GTHT - 1

ANNUAL REPORTS

2012

Annual Water Quality Monitoring Program Report

Annual Geothermal Well Report

DISCHARGE PERMIT GTHT-001

Los Lobos Renewable Power, LLC

Nick Goodman, CEO
136 South Main Street, Ste. 600
Salt Lake City, UT 84101

David W. Janney, PG
Senior Geologist | Agent for Los Lobos Renewable Power, LLC
AMEC Environment and Infrastructure
8519 Jefferson, NE
Albuquerque, NM 87113

January 31, 2013

MHenrie | Land ▫ Water ▫ Law

January 31, 2013

David K. Brooks
Assistant General Counsel
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Los Lobos Renewable Power, LLC ("Los Lobos")
2012 Annual Water Quality Monitoring Program Report
2102 Annual Geothermal Well Report

Dear Mr. Brooks:

Pursuant to the July 1, 2009 Discharge Permit ("D.P.") for Los Lobos' Lightning Dock Geothermal Project, pages 11-12, ¶20(F), and pages 16-17, ¶21(P), Los Lobos herein submits the following:

- 2012 Annual Water Quality Monitoring Program Report
- 2102 Annual Geothermal Well Report

Power plant startup is projected for 4th Quarter 2013. Thus, the 2012 Annual Reports reflect a situation where the monitoring programs have not yet been established and the geothermal wells are drilled and awaiting placement on production or injection. Even though there is limited information to report, we thought that it would be a good idea to start the annual reporting process this year.

Yours sincerely,

Michelle Henrie

michelle@mhenrie.com
505-842-1800
P.O. Box 7035 ▫ Albuquerque, New Mexico ▫ 87194-7035
126 E. DeVargas ▫ Santa Fe, New Mexico ▫ 87501

Annual Water Quality Monitoring Program Report

DISCHARGE PERMIT GTHT-001
Los Lobos Renewable Power, LLC

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136 South Main Street, Ste. 600
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8519 Jefferson, NE

January 31, 2013

Los Lobos Renewable Power, LLC
2012 Annual Water Quality Monitoring Program Report

Los Lobos Renewable Power, LLC ("Los Lobos") hereby submits its 2012 Annual Water Quality Monitoring Program Report pursuant to ¶20(F) of its Discharge Permit, dated July 1, 2009.

Background

Overview. Los Lobos is the operator for two BLM Geothermal Resources Leases, NM-34790 (2,500.96 acres) and NM-108801 (640.00 acres), in Hidalgo County, New Mexico. Los Lobos and its sister company, Lightning Dock Geothermal HI-01, LLC ("LDG") (both of which are owned by Cyrq Energy, Inc.), are in the process of developing the Lightning Dock geothermal resource to use geothermal fluids to generate electricity on a utility scale. Los Lobos expects the first phase of the power plant to be built and become operational in calendar year 2013. All wells intended for use in the first phase have been drilled (LDG 45-7, 47-7, 53-7, 55-7, and 63-7).

Technology. Los Lobos plans to use a binary-cycle technology, which does not require steam (water vapor) to turn a turbine. Instead, geothermal heat warms a working fluid, which vaporizes at a lower temperature than water. This working fluid, when vaporized, turns the turbine to generate electricity. Thus, the technology involves two closed loops.

In the first closed loop, the hot geothermal fluid is pumped to the surface via a production well. The hot geothermal fluid—contained in a pipeline—enters the power plant at over 250° F and flows through a heat exchanger that transfers the heat to a working fluid. Subsequently, 100% of the geothermal fluid, cooled slightly to between 140° F -160° F, is injected via an injection well into the same geothermal fluid flow interval. The fluid is then naturally reheated to be used again and again. From the point where the geothermal fluid leaves the geothermal reservoir to the point where it returns to the reservoir, it remains in a pipe, under pressure and in the fluid phase the whole time. It does not flash or comingle with the working fluid, shallow freshwater aquifers, or air. Nothing is added to the fluid, there is no surface ponding, no holding tanks, no evaporative losses. The fluid is contained in a pipe or well casing during its entire journey, it is chemically unaltered, and is never exposed to the atmosphere.

The second closed loop contains the working fluid. The working fluid, too, is continuously contained in pipes. The working fluid gathers heat from the heat exchanger, vaporizes, turns the turbine, becomes cooled via the air-cooling fans, and then returns to the heat exchanger to recycle again and again. Please see Figure 1.

Los Lobos anticipates that, at phase two of project build-out (which will expand power-production capacity to 10 MWh), the total volume of geothermal fluid displaced from the

geothermal reservoir and suspended in steel well casing or power plant pipes at any given time will be approximately 0.69 Acre Feet (or ~225,000 gallons).

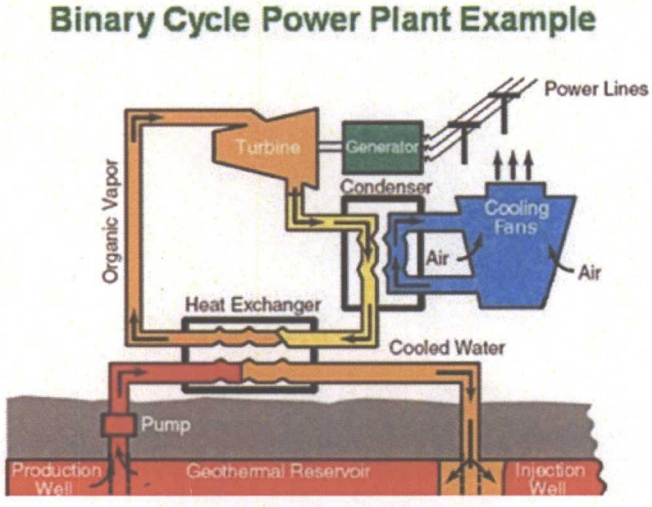

Figure 1

Because the fluids are constantly recycling through the geothermal reservoir at a steady rate, Los Lobos expects the geothermal reservoir to maintain equilibrium once the project is up and running.

Public Interest. The Lightning Dock Geothermal project uses geothermal fluids to generate electricity on a utility scale. By contract, this electricity will be sold to PNM and used by New Mexico customers. This project is in the public interest because geothermal heat is a renewable source of energy. In addition, geothermal heat is constant. Therefore it provides base load (i.e., 24/7) power, unlike wind and solar. Unlike other base-load sources of energy such as coal and natural gas, geothermal electricity is produced with no emissions.

No Waste. Because the Lightning Dock Geothermal project relies on a geothermal closed-loop system, resulting in no net depletion of the geothermal reservoir, and is constantly returning the thermally depleted fluids to the geothermal reservoir for reheating, the project is in the interest of conservation. Further, the project prevents waste because the geothermal fluids will be beneficially used to generate electricity that will be used by New Mexico customers.

Correlative Rights. Existing leases in the Lightning Dock geothermal area are: Los Lobos/LDG (3,140.96 acres of geothermal resources leased from BLM), Rosette, Inc. (313.59 acres of geothermal resources leased from NM State Land Office) and AmeriCulture, Inc. (10 acres of geothermal resources leased from NM State Land Office). In addition, the McCants family owns at least 240 acres of property with mineral rights in the Lightning Dock geothermal area. The Lightning Dock Geothermal project protects correlative rights and allows each leaseholder and owner their just and equitable share of recoverable geothermal resources.

Discharge Permit Requirements

1. **Cover Sheet.** Please see cover page.

2. **Comprehensive summary of all water quality monitoring data.** Los Lobos intends to drill water quality monitoring wells in 2013 so that it can timely begin its water quality monitoring program at power plant start-up. At this point in time, water quality data for the geothermal reservoir is available from samples collected from wells LDG 45-7, LDG 53-7, LDG 55-7 and LDG 63-7. A 2012 comprehensive summary of these samples is included at **Tab A**.

3. **Summary charts and tables depicting the constituents that have ever exceeded the ground water standards (20.6.2.3103 NMAC) or "background," or if any toxic pollutant has been detected (20.6.2.7(WW) NMAC).** At **Tab A**, Los Lobos provides information relevant to "background" for the Lightning Dock geothermal reservoir. As this summary table shows, in the Lightning Dock geothermal area, naturally occurring fluoride exceedes the WQCC ground water standards in 2012. Los Lobos is not aware of any detected toxic pollutant in the Lightning Dock geothermal area in 2012. Los Lobos intends to further establish background during 2013 so that it can timely begin its water quality monitoring program at power plant start-up.

4. **Description and reason for any remedial work on wells, ponds, ditches, etc.** In 2012, Los Lobos performed a workover of well LDG 45-7. The G-103 and Cleanout and Completion Handbook are included at **Tab B**.

5. **Copies of chemical analyses in accordance with Permit Condition 20 (Water Quality Monitoring Program).** Los Lobos expects the first phase of the power plant to be built and become operational in calendar year 2013. Thus, Los Lobos intends to begin implementing Discharge Permit Condition 20 during 2013 (e.g., ground water monitoring programs and further establishing "background").

6. **Copies of any leaks and spill reports submitted in accordance with Permit Condition 15.** Please see **Tab C** for copies of spill reports submitted by Los Lobos in 2012

7. **Miscellaneous section to include any other issues that should be brought to OCD's attention.** (A) Pursuant to ¶15 of the Discharge Permit, please know that Los Lobos anticipates the following modification to the process permitted by the Discharge Permit: Los Lobos plans to use air-cooling instead of water-cooling in power plant operations. This should result in a significant change affecting the permitted discharge of water contaminants. With air-cooling, no discharge of water contaminants is anticipated. Please see **Tab D** (affidavit of Nicholas Goodman). (B) On December 11, 2012, the New Mexico Public Regulation Commission approved a Geothermal Power Purchase and Sale Agreement between PNM and LDG for electricity generated at the Lightning Dock Geothermal project.

8. **Certification Form.** Please see following page.

MHenrie | Land ▫ Water ▫ Law

January 31, 2013

David K. Brooks
Assistant General Counsel
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Los Lobos Renewable Power, LLC ("Los Lobos")
2012 Annual Water Quality Monitoring Program Report

Dear Mr. Brooks:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

I further certify that I am a principal executive officer of at least the level of vice-president for Los Lobos.

