Appendix G

Sediment Quantity and Nutrient Load Reduction Report

Prepared by Melissa Varela, Watershed Protection Division Riverside County Flood Control and Water Conservation District October 17, 2019



The Holy Fire, a wildfire that began in August 2018, burned approximately 23,000 acres of the Cleveland National Forest. In anticipation of future debris flows sourcing from the Holy Fire burn area during storm season, the Riverside County Flood Control and Water Conservation District ("District") immediately began "capacity preparation" at two District facilities, Leach Canyon Dam and McVicker Canyon Basin. These facilities drain to Lake Elsinore, a 303(d) listed "impaired" waterbody for nutrients and organic enrichment/low dissolved oxygen. As efforts continued from November 2018 to April 2019, the sediment removal maintenance provided protection to downstream communities, enhanced debris basin capacity; meanwhile, preventing sediment and nutrient loads from reaching Lake Elsinore and impacting water quality.

The District's effective post Holy Fire response activities in 2018-2019 resulted in the removal of approximately 178,904 CY of wet sediment material from 2 debris basins, which otherwise would have been conveyed by storm flows to Lake Elsinore. This memo presents an evaluation of the nutrient load effected by the removal of this debris flow material.

SAMPLE APPROACH:

District staff collected sediment samples from both Leach Canyon Dam and McVicker Canyon Basin on March 1, 2019, in order to evaluate the quality of Total Nitrogen and Total Phosphorus excavated and removed. For safety reasons, staff considered the level of accessibility at each location and concluded that they would collect samples in the sediment stockpiles adjacent to areas in order to maintain a safe distance from with heavy equipment and maintenance crews performing operations. District staff marked global positioning system (GPS) coordinates for each sample and mapped the locations within the boundaries of the District facilities (refer to **Figure 1**, **Figure 2**, and **Figure 3**). The latitude and longitude for each sample location are provided in **Table 1**. Using pre-cleansed sampling equipment, samples were collected and transferred to three 8-ounce glass jars provided by the laboratory. Staff ensured the sample was properly labeled and contained a sufficient amount of sediment for all analyses to be successfully completed.

Sample	Latitude	Longitude
LC3	33.678619	-117.409432
MV2	33.6876644	-117.402245

Table 1 - Sample Locations

Sediment Quantity and Nutrient Load Reduction Report 2018-2019 Leach Canyon Dam and McVicker Canyon Basin Prepared by Melissa Varela, Watershed Protection Division Riverside County Flood Control and Water Conservation District October 17, 2019



MAPS AND FIGURES:









Figure 2 - Leach Canyon Dam (LC3)





Figure 3 - McVicker Canyon Basin (MV2)





Figure 4 - Leach Canyon Dam (Upstream View) immediately after the 2/14/2019 storm event.



Figure 5 - Leach Canyon Dam (Upstream view) in March 2019.





Figure 6 - Leach Canyon Dam (Downstream View) at stockpile staging area.



Figure 7 - McVicker Canyon Basin (Upstream View) excavation area.

Leach Canyon Dam and McVicker Canyon Basin Prepared by Melissa Varela, Watershed Protection Division Riverside County Flood Control and Water Conservation District October 17, 2019





Figure 8 - McVicker Canyon Basin (Downstream View) at stockpile staging area.



LABORATORY ANALYSIS:

Samples were analyzed for nutrients and other physical properties, as described in Table 2.

Constituent	Method							
Nutrients								
Total kjeldahl nitrogen (TKN)	EPA 351.2							
Nitrate as N	EPA 300.0							
Nitrite as N	EPA 300.0							
Total nitrogen (TN)	EPA 300.0 (Calculation)							
Total phosphorus (TP)	EPA 200.7							
Conventi	onals							
Total organic carbon (% TOC)	EPA 9060							
Total Solids (% TS)	SM 2450G							
Grain Particle Size Analysis	ASTM D4464M							

Table 2 - Analytical Tests

QUALITY CONTROL:

Prior to sampling, all equipment was cleaned with LiquonoxTM solution and distilled water airdried, and stored in a clean plastic bag until used in the field. Sediment sampling was completed in accordance with United States Environmental Protection Agency (USEPA) soil sampling operating procedure (USEPA, 2007¹). For field quality control, a new pair of disposable gloves was used by staff for sample collection and all equipment was decontaminated between site visits with LiquonoxTM solution and distilled water. Samples were chilled, labeled, and transported in a cooler, within holding times, to the Babcock Laboratories, Inc., accompanied by a completed chain-of-custody (COCs).

FIELD OBSERVATIONS:

Following the February 14th, 2019 storm, excavations continued at Leach Canyon Dam in order to return the facility to the designed debris storage capacity. Upon arrival on March 1, 2019, District staff observed large excavators and front-loaders transferring post-fire debris flow material to several dump trucks for transport behind the west toe of the dam, refer to **Figure 4** and **Figure 5**. During the time of sampling, no flows were observed to be entering the basin from upstream. Due to maintenance crew activity at Leach Canyon Dam monitoring staff collected samples from the sediment stockpile drying area on the dam's east toe (refer to **Figure 2** and **Figure 6**). Appearance of the sediment showed variation of aggregate size, textures, organics (e.g., tree litter), consistency, and color.

¹ USEPA Region 4 Science and Ecosystem Support Division (2007). Operating Procedure Soil Sampling, November 2007.

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Upon arrival on March 1, 2019, District staff observed significant amounts of sediment, boulders and vegetation in the McVicker Canyon Basin, which appeared to have been deposited in a short period of time likely due to the unique topographical characteristics and narrow canyons upstream of the McVicker Canyon Basin. Staff observed flowing residual stormwater as it moved through hillside rills and entered the project site (refer to **Figure 7**). At the time of sampling, District maintenance and operations (O&M) crews were actively clearing and transporting material from the basin (refer to **Figure 3**). Similar to Leach Canyon Dam, site conditions prompted monitoring staff to sample from the safely accessed sediment stockpile staging area (see **Figure 8**). The sediment collected was highly saturated with variations of aggregate type, textures, organics (e.g., tree litter), consistency, and color.

LABORATORY RESULTS:

The nutrient and general chemistry results from samples collected in Leach Canyon Dam and McVicker Canyon Basin are shown below in **Table 3** and the grain particle size characterizations per location are shown below in **Table 4**.

Leach Canyon Dam (LC3)	McVicker Canyon Basin (MV2)
Sample Re	esults (mg/kg)
20,000	47,000
(1.7)J*	ND (<1.7)
ND (<1.6)	ND (<1.6)
20,000	47,000
368	689
Sample	Results (%)
1.8	4.0
63	62
	Leach Canyon Dam (LC3) Sample Ro 20,000 (1.7)J* ND (<1.6) 20,000 368 Sample 1.8 63

Table 3 - Summary	of Analytical	Results
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ND = not detected at the indicated detection limit.

J = Qualified with a "J" flag, results were evaluated to the MDL, reported concentration is >MDL and <reporting limit.

Tuble 1 Summary of Grum Size Furthere Fest									
Percent Composition (%) ¹									
Sample Course Medium Fine ASTM									
Location	Gravel	Sand	Sand	Sand	Silt	Clay	Classification		
LC3	0	0	0	22.82	67.49	9.69	Silt		
MV2	0	0	1.1	11.35	51.63	35.93	Silt		

 Table 4 - Summary of Grain Size Particle Test

¹Percent Composition (%) = "Weight Percent" in Lab Analysis Report.



SEDIMENT DATA RESULTS:

The District used a standardized formula to estimate the total mass of sediment removed from Leach Canyon Dam and McVicker Canyon Basin during the sediment removal activities from September 2018 to April 2019. In addition, the District used the nutrient concentrations to estimate the total load of nutrients removed in the sediment. District facility from September 2018 to April 2019, District staff recorded the following sediment removal metrics from each site location per month:

- Total wet sediment volume removed (cubic yards);
- Number of truckloads (# of trucks);
- Average wet sediment weight per single truckload (tons)

To calculate the dry sediment weight removed from Leach Canyon Dam and McVicker Canyon Basin in tons (W_d), the wet sediment weight (T_w) was multiplied by number of trucks (N) and then multiplied by the dry weight conversion factor (CF).² See equation (1) presented and associated variables below:

(1)

$$W_d = N \cdot T_w \cdot CF$$

where:

 W_d = Total sediment, dry weight (tons) N = Number of trucks T_w = Total sediment, wet weight (tons) CF = Conversion factor of 0.7, wet to dry sediment weight²

To calculate nutrient load removed from Leach Canyon Dam and McVicker Canyon Basin in tons (M_x), dry sediment weight (W_d) from formula above was multiplied by analyte concentration in mg/kg (C_x) and then divided by the unit conversion factor, 10⁶ mg/kg (F). See equation (2) and associated variables presented below.

