North Coast Laboratories, Ltd.

Date: 17-Jul-2008

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT
Method Blank

Sample ID: MB	Batch ID: R53200	Test Code: 531W	Units: µg/L	Analysis Date 7/12/08 00:55:43	Prep Date: 7/11/08
Client ID:		Run ID: ORLC6_080714A		SeqNo: 774807	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	ND	3.0									
Aldicarb Sulfone	ND	4.0									
Oxamyl	ND	5.0									
Methomyl	ND	2.0									
3-OH-Carbofuran	ND	3.0									
Aldicarb	ND	3.0									
Propoxur	ND	5.0									
Carbofuran	ND	5.0									
Carbaryl	ND	5.0									
Methiocarb	ND	5.0									
BDMC	17.9	0.10	20.0	0	89.3%	52	134	0			

Sample ID: MB	Batch ID: R53186A	Test Code: 547W	Units: µg/L	Analysis Date 7/10/08 23:23:41	Prep Date: 7/10/08
Client ID:		Run ID: ORLC6_080710A		SeqNo: 774628	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	ND	10									

Sample ID: MB-20563	Batch ID: 20563	Test Code: 549W	Units: µg/L	Analysis Date 7/9/08 17:35:45	Prep Date: 7/9/08
Client ID:		Run ID: ORLC2_080709A		SeqNo: 774339	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	ND	0.40									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 17-Jul-2008

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID: **LCS**	Batch ID: **R53200**	Test Code: **531W**	Units: µg/L	Analysis Date **7/12/08 01:58:06**	Prep Date: **7/11/08**
Client ID:		Run ID: **ORLC6_080714A**		SeqNo: **774808**	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	5.841	3.0	6.00	0	97.3%	70	105	0			
Aldicarb Sulfone	8.601	4.0	8.00	0	108%	72	107	0			S
Oxamyl	10.61	5.0	10.0	0	106%	67	105	0			S
Methomyl	3.971	2.0	4.00	0	99.3%	73	106	0			
3-OH-Carbofuran	6.448	3.0	6.00	0	107%	64	111	0			
Aldicarb	8.117	3.0	6.00	0	135%	73	111	0			S
Propoxur	10.12	5.0	10.0	0	101%	72	107	0			
Carbofuran	9.663	5.0	10.0	0	96.6%	69	115	0			
Carbaryl	10.42	5.0	10.0	0	104%	77	107	0			
Methiocarb	9.105	5.0	10.0	0	91.1%	69	111	0			
BDMC	18.7	0.10	20.0	0	93.4%	52	134	0			

Sample ID: **LCSD**	Batch ID: **R53200**	Test Code: **531W**	Units: µg/L	Analysis Date **7/12/08 03:00:28**	Prep Date: **7/11/08**
Client ID:		Run ID: **ORLC6_080714A**		SeqNo: **774809**	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	5.785	3.0	6.00	0	96.4%	70	105	5.84	0.963%	20	
Aldicarb Sulfone	8.053	4.0	8.00	0	101%	72	107	8.60	6.57%	20	
Oxamyl	10.38	5.0	10.0	0	104%	67	105	10.6	2.20%	20	
Methomyl	3.879	2.0	4.00	0	97.0%	73	106	3.97	2.35%	20	
3-OH-Carbofuran	5.993	3.0	6.00	0	99.9%	64	111	6.45	7.32%	20	
Aldicarb	7.868	3.0	6.00	0	131%	73	111	8.12	3.11%	20	S
Propoxur	9.349	5.0	10.0	0	93.5%	72	107	10.1	7.92%	20	
Carbofuran	9.077	5.0	10.0	0	90.8%	69	115	9.66	6.25%	20	
Carbaryl	9.883	5.0	10.0	0	98.8%	77	107	10.4	5.27%	20	
Methiocarb	8.919	5.0	10.0	0	89.2%	69	111	9.10	2.06%	20	
BDMC	19.5	0.10	20.0	0	97.4%	52	134	18.7	4.20%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID: LCS	Batch ID: R53186A	Test Code: 547W	Units: µg/L	Analysis Date 7/10/08 23:46:03	Prep Date: 7/10/08
Client ID:		Run ID: ORLC6_080710A		SeqNo: 774629	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	52.31	10	50.0	0	105%	73	128	0			

Sample ID: LCSD	Batch ID: R53186A	Test Code: 547W	Units: µg/L	Analysis Date 7/11/08 00:08:21	Prep Date: 7/10/08
Client ID:		Run ID: ORLC6_080710A		SeqNo: 774630	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	52.22	10	50.0	0	104%	73	128	52.3	0.172%	20	

Sample ID: LCS-20563	Batch ID: 20563	Test Code: 549W	Units: µg/L	Analysis Date 7/9/08 17:53:33	Prep Date: 7/9/08
Client ID:		Run ID: ORLC2_080709A		SeqNo: 774340	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	1.557	0.40	2.00	0	77.9%	59	102	0			

Sample ID: LCSD-20563	Batch ID: 20563	Test Code: 549W	Units: µg/L	Analysis Date 7/9/08 18:11:22	Prep Date: 7/9/08
Client ID:		Run ID: ORLC2_080709A		SeqNo: 774341	

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	1.520	0.40	2.00	0	76.0%	59	102	1.56	2.39%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240 0807067

SENDING LABORATORY:

E.S. Babcock & Sons, Inc.
P. O. Box 432
Riverside, CA 92502-0432
Phone: (951) 653-3351
Fax: (951) 653-1662
Project Manager: Humaira Saleem

RECEIVING LABORATORY:

North Coast Labs - Subcontract
5680 West End Road
Arcata, CA 95521
Phone :(707) 822-4649
Fax: (707) 822-6831

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	
549-Diquat	07/14/08 17:00	07/09/08 10:00		
547	07/14/08 17:00	07/16/08 10:00		
531 JRL 7/3	07/14/08 17:00	07/30/08 10:00		
Containers Supplied:				
Quart Poly - Unpres (G)	Voa Vial MCAA, Na2S2O3 · Voa Vial MCAA, Na2S2O3 · Voa Vial -Unpres (J)			Voa Vial -Unpres (K)

All Containers Intact: X Yes ____No Samples Preserved Properly: X Yes ____No

Samples Received at 0.4 oC Sample Lables / COC Agree: X Yes ____No Custody Seals Present: ____Yes X No

An acknowledgement of sample receipt is requested. Please reply to slozon@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By	7/2/08 Date	Received By	7/3/08 1040 Date
Released By	Date	Received By	Temp 0.4°C Date

Page 1 of 1

Pace Analytical™

www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Report Prepared for:

Cathy Iijima
Edward S. Babcock & Sons, Inc.
6100 Quail Valley Court
Riverside CA 92507

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:
July 18, 2008

Report Information:

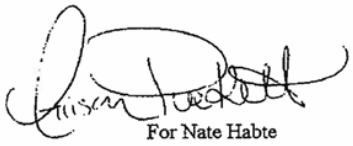
Pace Project #: 1076418
Sample Receipt Date: 07/03/2008
Client Project #: A8G0240
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nate Habte, your Pace Project Manager.

This report has been reviewed and prepared by:



For Nate Habte

Nate Habte, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
natnael.habte@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

1150

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240

1076418

SENDING LABORATORY:	**RECEIVING LABORATORY:**
E.S. Babcock & Sons, Inc. P. O. Box 432 Riverside, CA 92502-0432 Phone: (951) 653-3351 Fax: (951) 653-1662 Project Manager: Humaira Saleem	Pace Analytical - Subcontract 1700 Elm Street SE, Suite 200 Minneapolis, MN 55414 Phone :(612) 607-6383 Fax: 9612) 607-6444

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	001
Dioxin *Containers Supplied:* 1L Amber-Na2S2O3 (F)	07/14/08 17:00	07/30/08 10:00	D.W. as per Humaira Saleem 7/3/08 MH	

All Containers Intact: X Yes ____No Samples Preserved Properly: X Yes ____No

Samples Received at 5.2 oC Sample Lables / COC Agree: X Yes ____No Custody Seals Present: X Yes ____No

An acknowledgement of sample receipt is requested. Please reply to slozon@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By	Date	Received By	Date
[signature]	7/2/08	[signature] Pace	7/3/08 9:34
Released By	Date	Received By	Date

Page 1 of 1

Sample Condition Upon Receipt

Pace Analytical — Client Name: E.S. Babcock — Project # 1076418

Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other ______

[redacted]

Tracking #: 175 781 X90 14429637?

