montaño	35.145738, -106.678711	South of Montaño Bridge, west riverbank
Central West	35.089068, -106.681366	North of Central Bridge, west riverbank
Rio Bravo West	35.027410, -106.673757	North of Rio Bravo Bridge, west riverbank
Los Padillas	34.973066, -106.690553	North of I-25 Bridge near Valle de Oro NWR, west riverbank
State Land Office (SLO)	34.970360, -106.688214	North of I-25 Bridge near Valle de Oro NWR, east riverbank

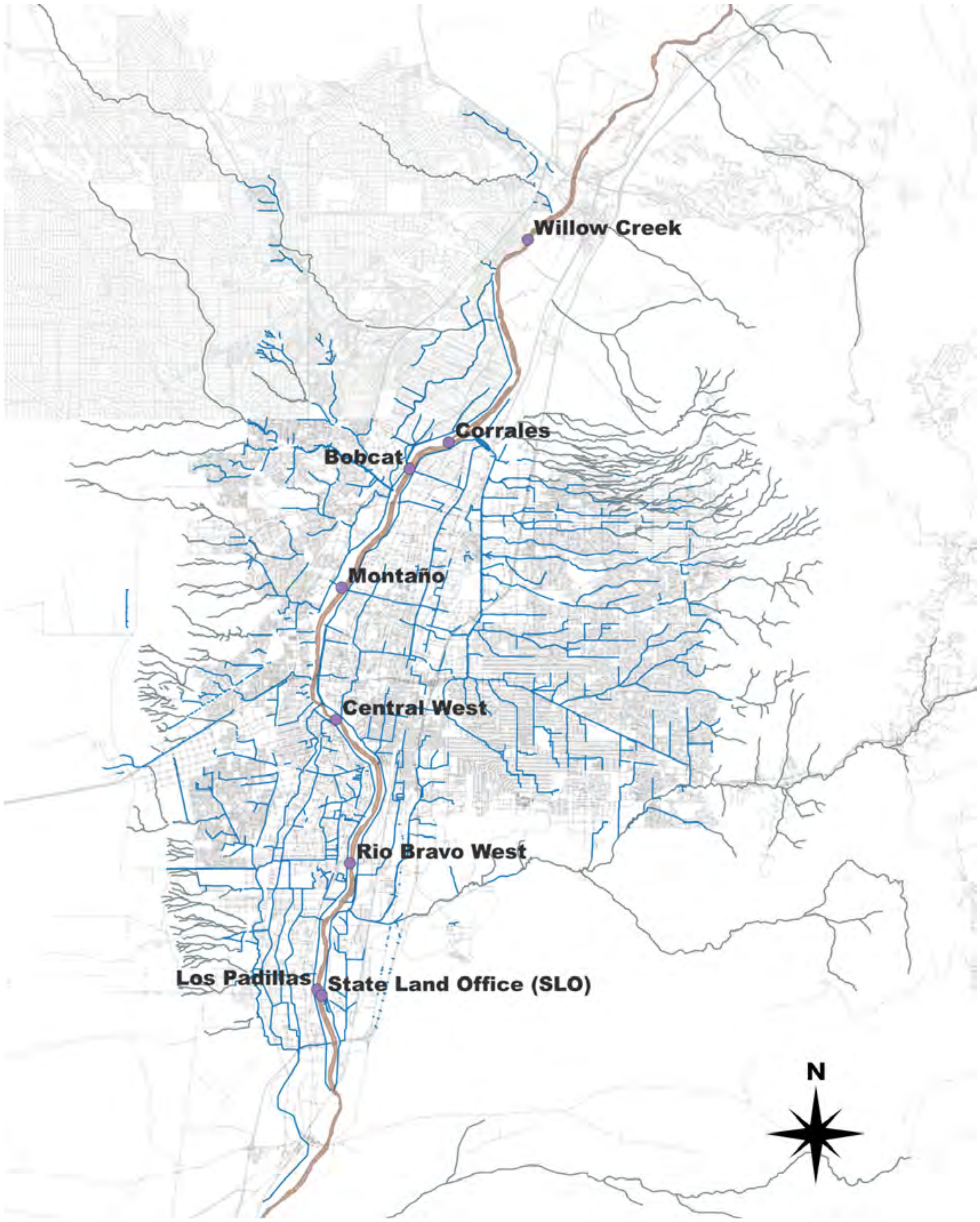


Figure 1. Sampling locations for 2022. Additional GIS layers include arroyos, drains and ditches, city streets, and river center.

Procedures

Prior to sampling, all equipment to be used was calibrated at the University of New Mexico using the manufacturer's protocol. An ice bath was constructed using a small cooler filled with an ice water slurry and equipped with a digital max/min thermometer to ensure proper holding conditions for *Escherichia coli* samples prior to delivery to the receiving laboratory. River flow was recorded using the USGS Rio Grande central gauge. All sampling and safety equipment were transported to each site by BEMP staff. Upon arrival at each collection site, safe river entry was determined using river flow data, visual inspection of the river, and if necessary, an extendable pole to determine depth. If the river was determined safe to enter, a collecting crew would don waders and personal flotation devices (PFDs) prior to entering the water. The collecting crew would walk in-stream away from the river bank to sample an area of water with adequate mixing. No fewer than two members of the collecting team entered the water at any one time while a minimum of one additional member stayed on shore with a throw rope for safety purposes. If only two crew members are available samples are taken from shore using modified poles and collection cups. Instream field parameters were collected following methodologies established by the New Mexico Environment Department, SOP 9.1 (NMED 2013) and included pH, conductivity, specific conductance, water temperature, and dissolved oxygen. Staff trained in proper *E. coli* collection technique collected samples at each site using gloved hands and specimen cups provided by the analyzing laboratory. Turbidity samples were collected in vials for analysis. Site specific information was collected including air temperature, number of upstream waterfowl, water color, and any unusual odors. Photo documentation of each site was taken with written site name, date, and time of arrival included in the photograph. *E. coli* samples were labeled with site name and collection time using laboratory provided labels and tamper-proof seals were applied. These samples were placed in sealed bags and submerged in the ice bath for transportation. After the final site was collected a "blank" *E. coli* sample was made using proper collection techniques using deionized water. This sample was labeled as "blank", stored, and transported using the same technique as the river samples. All *E. coli* samples were transported to Hall Environmental Analysis Laboratory in Albuquerque, New Mexico where *E. coli* coliform enumeration analysis was performed.

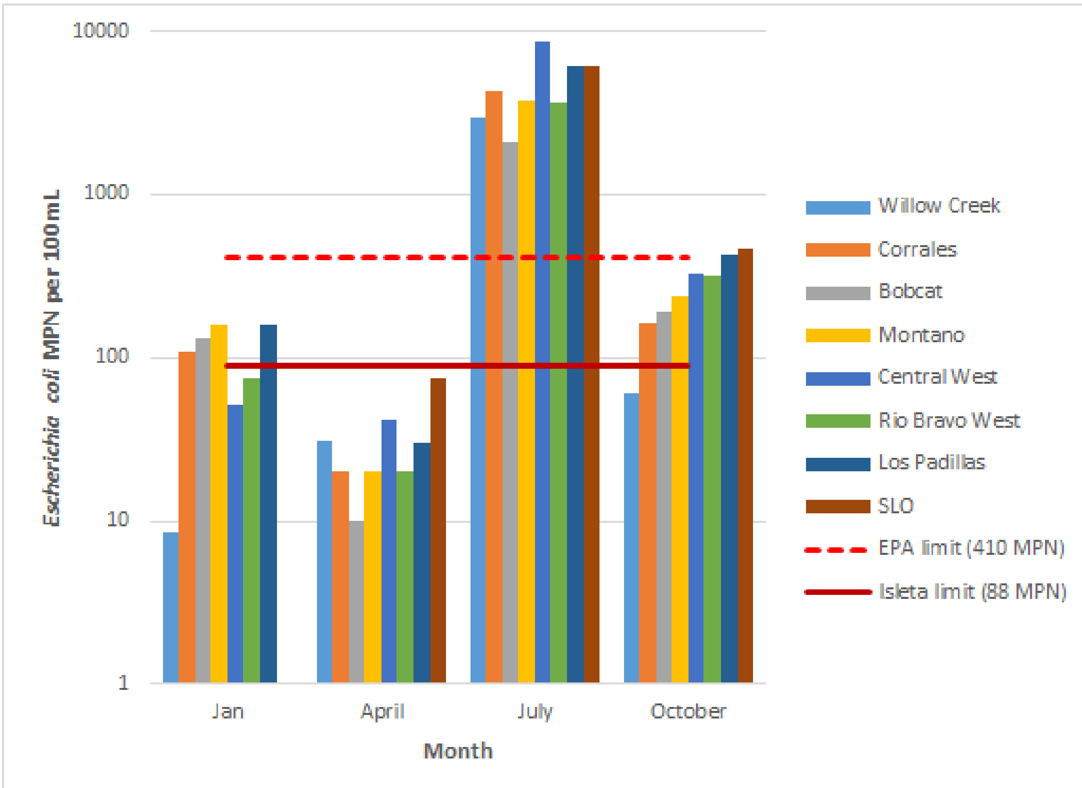


Figure 2a. *Escherichia coli* MPN/100mL on Log 10 scale at sampling sites across months.

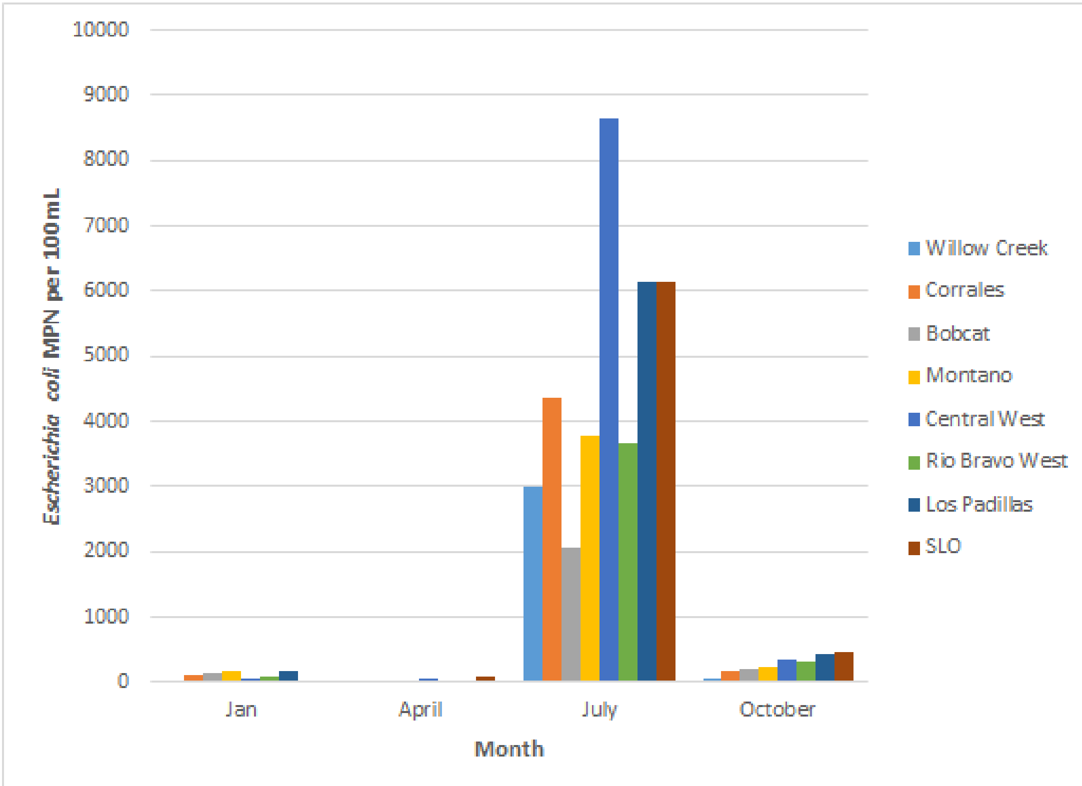


Figure 2b. *Escherichia coli* MPN/100mL at sampling sites across months. Same data as in Figure 2a but on a linear scale.

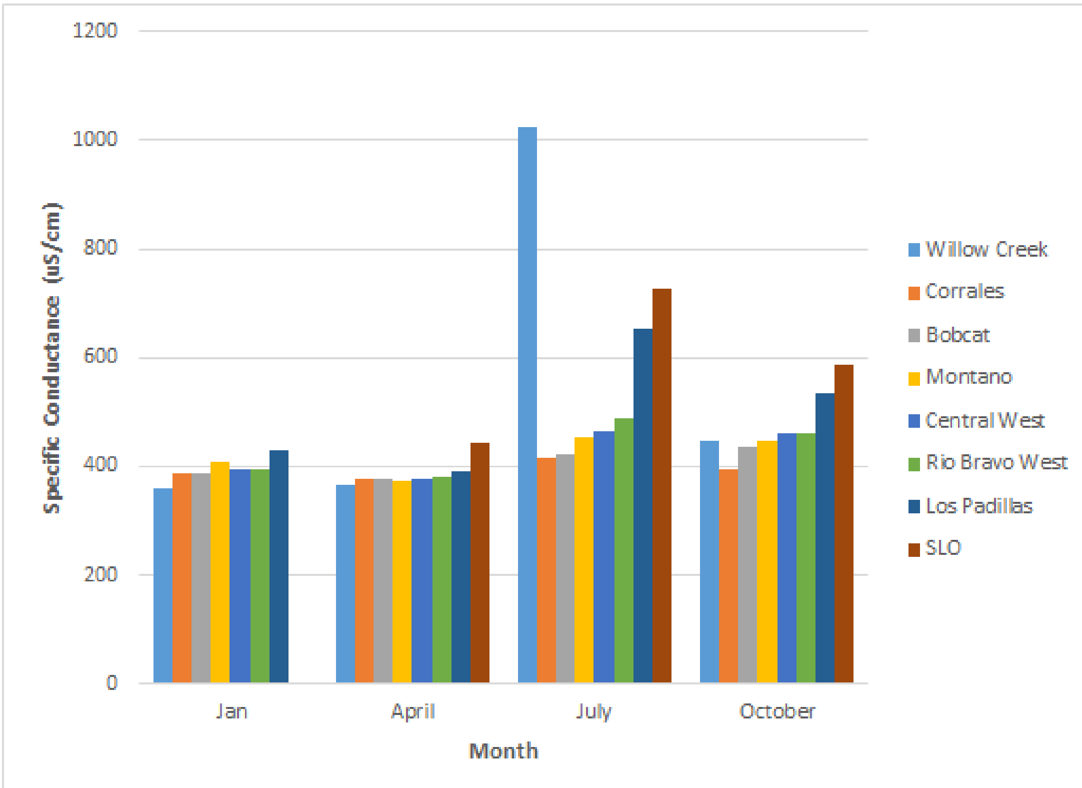


Figure 3. Specific conductance uS/cm measured at sampling sites across months.

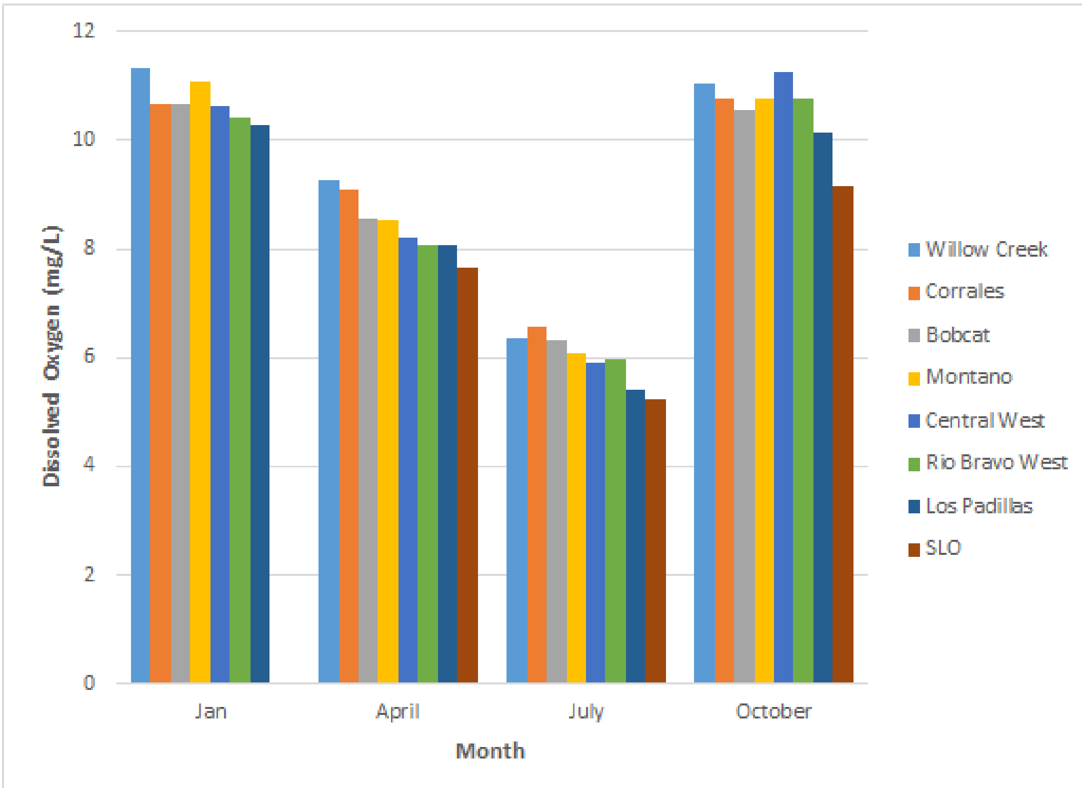


Figure 4. Dissolved oxygen mg/L measured at sampling sites across months.

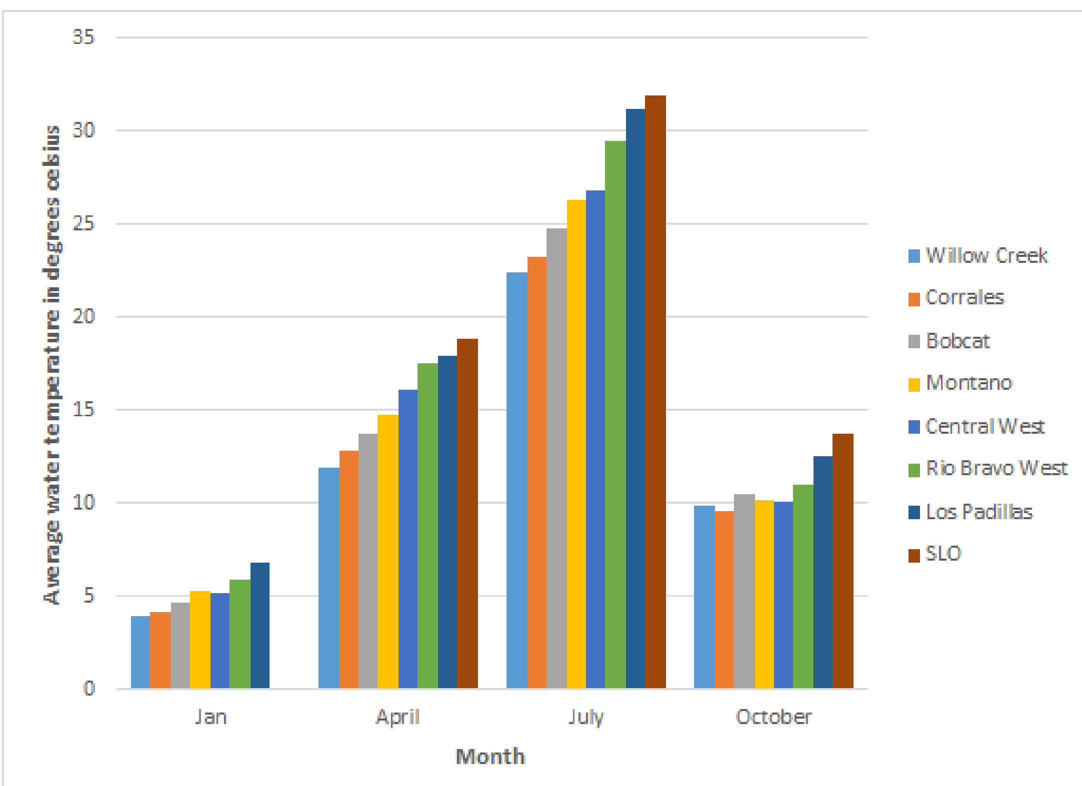


Figure 5. Temperature in degrees celsius measured at sampling sites across months.

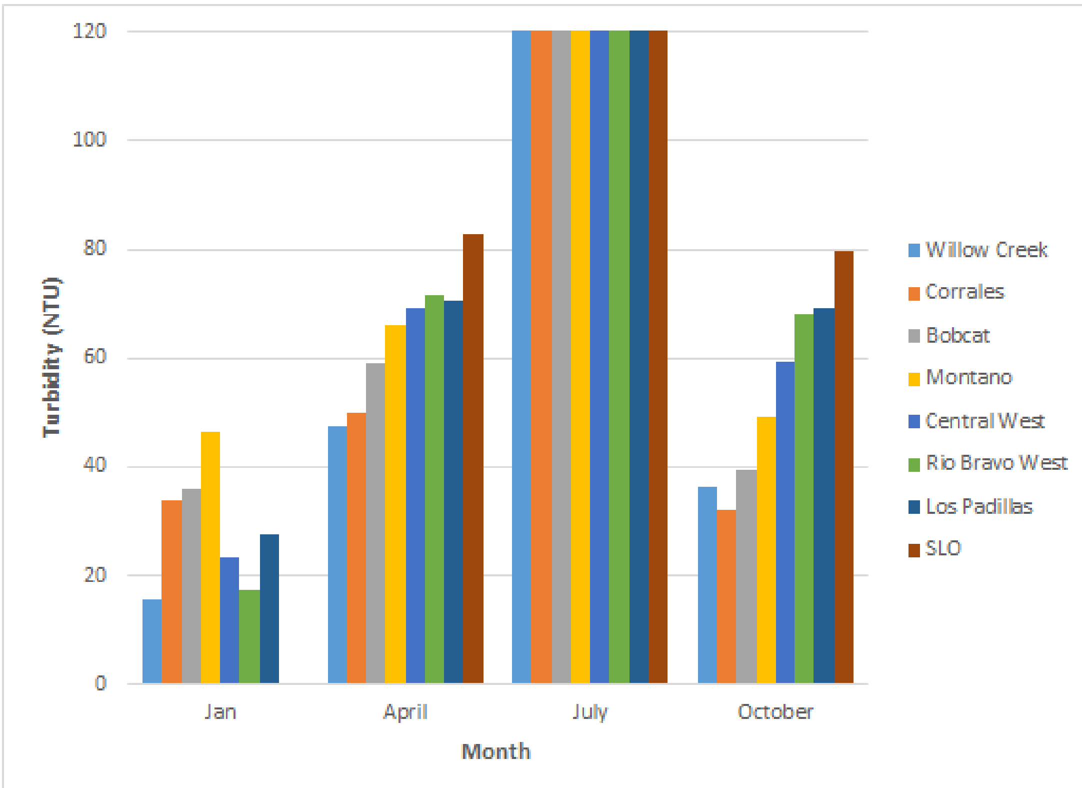


Figure 6. Turbidity (NTU) measured at sampling sites across months. Turbidity in July exceeded the instrument's range resulting in over range values at sample locations.

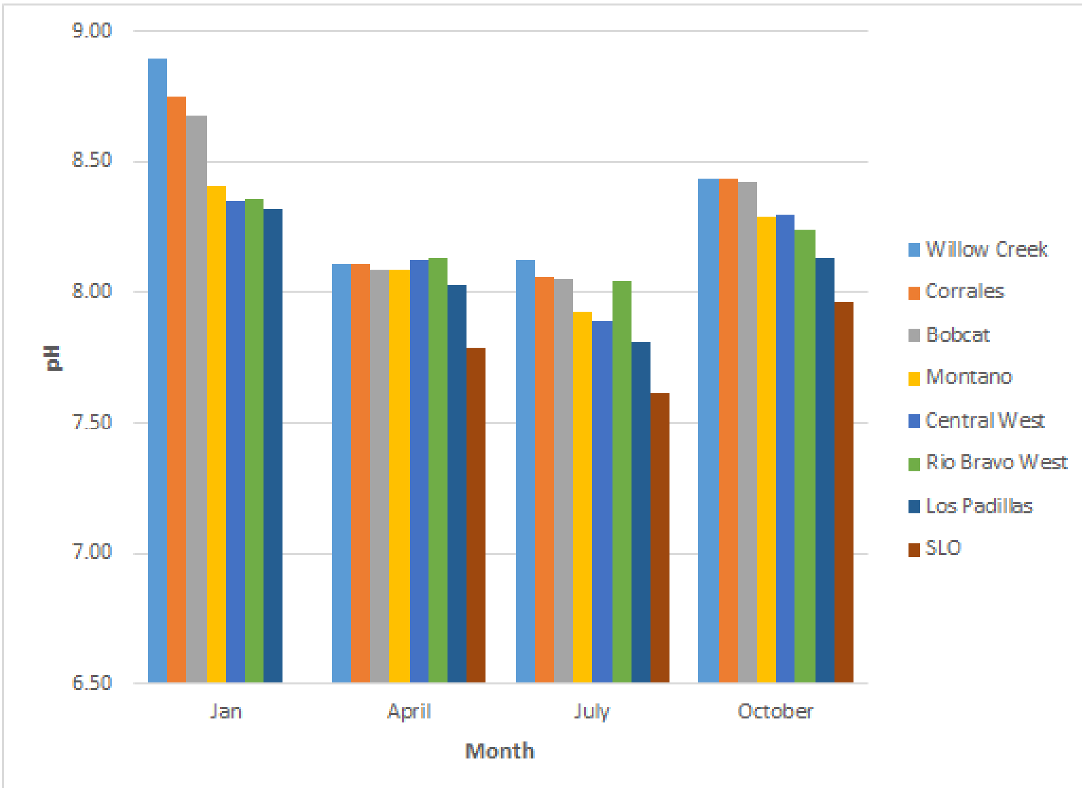


Figure 7. pH measured at the sampling sites across months.

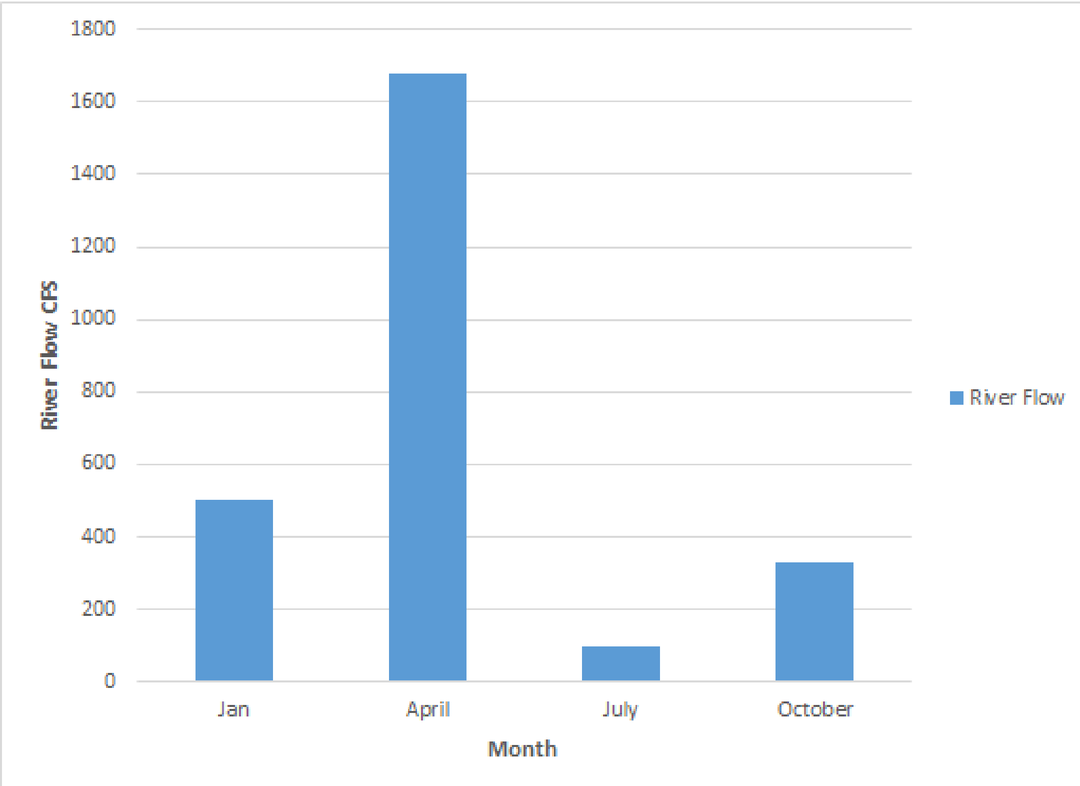


Figure 8. River flow at the Albuquerque gauge across sites.

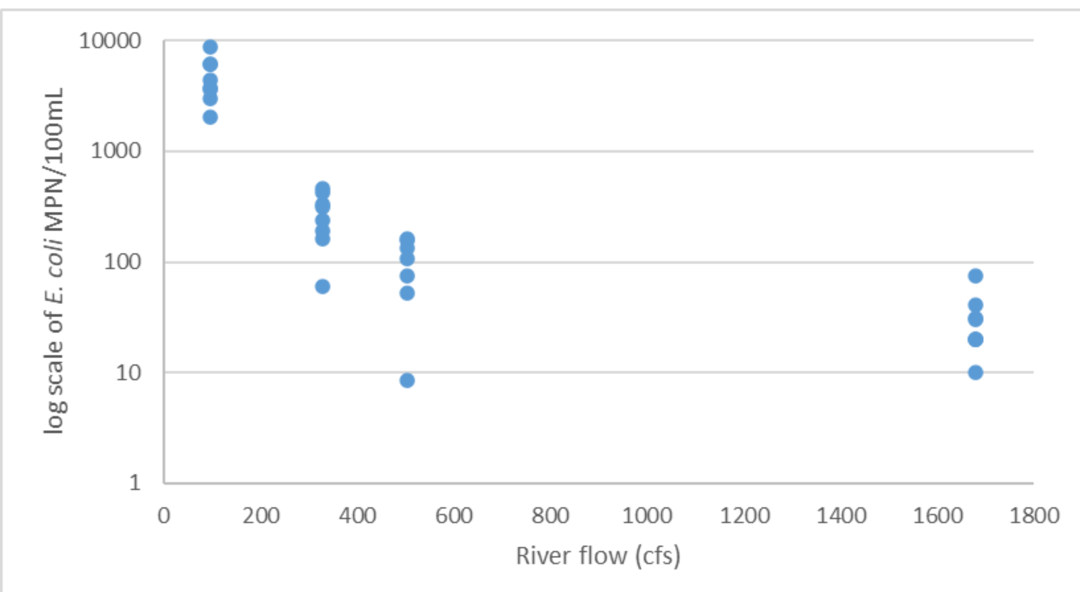


Figure 9. Log scale of *E. coli* vs river flow.

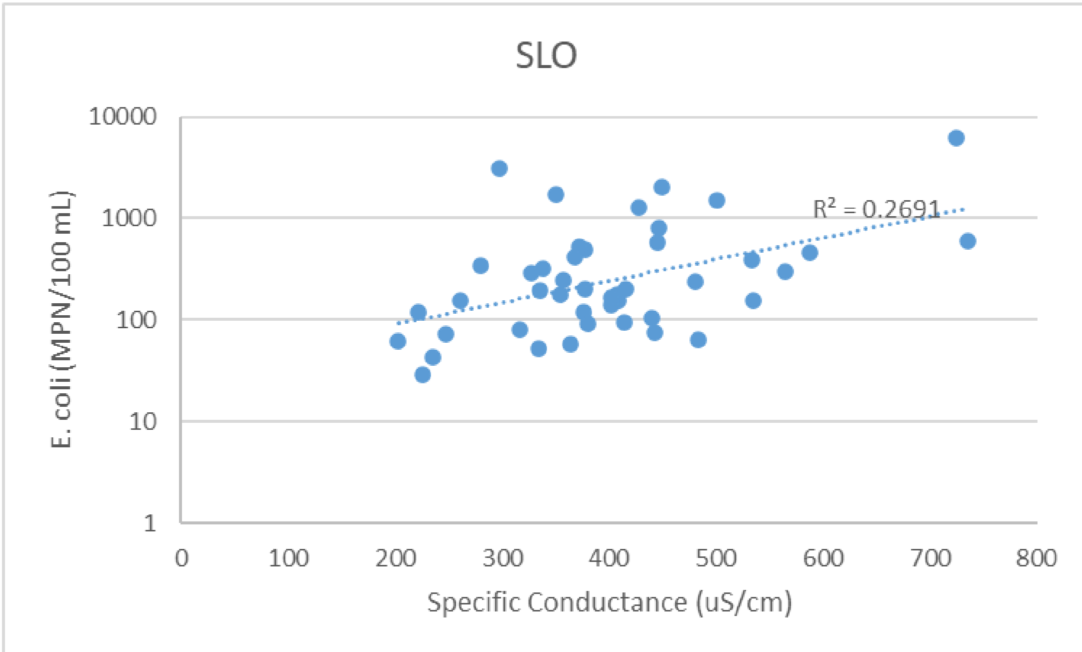


Figure 10. Log scale of *E. coli* vs. specific conductance at the SLO site for 2017-2022.

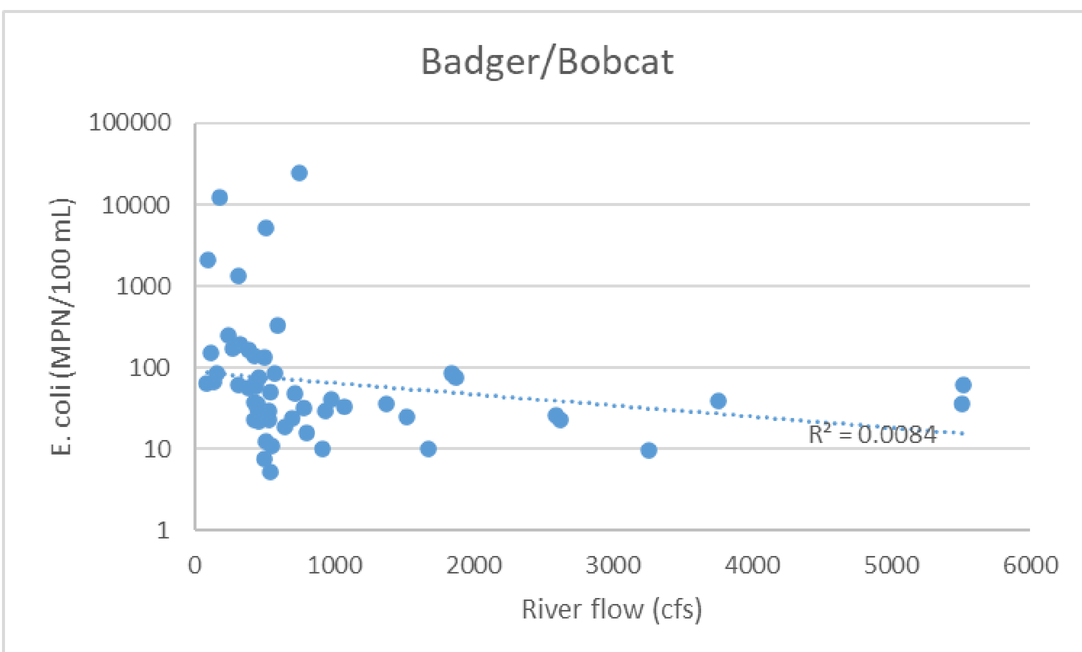


Figure 11. Log scale of *E. coli* vs. river flow at the Badger/Bobcat site (Alameda Bridge) for 2017-2022.