(2)

$$M_{x} = \frac{W_{d} \cdot C_{x}}{F}$$

where:

 $M_x =$ Nutrient "x" removed, (tons)

W_d = Total sediment, dry weight (tons)

 C_x = Analyte "x" concentration (mg/kg)

 $F = Unit conversion factor, divide by 10^6 (mg/kg)$

² Morgan State University. (2018). Inlet Cleaning Pollutant Characterization Study for TMLD Compliance-Appendix E: Debris Weight Calculation Method.

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The detailed calculations and results for Leach Canyon Dam and McVicker Canyon Basin are provided in Attachment 5. General information about the District facilities, including debris capacity, water level capacity and historical accumulation removed are shown portion of **Table 5**. An average truckload weight and approximate number of trucks was estimated by District staff to calculate the approximate wet sediment weight removed. A summary of sediment quantities removed from Leach Canyon Dam and McVicker Canyon Basin during the sediment removal activities from September 2018 to April 2019 are show in **Table 5**, including both historical (preseason) and operational (throughout 2018-2019 storm season) activities.

Sample Location	Leach Canyon Dam (LC)		McVicker Canyon Basin (MV	
Maintenance	Pre-Storm Season Prep	Storm Season	Pre-Storm Season Prep	Storm Season
Date Range	9/1/2018 - 11/27/2018	11/28/2018 – 4/8/2019	9/1/2018 - 11/27/2018	11/28/2018 – 4/5/2019
Debris Capacity	95,649 CY ¹	182,492 CY ²	242,0	$00 \mathrm{CY}^1$
Water Level Capacity	52,595 CY (32.6 ac-ft)	66,529 CY (41.2 ac-ft)	159,344 CY (98.8 ac-ft)	
Historical Accumulation Removed	46,32	25 CY	10,000 CY	
	W	et Sediment Ren	noved	
Total Wet Volume	31,000 tons (20,000 CY)	153,884 tons (79,424 CY)	15,500 tons (10,000 CY)	134,618 tons (69,410 CY)
Truckloads, # of trucks ⁴	2,000	9,928	1,000	8,685
	Conversion of	Wet to Dry Sed	iment Removed ⁵	
Total Dry Volume	21,700 tons	107,719 tons	10,850 tons	94,233 tons

Table 5 - Summary of Sediment Quantities

*Results, date ranges, and volumes removed are approximate due to data estimations. Volumes displayed in parenthesis are equivalent values. Dry sediment volume removed calculated by assuming Morgan State University Conversion Factor is used to address unknown moisture content.

⁽¹⁾Debris capacity ("As-built")

⁽²⁾ Design Grade Improvements for additional debris capacity (Attachment 6)

⁽³⁾ Estimated historically accumulated sediment value is a subtotal of total wet sediment collectively removed across pre/during storm preparation, varied by basin.

 $^{(4)}$ Average load weight per truck = 15.5 tons

⁽⁵⁾ Using wet to dry conversion factor (Morgan State University, 2018)².

Based on the Leach Canyon Dam "assumed As-Built", the dam has a debris capacity of 95,649

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CY, however, according to the 2018 Post-Holy Fire Digital Terrain Model (DTM) debris capacity survey with 4% debris slope, Leach Canyon Dam has 141,974 CY of debris capacity, see **Attachment 6** and **Attachment 7**. Prior to dam capacity improvements, District maintenance crews removed 20,000 CY of wet sediment. As the storm season progressed and leading up to the February 14th, 2019 storm event, District maintenance crews removed 59,376 CY of wet sediment (approximately 46,325 CY of it had accumulated historically). An additional 20,048 CY of wet sediment was removed just after the February 14th storm. In total, from September 2018 through April 2019, District maintenance crews removed approximately 99,424 CY of wet sediment from Leach Canyon Dam, which is equivalent to 11,928 truckloads hauled.

McVicker Canyon Basin has an "assumed As-Built" debris capacity of 242,000 CY, and there was approximately 10,000 CY of historically accumulated wet sediment removed during the pre-storm facility preparation. For McVicker Canyon Basin depth to volume capacity, see **Attachment 8** and **Attachment 9**. Prior to the major February 14th, 2019 storm, District maintenance crews removed approximately 41,992 CY of wet sediment from the debris basin. An additional 27,488 CY was removed from the basin to maintain capacity just after the February 14th storm. In total, from September 2018 through April 2019, District maintenance crews removed approximately 79,480 CY of wet sediment from the McVicker Canyon Basin, which is equivalent to 9,685 truckloads hauled.

Approximately, 178,904 CY of wet sediment was collectively removed from both District facilities and prevented from entering Leach Canyon Channel that outlets into Lake Elsinore.

Sample Location	Leach Canyon Dam (LC)	McVicker Canyon Basin (MV)			
Analyt	te Concentrations ¹				
TN (mg/kg)	20,000	47,000			
TP (mg/kg)	368	689			
Estimated Nutrient Load Reduction ²					
TN (tons)	2,588	4,939			
TP (tons)	48	72			
Total nitrogen removed (tons)	7,527				
Total phosphorus removed (tons)	120				

Table 6 -	Summary	of Sediment	Nutrient Loads
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⁽¹⁾Based on nutrient concentrations from samples collected on 3/1/2019. Which were used to represent sediment removed from each basin throughout wet season, see **Attachment 1-4** for lab reports and **Attachment 5** for calculations.

⁽²⁾Results estimated based on approximate dry sediment volumes removed calculated in **Table 5**.

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Using the nutrient concentrations reported and estimated sediment volume removed from the basins, District staff determined that approximately 7,527 (dry tons) of Total nitrogen and 120 (dry tons) of Total phosphorus were collectively removed from Leach Canyon Dam and McVicker Canyon Basin, see **Table 6** above for nutrient data summary.

CONCLUSIONS:

Overall, this study suggests that a significant amount of nutrient and sediment loads were removed from both District facilities between September 2018 and April 2019 in order to improve and maintain overall debris capacity, capture eroding sediment mobilized by major rain events, protect downstream communities, and prevent further impacts to a receiving water listed as "impaired" for nutrients and low dissolved oxygen.

ATTACHMENTS:

Attachment 1: Babcock Analytical Results – LC3 (TP/Grain Size Test), 4/9/19 (B9C0040-01)

Attachment 2: Babcock Analytical Results – LC3 (General/Nutrients), 9/18/19 (B9C0031) Revised-0101

Attachment 3: Babcock Analytical Results – MV2 (TP/Grain Size Test), 4/9/19 (B9C0039-01)

Attachment 4: Babcock Analytical Results – MV2 (General/Nutrients), 4/9/19 (B9C0037-01)

Attachment 5: Post Holy Fire Sediment Quantity and Nutrient Load Calculations

Attachment 6: Leach Canyon Dam Pre and Post Fire Comparison of Water and Debris Capacity

Attachment 7: Leach Canyon Debris Capacity

Attachment 8: McVicker Depth to Volume Capacity

Attachment 9: McVicker Capacity Curve



Client Name:	Riverside County Flood Control	Analytical Report:	Page 1 of 1	
Contact:	Rebekah Guill	Project Name:	RCFC - Post Fire Soil	
Address:	1995 Market Street	Project Number:	Post Fire Sediment - L	.C
	Riverside, CA, 92501	Work Order Number:	B9C0040	
Report Date:	09-Apr-2019	Received on Ice (Y/N)	Yes Temp: 1	6 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	<u>Matrix</u>	Date Sampled	By	Date Submitted	\underline{By}
B9C0040-01	1819-LC3-S1-01	Solid	3/1/19 10:55	A. Suter/M. Varela	3/1/19 11:55	Abigail Suter

Note: Total Phos was subcontracted to FGL Environmental.

Note: Grain Size (ASTM D4464) was subcontracted to PTS Laboratories.