Yours sincerely,

Nicholas Goodman

Name: Nicholas Goodman

Title: CEO

michelle@mhenrie.com
505-842-1800
P.O. Box 7035 ▫ Albuquerque, New Mexico ▫ 87194-7035
126 E. DeVargas ▫ Santa Fe, New Mexico ▫ 87501

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

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Form C-103
Adopted 10-1-74
Revised 10-1-78

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease: State ☐ Fee ☐
5.a State Lease No.: NM 34790

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☒ Temp. Observation ☐ Low-Temp Thermal ☐ Injection/Disposal ☐
7. Unit Agreement Name: NA
2. Name of Operator: Lightning Dock Geothermal HI-01, LLC
8. Farm or Lease Name:
3. Address of Operator: 136 S. Main Street, Ste 600, Salt Lake City, UT 84101
9. Well No.: LDG 45-7
4. Location of Well: Unit Letter 2360 Feet From The South Line and 2278 Feet From The West Line, Section 7 Township 25S Range 19W NMPM.
10. Field and Pool, or Wildcat: Lightning Dock Geothermal
15. Elevation (Show whether DF, RT, GR, etc.)
12. County: Hidalgo

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG & ABANDONMENT ☐
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☒		OTHER ☐	

17. Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 203.

RECEIVED
MAR 16 2012
NMOCD ARTESIA

Move on location and rig-up pump pull rig
Pull pump for reconditioning
Rig-down and move off pump pull rig
Move on and rig-up drilling rig
Clean out well
Rig-up geophysical loggers and log well
Rig-down loggers
Run slotted liner
close master valve, rig-down and move off location

Please see the attached LDG 45-7 Cleanout & Completion Program by Capuano Engineering Consultants for the details of this program.

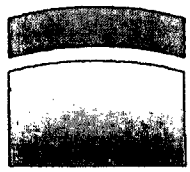
This 6-103 has been accepted with "Like Approval by BLM" After the BLM Change on Page 7, with that correction, This 6-101 is accepted and Approved.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED _____ TITLE Attorney for Operator DATE 3/16/2012

APPROVED BY R. A. Dade TITLE Dist II Supervisor DATE 03/16/2012

CONDITIONS OF APPROVAL, IF ANY:



CyrQ

Lightning Dock
geothermal

LDG 45-7
Cleanout &
Completion Program

Designed and Prepared By:

CAPUANO
ENGINEERING
CONSULTANTS

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

CAPUANO
ENGINEERING
CONSULTANTS

3883 Airway Drive
Suite 210
Santa Rosa, CA 95403
TELEPHONE: (707) 575-8740

Drilling Program	
Operating Company	Lightning Dock Geothermal HI-01, LLC
Field	Lightning Dock
Well	45-7
Location	Hidalgo County, NM
Well Type	Production Well
Drilling Engineer	Louis Capuano III
Date of Issue	February 29, 2012

		Signature	Date
Prepared	Louis Capuano III		
	Drilling Engineer	Capuano Engineering Consultants	
Accepted	Michael Hayter		
	Project Management	Cyrq Energy	

Table of Contents

Section:

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

Section A: General Well Information

Well Information Table	
Lightning Dock Geothermal HI-01, LLC	45-7
Location	Section: 7, Township: 25S, Range: 19W County: Hidalgo County State: NM
Elevation	GL: 4202'
	KB: 13'
Final Total Depth	2900' MD
Surface UTM Coordinates	32° 8'39.89" N, 108°50'16.15" W
Bottom Hole Target	64.4'S and 1.9' E of surface location
Target Zone:	Volcanic Tuff

Section	Maximum Depth of Section		Casing
OH	MD	TVD	
36"	48'	48'	30", 139 ppf, J-55 Welded Line Pipe
26"	411'	411'	20", 94 ppf, J-55, BTC Casing
17-1/2"	1680'	1679'	13-3/8", 54.5 ppf, K-55, BTC Casing
12-1/4"	2900'	2899'	9-5/8", 36 ppf, K-55, BTC Slotted Liner w/ TOL at 1600'

Wellhead Information	
Flange Size	Pressure Test (psi)
13-3/8" SOW x ANSI 12", 400 Series	1000

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

Overview:

LDG 45-7 is a pumped production well. The well was drilled from Dec 2010 to Feb 2011. However, the completion was delayed by logging and wellbore problems. The object of this operation is to complete the original plan for the well. The bottom hole section from 1680' to TD at 2900' is open hole completion. There is a 12" line shaft pump installed in the wellbore to 960'. The pump has three different strings of pipe that are (starting with the inner most shaft) the drive shaft, the lubricator string and the pump casing. This workover operation will begin with the removal of the line shaft pump. Once the pump is removed a BOP stack including a master valve will be placed on the wellhead. The BOP will be tested before proceeding into the wellbore. The well will then be cleaned out to a total depth of 2900'. Once clean out has occurred the well will be logged for fracture identification. After logging the rig will complete the well with a slotted 9-5/8" liner. The liner will be set on bottom with a liner adapter on top.

Safety, Hazards and Special Considerations:

Section B: Pump Removal Program
During the removal of the pump cool water must be flowed down the backside of the wellbore in order to keep the well killed. If no water is kept flowing down the annular space, the well will become active and want to flow.

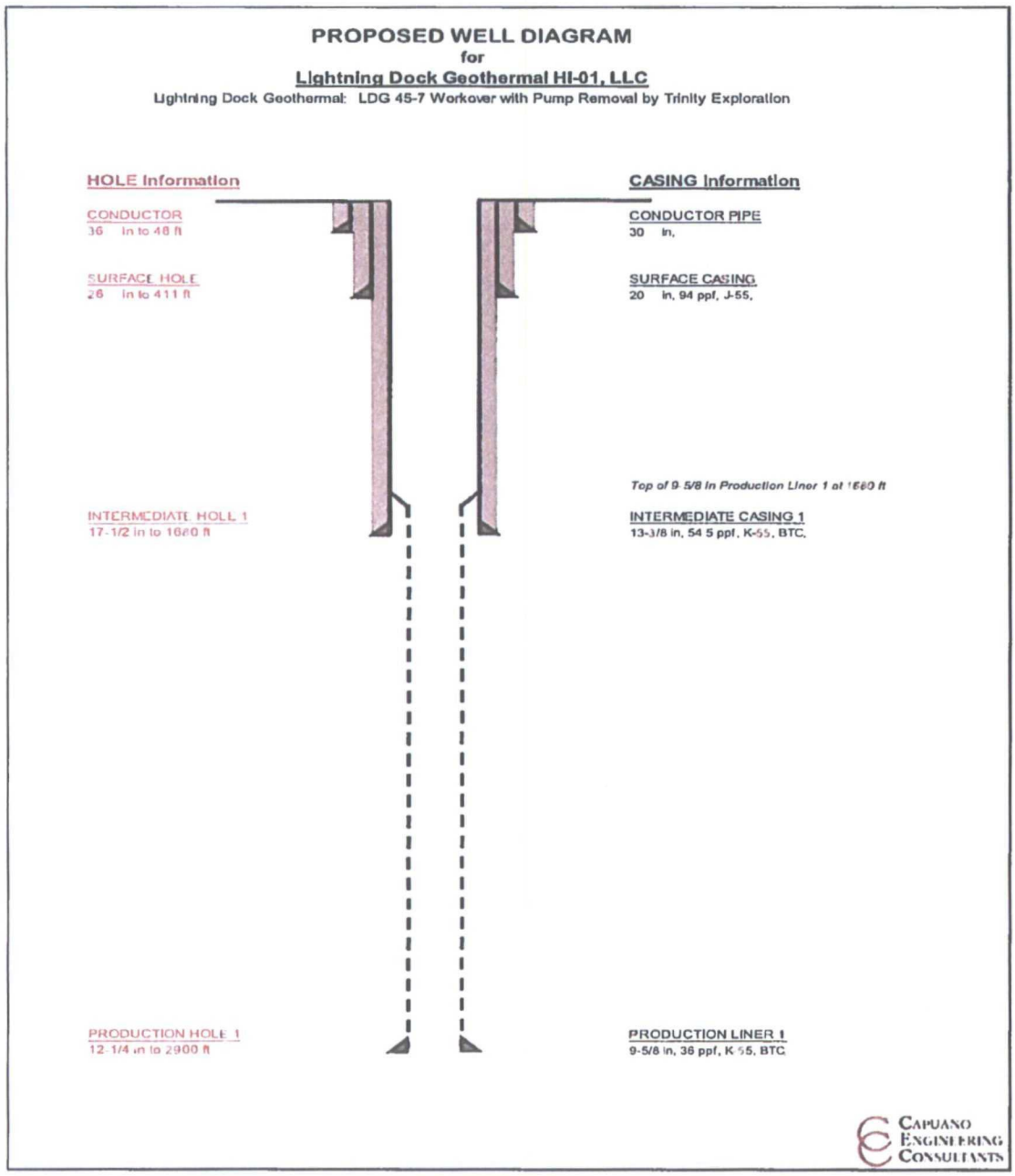
It is essential to handle the pump motor, bearings, seals and bells with the up most care. These pieces of equipment are very fragile and can be damaged easily.

The lubrication string will be filled with oil. This oil needs to be collected and contained. Standard clamps, rings, hoses and storage containers should be utilized to prevent contamination. Be aware when breaking the connection that the string will be full of oil.

Section C: Cleanout of 12-1/4" Hole and Placement of 9-5/8" Slotted Liner Program
The original 12-1/4" hole section was not completed with any type of slotted or perforated casing. The potential of a bridge to exist in the wellbore is very high and as the well is flowed more often the potential of future bridges grows every day. So a clean out run to bottom is needed to ensure that the hole is in gage and the wellbore is clean.

The rig will encounter lost circulation and should expect to handle the problem with aerated water. At no time will mud be used during the clean out of the hole. Mud will plug the producing formation and could permanently damage the well. Aerated water should be used as the drilling fluid.