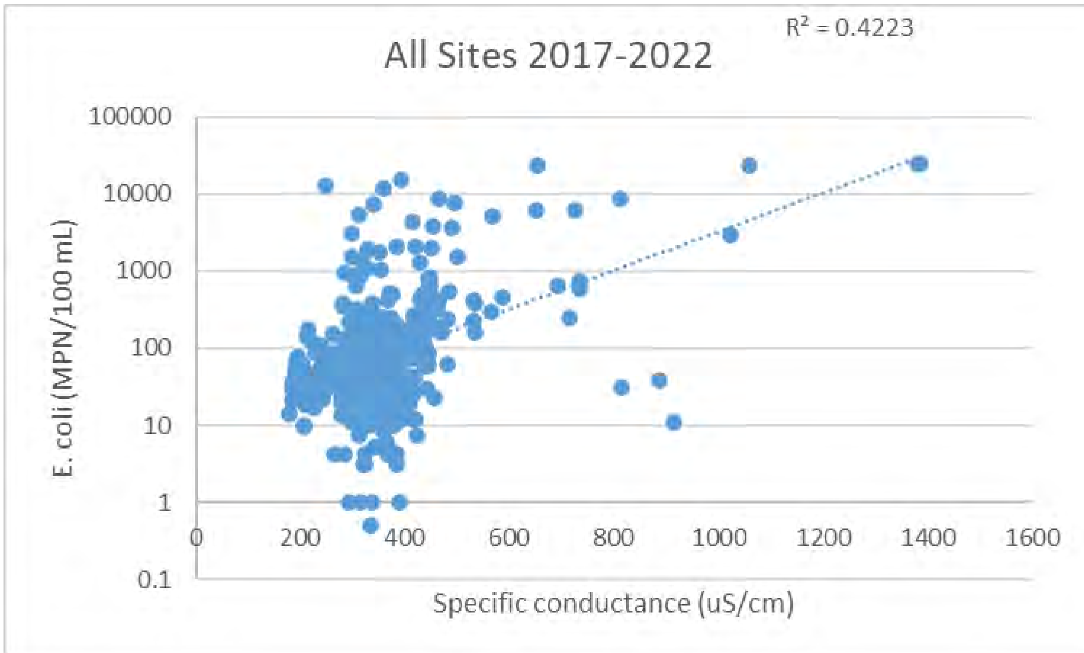


Figure 12. Log scale of *E. coli* vs. specific conductance for all sites from 2017-2022.

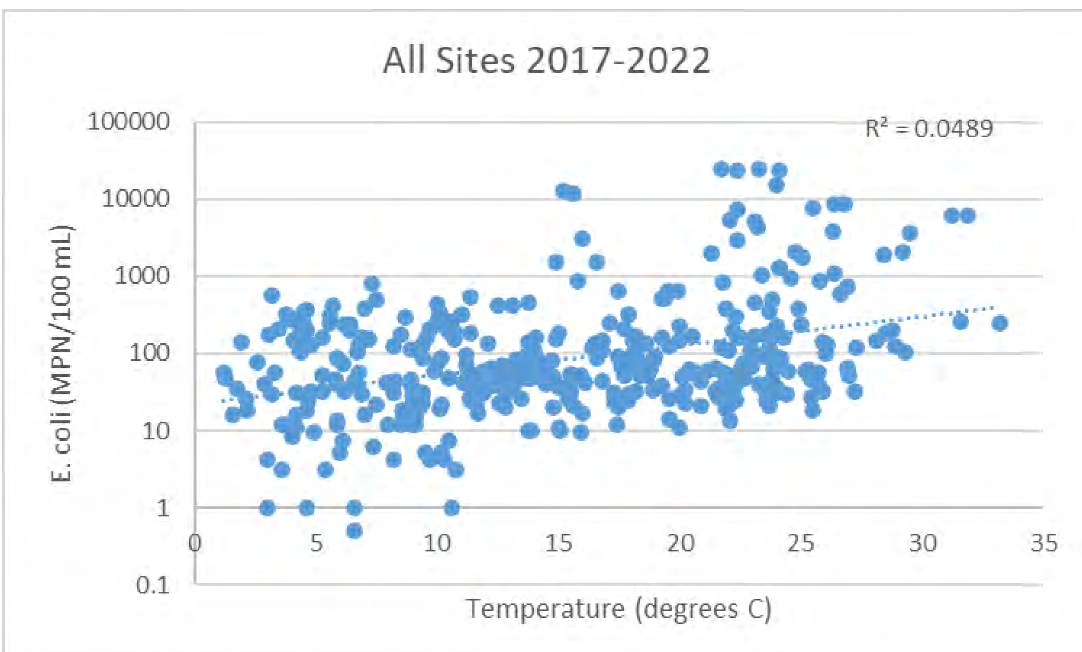


Figure 13. Log scale of *E. coli* vs. water temperature for all sites from 2017-2022.

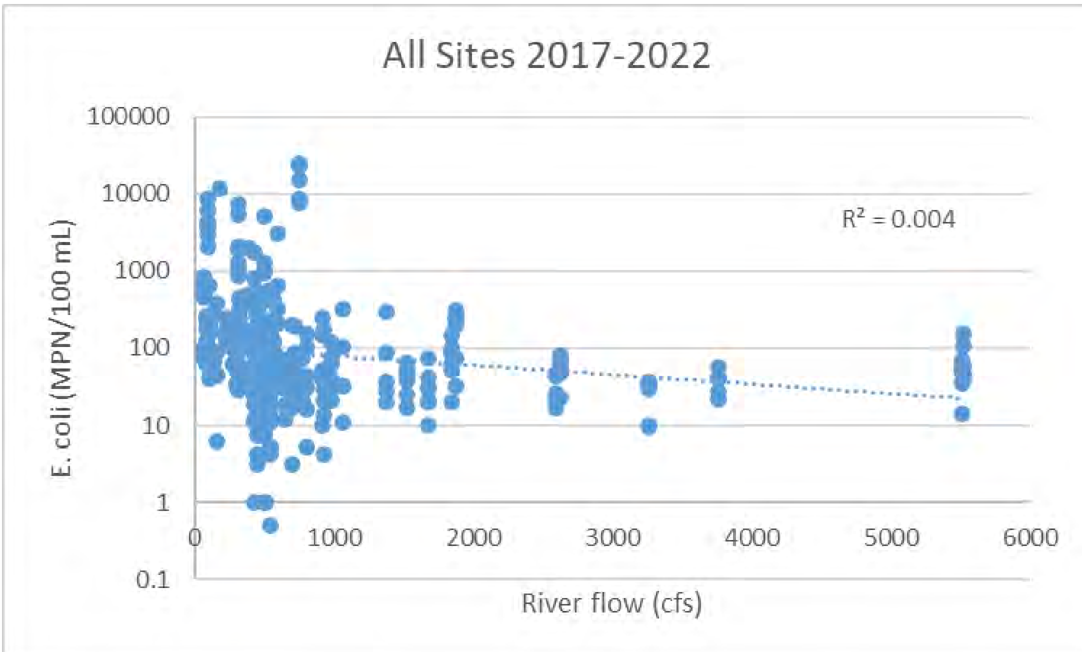


Figure 14. Log scale of *E. coli* vs. river flow for all sites from 2017-2022.

Conclusions

Escherichia coli

Escherichia coli levels exceeded the desired limit of 88 MPN/100 mL on three of the four sampling dates during January, July and October. These levels also exceeded the EPA and state limits of 410 MPN/100 mL on two of those sampling dates in July and October (Figure 2a,b).

The desired limits (88 MPN/100mL) were exceeded in January at Corrales, Bobcat, Montano, and Los Padillas. In July, samples exceeded both desired limits (88 MPN/100mL) and EPA limits (410 MPN/100mL) at all sampling locations. The highest *E. coli* level recorded for July was at Central West with 8,664 MPN/100mL. The lowest *E. coli* level recorded for July was at Bobcat with 2,064 MPN/100mL. In October all sample locations except Willow Creek exceeded the desired limits (88 MPN/100mL) with Los Padillas and SLO exceeding the EPA limits (410 MPN/100mL). The highest recorded *E. coli* level recorded for October was at SLO with 464 MPN/100mL. The lowest *E. coli* level recorded for October was at Willow Creek with 60.5 MPN/100mL.

The extremely high *E. coli* levels seen in July correspond with thunderstorms that occurred in the days preceding the collection. These rain events were responsible for the first rewetting of the Rio Grande after days of river drying in the Albuquerque stretch of the Rio Grande. This demonstrates how precipitation and runoff events can dramatically impact *E. coli* in the Rio Grande (Figure 2a,b). Exceedances disproportionately occurred in southern sites compared to northern sites, with SLO and/or Los Padillas (the southernmost sites, located below Albuquerque's Southside Wastewater Reclamation Plant - SWRP) exceeding the *E. coli* limits in all months that exceedances occurred (Figure 2a,b).

Specific conductance

Specific conductance had a large peak in July at Willow Creek and corresponded to the precipitation events preceding collections. Excluding this one value, Los Padillas and SLO are seen to have the highest specific conductance, deviating from the typical trend seen at other sampling locations. This trend is more pronounced later in the sampling season, most noticeable in July and October (Figure 3).

Dissolved oxygen

Dissolved oxygen (DO) levels are important for the health of aquatic systems and are directly influenced by numerous natural factors including respiration and consumption by aquatic life, salinity, and temperature. The DO levels in 2022 were lowest in July and highest in January and October (Figure 4), inversely related to average water temperature (Figure 5). This indicates that temperature may be the main driver of DO in this system.

Turbidity

Turbidity fluctuated throughout the year, peaking in July when the turbidity of the water exceeded the detection limitations of the equipment resulting in over-range values (Figure 6). This corresponds with the rewetting of the river (and low river flows) occurring from storm events.

pH

pH fluctuated throughout the year; values are seen in Figure 7.

Multi-year analyses

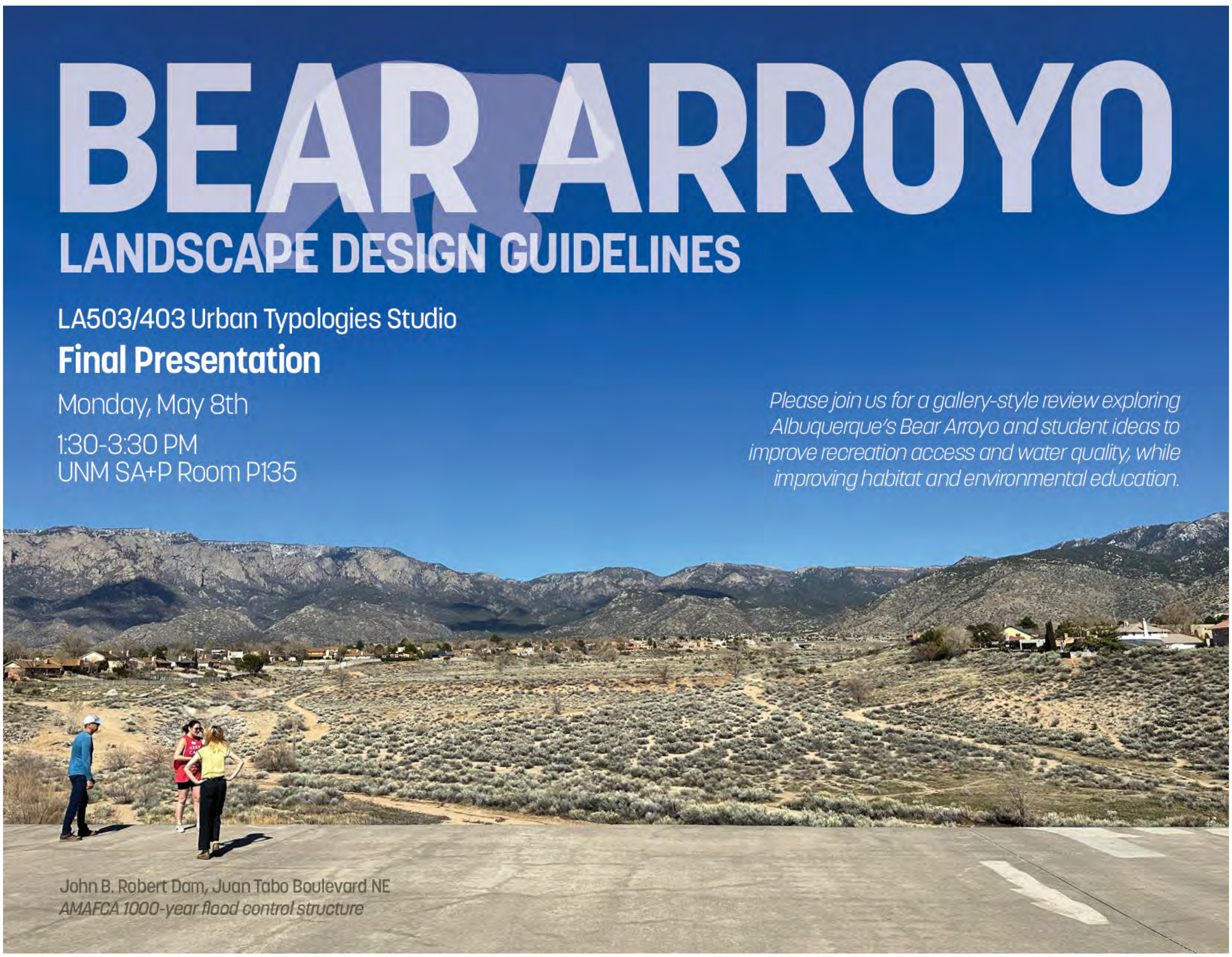
As mentioned in previous reports, specific conductance has the strongest correlation with *E. coli* levels (R^2 0.4223, Figure 12). This relationship is also seen at the site level (Figure 10), though can be driven by outliers. *E. coli* data from this year had a correlation with river flow with a 0.407 R^2 (Figure 9), but when analyzing trends across all sites from 2017-2022, the R^2 was 0.004 (Figure 14). When looking across multiple years within a site, the R^2 between *E. coli* and river flow continued to be low at 0.0084 (Figure 11). Temperature is also a poor predictor of *E. coli* when used alone (Figure 13).

Discussion

Even with reduced sampling, water quality parameters follow similar patterns of seasonal change noted in previous years. The reduced sampling method does miss some peak levels that could be caused by seasonal monsoons and periods of low flow. Season and water source (e.g., runoff) are strong contributors to *E. coli* levels. Temporal variation during typical peak flows (June through August) can be used to assess the typical peak *E. coli* values as well as rate of change by employing more frequent sampling. More frequent sampling in September would allow assessment of the impact of monsoons, if trends continue with late tropical storms occurring in September rather than in July.

Albuquerque Metropolitan Arroyo Flood Control Authority

On April 28th, 2023 AMAFCA presented to a studio class at UNM's school of architecture.



April 6, 2023

Dear AMAFCA,

On behalf of the Land and Water Summit Planning Committee, Ciudad Soil & Water Conservation District would like to take this opportunity to thank you for the generous sponsorship in the amount of $3,500 that was provided for the 2023 Land and Water Summit Hybrid Conference. As the fiscal manager for the Land and Water Summit, Ciudad SWCD is pleased to report that the AMAFCA charitable **Reservoir Level** sponsor contribution assisted with the planning efforts and implementation of the conference.

Through AMAFCA's sponsorship, the Land and Water Summit hosted a pre-conference field trip with 55 attendees and a conference with 249 registered attendees, 131 in-person and 118 remote viewers, and 20 sponsors receiving 30,481 impressions.

The 2023 Land and Water Summit featured a diverse range of presentations on topics related to building resilient landscapes and societies in the face of environmental challenges. A common theme that emerged was the importance of collaboration with communities in developing strategies for resilience. Presentations on shortage-sharing and water agreements highlighted the need for cooperation and sharing in managing scarce resources. Indigenous resiliency was also a prominent topic, emphasizing the importance of traditional knowledge and analysis in land and water management.

The Land and Water Summit annual conference plays a vital role in continuing education about resource conservation and best practices for safeguarding and enhancing local landscapes. The event could not be possible without AMAFCA's financial contribution. The Land and Water Summit Planning Committee and Ciudad SWCD are immensely grateful for your generous support and sponsorship of the conference.

Sincerely,

J. Steven Glass
Land and Water Summit Planning Committee, Co-Chair
Ciudad Soil & Water Conservation District, Board Chair

Bohannan Huston
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Spatial Data
Advanced Technologies

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MEMORANDUM

DATE: December 29, 2022

TO: Patrick Chavez, PE, AMAFCA

FROM: Sarah Ganley, PE, ENV-SP
Savannah Maynard
Emma Adams, EI

SUBJECT: **CMC Wet Season, Wet Weather Stormwater Monitoring Data Verification, Analysis Results Database, and Reporting Memo FY 2023 Wet Season (July 1, 2022 to October 31, 2022)**

Notification of In-Stream Water Quality Exceedances

For downstream notification purposes, the following parameters for in-stream samples taken in the Rio Grande for the FY 2023 wet season had results that exceeded applicable water quality standards (WQSs) for one or more samples: E. coli, polychlorinated biphenyls (PCBs), and gross alpha, adjusted. Table 1 summarizes the samples with exceedances and the applicable WQS that was exceeded. Additional details on the sampling results are provided in this memo.

Table 1: Parameters Detected Above Applicable Water Quality Standards
CMC FY 2023 Wet Season Monitoring

Sampling Date Location	Parameters, Applicable Water Quality Standard (WQS), and Results Exceeding Applicable WQS		
	E. coli	**PCBs**	**Gross Alpha, Adjusted**
	WQS: 88 MPN (CFU/100 mL) Pueblo of Isleta Primary Contact Ceremonial & Recreational	**WQS: 0.00017 ug/L** Pueblo of Isleta Human Health Criteria (based on fish consumption only)	**WQS: 15 pCi/L** Pueblo of Isleta and NM Domestic Water Supply & Livestock Watering Designated Uses
10/5/2022 Rio Grande North Angostura Diversion Dam Pre-Storm Sample – E. coli Only	135 MPN (CFU/100mL)	No Exceedance	No Exceedance

Table 1 (continued).

Sampling Date Location	Parameters, Applicable Water Quality Standard (WQS), and Results Exceeding Applicable WQS		
	E. coli	**PCBs**	**Gross Alpha, Adjusted**
	WQS: 88 MPN (CFU/100 mL) Pueblo of Isleta Primary Contact Ceremonial & Recreational	**WQS: 0.00017 ug/L** Pueblo of Isleta Human Health Criteria (based on fish consumption only)	**WQS: 15 pCi/L** Pueblo of Isleta and NM Domestic Water Supply & Livestock Watering Designated Uses
10/5/2022 Rio Grande at Alameda Bridge E. coli Only	No Exceedance	Not Tested	Not Tested
10/6/2022 Rio Grande South Isleta Diversion Dam	No Exceedance	0.0011 ug/L	22.98 pCi/L

Overview of Stormwater Monitoring Activity

Bohannan Huston, Inc. (BHI) has been tasked to perform water quality services for the Compliance Monitoring Cooperative (CMC) Stormwater Data Verification, Database, and Reporting for the Wet Weather Stormwater Quality Monitoring Program for Fiscal Year (FY) 2023 (July 1, 2022 to June 30, 2023). The scope of work for this task includes data verification of the stormwater laboratory analysis results, compiling the analysis results into a database, and calculating the E. coli loading to compare with the Waste Load Allocation (WLA) for the qualifying storm events. The stormwater compliance monitoring is conducted separately by Daniel B. Stephens & Associates, Inc. (DBS&A) and is not a part of this task. This task is being conducted to assist the CMC members with their comprehensive monitoring and assessment program for compliance under the 2014 Middle Rio Grande (MRG) Watershed Based Municipal Separate Storm Sewer System (MS4) Permit, NPDES Permit No. NMR04A000 ("WSB MS4 Permit").

The WSB MS4 Permit entered Administrative Continuance in December 2019 when U.S. Environmental Protection Agency (EPA) Region 6 did not issue a new MS4 Permit before the current MS4 Permit's expiration date. The MRG Technical Advisory Group (TAG) sent EPA a letter dated October 15, 2019, acknowledging Administrative Continuance after the expiration date of the 5-year Permit term. Until a new MS4 Permit is issued, there are no compliance monitoring requirements for the CMC in the Rio Grande. As identified in the CMC Monitoring Plan, the WSB MS4 Permit required a minimum of seven (7) storm events be sampled at both the Rio Grande North and Rio Grande South locations (refer to Figure 1, page 4). All Permit required samples have been obtained by the CMC, as well as two (2) samples obtained in FY 2021, one

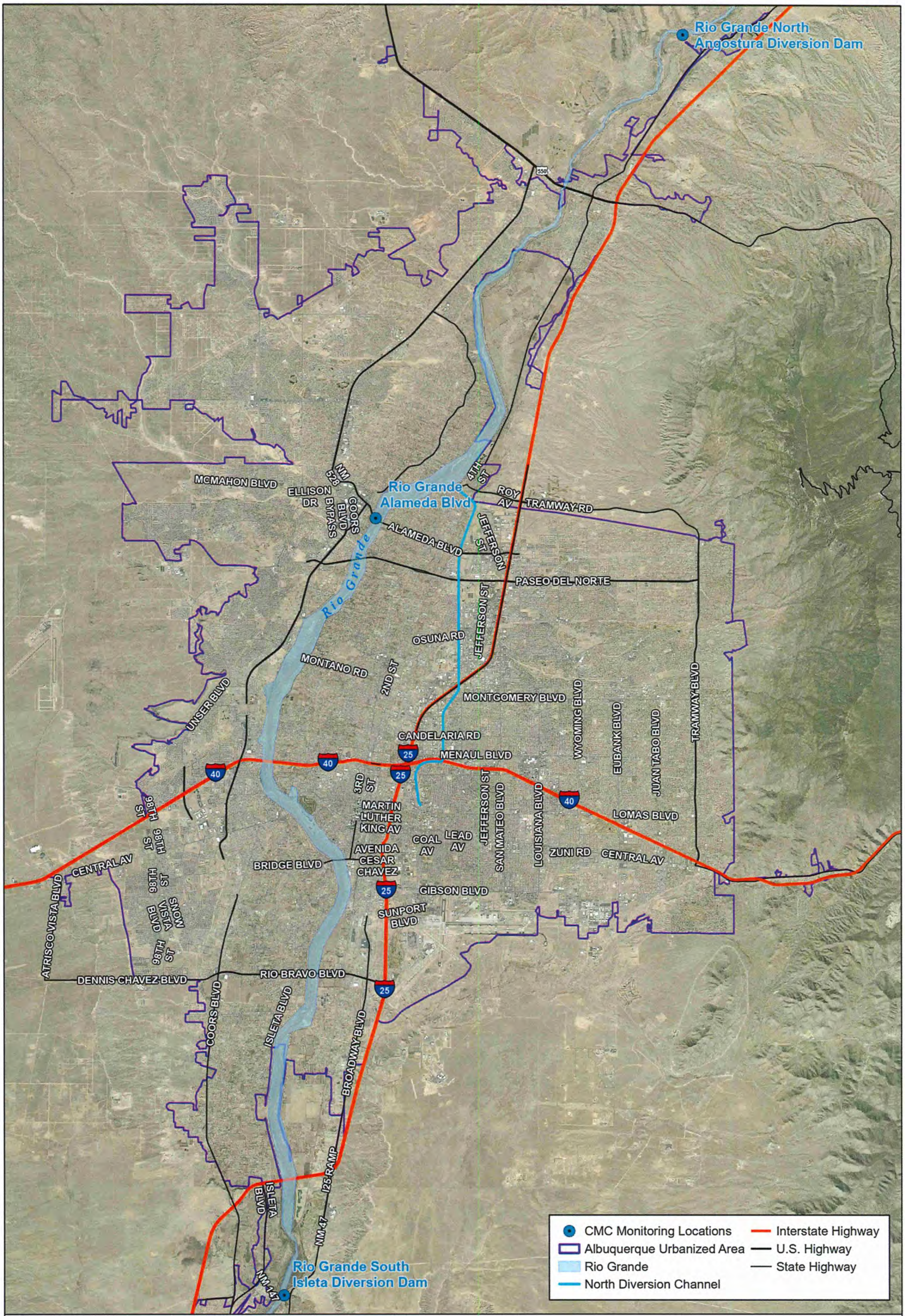
(1) sample obtained in FY 2022 wet season, and one (1) sample obtained in FY 2023 wet season during Administrative Continuance; all 11 CMC samples are summarized in Table 2 below.

Table 2: CMC Sample Summary
Compared to WSB MS4 Permit Requirements

No. of Storm Events Required to Sample	CMC-WSB MS4 Permit Required Samples per Season	FY (Date) Samples Obtained for CMC
1	#1 Wet Season	FY 2017 (8/10/2016)
2	#2 Wet Season	FY 2017 (9/12/2016)
3	#3 Wet Season	FY 2017 (9/21/2016)
4	#1 Dry Season	FY 2017 (11/21/2016)
5	#2 Dry Season	FY 2019 (3/13/2019)
6	Any Season	FY 2018 (Wet Season - 7/27/2017)
7	Any Season	FY 2018 (Wet Season - 9/27/2017)
Not Required	Wet Season	FY 2021 (10/28/2020)
Not Required	Dry Season	FY 2021 (4/28/2021)
Not Required	Wet Season	FY 2022 (9/1/2021)
Not Required	Wet Season	FY 2023 (10/5/2022)

During the WSB MS4 Permit Administrative Continuance, the CMC members chose to continue sampling within the Rio Grande to support their MS4 program needs and gather additional data in support of the future MS4 Permit compliance. This memo reports on the wet weather stormwater monitoring activity for the FY 2023 wet season (July 1, 2022 to October 31, 2022).

The CMC Excel database was updated with the FY 2023 wet season, wet weather monitoring data as results were received. The database contains sample location, sample date, analyses conducted, methods used, applicable surface WQSs, WSB MS4 Permit required Minimum Qualification Levels (MQL) and results.



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1 inch = 12,205 feet

CMC Monitoring

Figure 1
Monitoring Locations

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Author: mcrooks

Summary of the CMC Sampling Plan

Sampling Parameters:

Samples from both the Rio Grande North and Rio Grande South monitoring locations were analyzed for the parameters defined in the EPA approved WSB MS4 CMC Monitoring Plan, May 5, 2016. The parameter list for both locations, which is intended to characterize stormwater discharges into the river, is as follows:

Total Suspended Solids (TSS)
Total Dissolved Solids (TDS)
Chemical Oxygen Demand (COD)
Biological Oxygen Demand – 5-day (BOD_5)
Dissolved Oxygen (DO)
Oil & grease (N-Hexane Extractable Material)
E. coli
pH
Total Kjeldahl Nitrogen (TKN)
Nitrate plus Nitrite
Dissolved Phosphorus
Ammonia plus Organic Nitrogen (Nitrogen, Ammonia and Nitrogen, Total)
Phosphorous (Total Phosphorous)
Polychlorinated Biphenyls (PCBs - Method 1668A)
Gross Alpha, adjusted
Tetrahydrofuran
Benzo(a)pyrene
Benzo(b)fluoranthene (3, 4 Benzofluoranthene)
Benzo(k)fluoranthene
Chrysene
Indeno (1 ,2,3-cd) Pyrene
Dieldrin
Pentachlorophenol
Benzidine
Benzo(a)anthracene
Dibenzofuran
Dibenzo(a, h)anthracene
Chromium VI (Hexavalent)
Copper – Dissolved
Lead – Dissolved
Bis (2-ethylhexyl) phthalate
Conductivity
Temperature

Hardness (as CaCO3) was added to the parameter list to allow dissolved metal results to be compared to the applicable WQSs. DO, pH, conductivity, and temperature are required by the WSB MS4 Permit to be analyzed in the field during sample collection, which was conducted by DBS&A, within 15 minutes of sample collection. All E. coli samples were submitted to the laboratory within eight (8) hours of collection in order to meet the specified hold time.

Sampling Locations:

The sampling locations are shown in Figure 1, page 4.

Rio Grande North – In-stream sampling within the Rio Grande was performed upstream of the Angostura Diversion Dam at the north end of the watershed. The location is upstream of all inputs from the Urban Area (UA) to the river and provides the background water conditions.

Rio Grande South – In-stream sampling within the Rio Grande was performed at the Isleta Bridge at the south end of the watershed. The location is downstream of all inputs from the UA to the river and provides the downstream water conditions. These locations have been accepted by EPA and the New Mexico Environment Department (NMED) to meet the WSB MS4 Permit requirements in Part III.A.

During this FY 2023 wet season, an E. coli sample was collected within the Rio Grande at Alameda Blvd. This is the location of the NMED defined stream segment divide (refer to Figure 6). This sample point was added after discussion with NMED in February 2017 regarding potential refinements to E. coli loading calculations.

Sample Collection:

As mentioned previously, sample collection for the CMC is being conducted by DBS&A (through a separate on-call contract). Since BHI was not involved in the sample collection, this task and memo do not address the details of the methodologies regarding sampling, determining if an event was a qualifying storm event, or determining the timing of the hydrograph at the Rio Grande Alameda and Rio Grande South locations.

DBS&A provided BHI their field notes and field sample data (temperature, DO, specific conductivity, and pH) for the FY 2023 wet season sampling. AMAFCA provided BHI the completed laboratory analysis reports from Hall Environmental Analysis Laboratory (HEAL) for this monitoring season.

Quality Assurance Project Plan (QAPP):

AMAFCA provided BHI with the Draft Quality Assurance Project Plan (QAPP) for the CMC dated June 14, 2016. DBS&A followed this QAPP during sample collection. BHI used this QAPP and the included standard operating procedures (SOPs) for the data verification and validation.

Monitoring Activity & Lab Analysis Summary

The list below provides a summary of the CMC comprehensive monitoring program activities completed for the FY 2023 wet season from July 2022 through October 2022. One (1) qualifying storm event was sampled and analyzed during the FY 2023 wet season.

- **October 5-6, 2022 – Qualifying Storm Event – Full Analysis of Samples.** Samples were collected at the Rio Grande North and Alameda Blvd locations beginning at 11:25 a.m. and 1:30 p.m., respectively. These samples were sent to the laboratory for an E. coli test. The CMC determined that the storm event beginning October 5 was a qualifying storm event. A Rio Grande South sample was collected beginning at 8:15 a.m. on October 6. The samples from the North (collected October 5) and South (collected October 6) locations were taken to HEAL for full parameter testing.

Stormwater Quality Database for CMC

As stated previously, there was one (1) qualifying storm event during the FY 2023 wet season, wet weather monitoring sampled by the CMC, which occurred October 5-6, 2022. DBS&A's field notes containing DO, pH, conductivity, and temperature measurements, as well as sampling comments have been received, and field results have been added to the database. Additionally, the HEAL reports for the corresponding time period have been received, added to the database, and are provided with this memo (Attachment 1). The laboratory reports attached to this memo have BHI added comments including the field parameter measurements and other relevant notes related to the laboratory report.

Database Data Entry:

The CMC Excel database was updated with the FY 2023 wet season, wet weather monitoring data. The database contains sample locations, sample date, analyses conducted, methods used, applicable surface water quality standards (WQS), WSB MS4 Permit required Minimum Quantification Levels (MQL), and analysis results. The database was updated under this Task to include the Rio Grande at Alameda sample location. Applicable surface WQSs found in New Mexico Administrative Code (NMAC) 20.6.4, as well as the Pueblo of Isleta WQSs, are entered in the Excel database for comparison purposes with testing results. There is an indicator in the database to show if the monitoring results exceed the applicable surface WQS. An exceedance is not a violation of the WSB MS4 Permit, as the Permit does not have numeric discharge limitations. These ">WQ Standard" flags simply and quickly show the CMC members where the results of the lab data exceed the applicable WQS.

Water quality data was entered into the database upon receipt of the lab reports. All data entered into the database is initially denoted with a "P" to indicate that it is provisional and has not been through the verification and validation process yet. Full parameter analyses of qualifying storm events for both Rio Grande North and Rio Grande South locations were entered respectively into the database. The E. coli only samples from the Rio Grande Alameda location were also entered into the database.

Data Verification and Validation:

The HEAL analysis reports were provided to BHI by AMAFCA. The lab reports also contain the Chain of Custody for the submitted samples. Field data was requested by and provided to BHI by DBS&A. Data verification and validation (V&V) was conducted by BHI on all field notes, lab reports, and Chain of Custody documents in accordance with the CMC WQS Operating Procedure (SOP) #2, which is part of the existing CMC QAPP, Draft June 14, 2016. These procedures are based on EPA Guidance for Environmental Data Verification and Validation (EPA, 2008).

As stated in the QAPP, the V&V process was completed by a different person than the one who entered the data into the database. The V&V process included use of the *Data Verification and Validation Worksheet* (provided in the QAPP). For this task, field data was verified first, confirming all field notes were complete. BHI handled field parameter questions directly with DBS&A. Chemical data verification began as soon as the lab reports were received, checking that all parameters were tested and looking for any obvious exceedances of WQS. Other steps listed on the *Data Verification and Validation Worksheet* were completed after all data from the laboratory was received and entered into the database. Sample blank results were reviewed to identify potential contamination during field processing or transport. Replica/duplicate samples were evaluated based on relative percent difference (as described in more detail in the QAPP) to determine the variability of the samples.

All CMC FY 2023 wet season data met the appropriate QA/QC requirements. If there were any data that did not meet the appropriate QA/QC requirements, it would have been assigned an appropriate laboratory qualifier or validation codes. A summary of validation codes is provided in the QAPP.

Once the V&V process was completed, the worksheets were signed. Copies of the V&V worksheets are provided with this memo (Attachment 2). In the database, data that was checked during the V&V process was then changed from being denoted with a “P” for provisional to a “V” for verified, and laboratory qualifiers were added, as needed.

CMC FY 2023 Wet Season Assessment and Evaluation of Monitoring Results

The EPA approved WSB MS4 CMC Monitoring Plan, May 5, 2016, has 33 parameters to monitor at the Rio Grande North and Rio Grande South monitoring locations. Of these 33 parameters, 19 parameters were not detected in the FY 2023 wet season samples at either the Rio Grande North or South locations. Refer to Table 3 for a list of the parameters that were not detected.

Table 3: Parameters Not Detected
CMC FY 2023 Wet Season Monitoring

Parameters Not Detected	
Oil and Grease (N-Hexane Extractable Material)	Dieldrin
Nitrate plus Nitrite	Pentachlorophenol
Dissolved Phosphorous	Benzidine
Ammonia (mg/L as N)	Benzo(a)anthracene
Tetrahydrofuran	Dibenzofuran
Benzo(a)pyrene	Dibenzo(a,h)anthracene
Benzo(b)fluoranthene (3, 4 Benzofluoranthene)	Dissolved Lead
Benzo(k)fluoranthene	Chromium VI (Hexavalent)
Chrysene	Bis (2-ethyhexyl) Phthalate (other names: Di(2-ethylhexly)phthalate, DEHP)
Indeno (1,2,3-cd) Pyrene	

For the remaining 14 parameters on the CMC monitoring parameter list, only three (3) parameters (E. coli, PCBs, and gross alpha, adjusted) had exceedances of the applicable surface WQS found in New Mexico Administrative Code (NMAC) 20.6.4 and the Pueblo of Isleta WQS during the FY 2023 wet season. These exceedances are summarized on Table 1, pages 1-2, and discussed below in further detail.