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

KayeLani A. Marshall

cc:

e-Case Narrative+ COC.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

mailing P.O. Box 432 Riverside, CA 92502-0432 *location* 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com Page 1 of 1



Analytical Report: Page 1 of 1

Client Name: Riverside County Flood Control

Address:	Rebekah Gu 1995 Market Riverside, C	ill : Street A, 92501			Wo	Project Name: Project Number: rk Order Number:	RCFC - Post Fire Soil Post Fire Sediment - LC B9C0040
eport Date:	09-Apr-2019				Rece	ived on Ice (Y/N)	Yes Temp: 16
E.S. Ba (951) 653 www.bab	bcock Sons, Inc 3351 FAX (951) 653-1 cocklabs.com	. Environmental La	boratories	:	Ch	ain of Custody Samp	le Information Record
Client:	RCFC & WCD		Contact:	Rebekah Guill /	Abigail Suter	Phone No.	(951) 955.2901 / 955.1734
FAX No. Project Na Statio	951.788.9965 ame: Pos	t Fire Sediment LC	Email:	rguill@rivco.org ad: d Time:	uter@rivco.org Routine *3-5 Da Rush	v *48 Hour *24 Hour Rush Rush	Additional Reporting Requests Include QC Data Package: Yes No FAX Results: Yes No Email Results: Yes No State EDT: Yes No
Station Loca	tion:	Leach Canyon	*Lab TAT App	proval:	By:	*Additional Charges May Apply	(Include Source Number in Notes)
	Sampler Inform	nation		# of Containers & Preservatives	Sample Type Analysi	s Requested Matrix	Notes
TEAM	Names: A Switch ployer:RCFC	«wcd	pav	n Acetate	of Container e ple	SW = Storm Water NW = Nonstorm Water GW = Groundwater S = Soli	Subout
LEAD Sig	Sample ID	Data Tie	nprese CI CI	n03 a2S2O2 a0H ex Cr ex Cr a0H / Z A4CI H4CI CAA	otal # <u>Routin</u> Specia	SG = Sludge L = Liquid	Do not analyze Sample ID with (-03) for Toxicity.
1819-	_C3-S1-01	3/1/19 10 5	j <u>jrr</u>		3	M = Miscellaneous	
						* Total percent total Ey * Creain KMW	nitreagen, TOC, solid, and phos pequected phos pequected phos pequected site (Asth D4444) 3/04/19
Relinquis	hed By (sign)	Print Name 1 Abigal Sits 1	Company RCFC&WCD	Date / Time 3/01/19 1155	Received B	y (Sign) F	rint Name / Company MAKEMA N
(For Lab Use Only) Sample Integri Sample(s) Submitted on Custody Seal(s) In Sample(s) In	y Upon Receipt Ice? Ves Iact? Yes Iact? Yes	No No No		C Lab N	B9C004 3/01/2019 11:55 JMG	
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mailing P.O. Box 432 Riverside, CA 92502-0432 *location* 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com Page 1 of 1

SUBCONTRACT ORDER

Printed: 3/1/2019 13:35

Babcock Laboratories, Inc.

B9C0040

RECEIVING LABORATORY:

853 Corporation Street

Santa Paula, CA 93060

Phone :(805) 392-2000

Fax: (805) 525-4172

FGL Environmental, Inc. - Subcontracts

SENDING LABORATORY:

Babcock Laboratories, Inc. 6100 Quail Valley Court Riverside, CA 92507-0704 Phone: (951) 653-3351 Fax: (951) 653-1662 Project Manager: KayeLani A. Marshall

Client: Riverside County Flood Control

Sampler: A. Suter/M. Varela Analysis	Ex Due	xpires Regulatory Days Past Date Sampled	Laboratory ID	Comments	
Sample ID: B9C0040-01 Solid	Sampled: 03/01/19 10:55		1819-LC3-S1-01		Proj.No.: <u>Post Fire</u> Sediment - LC
Phos-Total Containers Supplied: 8 oz. jar (A)	03/15/19 23:59	03/29/19 10:55	Call ESB for total Second	olids	

A76 1505 730C

7

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1	All Containers Intact:	YesNo	Samples Preserved Properly:	YesNo
Samples Received at oC	Sample Labels / COC Agree:	YesNo	Custody Seals Present:	YesNo
Please forward all acknowledger	nents of sample receipt, final	reports and invoices to	data@babcocklabs.com	
NO HARDCOPIES PLEASE.		\square		
think langt	3-4-19			
Released	Date	Received By	3Emares	113()
$\frac{1}{1}$	Dete			
Keleased By	Date	Regented By	Date	

Received By

.

March 25, 2019

Babcock Laboratories, Inc. P.O. Box 432 Riverside, CA 92502

Lab ID Customer

AGRICULTURAL

: SP 1903019 : 2-14

Laboratory Report

Analytical Chemists

Introduction: This report package contains total of 3 pages divided into 3 sections:

ENVIRONMENTAL

Case Narrative	(1 pages) : An overview of the work performed at FGL.
Sample Results	(1 page) : Results for each sample submitted.
Quality Control	(1 page) : Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
1819-LC3-S1-01	03/01/2019	03/05/2019	SP 1903019-001	Sld

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 6 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Inorganic - Metals QC

200.7	03/19/2019:203934 All analysis quality controls are within established criteria.
3050	03/14/2019:202809 All preparation quality controls are within established criteria, except:The following note applies to Phosphorus:435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Digitally signed by Kelly A. Dunnahoo, B.S. Reviewed and Kelly A. Dunnahoo, B.S. Constructory Director Date: 2019-03-25 Date: 2019-03-25 Approved By

Corporate Offices & Laboratory 853 Corporation Street Santa Paula, CA 93060 TEL: (805)392-2000 Env FAX: (805)525-4172 / Ag FAX: (805)392-2063 FAX: (209)942-0423 CA ELAP Certification No. 1573

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Page 1 of 3



March 25, 2019

Babcock Laboratories, Inc.

P.O. Box 432 Riverside, CA 92502

Lab ID : SP 1903019-001 Customer ID : 2-14

Sampled On : March 1, 2019-10:55 Sampled By : A.Suter/M.Varela Received On : March 5, 2019-11:30 : Solid Matrix

Description : 1819-LC3-S1-01 Project : Riverside County Flood Control (B9C0040-01)

Sample Result - Inorganic(Dry Weight)

Constituent	Result	POI	Units	Note	Sample	Preparation	Samp	le Analysis
Constituent	Result	IQL	Onits	Note	Method	Date/ID	Method	Date/ID
Metals, Total								
Phosphorus	368	5	mg/kg		3050	03/14/19:202809	200.7	03/19/19:203934

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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March 25, 2019 **Babcock Laboratories, Inc.**

Lab ID Customer : SP 1903019 : 2-14

Quality Control - Inorganic

Constituent		Method	Date/ID	Туре	Units	Conc.	QC Data	DQO	Note
Metals									
Phosphorus		200.7	03/19/19:203934AC	CCV	ppm	5.000	98.1 %	90-110	
1				CCB	ppm		-0.001	0.1	
				CCV	ppm	5.000	96.9 %	90-110	
				CCB	ppm		-0.002	0.1	
		3050	03/14/19:202809EMM	Blank	mg/kg		ND	<5	
				LCS	mg/kg	200.0	93.6 %	80-120	
				MS	mg/kg	200.0	117 %	75-125	
			(SP 1902801-001)	MSD	mg/kg	200.0	149 %	75-125	435
				MSRPD	mg/kg	200.0	8.8%	≤30	
				PDS	mg/kg	200.0	121 %	75-125	
Definition									
PDS	: PDS failed, matrix - Post Digestion Spike (PDS) not within Acceptance Range (AR) because of matrix interferences affecting this								
105	analyte. Data was	accepted based	l on the LCS recovery.						
CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.								
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.								
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.								
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.								
MS	: Matrix Spikes - matrix affects and	A random samp lyte recovery.	ble is spiked with a know	n amount of	f analyte. The	recoveries a	re an indicatio	n of how that	at sample
MSD	: Matrix Spike Du	plicate of MS/I	MSD pair - A random san	mple duplica	ate is spiked v	vith a knowr	amount of an	alyte. The re	coveries
	· MS/MSD Poloti	of now that sam	iple matrix affects analyt	e recovery.	ant difference	is on india	tion of provisi	on for the n	operation
MSRPD	and analysis	ve Percent Dill	efence (RPD) - The MS	relative perc	cent difference		ation of precisi	on for the pi	eparation
ND	· Non-detect - Re-	sult was below t	the DOO listed for the ar	alvte					
DOO	: Data Quality Ob	iective - This is	the criteria against which	the qualit	v control data	is compared	L		
Evaluation		J			,				
435	: Sample matrix r	nay be affecting	g this analyte. Data was a	ccepted bas	ed on the LCS	or CCV rec	covery.		