Custody Seal on Cooler/Box Present: ☐ yes ☒ no   Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other ______

Thermometer Used: ~~230184010, 72310129~~ 79425   Type of Ice: Wet (Blue) None   ☐ Samples on ice, cooling process has begun

Cooler Temperature: 5.7°C   Biological Tissue is Frozen: Yes No   Date and Initials of person examining contents: 7-3-08

Temp should be above freezing to 6°C

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix:	☒Yes ☐No ☐N/A WT	12.
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required?   Y / N

Person Contacted: ______   Date/Time: ______

Comments/ Resolution: ______

Project Manager Review: MAH   Date: 7/7/08

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical™

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A8G0240-01
Client.....Edward S. Babcock & Sons, Inc.
Lab Sample ID.....1076418001

Date Collected.....07/02/2008
Date Received.....07/03/2008
Date Extracted.....07/15/2008

	Sample A8G0240-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5 pg/L	5 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	97%	93%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			4.1%	
IS Recovery	**79%**	80%	76%	76%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**87%**	83%	81%	83%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	D80717A19	D80716A06	D80716A03_08071	D80716A04
Analysis Date	07/17/2008	07/16/2008	07/16/2008	07/16/2008
Analysis Time	18:20	11:36	10:02	10:32
Analyst	JB	JB	JB	JB
Volume	0.950L	1.030L	1.035L	1.045L
Dilution	NA	NA	NA	NA
ICAL Date	07/08/2008	07/08/2008	07/08/2008	07/08/2008
CCAL Filename	D80717A02	D80716A02	D80716A02	D80716A02

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Julie Brenner

Project No.....1076418

Report No.....1076418_1613DW

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906
6100 Quail Valley Court Riverside, CA 92507
(951) 653-3351 • FAX (951) 653-1662
www.babcocklabs.com

Chain of Custody & Sample Information Record

Client: Geoscience Support Services Contact: Russ Kyle Fax No. 909 920 0403
Phone No. 909 920 0707 email: RKyle @ geoscience-water.com
Project Name: Mooncamp FP2 Turn Around Time: (Routine) *72 Hour Rush *48 Hour Rush *24 Hour Rush
Project Location: Fawnskin CA *Lab TAT Approval: By: *Additional Charges Apply

Additional Reporting Requests: Include QC Data Package: ☐ Yes ☐ No; FAX Results: ☐ Yes ☐ No; Email Results: ☐ Yes ☐ No; State EDT: ☐ Yes ☐ No (Include Source Number in Notes)

Sampler Information
Name: Christofer Coppinger
Employer: Geoscience Support Service
Signature: Christof Coppinger

Sample ID	Date	Time	# of Containers & Preservatives: Unpreserved	H_2SO_4	HCl	HNO_3	$Na_2S_2O_3$	NaOH	NaOH/Zn Acetate	NH_4Cl	MCAA	Ascorbic Acid	Total # of Containers	Sample Type: Routine	Resample	Special (In Hon)	Analysis Requested	Matrix	Notes
1 Liter Amber	7/2/08	10:00					8						9					GW	Email Results to RKyle@geoscience-water.com; See Attached for Analysis -
½ gal Poly			2										2						Temp 15.5C
1 quart Poly			5			1							6						TDS 290 PPM
1 pint Poly			1					1					2						Turbit. 1.36 NTU *
~~2~~ Radon			2										2						pH 6.9
VOA Vials			5	3							2		10						* No filter note in comments per Lorenzo. AD 7/2/08
liters Amber												2	2						
													31						

Matrix: DW = Drinking Water; WW = Waste Water; GW = Ground Water; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Analysis Requested: See attached Sheets. Uranium and Radium 226 only if Gross Alpha greater than 3 pCi/L. Ra 228 only if 226 Spec. L. Greater than 3 pCi/L

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (sign)	Print Name / Company
Christ Coppinger	Chris Coppinger	7/2/08 13:00		N. Reynolds / GEOSCIENCE
	N. Reynolds / GSST	7/2/08 14:50		Clyma / ESB

(For Lab Use Only) *Sample Integrity Upon Receipt*
Sample(s) Submitted on Ice? (Yes) No Temperature 6°C
Custody Seal(s) Intact? Yes No (NA)
Sample(s) Intact? (Yes) No ☐ Cooler Blank

Lab Notes

Lab No. AB02446
Page 1 of 1
Rev. 6/07

APPENDIX C

Microscopic Particulate Analysis Report

BioVir Laboratories, Inc.

NELAC #05234CA
EPA ID #01401, CA-ELAP # 1795

685 Stone Road, Unit 6 · Benicia, CA 94510 · (707) 747-5906 · 1-800-GIARDIA · FAX (707) 747-1751 · WEB: www.biovir.com

REPORT OF SAMPLE EVALUATION

REPORT: 081588-1

PAGE: 1 of 2

CLIENT: Geoscience Support Services
Attention: Russ Kyle
PO Box 220
Claremont, CA 91711

CLIENT NO.: GEO007

SAMPLE INFORMATION:

Name of Sampler:	Christofer Coppinger	Sample Date:	07/02/08
Sample Source:	New Well Discharge	Sample Time:	09:10
Sample Location:	Mooncamp FP-2	Turbidity:	1.36
Filter Type:	Parker Hannifan, M39R10A	Temperature:	15.5
Sample Volume:	996.8 Gallons	Comments:	Drinking Water

Sample Received Date:	07/03/08
Sample Received Time:	08:10
Sample Received Temp:	7.9 C

ASSAY RESULTS:

1. Giardia species Assay: 0 Giardia species cyst seen / 3394 Liters.
   (SM 18TH; SEC. 9711B; FA)

2. Cryptosporidium Assay: 0 Cryptosporidium oocyst seen / 3394 Liters.
   (SM 18TH; SEC. 9711B; FA)

3. Microscopic Particulate Analysis: See page 2
   (EPA 910/9-92-029)

Commentary:
An aliquot representing 378.5 Liters was taken from the 3773 Liter sample concentrate for particulate analysis.

1 Gallon = 3.785 Liters

REPORT NO.: 081558-1
PAGE NO.: 2 of 2
CLIENT NO.: GEO007

MICROSCOPIC PARTICULATE ANALYSIS

PRIMARY PARTICULATES (per 378.5 Liters)		SECONDARY PARTICULATES (per 378.5 Liters)	
Giardia:	NS	*Plant Pollen:	127
Cryptosporidium:	NS	Nematodes:	NS
Diatoms:	NS	Crustacea:	NS
Other Algae:	NS	Amoeba:	NS
Insect/Larvae:	NS	Ciliates/Flagellates:	NS
Rotifers:	NS	Other Organisms:	NS
Plant Debris:	NS		

Key: * Plant Pollen = Pine

EH - extremely heavy
H - heavy
M - moderate
R - rare
NS - none seen

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.
COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or otherwise disposed of.

07/07/08
COMPLETION DATE

Richard E Daniel
SIGNATURE/DATE 07/23/08 DE

F:\WP\REPDIR\Geo007 GeoScience-See Sou013\081588-1.wpd

BioVir LABORATORIES ®

MICROSCOPIC PARTICULATE ANALYSIS

Primary Particulates

Numerical range of each primary bio-indicator based on numbers counted per 378.5 Liters sampled

Surface Water	EH	H	M	R	NS
Giardia	**	**	**	**	None Seen
Coccidia	**	**	**	**	None Seen
Diatoms	>150	41-149	11-40	1-10	None Seen
Other Algae	>300	96-299	21-95	1-20	None Seen
Insects/Larvae	>100	31-99	16-30	1-15	None Seen
Rotifers	>150	61-149	21-60	1-20	None Seen
Plant Debris	>200	71-199	26-70	1-25	None Seen

Giardia lamblia Giardia species Cryptosporidium	**	Assayed by Immunofluorescent Method. The presence of any amount of these organisims represents a HIGH RISK to surface water contamination.

Key:

EH - extremely heavy
H - heavy
M - moderate
R - rare
NS - none seen

SECONDARY PARTICULATES

Secondary bio-indicators are reported as a number based on relative concentration per 100 gallons sampled and should be used only to support information derived from the primary bio-indicator category.

BioVir Laboratories, Inc., 685 Stone Road, Benicia, California 94510
Phone: 1-800-GIARDIA (442-7342) Fax: 707-747-1751

1-800-GIARDIA

RELATIVE SURFACE WATER RISK FACTOR

Indicators of Surface Water	EH	H	M	R	NS
Giardia	40	30	25	20	0
Coccidia	35	30	25	20	0
Diatoms	16	13	11	6	0
Other Algae	14	12	9	4	0
Insects/Larvae	9	7	5	3	0
Rotifers	4	3	2	1	0
Plant Debris	3	2	1	0	0

Indicators of Surface Water:

According to EPA "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources", March, 1991 ed.

Range of Indicators Key:

EH - extremely heavy
H - heavy
M - moderate
R - rare
NS - none seen

RISK OF SURFACE WATER CONTAMINATION

High Risk	=	20 or greater
Moderate Risk	=	10-19
Low Risk	=	9 or less

\\Biovirserver\F\WP\FORMS\MPA.TBL

BioVir LABORATORIES ®

GIARDIA / CRYPTOSPORIDIUM / MPA ASSAY SAMPLE DATA SHEET

(Please fill out applicable areas, sign and return to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:
LIMS #: 0815887
Client #: GEO007
Date Rec'd: 7/3/05
Time Rec'd: 0810
Temp Rec'd: 7.9

Note: Please print clearly using waterproof ink

NAME & ADDRESS: Geoscience Support Services PO 2230 Livermore CA 94551	SAMPLE DATE: 7/1/05 SAMPLE TIME: 09:10 AM
	Water Temp (C): 15.5 Turbidity (NTU): 1.36
PWS ID: FACILITY ID:	TREATMENT CHARACTERISTICS (Check One):
NAME OF SAMPLER: Chris Toner Coppinger	Raw Surface Water ☐ Treated Drinking Water ☐
SAMPLE SOURCE: Pump FP-2	Treated Wastewater ☐ Wastewater ☐
	Ground Water ☒ Other: Mine Discharge
SAMPLE LOCATION: Pump A	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes NO
SAMPLE COLLECTION POINT ID:	SAMPLE DESCRIPTION (G/C)
SAMPLE VOLUME: (Meter # 3MG 1571) Meter Start: 176285 Meter Stop: 180245	Regular Grab Sample ☐ Matrix Spike Grab ☐ Regular Filtered Sample ☒
Total Volume: 7.0 Gallons _____ Liters	Matrix Spike Grab / Matrix Spike Filter Pair ☐ Filtered Volume: _____ Liters Grab Volume: _____ Liters

Client Sample ID: [redacted] FP-2	P.O. #:

ASSAY REQUESTED: Please check one of the following

LT2 Samples: Special care should be taken for samples intended to satisfy the requirements of the Long Term 2 Enhanced Surface Water Treatment Rule. Samples must be at least 10 Liters in volume (at least 22lbs. plus vessel for grab samples). Samples must arrive at BioVir between 0 to 20 degrees C (not frozen). Pre-chill samples during sampling or before shipment for best results.