E. coli:

The E. coli results collected during the FY 2023 wet season are summarized in Table 4.

Table 4: E. coli Results
CMC FY 2023 Wet Season Monitoring

Date – Rio Grande Location	E. coli Results MPN (CFU/100 mL)
October 5, 2022 – North	135
October 5, 2022 – Alameda	52
October 6, 2022 – South	<1

At the Rio Grande North location (upstream of the Albuquerque UA, at the Angostura Diversion Dam), one (1) sample was collected and tested for E. coli. This E. coli result exceeded Pueblo of Isleta and Pueblo of Sandia's primary contact-single sample WQS of 88 CFU/100 mL. This October 5 sample was below NMAC's primary contact-single sample WQS of 410 CFU/100 mL. At the Rio Grande South location (downstream of the MS4 UA), one (1) sample was collected and tested for E. coli. This sample did not exceed any WQSs. This E. coli lab result at the Rio Grande South location is the lowest value that the CMC has seen reported in the Rio Grande at this location. AMAFCA called HEAL to discuss this result and verify that the reported result was correct.

In addition, the CMC collected one (1) E. coli sample in the Rio Grande at Alameda Blvd. during the FY 2023 wet season. The Alameda Blvd. analysis point was based on discussions with NMED in February 2017 on collecting actual E. coli data at the stream segment divide verses using an area percentage (as defined in the TMDL) for E. coli loading calculations. The lab results showed that the sample had an acceptable E. coli concentration below the primary contact-single sample Pueblo of Isleta WQS (88 CFU/100 mL) and the primary contact-single sample NMAC WQS (410 CFU/100 mL).

As a reminder, in January 2017 the CMC members clarified with NMED that the units MPN/100 mL and CFU/100 mL are considered to be interchangeable for the purposes of this stormwater quality monitoring reporting. The New Mexico and Pueblo WQSs for E. coli are currently in units of CFU/100 mL while the lab reports are typically in units of MPN/100mL. The graph presented in this section uses units of CFU/100 mL to be consistent with the WQS units. Refer to Figure 2 for a graphical representation of E. coli results from October 2022.

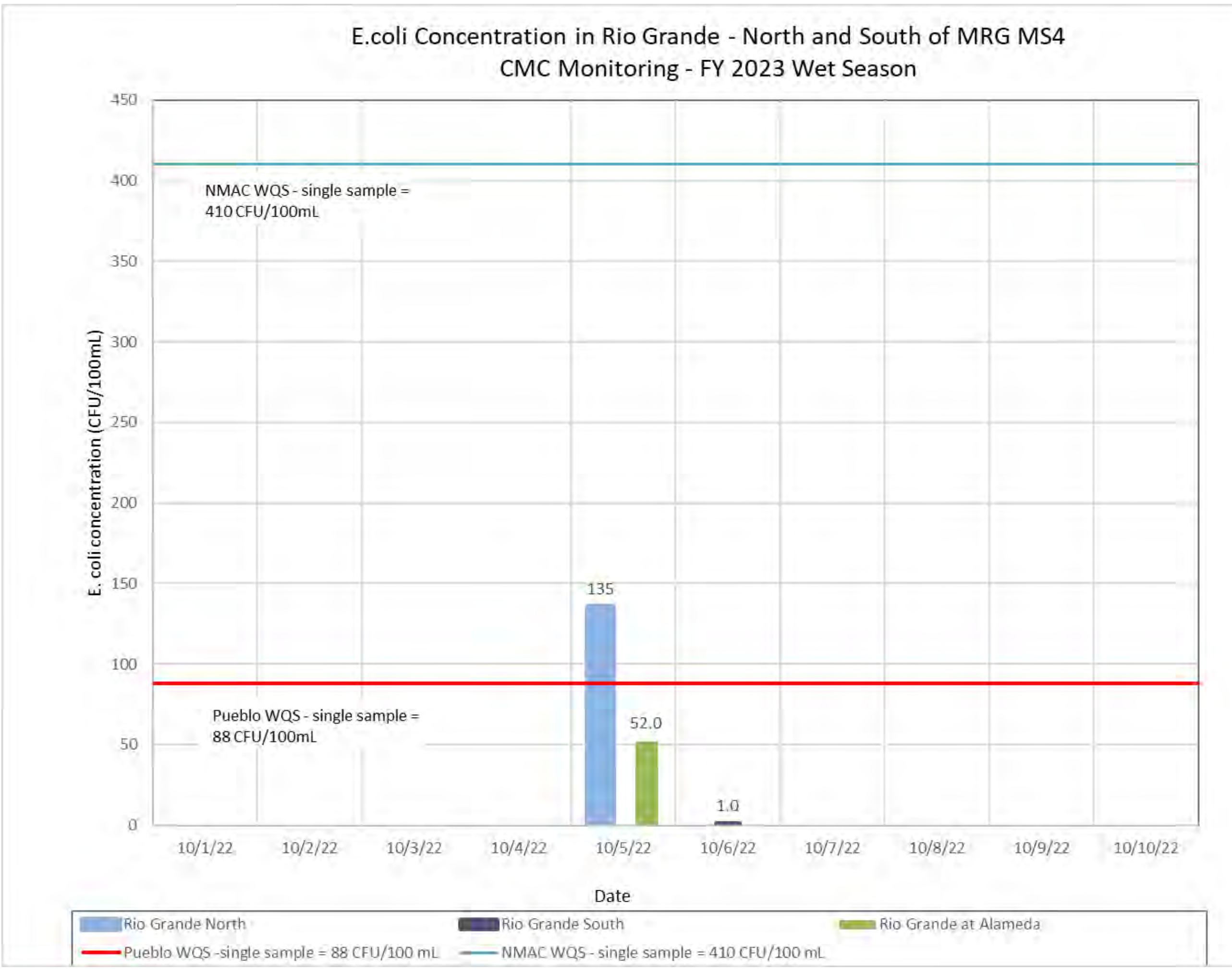


Figure 2: E. coli Results in Rio Grande
CMC Monitoring – FY 2023 Wet Season

PCBs:

There are multiple surface WQS values listed for PCBs in both the Pueblo of Isleta and the State of New Mexico standards for the various designated uses. The PCB results for samples collected from the Rio Grande during the FY 2023 wet season stormwater event were below the minimum quantification level (MQL) established in EPA standards for the MS4 NPDES Permit (Appendix F, 0.2 ug/L for PCBs). The PCB results for the Rio Grande North sample were also well below the New Mexico Surface WQSs and Pueblo of Isleta Surface WQSs for designated uses including drinking water (0.5 ug/L) and wildlife habitat, acute aquatic life, and chronic aquatic life (0.014 ug/L). However, the CMC sample from the Rio Grande South location was above the Pueblo of Isleta human health criteria (based on fish consumption only) WQS for surface waters. The human health-organism only criterion is based upon human consumption of fish and other aquatic life that bioaccumulate contaminants over time. The PCB results from 2016 through 2022 are shown in Figure 3 relative to several of the WQSs for PCBs.

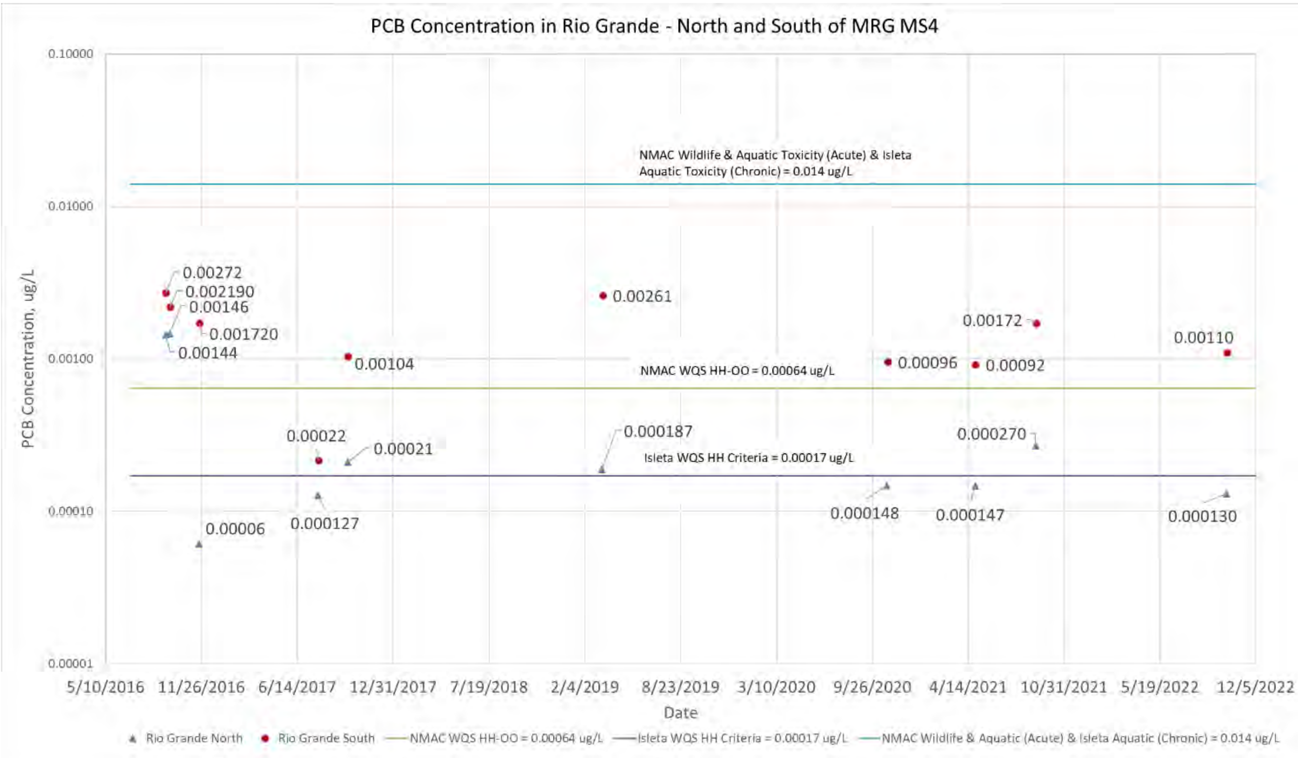


Figure 3: PCB Monitoring Results in Rio Grande
CMC Monitoring – 2016 - 2022

Gross Alpha, Adjusted:

The October 6, 2022, Rio Grande South sample result exceeded the New Mexico and Pueblo of Isleta WQS for gross alpha, adjusted. The WQS for gross alpha, adjusted is the same value for both the NMAC 20.6.4 Water Quality Criterion and Pueblo of Isleta; the WQS of 15 pCi/L ("pCi/L" means picocuries per liter) is a general standard for the Pueblo of Isleta, and for New Mexico it is based on Domestic Water Supply and Livestock Watering designated uses. In surface water, the gross alpha, adjusted analyses may be affected by a high content of suspended load, particularly where sediment sources may be derived from granitic terrain; gross alpha, adjusted results may reflect the radioactivity of the natural elements in the sediment more than the surface water.

The October 6, 2022, Rio Grande South gross alpha, adjusted analytical results are detailed below; the units are in pCi/L:

- Rio Grande South CMC sample result for gross alpha, adjusted = 22.98 pCi/L
- Gross alpha, adjusted WQS at the Rio Grande South location = 15 pCi/L (NMAC 20.6.4 Water Quality Criterion for livestock watering and domestic water supply designated uses and general standard for Pueblo of Isleta)

This is the third time since 2016 that the analytical results from a CMC sample have had an exceedance in gross alpha, adjusted. The prior exceedance was reported for the September 2, 2021, Rio Grande South sample. The CMC will continue to closely evaluate this parameter in future samples. If additional exceedances occur, the CMC will discuss the results further and may consult NMED for further guidance.

Dissolved Oxygen and Temperature:

Two (2) of the water quality parameters are specifically worth mentioning in this memo because they are listed in the WSB MS4 Permit, Part I.C.1 – Special Conditions: dissolved oxygen and temperature. These parameters did not have any surface water quality exceedances during the FY 2023 wet season sampling.

Dissolved oxygen is a water quality concern in the Rio Grande if it is below 5 mg/L. None of the samples taken from the Rio Grande during the FY 2023 wet season monitoring had dissolved oxygen values below 5 mg/L. This provides the MS4s with specific monitoring data showing that stormwater did not cause or contribute to exceedances of applicable dissolved oxygen water quality standards in the Rio Grande from any of the CMC samples from 2016 to 2022. Refer to Figure 4 for CMC dissolved oxygen results and comparison to applicable WQSs.

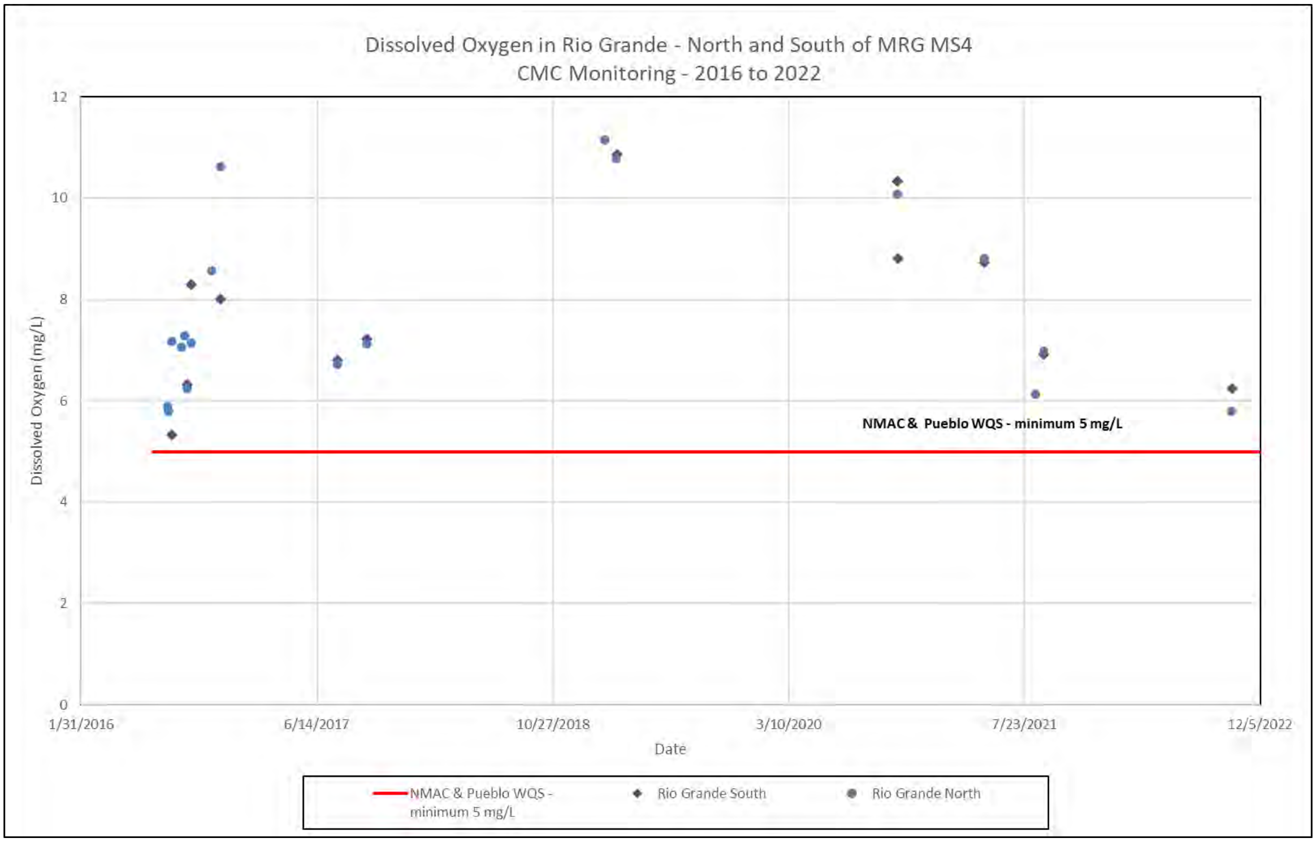


**Figure 4: Dissolved Oxygen Results in the Rio Grande
CMC Monitoring – 2016 - 2022**

Temperature is listed in the WSB MS4 Permit as a special condition (currently only applicable to the City of Albuquerque and AMAFCA). Past data submitted to EPA and NMED by the MS4 permittees have proven that stormwater discharges into the Rio Grande are not raising the Rio Grande temperature above the WQSs. The data collected during this FY 2023 wet season monitoring also supports this conclusion. All the temperature field readings taken in the Rio Grande during the CMC FY 2023 wet season were below 32.2°C (90°F), which is the WQS for the State of New Mexico and for the Isleta and Sandia Pueblos. Refer to Figure 5 for temperature results and comparison to applicable WQSs for all CMC samples taken upstream and downstream of the MRG MS4 area from 2016 to 2022.

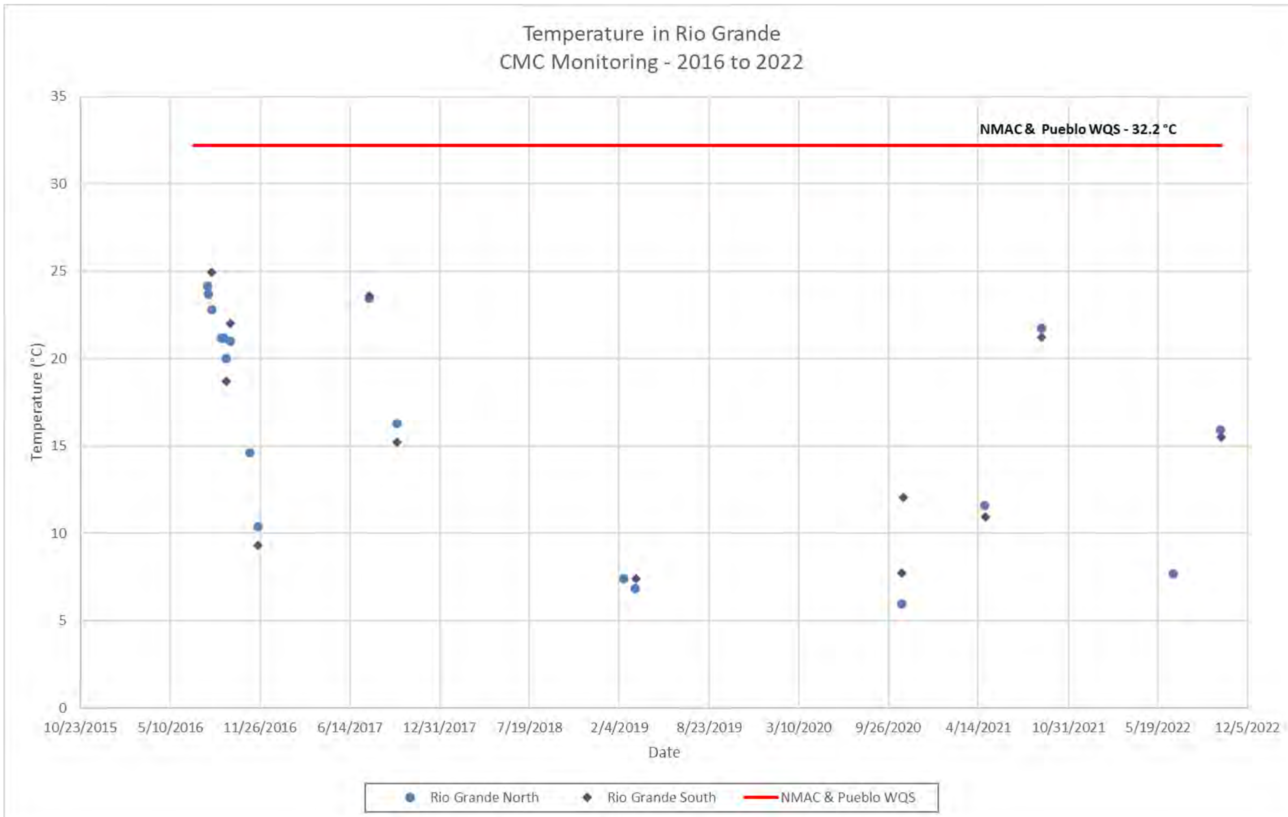


Figure 5: Temperature Monitoring Results in the Rio Grande
CMC Monitoring – 2016 - 2022

CMC FY 2023 Wet Season E. coli Loading Calculations and Waste Load Allocation (WLA)

Related to assessing the stormwater results, the E. coli loading was calculated and compared to the aggregate Total Maximum Daily Load (TMDL) Waste Load Allocation (WLA) for the CMC group. A TMDL is the maximum amount of a pollutant (E. coli in this case) that a water body (Rio Grande) can assimilate on a daily basis without violating applicable surface WQSs. The total TMDL for a stream segment consists of the multiple WLA for point sources, non-point sources, and natural sources, plus a margin of safety. The CMC MS4 allotted WLA was determined in the EPA Approved, Total Maximum Daily Load for the Middle Rio Grande Watershed, June 30, 2010, and subsequent communications with NMED. The WLA varies by flow condition in the Rio Grande and by stream segment.

E. coli loading calculations and comparison to the WLA follows the WSB MS4 Permit requirements in "Discharges to Water Quality Impaired Water Bodies with an Approved TMDL", Part I.C.2.b.(i).(c).B, Appendix B-Total Maximum Daily Loads (TMDLs) Tables of the WSB MS4 Permit, and the NMED guidance provided to the CMC. Attached to this memo is the WLA Calculation spreadsheet which steps through the E. coli loading calculations and assumptions comparing the calculated E. coli loading to the CMC aggregate WLA defined by NMED.

There are two (2) stream segments defined in the WSB MS4 Permit (Appendix B): Isleta Pueblo Boundary to Alameda Street Bridge (Stream Segment 2105_50) and Non-Pueblo Alameda Bridge to Angostura Diversion (Stream Segment 2105.1_00). These stream segments differ from NMED's current stream segments defined in the *2022-2024 State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report* (NMED, April 2022). NMED currently has four (4) stream segments instead of the two (2) WSB MS4 stream segments. These various stream segment designations are shown in Figure 6, page 16.

The *NMED 303(d)/305(b) 2020-2022 Integrated Report* tables show the most recent assessment results, and currently all segments of the Rio Grande (Isleta to Angostura Diversion) are impaired for E. coli and have a TMDL for E. coli.

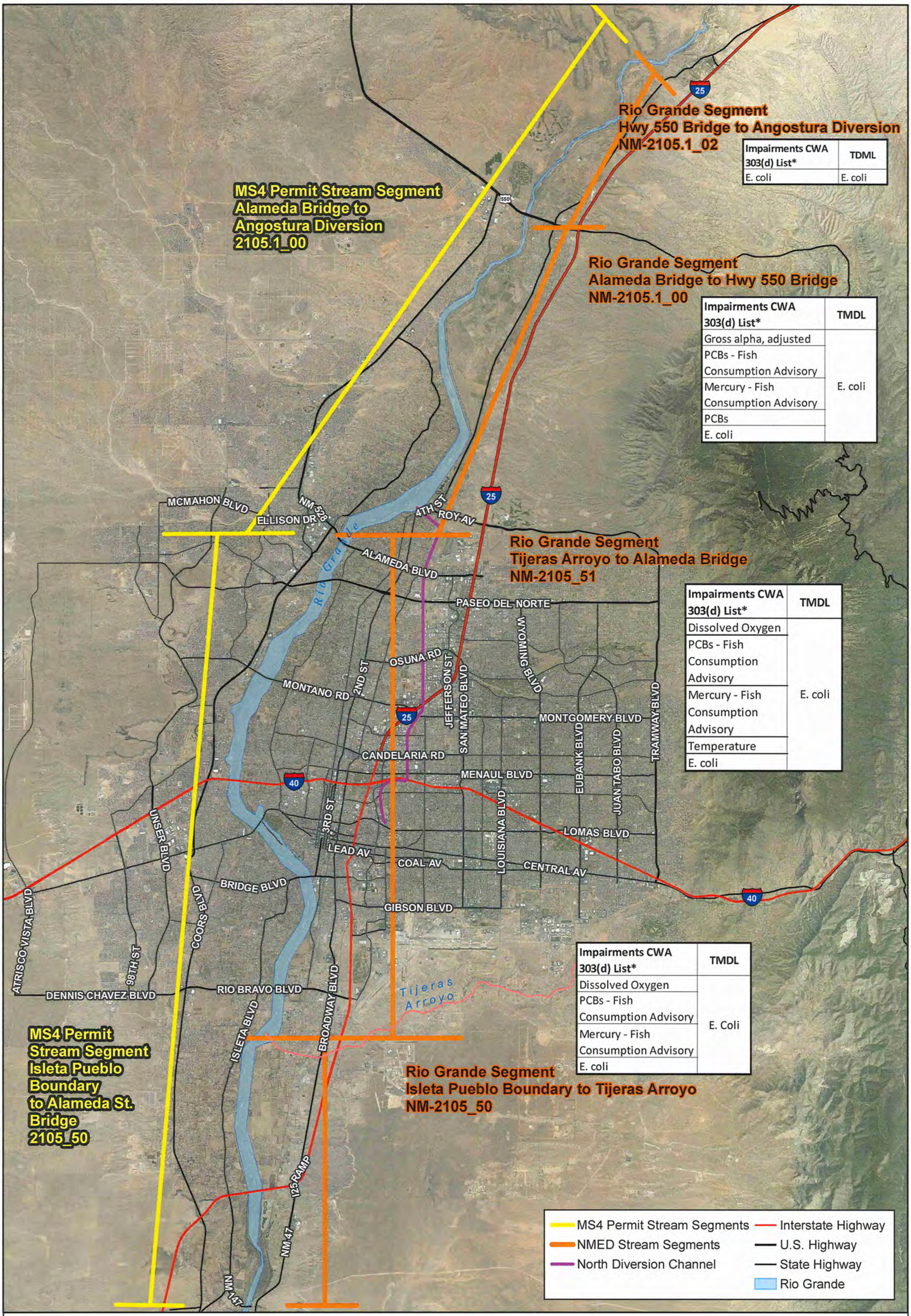
The E. coli daily loading associated with the CMC group and comparison to the NMED WLA was completed for the one (1) qualifying wet season storm event – October 5-6, 2022. For this event, the CMC obtained an E. coli sample in the Rio Grande at Alameda and used this to calculate the E. coli loading for the two (2) river segments. Refer to Table 5 for a summary of the WLA comparison results. A spreadsheet is attached to this memo that provides the detailed WLA calculations.

Table 5: Summary of CMC E. Coli Loading Compared to WLA for the CMC

Date / Stream Segment	**Daily Mean Flow (cfs)**	**Flow Conditions (cfs)** *range defined by NMED*	**CMC Daily E. coli Loading (CFU/day)**	**NMED WLA for CMC for Stream Segment and Flow Conditions**	**Loading Compared to WLA Potential Exceedance or Acceptable**
October 5-6, 2022 – Rio Grande North E. coli Concentration 10/5/2022 = 135 MPN (CFU/100 mL) Rio Grande at Alameda E. coli Concentration 10/5/2022 = 52 MPN (CFU/100 mL) Rio Grande South E. coli Concentration 10/6/2022 = <1 MPN (CFU/100 mL)					
Alameda to Angostura	146	Dry	0.00E+00	3.24E+10	WLA Acceptable
Isleta to Alameda	165	Dry	0.00E+00	1.57E+09	WLA Acceptable

As Table 5 illustrates, the calculated E. coli loading for the October 5-6, 2022 storm event for the northern segment (Alameda to Angostura) and the southern segment (Isleta to Almeda) of the Rio Grande was below the WLA for the CMC MS4s. This analysis used the mid-point E. coli sample result obtained in the Rio Grande at Alameda.

The WSB MS4 Permit implies that the WLA is a measurable goal for the MS4s related to E. coli. Based on extensive review of the EPA Approved, Total Maximum Daily Load (TMDL) for the Middle Rio Grande Watershed, June 30, 2010, this seems to be an unattainable goal for MS4s.



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1 in = 12,500 ft

CMC Monitoring

Figure 6
Rio Grande Impairments & TMDL Information

* Final 2022-2024 State of NM Clean Water Act, Section 303(d)/Section 305(b) Integrated Report

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Author: mcrooks

Page 40 of the 2010 TMDL Report states, "It is important to remember that the TMDL is a planning tool to be used to achieve water quality standards…Meeting the calculated TMDL may be a difficult objective." The TMDL/WLA was calculated by NMED to meet the Pueblo (Sandia and Isleta) geometric mean maximum of 47 CFU/100 ml, which was done to be "protective of downstream waters" and "to provide an implicit margin of safety (MOS)". A single grab sample E. coli result meeting this very low geometric means WQSs will be very difficult for the MS4s to obtain.

The CMC members discussed the difficulty of using the WLA as a measurable goal with NMED on February 1, 2017. NMED explained that exceeding the WLA does not trigger enforcement. However, NMED strongly encouraged the MS4s to document what they are doing once they realize the WLA is potentially exceeded. The meeting on February 1, 2017, and the CMC discussion with NMED on February 16, 2017, demonstrate CMC members are working toward understanding the WLA. In addition, the CMC members began implementing a refinement to the sampling plan discussed with NMED by obtaining an E. coli sample in the Rio Grande at Alameda effective the FY 2018 wet season, as feasible. This demonstrates that the CMC is continuing to investigate the potential exceedances and make improvements to monitor E. coli in the Rio Grande.

Data Entry for Discharge Monitoring Reports

The WSB MS4 Permit entered Administrative Continuance in December 2019 when EPA Region 6 did not issue a new MS4 Permit before the current MS4 Permit's expiration date. Until a new MS4 Permit is issued, there are no compliance monitoring requirements for the CMC in the Rio Grande. As identified in the CMC Monitoring Plan, the WSB MS4 Permit required a minimum of seven (7) storm events be sampled at both the Rio Grande North and Rio Grande South locations. All MS4 Permit required samples have been obtained by the CMC and verified stormwater quality data from these required events have been submitted to the EPA using electronic Discharge Monitoring Report (DMR) forms. Data from the DMRs are uploaded to a comprehensive nationwide database that contains discharge data for facilities and other point sources that discharge directly to receiving streams. For this Task, BHI has not completed any data entry related to the EPA DMRs for the FY 2023 wet season.

Conclusions and Planning

During the FY 2023 wet season (July 1 to October 31, 2022), one (1) qualifying stormwater sample was obtained by the CMC. Lab results were received, and this data has been entered into the CMC Excel database. The lab data entered is marked in the spreadsheet as "V" (verified), and data V&V has been completed (refer to Attachment 2).

To summarize, monitoring results and E. coli loading calculations for the FY 2023 wet season show that:

- The WSB MS4 Permit entered Administrative Continuance in December 2019 when U.S. Environmental Protection Agency (EPA) Region 6 did not issue a new MS4 Permit before the current MS4 Permit's expiration date. Until a new MS4 Permit is issued, there are no compliance monitoring requirements for the CMC in the Rio Grande. All MS4 Permit required samples have been obtained by the CMC, as well several samples collected during Administrative Continuance, including the one (1) sample obtained in the FY 2023 wet season, as reported in this memo.

- For the FY 2023 wet season, 19 of the 33 parameters tested were not detected in any of the Rio Grande North or South samples.
- Several key parameters all met the applicable WQSs, as they have for all the CMC samples to date:
    - All dissolved oxygen results were greater than 5 mg/L (minimum WQS).
    - All temperature results were less than 32.2°C (maximum WQS).
- The PCB results were below the New Mexico Surface WQSs and Pueblo of Isleta Surface WQSs for designated uses including drinking water, wildlife habitat, acute aquatic life, and chronic aquatic life. However, the Rio Grande South CMC sample from October 6, 2022, was above the Pueblo of Isleta and New Mexico human health criteria (based on fish consumption only) WQSs for surface waters.
- The October 6, 2022, Rio Grande South sample result exceeded the New Mexico Surface WQSs and Pueblo of Isleta Surface WQSs (15 pCi/L) for gross alpha, adjusted. This is the third time since 2016 that the analytical results from a CMC sample have had an exceedance in gross alpha, adjusted. The CMC will continue to closely evaluate this parameter in future samples.
- The calculated E. coli loading for the October 5-6, 2022 storm event for the northern segment (Alameda to Angostura) and the southern segment (Isleta to Almeda) of the Rio Grande was below the WLA for the CMC MS4s. This analysis used the mid-point E. coli sample result obtained in the Rio Grande at Alameda.
    - The E. coli lab result for the Rio Grande South location is the lowest value that the CMC has seen reported in the Rio Grande at this location. AMAFCA called HEAL to discuss this result and verify that the reported result was correct.
    - Sources for the E. coli loading measured in the river are not solely attributable to the CMC MS4 members; the E. coli loading calculations serve to provide a reasonable estimate of the CMC contribution to the measured E. coli loading.

For planning purposes for the CMC members, the FY 2023 dry season CMC monitoring, if a sample is obtained, will be summarized by BHI for the CMC in a dry season memo.