Office & Laboratory 2500 Stagecoach Road Stockton, CA 95215 TEL: (209)942-0182

Office & Laboratory 563 E. Lindo Avenue Chico, CA 95926 TEL: (530)343-5818 FAX: (530)343-3807

Office & Laboratory 3442 Empresa Drive, Suite D San Luis Obispo, CA 93401 TEL: (805)783-2940 FAX: (805)783-2912

Page 3 of 3



5730 Centralcrest St. • Houston, TX 77092 Telephone (713) 316-1800 • Fax (877) 225-9953

March 8, 2019

KayeLani A. Marshall, Project Manager, Babcock Laboratories, Inc. 6100 Quail Valley Court, Riverside, CA 92507-0704.

Re: PTS File No: **49026** Project Name: B9C0040 Job Number: B9C0040

Subject: Laser Particle Size Analyses – [1 Sample – B9C0040-01].

Dear KayeLani A. Marshall:

Please find enclosed report for Physical Properties analyses conducted upon one (1) soil samples received from the above referenced project.

All analyses were performed by applicable ASTM, EPA, or API methodologies. The sample is currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the sample will be disposed of at that time. You may contact me regarding storage, disposal, or return of the sample.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact me or Emeka Anazodo at (713) 316-1800.

Sincerely, PTS Laboratories, Inc.

C.A. Umeh

Chidi Umeh Flow Laboratory Supervisor

Encl.

PTS Laboratories

Project Name: Project Number:

B9C0040 B9C0040

PTS File No: 49026 Client: Babcock Laboratories, Inc

TEST PROGRAM - 20190306

	Denth	Decovery	Grain Size Analysis	
	ft.	ft.	ATM D4464M	Comments
		Grab	Grab	
Date Received: 20190306				
B9C0040-01	N/A	N/A	×	
TOTALS:			1	

Laboratory Test Program Notes Contaminant identification: Standard TAT for basic analysis is 10-15 business days.

Grain Size Analysis: Laser or sieve method; includes tabular data, graphics and statistical sorting in Excel format.

PTS Laboratories, Inc.

Babcock Laboratories, Inc. PTS File No: 49026

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

	Median	Grain Size
		Mean Grain Size
B9C0040 B9C0040		
PROJECT NAME: PROJECT NO:		

			Median		Particle	Size Distrik	bution, wt.	percent		Silt
		Mean Grain Size	Grain Size			Sand Size				ళ
Sample ID	Depth, ft.	Description (1)	mm	Grave	Coarse	Medium	Fine	Silt	Clay	Clay
B9C0040-01	N/A	Silt	0.041	0.00	0.00	0.00	22.82	67.49	69.69	77.18



© PTS Laboratories, Inc.

Fax: (877) 255-9953

SUBCONTRACT ORDER

Printed: 3/4/2019 11:51

Babcock Laboratories, Inc.

B9C0040

49026

	SENDING LABORATORY:			RECEIVING LABOR	ATORY:	
	Babcock Laboratories, Inc.			PTS Laboratories		
	6100 Quail Valley Court			5730 Centralcrest Stre	eet	
	Riverside, CA 92507-0704			Houston, TEXAS 770)92	
	Phone: (951) 653-3351			Phone :(713) 316-180	00	
	Fax: (951) 653-1662			Fax: -		
	Project Manager: KayeLani A.	Marshall	l			
	Client: Riverside County Flood Con	ıtrol				
	Sampler: A. Suter/M. Varela					
	Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments	
/	Sample ID: B9C0040-01		Sampled:	1819-LC3-S1-01		Proj.No.:Post Fire

9

Solid		03/01/19 10:55	1017-1205-01-01	Sediment - LC
Subout <i>Containers Supplied:</i> 8 oz. jar (B)	03/27/19 23:59	03/11/19 10:55	Gran Size ASTM D4464	
			*KAM 3/04/19	

	All Containers Intact:	Yes No	Samples Preserved Properly: <u>Yes</u> No						
Samples Received at $\frac{1}{2} \cdot g_{OC}$	Sample Labels / COC Agree:	Yes No	Custody Seals Present:YesNo						
Please forward all acknowledgements of sample receipt, final reports and invoices to data@babcocklabs.com									
NO HARDCOPIES PLEASE.	2 11 19	And	3-5-19						
Released By	Date	Received By	Date						
		Ũ							
Released By	Date	Received By	Date						



Report Date: 18-Sep-2019

Analytical Report: Page 1 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Work Order Number:B9C0031Received on Ice (Y/N):YesTemp: 16 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	<u>Matrix</u>	Date Sampled	By	Date Submitted	By
B9C0031-01	1819-LC3-S1-01	Sludge	03/1/19 10:55	Abigail Suter/M. Varela	03/01/19 11:55	Abigail Suter

Included in this Data Package please find an amended report for the work order referenced below. Work Order: B9C0031

Reason for Amendment:

As per client request, this report has been reissued to include the updated Total Nitrogen result. This report supersedes the report issued on 09-Apr-2019.

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 2 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Report Date: 18-Sep-2019

Work Order Number: B9C0031 Yes

Received on Ice (Y/N):

Temp: 16 °C

Laboratory Reference Number B9C0031-01

Sample Description 1819-LC3-S1-01		<u>Ma</u> Slue	<u>trix</u> dge	<u>Sar</u> 0	npled Date/T 3/01/19 10:5	<u>Fime Rec</u> 55 03	eived Date /01/19 11	<u>e/Time</u> :55
Analyte(s)	Result	RDL	MDL	Units	Method	Analysis Date	Analyst	Flag
Anions								
Nitrate as N	1.7	3.2	1.7	mg/kg dry	EPA 300.0	03/02/19 02:	14 KBS	N_WEX, J
Nitrite as N	ND	1.6	1.6	mg/kg dry	EPA 300.0	03/02/19 02:	14 KBS	N_WEX
Solids								
Total Solids	63	0.10	0.10	%	SM 2540G	03/01/19 16:4	47 TML	
Aggregate Organic Compounds								
Total Organic Carbon	1.8	0.20	0.050 %	% dry weight	EPA 9060	03/15/19 12:4	41 MEL	
Nutrients								
Kjeldahl Nitrogen	20000	1600	1600	mg/kg dry	EPA 351.2	03/05/19 12::	26 SLL	
Total Nitrogen	20000	100		mg/kg dry	Calculation			

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Report Date: 18-Sep-2019

Analytical Report: Page 3 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Work Order Number: B9C0031

Received on Ice (Y/N): Yes Temp: 16 °C

Anions - Batch Quality Control

Analyte(s)	Result	RDL		Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch 9C01067 - Water Extract	ion-IC										
Blank (9C01067-BLK1)				F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	ND	0.10	0.10	mg/kg wet							
Nitrate as N	ND	0.20	0.11	mg/kg wet							
LCS (9C01067-BS1)				F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	2.50	0.10	0.10	mg/kg wet	2.50		100	90-110			
Nitrate as N	5.24	0.20	0.11	mg/kg wet	5.65		92.8	90-110			
Matrix Spike (9C01067-MS1)		Source:	B9C003	7-01 F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	42.7	1.6	1.6	mg/kg dry	40.0	ND	107	62-121			
Nitrate as N	84.7	3.2	1.7	mg/kg dry	90.5	ND	93.6	80-120			
Matrix Spike Dup (9C01067-MSD1))	Source:	B9C003	7-01 F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	42.2	1.6	1.6	mg/kg dry	40.0	ND	105	62-121	1.15	20	
Nitrate as N	85.0	3.2	1.7	mg/kg dry	90.5	ND	93.9	80-120	0.362	20	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 4 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Report Date: 18-Sep-2019

Work Order Number: B9C0031

Received on Ice (Y/N): Yes Temp: 16 °C

Solids - Batch Quality Control

Analyte(s)	Result	RDL	ι	Jnits	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch 9C01050 - Analyzed as	received										
Blank (9C01050-BLK1)				I	Prepared	& Analyze	d: 03/01/1	9			
Total Solids	ND	0.10	0.10	%							
Duplicate (9C01050-DUP1)		Source	: B9C0031-01		Prepared	& Analyze	d: 03/01/1	9			
Total Solids	63.8	0.10	0.10	%		63.2			1.01	25	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 5 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Report Date: 18-Sep-2019