METHOD 1623: Cryptosporidium and Giardia (EPA 821-R-01-025)	
	REGULAR SAMPLE ☐ (Check if repeat sample for LT2. Original Sample Date:)
	MATRIX SPIKE SAMPLE -Required in addition to the first sample from a source and every 20 samples thereafter (e.g. 21st, 41st, etc.)
METHOD 1622: Cryptosporidium Only (EPA 821-R-01-026)	
	REGULAR SAMPLE ☐ (Check if repeat sample for LT2. Original Sample Date:)
	MATRIX SPIKE SAMPLE -Required in addition to the first sample from a source and every 20 samples thereafter (e.g. 21st, 41st, etc.)
MICROSCOPIC PARTICULATE ANALYSIS (MPA)	
✓	Microscopic Particulate Analysis (MPA) - (EPA 910/9-92-029)
OTHER ANALYTES (Please indicate Analyte & Method)	

COMMENTS:

COPY

RELINQUISHED BY: [signature]	DATE / TIME:
RECEIVED BY: [signature]	DATE / TIME: 7/3/05

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY

F:\WP\FORMS\Datasheets\G&C and MPA Data Sheet 04.05.07.doc

G.4 - Water Supply Analysis (California Collaborative Solutions, February 2009)

Nancy @ MRA

California Collaborative Solutions

Water Supply Analysis

Tentative Tract No. 16136

Moon Camp Tract

Fawnskin, Ca

February 11, 2009

P.O. Box 706 Big Bear City, CA 92314 909 586-5819 calcolsol@gmail.com

Tentative Tract No. 16136 --- Moon Camp

Water Supply Analysis

February 11, 2009

Background:

The Moon Camp Tract was originally proposed as a 92 lot subdivision. An existing, onsite domestic water well, FP2, was proposed to provide the water supply for the subdivision. Well FP2 extracts its groundwater from Sub Area "A" of the North Shore Groundwater Basin. During the evaluation of the Water Supply, it was determined that the Perennial Yield of Sub Area "A" is between 14 and 44 acre-feet per year (Geoscience Support Services, December 2, 2003 Focused Geohydrologic Evaluation, Summary of North Shore Subareas, Page 3, copy attached). The Geoscience Focused Evaluation and the DWP's Master Plan (November, 2006, Table 4-2, copy attached) uses the mid-point of this range, 29 acre-feet per year, as Sub Area A's annual yield. However, County Planning Staff stated that they would only support a project that utilized the most conservative 14 acre-feet per year. ALDA Engineering completed a Final Feasibility Study that determined that 50 lots (occupied full-time) could be served by the 14 acre-feet per year (DWP report dated March 6, 2007, Page 2, copy attached). As a result, the Proposed Subdivision was redesigned as 50, one-half acre minimum lots.

During the preparation of the Draft EIR by MBA, it was discovered that the existing Private Well production within Sub Area "A" is 5 acre-feet per year (Table 4-2, DWP Water Master Plan, November, 2006, copy attached). In order to provide 5 acre-feet per year of groundwater yield to the subdivision from a groundwater basin other than Sub Area "A", the developer has drilled Well FP4 in the adjoining Grout Creek Groundwater Basin. The Grout Creek Basin has a Perennial Yield of 280 acre-feet per year; existing private well production of 7 acre-feet per year; and DWP domestic well production of 121 acre-feet per year (Tables 4-1 and 4-2, DWP Water Master Plan, November, 2006, copies attached). Based on this data, the Grout Creek Basin has 152 acre-feet per year of Perennial Yield available.

Water Well FP2:

In order to produce 9 - 14 acre-feet per year from Sub Area "A", Well FP2 would need to pump at a rate of 5.6 – 8.7 gpm. In June, 2008, Well FP2 was cleaned, pump tested and a Title 22 Water Quality Analysis was performed (Geoscience Support Services Report, August 7, 2008, copy attached). Geoscience concluded:

- Well FP2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 feet of drawdown in the well (Well FP2 is 380' deep and the static water level is 2 feet below ground surface)
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 feet (the nearest private well is approximately 1,000 feet to the east of Well FP2)

- Title 22 Ground water quality data from Well FP2 indicates the water from the well is suitable for municipal supply

The 35 gpm rate from Well FP2 can produce 56 acre-feet per year and supports Geoscience's Focused Evaluation and the DWP Master Plan's conclusion that Sub Area A can produce 29 acre-feet per year.

Water Well FP4:

In December of 2008, Harich Enterprises drilled Well FP4 to a depth of 240 feet. Well FP4 is located in the north-west corner of the proposed subdivision, within the Grout Creek Groundwater Basin. In order to produce 5 acre-feet per year from the Grout Creek Basin, Well FP4 would need to pump at a rate of 3.1 gpm. Harich pump tested Well FP4 at 3.4 gpm (Harich Driller's Report, February, 2009, copy attached) and the County's Special Districts Department obtained Title 22 Water Quality samples for analysis. The results concluded:

- Well FP4 can be pumped at a rate of 3.4 gpm on a long-term basis with 87 feet of drawdown in the well (Well FP4 is 240 feet deep and the static water level is 22 feet below ground surface)

The 3.4 gpm pumping rate from Well FP4 will produce 5.5 acre-feet per year from the Grout Creek Basin.

Water Service Provider:

Based upon the January 24, 2008 letter from LAFCO Executive Officer Kathleen Rollings-McDonald (copy attached), County Service Area 53C can own and operate the Moon Camp Subdivision Water System, including Water Wells FP2 and FP4. Special Districts staff has stated that they would operate the water system with their existing staff. Currently, Special Districts staff operate the Fawnskin Sewer System through CSA 53B.

Conclusion:

The combined pumping capacity of FP2 and FP4 is more than adequate to meet the long term water supply needs of the proposed 50 lot subdivision without adverse impacts to either Sub-Area "A" of the North Shore Basin, or the Grout Creek groundwater basin.

References:

GEOSCIENCE Support Services Inc., 2003. Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas. Prepared for the City of Big Bear Lake, Department of Water and Power. December 2, 2003.

ALDA Engineering, Inc., 2007. Final Feasibility Study to Serve the Proposed Moon Camp Residential Development (Tentative Tract No. 16136). Prepared for the City of Big Bear Lake, Department of Water and Power. March 6, 2007.

Camp, Dresser & McKee, Inc., 2006. Water Master Plan. Prepared for the City of Big Bear Lake, Department of Water and Power. November, 2006.

GEOSCIENCE Support Services Inc., 2008. Results of Rehabilitation and Aquifer Testing Moon Camp Well FP-2. Prepared for California Collaborative Solutions. August 7, 2008.

HARICH Enterprises, 2009. Well FP4 Driller's Report. February, 2009.

Local Agency Formation Commission. 2008. Memorandum, Water Service to Tentative Tract 16136; Moon Camp Residential Subdivision. Prepared by Kathleen Rollings-McDonald, Executive Officer. January 24, 2008.

Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas

Prepared for: City of Big Bear Lake Department of Water and Power

December 2, 2003

GEOSCIENCE Support Services, Inc.
Tel: (909) 920-0707
Fax: (909) 920-0403
Mailing: P. O. Box 220, Claremont, CA 91711
1326 Monte Vista Ave., Suite 3, Upland, CA 91786
email: email@geoscience-water.com

- Long-term precipitation records from weather stations within the Big Bear Lake watershed,
- Evapotranspiration data from evaporation pans and weather stations within the watershed,
- Ground water levels, and
- Ground water production.

However, most of the input parameters that are required for a detailed evaluation of the average annual ground water recharge had to be estimated or assumed from data collected outside the Grout Creek and North Shore subunits or outside the Big Bear Lake Watershed due to lack of measured data in the area. Although the assumed values are published and are from reliable sources (i.e. the U.S. Environmental Protection Agency, United States Geological Survey, etc.), they are not specific to the area of interest. Numerous additional monitoring features can be developed to collect the data necessary to refine the ground water recharge estimates. However, priority should be given to the construction of monitoring wells and the development of a reliable ground water level baseline for the tributary subareas.

The results of the ground water recharge analysis for the North Shore Subunit are as follows:

Summary of Ground Water Recharge Results
North Shore Tributary Subareas

Tributary Subarea	Area [acres]	Annual Precipitation [inches]	Average Annual Ground Water Recharge - Low Estimate [acre-ft/yr]	Average Annual Ground Water Recharge - High Estimate [acre-ft/yr]	Average of Ground Water Recharge Estimate Range [acre-ft/yr]
A	247	27.87	14	44	29
B	720	25.45	36	110	73
C	828	23.01	37	107	72
D	558	21.45	22	63	43
E	392	20.01	15	39	27
F	814	18.27	23	66	44

WATER MASTER PLAN

November 2006

Department of Water and Power

Big Bear Lake, California

Mission

The mission of the DWP is to manage our limited water resources through responsible planning in order to assure quality water and essential services in the most cost-effective manner for our current and future customers.