SG/ab

Attachments:

Attachment 1 – DBS&A Field Data & Hall Environmental Analysis Laboratory Reports with BHI Notes for FY 2023 Wet Season

Attachment 2 – FY 2023 Wet Season Completed Data Verification and Validation (V&V) Forms

Spreadsheets Included Separately:

E. coli Loading and Comparison to Waste Load Allocation (WLA) Excel Spreadsheet

Excel CMC Spreadsheet with FY 2023 Wet Season Stormwater Quality Monitoring Results

ATTACHMENT 1

DBS&A FIELD DATA & HALL ENVIRONMENTAL ANALYSIS LABORATORY REPORTS WITH BHI NOTES FOR FY 2023 WET SEASON

CMC Water Quality Results Database
Date: December 29, 2022
Summary of Lab Results for CMC samples for FY 2023 Wet Season

			Rio Grande - North				Rio Grande - South - At Isleta Dam				Rio Grande - Alameda Bridge (E. coli Only Samples)			
Parameter	Permit Required Units	Analysis Method	Provisional or Verified	2023 CMC SAMPLE - EXTRA NORTH Collection Date 10/5/2022 Wet Season Sample	Qualifier	Check compared to Water Quality Criterion	Provisional or Verified	2023 CMC SAMPLE - EXTRA SOUTH Collection Date 10/6/2022 Wet Season Sample	Qualifier	Check compared to Water Quality Criterion	Provisional or Verified	2023 CMC SAMPLE - EXTRA ALAMEDA Collection Date 10/5/22 Wet Season Sample	Qualifier	Check compared to Water Quality Criterion
Total Suspended Solids (TSS)	mg/L	SM 2540D	V	29		--	V	890	D	--				
Total Dissolved Solids (TDS)	mg/L	SM2540C MOD	V	195		OK	V	265	D	OK				
Chemical Oxygen Demand (COD)	mg/L	EPA 410.4	V	22.3		--	V	ND		--				
Biochemical Oxygen Demand (BOD_5)	mg/L	SM5210B	--	Not provided		--	--	Not provided		--				
Dissolved Oxygen (DO)	mg/L	FIELD	V	5.79		OK	V	6.24		OK	V	5.58		OK
Oil and Grease (N-Hexane Extractable Material)	mg/L	EPA 1664A	V	ND		OK	V	ND		OK				
E. coli	MPN (CFU/100 mL)	SM 9223B Fecal Indicator	V	135		>WQ Standard	V	<1		OK	V	52		OK
pH	S.U.	FIELD	V	8.24	H	OK	V	8.02	H	OK	V	7.6		OK
Total Kjedahl Nitrogen (TKN)	mg/L	SM 4500	V	ND		--	V	1.7		--				
Nitrate plus Nitrite	mg/L	EPA 300.0: Anions	V	ND		OK	V	ND		OK				
Dissolved Phosphorous	mg/L	EPA 365.1, filtered sample	V	ND	D	--	V	ND	D	--				
Ammonia (mg/L as N)	mg/L	SM 4500 NH3	V	ND		OK	V	ND		OK				
Total Nitrogen	mg/L	--	V	ND		OK	V	1.70		OK				
Total Phosphorous	mg/L	EPA 365.1	V	ND	D	--	V	0.97	D	--				
PCBS - 0.000064 (Method 1668A - sum of all congeners)	µg/L	EPA 1668	V	0.00013	J	OK	V	0.0011	J	>WQ Standard				
Gross Alpha, Adjusted	pCi/L	EPA 900.0	V	0.895 ± NA		OK	V	22.98 ± NA		>WQ Standard				
Tetrahydrofuran	µg/L	EPA 8260 C	V	ND		--	V	ND		--				
Benzo[a]pyrene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Benzo[b]fluoranthene (other name: 3,4-Benzofluoranthene)	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Benzo(k)fluoranthene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Chrysene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Indeno(1,2,3-cd)Pyrene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Dieldrin	µg/L	EPA 608	V	ND		OK	V	ND		OK				
Pentachlorophenol	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Benzidine	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Benzo(a)anthracene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Dibenzofuran	µg/L	EPA 625	V	ND		--	V	ND		--				
Dibenzo(a,h)anthracene	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Chromium VI (Hexavalent)	µg/L	3500Cr C-2011	V	ND		OK	V	ND		OK				
Dissolved Copper	µg/L	EPA 200.8	V	1.1		OK	V	ND		OK				
Dissolved Lead	µg/L	EPA 200.8	V	ND		OK	V	ND		OK				
Bis (2-ethyhexyl) Phthalate (other names: Di(2-ethylhexly)phthalate, DEHP) - 2.2	µg/L	EPA 625	V	ND		OK	V	ND		OK				
Conductivity	umhos/cm	FIELD	V	290		--	V	395		--	V	275		--
Temperature	°C	FIELD	V	15.9		OK	V	15.5		OK	V	18		OK
Hardness (as $CaCO_3$)	mg/L	SM2340B	V	120		--	V	280		--				
Mercury	µg/l	--												

Data Verification/Validation and Qualifier Notes:
(R) The sample results are unusable because certain criteria were not met. The analyte may or may not be present in the sample.
(H) Sample holding time exceeded.
(J) The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
(D) Sample was diluted by Lab due to matrix
(U) Analyte was analyzed for, but not detected above the specified detection limit.

Notes:
1. Wet Season monitoring period - July 1 to October 31 and Dry Season monitoring period - November 1 to June 30 according to the Watershed Based MS4 Permit NMR04A000.
mean monthly flow of 100 cfs, monthly average concentration for TDS 1,500 mg/l or less,
sulfate 500 mg/L or less, and chloride 250 mg/L or less.
3. Aquatic life criteria for metals are expressed as a function of total hardness (mg/L as
4. According to NMAC 20.6.4, E. coli bacteria for Primary Contact - monthly geometric
5. Water quality criterion for metals is based on dissolved metals, NMAC 20.6.4.900.I and
individual sample results compared to acute toxicity values.
6. HEAL lab method: SM 9223B Fecal Indicator. Note - lab method for units of MPN/100
ml, lab report uses units CFU/100 ml, for this analysis assuming two units are equivalent

ND - analyte not detected above the laboratory method detection limit
NA - not analyzed
Hatching also indicates that parameter was not analyzed

National recommended WQ criteria Human Health
https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table

Samplers Chad Johansson
Sam Fire

CMC Sampling Data Sheet

Site Identification: Rio Grande North ; Angostura Diversion Dam

Notes:

Full Suite Sample Date and Time: 10/5/22 1215	
Full Sample Identification: RG North- 20221005	
QC Samples: Duplicate / None	QC Sample ID:
QC samples require a DIFFERENT sample time than the environmental sample. QC Sample time:	

Full Suite Collection Point : Diversion Structure

Full Suite Sample Volume: 8gal Collection Time Start: 1125 End: 1210

Field Parameters for each 2-gallon grab

Grab	Time	Temp (°C)	pH	Specific Conductance (μS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)
1	1125	16.4	8.56	334	6.56	66.6
2	1140	16.8	7.25	297	5.90	60.7
3	1155	16.8	8.01	295	3.42	34.6
4	1210	14.9	8.27	291	8.91	88.2
Composite	1215	15.9	8.24	290	5.79	59.6

☒*Turbid Water* ☐*Color* TAN ☒*Solids* ☐*Oil/Sheen* ☐*Foam* ☐*Odor*

Analytical - see 2021 COC table

☒Site Photo ☒Sample Photo

Samplers Chad Johannesen
Sam Fire

CMC Sampling Data Sheet

Site Identification: Rio Grande @ Isleta

Notes:

Full Suite Sample Date and Time: 10/6/22 0905	
Full Sample Identification: RG South- 20221006	
QC Samples: Duplicate / None	QC Sample ID:
QC samples require a DIFFERENT sample time than the environmental sample. QC Sample time:	

Full Suite Collection Point : Isleta diversion structure

Full Suite Sample Volume: 8 gal Collection Time Start: 0815 End: 0900

Field Parameters for each 2-gallon grab

Grab	Time	Temp (°C)	pH	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)
1	0815	15.9	8.51	423	5.43	54.7
2	0830	15.8	7.27	399	5.95	59.7
3	0845	15.6	7.97	394	6.08	60.7
4	0900	15.7	8.01	396	6.21	62.0
Composite	0905	15.5	8.02	395	6.24	62.1

☒*Turbid Water* ☒*Color* Brown ☒*Solids* ☐*Oil/Sheen* ☒*Foam* ☐*Odor*______

Analytical - see 2021 COC table

☒Site Photo ☐Sample Photo

Samplers Chad Johannesen
San File

CMC Sampling Data Sheet

Site Identification: Rio Grande at Alameda

Notes:

Full Suite Sample Date and Time: 10/5/22 1340	
Full Sample Identification: RG Alameda- 20221005	
QC Samples: Duplicate / None	QC Sample ID:
QC samples require a DIFFERENT sample time than the environmental sample. QC Sample time:	

Full Suite Collection Point : Alameda Bridge

Full Suite Sample Volume: 1 gal Collection Time Start: 1330 End: 1340

Field Parameters for each 2-gallon grab

Grab	Time	Temp (°C)	pH	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)
1						
2						
3						
4						
Composite	1340	18.0	7.60	275	5.58	57.9

☒*Turbid Water* ☒*Color* Brown ☒*Solids* ☐*Oil/Sheen* ☐*Foam* ☐*Odor*________

Analytical - see 2021 COC table

☒Site Photo ☒Sample Photo

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

October 10, 2022

10/5/2022: Alameda and Rio Grande North E.coli only samples

Patrick Chavez
AMAFCA
2600 Prospect Ave NE
Albuquerque, NM 87107
TEL: (505) 884-2215
FAX:

RE: CMC Wet 22 OrderNo.: 2210242

Dear Patrick Chavez:

Hall Environmental Analysis Laboratory received 2 sample(s) on 10/5/2022 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Field Parameters:
Rio Grande North
Temp = 15.9^{O}C
pH = 8.24
Conductivity = 290 uS/cm
Dissolved Oxygen = 5.79 mg/L

Field Parameters:
Rio Grande at Alameda
Temp = 18.0^{O}C
pH = 7.60
Conductivity = 275 uS/cm
Dissolved Oxygen = 5.58 mg/L

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet 22
Lab ID: 2210242-001 **Matrix:** AQUEOUS

Client Sample ID: RG North-20221005
Collection Date: 10/5/2022 12:05:00 PM
Received Date: 10/5/2022 2:20:00 PM

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed	Batch ID
SM 9223B FECAL INDICATOR: E. COLI MPN							Analyst: **dms**	
E. Coli	135	10.00	10.00		MPN/100	10	10/7/2022 5:05:00 PM	70632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet 22
Lab ID: 2210242-002
Matrix: AQUEOUS

Client Sample ID: RG Alameda-20221005
Collection Date: 10/5/2022 1:40:00 PM
Received Date: 10/5/2022 2:20:00 PM

Analyses	Result	MDL	RL	Qual	Units	DF	Date Analyzed	Batch ID
SM 9223B FECAL INDICATOR: E. COLI MPN							Analyst: **dms**	
E. Coli	52	10.00	10.00		MPN/100	10	10/7/2022 5:05:00 PM	70632

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: AMAFCA   Work Order Number: 2210242   RcptNo: 1

Received By: Juan Rojas 10/5/2022 2:20:00 PM

Completed By: Cheyenne Cason 10/5/2022 2:45:18 PM

Reviewed By: 10-5-22 @ 15:19

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐
   Samples were collected the same day and chilled.
5. Sample(s) in proper container(s)? Yes ☑ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
8. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA? Yes ☐ No ☐ NA ☑
10. Were any sample containers received broken? Yes ☐ No ☑
11. Does paperwork match bottle labels? Yes ☑ No ☐
    (Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
13. Is it clear what analyses were requested? Yes ☑ No ☐
14. Were all holding times able to be met? Yes ☑ No ☐
    (If no, notify customer for authorization.)

# of preserved bottles checked for pH:
(<2 or >12 unless noted)
Adjusted?
Checked by: KPG 10.05.22

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

16. Additional remarks:

17. Cooler Information

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	15.1	Good	Not Present			

Chain-of-Custody Record

Client: AMAFCA

Mailing Address:

Phone #:

email or Fax#: pchavez@amafca.org

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other
☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: CMC - Wet 22

Project #:

Project Manager: Patrick Chavez

Sampler: CJohanneson

On Ice: ☒ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 15.1-0=15.1 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2210242	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	Ecoli - enumerated
10-5-22	1215	AQ	RG North-20221005			001											X
10-5-22	1340	AQ	RG Alameda-20221005			002											X

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
10-5-22	1420	[signature]	[signature]	COC	10/5/22	14:20
Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

10/5/2022: Rio Grande North and 10/6/2022: Rio Grande South

November 23, 2022

Patrick Chavez
AMAFCA
2600 Prospect Ave NE
Albuquerque, NM 87107
TEL: (505) 884-2215
FAX:

RE: CMC Wet FY23 OrderNo.: 2210315

Dear Patrick Chavez:

Hall Environmental Analysis Laboratory received 3 sample(s) on 10/6/2022 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Field Parameters:
- Rio Grande North
Temp = 15.9^{O}C
pH = 8.24
Conductivity = 290 uS/cm
Dissolved Oxygen = 5.79 mg/L
- Rio Grande South
Temp = 15.5^{O}C
pH = 8.02
Conductivity = 395 uS/cm
Dissolved Oxygen = 6.24 mg/L

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-001A

Client Sample ID: R6 North-20221005
Collection Date: 10/5/2022 12:15:00 PM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8081: PESTICIDES						Analyst: **JME**	
Dieldrin	ND	0.10		µg/L	1	10/17/2022 12:51:12 PM	70767
Surr: Decachlorobiphenyl	94.3	40.9-111		%Rec	1	10/17/2022 12:51:12 PM	70767
Surr: Tetrachloro-m-xylene	64.3	15-107		%Rec	1	10/17/2022 12:51:12 PM	70767

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-001D

Client Sample ID: R6 North-20221005
Collection Date: 10/5/2022 12:15:00 PM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 1664B						Analyst:	**SMS**
N-Hexane Extractable Material	ND	9.40		mg/L	1	10/18/2022 6:18:00 PM	70825

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	AMAFCA	**Client Sample ID:**	R6 North-20221005
Project:	CMC Wet FY23	**Collection Date:**	10/5/2022 12:15:00 PM
Lab ID:	2210315-001E	**Matrix:**	Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS						Analyst:	**JTT**
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	10/6/2022 11:59:13 PM	A91618
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	10/6/2022 11:59:13 PM	A91618
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst:	**SNS**
Total Dissolved Solids	195	20.0		mg/L	1	10/12/2022 8:50:00 AM	70696
SM 4500 NH3: AMMONIA						Analyst:	**EKM**
Nitrogen, Ammonia	ND	1.0		mg/L	1	10/21/2022 1:24:00 PM	R91993
SM4500-H+B / 9040C: PH						Analyst:	**JTT**
pH	8.24		H	pH units	1	10/10/2022 3:56:29 PM	R91722
EPA METHOD 365.1: TOTAL PHOSPHOROUS						Analyst:	**CJS**
Phosphorus, Total (As P)	ND	0.25	D	mg/L	1	10/25/2022 3:03:00 PM	71023
SM 4500 NORG C: TKN						Analyst:	**EKM**
Nitrogen, Kjeldahl, Total	ND	1.0		mg/L	1	10/24/2022 10:19:00 AM	70981
SM 2540D: TSS						Analyst:	**KS**
Suspended Solids	29	4.0		mg/L	1	10/10/2022 3:18:00 PM	70679

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	AMAFCA	**Client Sample ID:**	R6 North-20221005
Project:	CMC Wet FY23	**Collection Date:**	10/5/2022 12:15:00 PM
Lab ID:	2210315-001F	**Matrix:**	Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 365.1: TOTAL PHOSPHOROUS							Analyst: **CJS**
Phosphorus, Total (As P)	ND	0.25	D	mg/L	1	10/25/2022 3:04:00 PM	71023

Dissolved phosphorous

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Analytical Report
Lab Order: **2210315**
Date Reported: **11/23/2022**

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	AMAFCA	**Client Sample ID:**	R6 North-20221005
Project:	CMC Wet FY23	**Collection Date:**	10/5/2022 12:15:00 PM
Lab ID:	2210315-001G	**Matrix:**	Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
SM2340B: HARDNESS							Analyst: **VP**
Hardness as CaCO3	120	6.6		mg/L	1	10/14/2022 2:05:00 PM	R91819
EPA METHOD 200.7: METALS							Analyst: **VP**
Calcium	39	1.0		mg/L	1	10/14/2022 5:58:24 PM	70811
Magnesium	6.8	1.0		mg/L	1	10/14/2022 5:58:24 PM	70811

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-001N

Client Sample ID: R6 North-20221005
Collection Date: 10/5/2022 12:15:00 PM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA 200.8: DISSOLVED METALS						Analyst: **bcv**	
Copper	0.0011	0.0010		mg/L	1	10/18/2022 1:04:27 PM	A91883
Lead	ND	0.00050		mg/L	1	10/18/2022 1:04:27 PM	A91883

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002A

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 8081: PESTICIDES						Analyst: **JME**	
Dieldrin	ND	0.10		µg/L	1	10/17/2022 1:04:20 PM	70767
Surr: Decachlorobiphenyl	96.8	40.9-111		%Rec	1	10/17/2022 1:04:20 PM	70767
Surr: Tetrachloro-m-xylene	76.2	15-107		%Rec	1	10/17/2022 1:04:20 PM	70767

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002B

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
SM 9223B FECAL INDICATOR: E. COLI MPN							Analyst: **dms**
E. Coli	<1	1.000		MPN/100	1	10/7/2022 5:05:00 PM	70671

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT:	AMAFCA	**Client Sample ID:**	R6 South-20221006
Project:	CMC Wet FY23	**Collection Date:**	10/6/2022 9:05:00 AM
Lab ID:	2210315-002D	**Matrix:**	Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 1664B						Analyst: **SMS**	
N-Hexane Extractable Material	ND	9.50		mg/L	1	10/18/2022 6:18:00 PM	70825

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002E

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 300.0: ANIONS							Analyst: **JTT**
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	10/7/2022 1:16:26 AM	A91618
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	10/7/2022 1:16:26 AM	A91618
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: **SNS**
Total Dissolved Solids	265	100	D	mg/L	1	10/12/2022 8:50:00 AM	70696
SM 4500 NH3: AMMONIA							Analyst: **EKM**
Nitrogen, Ammonia	ND	1.0		mg/L	1	10/21/2022 1:24:00 PM	R91993
SM4500-H+B / 9040C: PH							Analyst: **JTT**
pH	8.09		H	pH units	1	10/10/2022 4:00:35 PM	R91722
EPA METHOD 365.1: TOTAL PHOSPHOROUS							Analyst: **CJS**
Phosphorus, Total (As P)	0.97	0.25	D	mg/L	1	10/25/2022 3:06:00 PM	71023
SM 4500 NORG C: TKN							Analyst: **EKM**
Nitrogen, Kjeldahl, Total	1.7	1.0		mg/L	1	10/24/2022 10:19:00 AM	70981
SM 2540D: TSS							Analyst: **KS**
Suspended Solids	890	20	D	mg/L	1	10/10/2022 3:18:00 PM	70679

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002F

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA METHOD 365.1: TOTAL PHOSPHOROUS						Analyst: **CJS**	
Phosphorus, Total (As P)	ND	0.25	D	mg/L	1	10/25/2022 3:08:00 PM	71023

Dissolved phosphorous

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002G

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
SM2340B: HARDNESS							Analyst: **VP**
Hardness as CaCO3	280	6.6		mg/L	1	10/14/2022 2:05:00 PM	R91819
EPA METHOD 200.7: METALS							Analyst: **VP**
Calcium	82	1.0		mg/L	1	10/14/2022 6:01:40 PM	70811
Magnesium	17	1.0		mg/L	1	10/14/2022 6:01:40 PM	70811

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AMAFCA
Project: CMC Wet FY23
Lab ID: 2210315-002N

Client Sample ID: R6 South-20221006
Collection Date: 10/6/2022 9:05:00 AM
Matrix: Aqueous

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch ID
EPA 200.8: DISSOLVED METALS							Analyst: **bcv**
Copper	ND	0.0010		mg/L	1	10/18/2022 1:07:08 PM	A91883
Lead	ND	0.00050		mg/L	1	10/18/2022 1:07:08 PM	A91883

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

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Client:	Hall Environmental Analysis Lab	Work Order:	MCJ0294
Address:	4901 Hawkins NE Suite D	Project:	2210315
	Albuquerque, NM 87109	Reported:	11/1/2022 11:21
Attn:	Andy Freeman		

Analytical Results Report

Sample Location:	2210315-001H (R6 North-20221005)		
Lab/Sample Number:	MCJ0294-01	Collect Date:	10/05/22 12:15
Date Received:	10/07/22 14:03	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Volatiles							
Tetrahydrofuran	ND	ug/L	5.00	10/12/22 18:51	BKP	EPA 8260D	
Surrogate: 1,2-Dichlorobenzene-d4	*104%*		*70-130*	*10/12/22 18:51*	*BKP*	*EPA 8260D*	
Surrogate: 4-Bromofluorobenzene	*94.8%*		*70-130*	*10/12/22 18:51*	*BKP*	*EPA 8260D*	
Surrogate: Toluene-d8	*96.1%*		*70-130*	*10/12/22 18:51*	*BKP*	*EPA 8260D*	

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Analytical Results Report
(Continued)

Sample Location:	2210315-001I (R6 North-20221005)		
Lab/Sample Number:	MCJ0294-02	Collect Date:	10/05/22 12:15
Date Received:	10/07/22 14:03	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Semivolatiles							
Benzidine	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Benzo[a]anthracene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Benzo[a]pyrene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Benzo[b]fluoranthene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Benzo[k]fluoranthene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
bis(2-Ethylhexyl)phthalate	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Chrysene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Dibenz[a,h]anthracene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Dibenzofuran	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Indeno[1,2,3-cd]pyrene	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Pentachlorophenol	ND	ug/L	1.00	10/18/22 0:20	MH	EPA 8270E	
Surrogate: Terphenyl-d14	*64.9%*		*57-133*	*10/18/22 0:20*	*MH*	*EPA 8270E*	

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Analytical Results Report

(Continued)

Sample Location: 2210315-002H (R6 South-20221006)
Lab/Sample Number: MCJ0294-03 Collect Date: 10/06/22 09:05
Date Received: 10/07/22 14:03 Collected By:
Matrix: Water

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Volatiles							
Tetrahydrofuran	ND	ug/L	5.00	10/12/22 19:21	BKP	EPA 8260D	
Surrogate: 1,2-Dichlorobenzene-d4	*104%*		*70-130*	*10/12/22 19:21*	*BKP*	*EPA 8260D*	
Surrogate: 4-Bromofluorobenzene	*92.6%*		*70-130*	*10/12/22 19:21*	*BKP*	*EPA 8260D*	
Surrogate: Toluene-d8	*96.5%*		*70-130*	*10/12/22 19:21*	*BKP*	*EPA 8260D*	

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Analytical Results Report
(Continued)

Sample Location:	2210315-002I (R6 South-20221006)		
Lab/Sample Number:	MCJ0294-04	Collect Date:	10/06/22 09:05
Date Received:	10/07/22 14:03	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Semivolatiles							
Benzidine	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Benzo[a]anthracene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Benzo[a]pyrene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Benzo[b]fluoranthene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Benzo[k]fluoranthene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
bis(2-Ethylhexyl)phthalate	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Chrysene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Dibenz[a,h]anthracene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Dibenzofuran	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Indeno[1,2,3-cd]pyrene	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Pentachlorophenol	ND	ug/L	2.50	10/18/22 0:47	MH	EPA 8270E	
Surrogate: Terphenyl-d14	*78.7%*		*57-133*	*10/18/22 0:47*	*MH*	*EPA 8270E*	

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Analytical Results Report

(Continued)

Sample Location:	2210315-003A (Trip Blank)		
Lab/Sample Number:	MCJ0294-05	Collect Date:	10/06/22 00:00
Date Received:	10/07/22 14:03	Collected By:	
Matrix:	Water		

Analyte	Result	Units	PQL	Analyzed	Analyst	Method	Qualifier
Volatiles							
Tetrahydrofuran	ND	ug/L	0.500	10/12/22 19:51	BKP	EPA 8260D	
Surrogate: 1,2-Dichlorobenzene-d4	*104%*		*70-130*	*10/12/22 19:51*	*BKP*	*EPA 8260D*	
Surrogate: 4-Bromofluorobenzene	*91.6%*		*70-130*	*10/12/22 19:51*	*BKP*	*EPA 8260D*	
Surrogate: Toluene-d8	*104%*		*70-130*	*10/12/22 19:51*	*BKP*	*EPA 8260D*	

Authorized Signature,

Justin Doty For Todd Taruscio, Laboratory Manager

PQL	Practical Quantitation Limit
ND	Not Detected
MCL	EPA's Maximum Contaminant Level
Dry	Sample results reported on a dry weight basis
*	Not a state-certified analyte

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The results reported related only to the samples indicated.

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Quality Control Data

Semivolatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BCJ0360 - SVOC Water										
Blank (BCJ0360-BLK1)					Prepared: 10/10/2022 Analyzed: 10/17/2022					
Dibenzofuran	ND		0.500	ug/L						
Benzidine	ND		0.500	ug/L						
Indeno(1,2,3-cd)pyrene	ND		0.500	ug/L						
Dibenz(a,h)anthracene	ND		0.500	ug/L						
Chrysene	ND		0.500	ug/L						
Di (2-ethylhexyl) phthalate	ND		0.500	ug/L						
Benzo[k]fluoranthene	ND		0.500	ug/L						
Benzo[b]fluoranthene	ND		0.500	ug/L						
Benzo[a]pyrene	ND		0.500	ug/L						
Benzo[a]anthracene	ND		0.500	ug/L						
Pentachlorophenol	ND		0.500	ug/L						
Surrogate: Terphenyl-d14			*18.7*	*ug/L*	*25.0*		*74.9*	*57-133*		
LCS (BCJ0360-BS1)					Prepared: 10/10/2022 Analyzed: 10/17/2022					
Dibenzofuran	4.43		0.500	ug/L	5.00		88.6	75-120		
Benzo[a]anthracene	4.38		0.500	ug/L	5.00		87.6	80-120		
Benzo[a]pyrene	4.25		0.500	ug/L	5.00		85.0	66-116		
Benzo[b]fluoranthene	4.61		0.500	ug/L	5.00		92.2	72-116		
Benzo[k]fluoranthene	4.97		0.500	ug/L	5.00		99.4	71-121		
Di (2-ethylhexyl) phthalate	5.39		0.500	ug/L	5.00		108	60-144		
Indeno(1,2,3-cd)pyrene	4.19		0.500	ug/L	5.00		83.8	62-123		
Pentachlorophenol	4.17		0.500	ug/L	5.00		83.4	51-118		
Chrysene	4.70		0.500	ug/L	5.00		94.0	74-124		
Dibenz(a,h)anthracene	4.16		0.500	ug/L	5.00		83.2	62-120		
LCS Dup (BCJ0360-BSD1)					Prepared: 10/10/2022 Analyzed: 10/17/2022					
Di (2-ethylhexyl) phthalate	4.79		0.500	ug/L	5.00		95.8	60-144	11.8	32
Pentachlorophenol	4.51		0.500	ug/L	5.00		90.2	51-118	7.83	25
Indeno(1,2,3-cd)pyrene	4.05		0.500	ug/L	5.00		81.0	62-123	3.40	25
Dibenzofuran	4.46		0.500	ug/L	5.00		89.2	75-120	0.675	25
Chrysene	4.79		0.500	ug/L	5.00		95.8	74-124	1.90	25
Benzo[k]fluoranthene	5.08		0.500	ug/L	5.00		102	71-121	2.19	25
Benzo[b]fluoranthene	4.47		0.500	ug/L	5.00		89.4	72-116	3.08	25
Benzo[a]pyrene	4.07		0.500	ug/L	5.00		81.4	66-116	4.33	25
Benzo[a]anthracene	4.38		0.500	ug/L	5.00		87.6	80-120	0.00	25
Dibenz(a,h)anthracene	3.91		0.500	ug/L	5.00		78.2	62-120	6.20	30

Quality Control Data

Volatiles

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BCJ0445 - VOC										
Blank (BCJ0445-BLK1)					Prepared & Analyzed: 10/12/2022					
Tetrahydrofuran	ND		0.500	ug/L						
Surrogate: 4-Bromofluorobenzene			*23.7*	*ug/L*	*25.0*		*94.6*	*70-130*		
Surrogate: Toluene-d8			*24.7*	*ug/L*	*25.0*		*98.6*	*70-130*		
Surrogate: 1,2-Dichlorobenzene-d4			*19.1*	*ug/L*	*19.0*		*100*	*70-130*		

Anatek Labs, Inc.

1282 Alturas Drive - Moscow, ID 83843 - (208) 883-2839 - Fax (208) 8829246 - email moscow@anateklabs.com
504 E Sprague Ste. D - Spokane, WA 99202 - (509) 838-3999 - fax (509) 838-4433 - email spokane@anateklabs.com

Quality Control Data
(Continued)

Volatiles (Continued)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: BCJ0445 - VOC (Continued)										
LCS (BCJ0445-BS1)					Prepared & Analyzed: 10/12/2022					
Tetrahydrofuran	11.7		1.00	ug/L	10.0		117	80-120		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CHAIN OF CUSTODY RECORD

PAGE: 1 OF: 1

Hall

We

MCJ0294

Due: 10/24/22

SUB CONTRATOR: Anatek ID	COMPANY: Anatek Labs, Inc.	PHONE: (208) 883-2839	FAX: (208) 882-9246
ADDRESS: 1282 Alturas Dr		ACCOUNT #:	EMAIL:
CITY, STATE, ZIP: Moscow, ID 83843			

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2210315-001H	R6 North-20221005	VOAHCL	Aqueous	10/5/2022 12:15:00 PM	3	8260 Tetrahydrofuran Only
2	2210315-001I	R6 North-20221005	1LAMGU	Aqueous	10/5/2022 12:15:00 PM	3	8270 - See attached
3	2210315-002H	R6 South-20221006	VOAHCL	Aqueous	10/6/2022 9:05:00 AM	3	8260 Tetrahydrofuran Only
4	2210315-002I	R6 South-20221006	1LAMGU	Aqueous	10/6/2022 9:05:00 AM	2	8270 - See attached
5	2210315-003A	Trip Blank	VOAHCL	Trip Blank		2	8260 Tetrahydrofuran Only

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By	Date	Time	Received By	Date	Time
Relinquished By: Sa	Date: 10/6/2022	Time: 2:34 PM	Received By: JKT	Date: 10/7/22	Time: 14:03
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard ☑ RUSH Next BD ☐ 2nd BD ☐ 3rd BD ☐

REPORT TRANSMITTAL DESIRED:

☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY

Temp of samples ______ °C Attempt to Cool ? ______

Comments: ______

Attached Sheet

MCJ0294

Due: 10/24/22

Collaborative Monitoring Cooperative - Analyses List
Attach to Chain of Custody

Please refer to attached NPDES Permit No. NMR04A00 Appendix F. Methods and minimum qu...
(MQL's) will be those approved under 40 CFR 136 and specified in the attached permit

Analyte (Bold Indicates WQS)	CAS #	Fraction	Method #	MDL (µg/L)
Hardness (Ca + Mg)	NA	Total	200.7	2.4
Lead	7439-92-1	Dissolved	200.8	0.09
Copper	7440-50-8	Dissolved	200.8	1.06
Ammonia + organic nitrogen	7664-41-7	Total	350.1	31.32
Total Kjehidal Nitrogen	17778-88-0	Total	351.2	58.78
Nitrate + Nitrite	14797-55-8	Total	353.2	10.17
Polychlorinated biphenyls (PCBs)	1336-36-3	Total	1668	0.014
Tetrahydrofuran (THF)	109-99-9	Total	8260C	7.9
bis(2-Ethylhexyl)phthalate	117-81-7	Total	8270D	0.2
Dibenzofuran	132-64-9	Total	8270D	0.2
Indeno(1,2,3-cd)pyrene	193-39-5	Total	8270D	0.2
Benzo(b)fluoranthene	205-99-2	Total	8270D	0.1
Benzo(k)fluoranthene	207-08-9	Total	8270D	0.1
Chrysene	218-01-9	Total	8270D	0.2
Benzo(a)pyrene	50-32-8	Total	8270D	[illegible]
Dibenzo(a,h)anthracene	53-70-3	Total	8270D	0.3
Benzo(a)anthracene	56-55-3	Total	8270D	0.2
Dieldrin	60-57-1	Total	8081	0.1
Pentachlorophenol	87-86-5	Total	8270D	0.2
Benzidine	92-87-5	Total	8270D	0.1
Chemical Oxygen Demand	E1641638²	Total	HACH	5100
Gross alpha (adjusted)	NA	Total	Method 900	0.1 pCi/L
Total Dissolved Solids	E1642222²	Total	SM 2540C	60.4
Total Suspended Solids	NA	Total	SM 2540D	3450
Biological Oxygen Demand	N/A	Total	Standard Methods	930
Oil and Grease		Total	1664A	5000
Ecoli-enumeration			SM 9223B	
pH			SM 4500	
Phosphorus		Dissolved	365.1	100
Phosphorus		Total	365.1	100
Chromium IV		Total	3500Cr C-2011	100

S:\Projects\DB20.1245_SSCAFCA_On-Call_Engineering\Docs\SAP\2021_Parameter list_CMC.doc
8/4/2021

MCJ0294

Due: 10/24/22

Anatek Labs, Inc.

Sample Receipt and Preservation Form

Client Name: Hall

TAT: Normal RUSH: ______ days

Samples Received From: FedEx UPS USPS Client Courier Other: ______

Custody Seal on Cooler/Box: Yes No Custody Seals Intact: Yes No N/A

Number of Coolers/Boxes: 4 Type of Ice: Wet Ice Ice Packs Dry Ice None

Packing Material: Bubble Wrap Bags Foam/Peanuts Paper None Other: ______

Cooler Temp As Read (°C): 3.8 Cooler Temp Corrected (°C): – Thermometer Used: IR-5

				Comments:
Samples Received Intact?	Yes	No	N/A	
Chain of Custody Present?	Yes	No	N/A	
Samples Received Within Hold Time?	Yes	No	N/A	
Samples Properly Preserved?	Yes	No	N/A	
VOC Vials Free of Headspace (<6mm)?	Yes & No	No	N/A	One of 2 trip blanks
VOC Trip Blanks Present?	Yes	No	N/A	2210315-003A excessive HS
Labels and Chains Agree?	Yes	No	N/A	
Total Number of Sample Bottles Received: 11				

Chain of Custody Fully Completed?	Yes	No	N/A	
Correct Containers Received?	Yes	No	N/A	
Anatek Bottles Used?	Yes	No	Unknown	

Record preservatives (and lot numbers, if known) for containers below:

HCl - 8260 Tetrahydrofuran only - g 44mL × 6 + 2 TBs

Notes, comments, etc. (also use this space if contacting the client - record names and date/time)

8270 (See attached) - g1L × 3 (2210315-001I ×2)

Received/Inspected By: JKL Date/Time: 10/7/22 14:03

ANALYTICAL REPORT

October 18, 2022

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Hall Environmental Analysis Laboratory

Sample Delivery Group:	L1544321
Samples Received:	10/07/2022
Project Number:	
Description:	
Report To:	Andy Freeman 4901 Hawkins NE Albuquerque, NM 87109

Entire Report Reviewed By:

John Hawkins
Project Manager

Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

2210315-001KM R6 NORTH-20221005 L1544321-01 GW

Collected by	Collected date/time	Received date/time
	10/05/22 12:15	10/07/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 3500Cr C-2011	WG1938076	1	10/12/22 07:17	10/12/22 07:17	ARD	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1939857	1	10/09/22 17:30	10/09/22 20:03	EPW	Mt. Juliet, TN

2210315-002KM R6 SOUTH-20221006 L1544321-02 GW

Collected by	Collected date/time	Received date/time
	10/06/22 09:05	10/07/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 3500Cr C-2011	WG1938076	1	10/12/22 07:25	10/12/22 07:25	ARD	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1940273	1	10/10/22 13:00	10/10/22 16:42	TQP	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

John V Hawkins

John Hawkins
Project Manager

Wet Chemistry by Method 3500Cr C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		0.000500	1	10/12/2022 07:17	WG1938076

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	22.3		20.0	1	10/09/2022 20:03	WG1939857

Wet Chemistry by Method 3500Cr C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND		0.000500	1	10/12/2022 07:25	WG1938076

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		20.0	1	10/10/2022 16:42	WG1940273

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3849771-1 10/11/22 21:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexavalent Chromium	U		0.000150	0.000500

L1542321-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1542321-01 10/11/22 22:35 • (DUP) R3849771-5 10/11/22 22:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	ND	ND	1	0.000		20

L1542881-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1542881-01 10/12/22 00:15 • (DUP) R3849771-6 10/12/22 00:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hexavalent Chromium	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3849771-2 10/11/22 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hexavalent Chromium	0.00200	0.00205	102	90.0-110	

L1542312-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1542312-01 10/11/22 22:10 • (MS) R3849771-3 10/11/22 22:19 • (MSD) R3849771-4 10/11/22 22:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hexavalent Chromium	0.0500	ND	0.0507	0.0511	101	102	1	90.0-110			0.884	20

L1543260-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1543260-01 10/12/22 00:38 • (MS) R3849771-7 10/12/22 01:01

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Hexavalent Chromium	0.0500	ND	0.0503	101	1	90.0-110	

Method Blank (MB)

(MB) R3846395-1 10/09/22 19:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
COD	U		11.7	20.0

L1543424-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1543424-01 10/09/22 19:54 • (DUP) R3846395-3 10/09/22 19:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	47.4	47.7	1	0.610		20

L1544335-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1544335-01 10/09/22 20:03 • (DUP) R3846395-6 10/09/22 20:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	32.2	32.7	1	1.60		20

Laboratory Control Sample (LCS)

(LCS) R3846395-2 10/09/22 19:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	500	537	107	90.0-110	

L1543925-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1543925-02 10/09/22 19:56 • (MS) R3846395-4 10/09/22 19:57 • (MSD) R3846395-5 10/09/22 19:58

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	500	263	1160	1170	180	181	1	80.0-120	E J5	E J5	0.549	20

Sample Narrative:

MS: Matrix spike failure due to matrix interference.