Work Order Number:	B9C0031	
Received on Ice (Y/N):	Yes	1

N): Yes Temp: 16 °C

Aggregate Organic Compounds - Batch Quality Control

Anglute (c)	Desult			Linite	Spike	Source	% PEC	%REC	חסס	RPD Limit	Flag
Analyte(s)	Result	RDL		Units	Level	Result	%REC	LIIIIIIS	RFD	LIIIII	гіаў
Batch 9C12166 - Analyzed as re	ceived										
Blank (9C12166-BLK1)				F	repared	& Analyze	d: 03/15/1	9			
Total Organic Carbon	ND	0.20	0.050	% dry weight							
LCS (9C12166-BS1)				F	Prepared	& Analyze	d: 03/15/1	9			
Total Organic Carbon	1.62	0.20	0.050	% dry weight	1.59		102	70-130			
Matrix Spike (9C12166-MS1)		Source	: B9C0031	- 01 F	repared	& Analyze	d: 03/15/1	9			
Total Organic Carbon	3.00	0.20	0.050	% dry weight	1.59	1.84	73.5	41-139			
Matrix Spike Dup (9C12166-MSD1)		Source	: B9C0031	- 01 F	repared	& Analyze	d: 03/15/1	9			
Total Organic Carbon	3.78	0.20	0.050	% dry weight	1.59	1.84	122	41-139	22.7	25	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 6 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Report Date: 18-Sep-2019

Work Order Number: B9C0031

Received on Ice (Y/N): Yes Temp: 16 °C

Nutrients - Batch Quality Control

					Spike	Source		%REC		RPD	
Analyte(s)	Result	RDL		Units	Level	Result	%REC	Limits	RPD	Limit	Flag
Batch 9C04113 - Acid Digest											
Blank (9C04113-BLK1)					Prepared	03/04/19	Analyzed	03/05/19			
Kjeldahl Nitrogen	ND	100	100	mg/kg wet							
LCS (9C04113-BS1)					Prepared	03/04/19	Analyzed	03/05/19			
Kjeldahl Nitrogen	825	100	100	mg/kg wet	800		103	80-120			
Duplicate (9C04113-DUP1)		Source:	B9C003	1-01	Prepared	03/04/19	Analyzed	03/05/19			
Kjeldahl Nitrogen	19600	1600	1600	mg/kg dry		19500			0.116	25	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 7 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Work Order Number:B9C0031Received on Ice (Y/N):YesTemp: 16 °C

Notes and Definitions

J Estimated value

Report Date: 18-Sep-2019

N_WEX Analyte determined on a 1:10 water extract from the sample.

- ND: Analyte NOT DETECTED at or above the Method Detection Limit (if MDL is reported), otherwise at or above the Reportable Detection Limit (RDL)
- NR: Not Reported
- NRLrcf: RL for analyte does not meet the SWAMP / CTR required RL.
- RDL: Reportable Detection Limit
- MDL: Method Detection Limit
- * / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

KayeLani A. Marshall

cc:

e-Standard RCFC N2.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

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Analytical Report: Page 8 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment LC

Yes

Report Date: 18-Sep-2019

Work Order Number: B9C0031

Received on Ice (Y/N):

Temp: 16 °C

Client:	RCFC & WCD			Cor	ntact:			Reb	beka	h G	iuill	/	Abi	gai	l Sut	er					Phone No.	(951) 95	55.2901 / 955	.17
FAX No.	951.788.9965			Em	ail:			rguil	l@riv	/co.ol	rg	ads	uter@	Privo	co.org	g						Addit	ional Reporting Rec	uest
Project Name:	Post Fire	e Sediment	:	Tur	n Aro	und	Tim	le:					F	Routi	ine	*3.	5 D:	av	*48 -	lour	*24 Hour		FAX Results:] Yes
Station ID:		LC		2120300					*****					loui			Rush	h	R	ush	Rush		State EDT:	J ĭe J Ye
Station Location:	Leac	h Canyon	-	*Lal	TAT	Appr	oval	•					By:							٩.	dditional Charges May Apply	(Includ	le Source Number in	Not
	Sampler Informatio	n					# of & Pi	Cont	ainer vativ	rs es				Sa	imple Type	An	alys	sis Re	eques	sted	Matrix		Notes	
TEAM Names Employer	A suter / RCFC & WO	M Var co	elq =	p						Acetate			f Containers		6			List			SW = Storm Water NW = Nonstorm Water GW = Groundwater	Ţ	nhou	2
LEAD Signature	ple ID	30 Date	Time	Unpreserve	H ₂ SO ₄ HCI	HNO ₃	Na2S2O2	NaOH Hex Cr		NaOH / Zn /	MCAA		Total # o	Routine	Resample Special			See Project Trip Blank			S = Soll SG = Sludge L = Liquid M = Miscellaneous	Do n	ot analyze Sample IE (-03) for Toxicity.) w
1819-LC3-	S1-01	3/1/19	1055										3					Х			S			
Relinquished E	y (sign)A	Print huga Sufa	Name / Com	pany	/CD			3/01	- - - -	ate /	Time) R	ecei	ved I	By (S	iign)		total precent total Dy C	nite Solid Dho Leve KAr nt Name (C awy b	many man	
or Lab Use Only) Sam	Sample Integrity Up	on Receipt	No							Femp	pera	ture					_ab	Not	n}	he		1	回路	E

mailing P.O Box 432 Riverside, CA 92502-0432 *location* 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com

JMG



Client Name:	Riverside County Flood Control	Analytical Report:	Page 1 of 1	
Contact:	Rebekah Guill	Project Name:	RCFC - Post Fire Soil	
Address:	1995 Market Street	Project Number:	Post Fire Sediment - M	V
	Riverside, CA, 92501	Work Order Number:	B9C0039	
Report Date:	09-Apr-2019	Received on Ice (Y/N)	Yes Temp: 16	°C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	<u>Matrix</u>	Date Sampled	By	Date Submitted	\underline{By}
B9C0039-01	1819-MV2-S1-01	Solid	3/1/19 10:25	A. Suter/M. Varela	3/1/19 11:55	Abigail Suter

Note: Total Phos was subcontracted to FGL Environmental.

Note: Grain Size (ASTM D4464) was subcontracted to PTS Laboratories.

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

KayeLani A. Marshall

cc:

e-Case Narrative+ COC.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

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Analytical Report: Page 1 of 1

Client Name: Riverside County Flood Control

Contact.	Repekan Gui	11																	oject Marrie.	1010-10	
Address:	1995 Market	Street															P	roj	ect Number:	Post Fire S	Sediment - N
	Riverside, CA	A, 92501													V	Vor	'k C	Ord	ler Number:	B9C0039	
ort Date:	09-Apr-2019														Re	cei	vec	d o	n Ice (Y/N)	Yes	Temp: 16
			4																		
E.S. Bab (951) 653-3	ocock Sons, Inc. E	Environmer 2	ntal Labo	orato	ries										(Cha	in o	of C	ustody Sample	e Information	Record
www.babco	RCEC & WCD			Con	tact:			aha	kah	Guil	1 /	Ahi	gail	Sute	ər				Phone No	(951) 955 290	1 / 955 1734
FAX No	951,788,9965			Ema	ail:		n	ruill@	rivco	org	ad	suter	Drivee	org			-		T Holic No.	Additional Rep	prting Requests
Project Nar	me: Post F	ire Sedimen	t			und '	Timo		11100			iouter e	Doutin		*2 5	Davi	*40	Hou	*04 Hour	Include QC Data	Package: Yes No Results: Yes No
Station	ID:	MV			Aro	unu	rine	•					Koutin	ie	-3-5 Ri	ush	-48 F	Rush	Rush	St	ate EDT; Yes No
Station Locati	on: McV	/icker Canyon		*Lab	TAT	Appro	oval:					By							Additional Charges May Apply	(Include Source	Number in Notes)
	Sampler Informa	tion				#	f of C & Pres	ontair servat	ives				San Ty	nple /pe	Ana	lysis	Reque	ested	Matrix	No	tes
TEAM N	ames: <u>ASUTE</u> loyer: <u>RCFC&</u> ature: ASS	ry M Va wcd	irela 	eserved	7		12O2	5	H / Zn Acetate		A	al # of Container	utine	sampre scial		Project List	Blank X		SW = Storm Water NW = Nonstorm Water GW = Groundwater S = Soil SG = Sludge	Sub Do not analyze	Sample ID with
	Sample ID	Date	Time	Unpr	H ₂ SC HCI	ONH	Na ₂ S	Hex	NaOI	NH40	MCA	Tot	Roi	Spie		See	đ		L = Liquid M = Miscellaneous	(-03) for	l oxicity.
1819-N	IV2-S1-01	3/1/19	1025						_	\square		3				X	++		S		
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																			by Clife	ent	0
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				+	+	┝		+	-	+	-		+			+	++		KHII 31	04/19	
Relinquish	ed By (sign)	Print	Name / Con	npany	_				Date	e / Tin	ne		1	/ Re	eceive	ed By	(Sian))	1/. P	rint Name / Company	
Meninguisi	led by (sign)	Abigail	SAT IRC	FC&V	CD		2	10	III	9			A	a	10	de.	<u>, </u>	/	KINO	RShall	
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(For Lab Use Only)	Sample Integrity	Upon Receipt	×						Te	mne	ratur		1		La	al	T		C002		
(For Lab Use Only)) Sample Integrity Sample(s) Submitted on Ic Custody Seal(s) Inter	Upon Receipt e? Yes		lo lo <i>(</i>	N/	1			Te	mpei }	ratur	e °C			La	at	B	39	C003	9 1	遇 -

mailing P.O. Box 432 Riverside, CA 92502-0432

location 6100 Quail Valley Court Riverside, CA 92507-0704

P 951 653 3351 F 951 653 1662 www.babcocklabs.com

JMG

Page 1 of 1

CA ELAP No. 2698 EPA No. CA00102 NELAP No.OR4035 LACSD No., 10119

SUBCONTRACT ORDER

Printed: 3/1/2019 13:35

Babcock Laboratories, Inc.