Wellbore Schematic



Section B: Pump Removal Program

Spoke w/ Louis Capuano III. These depths are a misprint 45-7 was not deepen below 2900' M. S. 03/14/2012 1530 PM MT

~~12-1/4" Hole Section to 4000' MD / 3406' TVD (9-5/8" Slotted Liner):~~

Safety / Hazards Considerations in This Section:
During the removal of the pump cool water must be allowed to flow down the backside of the wellbore in order to keep the well killed. If no water is kept flowing down the annular space, the well will become active and want to flow.

It is essential to handle the pump motor, bearings, seals and bells with the up most care. These pieces of equipment are very fragile and can be damaged easily.

The lubrication string will be filled with oil. This oil needs to be collected and contained. Standard clamps, rings, hoses and storage containers should be utilized to prevent contamination. Be aware when breaking the connection that the string will be full of oil.

Program:

1. Rig up pump pulling unit on location and over the 45-7 pump head.
2. Remove pump motor and set aside.
   2.1. Secure shaft with dog collar.
3. Use power tongs to unscrew pump casing and shafts.
   3.1. Cut off strapped ¼" tubing and try to save on spool.
   3.2. Keep drive shaft inside of lubrication string and lubrication string inside of the pump casing.
      - Keep all shafts within each other and stack joints.
   3.3. Continue to remove pump until Bells are at surface.
   3.4. Lay down bells and housing.
4. Rig down pump pulling unit.
5. Carefully stack and haul off pump equipment for refurbishing.
6. At all times continue to flow cool water down the wellbore.

Section C: Cleanout of 12-1/4" Hole and Placement of 9-5/8" Slotted Liner

Safety / Hazards Considerations in This Section:
The original 12-1/4" hole section was not completed with any type of slotted or perforated casing. The potential of a bridge to exist in the wellbore is very high and as the well is flowed more often the potential of future bridges grows every day. So a clean out run to bottom is needed to ensure that the hole is in gage and the wellbore is clean.

The rig will encounter lost circulation and should expect to handle the problem with aerated water. At no time will mud be used during the clean out of the hole. Mud will plug the producing formation and could permanently damage the well. Aerated water should be used as the drilling fluid.

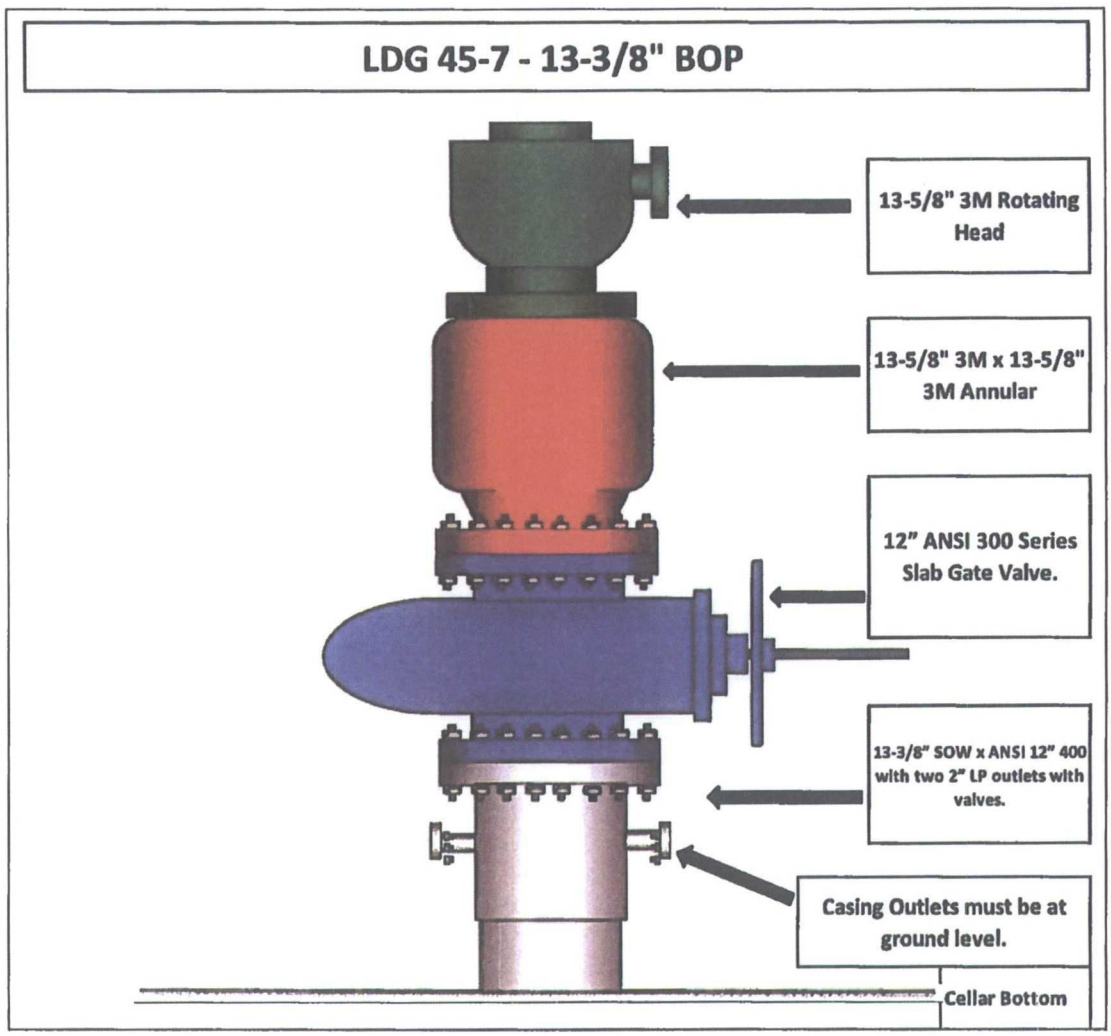
Bit & Hydraulics Program		**Mud Program**	
Bit Type	12-1/4" Tri-cone	Mud Weight	8.3
Nozzles	3 x 26	Mud Type	Water
IADC Code	5-1-7 to 6-1-7	Funnel Vis	< 40
RPM	75 – 100 RPM	YP	< 20
Pump Rate	300 – 600 gpm	PH	7
Expected Formations	Tuff, Limestone and Sandstone	Filtrate	< 5
		Solids	< 2% by Volume
12-1/4" Cleanout BHA	12-1/4" Bit, 1 x 6-3/4" DC, 12-1/4" String Stabilizer, 6 x 6-3/4" DC, Jar, 2 x 6-3/4" DC, XO, 10 x 4" HWDP		

Drilling:

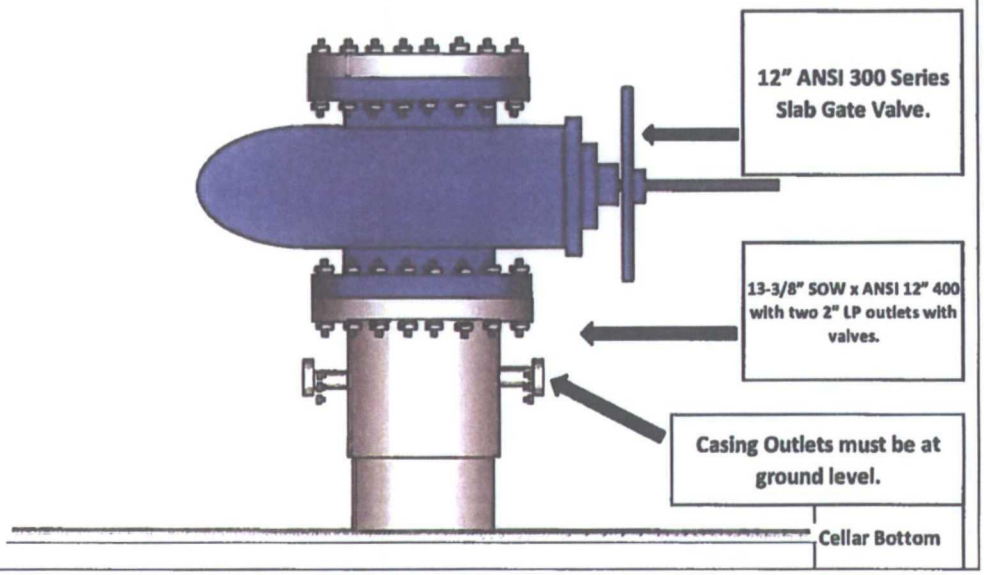
1. Rig up drilling rig over 45-7.
2. Nipple up BOP stack as follows:
   2.1. 12" 300 Series Master Valve.
   2.2. 12" 300 Series x 12" 900 Series Spool.
   2.3. 12" 900 Series Pipe Rams
   2.4. 12" 900 Series Flow Tee.
   2.5. 12" 900 Series Rotating Head
3. Function test BOPs.

4. Build Blooie Line and muffler system.
5. Hook up aerated drilling system.
6. Test Master Valve and Choke System.
7. Make up 12-1/4" Conventional BHA and run to the 1st joint of drill pipe.
8. Space out tool joint and test Pipe Rams and Casing.
9. Continue to RIH to the shoe of the 13-3/8" casing at 1680'.
10. Trip in to the well to 2900'.
    - 10.1. Cleanout and ream any tight sections or bridges that are encountered.
    - 10.2. Make all connections off bottom and never let the pipe sit on bottom without circulation and rotation.
    - 10.3. Continue to use clean water as a drilling fluid.
    - 10.4. Use aerated fluid for cuttings carrying capacity.
11. Once at 2900' pull out of the hole.
12. Rig up loggers and log the well.
    - 12.1. The loggers should be running a FMI log, Pressure/Temperature and possibly gamma or sonic.
13. Rig down loggers.
14. Trip back to bottom with assembly to ensure that the hole is still in gage.
15. Pull out of the hole.
16. Run approximately 1300' of 9-5/8", 36 ppf, K-55, BTC perforated liner on a 13-3/8" x 9-5/8" liner adapter.
    - 16.1. Plan liner for an 80' liner lap with blank casing.
      - The bottom 4 joints and the top 3 joints should be blank.
      - The rest of the liner is slotted.
    - 16.2. Adjust the amount of perforated liner based on the final TD.
    - 16.3. Equip liner with a drillable guide shoe.
    - 16.4. Weld the bottom four joints of casing.
    - 16.5. Run liner in the hole on 4" drill pipe.
    - 16.6. Tag bottom and pick up 3'.
    - 16.7. Set liner adapter, release running tool and pull out of the hole.
17. Close Master Valve and Rig Down.