MSD: Matrix spike failure due to matrix interference.

Method Blank (MB)

(MB) R3846784-1 10/10/22 16:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
COD	U		11.7	20.0

L1544252-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1544252-02 10/10/22 16:36 • (DUP) R3846784-5 10/10/22 16:36

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	33.9	37.2	1	9.50		20

L1544331-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1544331-02 10/10/22 16:42 • (DUP) R3846784-6 10/10/22 16:42

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	33.9	28.6	1	16.9		20

Laboratory Control Sample (LCS)

(LCS) R3846784-2 10/10/22 16:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	500	483	96.7	90.0-110	

L1544093-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1544093-01 10/10/22 16:34 • (MS) R3846784-3 10/10/22 16:34 • (MSD) R3846784-4 10/10/22 16:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	500	ND	532	549	106	110	1	80.0-120			3.15	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CHAIN OF CUSTODY RECORD

PAGE: 1 OF: 1

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975
FAX: 505-345-4107
Website: www.hallenvironmental.com

J091

SUB CONTRATOR: Pace TN	COMPANY: PACE TN	PHONE: (800) 767-5859	FAX: (615) 758-5859
ADDRESS: 12065 Lebanon Rd		ACCOUNT #:	EMAIL:
CITY, STATE, ZIP: Mt. Juliet, TN 37122			

L1544321

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2210315-001K	R6 North-20221005	500HDPEH2SO4	Aqueous	10/5/2022 12:15:00 PM	1	COD -01
2	2210315-001M	R6 North-20221005	120mL	Aqueous	10/5/2022 12:15:00 PM	1	HEXAVALENT CHROMIUM
3	2210315-002K	R6 South-20221006	500HDPEH2SO4	Aqueous	10/6/2022 9:05:00 AM	1	COD -02
4	2210315-002M	R6 South-20221006	120mL	Aqueous	10/6/2022 9:05:00 AM	1	HEXAVALENT CHROMIUM

cont. - 4

0221 5755 8093 2632

Sample Receipt Checklist
COC Seal Present/Intact: ✓ Y N
COC Signed/Accurate: ✓ Y N
Bottles arrive intact: ✓ Y N
Correct bottles used: ✓ Y N
Sufficient volume sent: ✓ Y N
RAD Screen <0.5 mR/hr: ✓ Y N
If Applicable
VOA Zero Headspace: Y N
Pres.Correct/Check: Y N

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By: [signature]	Date: 10/6/2022	Time: 11:42 AM	Received By: [signature]	Date: 10/07/22	Time: 0900
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard ☑ RUSH Next BD ☐ 2nd BD ☐ 3rd BD ☐

REPORT TRANSMITTAL DESIRED:
☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY
NSA7
Temp of samples 5.8+0=5.8 C Attempt to Cool ?
Comments:

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

November 10, 2022

Andy Freeman
Hall Environmental
4901 Hawkins NE
Albuquerque, NM 87109

RE: Project: 2210315
Pace Project No.: 30528336

Dear Andy Freeman:

Enclosed are the analytical results for sample(s) received by the laboratory on October 07, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Greensburg

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carla Cmar
carla.cmar@pacelabs.com
(724)850-5600
Project Manager

Enclosures

cc: Ms. Jackie Ball, Hall Environmental
Michelle Garcia, Hall Environmental

CERTIFICATIONS

Project: 2210315
Pace Project No.: 30528336

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: 2210315
Pace Project No.: 30528336

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30528336001	**2210315-001L/R6 North-20221005**	Water	10/05/22 12:15	10/07/22 09:25
30528336002	**2210315-002L/ R6 South-2022100**	Water	10/06/22 09:05	10/07/22 09:25

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SAMPLE ANALYTE COUNT

Project: 2210315
Pace Project No.: 30528336

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30528336001	**2210315-001L/R6 North-20221005**	EPA 900.0	SVM	1	PASI-PA
		EPA 900.0	JAL	1	PASI-PA
30528336002	**2210315-002L/ R6 South-2022100**	EPA 900.0	SVM	1	PASI-PA
		EPA 900.0	JAL	1	PASI-PA

PASI-PA = Pace Analytical Services - Greensburg

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PROJECT NARRATIVE

Project:	2210315
Pace Project No.:	30528336

Method: **EPA 900.0**
Description: 900.0 Gross Alpha/Beta
Client: Hall Environmental
Date: November 10, 2022

General Information:
2 samples were analyzed for EPA 900.0 by Pace Analytical Services Greensburg. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project:	2210315
Pace Project No.:	30528336

Method: **EPA 900.0**
Description: Adjusted Gross Alpha
Client: Hall Environmental
Date: November 10, 2022

General Information:
2 samples were analyzed for EPA 900.0 by Pace Analytical Services Greensburg. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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(724)850-5600

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 2210315
Pace Project No.: 30528336

Sample: 2210315-001L/R6 North-20221005 **Lab ID: 30528336001** Collected: 10/05/22 12:15 Received: 10/07/22 09:25 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Gross Alpha	EPA 900.0	**2.00 ± 1.50 (2.55) C:NA T:NA**	pCi/L	10/14/22 08:41	12587-46-1	
	Pace Analytical Services - Greensburg					
Adjusted Gross Alpha	EPA 900.0	**0.895 ± NA (NA) C:NA T:NA**	pCi/L	11/10/22 15:20		

Sample: 2210315-002L/ R6 South-2022100 **Lab ID: 30528336002** Collected: 10/06/22 09:05 Received: 10/07/22 09:25 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Gross Alpha	EPA 900.0	**25.3 ± 5.74 (3.07) C:NA T:NA**	pCi/L	10/13/22 19:38	12587-46-1	
	Pace Analytical Services - Greensburg					
Adjusted Gross Alpha	EPA 900.0	**22.98 ± NA (NA) C:NA T:NA**	pCi/L	11/10/22 15:20		

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Greensburg, PA 15601
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QUALITY CONTROL - RADIOCHEMISTRY

Project: 2210315
Pace Project No.: 30528336

QC Batch: 538872
QC Batch Method: EPA 900.0
Analysis Method: EPA 900.0
Analysis Description: 900.0 Gross Alpha/Beta
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 30528336001, 30528336002

METHOD BLANK: 2614993
Matrix: Water
Associated Lab Samples: 30528336001, 30528336002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Gross Alpha	0.883 ± 0.808 (1.48) C:NA T:NA	pCi/L	10/14/22 08:19	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

QUALIFIERS

Project: 2210315
Pace Project No.: 30528336

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Act - Activity

Unc - Uncertainty: For Safe Drinking Water Act (SDWA) analyses, the reported Unc. Is the calculated Count Uncertainty (95% confidence interval) using a coverage factor of 1.96. For all other matrices (non-SDWA), the reported Unc. is the calculated Expanded Uncertainty (aka Combined Standard Uncertainty, CSU), reported at the 95% confidence interval using a coverage factor of 1.96.

Gamma Spec: The Unc. reported for all gamma-spectroscopy analyses (EPA 901.1), is the calculated Expanded Uncertainty (CSU) at the 95.4% confidence interval, using a coverage factor of 2.0.

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CHAIN OF CUSTODY RECORD

PAGE: 1 OF: 1

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975
FAX: 505-345-4107
Website: www.hallenvironmental.com

SUB CONTRATOR: Pace-Greensburg	COMPANY: Pace Analytical Services, Inc.	PHONE: (724) 850-5600	FAX: (724) 850-5601
ADDRESS: 1638 Roseytown Rd Ste 2,3,4		ACCOUNT #:	EMAIL:
CITY, STATE, ZIP: Greensburg, PA 15601			

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2210315-001L	R6 North-20221005	1LHDPEHNO3	Aqueous	10/5/2022 12:15:00 PM	2	Adjusted Gross Alpha
2	2210315-002L	R6 South-20221006	1LHDPEHNO3	Aqueous	10/6/2022 9:05:00 AM	2	Adjusted Gross Alpha

WO#: 30528336

30528336

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
[signature]	10/6/2022	11:46 AM	[signature]	10/7/22	9:25

TAT: Standard ☑ RUSH Next BD ☐ 2nd BD ☐ 3rd BD ☐

REPORT TRANSMITTAL DESIRED:
☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY

Temp of samples ______ °C Attempt to Cool ? ______

Comments: ______

Pace Analytical Services	DC#_Title: ENV-FRM-GBUR-0088 v02_Sample Condition Upon Receipt-Pittsburgh
	Effective Date: 10/03/2022

Client Name: Hall **Project #:**

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ Other

Tracking Number: 5344 4102 7710

Examined By	PS
Labeled By	PS
Temped By	—

Custody Seal on Cooler/Box Present: ☐ Yes ☑ No **Seals Intact:** ☐ Yes ☑ No

Thermometer Used: — **Type of Ice:** Wet Blue None

Cooler Temperature: Observed Temp — °C Correction Factor: — °C Final Temp: — °C

Temp should be above freezing to 6°C

pH paper Lot#	D.P.D. Residual Chlorine Lot #
1000421	—

Comments:	Yes	No	NA	
Chain of Custody Present	✓			1.
Chain of Custody Filled Out:	✓			2.
-Were client corrections present on COC		✓		
Chain of Custody Relinquished	✓			3.
Sampler Name & Signature on COC:		✓		4.
Sample Labels match COC:	✓			5.
-Includes date/time/ID				
Matrix:	WT			
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used:	✓			10.
-Pace Containers Used		✓		
Containers Intact:	✓			11.
Orthophosphate field filtered:			✓	12.
Hex Cr Aqueous samples field filtered:			✓	13.
Organic Samples checked for dechlorination			✓	14:
Filtered volume received for dissolved tests:			✓	15:
All containers checked for preservation: exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix	✓			16. PH<2
All containers meet method preservation requirements:	✓			Initial when completed: PS; Date/Time of Preservation:; Lot# of added Preservative:
Headspace in VOA Vials (>6mm):			✓	17.
Trip Blank Present:		✓		18.
Trip Blank Custody Seals Present		✓		
Rad Samples Screened <0.5 mrem/hr.	✓			Initial when completed: PS; Date: 10/7/22; Survey Meter SN: 1563

Comments:

WO#: 30528336 Due Date: 10/28/22

PM: HMC CLIENT: HALL ENVIRON

Note: For NC compliance samples with discrepancies, a copy of this form must be sent to the DEHNR Certification office.
PM Review is documented electronically in LIMS through the SRF Review schedule in the Workorder Edit Screen.

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Pace Greensburg Lab -Sample Container Count

Client ______________________

Site 7210315

Profile Number 1845

Notes ______________________

Sample Line Item	Matrix	AG1H	AG1S	AG1T	AG2U	AG3S	AG3U	AG5U	AG5T	BG1U	BG2U	BP1N	BP1U	BP2S	BP2U	BP3C	BP3N	BP3S	BP3U	DG9S	GCUB	VG9H	VG9T	VG9U	VOAK	WGFU	WGKU	ZPLC	
1	WT											2																	
2	↓											2																	
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													

WO#: 30528336

PM: HMC Due Date: 10/28/22

CLIENT: HALL ENVIRON

Container Codes

Glass

GJN	1 Gallon Jug with HNO3	DG9S	40mL amber VOA vial H2SO4
AG5U	100mL amber glass unprserved	VG9U	40mL clear VOA vial
AG5T	100mL amber glass Na Thiosulfate	VG9T	40mL clear VOA vial Na Thiosul
GJN	1 Gallon Jug	VG9H	40mL clear VOA vial HCl
AG1S	1L amber glass H2SO4	JGFU	4oz amber wide jar
AG1H	1L amber glass HCl	WGFU	4oz wide jar unpreserved
AG1T	1L amber glass Na Thiosulfate	BG2U	500mL clear glass unpreserved
BG1U	1L clear glass unpreserved	AG2U	500mL amber glass unpreserve
AG3S	250mL amber glass H2SO4	WGKU	8oz wide jar unpreserved
AG3U	250mL amber glass unpresered		

Plastic / Misc.

GCUB	1 Gallon Cubitainer
12GN	1/2 Gallon Cubitainer
SP5T	120mL Coliform Na Thiosulfate
BP1N	1L plastic HNO3
BP1U	1L plastic unpreserved
BP3S	250mL plastic H2SO4
BP3N	250mL plastic HNO3
BP3U	250mL plastic unpreserved
BP3C	250ml plastic NAOH
BP2S	500mL plastic H2SO4
BP2U	500mL plastic unpreserved

EZI	5g Encore
VOAK	Kit for Volatile Solid
I	Wipe/Swab
ZPLC	Ziploc Bag

WT	Water
SL	Solid
OL	Non-aqueous liquid
WP	Wipe

ENV-FRM-GBUR-0072.00 29Dec2020

ANALYTICAL REPORT

November 10, 2022

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Pace Analytical - Greensburg, PA

Sample Delivery Group:	L1547177
Samples Received:	10/15/2022
Project Number:	30528336
Description:	2210315
Site:	001
Report To:	Carla Cmar 1638 Roseytown Road Greensburg, PA 15601

Entire Report Reviewed By:

Donna Eidson
Project Manager

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

2210315-001L/R6 NORTH-20221005 L1547177-01 Non-Potable Water	Collected by	Collected date/time	Received date/time
		10/05/22 12:15	10/15/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1949166	1	11/03/22 14:48	11/09/22 16:17	SNR	Mt. Juliet, TN

2210315-002L//R6 SOUTH-2022100 L1547177-02 Non-Potable Water	Collected by	Collected date/time	Received date/time
		10/06/22 09:05	10/15/22 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1949166	1	11/03/22 14:48	11/09/22 16:20	SNR	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Donna Eidson
Project Manager

Radiochemistry by Method D5174

Analyte	Result ug/l	Qualifier	Uncertainty + / -	RDL ug/l	Analysis Date date / time	Batch
Uranium	1.65		0.0549	1.00	11/09/2022 16:17	WG1949166

Radiochemistry by Method D5174

Analyte	Result ug/l	Qualifier	Uncertainty + / -	RDL ug/l	Analysis Date date / time	Batch
Uranium	3.46		0.115	1.00	11/09/2022 16:20	WG1949166

Cp Tc Ss Cn Sr Qc Gl Al Sc

Method Blank (MB)

(MB) R3859221-1 11/09/22 15:57

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Uranium	U		1.00	1.00

Laboratory Control Sample (LCS)

(LCS) R3859221-2 11/09/22 16:00

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Uranium	30.0	29.2	97.5	80.0-120	

L1547600-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1547600-01 11/09/22 16:58 • (MS) R3859221-3 11/09/22 16:02 • (MSD) R3859221-5 11/09/22 16:07

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	20.0	ND	20.3	20.1	101	101	1	75.0-125			0.781	20

L1547600-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1547600-02 11/09/22 17:00 • (MS) R3859221-4 11/09/22 16:04 • (MSD) R3859221-6 11/09/22 16:10

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	20.0	ND	18.7	19.3	93.6	96.5	1	75.0-125			3.07	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
	The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1,6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1,4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

D171

Internal Transfer Chain of Custody

Pace Analytical® www.pacelabs.com

☐ Samples Pre-Logged into eCOC.

State Of Origin: NM
Cert. Needed: ☐ Yes ☐ No
Owner Received Date: 10/7/2022 Results Requested By: 11/4/2022

Workorder: 30528336 Workorder Name: 2210315

Report To	Subcontract To
Hollie M. Compton Pace Analytical Pittsburgh 1638 Roseytown Road Suites 2,3,4 Greensburg, PA 15601 Phone (724)850-5600	Pace National 12065 Lebanon Rd Mt. Juliet, TN 37122 Phone (615) 758-5858

Requested Analysis: Uranium KPA (N 1)

L1547177

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: HNO3	Uranium KPA	LAB USE ONLY
1	2210315-001L/R6 North-20221005	PS	10/5/2022 12:15	30528336001	Water	1	X	-01
2	2210315-002L/ R6 South-2022100	PS	10/6/2022 09:05	30528336002	Water	1	X	
3								
4								
5								

Transfers	Released By	Date/Time	Received By	Date/Time
1	Jacob Thomas	10/14/22 1700	D. Rambey	10/15/22 0900
2				
3				

Comments: OK

Cooler Temperature on Receipt °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document.
This chain of custody is considered complete as is since this information is available in the owner laboratory.

```
Sample Receipt Checklist
COC Seal Present/Intact:  ✓Y__N        If Applicable
COC Signed/Accurate:      ✓Y__N   VOA Zero Headspace:  __Y__N
Bottles arrive intact:    ✓Y__N   Pres.Correct/Check:  ✓Y__N
Correct bottles used:     ✓Y__N
Sufficient volume sent:   ✓Y__N   DR1A7 14.1+0=14.1
RAD Screen <0.5 mR/hr:    ✓Y  N
```

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CHAIN OF CUSTODY RECORD

PAGE: 1 OF: 1

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975
FAX: 505-345-4107
Website: www.hallenvironmental.com

U547177

SUB CONTRATOR: Pace-Greensburg	COMPANY: Pace Analytical Services, Inc.	PHONE: (724) 850-5600	FAX: (724) 850-5601
ADDRESS: 1638 Roseytown Rd Ste 2,3,4		ACCOUNT #:	EMAIL:
CITY, STATE, ZIP: Greensburg, PA 15601			

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2210315-001L	R6 North-20221005	1LHDPEHNO3	Aqueous	10/5/2022 12:15:00 PM	2	Adjusted Gross Alpha
2	2210315-002L	R6 South-20221006	1LHDPEHNO3	Aqueous	10/6/2022 9:05:00 AM	2	Adjusted Gross Alpha

WO#: 30528336

30528336

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By: SL	Date: 10/6/2022	Time: 11:46 AM	Received By: [signature]	Date: 10/7/22	Time: 9:25
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard ☑ RUSH Next BD ☐ 2nd BD ☐ 3rd BD ☐

REPORT TRANSMITTAL DESIRED:
☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY

Temp of samples ______ °C Attempt to Cool? ______

Comments: ______

CFA Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421

www.capefearanalytical.com

November 23, 2022

Mr. Andy Freeman
Hall Environmental
4901 Hawkins NE
Suite D
Albuquerque, New Mexico 87109

Re: Routine Analysis
Work Order: 20534
SDG: 2210315

Dear Mr. Freeman:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on October 07, 2022. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Purchase Order: IDIQ Pricing
Enclosures

HALL ENVIRONMENTAL ANALYSIS LABORATORY

CHAIN OF CUSTODY RECORD

PAGE: 1 OF: 1

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975
FAX: 505-345-4107
Website: www.hallenvironmental.com

CFA WO#20534

SUB CONTRATOR: Cape Fear Analytical	COMPANY: Cape Fear Analytical	PHONE: (910) 795-0421	FAX:
ADDRESS: 3306 Kitty Hawk Rd Ste 120		ACCOUNT #:	EMAIL:
CITY, STATE, ZIP: Wilmington, NC 28405			

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2210315-001J	R6 North-20221005	1LAMGU	Aqueous	10/5/2022 12:15:00 PM	1	PCBs by 1668
2	2210315-002J	R6 South-20221006	1LAMGU	Aqueous	10/6/2022 9:05:00 AM	1	PCBs by 1668

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By	Date	Time	Received By	Date	Time
Relinquished By: [signature]	Date: 10/6/2022	Time: 11:42 AM	Received By: Cynde Jalbuis	Date: 07OCT22	Time: 0947
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard ☑ RUSH Next BD ☐ 2nd BD ☐ 3rd BD ☐

REPORT TRANSMITTAL DESIRED:

☐ HARDCOPY (extra cost) ☐ FAX ☐ EMAIL ☐ ONLINE

FOR LAB USE ONLY

Temp of samples 5.2 C Attempt to Cool ? ✓

Comments:

SAMPLE RECEIPT CHECKLIST
Cape Fear Analytical

Client: HALL	Work Order: 20534
Shipping Company: FedEx	Date/Time Received: 07OCT22 0947

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?		✓	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: ____________

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? Yes No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: ice bags loose ice blue ice dry ice none other (describe) Temperature Blank present: Yes No 5.3° - 0.1 = 5.2°C
5	Aqueous samples found to have visible solids?	✓			Sample IDs, containers affected: Minimal solids (<1%), cloudy
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: pH = 7 on both If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?	✓			Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 2 - 1L WMAG bottles, 1 per sample
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

Checklist performed by: Initials: CJ Date: 07OCT22

CF-UD-F-7

PCB Congeners Analysis

Case Narrative

PCBC Case Narrative
Hall Environmental Analysis Laboratory (HALL)
SDG 2210315
Work Order 20534

Method/Analysis Information

Product:	**PCB Congeners by EPA Method 1668A in Liquids**
Analytical Method:	EPA Method 1668A
Extraction Method:	SW846 3520C
Analytical Batch Number:	51323
Clean Up Batch Number:	51322
Extraction Batch Number:	51321

Sample Analysis

Samples were received within temperature requirements at 5.2°C (20534001, 20534002). The following samples were analyzed using the analytical protocol as established in EPA Method 1668A:

Sample ID	Client ID
12033076	Method Blank (MB)
12033077	Laboratory Control Sample (LCS)
12033078	Laboratory Control Sample Duplicate (LCSD)
20534001	2210315-001J R6 North-20221005
20534002	2210315-002J R6 South-20221006

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-003 REV# 10.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
A matrix spike and matrix spike duplicate analysis was not required for this SDG.

Technical Information

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Manual Integrations
Manual integrations were required for data files in this SDG. Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard

injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP875_1	PCB Analysis	PCB Analysis	SPB-Octyl	30m x 0.25mm, 0.25um

Sample Data Summary

Cape Fear Analytical, LLC
3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Certificate of Analysis Report
for

HALL001 Hall Environmental Analysis Laboratory

Client SDG: 2210315 CFA Work Order: 20534

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- B The target analyte was detected in the associated blank.
- C Congener has coeluters. When Cxxx, refer to congener number xxx for data
- J Value is estimated
- U Analyte was analyzed for, but not detected above the specified detection limit.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature: Alexis Finks **Name:** Alexis Finks

Date: 23 NOV 2022 **Title:** Data Validator

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
2051-60-7	1-MoCB	U	ND	pg/L	6.00	114
2051-61-8	2-MoCB	U	ND	pg/L	7.44	114
2051-62-9	3-MoCB	U	ND	pg/L	4.95	114
13029-08-8	4-DiCB	U	ND	pg/L	14.3	114
16605-91-7	5-DiCB	U	ND	pg/L	11.3	114
25569-80-6	6-DiCB	U	ND	pg/L	8.42	114
33284-50-3	7-DiCB	U	ND	pg/L	8.40	114
34883-43-7	8-DiCB	U	ND	pg/L	7.33	114
34883-39-1	9-DiCB	U	ND	pg/L	10.8	114
33146-45-1	10-DiCB	U	ND	pg/L	7.01	114
2050-67-1	11-DiCB	J	33.7	pg/L	9.79	114
2974-92-7	12-DiCB	CU	ND	pg/L	9.11	228
2974-90-5	13-DiCB	C12				
34883-41-5	14-DiCB	U	ND	pg/L	9.15	114
2050-68-2	15-DiCB	U	ND	pg/L	12.1	114
38444-78-9	16-TrCB	U	ND	pg/L	3.99	114
37680-66-3	17-TrCB	U	ND	pg/L	4.79	114
37680-65-2	18-TrCB	CJ	6.39	pg/L	4.13	228
38444-73-4	19-TrCB	U	ND	pg/L	5.75	114
38444-84-7	20-TrCB	BCJ	11.3	pg/L	3.58	228
55702-46-0	21-TrCB	CU	ND	pg/L	3.13	228
38444-85-8	22-TrCB	J	4.47	pg/L	3.54	114
55720-44-0	23-TrCB	U	ND	pg/L	3.31	114
55702-45-9	24-TrCB	U	ND	pg/L	4.40	114
55712-37-3	25-TrCB	U	ND	pg/L	2.97	114
38444-81-4	26-TrCB	CU	ND	pg/L	3.45	228
38444-76-7	27-TrCB	U	ND	pg/L	3.72	114
7012-37-5	28-TrCB	C20				
15862-07-4	29-TrCB	C26				
35693-92-6	30-TrCB	C18				
16606-02-3	31-TrCB	U	ND	pg/L	6.60	114
38444-77-8	32-TrCB	U	ND	pg/L	3.29	114

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
38444-86-9	33-TrCB	C21				
37680-68-5	34-TrCB	U	ND	pg/L	3.86	114
37680-69-6	35-TrCB	U	ND	pg/L	4.70	114
38444-87-0	36-TrCB	U	ND	pg/L	4.11	114
38444-90-5	37-TrCB	U	ND	pg/L	4.11	114
53555-66-1	38-TrCB	U	ND	pg/L	4.61	114
38444-88-1	39-TrCB	U	ND	pg/L	4.70	114
38444-93-8	40-TeCB	CU	ND	pg/L	5.59	228
52663-59-9	41-TeCB	U	ND	pg/L	9.04	114
36559-22-5	42-TeCB	U	ND	pg/L	5.80	114
70362-46-8	43-TeCB	U	ND	pg/L	7.17	114
41464-39-5	44-TeCB	CU	ND	pg/L	8.26	342
70362-45-7	45-TeCB	CJ	4.22	pg/L	2.65	228
41464-47-5	46-TeCB	U	ND	pg/L	2.58	114
2437-79-8	47-TeCB	C44				
70362-47-9	48-TeCB	U	ND	pg/L	6.16	114
41464-40-8	49-TeCB	CU	ND	pg/L	5.00	228
62796-65-0	50-TeCB	CU	ND	pg/L	2.51	228
68194-04-7	51-TeCB	C45				
35693-99-3	52-TeCB	BJ	8.44	pg/L	6.69	228
41464-41-9	53-TeCB	C50				
15968-05-5	54-TeCB	U	ND	pg/L	1.89	114
74338-24-2	55-TeCB	U	ND	pg/L	3.77	114
41464-43-1	56-TeCB	U	ND	pg/L	3.97	114
70424-67-8	57-TeCB	U	ND	pg/L	3.61	114
41464-49-7	58-TeCB	U	ND	pg/L	3.70	114
74472-33-6	59-TeCB	CU	ND	pg/L	4.61	342
33025-41-1	60-TeCB	U	ND	pg/L	3.81	114
33284-53-6	61-TeCB	CU	ND	pg/L	11.1	456
54230-22-7	62-TeCB	C59				
74472-34-7	63-TeCB	U	ND	pg/L	3.70	114
52663-58-8	64-TeCB	U	ND	pg/L	4.47	114

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	2210315	**Client:**	HALL001	**Project:**	HALL00113
Lab Sample ID:	20534001	**Date Collected:**	10/05/2022 12:15	**Matrix:**	WATER
Client Sample:	1668A Water	**Date Received:**	10/07/2022 09:47		
Client ID:	2210315-001J R6 North-20221005			**Prep Basis:**	As Received
Batch ID:	51323	**Method:**	EPA Method 1668A		
Run Date:	11/11/2022 21:11	**Analyst:**	MLL	**Instrument:**	HRP875
Data File:	d08nov22a_7-9			**Dilution:**	1
Prep Batch:	51321	**Prep Method:**	SW846 3520C	**Prep SOP Ref:**	CF-OA-E-001
Prep Date:	02-NOV-22	**Prep Aliquot:**	876.4 mL		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
33284-54-7	65-TeCB	C44				
32598-10-0	66-TeCB	J	4.52	pg/L	3.95	114
73575-53-8	67-TeCB	U	ND	pg/L	3.08	114
73575-52-7	68-TeCB	U	ND	pg/L	3.35	114
60233-24-1	69-TeCB	C49				
32598-11-1	70-TeCB	C61				
41464-46-4	71-TeCB	C40				
41464-42-0	72-TeCB	U	ND	pg/L	3.63	114
74338-23-1	73-TeCB	U	ND	pg/L	4.27	114
32690-93-0	74-TeCB	C61				
32598-12-2	75-TeCB	C59				
70362-48-0	76-TeCB	C61				
32598-13-3	77-TeCB	U	ND	pg/L	3.72	114
70362-49-1	78-TeCB	U	ND	pg/L	4.56	114
41464-48-6	79-TeCB	U	ND	pg/L	3.51	114
33284-52-5	80-TeCB	U	ND	pg/L	3.31	114
70362-50-4	81-TeCB	U	ND	pg/L	3.47	114
52663-62-4	82-PeCB	U	ND	pg/L	5.04	114
60145-20-2	83-PeCB	U	ND	pg/L	5.77	114
52663-60-2	84-PeCB	U	ND	pg/L	4.27	114
65510-45-4	85-PeCB	CU	ND	pg/L	3.56	342
55312-69-1	86-PeCB	BCJ	7.80	pg/L	3.61	685
38380-02-8	87-PeCB	C86				
55215-17-3	88-PeCB	CU	ND	pg/L	4.31	228
73575-57-2	89-PeCB	U	ND	pg/L	4.95	114
68194-07-0	90-PeCB	CU	ND	pg/L	7.17	342
68194-05-8	91-PeCB	C88				
52663-61-3	92-PeCB	U	ND	pg/L	4.75	114
73575-56-1	93-PeCB	CU	ND	pg/L	3.95	228
73575-55-0	94-PeCB	U	ND	pg/L	4.02	114
38379-99-6	95-PeCB	U	ND	pg/L	4.47	114
73575-54-9	96-PeCB	U	ND	pg/L	2.53	114

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
41464-51-1	97-PeCB	C86				
60233-25-2	98-PeCB	CU	ND	pg/L	3.86	228
38380-01-7	99-PeCB	U	ND	pg/L	3.81	114
39485-83-1	100-PeCB	C93				
37680-73-2	101-PeCB	C90				
68194-06-9	102-PeCB	C98				
60145-21-3	103-PeCB	U	ND	pg/L	4.06	114
56558-16-8	104-PeCB	U	ND	pg/L	2.01	114
32598-14-4	105-PeCB	U	ND	pg/L	4.08	114
70424-69-0	106-PeCB	U	ND	pg/L	4.13	114
70424-68-9	107-PeCB	U	ND	pg/L	3.42	114
70362-41-3	108-PeCB	CU	ND	pg/L	4.20	228
74472-35-8	109-PeCB	C86				
38380-03-9	110-PeCB	CJ	6.91	pg/L	3.31	228
39635-32-0	111-PeCB	U	ND	pg/L	3.15	114
74472-36-9	112-PeCB	U	ND	pg/L	2.85	114
68194-10-5	113-PeCB	C90				
74472-37-0	114-PeCB	U	ND	pg/L	3.72	114
74472-38-1	115-PeCB	C110				
18259-05-7	116-PeCB	C85				
68194-11-6	117-PeCB	C85				
31508-00-6	118-PeCB	U	ND	pg/L	5.41	114
56558-17-9	119-PeCB	C86				
68194-12-7	120-PeCB	U	ND	pg/L	3.33	114
56558-18-0	121-PeCB	U	ND	pg/L	2.99	114
76842-07-4	122-PeCB	U	ND	pg/L	5.39	114
65510-44-3	123-PeCB	U	ND	pg/L	3.42	114
70424-70-3	124-PeCB	C108				
74472-39-2	125-PeCB	C86				
57465-28-8	126-PeCB	U	ND	pg/L	4.52	114
39635-33-1	127-PeCB	U	ND	pg/L	4.47	114
38380-07-3	128-HxCB	CU	ND	pg/L	3.93	228

Comments:

B **The target analyte was detected in the associated blank.**

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**

J **Value is estimated**

U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
55215-18-4	129-HxCB	CJ	9.97	pg/L	4.27	342
52663-66-8	130-HxCB	U	ND	pg/L	4.95	114
61798-70-7	131-HxCB	U	ND	pg/L	4.88	114
38380-05-1	132-HxCB	U	ND	pg/L	4.59	114
35694-04-3	133-HxCB	U	ND	pg/L	4.70	114
52704-70-8	134-HxCB	U	ND	pg/L	5.16	114
52744-13-5	135-HxCB	CJ	5.18	pg/L	3.42	228
38411-22-2	136-HxCB	U	ND	pg/L	2.49	114
35694-06-5	137-HxCB	U	ND	pg/L	4.77	114
35065-28-2	138-HxCB	C129				
56030-56-9	139-HxCB	CU	ND	pg/L	3.99	228
59291-64-4	140-HxCB	C139				
52712-04-6	141-HxCB	U	ND	pg/L	4.04	114
41411-61-4	142-HxCB	U	ND	pg/L	4.86	114
68194-15-0	143-HxCB	U	ND	pg/L	4.56	114
68194-14-9	144-HxCB	U	ND	pg/L	3.38	114
74472-40-5	145-HxCB	U	ND	pg/L	2.35	114
51908-16-8	146-HxCB	U	ND	pg/L	3.90	114
68194-13-8	147-HxCB	CJ	5.73	pg/L	3.88	228
74472-41-6	148-HxCB	U	ND	pg/L	3.26	114
38380-04-0	149-HxCB	C147				
68194-08-1	150-HxCB	U	ND	pg/L	2.19	114
52663-63-5	151-HxCB	C135				
68194-09-2	152-HxCB	U	ND	pg/L	2.44	114
35065-27-1	153-HxCB	BCJ	6.71	pg/L	3.56	228
60145-22-4	154-HxCB	U	ND	pg/L	2.65	114
33979-03-2	155-HxCB	U	ND	pg/L	1.87	114
38380-08-4	156-HxCB	CU	ND	pg/L	3.40	228
69782-90-7	157-HxCB	C156				
74472-42-7	158-HxCB	U	ND	pg/L	2.97	114
39635-35-3	159-HxCB	U	ND	pg/L	2.81	114
41411-62-5	160-HxCB	U	ND	pg/L	3.63	114

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
74472-43-8	161-HxCB	U	ND	pg/L	3.26	114
39635-34-2	162-HxCB	U	ND	pg/L	2.78	114
74472-44-9	163-HxCB	C129				
74472-45-0	164-HxCB	U	ND	pg/L	3.10	114
74472-46-1	165-HxCB	U	ND	pg/L	3.63	114
41411-63-6	166-HxCB	C128				
52663-72-6	167-HxCB	U	ND	pg/L	2.42	114
59291-65-5	168-HxCB	C153				
32774-16-6	169-HxCB	U	ND	pg/L	3.01	114
35065-30-6	170-HpCB	U	ND	pg/L	3.67	114
52663-71-5	171-HpCB	CU	ND	pg/L	3.56	228
52663-74-8	172-HpCB	U	ND	pg/L	3.65	114
68194-16-1	173-HpCB	C171				
38411-25-5	174-HpCB	U	ND	pg/L	3.95	114
40186-70-7	175-HpCB	U	ND	pg/L	3.19	114
52663-65-7	176-HpCB	U	ND	pg/L	2.46	114
52663-70-4	177-HpCB	U	ND	pg/L	3.61	114
52663-67-9	178-HpCB	U	ND	pg/L	3.51	114
52663-64-6	179-HpCB	U	ND	pg/L	2.37	114
35065-29-3	180-HpCB	CU	ND	pg/L	5.77	228
74472-47-2	181-HpCB	U	ND	pg/L	3.45	114
60145-23-5	182-HpCB	U	ND	pg/L	3.08	114
52663-69-1	183-HpCB	CJ	3.54	pg/L	3.26	228
74472-48-3	184-HpCB	U	ND	pg/L	2.33	114
52712-05-7	185-HpCB	C183				
74472-49-4	186-HpCB	U	ND	pg/L	2.49	114
52663-68-0	187-HpCB	J	3.13	pg/L	3.08	114
74487-85-7	188-HpCB	U	ND	pg/L	2.19	114
39635-31-9	189-HpCB	U	ND	pg/L	2.56	114
41411-64-7	190-HpCB	U	ND	pg/L	2.85	114
74472-50-7	191-HpCB	U	ND	pg/L	2.65	114
74472-51-8	192-HpCB	U	ND	pg/L	2.94	114

Comments:

B The target analyte was detected in the associated blank.