RECEIVING LABORATORY:

853 Corporation Street

Santa Paula, CA 93060 Phone :(805) 392-2000

Fax: (805) 525-4172

FGL Environmental, Inc. - Subcontracts

B9C0039

SENDING LABORATORY:

Babcock Laboratories, Inc. 6100 Quail Valley Court Riverside, CA 92507-0704 Phone: (951) 653-3351 Fax: (951) 653-1662 Project Manager: KayeLani A. Marshall

Client: Riverside County Flood Control

Analysis	E: Due	xpires Regulatory Days Past Date Sampled	Laboratory ID	Comments	<u></u>
Sample ID: B9C0039-01 Solid		Sampled: 03/01/19 10:25	1819-MV2-S1-01		Proj.No.: <u>Post Fire</u> Sediment - MV
Phos-Total Containers Supplied: 8 oz. jar (A)	03/15/19 23:59	03/29/19 10:25	Call ESB for total S	Solids	

1505 7300

	\bigwedge_{a}	
Samples Received at	<u> </u>	oC

All Containers Intact:

Sample Labels / COC Agree:

_____ Yes ____No ____Yes ____No

Custody Seals Present: ____Yes ____No

Samples Preserved Properly: ____Yes ____No

Please forward all acknowledgements of sample receipt, final reports and invoices to data@babcocklabs.com NO HARDCOPIES PLEASE.

Li-In Sam log	7 3-4-19			<u> </u>
Released By	Date	Received/By	3 Bartel	1130
Released By	Date	Received By	Date	Page 1 of 1

March 25, 2019

Babcock Laboratories, Inc. P.O. Box 432 Riverside, CA 92502

Lab ID Customer

AGRICULTURAL

: SP 1903020 : 2-14

Laboratory Report

Analytical Chemists

Introduction: This report package contains total of 3 pages divided into 3 sections:

ENVIRONMENTAL

Case Narrative	(1 pages) : An overview of the work performed at FGL.
Sample Results	(1 page) : Results for each sample submitted.
Quality Control	(1 page) : Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
1819-MV2-S1-01	03/01/2019	03/05/2019	SP 1903020-001	Sld

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 6 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Inorganic - Metals QC

200.7	03/19/2019:203934 All analysis quality controls are within established criteria.
3050	03/14/2019:202809 All preparation quality controls are within established criteria, except:The following note applies to Phosphorus:435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Digitally signed by Kelly A. Dunnahoo, B.S. Reviewed and Kelly A. Dunnahoo, B.S. Constitute: Laboratory Director Date: 2019-03-25 Date: 2019-03-25 Approved By

Corporate Offices & Laboratory 853 Corporation Street Santa Paula, CA 93060 TEL: (805)392-2000 Env FAX: (805)525-4172 / Ag FAX: (805)392-2063 FAX: (209)942-0423 CA ELAP Certification No. 1573

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Office & Laboratory 3442 Empresa Drive, Suite D San Luis Obispo, CA 93401 TEL: (805)783-2940 FAX: (805)783-2912

Page 1 of 3



March 25, 2019

Babcock Laboratories, Inc.

P.O. Box 432 Riverside, CA 92502

Lab ID : SP 1903020-001 Customer ID : 2-14

Sampled On : March 1, 2019-10:25 Sampled By : A.Suter/M.Varela Received On : March 5, 2019-11:30 : Solid Matrix

Description : 1819-MV2-S1-01 Project : Riverside County Flood Control B9C0039

Sample Result - Inorganic(Dry Weight)

Constituent	Result	POI	Units	Note	Sample	Preparation	Samp	le Analysis
Constituent	Result	IQL	Onts	Note	Method	Date/ID	Method	Date/ID
Metals, Total								
Phosphorus	689	5	mg/kg		3050	03/14/19:202809	200.7	03/19/19:203934

ND=Non-Detected. PQL=Practical Quantitation Limit. * PQL adjusted for dilution.

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Page 2 of 3



March 25, 2019 **Babcock Laboratories, Inc.**

Lab ID

Customer

: SP 1903020 : 2-14

Quality Control - Inorganic

Constituent	Method Date/ID Type Units Conc. QC Data DQO Note								Note
Metals									
Phosphorus		200.7	03/19/19:203934AC	CCV	ppm	5.000	96.9 %	90-110	
-				CCB	ppm		-0.002	0.1	
				CCV	ppm	5.000	97.1 %	90-110	
				CCB	ppm		0.0004	0.1	
		3050	03/14/19:202809EMM	Blank	mg/kg		ND	<5	
				LCS	mg/kg	200.0	93.6 %	80-120	
				MS	mg/kg	200.0	117 %	75-125	
			(SP 1902801-001)	MSD	mg/kg	200.0	149 %	75-125	435
				MSRPD	mg/kg	200.0	8.8%	≤30	
	PDS mg/kg 200.0 121 % 75-125								
Definition	efinition								
PDS	: PDS failed, matrix - Post Digestion Spike (PDS) not within Acceptance Range (AR) because of matrix interferences affecting this								
105	analyte. Data was accepted based on the LCS recovery.								
CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.								
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.								
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.								
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.								
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery								
MSD	: Matrix Spike Du	plicate of MS/	MSD pair - A random sa	mple duplica	ate is spiked v	vith a knowr	n amount of an	alyte. The re	coveries
	ME MED Delet	of now that san	iple matrix affects analyt	e recovery.	ant difference	ia an india	tion of mussici	on for the ne	ananation
MSRPD	. MS/MSD Kelau	ve Percent Dill	efence (RPD) - The MS	relative perc	ent unterence	e is an indica	ation of precisi	on for the pr	eparation
ND	· Non detect Po	ult was balow	the DOO listed for the or	aluta					
DOO	: Data Quality Ob	iective - This is	the criteria against which	the quality	v control data	is compared	1		
	. Data Quality Ot	jeeuve - This h	s une errierra against wine	in the quant	y control uata	is compared	1.		
Explanation 435	· Sample matrix r	nav he affecting	r this analyte. Data was a	ccented base	ed on the LCS	or CCV re	overv		
-55	. Sample matrix I	hay be affecting	s uns analyte. Data was a	ccepieu bas			Jovery.		

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Page 3 of 3



5730 Centralcrest St. • Houston, TX 77092 Telephone (713) 316-1800 • Fax (877) 225-9953

March 8, 2019

KayeLani A. Marshall, Project Manager, Babcock Laboratories, Inc. 6100 Quail Valley Court, Riverside, CA 92507-0704.

Re: PTS File No: **49025** Project Name: B9C0039 Job Number: B9C0039

Subject: Laser Particle Size Analyses – [1 Sample – B9C0039-01].

Dear KayeLani A. Marshall:

Please find enclosed report for Physical Properties analyses conducted upon one (1) soil samples received from the above referenced project.

All analyses were performed by applicable ASTM, EPA, or API methodologies. The sample is currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the sample will be disposed of at that time. You may contact me regarding storage, disposal, or return of the sample.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact me or Emeka Anazodo at (713) 316-1800.

Sincerely, PTS Laboratories, Inc.

C.A. Umeh

Chidi Umeh Flow Laboratory Supervisor

Encl.