Section D: BOP Wellhead Diagrams



LDG - 45-7 -Final Wellhead



MHenrie | Land ▫ Water ▫ Law

March 22, 2012

Director Jami Bailey
Division Director
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Carl Chavez
Environmental Bureau
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Los Lobos Renewable Power

Dear Director Bailey and Mr. Chavez:

Enclosed per your request, please find a form C-141 relating to my client's injection of tracer dye into the shallow geothermal aquifer near its proposed power plant facility in Hidalgo County, New Mexico. I recognize that your office needs information about the injection given AmeriCulture's complaint. I also understand that there is not a "perfect fit" form for this situation, which seems to be novel in many ways. So, per your guidance, we have prepared the form C-141 and also attached some additional information to provide your office with requested information.

In this letter, I specifically wanted to address what I consider to be a grey area in regulations. I also wanted to answer your question about communications with the State Engineer's Office.

Los Lobos' Discharge Permit for the geothermal project states as follows:

> **15. Spill Reporting**: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and shall conduct corrective actions pursuant to WQCC Regulation 20.6.2.1203 NMAC and 19.15.29 NMAC. The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days. The owner/operator shall notify OCD of any fire, break, leak, spill or blowout at any geothermal drilling, producing, transporting, treating, and disposal or utilization facility in the State of New Mexico by the person operating or controlling the facility pursuant to 19.14.36.8 NMAC.

michelle@mhenrie.com
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P.O. Box 7035 ▫ Albuquerque, New Mexico ▫ 87194-7035
126 E. DeVargas ▫ Santa Fe, New Mexico ▫ 87501

The above-cited regulations are (a) the Water Quality Control Commission Regulations for Ground and Surface Water Protection and (b) the Oil and Gas Regulations for Release Notification. The EPA has given New Mexico primacy in water quality issues. The Water Quality Control Act gives NMED jurisdiction over most water quality issues. Some water quality issues have been delegated to OCD. Reading the above-cited Regulations together, I understand them to say that where OCD has jurisdiction, notice of "spills" etc. is to OCD and follows OCD requirements, not NMED's. Both regulations discuss corrective actions, and both cite to the same triggering standards for clean up: either "toxic pollutants" or exceedance of the thresholds stated at 20.6.2.3103 NMAC. In addition, there are separate Geothermal Regulations specific to "Fire, Breaks, Leaks, Spills and Blowouts" at 19.14.36.8 NMAC, which don't trigger at amounts less than 25 barrels.

I want to reiterate that I do not believe that this situation involves "toxic pollutants" or any exceedance of the thresholds stated at 20.6.2.3103 NMAC. Nevertheless, as you will see in the form C-141, corrective or remedial actions have been taken. Those actions have been taken (a) to address community concerns and (b), specifically with regard to AmeriCulture, pursuant to a contractual indemnity provision.

With that backdrop, I fully recognize that there were several uncertainties about whether and how to permit a tracer test in a low temperature geothermal aquifer. One question is how to characterize the injection of an EPA-approved tracer dye like Rhodamine WT. In your letter, you were express (and I appreciated the clarification) that your office is not now asserting that the tracer test was an "unauthorized" discharge or release. Absent the clarification, I would be concerned that use of form C-141 suggests that such an injection is a "release" per the Oil and Gas Regulations (oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixtures of those chemicals or contaminants that occur during drilling, producing, storing, disposing, injecting, transporting, servicing or processing and to establish reporting procedures. 19.15.29.6 NMAC). In recent communications with NMED Staff, I understand that their office often receives Notices of Intent to discharge for tracer tests so they know what is going on—but these tests do not necessarily require a permit. Going forward, for tracer tests in geothermal aquifers, we might suggest such a path for OCD.

I think another uncertainty stems from the situation involving a low-temperature geothermal aquifer. As between the State Engineer and the OCD, the Legislature has given a dividing line: 250° F. So, for use of water under 250° F, the Water Code governs and water rights are required. But what about determinations relating to geothermal water quality under the Water Quality Act? Does the temperature matter? I have heard different positions on this issue.

From your letter, I appreciated a third area of uncertainty. Your office apparently characterized the tracer test as a matter of "aquifer delineation." This helped me understand why your office thought that the State Engineer's Office should be involved because the State Engineer manages the waters of the State.

However, in my experience with the Office of the State Engineer, they do not permit the injection of tracer dye—which, in their eyes, is a water quality issue, not a water rights issue. My client relied on my experience, and I am not aware of any discussions with anyone from the State Engineer's Office about this issue prior to the test.

After my client performed this tracer test, I talked with several State Engineer employees who confirmed that my understanding was correct, including WRAP Director, John Romero. That being said, this tracer test involved more than dye injection—it also involved flushing. The State Engineer's Office does need to permit the use of water to flush the dye, and I am now working with the District III Office of the State Engineer to come into compliance on this issue.

Please let us know if we can provide any more information.

Yours sincerely,

Michelle Henrie
Attorney for Lightning Dock Geothermal HI-01, LLC and Los Lobos Renewable Power, LLC

cc. OCD District II Office, Artesia

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company	Los Lobos Renewable Power, LLC	Contact	Mike Hayter (801) 875-4200 or
Address	136 S. Main, Ste. 600, Salt Lake City, UT 84101	Telephone No.	David Janney (505) 821-1801
Facility Name	Lightning Dock\	Facility Type	Geothermal

Surface Owner State Trust Land	Mineral Owner State (Lessee is Rosette, Inc.)	API No. None

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	6	25 S	19 W	345'	South line	930'	East line	Hidalgo

Latitude 32.152859°N **Longitude** 108.830964°W

NATURE OF RELEASE

Type of Release Minor	Volume of Release 400 gallons (9.53 barrels)	Volume Recovered 0
Source of Release Tracer dye injected for testing	Date and Hour of Occurrence January 23, 2012, noon-1:00 PM	Date and Hour of Discovery Approx. February 16, 2012
Was Immediate Notice Given? ☒ Yes (Prior Notice) ☐ No ☐ Not Required	If YES, To Whom? Work Plan sent by David Janney(AMEC), to Randy Dade and Craig Shapard (Artesia OCD) and Carl Chavez (Santa Fe OCD) on January19, 2012; follow up telephone discussion by Michael Hayter (Los Lobos RP, LLC) and David Janney (AMEC) to Jami Bailey, David Brooks, and Carl Chavez (Santa Fe OCD) on January 19, 2012, at approximately 1:30 PM.	
By Whom? David Janney, AMEC	Date and Hour See above	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	
If a Watercourse was Impacted, Describe Fully.* N/A		

Describe Cause of Problem and Remedial Action Taken.* Injection of tracer dye in Rosette's State Well #7 (State Engineer well number A-36-A S17) for tracer test.

Purpose for Test. During pump testing of Well LDG 45-7 in December 2011, monitoring of Rosette State Well #7 suggested that this well could be ıected with Well LDG 45-7. The tracer test was conducted for aquifer delineation to determine whether there is any relationship between wells drilled e shallow geothermal outflow (such as Rosette State Well #7) and wells drilled into the deep geothermal aquifer (such as Wells LDG 45-7 and 53-7).

Tracer Dye Chemical Constituents. An MSDS and additional information about Rhodamine WT is contained at Exhibit 1. Operator does not know the percentage of pure Rhodamine WT provided by the supplier, and reasonably believes that chemical constituents included impurities to some degree.

Injection of Tracer Dye. 50 kilos of tracer dye was dissolved in a tank containing 400 gallons of fresh water. This solution was injected into Rosette State Well #7. During tracer injection, the wellhead pressure never went above 20 psi on the wellhead.

Flushing of Tracer Dye. The solution was first flushed with 800 gallons of water. Then, over a period of seven days, fresh water was injected into Rosette State Well #7 in the following approximate amounts: (a) 24,000 gallons of trucked water, and (b) 2,250,000 gallons of water from a water storage tank owned by Rosette, Inc. The source of injected water was one to three cold freshwater wells owned by Rosette, Inc., State Engineer well numbers A-36-A-S10, A-36-A-S11, and A-36-A-S14, which are connected by pipeline to the water storage tank owned by Rosette, Inc. During water injection, the wellhead pressure never went above 30 psi. After approximately 24 hours, injection was by gravity without any added pressure.

Test Results and Dye Discovery. During closed-loop testing, which started prior to the tracer test and was conducted through February 3, 2012, there was no tracer from Rosette State Well #7 found in Wells LDG 45-7 and 53-7. On or about February 16, 2012, we understand that a neighboring property owner, AmeriCulture, Inc., discovered tracer dye in the geothermal fluid it was using from a nearby well, Rosette State Well #1, which is the same shallow geothermal outflow into which the dye was injected. Operator was not made aware of the discovery until February 22, 2012.

Investigative Action: Sampling. Operator learned of community concern that the tracer dye may be migrating to non-geothermal water wells used for drinking water and agriculture. On February 29 and March 1, 2012, Dr. Gregory P. Miller, Geochemical, LLC, conducted a sampling and analysis program to evaluate the presence of tracer dye in potable water and agricultural wells. Sixteen wells were sampled. Dye fluorescence analysis was conducted in the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 2, 2012. Laboratory analysis with a tracer dye detection limit of 0.1 parts per billion was used to test the water. Tracer dye was detected only in geothermal wells within 800 feet of the dye tracer test injection well. The remaining 14 agricultural and potable water wells did not contain dye tracer. Dr. Miller's report is attached as Exhibit 2.