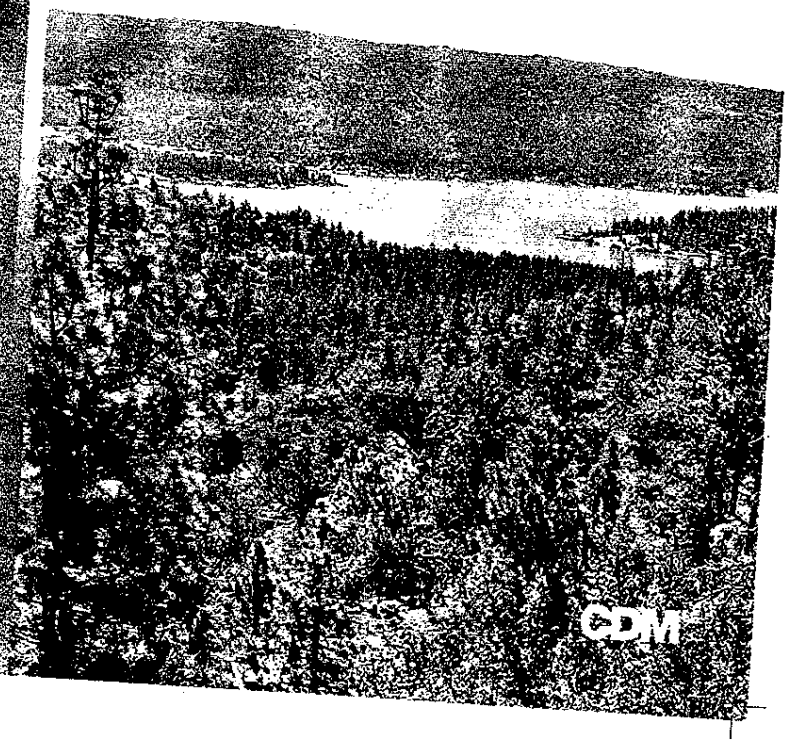


Table 4-1
Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Pressure Zone	Current		Full Development			
			25% Full-Time Equivalent		50% Full-Time Equivalent	
	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	MDD (gpm)
Erwin Lake / Sugarloaf/ Lake William						
Erwin Lake	87	93	144	154	194	208
Lower Sugarloaf	173	186	225	241	339	363
Upper Sugarloaf	86	92	120	129	201	215
Lake William	28	29	45	48	57	61
Sub-total	374	400	535	572	791	846
Moonridge						
Wolf Booster	31	33	53	56	84	90
Wolf Tank	117	125	162	173	284	303
Lassen	54	58	70	75	104	111
Minton	11	12	17	18	30	32
Travertine	4	5	8	9	14	15
Lower Moonridge	162	173	207	221	286	306
High Timber Ranch	-	-	45	48	64	68
Sub-total	378	405	562	601	865	926
Big Bear Lake						
Town [1]	1,585	1,696	2,370	2,536	2,847	3,046
Conklin Booster	14	15	26	27	41	44
Ironwood Booster	18	19	35	37	48	51
Sub-total	1,617	1,730	2,431	2,601	2,935	3,141
Unmatched	61	65	--	--	--	--
"BIG FOUR" TOTAL:	2,431	2,601	3,527	3,774	4,591	4,913
Fawnskin						
Lower Fawnskin	102	109	172	184	224	240
Upper Fawnskin	19	20	32	35	51	54
Sub-total	121	129	204	219	275	294
Rim Forest	47	50	47	50	47	50
OVERALL TOTAL	2,598	2,780	3,778	4,043	4,913	5,257

(1) Includes Knickerbocker and Pond pressure zones.

Table 4-2
Maximum Perennial Yield Estimate by Subunit (ac-ft/yr)

Maximum Perennial Yield Estimates by Hydrologic Subunit (ac-ft/yr)			
Subunit	*Perennial Yield Estimate*	*Private Wells Production*	*Available to DWP (ac-ft/yr)*
Grout Creek [1]	280	7	273
Mill Creek	100-175	3	147
Village	250	3	247
Rathbone	1,100	135	965
Division	496	2	494
North Shore			
Sub-Area A [1]	29	5	24
Sub-Area B	71		71
Sub-Area C	70		70
Sub-Area D	43		43
Sub-Area E	27		27
Sub-Area F	44		44
Erwin [2]	890	14	576
TOTAL:	3,400 - 3,475	169	2,981

(1) Assumed to be available to the Fawnskin system only.

(2) Only 576 ac-ft/yr are available to DWP from the Erwin Lake Subunit as an estimated 300 ac-ft/yr are produced by CSD. An additional 14 ac-ft/yr are produced by private wells

The Perennial Yield from the Grout Creek subunit (280 ac-ft per year) and from Sub A of the North Shore subunit (29 ac-ft per year) is only available to the Fawnskin area. However, only 297 ac-ft per year are available to the DWP as an estimated 12 ac-ft per year are pumped by private wells. Therefore, an estimated 2,684 ac-ft per year are available to DWP to meet the water needs of the "Big Four" system on the south side of the lake. This number assumes that DWP would be able to develop all water sources in the remaining sub-areas in the North Shore subunit given that they are located in United States Forest Service (USFS) lands.

A comparison of supply requirements from Table 4-1 with available local supplies from Table 4-2 indicates that local supplies are capable of meeting current and projected water demands in the Fawnskin system. Local groundwater supplies available to the "Big Four" system are sufficient to meet current water demand of 2,601 ac-ft per year in that system; however, there would be a need to either reduce projected demands through conservation, secure additional supplies, or a combination of both options to meet demands at full development or resulting from conversion to full-time equivalent use. The supply deficit in the "Big Four" is estimated at approximately 1,090 ac-ft per year to meet projected demands at full development assuming the current distribution of full-time equivalent use is maintained; an additional 1,139 ac-ft per year of new supplies would be required to address the impact from demographics.

ALDA Engineering Inc.
9996 Orange Street
Alta Loma, CA 91737
Tel: 909-297-3741
Fax: 909-498-0423

March 6, 2007

Mr. Scott Heule, C.E.G./C.H.G., Assistant General Manager
City of Big Bear Lake
Department of Water & Power
41972 Garstin Drive
Big Bear Lake, CA 92315

Subject: **Final Feasibility Study to Serve the Proposed Moon Camp Residential Development** (Tentative Tract No. 16136)

Dear Mr. Heule:

Pursuant to your request, ALDA Engineering Inc. (ALDA) has conducted a feasibility study to determine the necessary system facilities to serve the above referenced development. This report summarizes the results of our investigation and recommendations. This report presents the project background, an assessment of demand and supply issues, the results of the system analysis, and the recommended improvements.

Project Background

The proposed Moon Camp development consists of 50 residential lots to be developed over approximately 62 acres of land. The proposed development is located along North Shore Drive, in the community of Fawnskin on the north side of Big Bear Lake, and ranges in elevation from approximately 6,750 ft. near the lake to approximately 6,950 ft. in the northeasterly quadrant. Individual lots range in size from approximately half an acre to well over two acres depending on location and are anticipated to be developed as single family residential units; average lot size is approximately one and a quarter acres. Because of its location and lot size, some of the residential units are anticipated to be fairly large and potentially exceed 4,000 square feet in size.

Water service to the proposed development will be provided off the Upper Fawnskin pressure zone as the Lower Fawnskin zone would not provide enough static head to provide the development adequate fire flow. DWP's closest pipeline off the Upper Fawnskin system is a single 6-inch diameter pipeline located near the intersection of Flicker Road and Chinook Road, approximately 2,000 ft away from the westerly boundary of the proposed development. Significant transmission improvements in the Fawnskin system are needed to provide fire flow to the proposed tract.

Currently, there are two groundwater production wells within the proposed residential tract. These wells are located in subarea A of the North Shore hydrologic subunit. It is our understanding that these wells will be deeded to the DWP at the time the tract map is recorded. The developer plans to equip the FP-2 well initially to meet the development projected water demands. The DWP will use excess capacity from this well to help reduce reliance on the leased North Shore Well No. 1. Groundwater production capacity from this well is estimated at approximately 100 gallons per minute. The second well (FP-3), located to the east of the FP-2 well, will not be initially equipped by DWP.

Pressure Zone Service Area

Based on the elevation range of the proposed development, 6,750 ft. to 6,950 ft., the development can be served off the Upper Fawnskin pressure zone. This pressure zone has an operating hydraulic grade of 7,113 ft. set by the high water level of the existing 0.25-million gallon Racoon Reservoir. Based on this hydraulic elevation, static pressures would range from a low of 71 psi at the highest point in Lot 18 to 157 psi near the lake. Individual pressure regulators would be required for all lots with static pressures exceeding 80 psi.

Water supply in the Fawnskin area is provided by two groundwater wells in the Lower Fawnskin pressure zone and by slant wells in the vicinity of the Racoon Reservoir. Excess groundwater production from the Lower Fawnskin pressure zone is conveyed to the Upper Fawnskin pressure zone through a booster station located at the Cline Miller Reservoir.