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J Value is estimated

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
69782-91-8	193-HpCB	C180				
35694-08-7	194-OcCB	U	ND	pg/L	4.06	114
52663-78-2	195-OcCB	U	ND	pg/L	2.74	114
42740-50-1	196-OcCB	U	ND	pg/L	3.04	114
33091-17-7	197-OcCB	CJ	3.10	pg/L	2.33	228
68194-17-2	198-OcCB	CJ	4.91	pg/L	3.26	228
52663-75-9	199-OcCB	C198				
52663-73-7	200-OcCB	C197				
40186-71-8	201-OcCB	U	ND	pg/L	2.17	114
2136-99-4	202-OcCB	U	ND	pg/L	2.35	114
52663-76-0	203-OcCB	U	ND	pg/L	3.10	114
74472-52-9	204-OcCB	U	ND	pg/L	2.24	114
74472-53-0	205-OcCB	U	ND	pg/L	1.94	114
40186-72-9	206-NoCB	U	ND	pg/L	4.06	114
52663-79-3	207-NoCB	U	ND	pg/L	2.81	114
52663-77-1	208-NoCB	U	ND	pg/L	2.42	114
2051-24-3	209-DeCB	U	ND	pg/L	3.01	114
1336-36-3	Total PCB Congeners	J	130	pg/L		114

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		896	2280	pg/L	39.3	(15%-150%)
13C-3-MoCB		1040	2280	pg/L	45.7	(15%-150%)
13C-4-DiCB		1100	2280	pg/L	48.0	(25%-150%)
13C-15-DiCB		1650	2280	pg/L	72.2	(25%-150%)
13C-19-TrCB		1390	2280	pg/L	61.0	(25%-150%)
13C-37-TrCB		1450	2280	pg/L	63.6	(25%-150%)
13C-54-TeCB		1430	2280	pg/L	62.6	(25%-150%)
13C-77-TeCB		1840	2280	pg/L	80.8	(25%-150%)
13C-81-TeCB		1900	2280	pg/L	83.2	(25%-150%)
13C-104-PeCB		1320	2280	pg/L	57.7	(25%-150%)
13C-105-PeCB		1480	2280	pg/L	64.7	(25%-150%)
13C-114-PeCB		1470	2280	pg/L	64.4	(25%-150%)
13C-118-PeCB		1370	2280	pg/L	60.1	(25%-150%)
13C-123-PeCB		1590	2280	pg/L	69.5	(25%-150%)
13C-126-PeCB		1530	2280	pg/L	66.9	(25%-150%)
13C-155-HxCB		1480	2280	pg/L	64.7	(25%-150%)
13C-156-HxCB	C	2990	4560	pg/L	65.5	(25%-150%)
13C-157-HxCB	C156L					
13C-167-HxCB		1470	2280	pg/L	64.6	(25%-150%)
13C-169-HxCB		1480	2280	pg/L	64.7	(25%-150%)
13C-188-HpCB		1490	2280	pg/L	65.2	(25%-150%)
13C-189-HpCB		1480	2280	pg/L	64.9	(25%-150%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534001**	**Date Collected:**	**10/05/2022 12:15**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-001J R6 North-20221005**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 21:11**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-9**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**876.4 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		1460	2280	pg/L	64.0	(25%-150%)
13C-205-OcCB		1780	2280	pg/L	78.1	(25%-150%)
13C-206-NoCB		1730	2280	pg/L	76.0	(25%-150%)
13C-208-NoCB		1670	2280	pg/L	73.1	(25%-150%)
13C-209-DeCB		1650	2280	pg/L	72.4	(25%-150%)
13C-28-TrCB		1610	2280	pg/L	70.7	(30%-135%)
13C-111-PeCB		1790	2280	pg/L	78.5	(30%-135%)
13C-178-HpCB		2090	2280	pg/L	91.6	(30%-135%)

Comments:

B **The target analyte was detected in the associated blank.**
C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
2051-60-7	1-MoCB	U	ND	pg/L	6.23	105
2051-61-8	2-MoCB	U	ND	pg/L	7.85	105
2051-62-9	3-MoCB	U	ND	pg/L	5.33	105
13029-08-8	4-DiCB	U	ND	pg/L	12.7	105
16605-91-7	5-DiCB	U	ND	pg/L	11.7	105
25569-80-6	6-DiCB	U	ND	pg/L	8.73	105
33284-50-3	7-DiCB	U	ND	pg/L	8.69	105
34883-43-7	8-DiCB	U	ND	pg/L	7.60	105
34883-39-1	9-DiCB	U	ND	pg/L	11.2	105
33146-45-1	10-DiCB	U	ND	pg/L	6.40	105
2050-67-1	11-DiCB	J	86.7	pg/L	10.1	105
2974-92-7	12-DiCB	CU	ND	pg/L	9.42	210
2974-90-5	13-DiCB	C12				
34883-41-5	14-DiCB	U	ND	pg/L	9.49	105
2050-68-2	15-DiCB	U	ND	pg/L	15.0	105
38444-78-9	16-TrCB	U	ND	pg/L	4.32	105
37680-66-3	17-TrCB	U	ND	pg/L	5.18	105
37680-65-2	18-TrCB	CU	ND	pg/L	7.68	210
38444-73-4	19-TrCB	U	ND	pg/L	6.02	105
38444-84-7	20-TrCB	BCJ	16.7	pg/L	3.88	210
55702-46-0	21-TrCB	CU	ND	pg/L	6.86	210
38444-85-8	22-TrCB	U	ND	pg/L	6.59	105
55720-44-0	23-TrCB	U	ND	pg/L	3.59	105
55702-45-9	24-TrCB	U	ND	pg/L	4.76	105
55712-37-3	25-TrCB	U	ND	pg/L	3.21	105
38444-81-4	26-TrCB	CU	ND	pg/L	3.71	210
38444-76-7	27-TrCB	U	ND	pg/L	4.03	105
7012-37-5	28-TrCB	C20				
15862-07-4	29-TrCB	C26				
35693-92-6	30-TrCB	C18				
16606-02-3	31-TrCB	U	ND	pg/L	11.3	105
38444-77-8	32-TrCB	U	ND	pg/L	3.76	105

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
38444-86-9	33-TrCB	C21				
37680-68-5	34-TrCB	U	ND	pg/L	4.18	105
37680-69-6	35-TrCB	U	ND	pg/L	6.57	105
38444-87-0	36-TrCB	U	ND	pg/L	5.71	105
38444-90-5	37-TrCB	J	7.98	pg/L	5.81	105
53555-66-1	38-TrCB	U	ND	pg/L	6.44	105
38444-88-1	39-TrCB	U	ND	pg/L	6.55	105
38444-93-8	40-TeCB	CU	ND	pg/L	5.79	210
52663-59-9	41-TeCB	U	ND	pg/L	9.78	105
36559-22-5	42-TeCB	U	ND	pg/L	6.28	105
70362-46-8	43-TeCB	U	ND	pg/L	7.77	105
41464-39-5	44-TeCB	CJ	18.1	pg/L	6.07	315
70362-45-7	45-TeCB	CJ	5.08	pg/L	3.25	210
41464-47-5	46-TeCB	U	ND	pg/L	3.17	105
2437-79-8	47-TeCB	C44				
70362-47-9	48-TeCB	U	ND	pg/L	6.67	105
41464-40-8	49-TeCB	CU	ND	pg/L	7.70	210
62796-65-0	50-TeCB	CU	ND	pg/L	3.30	210
68194-04-7	51-TeCB	C45				
35693-99-3	52-TeCB	BJ	25.7	pg/L	7.26	210
41464-41-9	53-TeCB	C50				
15968-05-5	54-TeCB	U	ND	pg/L	2.14	105
74338-24-2	55-TeCB	U	ND	pg/L	3.69	105
41464-43-1	56-TeCB	J	8.37	pg/L	3.92	105
70424-67-8	57-TeCB	U	ND	pg/L	3.57	105
41464-49-7	58-TeCB	U	ND	pg/L	3.65	105
74472-33-6	59-TeCB	CU	ND	pg/L	5.00	315
33025-41-1	60-TeCB	U	ND	pg/L	4.01	105
33284-53-6	61-TeCB	CU	ND	pg/L	33.6	420
54230-22-7	62-TeCB	C59				
74472-34-7	63-TeCB	U	ND	pg/L	3.63	105
52663-58-8	64-TeCB	J	8.08	pg/L	4.85	105

Comments:
B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
33284-54-7	65-TeCB	C44				
32598-10-0	66-TeCB	J	12.8	pg/L	3.88	105
73575-53-8	67-TeCB	U	ND	pg/L	3.04	105
73575-52-7	68-TeCB	U	ND	pg/L	3.32	105
60233-24-1	69-TeCB	C49				
32598-11-1	70-TeCB	C61				
41464-46-4	71-TeCB	C40				
41464-42-0	72-TeCB	U	ND	pg/L	3.59	105
74338-23-1	73-TeCB	U	ND	pg/L	4.62	105
32690-93-0	74-TeCB	C61				
32598-12-2	75-TeCB	C59				
70362-48-0	76-TeCB	C61				
32598-13-3	77-TeCB	J	4.11	pg/L	3.80	105
70362-49-1	78-TeCB	U	ND	pg/L	4.49	105
41464-48-6	79-TeCB	U	ND	pg/L	3.46	105
33284-52-5	80-TeCB	U	ND	pg/L	3.27	105
70362-50-4	81-TeCB	U	ND	pg/L	3.51	105
52663-62-4	82-PeCB	U	ND	pg/L	7.64	105
60145-20-2	83-PeCB	U	ND	pg/L	8.73	105
52663-60-2	84-PeCB	J	9.00	pg/L	6.46	105
65510-45-4	85-PeCB	CJ	8.56	pg/L	5.39	315
55312-69-1	86-PeCB	BCJ	35.2	pg/L	5.48	630
38380-02-8	87-PeCB	C86				
55215-17-3	88-PeCB	CU	ND	pg/L	6.53	210
73575-57-2	89-PeCB	U	ND	pg/L	7.49	105
68194-07-0	90-PeCB	CJ	48.3	pg/L	5.56	315
68194-05-8	91-PeCB	C88				
52663-61-3	92-PeCB	J	8.54	pg/L	7.20	105
73575-56-1	93-PeCB	CU	ND	pg/L	5.98	210
73575-55-0	94-PeCB	U	ND	pg/L	6.09	105
38379-99-6	95-PeCB	J	37.5	pg/L	6.76	105
73575-54-9	96-PeCB	U	ND	pg/L	2.92	105

Comments:

B The target analyte was detected in the associated blank.
C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
41464-51-1	97-PeCB	C86				
60233-25-2	98-PeCB	CU	ND	pg/L	5.83	210
38380-01-7	99-PeCB	J	14.9	pg/L	5.77	105
39485-83-1	100-PeCB	C93				
37680-73-2	101-PeCB	C90				
68194-06-9	102-PeCB	C98				
60145-21-3	103-PeCB	U	ND	pg/L	6.15	105
56558-16-8	104-PeCB	U	ND	pg/L	2.27	105
32598-14-4	105-PeCB	J	16.5	pg/L	4.47	105
70424-69-0	106-PeCB	U	ND	pg/L	4.83	105
70424-68-9	107-PeCB	U	ND	pg/L	4.30	105
70362-41-3	108-PeCB	CU	ND	pg/L	4.91	210
74472-35-8	109-PeCB	C86				
38380-03-9	110-PeCB	CJ	59.8	pg/L	5.02	210
39635-32-0	111-PeCB	U	ND	pg/L	4.76	105
74472-36-9	112-PeCB	U	ND	pg/L	4.32	105
68194-10-5	113-PeCB	C90				
74472-37-0	114-PeCB	U	ND	pg/L	4.37	105
74472-38-1	115-PeCB	C110				
18259-05-7	116-PeCB	C85				
68194-11-6	117-PeCB	C85				
31508-00-6	118-PeCB	BJ	43.2	pg/L	4.64	105
56558-17-9	119-PeCB	C86				
68194-12-7	120-PeCB	U	ND	pg/L	5.06	105
56558-18-0	121-PeCB	U	ND	pg/L	4.53	105
76842-07-4	122-PeCB	U	ND	pg/L	6.28	105
65510-44-3	123-PeCB	U	ND	pg/L	4.03	105
70424-70-3	124-PeCB	C108				
74472-39-2	125-PeCB	C86				
57465-28-8	126-PeCB	U	ND	pg/L	5.10	105
39635-33-1	127-PeCB	U	ND	pg/L	5.23	105
38380-07-3	128-HxCB	CJ	14.2	pg/L	7.35	210

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
55215-18-4	129-HxCB	CJ	116	pg/L	8.00	315
52663-66-8	130-HxCB	U	ND	pg/L	9.23	105
61798-70-7	131-HxCB	U	ND	pg/L	9.15	105
38380-05-1	132-HxCB	J	30.4	pg/L	8.56	105
35694-04-3	133-HxCB	U	ND	pg/L	8.77	105
52704-70-8	134-HxCB	U	ND	pg/L	9.63	105
52744-13-5	135-HxCB	CJ	33.3	pg/L	4.64	210
38411-22-2	136-HxCB	J	10.7	pg/L	3.36	105
35694-06-5	137-HxCB	U	ND	pg/L	8.92	105
35065-28-2	138-HxCB	C129				
56030-56-9	139-HxCB	CU	ND	pg/L	7.49	210
59291-64-4	140-HxCB	C139				
52712-04-6	141-HxCB	J	20.9	pg/L	7.56	105
41411-61-4	142-HxCB	U	ND	pg/L	9.09	105
68194-15-0	143-HxCB	U	ND	pg/L	8.52	105
68194-14-9	144-HxCB	J	6.00	pg/L	4.55	105
74472-40-5	145-HxCB	U	ND	pg/L	3.19	105
51908-16-8	146-HxCB	U	ND	pg/L	13.1	105
68194-13-8	147-HxCB	CJ	68.6	pg/L	7.24	210
74472-41-6	148-HxCB	U	ND	pg/L	4.37	105
38380-04-0	149-HxCB	C147				
68194-08-1	150-HxCB	U	ND	pg/L	2.98	105
52663-63-5	151-HxCB	C135				
68194-09-2	152-HxCB	U	ND	pg/L	3.30	105
35065-27-1	153-HxCB	CJ	85.4	pg/L	6.67	210
60145-22-4	154-HxCB	U	ND	pg/L	3.61	105
33979-03-2	155-HxCB	U	ND	pg/L	2.67	105
38380-08-4	156-HxCB	CU	ND	pg/L	10.9	210
69782-90-7	157-HxCB	C156				
74472-42-7	158-HxCB	U	ND	pg/L	10.8	105
39635-35-3	159-HxCB	U	ND	pg/L	4.16	105
41411-62-5	160-HxCB	U	ND	pg/L	6.78	105

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
74472-43-8	161-HxCB	U	ND	pg/L	6.11	105
39635-34-2	162-HxCB	U	ND	pg/L	4.13	105
74472-44-9	163-HxCB	C129				
74472-45-0	164-HxCB	U	ND	pg/L	6.00	105
74472-46-1	165-HxCB	U	ND	pg/L	6.78	105
41411-63-6	166-HxCB	C128				
52663-72-6	167-HxCB	J	4.22	pg/L	3.65	105
59291-65-5	168-HxCB	C153				
32774-16-6	169-HxCB	U	ND	pg/L	4.37	105
35065-30-6	170-HpCB	J	32.8	pg/L	3.86	105
52663-71-5	171-HpCB	CU	ND	pg/L	10.5	210
52663-74-8	172-HpCB	J	6.23	pg/L	3.84	105
68194-16-1	173-HpCB	C171				
38411-25-5	174-HpCB	J	27.2	pg/L	3.38	105
40186-70-7	175-HpCB	U	ND	pg/L	3.40	105
52663-65-7	176-HpCB	U	ND	pg/L	3.74	105
52663-70-4	177-HpCB	U	ND	pg/L	18.2	105
52663-67-9	178-HpCB	U	ND	pg/L	8.50	105
52663-64-6	179-HpCB	J	12.2	pg/L	2.52	105
35065-29-3	180-HpCB	CJ	63.2	pg/L	3.09	210
74472-47-2	181-HpCB	U	ND	pg/L	3.63	105
60145-23-5	182-HpCB	U	ND	pg/L	3.27	105
52663-69-1	183-HpCB	CJ	19.3	pg/L	3.44	210
74472-48-3	184-HpCB	U	ND	pg/L	2.48	105
52712-05-7	185-HpCB	C183				
74472-49-4	186-HpCB	U	ND	pg/L	2.64	105
52663-68-0	187-HpCB	J	33.5	pg/L	3.25	105
74487-85-7	188-HpCB	U	ND	pg/L	2.35	105
39635-31-9	189-HpCB	J	3.21	pg/L	3.04	105
41411-64-7	190-HpCB	J	6.07	pg/L	3.00	105
74472-50-7	191-HpCB	U	ND	pg/L	2.79	105
74472-51-8	192-HpCB	U	ND	pg/L	3.13	105

Comments:

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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
69782-91-8	193-HpCB	C180				
35694-08-7	194-OcCB	J	16.7	pg/L	3.15	105
52663-78-2	195-OcCB	U	ND	pg/L	6.67	105
42740-50-1	196-OcCB	U	ND	pg/L	8.71	105
33091-17-7	197-OcCB	CU	ND	pg/L	3.97	210
68194-17-2	198-OcCB	CU	ND	pg/L	16.3	210
52663-75-9	199-OcCB	C198				
52663-73-7	200-OcCB	C197				
40186-71-8	201-OcCB	U	ND	pg/L	2.92	105
2136-99-4	202-OcCB	U	ND	pg/L	3.61	105
52663-76-0	203-OcCB	J	9.93	pg/L	4.20	105
74472-52-9	204-OcCB	U	ND	pg/L	3.00	105
74472-53-0	205-OcCB	U	ND	pg/L	2.22	105
40186-72-9	206-NoCB	J	8.02	pg/L	3.82	105
52663-79-3	207-NoCB	U	ND	pg/L	2.85	105
52663-77-1	208-NoCB	U	ND	pg/L	2.98	105
2051-24-3	209-DeCB	U	ND	pg/L	5.18	105
1336-36-3	Total PCB Congeners	J	1100	pg/L		105

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		886	2100	pg/L	42.2	(15%-150%)
13C-3-MoCB		1020	2100	pg/L	48.7	(15%-150%)
13C-4-DiCB		1130	2100	pg/L	53.8	(25%-150%)
13C-15-DiCB		1550	2100	pg/L	73.8	(25%-150%)
13C-19-TrCB		1330	2100	pg/L	63.5	(25%-150%)
13C-37-TrCB		1380	2100	pg/L	65.7	(25%-150%)
13C-54-TeCB		1390	2100	pg/L	66.4	(25%-150%)
13C-77-TeCB		1680	2100	pg/L	79.8	(25%-150%)
13C-81-TeCB		1770	2100	pg/L	84.2	(25%-150%)
13C-104-PeCB		1260	2100	pg/L	60.2	(25%-150%)
13C-105-PeCB		1460	2100	pg/L	69.7	(25%-150%)
13C-114-PeCB		1400	2100	pg/L	66.6	(25%-150%)
13C-118-PeCB		1310	2100	pg/L	62.5	(25%-150%)
13C-123-PeCB		1510	2100	pg/L	71.8	(25%-150%)
13C-126-PeCB		1520	2100	pg/L	72.5	(25%-150%)
13C-155-HxCB		1270	2100	pg/L	60.3	(25%-150%)
13C-156-HxCB	C	2670	4200	pg/L	63.5	(25%-150%)
13C-157-HxCB	C156L					
13C-167-HxCB		1310	2100	pg/L	62.3	(25%-150%)
13C-169-HxCB		1300	2100	pg/L	62.1	(25%-150%)
13C-188-HpCB		1280	2100	pg/L	61.1	(25%-150%)
13C-189-HpCB		1330	2100	pg/L	63.3	(25%-150%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**20534002**	**Date Collected:**	**10/06/2022 09:05**	**Matrix:**	**WATER**
Client Sample:	**1668A Water**	**Date Received:**	**10/07/2022 09:47**		
Client ID:	**2210315-002J R6 South-20221006**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/11/2022 22:21**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_7-10**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**952.9 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		1260	2100	pg/L	60.1	(25%-150%)
13C-205-OcCB		1590	2100	pg/L	75.6	(25%-150%)
13C-206-NoCB		1610	2100	pg/L	76.8	(25%-150%)
13C-208-NoCB		1420	2100	pg/L	67.8	(25%-150%)
13C-209-DeCB		1590	2100	pg/L	75.8	(25%-150%)
13C-28-TrCB		1570	2100	pg/L	75.0	(30%-135%)
13C-111-PeCB		1650	2100	pg/L	78.5	(30%-135%)
13C-178-HpCB		1800	2100	pg/L	85.9	(30%-135%)

Comments:

B **The target analyte was detected in the associated blank.**
C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

Quality Control Summary

PCB Congeners
Surrogate Recovery Report

SDG Number: 2210315
Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12033077	LCS for batch 51321	13C-1-MoCB		37.9	(15%-140%)
		13C-3-MoCB		43.8	(15%-140%)
		13C-4-DiCB		43.3	(30%-140%)
		13C-15-DiCB		65.1	(30%-140%)
		13C-19-TrCB		53.6	(30%-140%)
		13C-37-TrCB		61.0	(30%-140%)
		13C-54-TeCB		51.6	(30%-140%)
		13C-77-TeCB		64.6	(30%-140%)
		13C-81-TeCB		66.8	(30%-140%)
		13C-104-PeCB		60.0	(30%-140%)
		13C-105-PeCB		57.4	(30%-140%)
		13C-114-PeCB		56.9	(30%-140%)
		13C-118-PeCB		50.5	(30%-140%)
		13C-123-PeCB		58.0	(30%-140%)
		13C-126-PeCB		65.6	(30%-140%)
		13C-155-HxCB		57.6	(30%-140%)
		13C-156-HxCB	C	65.3	(30%-140%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		65.4	(30%-140%)
		13C-169-HxCB		67.8	(30%-140%)
		13C-188-HpCB		56.5	(30%-140%)
		13C-189-HpCB		58.4	(30%-140%)
		13C-202-OcCB		61.1	(30%-140%)
		13C-205-OcCB		70.3	(30%-140%)
		13C-206-NoCB		69.1	(30%-140%)
		13C-208-NoCB		57.7	(30%-140%)
		13C-209-DeCB		68.4	(30%-140%)
		13C-28-TrCB		61.0	(40%-125%)
		13C-111-PeCB		64.1	(40%-125%)
		13C-178-HpCB		73.2	(40%-125%)
12033078	LCSD for batch 51321	13C-1-MoCB		27.2	(15%-140%)
		13C-3-MoCB		31.8	(15%-140%)
		13C-4-DiCB		32.8	(30%-140%)
		13C-15-DiCB		44.8	(30%-140%)
		13C-19-TrCB		41.9	(30%-140%)
		13C-37-TrCB		37.6	(30%-140%)
		13C-54-TeCB		37.5	(30%-140%)
		13C-77-TeCB		41.3	(30%-140%)
		13C-81-TeCB		43.7	(30%-140%)
		13C-104-PeCB		44.2	(30%-140%)
		13C-105-PeCB		43.2	(30%-140%)
		13C-114-PeCB		42.1	(30%-140%)
		13C-118-PeCB		38.2	(30%-140%)
		13C-123-PeCB		44.0	(30%-140%)
		13C-126-PeCB		42.9	(30%-140%)
		13C-155-HxCB		38.2	(30%-140%)
		13C-156-HxCB	C	41.2	(30%-140%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		41.8	(30%-140%)
		13C-169-HxCB		41.8	(30%-140%)
		13C-188-HpCB		39.7	(30%-140%)
		13C-189-HpCB		40.8	(30%-140%)

PCB Congeners
Surrogate Recovery Report

SDG Number: 2210315

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12033078	LCSD for batch 51321	13C-202-OcCB		39.0	(30%-140%)
		13C-205-OcCB		47.6	(30%-140%)
		13C-206-NoCB		46.5	(30%-140%)
		13C-208-NoCB		40.6	(30%-140%)
		13C-209-DeCB		46.0	(30%-140%)
		13C-28-TrCB		54.9	(40%-125%)
		13C-111-PeCB		61.1	(40%-125%)
		13C-178-HpCB		63.3	(40%-125%)
12033076	MB for batch 51321	13C-1-MoCB		33.3	(15%-150%)
		13C-3-MoCB		38.0	(15%-150%)
		13C-4-DiCB		38.1	(25%-150%)
		13C-15-DiCB		50.4	(25%-150%)
		13C-19-TrCB		45.8	(25%-150%)
		13C-37-TrCB		48.2	(25%-150%)
		13C-54-TeCB		43.6	(25%-150%)
		13C-77-TeCB		56.2	(25%-150%)
		13C-81-TeCB		60.0	(25%-150%)
		13C-104-PeCB		46.6	(25%-150%)
		13C-105-PeCB		48.6	(25%-150%)
		13C-114-PeCB		48.2	(25%-150%)
		13C-118-PeCB		44.1	(25%-150%)
		13C-123-PeCB		50.5	(25%-150%)
		13C-126-PeCB		50.6	(25%-150%)
		13C-155-HxCB		49.8	(25%-150%)
		13C-156-HxCB	C	56.2	(25%-150%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		55.7	(25%-150%)
		13C-169-HxCB		57.1	(25%-150%)
		13C-188-HpCB		49.5	(25%-150%)
		13C-189-HpCB		51.5	(25%-150%)
		13C-202-OcCB		51.8	(25%-150%)
		13C-205-OcCB		58.6	(25%-150%)
		13C-206-NoCB		57.5	(25%-150%)
		13C-208-NoCB		51.4	(25%-150%)
		13C-209-DeCB		57.7	(25%-150%)
		13C-28-TrCB		51.9	(30%-135%)
		13C-111-PeCB		55.2	(30%-135%)
		13C-178-HpCB		62.0	(30%-135%)
20534001	2210315-001J R6 North-20221005	13C-1-MoCB		39.3	(15%-150%)
		13C-3-MoCB		45.7	(15%-150%)
		13C-4-DiCB		48.0	(25%-150%)
		13C-15-DiCB		72.2	(25%-150%)
		13C-19-TrCB		61.0	(25%-150%)
		13C-37-TrCB		63.6	(25%-150%)
		13C-54-TeCB		62.6	(25%-150%)
		13C-77-TeCB		80.8	(25%-150%)
		13C-81-TeCB		83.2	(25%-150%)
		13C-104-PeCB		57.7	(25%-150%)
		13C-105-PeCB		64.7	(25%-150%)
		13C-114-PeCB		64.4	(25%-150%)
		13C-118-PeCB		60.1	(25%-150%)

PCB Congeners
Surrogate Recovery Report

SDG Number: 2210315

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
20534001	2210315-001J R6 North-20221005	13C-123-PeCB		69.5	(25%-150%)
		13C-126-PeCB		66.9	(25%-150%)
		13C-155-HxCB		64.7	(25%-150%)
		13C-156-HxCB	C	65.5	(25%-150%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		64.6	(25%-150%)
		13C-169-HxCB		64.7	(25%-150%)
		13C-188-HpCB		65.2	(25%-150%)
		13C-189-HpCB		64.9	(25%-150%)
		13C-202-OcCB		64.0	(25%-150%)
		13C-205-OcCB		78.1	(25%-150%)
		13C-206-NoCB		76.0	(25%-150%)
		13C-208-NoCB		73.1	(25%-150%)
		13C-209-DeCB		72.4	(25%-150%)
		13C-28-TrCB		70.7	(30%-135%)
		13C-111-PeCB		78.5	(30%-135%)
		13C-178-HpCB		91.6	(30%-135%)
20534002	2210315-002J R6 South-20221006	13C-1-MoCB		42.2	(15%-150%)
		13C-3-MoCB		48.7	(15%-150%)
		13C-4-DiCB		53.8	(25%-150%)
		13C-15-DiCB		73.8	(25%-150%)
		13C-19-TrCB		63.5	(25%-150%)
		13C-37-TrCB		65.7	(25%-150%)
		13C-54-TeCB		66.4	(25%-150%)
		13C-77-TeCB		79.8	(25%-150%)
		13C-81-TeCB		84.2	(25%-150%)
		13C-104-PeCB		60.2	(25%-150%)
		13C-105-PeCB		69.7	(25%-150%)
		13C-114-PeCB		66.6	(25%-150%)
		13C-118-PeCB		62.5	(25%-150%)
		13C-123-PeCB		71.8	(25%-150%)
		13C-126-PeCB		72.5	(25%-150%)
		13C-155-HxCB		60.3	(25%-150%)
		13C-156-HxCB	C	63.5	(25%-150%)
		13C-157-HxCB	C156L		
		13C-167-HxCB		62.3	(25%-150%)
		13C-169-HxCB		62.1	(25%-150%)
		13C-188-HpCB		61.1	(25%-150%)
		13C-189-HpCB		63.3	(25%-150%)
		13C-202-OcCB		60.1	(25%-150%)
		13C-205-OcCB		75.6	(25%-150%)
		13C-206-NoCB		76.8	(25%-150%)
		13C-208-NoCB		67.8	(25%-150%)
		13C-209-DeCB		75.8	(25%-150%)
		13C-28-TrCB		75.0	(30%-135%)
		13C-111-PeCB		78.5	(30%-135%)
		13C-178-HpCB		85.9	(30%-135%)

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

PCB Congeners

Quality Control Summary
Spike Recovery Report

SDG Number:	**2210315**	**Sample Type:**	**Laboratory Control Sample**
Client ID:	**LCS for batch 51321**	**Matrix:**	**WATER**
Lab Sample ID:	**12033077**		
Instrument:	**HRP875**	**Analysis Date:**	**11/10/2022 12:14**
Analyst:	**MLL**	**Prep Batch ID:**	**51321**
		Batch ID:	**51323**

Dilution: 1

CAS No.		Parmname	Amount Added pg/L		Spike Conc. pg/L	Recovery %	Acceptance Limits
2051-60-7	LCS	1-MoCB	500		490	98.1	50-150
2051-62-9	LCS	3-MoCB	500		498	99.6	50-150
13029-08-8	LCS	4-DiCB	500		462	92.3	50-150
2050-68-2	LCS	15-DiCB	500		513	103	50-150
38444-73-4	LCS	19-TrCB	500		513	103	50-150
38444-90-5	LCS	37-TrCB	500		483	96.6	50-150
15968-05-5	LCS	54-TeCB	1000		1020	102	50-150
32598-13-3	LCS	77-TeCB	1000		977	97.7	50-150
70362-50-4	LCS	81-TeCB	1000		826	82.6	50-150
56558-16-8	LCS	104-PeCB	1000		1010	101	50-150
32598-14-4	LCS	105-PeCB	1000		924	92.4	50-150
74472-37-0	LCS	114-PeCB	1000		1040	104	50-150
31508-00-6	LCS	118-PeCB	1000		1110	111	50-150
65510-44-3	LCS	123-PeCB	1000		926	92.6	50-150
57465-28-8	LCS	126-PeCB	1000		993	99.3	50-150
33979-03-2	LCS	155-HxCB	1000		1000	100	50-150
38380-08-4	LCS	156-HxCB	2000	C	1980	98.9	50-150
69782-90-7	LCS	157-HxCB		C156			
52663-72-6	LCS	167-HxCB	1000		1000	100	50-150
32774-16-6	LCS	169-HxCB	1000		967	96.7	50-150
74487-85-7	LCS	188-HpCB	1000		997	99.7	50-150
39635-31-9	LCS	189-HpCB	1000		1010	101	50-150
2136-99-4	LCS	202-OcCB	1500		1620	108	50-150
74472-53-0	LCS	205-OcCB	1500		1450	96.4	50-150
40186-72-9	LCS	206-NoCB	1500		1490	99.3	50-150
52663-77-1	LCS	208-NoCB	1500		1590	106	50-150
2051-24-3	LCS	209-DeCB	1500		1430	95.4	50-150

PCB Congeners

Quality Control Summary
Spike Recovery Report

SDG Number:	**2210315**	**Sample Type:**	**Laboratory Control Sample Duplicate**
Client ID:	**LCSD for batch 51321**	**Matrix:**	**WATER**
Lab Sample ID:	**12033078**		
Instrument:	**HRP875**	**Analysis Date:**	**11/10/2022 13:23**
Analyst:	**MLL**	**Prep Batch ID:**	**51321**
		Batch ID:	**51323**