Remedial Action: Treatment. In addition, Operator understands that the holding ponds used for raising tilapia fish at AmeriCulture's facility have been tinted with a pink hue. Pursuant to a Joint Facility Joint Facility Operating Agreement (JFOA) dated September 6, 1995, Operator must reasonably indemnify AmeriCulture against harms arising out of its activities undertaken pursuant to the JFOA. For this reason, Dr. Gregory P. Miller, Geochemical, , visited the AmeriCulture facility on March 1, 7, and 13, 2012 to discuss and plan for water treatment to remove the tracer dye. Dr. Miller verified easibility of carbon treatment in hot water at the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 5, 2012. Dr. Miller then began working with Calgon Carbon Corporation and Siemens on March 6, 2012, to determine treatment options. Kenneth Hale from AMEC visited the AmeriCulture facility on March 13, 2012 to begin designing a water treatment system that will use carbon filtration to remove tracer dye from the geothermal water before it enters into the AmeriCulture facility. This treatment system and treatment program were offered to AmeriCulture on March 20, 2012. See Exhibit 3.

Additional Remedial Concerns. To Operator's knowledge, tracer dye is not a "toxic pollutant" as defined in 20.6.2.7 NMAC nor have the standards of 20.6.2.3103 NMAC been exceeded. However, Operator has received from AmeriCulture an article, Exhibit 4, which indicates that Rhodamine WT, when combined with nitrites, could possibly form Diethylnitrosamine. (Several Nitrosamines are on the "toxic pollutant" list, but Diethylnitrosamine is not). Nitrites could exist in AmeriCulture's fish ponds. See Exhibit 4. Because the proposed treatment system and treatment program will remove the tracer dye before geothermal water enters the AmeriCulture facility, this concern for possible formation of Diethylnitrosamine is being addressed as well. Dr. Miller offered to sample the AmeriCulture fish ponds for Nitrosamines on March 1, 7, and 13, 2012, and was not permitted to do so.

Describe Area Affected and Cleanup Action Taken.* Through the sampling program described above, the affected area has been identified. The affected area is solely the shallow geothermal aquifer only in geothermal wells within 800 feet of the dye tracer test injection well. No drinking water or irrigation wells have been affected.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: M. Hayter	OIL CONSERVATION DIVISION
Printed Name: Michael Hayter	Approved by Environmental Specialist:
: Director	Approval Date: / Expiration Date:
E-mail Address: michael.hayter@cyrqenergy.com	Conditions of Approval: / Attached ☐
Date: 3/21/2012 Phone: 801-875-4700	

* Attach Additional Sheets If Necessary

Presto Dyechem Co
60 North Front St
Philadelphia, PA 19106
215-627-1864

Material Safety Data Sheet

July 15, 2011

SECTION I - Material Identity

Item Name	Fluorescent Red Dye
Part Number/Trade Name	Acid red 52
Chemical Formula	C27 H30 N2 07 S2.Na
CAGE Code	25521
Part Number Indicator	A
MSDS Number	189644
HAZ Code	B

SECTION II - Manufacturer's Information

Manufacturer Name	Presto Dyechem Co
Street	60 North Front St
City	Philadelphia
State	PA
Country	US
Zip Code	19106
Emergency Phone	215-627-1864
Information Phone	215-627-1864

MSDS Preparer's Information

Date MSDS Prepared/Revised	01/01/2006
Active Indicator	Y

SECTION III - Physical/Chemical Characteristics

Appearance/Odor	Red POWDER
Boiling Point	NA
Melting Point	NA
Vapor Pressure	NA
Vapor Density	NA
Specific Gravity	1
Solubility in Water	COMPLETE
Container Type	R
Container Pressure Code	1
Temperature Code	4
Product State Code	S

SECTION IV - Fire and Explosion Hazard Data

Flash Point Method	NA
Lower Explosion Limit	NA
Upper Explosion Limit	NA
Extinguishing Media	WATER, DRY CHEMICAL, CO2
Special Fire Fighting Procedures	WEAR SCBA
Unusual Fire/Explosion Hazards	NONE

SECTION V - Reactivity Data

Stability	YES
Stability Conditions to Avoid	WILL PRECIPITATE WITH ACIDS
Materials to Avoid	OXIDIZING AGENTS
Hazardous Decomposition Products	BURNING WILL PRODUCE OXIDES OF CARBON AND NITROGEN
Hazardous Polymerization	NO
Polymerization Conditions to Avoid	WILL NOT OCCUR

SECTION VI - Health Hazard Data

Route of Entry: Skin	YES
Route of Entry: Ingestion	YES
Route of Entry: Inhalation	YES
Health Hazards - Acute and Chronic	NONE DOCUMENTED
Carcinogenity: NTP	NO
Carcinogenity: IARC	NO
Carcinogenity: OSHA	NO
Explanation of Carcinogenity	NONE
Symptoms of Overexposure	NOT KNOWN
Medical Cond. Aggravated by Exposure	NONE KNOWN
Emergency/First Aid Procedures	[EYES] FLUSH WITH WATER [SKIN] WASH WITH SOAP AND WATER [INHAL] MOVE TO FRESH AIR. [INGEST] DILUTE WITH WATER, INDUCE VOMITING.

SECTION VII - Precautions for Safe Handling and Use

Steps if Material Released/Spilled	WEAR APPROPRIATE SAFETY EQUIPMENT. CONTAIN AND CLEAN UP SPILL. CONTAIN LIQUIDS USING ABSORBANTS, SWEEP POWDERS CAREFULLY MINIMIZING DUSTING. SHOVEL ALL SPILL MATERIAL INTO DISPOSAL DRUM.
Neutralizing Agent	NR
Waste Disposal Method	BURY OR INCINERATE ACCORDING TO FEDERAL, STATE AND LOCAL REGULATIONS. CONTAINERS SHOULD BE TRIPLE RINSED ACCORDING TO FEDERAL REGULATIONS.
Handling and Storage Precautions	HANDLE THIS PRODUCT WITH CARE

	AND AVOID PERSONAL CONTACT.
Other Precautions.....	NR

SECTION VIII - Control Measures

Respiratory Protection.....	NIOSH APPROVED RESPIRATOR MOLDEX 2200
Ventilation.....	LOCAL EXHAUST
Protective Gloves.....	RUBBER
Eye Protection.....	SAFETY GLASSES WITH SIDE SHIELDS
Other Protective Equipment.....	WEAR APRON/COVERALLS TO MINIMIZE SKIN CONTACT
Work Hygenic Practices.....	WASH THOROUGHLY AFTER HANDLING

SECTION IX - Label Data

Protect Eye.....	YES
Protect Skin.....	YES
Protect Respiratory.....	YES
Chronic Indicator.....	NO
Contact Code.....	SLIGHT
Fire Code.....	1
Health Code.....	0
React Code.....	0
Specific Hazard and Precaution.....	NO TARGET ORGANS LISTED FOR CHRONIC EXPOSURES

SECTION X - Transportation Data

Container Quantity.....	1
Unit of Measure.....	GM

SECTION XI - Site Specific/Reporting Information

Volatile Organic Compounds (P/G).....	0
Volatile Organic Compounds (G/L).....	0

SECTION XII - Ingredients/Identity Infomation

Color Index #.....	45100
Ingredient Name.....	Xanthene
CAS Number.....	3520-42-1
Proprietary.....	NO
Percent.....	0
OSHA PEL.....	NE
ACGIH TLV.....	NE

sole responsibility of the user. All materials that may present unknown health hazards are described herein. We cannot guarantee that these are the only hazards that exist.

JOHN SHOMAKER & ASSOCIATES, INC.
WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS
2611 BROADBENT PARKWAY NE
ALBUQUERQUE, NEW MEXICO 87107
(505) 345-3407, FAX (505) 345-9920
www.shomaker.com

February 23, 2012

Michelle Henrie, Attorney at Law
126 East DeVargas
Santa Fe, New Mexico 87501

by email: michelle@mhenrie.com

Re: Cyrq Energy, dye tracers in groundwater

Dear Michelle:

You asked about the use of dye tracers, and Rhodamine WT in particular, in water-resource studies. Tracer studies have been used for many years to measure groundwater velocities, and are described in standard textbooks on groundwater.[1] Both the U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey have conducted and published many studies using dye-tracers in a wide variety of their groundwater and surface-water investigations, and many other studies are reported in the scientific literature. The University of New Mexico Water Resources Program is currently conducting a dye-tracer study in Albuquerque, to determine the disposition of septic-tank effluent and the timing of its arrival at the water table.

Rhodamine WT is an EPA-approved fluorescent dye used for aquifer characterization, as a water tracer in surface and groundwater systems, and a means of measuring various hydraulic parameters.[2] It is also NSF-approved for use in such studies.

Our firm has used Rhodamine as a tracer to mark the drilling water during the drilling of a supply well, to provide a means of determining when well-development was essentially complete.

Sincerely,

JOHN SHOMAKER & ASSOCIATES, INC.

John W. Shomaker, Ph.D.

Cc: Nicholas Goodman, Cyrq Energy
Michael Hayter, Cyrq Energy

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[1] See, e.g., Freeze, R.A., and Cherry, J.A., 1979, Groundwater: Englewood Cliffs, NJ, Prentice-Hall, Inc., 604 p., at p. 427..

[2] See, e.g., Stone, A.T., 2000, Specialty chemicals in the environment: American Chemical Society, Symposia papers presented before the Div. of Environmental Chemistry, Preprints of Extended Abstracts, v. 40, no. 1, pp. 167-169.

Results of Groundwater Sampling For a Dye Tracer Conducted February 29 and March 1, 2012

Cotton City, Hidalgo County, New Mexico

March 5, 2012

Prepared for:

Michelle Henrie, Attorney
MHenrie
PO Box 7035, Albuquerque, New Mexico 87194-7035
126 E. DeVargas. Santa Fe, New Mexico 87501

GEOCHEMICAL, LLC
PO Box 1468, Socorro, NM 87801

Executive Summary

A dye tracer test was conducted in geothermal wells located near Cotton City, Hidalgo County, New Mexico in late January 2012. The purpose of the test was to determine the physical properties of the geothermal reservoir. Public concern was expressed that the tracer may be migrating to non-thermal water wells used for domestic use and agriculture. A sampling and analysis program was conducted to evaluate the presence of dye in potable water and agricultural wells. Sixteen wells were sampled at distances from under 200 feet to over 7 miles from the dye tracer injection point. Laboratory analysis with a detection limit of 0.1 parts-per-billion (ppb) dye was used to test the water.