Water Demand

Projected water demand for the proposed development is based on the average consumption rate of 250 gallons per day per connection. Maximum day demand is estimated based on information provided in the recently completed water master plan and it is equivalent to 1.76 times the average day demand. Therefore, the average and maximum day demands for the proposed 50-lot subdivision are estimated as follows:

- Average Day Demand (ADD) = 12,500 gpd or 8.68 gpm
- Maximum Day Demand (MDD) = 15.27 gpm

Based on an estimated average day demand of 12,500 gallons, the annual water demand for the development is estimated at 4.56 million gallons or 14.00 ac-ft per year.

LOCAL AGENCY FORMATION COMMISSION
COUNTY OF SAN BERNARDINO

215 North "D" Street, Suite 204
San Bernardino, CA 92415-0490 • (909) 383-9900 • Fax (909) 383-9901
E-mail: lafco@lafco.sbcounty.gov
www.sbclafco.org

DATE: **JANUARY 24, 2008**

FROM: **KATHLEEN ROLLINGS-McDONALD, Executive Officer**

TO: **MATTHEW SLOWIK, Senior Planner**
Advance Planning Division – Land Use Services Department

SUBJECT: **WATER SERVICE TO TENTATIVE TRACT 16136; MOONCAMP RESIDENTIAL SUBDIVISION**

In response to your memorandum, dated January 15, 2008, I would like to provide a description of the three options for water service to this tract and the implications of Government Code Section 56133 to them from the LAFCO staff perspective.

First, Option #1, as previously identified to LAFCO staff, would be for the City of Big Bear Lake Department of Water and Power (hereafter DWP) to extend its infrastructure to serve the entirety of the residential subdivision. As I understand it, a portion of the tract is within the boundaries of the former SoCal Water Company which was condemned and acquired by the City of Big Lake and now operates under the DWP. Pursuant to the provisions of Government Code Section 56133 and LAFCO policies, the DWP has been authorized to continue to expand its services within the former boundaries of the SoCal system without the need for review and approval of LAFCO pursuant to Govt. Code Section 56133, but not beyond. Therefore, a review of the current project with our Special Counsel indicated that Option #1, to extend services by the DWP, was not viable since it would require consideration under §56133 which precludes service outside an agency's sphere of influence. None of the Fawnskin community is within the City of Big Bear Lake sphere of influence.

Please note that there is an area outside the existing DWP boundary defined as the former certificated service area of the SoCal Water Company that is receiving water service from DWP. The agreement between the DWP and Big

Bear Shores Homeowners Association was entered into in 1993, prior to the 1994 enactment of §56133. A copy of this agreement is included as an attachment to this memorandum.

Option #2, as presented to LAFCO staff, was the creation of a Joint Powers Authority (JPA) between the City of Big Bear Lake and County Service Area 53 Improvement Zone C (hereafter CSA 53C) to provide for domestic water service to the area outside the DWP system. CSA 53C was created with water powers to encompass the whole of the North Shore of Big Bear Lake including the entirety of the community of Fawnskin. This option is viable for the provision of domestic water service should it be the choice of the developers of the project.

Option #3, identified by LAFCO staff, would be for CSA 53C to own and/or install the domestic water system required by the project including development of wells and infrastructure and contract with the DWP to operate the system. CSA 53C, as noted above, includes the whole of the Fawnskin community, including areas inside and outside the service area of DWP, and is authorized water service as its only function. In the LAFCO staff view, such a management contract would be exempt from review by LAFCO under provisions of Government Code Section 56133 Subsection (e) which reads as follows:

> *"(e) This section does not apply to contracts or agreements solely involving two or more public agencies where the public service to be provided is an alternative to, or substitute for, public services already being provided by an existing public service provider and where the level of service to be provided is consistent with the level of service contemplated by the existing service provider..."*

The determination of exemption is made by the Commission following the receipt of a written request for consideration. The request shall include a copy of the contract for service, a map delineating the area to be served and a description of the manner in which the service is to be provided. Precedent for this procedure includes the contracts for service between the County (for law enforcement) and County Service Area 38 (Fire protection) and the City of Redlands related to service delivery to the "Donut Hole". A copy of these exemptions is included as an attachment to this memorandum.

Please contact me if you have any questions at (909) 383-9900.

/KRM

Attachments (3)

HARICH ENTERPRISES INC

Michael Perry
California Collaborative Solutions
P.O. Box 706
Big Bear City, Ca 92314

February 12, 2009

RE: Driller's Report and Pump Test for Moon Camp Well FP4

Dear Mr. Perry:

Enclosed please find the Well Completion Report and the results of the 48 hour constant rate pumping test for your Moon Camp Well FP4.

Harich Enterprises drilled Well FP4 at a 12" diameter to a total depth of 240 feet, with the screened interval from 100 to 240 feet and a 60' sanitary seal. Well FP4 is permitted through the County of San Bernardino as a municipal well. The well screen is a 6" diameter Roscoe Moss "Ful-Flo Louver" steel pipe. An Aquarium Sand filter pack was installed per the Special Districts Department specifications.

Static water level in the well was 22 feet measured on 2/4/09. The well was pumped at 3.4 gpm for 48 hours with the drawdown stabilizing at 87 feet (see enclosed Constant Rate Test Drawdown Chart).

Well FP4 was drilled in the northwest corner of the Moon Camp Tract as shown on the enclosed map.

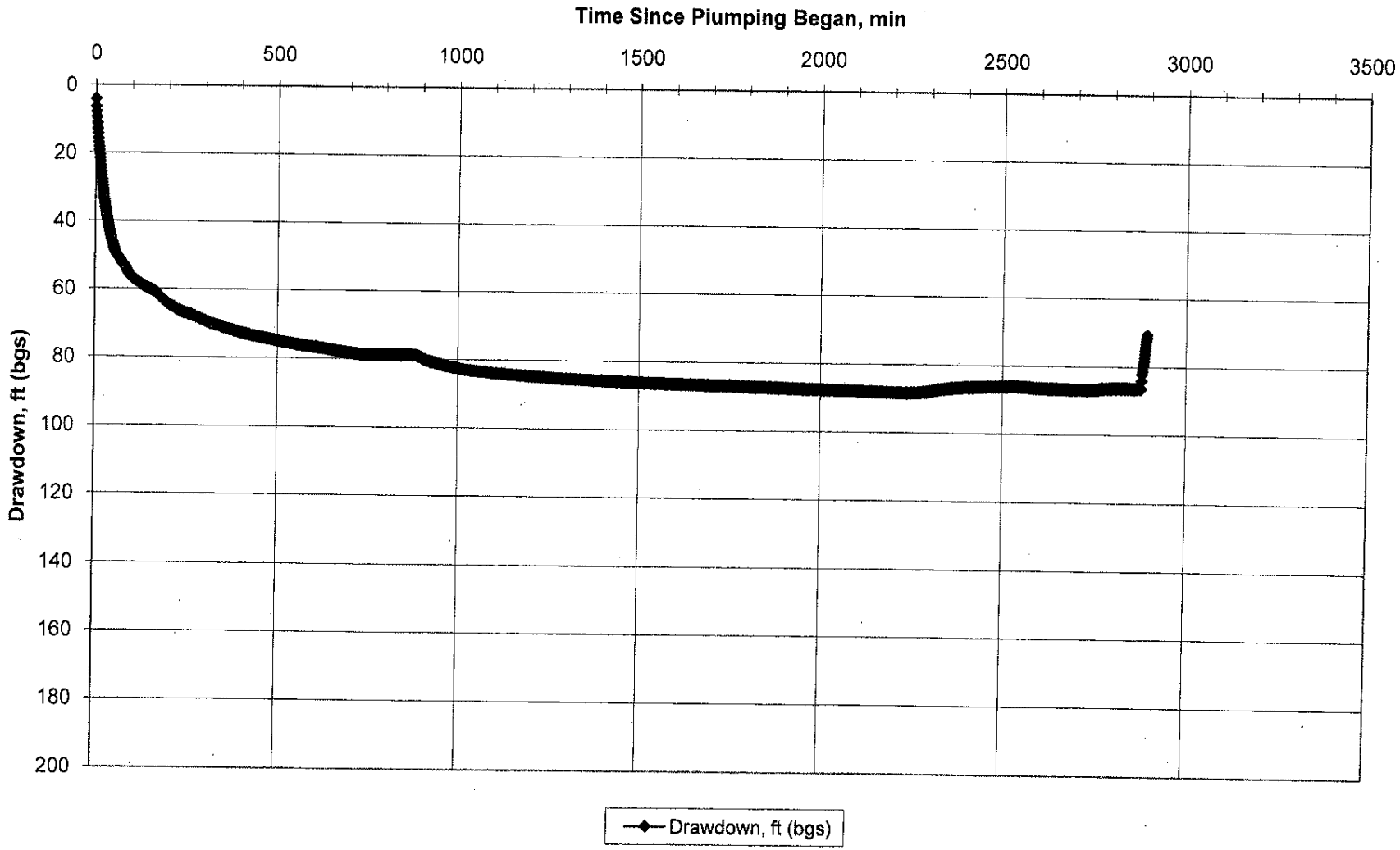
Please call me if you need any additional information.