Dilution: 1

CAS No.		Parmname	Amount Added pg/L		Spike Conc. pg/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
2051-60-7	LCSD	1-MoCB	500		443	88.5	50-150	10.2	0-20
2051-62-9	LCSD	3-MoCB	500		480	96	50-150	3.66	0-20
13029-08-8	LCSD	4-DiCB	500		425	85	50-150	8.22	0-20
2050-68-2	LCSD	15-DiCB	500		471	94.3	50-150	8.51	0-20
38444-73-4	LCSD	19-TrCB	500		473	94.5	50-150	8.26	0-20
38444-90-5	LCSD	37-TrCB	500		456	91.2	50-150	5.67	0-20
15968-05-5	LCSD	54-TeCB	1000		988	98.8	50-150	3.41	0-20
32598-13-3	LCSD	77-TeCB	1000		901	90.1	50-150	8.10	0-20
70362-50-4	LCSD	81-TeCB	1000		769	76.9	50-150	7.23	0-20
56558-16-8	LCSD	104-PeCB	1000		953	95.3	50-150	5.83	0-20
32598-14-4	LCSD	105-PeCB	1000		847	84.7	50-150	8.71	0-20
74472-37-0	LCSD	114-PeCB	1000		985	98.5	50-150	5.75	0-20
31508-00-6	LCSD	118-PeCB	1000		1010	101	50-150	9.72	0-20
65510-44-3	LCSD	123-PeCB	1000		818	81.8	50-150	12.3	0-20
57465-28-8	LCSD	126-PeCB	1000		947	94.7	50-150	4.74	0-20
33979-03-2	LCSD	155-HxCB	1000		941	94.1	50-150	6.09	0-20
38380-08-4	LCSD	156-HxCB	2000	C	1830	91.4	50-150	7.91	0-20
69782-90-7	LCSD	157-HxCB		C156					
52663-72-6	LCSD	167-HxCB	1000		933	93.3	50-150	7.24	0-20
32774-16-6	LCSD	169-HxCB	1000		907	90.7	50-150	6.37	0-20
74487-85-7	LCSD	188-HpCB	1000		909	90.9	50-150	9.26	0-20
39635-31-9	LCSD	189-HpCB	1000		895	89.5	50-150	12.1	0-20
2136-99-4	LCSD	202-OcCB	1500		1510	100	50-150	7.05	0-20
74472-53-0	LCSD	205-OcCB	1500		1340	89.4	50-150	7.52	0-20
40186-72-9	LCSD	206-NoCB	1500		1420	94.8	50-150	4.66	0-20
52663-77-1	LCSD	208-NoCB	1500		1530	102	50-150	4.20	0-20
2051-24-3	LCSD	209-DeCB	1500		1330	88.7	50-150	7.30	0-20

Method Blank Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Matrix:**	**WATER**
Client ID:	**MB for batch 51321**	**Instrument ID:**	**HRP875**	**Data File:**	**d08nov22a_5-3**
Lab Sample ID:	**12033076**	**Prep Date:**	**02-NOV-22**	**Analyzed:**	**11/10/22 14:33**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 51321	12033077	d08nov22a_5-1	11/10/22	1214
02	LCSD for batch 51321	12033078	d08nov22a_5-2	11/10/22	1323
03	2210315-001J R6 North-20221005	20534001	d08nov22a_7-9	11/11/22	2111
04	2210315-002J R6 South-20221006	20534002	d08nov22a_7-10	11/11/22	2221

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
2051-60-7	1-MoCB	U	ND	pg/L	4.24	100
2051-61-8	2-MoCB	U	ND	pg/L	4.84	100
2051-62-9	3-MoCB	U	ND	pg/L	3.80	100
13029-08-8	4-DiCB	U	ND	pg/L	11.4	100
16605-91-7	5-DiCB	U	ND	pg/L	9.04	100
25569-80-6	6-DiCB	U	ND	pg/L	7.52	100
33284-50-3	7-DiCB	U	ND	pg/L	7.66	100
34883-43-7	8-DiCB	U	ND	pg/L	6.54	100
34883-39-1	9-DiCB	U	ND	pg/L	8.86	100
33146-45-1	10-DiCB	U	ND	pg/L	6.40	100
2050-67-1	11-DiCB	U	ND	pg/L	58.1	100
2974-92-7	12-DiCB	CU	ND	pg/L	7.68	200
2974-90-5	13-DiCB	C12				
34883-41-5	14-DiCB	U	ND	pg/L	7.86	100
2050-68-2	15-DiCB	U	ND	pg/L	6.96	100
38444-78-9	16-TrCB	U	ND	pg/L	5.24	100
37680-66-3	17-TrCB	U	ND	pg/L	5.26	100
37680-65-2	18-TrCB	CU	ND	pg/L	4.46	200
38444-73-4	19-TrCB	U	ND	pg/L	5.52	100
38444-84-7	20-TrCB	CJ	5.80	pg/L	3.66	200
55702-46-0	21-TrCB	CU	ND	pg/L	3.52	200
38444-85-8	22-TrCB	U	ND	pg/L	3.82	100
55720-44-0	23-TrCB	U	ND	pg/L	3.82	100
55702-45-9	24-TrCB	U	ND	pg/L	4.22	100
55712-37-3	25-TrCB	U	ND	pg/L	3.36	100
38444-81-4	26-TrCB	CU	ND	pg/L	3.82	200
38444-76-7	27-TrCB	U	ND	pg/L	4.04	100
7012-37-5	28-TrCB	C20				
15862-07-4	29-TrCB	C26				
35693-92-6	30-TrCB	C18				
16606-02-3	31-TrCB	U	ND	pg/L	3.52	100
38444-77-8	32-TrCB	U	ND	pg/L	3.68	100

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data

J Value is estimated

U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
38444-86-9	33-TrCB	C21				
37680-68-5	34-TrCB	U	ND	pg/L	4.14	100
37680-69-6	35-TrCB	U	ND	pg/L	5.24	100
38444-87-0	36-TrCB	U	ND	pg/L	4.62	100
38444-90-5	37-TrCB	U	ND	pg/L	4.66	100
53555-66-1	38-TrCB	U	ND	pg/L	5.26	100
38444-88-1	39-TrCB	U	ND	pg/L	5.12	100
38444-93-8	40-TeCB	CU	ND	pg/L	4.88	200
52663-59-9	41-TeCB	U	ND	pg/L	6.64	100
36559-22-5	42-TeCB	U	ND	pg/L	5.40	100
70362-46-8	43-TeCB	U	ND	pg/L	6.46	100
41464-39-5	44-TeCB	CU	ND	pg/L	6.04	300
70362-45-7	45-TeCB	CU	ND	pg/L	3.42	200
41464-47-5	46-TeCB	U	ND	pg/L	3.54	100
2437-79-8	47-TeCB	C44				
70362-47-9	48-TeCB	U	ND	pg/L	5.38	100
41464-40-8	49-TeCB	CU	ND	pg/L	4.44	200
62796-65-0	50-TeCB	CU	ND	pg/L	3.34	200
68194-04-7	51-TeCB	C45				
35693-99-3	52-TeCB	J	8.28	pg/L	5.84	200
41464-41-9	53-TeCB	C50				
15968-05-5	54-TeCB	U	ND	pg/L	2.26	100
74338-24-2	55-TeCB	U	ND	pg/L	4.76	100
41464-43-1	56-TeCB	U	ND	pg/L	4.80	100
70424-67-8	57-TeCB	U	ND	pg/L	4.56	100
41464-49-7	58-TeCB	U	ND	pg/L	4.72	100
74472-33-6	59-TeCB	CU	ND	pg/L	4.12	300
33025-41-1	60-TeCB	U	ND	pg/L	4.66	100
33284-53-6	61-TeCB	CJ	7.58	pg/L	4.50	400
54230-22-7	62-TeCB	C59				
74472-34-7	63-TeCB	U	ND	pg/L	4.44	100
52663-58-8	64-TeCB	U	ND	pg/L	3.86	100

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
33284-54-7	65-TeCB	C44				
32598-10-0	66-TeCB	U	ND	pg/L	4.66	100
73575-53-8	67-TeCB	U	ND	pg/L	3.66	100
73575-52-7	68-TeCB	U	ND	pg/L	4.02	100
60233-24-1	69-TeCB	C49				
32598-11-1	70-TeCB	C61				
41464-46-4	71-TeCB	C40				
41464-42-0	72-TeCB	U	ND	pg/L	4.34	100
74338-23-1	73-TeCB	U	ND	pg/L	3.84	100
32690-93-0	74-TeCB	C61				
32598-12-2	75-TeCB	C59				
70362-48-0	76-TeCB	C61				
32598-13-3	77-TeCB	U	ND	pg/L	4.76	100
70362-49-1	78-TeCB	U	ND	pg/L	5.30	100
41464-48-6	79-TeCB	U	ND	pg/L	4.20	100
33284-52-5	80-TeCB	U	ND	pg/L	4.04	100
70362-50-4	81-TeCB	U	ND	pg/L	4.04	100
52663-62-4	82-PeCB	U	ND	pg/L	6.86	100
60145-20-2	83-PeCB	U	ND	pg/L	7.94	100
52663-60-2	84-PeCB	U	ND	pg/L	5.86	100
65510-45-4	85-PeCB	CU	ND	pg/L	4.86	300
55312-69-1	86-PeCB	CJ	6.84	pg/L	4.90	600
38380-02-8	87-PeCB	C86				
55215-17-3	88-PeCB	CU	ND	pg/L	5.84	200
73575-57-2	89-PeCB	U	ND	pg/L	6.96	100
68194-07-0	90-PeCB	CU	ND	pg/L	7.70	300
68194-05-8	91-PeCB	C88				
52663-61-3	92-PeCB	U	ND	pg/L	6.42	100
73575-56-1	93-PeCB	CU	ND	pg/L	5.26	200
73575-55-0	94-PeCB	U	ND	pg/L	5.60	100
38379-99-6	95-PeCB	U	ND	pg/L	6.24	100
73575-54-9	96-PeCB	U	ND	pg/L	3.24	100

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
41464-51-1	97-PeCB	C86				
60233-25-2	98-PeCB	CU	ND	pg/L	5.32	200
38380-01-7	99-PeCB	U	ND	pg/L	5.34	100
39485-83-1	100-PeCB	C93				
37680-73-2	101-PeCB	C90				
68194-06-9	102-PeCB	C98				
60145-21-3	103-PeCB	U	ND	pg/L	5.42	100
56558-16-8	104-PeCB	U	ND	pg/L	2.42	100
32598-14-4	105-PeCB	U	ND	pg/L	4.16	100
70424-69-0	106-PeCB	U	ND	pg/L	4.48	100
70424-68-9	107-PeCB	U	ND	pg/L	3.60	100
70362-41-3	108-PeCB	CU	ND	pg/L	4.32	200
74472-35-8	109-PeCB	C86				
38380-03-9	110-PeCB	CU	ND	pg/L	6.76	200
39635-32-0	111-PeCB	U	ND	pg/L	4.16	100
74472-36-9	112-PeCB	U	ND	pg/L	3.94	100
68194-10-5	113-PeCB	C90				
74472-37-0	114-PeCB	U	ND	pg/L	3.92	100
74472-38-1	115-PeCB	C110				
18259-05-7	116-PeCB	C85				
68194-11-6	117-PeCB	C85				
31508-00-6	118-PeCB	J	5.50	pg/L	4.02	100
56558-17-9	119-PeCB	C86				
68194-12-7	120-PeCB	U	ND	pg/L	4.38	100
56558-18-0	121-PeCB	U	ND	pg/L	4.12	100
76842-07-4	122-PeCB	U	ND	pg/L	5.68	100
65510-44-3	123-PeCB	U	ND	pg/L	3.70	100
70424-70-3	124-PeCB	C108				
74472-39-2	125-PeCB	C86				
57465-28-8	126-PeCB	U	ND	pg/L	4.76	100
39635-33-1	127-PeCB	U	ND	pg/L	4.44	100
38380-07-3	128-HxCB	CU	ND	pg/L	5.02	200

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data
J Value is estimated
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
55215-18-4	129-HxCB	CU	ND	pg/L	6.82	300
52663-66-8	130-HxCB	U	ND	pg/L	6.36	100
61798-70-7	131-HxCB	U	ND	pg/L	6.48	100
38380-05-1	132-HxCB	U	ND	pg/L	5.90	100
35694-04-3	133-HxCB	U	ND	pg/L	6.18	100
52704-70-8	134-HxCB	U	ND	pg/L	6.48	100
52744-13-5	135-HxCB	CU	ND	pg/L	4.58	200
38411-22-2	136-HxCB	U	ND	pg/L	3.48	100
35694-06-5	137-HxCB	U	ND	pg/L	5.58	100
35065-28-2	138-HxCB	C129				
56030-56-9	139-HxCB	CU	ND	pg/L	5.20	200
59291-64-4	140-HxCB	C139				
52712-04-6	141-HxCB	U	ND	pg/L	5.24	100
41411-61-4	142-HxCB	U	ND	pg/L	6.30	100
68194-15-0	143-HxCB	U	ND	pg/L	5.98	100
68194-14-9	144-HxCB	U	ND	pg/L	4.50	100
74472-40-5	145-HxCB	U	ND	pg/L	3.30	100
51908-16-8	146-HxCB	U	ND	pg/L	5.00	100
68194-13-8	147-HxCB	CU	ND	pg/L	5.08	200
74472-41-6	148-HxCB	U	ND	pg/L	4.38	100
38380-04-0	149-HxCB	C147				
68194-08-1	150-HxCB	U	ND	pg/L	3.16	100
52663-63-5	151-HxCB	C135				
68194-09-2	152-HxCB	U	ND	pg/L	3.38	100
35065-27-1	153-HxCB	CJ	4.94	pg/L	4.58	200
60145-22-4	154-HxCB	U	ND	pg/L	3.64	100
33979-03-2	155-HxCB	U	ND	pg/L	2.48	100
38380-08-4	156-HxCB	CU	ND	pg/L	4.10	200
69782-90-7	157-HxCB	C156				
74472-42-7	158-HxCB	U	ND	pg/L	3.68	100
39635-35-3	159-HxCB	U	ND	pg/L	3.54	100
41411-62-5	160-HxCB	U	ND	pg/L	4.46	100

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
74472-43-8	161-HxCB	U	ND	pg/L	4.34	100
39635-34-2	162-HxCB	U	ND	pg/L	3.46	100
74472-44-9	163-HxCB	C129				
74472-45-0	164-HxCB	U	ND	pg/L	4.12	100
74472-46-1	165-HxCB	U	ND	pg/L	4.58	100
41411-63-6	166-HxCB	C128				
52663-72-6	167-HxCB	U	ND	pg/L	3.06	100
59291-65-5	168-HxCB	C153				
32774-16-6	169-HxCB	U	ND	pg/L	3.52	100
35065-30-6	170-HpCB	U	ND	pg/L	4.72	100
52663-71-5	171-HpCB	CU	ND	pg/L	4.98	200
52663-74-8	172-HpCB	U	ND	pg/L	4.90	100
68194-16-1	173-HpCB	C171				
38411-25-5	174-HpCB	U	ND	pg/L	4.64	100
40186-70-7	175-HpCB	U	ND	pg/L	4.20	100
52663-65-7	176-HpCB	U	ND	pg/L	3.24	100
52663-70-4	177-HpCB	U	ND	pg/L	5.02	100
52663-67-9	178-HpCB	U	ND	pg/L	4.46	100
52663-64-6	179-HpCB	U	ND	pg/L	3.16	100
35065-29-3	180-HpCB	CU	ND	pg/L	3.88	200
74472-47-2	181-HpCB	U	ND	pg/L	4.80	100
60145-23-5	182-HpCB	U	ND	pg/L	4.04	100
52663-69-1	183-HpCB	CU	ND	pg/L	4.64	200
74472-48-3	184-HpCB	U	ND	pg/L	3.10	100
52712-05-7	185-HpCB	C183				
74472-49-4	186-HpCB	U	ND	pg/L	3.22	100
52663-68-0	187-HpCB	U	ND	pg/L	4.08	100
74487-85-7	188-HpCB	U	ND	pg/L	2.70	100
39635-31-9	189-HpCB	U	ND	pg/L	4.02	100
41411-64-7	190-HpCB	U	ND	pg/L	3.48	100
74472-50-7	191-HpCB	U	ND	pg/L	3.44	100
74472-51-8	192-HpCB	U	ND	pg/L	4.00	100

Comments:
C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
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PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
69782-91-8	193-HpCB	C180				
35694-08-7	194-OcCB	U	ND	pg/L	3.80	100
52663-78-2	195-OcCB	U	ND	pg/L	4.02	100
42740-50-1	196-OcCB	U	ND	pg/L	3.70	100
33091-17-7	197-OcCB	CU	ND	pg/L	2.94	200
68194-17-2	198-OcCB	CU	ND	pg/L	3.84	200
52663-75-9	199-OcCB	C198				
52663-73-7	200-OcCB	C197				
40186-71-8	201-OcCB	U	ND	pg/L	2.74	100
2136-99-4	202-OcCB	U	ND	pg/L	2.74	100
52663-76-0	203-OcCB	U	ND	pg/L	3.66	100
74472-52-9	204-OcCB	U	ND	pg/L	2.82	100
74472-53-0	205-OcCB	U	ND	pg/L	3.00	100
40186-72-9	206-NoCB	U	ND	pg/L	5.48	100
52663-79-3	207-NoCB	U	ND	pg/L	4.04	100
52663-77-1	208-NoCB	U	ND	pg/L	3.76	100
2051-24-3	209-DeCB	U	ND	pg/L	4.54	100
1336-36-3	Total PCB Congeners	J	38.9	pg/L		100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		666	2000	pg/L	33.3	(15%-150%)
13C-3-MoCB		760	2000	pg/L	38.0	(15%-150%)
13C-4-DiCB		761	2000	pg/L	38.1	(25%-150%)
13C-15-DiCB		1010	2000	pg/L	50.4	(25%-150%)
13C-19-TrCB		915	2000	pg/L	45.8	(25%-150%)
13C-37-TrCB		963	2000	pg/L	48.2	(25%-150%)
13C-54-TeCB		872	2000	pg/L	43.6	(25%-150%)
13C-77-TeCB		1120	2000	pg/L	56.2	(25%-150%)
13C-81-TeCB		1200	2000	pg/L	60.0	(25%-150%)
13C-104-PeCB		932	2000	pg/L	46.6	(25%-150%)
13C-105-PeCB		971	2000	pg/L	48.6	(25%-150%)
13C-114-PeCB		964	2000	pg/L	48.2	(25%-150%)
13C-118-PeCB		882	2000	pg/L	44.1	(25%-150%)
13C-123-PeCB		1010	2000	pg/L	50.5	(25%-150%)
13C-126-PeCB		1010	2000	pg/L	50.6	(25%-150%)
13C-155-HxCB		996	2000	pg/L	49.8	(25%-150%)
13C-156-HxCB	C	2250	4000	pg/L	56.2	(25%-150%)
13C-157-HxCB	C156L					
13C-167-HxCB		1110	2000	pg/L	55.7	(25%-150%)
13C-169-HxCB		1140	2000	pg/L	57.1	(25%-150%)
13C-188-HpCB		989	2000	pg/L	49.5	(25%-150%)
13C-189-HpCB		1030	2000	pg/L	51.5	(25%-150%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033076**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**MB for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 14:33**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-3**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-202-OcCB		1040	2000	pg/L	51.8	(25%-150%)
13C-205-OcCB		1170	2000	pg/L	58.6	(25%-150%)
13C-206-NoCB		1150	2000	pg/L	57.5	(25%-150%)
13C-208-NoCB		1030	2000	pg/L	51.4	(25%-150%)
13C-209-DeCB		1150	2000	pg/L	57.7	(25%-150%)
13C-28-TrCB		1040	2000	pg/L	51.9	(30%-135%)
13C-111-PeCB		1100	2000	pg/L	55.2	(30%-135%)
13C-178-HpCB		1240	2000	pg/L	62.0	(30%-135%)

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
J **Value is estimated**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	2210315	**Client:**	HALL001	**Project:**	HALL00113
Lab Sample ID:	12033077			**Matrix:**	WATER
Client Sample:	QC for batch 51321				
Client ID:	LCS for batch 51321			**Prep Basis:**	As Received
Batch ID:	51323	**Method:**	EPA Method 1668A		
Run Date:	11/10/2022 12:14	**Analyst:**	MLL	**Instrument:**	HRP875
Data File:	d08nov22a_5-1			**Dilution:**	1
Prep Batch:	51321	**Prep Method:**	SW846 3520C	**Prep SOP Ref:**	CF-OA-E-001
Prep Date:	02-NOV-22	**Prep Aliquot:**	1000 mL		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
2051-60-7	1-MoCB		490	pg/L	5.90	100
2051-62-9	3-MoCB		498	pg/L	5.40	100
13029-08-8	4-DiCB		462	pg/L	9.84	100
2050-68-2	15-DiCB		513	pg/L	8.46	100
38444-73-4	19-TrCB		513	pg/L	7.04	100
38444-90-5	37-TrCB		483	pg/L	12.0	100
15968-05-5	54-TeCB		1020	pg/L	3.78	100
32598-13-3	77-TeCB		977	pg/L	16.2	100
70362-50-4	81-TeCB		826	pg/L	15.1	100
56558-16-8	104-PeCB		1010	pg/L	2.54	100
32598-14-4	105-PeCB		924	pg/L	19.9	100
74472-37-0	114-PeCB		1040	pg/L	18.6	100
31508-00-6	118-PeCB		1110	pg/L	18.9	100
65510-44-3	123-PeCB		926	pg/L	17.8	100
57465-28-8	126-PeCB		993	pg/L	20.4	100
33979-03-2	155-HxCB		1000	pg/L	2.64	100
38380-08-4	156-HxCB	C	1980	pg/L	17.4	200
69782-90-7	157-HxCB	C156				
52663-72-6	167-HxCB		1000	pg/L	12.8	100
32774-16-6	169-HxCB		967	pg/L	14.7	100
74487-85-7	188-HpCB		997	pg/L	3.20	100
39635-31-9	189-HpCB		1010	pg/L	8.64	100
2136-99-4	202-OcCB		1620	pg/L	22.6	100
74472-53-0	205-OcCB		1450	pg/L	9.54	100
40186-72-9	206-NoCB		1490	pg/L	7.36	100
52663-77-1	208-NoCB		1590	pg/L	5.44	100
2051-24-3	209-DeCB		1430	pg/L	4.50	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		757	2000	pg/L	37.9	(15%-140%)
13C-3-MoCB		876	2000	pg/L	43.8	(15%-140%)
13C-4-DiCB		865	2000	pg/L	43.3	(30%-140%)
13C-15-DiCB		1300	2000	pg/L	65.1	(30%-140%)
13C-19-TrCB		1070	2000	pg/L	53.6	(30%-140%)
13C-37-TrCB		1220	2000	pg/L	61.0	(30%-140%)
13C-54-TeCB		1030	2000	pg/L	51.6	(30%-140%)
13C-77-TeCB		1290	2000	pg/L	64.6	(30%-140%)
13C-81-TeCB		1340	2000	pg/L	66.8	(30%-140%)
13C-104-PeCB		1200	2000	pg/L	60.0	(30%-140%)
13C-105-PeCB		1150	2000	pg/L	57.4	(30%-140%)
13C-114-PeCB		1140	2000	pg/L	56.9	(30%-140%)
13C-118-PeCB		1010	2000	pg/L	50.5	(30%-140%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033077**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**LCS for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 12:14**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-1**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-123-PeCB		1160	2000	pg/L	58.0	(30%-140%)
13C-126-PeCB		1310	2000	pg/L	65.6	(30%-140%)
13C-155-HxCB		1150	2000	pg/L	57.6	(30%-140%)
13C-156-HxCB	C	2610	4000	pg/L	65.3	(30%-140%)
13C-157-HxCB	C156L					
13C-167-HxCB		1310	2000	pg/L	65.4	(30%-140%)
13C-169-HxCB		1360	2000	pg/L	67.8	(30%-140%)
13C-188-HpCB		1130	2000	pg/L	56.5	(30%-140%)
13C-189-HpCB		1170	2000	pg/L	58.4	(30%-140%)
13C-202-OcCB		1220	2000	pg/L	61.1	(30%-140%)
13C-205-OcCB		1410	2000	pg/L	70.3	(30%-140%)
13C-206-NoCB		1380	2000	pg/L	69.1	(30%-140%)
13C-208-NoCB		1150	2000	pg/L	57.7	(30%-140%)
13C-209-DeCB		1370	2000	pg/L	68.4	(30%-140%)
13C-28-TrCB		1220	2000	pg/L	61.0	(40%-125%)
13C-111-PeCB		1280	2000	pg/L	64.1	(40%-125%)
13C-178-HpCB		1460	2000	pg/L	73.2	(40%-125%)

Comments:

C Congener has coeluters. When Cxxx, refer to congener number xxx for data
U Analyte was analyzed for, but not detected above the specified detection limit.

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	2210315	Client:	HALL001	Project:	HALL00113
Lab Sample ID:	12033078			Matrix:	WATER
Client Sample:	QC for batch 51321				
Client ID:	LCSD for batch 51321			Prep Basis:	As Received
Batch ID:	51323	Method:	EPA Method 1668A		
Run Date:	11/10/2022 13:23	Analyst:	MLL	Instrument:	HRP875
Data File:	d08nov22a_5-2			Dilution:	1
Prep Batch:	51321	Prep Method:	SW846 3520C	Prep SOP Ref:	CF-OA-E-001
Prep Date:	02-NOV-22	Prep Aliquot:	1000 mL		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
2051-60-7	1-MoCB		443	pg/L	6.46	100
2051-62-9	3-MoCB		480	pg/L	7.18	100
13029-08-8	4-DiCB		425	pg/L	11.5	100
2050-68-2	15-DiCB		471	pg/L	12.7	100
38444-73-4	19-TrCB		473	pg/L	9.06	100
38444-90-5	37-TrCB		456	pg/L	16.4	100
15968-05-5	54-TeCB		988	pg/L	4.04	100
32598-13-3	77-TeCB		901	pg/L	27.0	100
70362-50-4	81-TeCB		769	pg/L	25.2	100
56558-16-8	104-PeCB		953	pg/L	3.18	100
32598-14-4	105-PeCB		847	pg/L	23.4	100
74472-37-0	114-PeCB		985	pg/L	20.8	100
31508-00-6	118-PeCB		1010	pg/L	23.3	100
65510-44-3	123-PeCB		818	pg/L	19.9	100
57465-28-8	126-PeCB		947	pg/L	26.0	100
33979-03-2	155-HxCB		941	pg/L	9.38	100
38380-08-4	156-HxCB	C	1830	pg/L	21.8	200
69782-90-7	157-HxCB	C156				
52663-72-6	167-HxCB		933	pg/L	16.1	100
32774-16-6	169-HxCB		907	pg/L	18.4	100
74487-85-7	188-HpCB		909	pg/L	3.64	100
39635-31-9	189-HpCB		895	pg/L	8.12	100
2136-99-4	202-OcCB		1510	pg/L	25.5	100
74472-53-0	205-OcCB		1340	pg/L	7.66	100
40186-72-9	206-NoCB		1420	pg/L	9.36	100
52663-77-1	208-NoCB		1530	pg/L	6.86	100
2051-24-3	209-DeCB		1330	pg/L	5.86	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1-MoCB		544	2000	pg/L	27.2	(15%-140%)
13C-3-MoCB		636	2000	pg/L	31.8	(15%-140%)
13C-4-DiCB		656	2000	pg/L	32.8	(30%-140%)
13C-15-DiCB		895	2000	pg/L	44.8	(30%-140%)
13C-19-TrCB		838	2000	pg/L	41.9	(30%-140%)
13C-37-TrCB		753	2000	pg/L	37.6	(30%-140%)
13C-54-TeCB		750	2000	pg/L	37.5	(30%-140%)
13C-77-TeCB		827	2000	pg/L	41.3	(30%-140%)
13C-81-TeCB		874	2000	pg/L	43.7	(30%-140%)
13C-104-PeCB		884	2000	pg/L	44.2	(30%-140%)
13C-105-PeCB		864	2000	pg/L	43.2	(30%-140%)
13C-114-PeCB		843	2000	pg/L	42.1	(30%-140%)
13C-118-PeCB		764	2000	pg/L	38.2	(30%-140%)

PCB Congeners
Certificate of Analysis
Sample Summary

SDG Number:	**2210315**	**Client:**	**HALL001**	**Project:**	**HALL00113**
Lab Sample ID:	**12033078**			**Matrix:**	**WATER**
Client Sample:	**QC for batch 51321**				
Client ID:	**LCSD for batch 51321**			**Prep Basis:**	**As Received**
Batch ID:	**51323**	**Method:**	**EPA Method 1668A**		
Run Date:	**11/10/2022 13:23**	**Analyst:**	**MLL**	**Instrument:**	**HRP875**
Data File:	**d08nov22a_5-2**			**Dilution:**	**1**
Prep Batch:	**51321**	**Prep Method:**	**SW846 3520C**	**Prep SOP Ref:**	**CF-OA-E-001**
Prep Date:	**02-NOV-22**	**Prep Aliquot:**	**1000 mL**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-123-PeCB		880	2000	pg/L	44.0	(30%-140%)
13C-126-PeCB		857	2000	pg/L	42.9	(30%-140%)
13C-155-HxCB		763	2000	pg/L	38.2	(30%-140%)
13C-156-HxCB	C	1650	4000	pg/L	41.2	(30%-140%)
13C-157-HxCB	C156L					
13C-167-HxCB		837	2000	pg/L	41.8	(30%-140%)
13C-169-HxCB		835	2000	pg/L	41.8	(30%-140%)
13C-188-HpCB		795	2000	pg/L	39.7	(30%-140%)
13C-189-HpCB		817	2000	pg/L	40.8	(30%-140%)
13C-202-OcCB		781	2000	pg/L	39.0	(30%-140%)
13C-205-OcCB		953	2000	pg/L	47.6	(30%-140%)
13C-206-NoCB		929	2000	pg/L	46.5	(30%-140%)
13C-208-NoCB		811	2000	pg/L	40.6	(30%-140%)
13C-209-DeCB		920	2000	pg/L	46.0	(30%-140%)
13C-28-TrCB		1100	2000	pg/L	54.9	(40%-125%)
13C-111-PeCB		1220	2000	pg/L	61.1	(40%-125%)
13C-178-HpCB		1270	2000	pg/L	63.3	(40%-125%)

Comments:

C **Congener has coeluters. When Cxxx, refer to congener number xxx for data**
U **Analyte was analyzed for, but not detected above the specified detection limit.**

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB-70825** SampType: **MBLK** TestCode: **EPA Method 1664B**
Client ID: **PBW** Batch ID: **70825** RunNo: **91919**
Prep Date: **10/14/2022** Analysis Date: **10/18/2022** SeqNo: **3297147** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extractable Material	ND	10.0								

Sample ID: **LCS-70825** SampType: **LCS** TestCode: **EPA Method 1664B**
Client ID: **LCSW** Batch ID: **70825** RunNo: **91919**
Prep Date: **10/14/2022** Analysis Date: **10/18/2022** SeqNo: **3297148** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extractable Material	37.8	10.0	40.00	0	94.5	78	114			

Sample ID: **LCSD-70825** SampType: **LCSD** TestCode: **EPA Method 1664B**
Client ID: **LCSS02** Batch ID: **70825** RunNo: **91919**
Prep Date: **10/14/2022** Analysis Date: **10/18/2022** SeqNo: **3297149** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extractable Material	37.4	10.0	40.00	0	93.5	78	114	1.06	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA
Project: CMC Wet FY23

Sample ID: **MB-70811** SampType: **MBLK** TestCode: **EPA Method 200.7: Metals**
Client ID: **PBW** Batch ID: **70811** RunNo: **91819**
Prep Date: **10/13/2022** Analysis Date: **10/14/2022** SeqNo: **3291906** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								

Sample ID: **LCSLL-70811** SampType: **LCSLL** TestCode: **EPA Method 200.7: Metals**
Client ID: **BatchQC** Batch ID: **70811** RunNo: **91819**
Prep Date: **10/13/2022** Analysis Date: **10/14/2022** SeqNo: **3291907** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0	0.5000	0	103	50	150			
Magnesium	ND	1.0	0.5000	0	104	50	150			

Sample ID: **LCS-70811** SampType: **LCS** TestCode: **EPA Method 200.7: Metals**
Client ID: **LCSW** Batch ID: **70811** RunNo: **91819**
Prep Date: **10/13/2022** Analysis Date: **10/14/2022** SeqNo: **3291908** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	51	1.0	50.00	0	102	85	115			
Magnesium	52	1.0	50.00	0	104	85	115			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB** SampType: **MBLK** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **PBW** Batch ID: **A91883** RunNo: **91883**
Prep Date: Analysis Date: **10/18/2022** SeqNo: **3295065** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	ND	0.0010								
Lead	ND	0.00050								

Sample ID: **LCSLL** SampType: **LCSLL** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **BatchQC** Batch ID: **A91883** RunNo: **91883**
Prep Date: Analysis Date: **10/18/2022** SeqNo: **3295066** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	0.0010	0.0010	0.001000	0	101	50	150			
Lead	0.00052	0.00050	0.0005000	0	105	50	150			

Sample ID: **LCS** SampType: **LCS** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **LCSW** Batch ID: **A91883** RunNo: **91883**
Prep Date: Analysis Date: **10/18/2022** SeqNo: **3295067** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	0.025	0.0010	0.02500	0	98.9	85	115			
Lead	0.012	0.00050	0.01250	0	97.4	85	115			

Sample ID: **2210315-002NMSLL** SampType: **MS** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **R6 South-20221006** Batch ID: **A91883** RunNo: **91883**
Prep Date: Analysis Date: **10/18/2022** SeqNo: **3295096** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	0.026	0.0010	0.02500	0.0007151	102	70	130			
Lead	0.013	0.00050	0.01250	).00007696	107	70	130			

Sample ID: **2210315-002NMSDL** SampType: **MSD** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **R6 South-20221006** Batch ID: **A91883** RunNo: **91883**
Prep Date: Analysis Date: **10/18/2022** SeqNo: **3295097** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	0.026	0.0010	0.02500	0.0007151	101	70	130	0.371	20	
Lead	0.013	0.00050	0.01250	).00007696	105	70	130	1.82	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB**	SampType: **MBLK**			TestCode: **EPA Method 300.0: Anions**						
Client ID: **PBW**	Batch ID: **A91618**			RunNo: **91618**						
Prep Date:	Analysis Date: **10/6/2022**			SeqNo: **3282485**	Units: **mg/L**					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								

Sample ID: **LCS**	SampType: **LCS**			TestCode: **EPA Method 300.0: Anions**						
Client ID: **LCSW**	Batch ID: **A91618**			RunNo: **91618**						
Prep Date:	Analysis Date: **10/6/2022**			SeqNo: **3282486**	Units: **mg/L**					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Nitrite (As N)	0.94	0.10	1.000	0	93.8	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	98.8	90	110			

Sample ID: **2210315-001EMS**	SampType: **MS**			TestCode: **EPA Method 300.0: Anions**						
Client ID: **R6 North-20221005**	Batch ID: **A91618**			RunNo: **91618**						
Prep Date:	Analysis Date: **10/7/2022**			SeqNo: **3282497**	Units: **mg/L**					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Nitrite (As N)	4.7	0.50	5.000	0	94.4	83.4	110			
Nitrogen, Nitrate (As N)	13	0.50	12.50	0.1075	99.8	89.5	113			

Sample ID: **2210315-001EMSD**	SampType: **MSD**			TestCode: **EPA Method 300.0: Anions**						
Client ID: **R6 North-20221005**	Batch ID: **A91618**			RunNo: **91618**						
Prep Date:	Analysis Date: **10/7/2022**			SeqNo: **3282498**	Units: **mg/L**					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Nitrite (As N)	4.7	0.50	5.000	0	93.8	83.4	110	0.691	20	
Nitrogen, Nitrate (As N)	12	0.50	12.50	0.1075	98.8	89.5	113	0.995	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB-70767** SampType: **MBLK** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **PBW** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294644** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	ND	0.10								
Surr: Decachlorobiphenyl	2.5		2.500		101	40.9	111			
Surr: Tetrachloro-m-xylene	2.0		2.500		79.4	15	107			

Sample ID: **MB-70767** SampType: **MBLK** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **PBW** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294646** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	ND	0.10								
Surr: Decachlorobiphenyl	2.5		2.500		102	40.9	111			
Surr: Tetrachloro-m-xylene	2.0		2.500		80.9	15	107			

Sample ID: **LCS-70767** SampType: **LCS** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSW** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294647** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	0.43	0.10	0.5000	0	86.2	56.3	121			
Surr: Decachlorobiphenyl	2.4		2.500		95.2	40.9	111			
Surr: Tetrachloro-m-xylene	2.0		2.500		78.6	15	107			

Sample ID: **LCS-70767** SampType: **LCS** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSW** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294648** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	0.44	0.10	0.5000	0	87.9	56.3	121			
Surr: Decachlorobiphenyl	2.4		2.500		95.7	40.9	111			
Surr: Tetrachloro-m-xylene	2.0		2.500		79.7	15	107			

Sample ID: **LCSD-70767** SampType: **LCSD** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSS02** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294649** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	0.42	0.10	0.5000	0	84.6	56.3	121	1.91	20	
Surr: Decachlorobiphenyl	2.3		2.500		90.9	40.9	111	0	20	
Surr: Tetrachloro-m-xylene	1.8		2.500		73.5	15	107	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**
23-Nov-22

Client: AMAFCA
Project: CMC Wet FY23

Sample ID: **LCSD-70767** SampType: **LCSD** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSS02** Batch ID: **70767** RunNo: **91851**
Prep Date: **10/12/2022** Analysis Date: **10/17/2022** SeqNo: **3294650** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Dieldrin	0.43	0.10	0.5000	0	86.1	56.3	121	2.00	20	
Surr: Decachlorobiphenyl	2.3		2.500		91.5	40.9	111	0	20	
Surr: Tetrachloro-m-xylene	1.8		2.500		73.9	15	107	0	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

WO#: **2210315**

Hall Environmental Analysis Laboratory, Inc.