Dye tracer was detected only in geothermal wells within 800 feet of the dye tracer test injection well. The remaining 14 agricultural and potable water wells did not contain dye tracer.

GEOCHEMICAL, LLC
PO Box 1468, Socorro, NM 87801

GEOCHEMICAL
EARTH - WATER - CHEMISTRY

Introduction

A dye tracer test was conducted at the Cyrq Energy Lightning Dock geothermal project located near Cotton City, Hidalgo County, New Mexico in late January 2012. The appearance of dye tracer was noted in other thermal wells adjacent to the tracer test. When dye tracer was noted in these other wells public concern was expressed that the tracer may be migrating to non-thermal wells used for agriculture and private water supply.

Geochemical, LLC was retained for a fast-track sampling and analysis program to evaluate the presence of dye tracer in selected wells in the vicinity of the geothermal dye tracer test. The major objective of the program was to confirm the presence or absence of dye tracer in private wells used for potable water. All Geochemical, LLC activities were conducted by the Principal of the company, Dr. Gregory P. Miller, or under his direct observation.

Sampling Locations

Sampling locations were selected through coordination with:

- Ed Kerr, Hidalgo County Commissioner;
- Kacie Peterson and Steve Harman, on-site representatives of Cyrq Energy;
- Damon Seawright of AmeriCulture, a thermal water user adjacent to the test site; and,
- Dale Burgett, a thermal water user adjacent to the test site.

Sample sites were first chosen on the basis of public interest – well owners that had expressed a desire to have their well(s) tested to either Cyrq Energy or the County Commissioners' office. The county also arrainged for Geochemical, LLC to sample water at the adjacent AmeriCulture facility. Additionally, Cyrq Energy sought permission for Geochemical, LLC to sample wells operated by Dale Burgett.

The greatest constraint on the number and locations of groundwater samples was time. Public and regulatory interest in the distribution of dye tracer in groundwater in the vicinity of the tracer test required immediate answers. Accordingly, the sampling program was limited to existing wells. An additional constraint on selecting sampling locations was the availability of wells for sampling. Wells without operating pumps were excluded as time constraints prevented installation of appropriate pumps and/or power supplies.

Sixteen wells were sampled during the February 29 and March 1, 2012 effort. The locations of the sampled wells are depicted in **Figure 1** and **Figure 2**. Well locations are determined from handheld field GPS readings, inspection using Google Earth, and cross checks with the New Mexico Office of the State Engineer's WATERS database. **Table 1** lists the well locations, users and sampling information.

Sampling Methods

The rapid response required for this activity precluded development and peer-review of a sampling and analysis plan. The sampling program relied on professional experience and judgment to collect groundwater samples representative of aquifer condition. Two sampling techniques were used: purging and sampling by time; and, purging and sampling according to indicators of geochemical stabilization.

Groundwater sampling with the highest quality level is accomplished using wells, screens, casing and pumps designed for the purpose, in an array that is designed to answer a specific question. In this project, adaptations were required to use existing wells and pumps.

Samples were collected at nine domestic wells from a threaded spigot (hose bib) to which a pre-cleaned (bleach), deionized water rinsed, air-dried nylon threaded hose barb is attached. The hose barb is fitted with new vinyl tubing of sufficient length for the sampler to have a work area (3 to 8 feet). The hose bib is opened and the rate adjusted to approximately 1-2 gallons per minute. Flow from the tubing is directed to a ¼ gallon polyethylene container that is fitted within a 5 gallon polyethylene pail. Flow rate is gauged using the 5 gallon pail and timed to the minute.

Flow into the smaller container is monitored for the "field parameters" of pH, Specific Conductance (to 10 uS/cm), Temperature (to 0.2 °C), and Oxidation-Reduction Potential (ORP to 1 mV). Field parameters are measured frequently using calibrated instrumentation and recorded. Calibrations were conducted using the manufacturer instructions before each field day with a calibration check performed at the end of the day.

The use of parameter stabilization is a preferred practice in groundwater sampling because it is a chemical rather than volumetric method of determining when the water discharging from the well is representative of the aquifer. Ideally, running calculations are made evaluating the rate

of change of stability criteria. Here, parameter stabilization was evaluated using professional judgment rather than by calculation to limit time on each well to about 30 minutes. Purge volumes before stabilization varied from 20 to 45 gallons.

After parameter stabilization a sample is collected from the flowing groundwater stream at the end of the vinyl tubing in a 500 ml high-density polyethylene bottle, rinsing the bottle and cap with flowing sample three times prior to sample collection. Bottles were labeled uniquely with indelible marker, water-tight bagged individually, and placed on ice immediately after collection. Samples have remained in Dr. Miller's custody from sampling through the date of this report.

Unlike the domestic wells, the five non-thermal agricultural wells and two thermal wells sampled did not have convenient sampling ports or hose bibs. It was not possible to use the hose bib and tubing apparatus, or practical to collect a series of field parameter measurements on these wells. In these cases the wells sampled were either running at the time of arrival, or were run on arrival - discharging to the ground or tanks for sufficient time to clear water contained in the casing and distribution line. Samples from these six wells were either collected directly into sample containers, or were collected in a new clean 5 gallon pail and sub-sampled from the pail. In all cases, samples and bottles are handled as described in the preceding paragraph (rinsing, labeling and preservation as described above).

Clean sampling procedures were used to the extent practical. Sampling equipment was new and unused ,or had been cleaned or stored clean prior to starting the sampling program. Disposable, powder-free Nitrile gloves were donned for all sampling equipment and instrument handling. Glove changes were made just prior to bottle handling and sampling. Tubing was always discarded between samples. All disposable sampling equipment (5-gallon pails, hose bibs, ¼ gallon containers) were discarded when contact with visible dye was noted. Dr. Miller avoided inadvertent contact with dye by remaining away from equipment and areas used for tracer test preparation.

Dye Detection and Quantification Analysis Method

Dye tracers are uniquely useful in hydrology studies because they are visible to the naked eye at very low concentrations (~1 ppb) and are detectable at much smaller concentrations using spectroscopy. Spectrophotometers measure the wavelength of light emitted by dyes when excited with another light source. Dyes differ in the wavelengths that they are excited by and

emit. The presence or absence of a dye can be determined by fluorescence (emission) at a particular wavelength.

Dye fluorescence analysis was conducted in the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 2, 2012. The analysis was conducted by a research assistant under the supervision of Dr. Thompson. Dr. Miller was present for all analytical procedures conducted on the 16 groundwater samples with Dr. Thompson's review of the methods.

A Varian Cary Eclipse Fluorescence Spectrophotometer was used. A dye standard was prepared from material from the January 2012 dye tracer study, as supplied by Cyrq Energy. Commercial tracer dyes vary in the amount of pure dye contained in the bulk chemical. Dye standards prepared in the lab were assigned a concentration using the assumption that the dye is 100% pure, and are thus relative concentrations. This assumption is always conservative in that relative concentrations are always greater than true concentrations. The detection limit determined for this effort was 0.1 ppb relative concentration using maximum excitation. A linear calibration curve using medium excitation was prepared using 1.0, 10.1 and 101 ppb relative concentration standards for quantitative analysis of samples with visible dye (>> 1 ppb relative).

Results

Table 1 presents the analytical results for the sampled wells. Two samples of thermal water had quantifiable dye tracer at concentrations of 38.6 and 87.0 ppb relative to pure dye. No agricultural or domestic (potable) wells had detectable dye tracer (<0.1 ppb relative concentration).

Summary

A rapid response sampling program was conducted on to test for dye tracer in non-thermal groundwater near the site of a geothermal system dye tracer test. Sixteen wells were sampled, two thermal and 14 non-thermal. Dye detections were confined to thermal waters. Dye tracer was not found in non-thermal water.

Table 1. Wells sampled for dye tracer near Cotton City, Hidalgo County, New Mexico.

Sample ID[1]	Sample Date	Sample Time	Dye Concentration (ppb)[2]	OSE Well Number[3]	UTM Easting (meters)[4]	UTM Northing (meters)[4]	Sampling Method	Water User
A0141	29-Feb-12	1200	ND	A0141	12701727	3562522	Stabilization	Clyde Mahan
A0145	29-Feb-12	1248	ND	A0145	12703265	3561269	Stabilization	Linda Ventimiglia
A0055	29-Feb-12	1343	ND	A0055	12700745	3562570	Stabilization	Myra Mahan
MT01	29-Feb-12	1439	ND		12701139	3562401	Stabilization	Mark Thomas
GK01	29-Feb-12	1550	ND		12702990	3568589	Timed Purge	Greg Kerr
A0018	29-Feb-12	1601	ND	A0018	12702974	3570885	Stabilization	Ed Kerr
AC Hot	29-Feb-12	1724	87.0		12704503	3559223	Timed Purge	Damon Seawright
AC Cold	29-Feb-12	1740	ND		12702046	3558968	Timed Purge	Damon Seawright
A0091	1-Mar-12	930	38.6	A0091	12704509	3559405	Timed Purge	Dale Burgett
A0012	1-Mar-12	1016	ND	A0012	12702522	3556942	Stabilization	Colt Rudiger
A0276	1-Mar-12	1120	ND	A0276	12701958	3553368	Stabilization	Jim Victor
VVC	1-Mar-12	1200	ND	A0253	12699959	3559275	Stabilization	Valley View Church
A0083	1-Mar-12	1313	ND	A0083	12702078	3558948	Stabilization	McCant
DB1	1-Mar-12	1400	ND		12701671	3558907	Timed Purge	Dale Burgett
DB2	1-Mar-12	1414	ND		12701687	3558872	Timed Purge	Dale Burgett
DB3	1-Mar-12	1426	ND		12701680	3558866	Timed Purge	Dale Burgett

[1] Sample ID used for analytical work and Figure 1

[2] Relative to original dye concentration of 100%

[3] Some OSE well numbers unresolved by the date of this report

[4] Readings by handheld GPS, NAD 83

Figure 1. Map showing wells sampled for dye tracer near Cotton City, Hidalgo County, New Mexico on February 29 and March 1, 2012. Wells depicted in red are geothermal. The two geothermal wells are also the only locations where dye tracer was found. Not all wells are depicted in the center of the figure for clarity. See Figure 2 for detail of the Figure 1 center.