Sincerely,

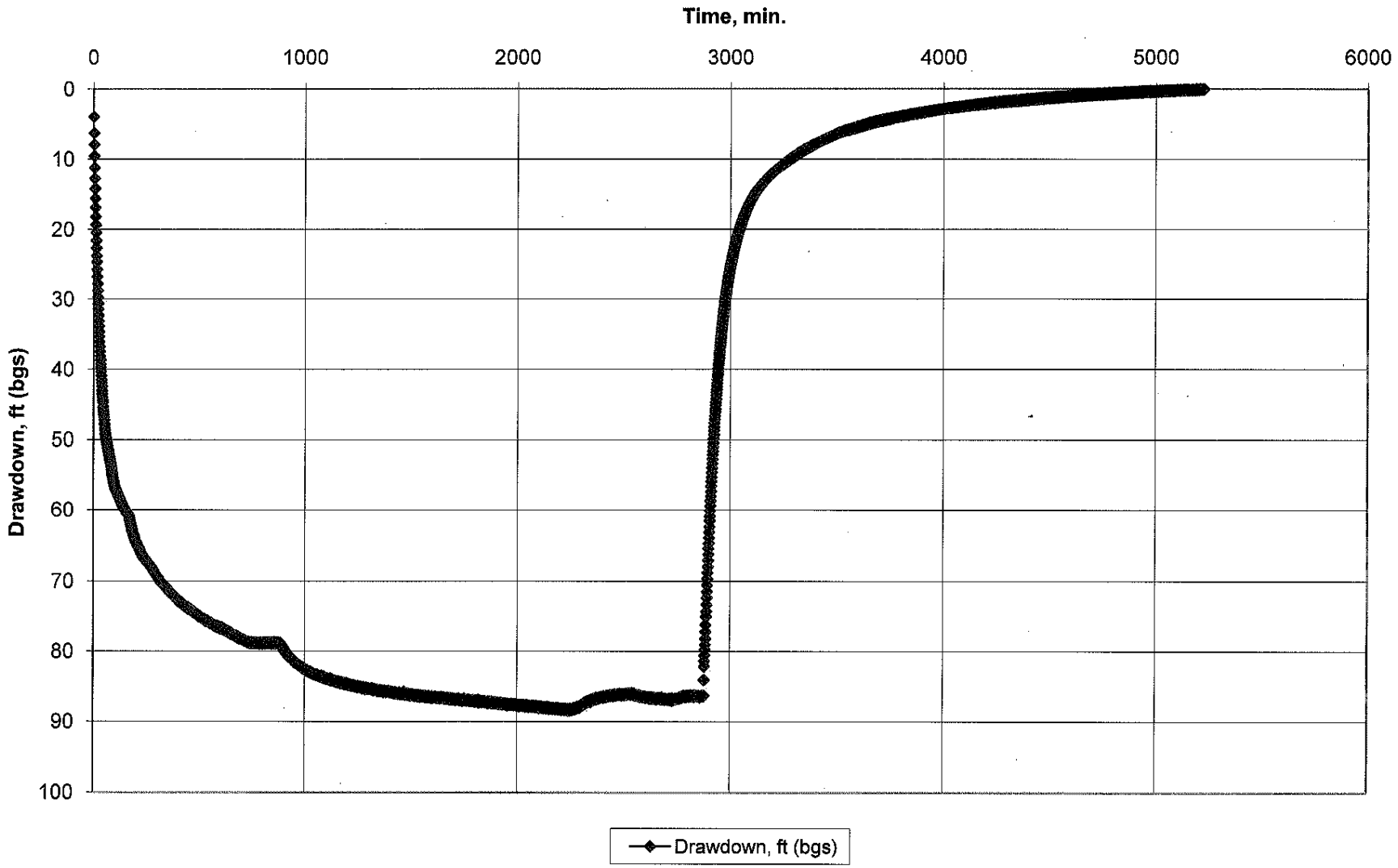
David Harich
Harich Enterprises Inc.

WATER RESOURCES DEVELOPMENT
POST OFFICE BOX 2233 RUNNING SPRINGS, CA. 92382
FAX (909)867-7759 / OFFICE (909) 867-2483

Constant Rate Test Moon Camp Well FP4
Constant Flow Rate at 3.4 GPM



Moon Camp Well FP4 Constant Rate Test at 3.4 GPM



TRIPLICATE
Owner's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e0085096

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./ STATION NO
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. WELL FP4
Date Work Began 12/17/2009 , Ended 2/6/2009
Local Permit Agency SAN BERNARDINO
Permit No. 2008100582 Permit Date 9/26/2008

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL — HORIZONTAL — ANGLE — (SPECIFY)
DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain, size, color, etc.
0	10	BROWN/RED/COBBLES/CLAY
10	20	BROWN/CLAY
20	40	BROWN/CLAY/GRAVELS
40	75	BROWN CLAY/PINK QUARTZITE
75	85	TAN/SANDS/GRAVELS/COBBLES/ 1st WATER
85	110	TAN/PINK/BLACK/COBBLES/SAND
110	120	BROWN/CLAY/GRAVELS
120	140	TAN/SAND (ADDITIONAL WATER)
140	150	TAN/GREY/BROKEN GRANITE(SMALL WATER)
150	240	GREY/SOLID GRANITE

TOTAL DEPTH OF BORING 240 (Feet)
TOTAL DEPTH OF COMPLETED WELL 240 (Feet)

WELL OWNER

Name TIM WOOD MOON CAMP
Mailing Address P.O. BOX 6820
BIG BEAR LAKE CA 92315
CITY STATE ZIP

WELL LOCATION

Address HWY 18 & CANYON RD.
City FAWNSKIN, CA CA 92333
County SAN BERNARDINO
APN Book 0304 Page 091 Parcel 22
Township 2 N Range 1 W Section 13
Latitude 34 15 56 N DEG. MIN. SEC. 116 56 15 W DEG. MIN. SEC.

LOCATION SKETCH
NORTH
WEST
EAST
SOUTH
See Attached
Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
Deepen
Other (Specify)
DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)
WATER SUPPLY
— Domestic ✓ Public
— Irrigation — Industrial
MONITORING
TEST WELL
CATHODIC PROTECTION
HEAT EXCHANGE
DIRECT PUSH
INJECTION
VAPOR EXTRACTION
SPARGING
REMEDIATION
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 80 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 22 (Ft.) & DATE MEASURED 2/4/2009
ESTIMATED YIELD 3.4 (GPM) & TEST TYPE PUMP
TEST LENGTH 48 (Hrs.) TOTAL DRAWDOWN 87 (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	60	12"				✓	STEEL	6"	.188	
60	100	12"				✓	STEEL	6"	.188	
100	240	12"		✓			STEEL	6"	.188	.093
							(Roscoe Mo	Ful-flo	Louvered	Pipe)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	60	✓			
60	240				AQUARIUM SAND

ATTACHMENTS (✓)

Geologic Log
Well Construction Diagram
Geophysical Log(s)
Soil/Water Chemical Analysis
Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME HARICH ENTERPRISES, INC. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
P.O. BOX 2233 ADDRESS
RUNNING SPRING CA 92382 CITY STATE ZIP
Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE
02/10/09 DATE SIGNED
618447 C-57 LICENSE NUMBER

DWR 188 REV 11-97
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

California Collaborative Solutions
Results of Rehabilitation and Aquifer Testing
Moon Camp Well FP-2

August 7, 2008

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91711
Tel: (909) 920-0707 Fax: (909) 920-0403
email: email@geoscience-water.com

THIS REPORT IS RENDERED TO CALIFORNIA COLLABORATIVE SOLUTIONS AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. ALL CALCULATIONS WERE PERFORMED USING ACCEPTED PROFESSIONAL STANDARDS.

AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

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A	Pumping Test Data
B	Water Quality Data
C	Microscopic Particulate Analysis

CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

1.0 INTRODUCTION

This report summarizes the results of rehabilitation and testing of Well FP-2, located in the vicinity of the proposed Moon Camp development, east of Fawnskin, California (see Figures 1 and 2). Well FP-2 is a potential water source for the development, however, prior to recent activities, it had not been pumped since its construction in 1987. In order to assess the suitability of the well for water supply, GEOSCIENCE developed and implemented a well rehabilitation and testing program.

1.1 Purpose and Scope

The purpose of rehabilitation and testing of Moon Camp Well FP-2 was to:

1) Assess the current condition of the well;

2) Develop a rehabilitation program adequate to restore the specific capacity of the well so that its potential yield and water quality could be evaluated;

3) Implement the rehabilitation and testing program; and

4) Collect and analyze the data necessary for evaluating aquifer characteristics including water quality, potential interference to nearby wells, and possible hydraulic continuity with Big Bear Lake.

The scope of work to address the objectives included:

1) Conducting a downhole video survey of the well;

2) Developing a rehabilitation and testing program and coordinating implementation of the program with a rehabilitation contractor;

3) Implementing the rehabilitation program;

4) Conducting a 72-hour aquifer pumping test;

5) Collecting ground water quality samples from the well and having them analyzed for full Title 22 suite and microscopic particulate analysis (MPA); and

6) Analysis of the data and preparation of the report.