23-Nov-22

Client: AMAFCA
Project: CMC Wet FY23

Sample ID:	**MB-70671**	SampType:	**MBLK**	TestCode:	**SM 9223B Fecal Indicator: E. coli MPN**
Client ID:	**PBW**	Batch ID:	**70671**	RunNo:	**91638**
Prep Date:	**10/6/2022**	Analysis Date:	**10/7/2022**	SeqNo:	**3283469** Units: **MPN/100mL**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
E. Coli	<1	1.000								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB**	SampType: **MBLK**	TestCode: **SM 4500 NH3: Ammonia**	
Client ID: **PBW**	Batch ID: **R91993**	RunNo: **91993**	
Prep Date:	Analysis Date: **10/21/2022**	SeqNo: **3300449**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	ND	1.0								

Sample ID: **LCS**	SampType: **LCS**	TestCode: **SM 4500 NH3: Ammonia**	
Client ID: **LCSW**	Batch ID: **R91993**	RunNo: **91993**	
Prep Date:	Analysis Date: **10/21/2022**	SeqNo: **3300450**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	9.8	1.0	10.00	0	98.0	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB-71023**		SampType: **MBLK**			TestCode: **EPA Method 365.1: Total Phosphorous**						
Client ID: **PBW**		Batch ID: **71023**			RunNo: **92060**						
Prep Date: **10/24/2022**		Analysis Date: **10/25/2022**			SeqNo: **3303642**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total (As P)	ND	0.050									

Sample ID: **LCS-71023**		SampType: **LCS**			TestCode: **EPA Method 365.1: Total Phosphorous**						
Client ID: **LCSW**		Batch ID: **71023**			RunNo: **92060**						
Prep Date: **10/24/2022**		Analysis Date: **10/25/2022**			SeqNo: **3303643**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Phosphorus, Total (As P)	0.24	0.050	0.2500	0	96.9	90	110				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

WO#: **2210315**

Hall Environmental Analysis Laboratory, Inc.

23-Nov-22

Client: AMAFCA
Project: CMC Wet FY23

Sample ID: **MB-70696**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**	
Client ID: **PBW**	Batch ID: **70696**	RunNo: **91714**	
Prep Date: **10/10/2022**	Analysis Date: **10/12/2022**	SeqNo: **3286928**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: **LCS-70696**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**	
Client ID: **LCSW**	Batch ID: **70696**	RunNo: **91714**	
Prep Date: **10/10/2022**	Analysis Date: **10/12/2022**	SeqNo: **3286929**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1050	20.0	1000	0	105	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

WO#: **2210315**

Hall Environmental Analysis Laboratory, Inc.

23-Nov-22

Client: AMAFCA
Project: CMC Wet FY23

Sample ID: **MB-70981**	SampType: **MBLK**	TestCode: **SM 4500 Norg C: TKN**	
Client ID: **PBW**	Batch ID: **70981**	RunNo: **92019**	
Prep Date: **10/21/2022**	Analysis Date: **10/24/2022**	SeqNo: **3301880**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Kjeldahl, Total	ND	1.0								

Sample ID: **LCS-70981**	SampType: **LCS**	TestCode: **SM 4500 Norg C: TKN**	
Client ID: **LCSW**	Batch ID: **70981**	RunNo: **92019**	
Prep Date: **10/21/2022**	Analysis Date: **10/24/2022**	SeqNo: **3301881**	Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Nitrogen, Kjeldahl, Total	10	1.0	10.00	0	101	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2210315**

23-Nov-22

Client: AMAFCA

Project: CMC Wet FY23

Sample ID: **MB-70679** SampType: **MBLK** TestCode: **SM 2540D: TSS**

Client ID: **PBW** Batch ID: **70679** RunNo: **91686**

Prep Date: **10/7/2022** Analysis Date: **10/10/2022** SeqNo: **3285851** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Suspended Solids	ND	4.0								

Sample ID: **LCS-70679** SampType: **LCS** TestCode: **SM 2540D: TSS**

Client ID: **LCSW** Batch ID: **70679** RunNo: **91686**

Prep Date: **10/7/2022** Analysis Date: **10/10/2022** SeqNo: **3285852** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Suspended Solids	89	4.0	91.90	0	96.8	83.89	119.7			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Above Quantitation Range/Estimated Value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of standard limits. If undiluted results may be estimated.		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: AMAFCA   Work Order Number: 2210315   RcptNo: 1

Received By: Joseph Alderette   10/6/2022 10:25:00 AM
Completed By: Sean Livingston   10/6/2022 11:10:53 AM
Reviewed By: JO   10/6/22

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☑ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
8. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA? Yes ☑ No ☐ NA ☐
10. Were any sample containers received broken? Yes ☐ No ☑
11. Does paperwork match bottle labels? Yes ☑ No ☐
(Note discrepancies on chain of custody)
12. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
13. Is it clear what analyses were requested? Yes ☑ No ☐
14. Were all holding times able to be met? Yes ☑ No ☐
(If no, notify customer for authorization.)

# of preserved bottles checked for pH: 14
(<2 or >12 unless noted)
Adjusted? NO
Checked by: KPG 10.6.22

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:
By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:
Client Instructions:

16. Additional remarks: NO BOD Bottles. NO E coli bottle for RG North JO 10-7-22

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.9	Good				

note - BOD bottles not provided to lab for these samples. E. coli for Rio Grande North sample and results provided in previous lab report.

Chain-of-Custody Record

Client: AMAFCA

Mailing Address:

Phone #:

email or Fax#: pchavez@AMAFCA.org

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other

☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: CMC Wet FY23

Project #:

Project Manager: Patrick Chavez

Sampler: Chad Johannesen

On Ice: ☒ Yes ☐ No

# of Coolers: 2

Cooler Temp (including CF): 4.8+0.1=4.9 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2210315	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	See Attached Sheet	E coli-enumerated
10/5/22	1215	AQ	R6North-20221005			001											X	
10/6/22	0905	AQ	R6South-20221006 sca 10/6/22			002											X	
																		X

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
10/6/22	10:25	SAM FIRE		CDO	10.6.22	10:25
Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time

Remarks: Second Cooler temp 13.3+0.1=13.4°C 10.6.22

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Collaborative Monitoring Cooperative - Analyses List
Attach to Chain of Custody

Please refer to attached NPDES Permit No. NMR04A00 Appendix F. Methods and minimum quantification levels (MQL's) will be those approved under 40 CFR 136 and specified in the attached permit

Analyte (Bold Indicates WQS)	CAS #	Fraction	Method #	MDL (µg/L)
Hardness (Ca + Mg)	NA	Total	200.7	2.4
Lead	7439-92-1	Dissolved	200.8	0.09
Copper	7440-50-8	Dissolved	200.8	1.06
Ammonia + organic nitrogen	7664-41-7	Total	350.1	31.32
Total Kjehldal Nitrogen	17778-88-0	Total	351.2	58.78
Nitrate + Nitrite	14797-55-8	Total	353.2	10.17
Polychlorinated biphenyls (PCBs)	1336-36-3	Total	1668	0.014
Tetrahydrofuran (THF)	109-99-9	Total	8260C	7.9
bis(2-Ethylhexyl)phthalate	117-81-7	Total	8270D	0.2
Dibenzofuran	132-64-9	Total	8270D	0.2
Indeno(1,2,3-cd)pyrene	193-39-5	Total	8270D	0.2
Benzo(b)fluoranthene	205-99-2	Total	8270D	0.1
Benzo(k)fluoranthene	207-08-9	Total	8270D	0.1
Chrysene	218-01-9	Total	8270D	0.2
Benzo(a)pyrene	50-32-8	Total	8270D	[illegible]
Dibenzo(a,h)anthracene	53-70-3	Total	8270D	0.3
Benzo(a)anthracene	56-55-3	Total	8270D	0.2
Dieldrin	60-57-1	Total	8081	0.1
Pentachlorophenol	87-86-5	Total	8270D	0.2
Benzidine	92-87-5	Total	8270D	0.1
Chemical Oxygen Demand	E1641638²	Total	HACH	5100
Gross alpha (adjusted)	NA	Total	Method 900	0.1 pCi/L
Total Dissolved Solids	E1642222²	Total	SM 2540C	60.4
Total Suspended Solids	NA	Total	SM 2540D	3450
Biological Oxygen Demand	N/A	Total	Standard Methods	930
Oil and Grease		Total	1664A	5000
Ecoli-enumeration			SM 9223B	
pH			SM 4500	
Phosphorus		Dissolved	365.1	100
Phosphorus		Total	365.1	100
Chromium IV		Total	3500Cr C-2011	100

ATTACHMENT 2

FY 2023 WET SEASON COMPLETED DATA VERIFICATION AND VALIDATION (V&V) FORMS

Attachment 1.1 Water Quality Sample Data Verification and Validation Worksheet

Study Name: Compliance Monitoring Cooperative (CMC)
Year: FY 2023 (October 2022 – Wet Season Sample)
Project Coordinator: For Data Review and Reporting – SJG, BHI
V&V Reviewer: SJG
Data covered by this worksheet: Rio Grande North – 10/5/2022
Version of Verification/Validation Procedures: QAPP –AMAFCA SOP #5 (7/2022)

Step 1: Verify Field Data

A. Are all Field Data forms present and complete? ☒ Yes ☐ No

If yes, proceed; if no, attempt to locate missing forms, then indicate any remaining missing forms and action taken.

Missing Field Data Forms	Action Taken
______	______
______	______

Total number of occurrences: 0

B. Are station name and ID, and sampling date and time on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station and Parameter	Action Taken	Re-verified?
_____	_____	_________
_____	_____	_________

Total number of occurrences: 0

C. Are field data on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station	Sampling Date	Parameter(s) Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: 0

D. Are RIDs correct and associated with the correct analytical suite, media subdivision (e.g. surface water, municipal waste, etc.) and activity type (e.g. Field observation, Routine sample, QA sample etc.)?
☒ Yes ☐ No

If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify

Station/RID	Sampling Date	RID Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: 0

☒ **Step 1 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 2: Verify Data Deliverables

A. Have all data in question been delivered? ☒ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing data (samples or blanks) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken. Complete this step upon receipt of all missing data.

RID	Submittal Date	Missing Data/Parameters	Date of Initial Verification	Date Missing Data Were Received
______	______	______	______	______

Total number of occurrences: 0

B. Do all of the analytical suites have the correct number and type of analytes. ☐ Yes ☒ No

If yes, proceed; if no, indicate RIDs with missing or incorrect analyte(s) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken.

RID	Submittal Date	Missing or Incorrect Parameters	Action Taken	Re-verified?
	11/30/22 emailed AMAFCA on missing parameter; BOD	BOD		

	bottle not submitted for sample.			
______	______	______	______	______

*Note – HEAL Lab report order numbers 2210242 & 2210315.

☒ **Step 2 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 3: Verify Flow Data

*Note – Not Applicable – no flow data provided with CMC sample collection

A. Identify incorrect or missing data on the flow calculation spreadsheet and correct errors.

Station	Sampling Date	Flow data missing or incorrect?
______	______	__________
______	______	__________

Total number of occurrences: 0

B. Identify incorrect or missing discharge measurements, correct errors in database and re-verify.

Station	Sampling Date	Flow data missing or incorrect?	Re-verified?
______	______	__________	_________
______	______	__________	_________

Total number of occurrences: 0

_Not Applicable
☐ **Step 3 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 4: Verify Analytical Results for Missing Information or Questionable Results

Were any results with missing/questionable information identified? ☒ Yes ☐ No

If no, proceed; if yes, indicate results with missing information or questionable results or attach report. Contact data source and indicate action taken. Complete this step upon receipt of missing information or clarification of questionable results (clarify questionable results only, DO NOT change results without written approval (from lab or QA officer) and associated documentation).

RID	Sample Date	Missing or Questionable Information/Results	Action Taken
Rio Grande South	10/5/2022	Lab report lists Dissolved Phosphorous results as “Total Phosphorous” for “filtered sample”.	BHI added note to the lab report.

Total number of occurrences: 1

☒ **Step 4 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 5: Validate Blanks Results
Were any analytes of concern detected in blank samples? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager, with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes have been added to database correctly.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database?*
____	______	______	______	______		_________
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged and include on *Validation Codes Form*.

Total number of occurrences: 0

☒ **Step 5 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 6: Validate Holding Times Violations
Were any samples submitted that did not meet specified holding times? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database to ALL associated data?*

______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged.
*Note – Lab reports lists pH with hold time flag. Database uses field data reported pH, so this is hold time is not applicable.
Total number of occurrences: 0

☒ **Step 6 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 7: Validate Replicate/Duplicate Results (if applicable)
Were any replicate/duplicate pairs submitted outside of the established control limit of 20%?
☐ Yes ☒ No
If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID Pairs		Replicate or Duplicate?	Sample Date	Parameter	RPD	Validation Code/Flag Applied	Code/Flag verified in database applied?*
______	______	______	______	______	______		_________
______	______	______	______	______	______		_________

Total number of occurrences: 0

☒ **Step 7 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

****

After all of the above steps have been completed, save and print the worksheet, attach all applicable supplemental information and sign below.

I acknowledge that the data verification and validation process has been completed for the data identified above in accordance with the procedures described in the CMC QAPP, SOP #2

Sarah Conway 12/14/22

Data Verifier/Validator Signature Date

COMPLETION OF DATA VERIFICATION AND VALIDATION PROCESS

Once the data verification and validation process has been completed for the entire study (note: if the worksheet is for a subset of the data from a study, be sure ALL the data for the entire study is included before final completion of the data verification and validation process), notify the NMSQUID administrator that the process is complete and request that “V V in STORET” be added to the project title.

Once all data have been verified and validated for a study provide copies of ALL *Data Verification and Validation Worksheets* and attachments associated with the study to the Quality Assurance Officer and retain originals in the project binder.

Attachment 1.2 SWQB Validation Codes

When deficiencies are identified through the data verification and validation process, AMAFCA documents or "flags" the deficiencies by assigning validation codes. All data collected from the last compliant QC sample and up to the next compliant QC sample are assigned validation codes.
The validation code alerts the data user that the results are outside QA control limits and may require re-sampling or a separate, qualitative analysis based on professional judgment.

Validation Code	Definition	WQX Equivalent
A1	Sample not collected according to SOP	
B1	Chemical was detected in the field blank at a concentration less than 5% of the sample concentration.	
BN	Blanks NOT collected during sampling run	
BU	Detection in blank. Analyte was not detected in this sample above the method's sample detection limit.	BU
RB1	Chemical was detected in the field blank at a concentration greater than or equal to 5% of the sample concentration. Results for this sample are rejected because they may be the result of contamination; the results may not be reported or used for regulatory compliance purposes.	B
R1	Rejected due to incorrect sample preservation	R
R2	Rejected due to equipment failure in the field	R
R3	Rejected based on best professional judgment	R
D1	Spike recovery not within method acceptance limits	
F1	Sample filter time exceeded	
J1	Estimated: the analyte was positively identified and the associated value is an approximate concentration of the analyte in the sample	J
K1	Holding time violation	H
Ea	Estimated-Incubation temperature between 35.5 and 38.0° Celsius	
Er	Rejected-Incubation temperature < 34.5 or >38.0° Celsius	
PD1	Percent difference between duplicate samples excessive	
S1	Per SLD, uncertainties (sigmas) are expressed as one standard deviation, i.e. one standard error. Small negative or positive values that are less than two standard deviations should be interpreted as "less than the detection limit."	
S2	Data are suspect but deemed usable based on best professional judgment; documentation of justification is required and should be included in the Data Verification and Validation Packet and reported with results	
Z1	Macroinvertebrate data did not meet QC criteria specified in Section 2.5 of QAPP	
H1	Habitat data did not meet QC criteria specified in Section 2.5 of QAPP	

Attachment 1.1 Water Quality Sample Data Verification and Validation Worksheet

Study Name: Compliance Monitoring Cooperative (CMC)
Year: FY 2023 (October 2022 – Wet Season Sample)
Project Coordinator: For Data Review and Reporting – SJG, BHI
V&V Reviewer: SJG
Data covered by this worksheet: Alameda – 10/5/2022– E. coli Only Sample
Version of Verification/Validation Procedures: QAPP –AMAFCA SOP #5 (7/2022)

Step 1: Verify Field Data

A. Are all Field Data forms present and complete? ☒ Yes ☐ No

If yes, proceed; if no, attempt to locate missing forms, then indicate any remaining missing forms and action taken.

Missing Field Data Forms	Action Taken
______	______
______	______

Total number of occurrences: 0

B. Are station name and ID, and sampling date and time on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station and Parameter	Action Taken	Re-verified?
_____	_____	_________
_____	_____	_________

Total number of occurrences: 0

C. Are field data on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station	Sampling Date	Parameter(s) Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: 0

D. Are RIDs correct and associated with the correct analytical suite, media subdivision (e.g. surface water, municipal waste, etc.) and activity type (e.g. Field observation, Routine sample, QA sample etc.)?
☒ Yes ☐ No

If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify

Station/RID	Sampling Date	RID Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: <u>**0**</u>

☒ **Step 1 Completed** ***Initials:*** <u>SJG</u> ***Date:*** <u>12/7/22</u>

- -

<u>Step 2: Verify Data Deliverables</u>
A. Have all data in question been delivered? ☒ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing data (samples or blanks) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken. Complete this step upon receipt of all missing data.

RID	Submittal Date	Missing Data/Parameters	Date of Initial Verification	Date Missing Data Were Received
______	______	______	______	______

Total number of occurrences: <u>**0**</u>

B. Do all of the analytical suites have the correct number and type of analytes. ☒ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing or incorrect analyte(s) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken.

RID	Submittal Date	Missing or Incorrect Parameters	Action Taken	Re-verified?
______	______	______	______	______

☒ **Step 2 Completed** ***Initials:*** <u>SJG</u> ***Date:*** <u>12/7/22</u>

Step 3: Verify Flow Data
*Note – Not Applicable – no flow data provided with CMC sample collection
A._Identify incorrect or missing data on the flow calculation spreadsheet and correct errors.

Station	Sampling Date	Flow data missing or incorrect?
______	______	__________
______	______	__________

Total number of occurrences: 0

B. Identify incorrect or missing discharge measurements, correct errors in database and re-verify.

Station	Sampling Date	Flow data missing or incorrect?	Re-verified?
______	______	__________	__________
______	______	__________	__________

Total number of occurrences: 0

Not Applicable
☐ **Step 3 Completed** ***Initials:*** SJG ***Date:*** 12/7/22

Step 4: Verify Analytical Results for Missing Information or Questionable Results

Were any results with missing/questionable information identified? ☐ Yes ☒ No

If no, proceed; if yes, indicate results with missing information or questionable results or attach report. Contact data source and indicate action taken. Complete this step upon receipt of missing information or clarification of questionable results (clarify questionable results only, DO NOT change results without written approval (from lab or QA officer) and associated documentation).

RID	Sample Date	Missing or Questionable Information/Results	Action Taken

Total number of occurrences: 0

☒ **Step 4 Completed** ***Initials:*** SJG ***Date:*** 12/7/22

Step 5: Validate Blanks Results
Were any analytes of concern detected in blank samples? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager, with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes have been added to database correctly.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database? *
_____	______	______	______	______		_________
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged and include on *Validation Codes Form*.

Total number of occurrences: 0

☒ **Step 5 Completed** ***Initials:*** SJG ***Date:*** 12/7/22

Step 6: Validate Holding Times Violations
Were any samples submitted that did not meet specified holding times? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database to ALL associated data?*
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged.
Total number of occurrences: 0

☒ **Step 6 Completed** ***Initials:*** SJG ***Date:*** 12/7/22

Step 7: Validate Replicate/Duplicate Results (if applicable)
Were any replicate/duplicate pairs submitted outside of the established control limit of 20%?
☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID Pairs		Replicate or Duplicate?	Sample Date	Parameter	RPD	Validation Code/Flag Applied	Code/Flag verified in database applied?*
______	______	______	______	______	______		_________
______	______	______	______	______	______		_________

Total number of occurrences: **0**

☒ **Step 7 Completed** ***Initials:*** SJG ***Date:*** 12/7/22

****

After all of the above steps have been completed, save and print the worksheet, attach all applicable supplemental information and sign below.

I acknowledge that the data verification and validation process has been completed for the data identified above in accordance with the procedures described in the CMC QAPP, SOP #2

12/7/22

Data Verifier/Validator Signature Date

COMPLETION OF DATA VERIFICATION AND VALIDATION PROCESS

Once the data verification and validation process has been completed for the entire study (note: if the worksheet is for a subset of the data from a study, be sure ALL the data for the entire study is included before final completion of the data verification and validation process), notify the NMSQUID administrator that the process is complete and request that “V V in STORET” be added to the project title.

Once all data have been verified and validated for a study provide copies of ALL *Data Verification and Validation Worksheets* and attachments associated with the study to the Quality Assurance Officer and retain originals in the project binder.

Attachment 1.2 SWQB Validation Codes

When deficiencies are identified through the data verification and validation process, AMAFCA documents or "flags" the deficiencies by assigning validation codes. All data collected from the last compliant QC sample and up to the next compliant QC sample are assigned validation codes.
The validation code alerts the data user that the results are outside QA control limits and may require re-sampling or a separate, qualitative analysis based on professional judgment.

Validation Code	Definition	WQX Equivalent
A1	Sample not collected according to SOP	
B1	Chemical was detected in the field blank at a concentration less than 5% of the sample concentration.	
BN	Blanks NOT collected during sampling run	
BU	Detection in blank. Analyte was not detected in this sample above the method's sample detection limit.	BU
RB1	Chemical was detected in the field blank at a concentration greater than or equal to 5% of the sample concentration. Results for this sample are rejected because they may be the result of contamination; the results may not be reported or used for regulatory compliance purposes.	B
R1	Rejected due to incorrect sample preservation	R
R2	Rejected due to equipment failure in the field	R
R3	Rejected based on best professional judgment	R
D1	Spike recovery not within method acceptance limits	
F1	Sample filter time exceeded	
J1	Estimated: the analyte was positively identified and the associated value is an approximate concentration of the analyte in the sample	J
K1	Holding time violation	H
Ea	Estimated-Incubation temperature between 35.5 and 38.0° Celsius	
Er	Rejected-Incubation temperature < 34.5 or >38.0° Celsius	
PD1	Percent difference between duplicate samples excessive	
S1	Per SLD, uncertainties (sigmas) are expressed as one standard deviation, i.e. one standard error. Small negative or positive values that are less than two standard deviations should be interpreted as "less than the detection limit."	
S2	Data are suspect but deemed usable based on best professional judgment; documentation of justification is required and should be included in the Data Verification and Validation Packet and reported with results	
Z1	Macroinvertebrate data did not meet QC criteria specified in Section 2.5 of QAPP	
H1	Habitat data did not meet QC criteria specified in Section 2.5 of QAPP	

Attachment 1.1 Water Quality Sample Data Verification and Validation Worksheet

Study Name: Compliance Monitoring Cooperative (CMC)
Year: : FY 2023 (October 2022 – Wet Season Sample)Project Coordinator: For Data Review and Reporting – SJG, BHI
V&V Reviewer: SJG
Data covered by this worksheet: Rio Grande South – 10/6/2022
Version of Verification/Validation Procedures: QAPP –AMAFCA SOP #5 (7/2022)

Step 1: Verify Field Data
A. Are all Field Data forms present and complete? ☒ Yes ☐ No

If yes, proceed; if no, attempt to locate missing forms, then indicate any remaining missing forms and action taken.

Missing Field Data Forms	Action Taken
______	______
______	______

Total number of occurrences: 0

B. Are station name and ID, and sampling date and time on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station and Parameter	Action Taken	Re-verified?
_____	_____	_________
_____	_____	_________

Total number of occurrences: 0

C. Are field data on forms consistent with database? ☒ Yes ☐ No
If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify.

Station	Sampling Date	Parameter(s) Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: 0

D. Are RIDs correct and associated with the correct analytical suite, media subdivision (e.g. surface water, municipal waste, etc.) and activity type (e.g. Field observation, Routine sample, QA sample etc.)?

☒ Yes ☐ No

If yes, proceed; if no, indicate errors identified, correct errors in database and re-verify

Station/RID	Sampling Date	RID Corrected	Re-verified?
______	______	______	_________
______	______	______	_________

Total number of occurrences: **0**

☒ **Step 1 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 2: Verify Data Deliverables

A. Have all data in question been delivered? ☒ Yes ☐ No

If yes, proceed; if no, indicate RIDs with missing data (samples or blanks) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken. Complete this step upon receipt of all missing data.

RID	Submittal Date	Missing Data/Parameters	Date of Initial Verification	Date Missing Data Were Received
______	______	______	______	______

Total number of occurrences: **0**

B. Do all of the analytical suites have the correct number and type of analytes. ☐ Yes ☒ No

If yes, proceed; if no, indicate RIDs with missing or incorrect analyte(s) or attach report with applicable RIDs highlighted. Contact data source and indicate action taken.

RID	Submittal Date	Missing or Incorrect Parameters	Action Taken	Re-verified?
	11/30/22 emailed AMAFCA on missing parameter; BOD bottle not	BOD		

	submitted for sample.			

*Note – HEAL Lab report order number 2210315.

☒ **Step 2 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 3: Verify Flow Data
*Note – Not Applicable – no flow data provided with CMC sample collection
A._Identify incorrect or missing data on the flow calculation spreadsheet and correct errors.

Station	Sampling Date	Flow data missing or incorrect?
______	______	__________
______	______	__________

Total number of occurrences: 0

B. Identify incorrect or missing discharge measurements, correct errors in database and re-verify.

Station	Sampling Date	Flow data missing or incorrect?	Re-verified?
______	______	__________	_________
______	______	__________	_________

Total number of occurrences: 0

_Not Applicable
☐ **Step 3 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 4: Verify Analytical Results for Missing Information or Questionable Results

Were any results with missing/questionable information identified? ☒ Yes ☐ No

If no, proceed; if yes, indicate results with missing information or questionable results or attach report. Contact data source and indicate action taken. Complete this step upon receipt of missing information or clarification of questionable results (clarify questionable results only, DO NOT change results without written approval (from lab or QA officer) and associated documentation).

RID	Sample Date	Missing or Questionable Information/Results	Action Taken
Rio Grande South	10/6/2022	Lab report lists Dissolved Phosphorous results as "Total Phosphorous" for "filtered sample".	BHI added note to the lab report.

*Note – HEAL Lab report order number 2210315.

Total number of occurrences: 1

☒ **Step 4 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 5: Validate Blanks Results
Were any analytes of concern detected in blank samples? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager, with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes have been added to database correctly.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database? *
_____	______	______	______	______		_________
______	______	______	______	______		_________

*See validation procedures to determine which associated data need to be flagged and include on *Validation Codes Form*.

Total number of occurrences: 0

☒ **Step 5 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 6: Validate Holding Times Violations
Were any samples submitted that did not meet specified holding times? ☐ Yes ☒ No

If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID	Sample Date	Parameter	[Blank]	[Sample]	Validation Code/Flag Applied	Code/Flag verified in database to ALL associated data?*
_____	_____	_____	_____	_____		________

*See validation procedures to determine which associated data need to be flagged.
*Note – Lab reports lists pH with hold time flag. Database uses field data reported pH, so this is hold time is not applicable.
Total number of occurrences: 0

☒ **Step 6 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

- -

Step 7: Validate Replicate/Duplicate Results (if applicable)
Were any replicate/duplicate pairs submitted outside of the established control limit of 20%?
☐ Yes ☒ No
If no, proceed; if yes, list results that need to have validation codes applied in the database save these results as an excel file and forward to QA officer or Program Manager with a request to add appropriate validation codes to database. Complete this step after verifying that validation codes/flags have been added to database.

RID Pairs		Replicate or Duplicate?	Sample Date	Parameter	RPD	Validation Code/Flag Applied	Code/Flag verified in database applied?*
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_____	_____	_____	_____	_____	_____		________

Total number of occurrences: 0

☒ **Step 7 Completed** ***Initials:*** SJG ***Date:*** 12/14/22

****

After all of the above steps have been completed, save and print the worksheet, attach all applicable supplemental information and sign below.

I acknowledge that the data verification and validation process has been completed for the data identified above in accordance with the procedures described in the CMC QAPP, SOP #2

Sarah Carey 12/14/22

Data Verifier/Validator Signature Date

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Albuquerque
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Website: www.amafca.org

October 15, 2019

Mr. Robert Houston
Chief, Special Projects Section
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270

RE: NPDES Permit No. NMR04A000 Administrative Continuance – Duty to Re-Apply

Dear Mr. Houston:

This correspondence serves as a written notification that the members copied below of the Middle Rio Grande Technical Advisory Group (TAG) will continue to operate and discharge into the Rio Grande under the coverage and the conditions set forth in NPDES Permit No. NMR04A000 (Permit), after December 19, 2019, based on Permit language in Part IV:V and required notification in Part IV:C.

On June 27, 2019 the Middle Rio Grande TAG MS4 permittees met with and were informed by EPA Region 6 staff Brent Larson & Maria Martinez that the Permit, which expires on December 19, 2019, would likely go into administrative continuance. As EPA staff explained during the meeting, EPA is not required to issue a public notice related to the administrative continuance and the current permittees do not need to complete any actions or submit renewal applications to have continued coverage under the current Permit.

This guidance from EPA was confirmed in the Permit, in Part IV:V. CONTINUATION OF THE EXPIRED GENERAL PERMIT. *If this Permit is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedures Act and remain in force and effect. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued Permit until the earlier of:*

1. *Reissuance or replacement of this Permit, at which time the permittee must comply with the Notice of Intent conditions of the new permit to maintain authorization to discharge; or*
2. *Issuance of an individual permit for your discharges; or*
3. *A formal permit decision by the permitting authority not to reissue this general Permit, at which time the permittee must seek coverage under an alternative general permit or an individual permit.*

Closer review of the Permit noted the language in Part IV:C: DUTY TO REAPPLY. *If the permittee wishes to continue an activity regulated by this Permit after the Permit expiration date, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days prior to expiration of this permit. The EPA may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated at 40 CFR § 122.6 and any subsequent amendments.* It is unclear from the Permit language in Part IV: C, if this section applies to permits that are administratively continued.

This letter is to inform EPA that, based on the provided guidance from EPA and the MS4 Permit language in Part IV:V, members of the Middle Rio Grande TAG will continue to operate with coverage under the current MS4 Permit when the Permit is administratively continued on December 19, 2019. If these assumptions are incorrect or if an application is required for continued coverage under MS4 Permit NMR04A000, please let us know as soon as possible.

We appreciate your attention to this matter. Please contact me if you have any questions.

Sincerely,
Middle Rio Grande TAG

Patrick A. Chavez

Patrick Chavez, PE
AMAFCA Storm Water Quality Engineer and TAG Member

TAG Members Included and Copied:

Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA)
City of Rio Rancho
Sandia National Labs (operated by NTESS for US DOE)
Bernalillo County
Kirtland Air Force Base
Village of Los Ranchos
Eastern Sandoval County Arroyo Flood Control Authority (ESCACA)
Southern Sandoval County Arroyo Flood Control Authority (SSCAFCA)
City of Albuquerque
Village of Corrales
Sandoval County
Town of Bernalillo
New Mexico Department of Transportation (NMDOT)
University of New Mexico

Bohannan Huston

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M E M O R A N D U M

DATE: October 29, 2020

TO: Patrick Chavez, PE, AMAFCA, Representative for Compliance Monitoring Cooperative (CMC) Members

FROM: Sarah Ganley, PE

SUBJECT: **CMC Stormwater Monitoring Reporting**
AMAFCA On-Call Task 28 – Contract Summary Memo

Bohannan Huston, Inc. (BHI) has been tasked to perform water quality services for the Compliance Monitoring Cooperative (CMC) Stormwater Data Verification, Database, and Reporting for the Wet Weather Stormwater Quality Monitoring Program. This work is through an AMAFCA on-call contract, and the CMC has delegated AMAFCA to manage this Task Order. Included with this Task, the CMC members, except for the City of Albuquerque, have delegated AMAFCA to enter the CMC data into the EPA electronic Discharge Monitoring Report (DMR) forms. The scope of work for this Task includes data verification of the stormwater laboratory analysis results, compiling the analysis results into a database, and calculating the E. coli loading to compare with the Waste Load Allocation (WLA) for the qualifying storm events. The stormwater compliance monitoring is being conducted separately by Daniel B. Stephens & Associates, Inc. (DBS&A) and is not a part of this on-call Task.

This Task is being conducted to assist the CMC members with their comprehensive monitoring and assessment program for compliance under the 2014 Middle Rio Grande Watershed Based Municipal Separate Storm Sewer System (MS4) Permit, NPDES Permit No. NMR04A000 ("WSB MS4 Permit"). The WSB MS4 Permit was issued on December 22, 2014 for a 5-year term with an expiration date of December 19, 2019. In December 2019, the WSB MS4 Permit went into administrative continuance when EPA Region 6 did not issue a new MS4 Permit before the expiration date of the existing WSB MS4 Permit.

The required CMC sampling for the WSB MS4 Permit term (2014 to 2019) was completed in FY 2019. Until a new MS4 Permit is issued, no additional compliance stormwater sampling for the CMC is required. There were no CMC monitoring results required or obtained in FY 2020. No netDMR forms are required to be submitted to EPA for FY 2020 since there were no CMC monitoring results required or obtained in FY 2020.

If the CMC does continue wet weather compliance monitoring during administrative continuance of this MS4 Permit, the CMC members will summarize, as applicable, any wet weather monitoring activity, results, and E. coli loading calculations in future Annual Reports.

SG/ab