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Figure 2. Detail of center section of Figure 1. Dye tracer was not detected in all domestic and agricultural wells (blue) shown here. The injection point, State Well 7, lies about 200 feet north of thermal well A0091.

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Lightning Dock Geothermal HI-01, LLC
Kearns Building, Suite 600
136 South Main Street
Salt Lake City, UT 84101

March 20, 2012

Mr. Damon Seawright
President
AmeriCulture, Inc.
25 Tilapia Trail
Animas, NM 88020

Re: Water Quality Remediation Services

Dear Mr. Seawright,

This letter agreement (this "Agreement"), if signed by you, as authorized representative of AmeriCulture, Inc. (together with its shareholders, directors, officers, and successors in interest, "AmeriCulture"), on or before March 31, 2012, sets forth the agreement between AmeriCulture and Lightning Dock Geothermal HI-01, LLC ("LDG"), with respect to certain water quality remediation services we will provide in connection with LDG's injection in January 2012 of Rhodamine-WT tracer dye into a geothermal well near AmeriCulture's property (the "Occurrence"). In this Agreement, AmeriCulture and LDG are each a "Party" and, together, may be referred to as the "Parties."

This Agreement is being entered into pursuant to that certain Joint Facility Operating Agreement dated September 6, 1995 (the "JFOA"), that delineates the Parties' mutual rights and responsibilities with regard to the geothermal resource under their respective properties. Section IV.B.4 of the JFOA obligates LDG to indemnify AmeriCulture against harms arising out of any activities of LDG permitted by the JFOA.

AmeriCulture operates a commercial tilapia production facility (the "Tilapia Farm") on property located in Hidalgo County, and has alleged that the Occurrence has resulted in some or all of the tilapia fish being raised and sold by AmeriCulture being tinted with a pink hue. This Agreement lays out our mutual responsibilities with regard to remediating any harm caused as a result of the Occurrence.

1. LDG's Provision of a Water Treatment System.

Promptly after the full execution of this Agreement, and subject to any events of force majeure, LDG shall supply and install, and shall thereafter operate and maintain, a water treatment system ("System") substantially in the form as described in Exhibit A hereto, for the purpose of reducing Rhodamine-WT concentrations in the water used to cultivate fish at the Tilapia Farm.

The System will be owned by LDG, and the supply, construction, operation, and maintenance of the System shall be without cost to AmeriCulture, provided that AmeriCulture fully cooperates, assists and allows LDG and its agents and contractors to access AmeriCulture property as necessary and as more fully described in paragraph 2 below.

LDG will periodically monitor and test the quality of the water entering into AmeriCulture's tilapia fish tanks and the operation of the System to ensure its continued functioning. LDG shall have the right to maintain and alter the System as necessary to ensure the water being used to cultivate fish at the Tilapia Farm is substantially free of Rhodamine-WT. The Parties agree to evaluate the effectiveness of the System at least every two years and to make a determination of whether the System continues to be needed.

LDG shall have the right, in its sole discretion, to terminate its obligations under this paragraph 1 if (a) AmeriCulture ceases operation of the Tilapia Farm, or (b) AmeriCulture breaches any of its obligations under this Agreement. In the event that LDG elects to terminate its obligations pursuant to the foregoing sentence, it has the right, but not the obligation, to dismantle and remove the System.

2. AmeriCulture's Consideration.

AmeriCulture agrees, without condition, qualification or payment, to provide LDG and its representatives, contractors and subcontractors, access at all reasonable times to AmeriCulture's property as necessary for the implementation of LDG's obligations under paragraph 1 above, including but not limited to (a) constructing, operating, monitoring, maintaining and implementing the System; (b) conducting investigations relating to contamination at or near the Tilapia Farm; (c) obtaining water samples from the Tilapia Farm and related wells as frequently as weekly; and (d) assessing the need for, planning, or implementing additional response actions at or near the Tilapia Farm.

In further consideration of LDG's obligations hereunder, AmeriCulture restates and reaffirms the JFOA.

3. Non-Disparagement.

AmeriCulture agrees that it will not directly or indirectly make, repeat or publish any false or disparaging, negative, unflattering, or accusatory remarks or references, whether oral or in writing, regarding LDG, its officers, directors, employees and affiliates, in any dealings with third parties including any members of the press or media, and LDG's customers, potential customers, suppliers, contractors and employees.

4. Complete and Binding Agreement; Amendments.

This Agreement sets forth all of the terms and conditions of the agreement between the Parties concerning the subject matter hereof and supersedes any prior oral communications. This Agreement may be amended only by a written document signed by the Parties.

5. Severability.

In the event that any of the provisions of this Agreement are found by a judicial or other tribunal to be unenforceable, the remaining provisions of this Agreement will remain enforceable.

6. Nonadmission.

This Agreement is being entered into solely for the purpose of settling disputed claims, and shall not be construed as: (a) an admission by LDG of any (i) liability or wrongdoing to AmeriCulture, (ii) breach of any agreement, or (iii) violation of a statute, law or regulation; or (b) a waiver of any defenses as to those matters within the scope of this Agreement. LDG specifically denies any liability or wrongdoing with respect to the Occurrence, and AmeriCulture agrees that it will not state, suggest or imply the contrary to anyone, either directly or indirectly, whether through counsel or otherwise.

7. Governing Law.

This Agreement shall be governed by New Mexico law.

8. Dispute Resolution; Waiver of Jury Trial.

Any dispute that arises in connection with this Agreement and that is not resolved informally by the Parties within thirty (60) days after notice of the dispute is given to a Party may be referred by either Party to the American Arbitration Association for arbitration. The arbitration shall be conducted by one (1) mutually agreeable, impartial arbitrator in Albuquerque, New Mexico. The award of the arbitrator shall be final and binding upon the Parties without right of appeal to the courts. Notwithstanding the foregoing, any Party may seek injunctive relief to prevent immediate harm arising from the breach of the other Party's obligations hereunder. To the fullest extent permitted by law, each of the Parties hereby waives any right to trial by jury with respect to any dispute arising out of or relating to the enforcement, interpretation or existence of this Agreement which may be brought in a court of law.

9. Costs.

Each Party shall pay its own costs and fees, including attorneys' fees and other legal fees in connection with and enforcement of this Agreement.

10. Counterparts.

This Agreement may be signed by the Parties in multiple counterparts, each of which shall constitute an original, but all of which together shall be deemed one and the same instrument. No Party to this Agreement shall be bound hereby until a counterpart of this Agreement has been executed by all Parties hereto.

[SIGNATURES FOLLOW ON NEXT PAGE]

Sincerely,

LIGHTNING DOCK GEOTHERMAL HI-01, LLC

Nicholas Goodman

Printed: Nicholas Goodman

Title: Chief Executive Officer

Date: March 20, 2012

Acknowledged and Agreed,

AMERICULTURE, INC.

_____

Printed: Damon Seawright

Title: President

Date: March ___, 2012

EXHIBIT A - DESCRIPTION OF WATER TREATMENT SYSTEM

[SEE ATTACHED]

Water Treatment System – Rhodamine Removal
AmeriCulture Facility, New Mexico
CERQ Energy

Concept Summary

The water treatment system will reduce the rhodamine concentration in the process water using granular activated carbon (GAC) as an adsorbent. GAC adsorbent of rhodamine has been bench tested (by others) and is considered an efficient media for rhodamine removal from high temperature water. The water temperature has been reported to range from 180 to 240 degrees F. The new water treatment system will tie into the existing 3" carbon steel (CS) line that runs from the existing well to the existing, 12-inch diameter CS standpipe. The tie-in will be achieved with 3" galvanized steel (GS) piping. Hot (geothermal) well water (180-240°F), will be diverted to a 5,000 gallon, vertical, surge tank where steam will be permitted to vent and large particles will be permitted to settle out of suspension. The surge tank will be fitted with a steam vent to prevent over pressurization, as well as a manway and drain valve to facilitate the removal of settled solids. The process stream will flow from the surge tank through a 3" GS line, to a pump regulated at a flow rate of approximately 100 gallons per minute at 50 psi, to match the incoming flow rate during production well operations. An identical, redundant pump will be installed in parallel to allow servicing of the pumps without having to shut down the entire system. A level transmitter located in the surge tank will control the variable frequency drive of the operating pump to maintain a proper water operating level in the tank, balancing process flow to production flow. A low level set point will be established for low water pump shut off. A high level set point will also be established to activate a local, high water alarm light. A magnetic flow meter with a local, flow indicator and a pressure indicator will be located downstream of the pumps.