PTS Laboratories

Project Name: Project Number:

B9C0039 B9C0039

PTS File No: 49025 Client: Babcock Laboratories, Inc

TEST PROGRAM - 20190306

		Core	Grain Size	
COREID	Depth	Recovery	Analysis	
	ft.	ft.	ASTM D4464M	Comments
		Grab	Grab	
Date Received: 20190306				
B9C0039-01	N/A	N/A	×	
TOTALS:			ŀ	

Laboratory Test Program Notes Contaminant identification: Standard TAT for basic analysis is 10-15 business days.

Grain Size Analysis: Laser or sieve method; includes tabular data, graphics and statistical sorting in Excel format.

PTS Laboratories, Inc.

Babcock Laboratories, Inc. PTS File No: 49025

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: PROJECT NO:	B9C0039 B9C0039							
			Median		Particle	Size Distrib	ution, wt. p	ercent
		Mean Grain Size	Grain Size			Sand Size		
Sample ID	Depth, ft.	Description (1)	mm	Gravel	Coarse	Medium	Fine	Silt

87.55

35.93

51.63

11.35

1.10

0.00

0.00

0.009

Silt

N/A

B9C0039-01

Silt & Clay

Clay

(1) Based on Mean from Trask



© PTS Laboratories, Inc.

SUBCONTRACT ORDER

Printed: 3/4/2019 11:51

Babcock Laboratories, Inc.

B9C0039

49025

SENDING LABORATORY: RECEIVING LABORATORY: Babcock Laboratories, Inc. **PTS** Laboratories 6100 Quail Valley Court 5730 Centralcrest Street Riverside, CA 92507-0704 Houston, TEXAS 77092 Phone: (951) 653-3351 Phone :(713) 316-1800 Fax: (951) 653-1662 Fax: -Project Manager: KayeLani A. Marshall Client: Riverside County Flood Control Sampler: A. Suter/M. Varela **Expires Regulatory Days** Past Date Sampled Analysis Due Comments Laboratory ID Sample ID: B9C0039-01 Sampled: 1819-MV2-S1-01 Proj.No.: Post Fire 03/01/19 10:25 Sediment - MV Solid Gran size ASTM D4464 Subout 03/27/19 23:59 03/11/19 10:25

*GRain

*12Am 3/04/19

Containers Supplied: 8 oz. jar (B)

	All Containers Intact:	Yes No	Samples Preserved Properly: YesNo
Samples Received at <u>11-2</u> oC	Sample Labels / COC Agree:	Yes No	Custody Seals Present: Yes <u>Yes</u>
Please forward all acknowledgen	nents of sample receipt, final 1	reports and invoices to	o data@babcocklabs.com
NO HARPCOPIES PLEASE.	3-4-19	Connort	2=5-19
Released By Jan Capt +	Date	Received By	Date
Released By	Date	Received By	Date



Report Date: 09-Apr-2019

Analytical Report: Page 1 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Work Order Number:B9C0037Received on Ice (Y/N):YesTemp: 16 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	<u>Matrix</u>	Date Sampled	By	Date Submitted	By
B9C0037-01	1819-MV2-S1-01	Sludge	03/1/19 10:25	Abigail Suter/M. Varela	03/01/19 11:55	Abigail Suter

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Report Date: 09-Apr-2019

Analytical Report: Page 2 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Work Order Number:B9C0037Received on Ice (Y/N):YesTemp: 16 °C

Laboratory Reference Number B9C0037-01

Sample Description	<u>Matrix</u>	Sampled Date/Time	Received Date/Time
1819-MV2-S1-01	Sludge	03/01/19 10:25	03/01/19 11:55

Analyte(s)	Result	RDL	MDL	Units	Method	Analysis Date	Analyst	Flag
Anions								
Nitrate as N	ND	3.2	1.7	mg/kg dry	EPA 300.0	03/02/19 02:	26 KBS	N_WEX
Nitrite as N	ND	1.6	1.6	mg/kg dry	EPA 300.0	03/02/19 02:	26 KBS	N_WEX
Solids Total Solids	62	0.10	0.10	%	SM 2540G	03/01/19 16:	47 TML	
Aggregate Organic Compounds Total Organic Carbon	4.0	0.20	0.050 9	% dry weight	EPA 9060	03/15/19 12:	57 MEL	
Nutrients Kjeldahl Nitrogen Total Nitrogen	47000 47000	2600 100	2600	mg/kg dry mg/kg dry	EPA 351.2 Calculation	03/05/19 12:	54 SLL	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Report Date: 09-Apr-2019

Analytical Report: Page 3 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Work Order Number: B9C0037

Received on Ice (Y/N): Yes Temp: 16 °C

Anions - Batch Quality Control

Analyte(s)	Result	RDL		Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
											-
Batch 9C01067 - Water Extracti	on-IC										
Blank (9C01067-BLK1)				F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	ND	0.10	0.10	mg/kg wet							
Nitrate as N	ND	0.20	0.11	mg/kg wet							
LCS (9C01067-BS1)		Prepared & Analyzed: 03/02/19									
Nitrite as N	2.50	0.10	0.10	mg/kg wet	2.50		100	90-110			
Nitrate as N	5.24	0.20	0.11	mg/kg wet	5.65		92.8	90-110			
Matrix Spike (9C01067-MS1)		Source:	B9C003	7-01 F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	42.7	1.6	1.6	mg/kg dry	40.0	ND	107	62-121			
Nitrate as N	84.7	3.2	1.7	mg/kg dry	90.5	ND	93.6	80-120			
Matrix Spike Dup (9C01067-MSD1)		Source:	B9C003	7-01 F	Prepared	& Analyze	d: 03/02/1	9			
Nitrite as N	42.2	1.6	1.6	mg/kg dry	40.0	ND	105	62-121	1.15	20	
Nitrate as N	85.0	3.2	1.7	mg/kg dry	90.5	ND	93.9	80-120	0.362	20	

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 4 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Report Date: 09-Apr-2019

Work Order Number: B9C0037

Received on Ice (Y/N): Yes Temp: 16 °C

Solids - Batch Quality Control

					Spike	Source		%REC		RPD	
Analyte(s)	Result	RDL		Units	Level	Result	%REC	Limits	RPD	Limit	Flag
Batch 9C01050 - Analyzed as	received										
Blank (9C01050-BLK1)					Prepared	& Analyze	d: 03/01/1	9			
Total Solids	ND	0.10	0.10	%							
Duplicate (9C01050-DUP1)		Source	: B9C0031-0 ⁻	1	Prepared	& Analyze	d: 03/01/1	9			
Total Solids	63.8	0.10	0.10	%		63.2			1.01	25	

P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 5 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Report Date: 09-Apr-2019

Work Orde	er Number:	B9C0037
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Received on Ice (Y/N): Yes Temp: 16 °C

Aggregate Organic Compounds - Batch Quality Control

Analyte(s)	Result	RDL		Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag	
Batch 9C12166 - Analyzed as re	ceived											
Blank (9C12166-BLK1)				F	Prepared	& Analyze	d: 03/15/1	9				
Total Organic Carbon	ND	0.20	0.050	% dry weight								
LCS (9C12166-BS1)		Prepared & Analyzed: 03/15/19										
Total Organic Carbon	1.62	0.20	0.050	% dry weight	1.59		102	70-130				
Matrix Spike (9C12166-MS1)		Source	: B9C0031	-01 F	Prepared	& Analyze	d: 03/15/1	9				
Total Organic Carbon	3.00	0.20	0.050	% dry weight	1.59	1.84	73.5	41-139				
Matrix Spike Dup (9C12166-MSD1)		Source	: B9C0031	-01 F	Prepared	& Analyze	d: 03/15/1	9				
Total Organic Carbon	3.78	0.20	0.050	% dry weight	1.59	1.84	122	41-139	22.7	25		

location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com



Analytical Report: Page 6 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Report Date: 09-Apr-2019

Work Order Number: B9C0037

Received on Ice (Y/N): Yes Temp: 16 °C

Nutrients - Batch Quality Control

					Spike	Source		%REC		RPD	
Analyte(s)	Result	RDL		Units	Level	Result	%REC	Limits	RPD	Limit	Flag
Batch 9C04113 - Acid Digest											
Blank (9C04113-BLK1)					Prepared:	03/04/19	Analyzed:	03/05/19			
Kjeldahl Nitrogen	ND	100	100	mg/kg wet							
LCS (9C04113-BS1)					Prepared:	03/04/19	Analyzed:	03/05/19			
Kjeldahl Nitrogen	825	100	100	mg/kg wet	800		103	80-120			
Duplicate (9C04113-DUP1)		Source: I	B9C003	1-01	Prepared:	03/04/19	Analyzed:	03/05/19			
Kjeldahl Nitrogen	19600	1600	1600	mg/kg dry		19500			0.116	25	

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Analytical Report: Page 7 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Work Order Number:B9C0037Received on Ice (Y/N):YesYesTemp

Temp: 16 °C

Notes and Definitions

Report Date: 09-Apr-2019

N_WEX Analyte determined on a 1:10 water extract from the sample. ND: Analyte NOT DETECTED at or above the Method Detection Limit (if MDL is reported), otherwise at or above the Reportable Detection Limit (RDL) NR: Not Reported NRLrcf: RL for analyte does not meet the SWAMP / CTR required RL. RDL: Reportable Detection Limit MDL: Method Detection Limit * / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted.