1.2 Background

The Moon Camp Well FP-2 was drilled in 1987 by Howard Pump Company of Barstow, California, using the mud rotary drilling method. A 17-inch borehole was drilled to a depth of 50 ft below ground surface (bgs), below which a 15-inch borehole was drilled to the total depth of 385 ft bgs. Well casing and screen, consisting of 8 1/8-inch inside diameter (ID) mild steel with a 1/4-inch wall thickness was installed to a total depth of 380 ft bgs. The screened portion of the well consists of Johnson Hi-Cap, a type of wire-wrap, located at depths of 60 to 120, 156 to 176, 216 to 278, and 310 to 370 ft bgs. The well was equipped with a 2-inch sounding tube that attaches to the well casing just below the ground surface. The well was filter packed using an 8 x 16 Monterey Sand from the total borehole depth to 53 ft bgs. A 2-foot bentonite layer was placed above the filter pack from 51 to 53 ft bgs and a cement annular seal was placed above the bentonite layer from 51 ft bgs to the ground surface.

Following well construction, the well was developed by bailing and pumping. Following development, an 8-hour variable rate (step drawdown) test was performed. During this test, a maximum discharge rate of 100 gallons per minute (gpm) was achieved with a pumping water level of 26 ft bgs. The specific capacity calculated from data collected during this test was approximately 5 gpm per foot of drawdown.

2.0 DOWNHOLE VIDEO SURVEY

On May 2, 2008, Pacific Surveys, LLC, conducted a downhole video survey of Well FP-2. GEOSCIENCE personnel were on site to note observations made during the survey and to direct the operation of the camera as necessary.

At the time of the video survey, the depth to static ground water level was approximately 2 ft bgs. The camera reached a depth of approximately 376 ft bgs before visibility within the water column became so reduced (i.e. blackout conditions) as to warrant the removal of the camera.

The video survey showed that the blank well casing and screen was locally scaled and corroded although no obvious structural damage was observed. The blank well casing was coated with moderate to heavy scale, with encrustants occurring in localized patches, particularly along welded casing joints. Large mounds of encrustants became more frequent and larger with depth. The wire-wrapped screen sections showed minor to complete clogging with some localized patches of encrustants and tubercles. Where screens were open, no filter pack could be seen through the screen apertures. Some of the encrusting material was observed to be relatively fragile and brittle and became dislodged from contact with the video camera.

3.0 WELL REHABILITATION PROCEDURE

Based on review of the video log, GEOSCIENCE developed a chemical and mechanical rehabilitation program for Well FP-2[1]. Rehabilitation was performed by Roadrunner Drilling & Pump Company of Winnemucca, Nevada (Contractor). The rehabilitation program was initiated on June 27, 2008.

Initial rehabilitation of Well FP-2 included mechanical dislodging of encrusted material throughout the wetted portion of the well casing and screen using a spirally-wound nylon brush. Scale and debris were dislodged by gently raising and lowering the brush throughout the specified area. The Contractor brushed each wetted foot of blank well casing for one minute and each wetted foot of screen for two minutes, for a total of 10 hours brushing time. Following brushing, a bailer was used to remove material that had accumulated at the bottom of the well.

The well was disinfected through a combination of acidification and chlorination. Using a tremie pipe, acid was introduced throughout the length of the well. The acid was mixed into the screened portion by gently lifting and lowering a bailer tool. Once the pH of the well water had been lowered to approximately 4.5 pH units, a chlorine solution was added through the tremie pipe and worked into the screened portion of the well by lifting and lowering the bailer. Once the chlorine concentration of the water in the well exceeded 200 milligrams per liter (mg/L), the well was allowed to sit idle for 24 hours.

Following chlorination, the Contractor continued rehabilitation of Well FP-2 using a combination swab and airlift tool. Swabbing was accomplished by gently lifting and lowering the double-packer tool opposite 10-foot sections of the well screen, effectively dislodging any remaining biofilm and/or fine-grained sediment from the gravel pack and near well zone. Following several passes with the swab tool through a 10-foot screened interval, the interval was

[1] Letter to Michael Perry dated May 9, 2008

pumped (air lifted) using the tool until the discharged water was clear and free of sediment. The screened portion of the well was swabbed and airlifted for a total of 20 hours.

Following swabbing and airlifting, a submersible test pump was installed within the well for final development and testing. The test pump intake was installed at a depth of approximately 130 ft bgs. Initial pumping was performed at a relatively low flow rate (approximately 30 gpm) and was gradually increased as water clarity improved and sand production decreased. Pumping was periodically interrupted to surge the well. a process where water in the pump column is allowed to flow back into the screened section of the well. This process was repeated until the discharge water was clear and the sand content was less than 0.1 parts per million (ppm). The well was developed by pumping for approximately 11 hours. The maximum discharge rate during development was approximately 150 gpm with approximately 25 feet of drawdown.

4.0 AQUIFER PUMPING TEST

A 72-hour variable rate (step-drawdown) pumping test was conducted at Well FP-2 during the period from July 1 to 4, 2008. The well was pumped in 24-hour "steps" at average discharge rates of 35 gpm, 60 gpm and 105 gpm (see Figure 3). During the pumping test, the pumping water level, discharge rate, and sand content were closely monitored (see Appendix A). Ground water levels in a nearby private well, referred to as the Fujimoto Well (see Figure 2), were also monitored during the pumping test. The pumping test was followed by 4 hours of recovery measurements in both the pumping well and the observation well. The field procedure for the pumping test followed the American Society for Testing and Materials (ASTM, 1994), Standard Test Method D4050.

4.1 Pumping Test Methodology

4.1.1 Basic Assumptions Used in Analysis of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have been used to derive these equations, it is important to consider or control these factors during the test. These assumptions are:

- The aquifer material is assumed to consist of porous media, with flow velocities being laminar and obeying Darcy's law.
- The aquifer is considered to be homogeneous, isotropic, of infinite aerial extent, and of constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.

- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural (or other) recharge occurring, which would affect test results.
- The pumping rate is assumed constant during the entire time period of pumping during a constant-rate test, and constant during each discharge step in a variable-rate test.

4.1.2 Theis Equation

Estimation of aquifer parameters from pumping test data is based on analytical solutions of the basic differential equation of ground water flow that can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to wells is the "Theis Equation":

$$s(r,t) = \frac{114.6Q}{T} W(u) \qquad \text{"Theis Equation"} \qquad (1)$$

where:

s(r,t) = Drawdown in the vicinity of an artesian well, [ft]
r = Distance from pumping well, [ft]
Q = Discharge rate of pumping well, [gpm]
T = Transmissivity of aquifer, [gpd/ft]
W(u) = "Well function of Theis"

$$u = \frac{1.87r^2S}{Tt}$$

where:

S = Storativity, [fraction]

t = Time after pumping started, [days]

4.1.3 Jacob's Straight-Line (Modified Theis Non-Equilibrium) Method

According to Jacob (1950), for small values of "u" ($u < 0.05$), the Theis equation may be approximated by Jacob's equation:

$$s(r,t) = \frac{264Q}{T}\log\left(\frac{0.3\,Tt}{r^2 S}\right) \qquad \text{"Jacob's Equation"} \qquad (2)$$

Jacob's equation is valid for use for most hydrogeologic problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to estimate transmissivity and storativity. This method (D 4105) is summarized by ASTM (1994).

Transmissivity (T, in gpd/ft) can be estimated as:

$$T = \frac{264Q}{\Delta s} \qquad (3)$$

where:

Q = Pumping rate, [gpm]

Δs = Change in drawdown over one log cycle of time, [ft]

4.2 Pumping Well

Well FP-2 served as the pumping well for the 72-hour constant rate pumping test. The static ground water level in the well was measured to be approximately 6 ft bgs prior to the start of pumping. Ground water levels were measured during the pumping test and recovery phase using a downhole pressure transducer programmed to collect measurements at one-minute intervals. Additionally, an electric wireline sounder was used to manually collect ground water levels in FP-2 during the pumping and recovery phases.

The discharge rate was monitored with a flowmeter equipped with a totalizer and instantaneous rate gauge. During the course of the 72-hour pumping test, Well FP-2 pumped at average discharge rates of 35, 60, and 105 gpm (Steps 1, 2, and 3, respectively). The total volume of ground water pumped during testing was 289,350 gallons.

Ground water samples were collected during the 72-hour step test after approximately 44 hours of pumping (July 2, 2008). The samples were submitted to E.S. Babcock & Sons, Inc. of Riverside, California for analysis of constituents required by the State of California Code of Regulations Title 22 Rule as well as other selected constituents. A complete list of the constituents tested and their detection limits are provided in Table 1. Laboratory results of the water quality testing are presented in Appendix B.

A microscopic particulate analysis (MPA) was performed during the first 24 hours of the step drawdown test. After approximately 1,000 gallons of discharge water were run through a filtering apparatus, the filter was submitted to BioVir laboratories, Inc. of Benicia, California. The sample was analyzed according to EPA Method 910/9-92-029 including *Giardia* species and *Cryptosporidium*. Results of the MPA are presented in Appendix C.

4.3 Observation Well

Ground water levels were monitored before, during and after the pumping test in an observation well (a private well referred to as the Fujimoto Well) located approximately 910 ft east of Well FP-2. Water level measurements were collected and recorded in this well using a pressure transducer.

5.0 PUMPING TEST RESULTS

5.1 Production Well (FP-2)

As shown on Figure 3, Well FP-2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 ft of drawdown in the well. The well can also sustain a pumping rate of 105 gpm on a long-term basis although the rate of ground water level decline is greater. Analysis of the 105 gpm step using Jacob's straight-line interpretation shows an aquifer transmissivity of approximately 14,600 gallons per day per foot of drawdown (gpd/ft; see Figure 4). At a pumping rate of 105 gpm, the specific capacity of FP-2 is approximately 4.7 gpm/ft.

The specific capacity (the inverse of specific drawdown), of the well during Step 1 was less than the specific capacity measured during Steps 2 and 3. This results in a negative trendline when plotting specific drawdown with discharge rate, and thus, well efficiency cannot be calculated (see Figure 5).

Calculated recovery is a method of analysis whereby extrapolated drawdown data is compared to actual recovery data from the pumping well. It can be used to calculate transmissivity using Jacob's straight line interpretation in a similar manner as used with the pumping drawdown data. Results of the calculated recovery analysis for well FP-2 shows an aquifer transmissivity of approximately 8,900 gpd/ft (see Figure 6). Residual drawdown analysis, a method whereby residual drawdown (the difference between the static and recovering water level) is plotted with respect to the ratio between the time since pumping stopped and the time since pumping started, can also be used for calculating aquifer transmissivity using Jacob's straight line interpretation. Results of the residual drawdown analysis for Well FP-2 shows an aquifer transmissivity of approximately 9,600 gpd/ft (see Figure 7).

5.2 Observation Well

Ground water level data collected from the observation (Fujimoto) well, located approximately 910 ft east of Well FP-2, during the pumping test shows minor ground water pumping interference that can be attributed to pumping of Well FP-2. Given that the Fujimoto well was an actively pumping well that cycled on and off periodically during the pumping test, it was necessary to interpret pumping interference from Well FP-2 through the ground water level "noise" of the pumping observation well. To account for this, static ground water levels were used to interpret interference trends (see Figure 8). Interpretation of static ground water trends during the pumping test shows a decline of approximately 0.3 ft that can be attributed to interference from pumping Well FP-2 at a rate of 35 gpm.

5.3 Ground Water Quality

Ground water quality data from Well FP-2 indicate that water produced from the well is suitable for municipal supply. The water is of calcium-bicarbonate type (see Figure 9). The total dissolved solids (TDS) concentration was reported to be 300 mg/L, below the recommended California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 500 mg/L. Toluene was detected at a concentration of 1.2 micrograms per liter (µg/L), below the CDPH primary MCL of 150 µg/L, and is likely from materials used during installation of the test pump. Chloroform was detected at a concentration of 0.98 µg/L, below the USEPA MCL of 80 µg/L for trihalomethanes, and is likely a by-product of the chlorine used during rehabilitation of the well casing and screen. All other detected constituents were below their respective MCLs or notification levels.

The results of the water quality analyses are summarized in the following table:

Water Quality Analytical Data – Moon Camp Well FP-2

		Analysis Result	Drinking Water Regulatory Standards
Aluminum	[µg/L]	< 50	200[2]/1,000[1]
Arsenic	[µg/L]	< 2.0	10[1]
Boron	[µg/L]	< 100	1,000[3]
Chloride	[mg/L]	2.7	250-500[2]
Chromium, Hexavalent	[µg/L]	< 1.0	50[1,4]
Chromium, Total	[µg/L]	1.1	50[1]
Color	[Color Units]	< 3.0	15[2]
Fluoride	[mg/L]	< 1.0	2.0[1]
Iron	[µg/L]	< 100	300[2]
Manganese	[µg/L]	< 20	50[2]
Nitrate (as NO_3)	[mg/L]	< 1.0	45[1]
Odor	[TON]	< 1.0	3[2]
Perchlorate	[µg/L]	< 4.0	6.0[1]
pH	[pH Units]	7.5	6.5 - 8.5[5]
Silica, Total	[mg/L]	25	NA[6]
Specific Conductance	[µmhos/cm]	510	900-1,600[2]
Sulfate (as SO_4)	[mg/L]	5.2	250-500[2]
Surfactants (MBAS)	[mg/L]	< 0.05	0.5[2]
Total Dissolved Solids (TDS)	[mg/L]	300	500 - 1,000[2]
Total Hardness	[mg/L]	270	NA[6]
Turbidity	[NTU]	0.39	5[2]
Vanadium	[µg/L]	< 3.0	50[3]
1,2,3-Trichloropropane	[µg/L]	< 0.005	0.005[3]
Gross Alpha	[pCi/L]	1.74 +/- 1.33	15[1]
Radon	[pCi/L]	447 +/- 43.1	300-4,000[7]
Volatile Organic Compounds (EPA Method 524.2) except as noted below:	[µg/L]	ND	Varies with Chemical[1]
Chloroform	[µg/L]	0.98	80[8]
Toluene	[µg/L]	1.2	150[1]

1 California Department of Public Health (CDPH) primary maximum contaminant level (MCL).
2 CDPH secondary MCL.
3 CDPH notification level for unregulated chemicals.
4 Chromium-6 (hexavalent chromium) is regulated by CDPH under the 50 µg/L total chromium MCL.
5 United States Environmental Protection Agency (USEPA) secondary standard for pH.
6 Not Applicable – no current MCL.
7 USEPA proposed MCL and alternative MCL
8 Chloroform is regulated under the 80 µg/L USEPA MCL for total trihalomethanes.
ND Not detected above laboratory detection limit.
BOLD Equal to or above current CDPH MCL or notification level.

5.4 Microscopic Particulate Analysis

Microscopic particulate analysis (MPA) did not show any primary or secondary particulates in the well discharge, with the exception of plant pollen. The plant pollen identified was determined to be pine pollen, and is likely an airborne contaminant that contacted the sampling apparatus during field set-up. Given this, there is no evidence from the MPA that the ground water produced by Well FP-2 is under the direct influence of surface water in Big Bear Lake. A copy of the complete MPA report is presented in Appendix C.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected during this investigation, we have developed the following conclusions:

- Well FP-2 has successfully been rehabilitated and its specific capacity restored to near original levels;
- Extreme care should be exercised when equipping or redeveloping the well in the future to avoid damaging the wire-wrap screen. Although no clear damage was visible from the video survey, the screen design is fragile and can easily be damaged;
- Well FP-2 can yield up to 35 gpm on a long-term basis with less than 10 ft of drawdown;
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 ft;
- Ground water quality data from Well FP-2 indicates the water from the well is suitable for municipal supply;
- Microscopic particulate analysis of discharge water detected pine pollen on the sampling filter. However, the detection was likely the result of an airborne contaminant and not from ground water under the direct influence of surface water. Confirmation sampling and analysis may be necessary to verify this conclusion prior to permitting the well with the CDPH.

7.0 REFERENCES

American Society for Testing and Materials, 1994. ASTM Standards on Ground Water and Vadose Zone Investigations. 2nd Edition.

Jacob, C.E., 1950. Engineering Hydraulics. J. Wiley and Sons, New York.

Driscoll, Fletcher G., 1986. Groundwater and Wells. Second Edition. U.S. Filter/Johnson Screens, St Paul Minnesota.

G.5 - Recommendations for Ground Water Monitoring in the Mooncamp Development Area. (GEOSCIENCE, September 2004

GEOSCIENCE

September 2, 2004

Mr. Jerry Gruber
General Manager
City of Big Bear Lake Department of Water and Power
41972 Garstin Drive
P.O. Box 1929
Big Bear Lake, CA 92315

Subject: **Recommendations for Ground Water Monitoring and Management in the Moon Camp Development Area**

Dear Jerry:

As a follow-up to our 30-Jul-04 meeting at the County of San Bernardino regarding the proposed Moon Camp development near Fawnskin, this letter outlines a process to establish a monitoring well and develop a ground water monitoring and management plan (GWMP) specific to the tributary subarea within which the proposed development would be located. The maximum perennial yield of the tributary subarea surrounding the proposed development has been estimated to range from 14 to 44 acre-ft/yr. However, the relatively wide range of potential yield reflects the limited data available to determine the estimate. At the 30-Jul-04 meeting, the County of San Bernardino indicated they would not permit a project with a water supply requirement that exceeded the low end of the maximum perennial yield estimate until it could be demonstrated, with additional data, that the yield was indeed higher.

To refine the maximum perennial yield estimate and, perhaps more importantly, provide a basis for managing the ground water resources within the tributary subunit encompassing the proposed development, it is recommended to establish one or more monitoring wells (i.e. wells that are not pumped) in this area to enable the collection of ground water level data. Monitoring wells could consist of existing wells in the area or newly constructed wells. Future monitoring wells should be drilled and completed to the bedrock surface. The wells should be at least 4 inches in diameter (to allow for the collection of future water quality samples) and can be constructed of

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Schedule 40 PVC or mild steel casing and screen. The perforated intervals of the wells should be similar to those of nearby production wells.

The monitoring wells for the tributary subarea around the Moon Camp Development would be incorporated into the existing City of Big Bear Lake Department of Water and Power GWMP, which outlines a standard methodology for the collection of ground water data for the purpose of facilitating ground water management decisions. The types of data to be collected from the monitoring wells in accordance with the GWMP would include ground water levels and ground water quality. At least one of the monitoring wells should be established as a "key" monitoring well, in which a ground water level thresholds are identified to guide decision-making.

The location of monitoring wells will depend on the suitability of the existing U.S. Forest Service wells for production. It is planned to evaluate these wells in the near future. Using the information obtained from this evaluation, existing and/or proposed future monitoring wells will be identified.

If you have any questions, please call.

Sincerely,

Dennis E. Williams, Ph.D
President