KayeLani A. Marshall

cc:

e-Standard_RCFC_N2.rpt

This report applies only to the sample(s) analyzed. As a mutual protection to clients, the public, and Babcock Laboratories, Inc., this report is submitted and accepted for the exclusive use of the Client to whom it is addressed. Interpretation and use of the information contained within this report are the sole responsibility of the Client. Babcock Laboratories, Inc. is not responsible for any misinformation or consequences that may result from misinterpretation or improper use of this report. This report is not to be modified or abbreviated in any way. Additionally, this report is not to be used, in whole or in part, in any advertising or publicity matter without written authorization from Babcock Laboratories, Inc. The liability of Babcock Laboratories, Inc. is limited to the actual cost of the requested analyses, unless otherwise agreed upon in writing. There is no other warranty expressed or implied.

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Report Date: 09-Apr-2019

Analytical Report: Page 8 of 8 Project Name: RCFC - Post Fire Soil Project Number: Post Fire Sediment MV

Yes

Work Order Number: B9C0037

Received on Ice (Y/N):

Temp: 16 °C

	RCFC & WCD			Co	ntac	ct:			Rel	bek	ah (Gui	11,	/ A	٩bi	gail	Sut	er					Phone No.	(951) 955.290)1/955.
FAX No.	951.788.9965			Em	ail:			ļ	rgui	ill@r	ivco.	org	ŝ	dsut	ter@	rivc	o.org							Additional Re Include QC Data	Package:
Project Name:	me: Post Fire Sediment Turn Around Time: Routine *3-5				3-5 Day *48 Hour *24 Hour					FA Ema	X Results: 🗆 ail Results: 🗆														
Station ID:		MV		EXCLUSION OF	-	201 M							1200	1000				R	ush		Rus	sh	Rush		State EDT: 🗆
Station Location:	McVick	ker Canyon		*La	b TA	AT A	ppro	oval:							By:			Nord				*Ac	ditional Charges May Apply	(Include Source	Number in N
	Sampler Informatio	n					8	Pre	ser	rvati	ves			_	_	T	mpie ype	Ana	lysis	Req	uest	ed	Matrix	N	otes
TEAM Names Employer	A Suter RCFC & WO	M Va co	irela	ed							Acetate				of Containers		le		ct List	*			SW = Storm Water NW = Nonstorm Water GW = Groundwater S = Soil	Sut	DUT
LEAD Signature	4122	5	-	reserv	3		5	5 ² 0 ²	т	Շ	H / Zn	5	A		al #	utine	samp ecial		Proje	Blank			SG = Sludge	Do not analyz	e Sample ID v
Sam	ple ID	Date	Time	Unp	H ₂ SC	Ę	ONH	Na ₂ S	NaO	Hex	NaO	NH40	MCA		Tot	Ro	Spi		See	Trip			M = Miscellaneous	(-03) 10	TOXICITY.
1819-MV2	-S1-01	3/1/19	1025							_			_		3		_		X		\square	_	S		
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(For Lab Lise Only)	Sample Integrity Up	on Receipt	in a second			Sec.			10			12	1		Sec.							~	0005	154	
		and the second second second second		CTATE OF THE OWNER	1000			-						Lord Card		10000	-							L P P	

mailing P.O Box 432 Riverside, CA 92502-0432 location 6100 Quail Valley Court Riverside, CA 92507-0704 P 951 653 3351 F 951 653 1662 www.babcocklabs.com

Post Holy Fire Sediment Quantity and Nutrient Load Calculations

		Se	ediment Informa	ation from RCFC8	&WCD		Analytical C	Concentrations	Estimated Nutrier	nt Load Reduction
Site	Approximate Date Range	Approximate Volume Removed (CY)	Approximate Truckloads (# of Trucks) N	Average Truck Weight ¹ (tons) AW	Approximate Wet Weight (tons) = (N·AW) T_w	Approximate Dry Weight (tons) = (T _w ·CF) W _d	Total Nitrogen (mg/kg) C_x	Total Phosphorus (mg/kg) C_x	Total Nitrogen (Tons) M_x	Total Phosphorus (Tons) M_x
Leach Canyon Dam (LC3) Pre-	9/1/2018 -									
Storm Season	11/27/2018	20,000	2,000	15.5	31,000	21,700	20,000	368	434	8
Leach Canyon Dam (LC3) Storm Season	11/28/2018 - 2/15/2019 2/16/2019 - 4/8/2019	59,376 20,048	7,422 2,506	15.5 15.5	115,041 38,843	80,529 27,190	20,000	368 368	1,611 544	30 10
McVicker Canyon Basin	9/1/2018 -									
(MV2) Pre-Storm Season	11/27/2018	10,000	1,000	15.5	15,500	10,850	47,000	689	510	7
McVicker Canyon Basin (MV2) Storm Season	11/28/2018 - 2/15/2019 2/16/2019 - 4/5/2019	41,992	5,249	15.5	81,360	56,952	47,000	689	2,677	39

Total (tons) 7527 120

Notes:

1- Average Truck Weight calculated from all weigh tickets throughout project

AW- Average truckload weight

T_w = Approximate wet weight of sediment (tons)

W_d = Approximate, dry weight (tons)

N = Number of trucks

CF = Conversion factor of 0.7, wet to dry sediment weight

M_x = Nutrient "x" removed, (tons)

W_d = Total sediment, dry weight (tons)

C_x = Analyte "x" concentration (mg/kg)

F = Unit conversion factor, divide by 10⁶ (mg/kg)

Calculations:

$$W_d = N \cdot T_w \cdot CF$$

$$M_x = \frac{W_d \cdot C_x}{F}$$

Leach Canyon Dam Pre and Post Fire Comparison of Water and Debris Capacity

3/7/2019 MGZ

Topography Source	Level W	ater Pool Capacity	Debris Capacity with 4-Percent As-Built Slope Beginning at Spillway Elevation				
	(yd ³)	(ac-ft)	(yd ³)	(ac-ft)			
1956 Design As-Built Line Topo ^a	52,595 (27,427)	32.6 (17)	95,649 (140,000)	59.3 (86.8)			
1963.02.23 Line Topo	24,523	15.2	160,894	99.7			
2016 Pre Holy Fire DTM ^b	21,619	13.4					
2018 Post Holy Fire DTM ^c	26,011	16.1	141,974	88.0			
2019 Design Grade Improvements DTM ^d	66,529	41.2	182,492	113.1			

Notes:

a. As-built backup is lacking. Plans contain contentious data. As-built line work does not match quantities written on as-built.

32.6 (17) = results from generated DTM (information written on as-built)

b. 2016 DTM insufficient for debris analysis.

c. DTM generated after area was flown via drone on 8-29-2018.

d. Original DTM used from 8-29-2018 drone flight and was modified with grading changes to improve dam capacity (includes 2 feet of dead storage).

Leach Debris Capacity



DEBRIS CAPACITY = 94,000 cuyds



AS-BUILT BACKUP IS LACKING. PLANS CONTAIN CONTENTIOUS DATA.

KRG 9.6.18

McVicker -	Depth to Vo	olume			
		Volume	Incr Volume	Cum Volume	Cum Volume
Elevation	Area	(CF)	(ACRE FT)	(ACRE FT)	(CY)
27.5	0	0	0	0	0
28	11602	2900.5	0.07	0.1	107
30	47723	59325	1.36	1.4	2305
35	65846	283922.5	6.52	7.9	12820
40	84344	375475	8.62	16.6	26727
45	104833	472942.5	10.86	27.4	44243
50	127108	579852.5	13.31	40.7	65719
55	153172	700700	16.09	56.8	91671
60	182269	838602.5	19.25	76.1	122730
61.5	191535.1	280353.1	6.44	82.5	133114
65	213156	708209.4	16.26	98.8	159344