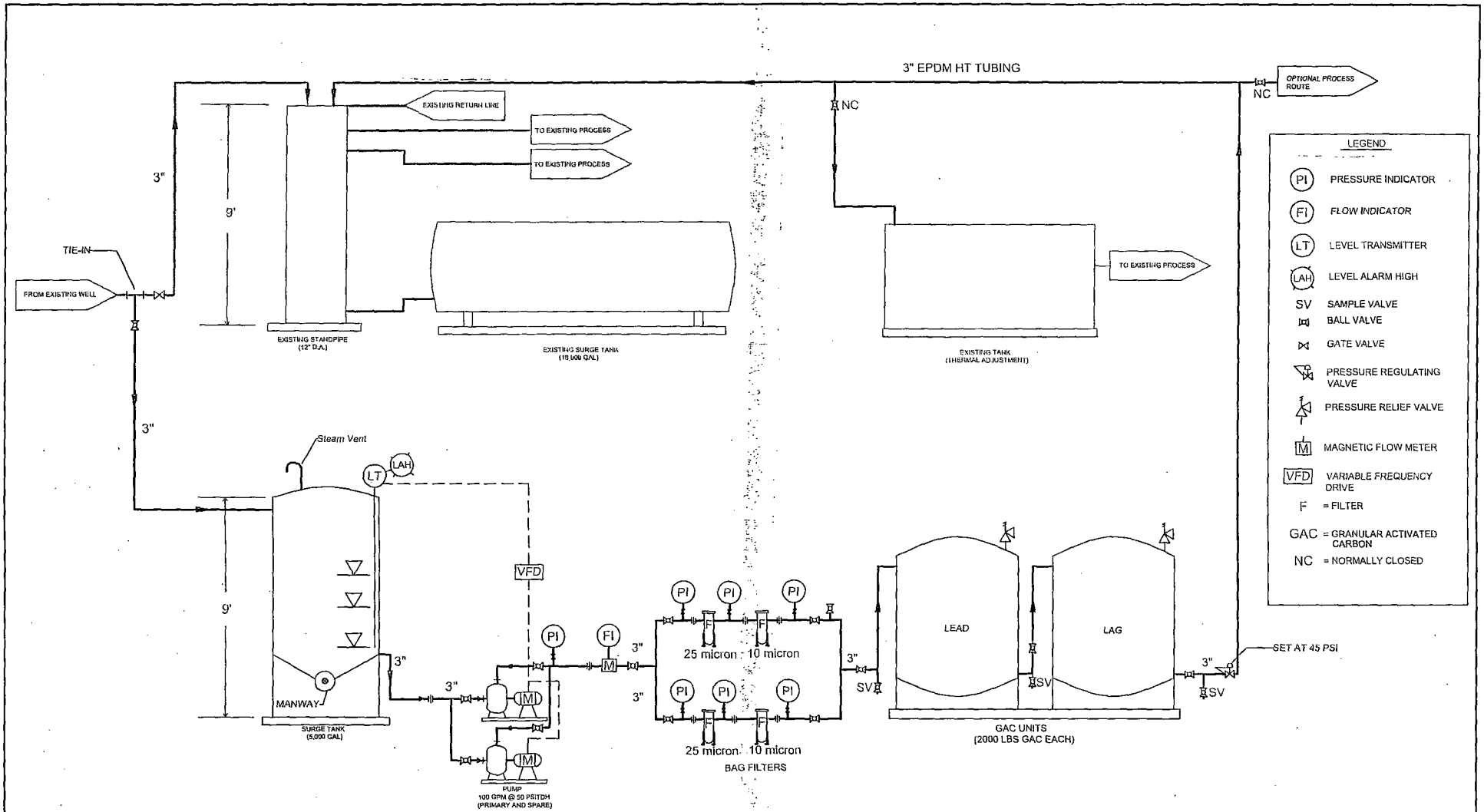
The water from the pump will flow through a 3" line to a bank of two bag filters. The first bag filter will have a filter element of 25 microns, and the second will have a filter element of 10 microns. A second bank of identical filters will be installed in parallel in order to allow filter element changes without system shutdown. A pressure indicator will be located before and after each filter housing to provide a means of monitoring filter performance and indicating when filter changes are necessary. The filters will remove large particulates anticipated to accumulate in the surge tank. Removal of these particulates will increase the life of the GAC media.

After passing through the filters, the water will flow through a 3" line to two GAC vessels installed in series. Each vessel will contain 2000 lbs of GAC. The first vessel, or Lead vessel, will remove the majority of the rhodamine in the water, and the second vessel, or Lag, will polish the stream to ensure that rhodamine levels are below detection limits. When the media in the lead vessel reaches rhodamine breakthrough, the media will be refreshed, and placed back online as the new lag vessel. The old lag vessel will be plumbed to become the new lead vessel. Sample valves will be located before, between, and after the GAC units allowing the operator to analyze the performance of the units and to determine media replacement schedules.

A pressure regulator will be located downstream of the GAC units in order to keep the system pressurized and prevent steam flashing within the treatment system. After the pressure regulator, the process stream will be directed either to the existing standpipe or the existing thermal adjustment tank, as needed, before being delivered to the existing process by the facility operator.

The new water treatment components will be installed on a concrete pad near the tie-in point adjacent to the existing standpipe and surge tank. A 20 ft X 20 ft X 8 inch pad is anticipated. The components will be assembled and connected in the field with galvanized steel fittings and EDPM high temperature hose.

Figure 1 shows the General Process Flow Diagram for the system, Table 1 contains an Equipment and Materials Schedule, and Appendix A contains Manufacturer's Data Sheets for the equipment and materials.



CLIENT: CYRQ ENERGY		DWN BY: KWJ	PROJECT: AMERICULTURE FACILITY PROJECT	DATE: 03/16/12
		CHK'D BY: DAK		PROJECT NO: 1151700102
AMEC Environment & Infrastructure 8519 Jefferson, NE Albuquerque, NM 87113	amec	DATUM: N/A	TITLE: GENERAL PROCESS FLOW DIAGRAM RHODAMINE / WATER TREATMENT SYSTEM	REV. NO.: -
		PROJECTION: NTS		FIGURE NO. 1
		SCALE: AS SHOWN		

Water Treatment System - Rhodamine Removal
AmeriCulture Facility, New Mexico
CERQ Energy

Table 1. Equipment and Materials Schedule

Item	Description	Model	Qty	Unit
1	Goulds Pumps™ Frame Mounted End Suction Stainless Steel Pump	4SHFMR2C2	2	Ea
2	AC Tech™ Variable Frequency AC Drive	ESV552N02TXD	1	Ea
3	Gems Sensors and Controls™ Ultrasonic Level Transmitter	UCL-510	1	Ea
4	Pentek™ Bag Filter Assembly	AC8024S3	4	Ea
5	Siemens Water Technologies™ Granular Activated Carbon Vessels	HP®2000SS	2	Ea
6	Badger Meter™ Magnetic Flow Meter	M Series, 3-Inch	1	Ea
7	Sani-Tech® High Temperature Food Grade Hose	GFDA-2000, 3000	TBD	LF

Equipment and Materials Schedule

Item 1

GOULDS PUMPS

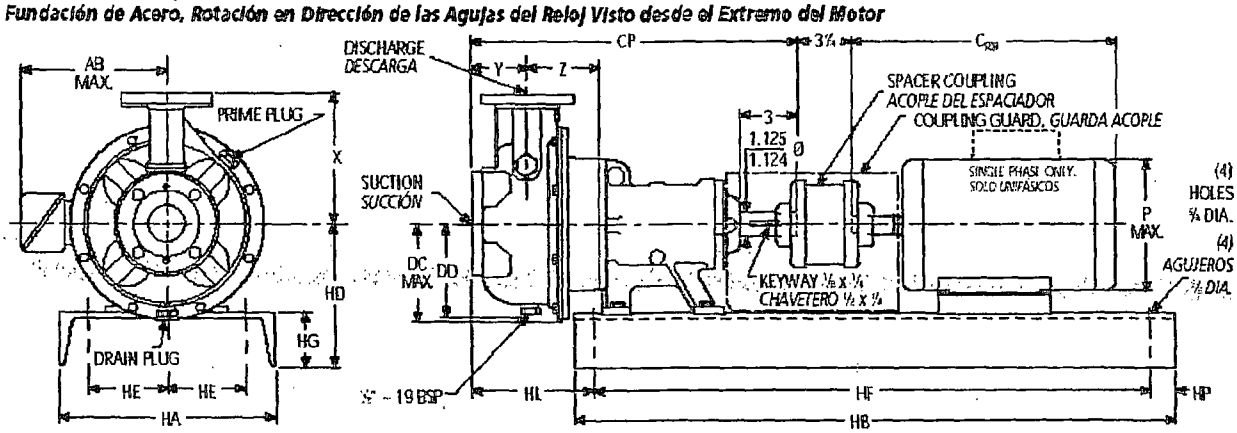
Unit Dimensions

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Channel Steel Bedplate, Clockwise Rotation Viewed from Drive End;
Fundación de Acero, Rotación en Dirección de las Agujas del Reloj Visto desde el Extremo del Motor



Dimension	Value	Dimension	Value
AB	7 3/8	HG	3
C ref	18	HP	1
CP	16 1/2	P max	9 5/8
CPmax	16 1/2	X	6 3/8
DC	5	Y	3 1/4
DD	4 3/4	Z	3 5/8
HA	12		
HB	31		
HD	8 1/4		
HE	4 1/4		
HF	29		

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2012-03-15

GOULDS PUMPS

Submittal Data

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Engineering Data

Pump Code: 4SHFRM2C2
Pump Size: 1 1/2 x 2 1/2 - 6
Pump Max Horsepower: 6.3437 hp
Pump Horsepower at Rating Point: 5.30 hp
Pump Shut Off Head: 141 ft
Motor Speed: 3450 rpm
Max. Temperature: 212 °F
Liquid: Water
Motor Code: H11142
System Input Power: 3~ 460 V
Motor Rated Horsepower: 7.50 hp
Max. Frequency 60
Electrical Enclosures: TEFC
Motor Standard: NEMA
Suction Flange Standard: ANSI
Suction Flange Rating: Class 150
Suction Size: 2 1/2" 316SS
Discharge Flange Standard: ANSI
Discharge Flange Rating: Class 150
Discharge: 1 1/2" 316SS
Approximate Net Weight: 99 lb
Impeller Size: $6^{1}/_{16}$"
Impeller Construction: Closed
Impeller Type: Radial impeller
Impeller Material:
316L Stainless Steel
Sense of Rotation: Clockwise from the drive end
Shaft Seal: Carbon/Sil-Carbide/EPR

Standard Equipment / Capability:

Close coupled or frame mounted end suction pump.
All liquid handling components of AISI 316L statinless steel.
Flanged connections to mate with standard ANSI 150 lb raised face flange.
Discharge is top centerline for piping flexibility.
Close coupled version uses standard NEMA JM frame motors.
Frame mounted version uses standard NEMA T frame motors.
Uses standard John Crane Type 21 mechanical seal.
Maximum working pressures to 230 PSI
Maximum temperatures to 250 F
Enclosed impeller with replaceable wear ring for high efficiency and long pump life.

GOULDS PUMPS

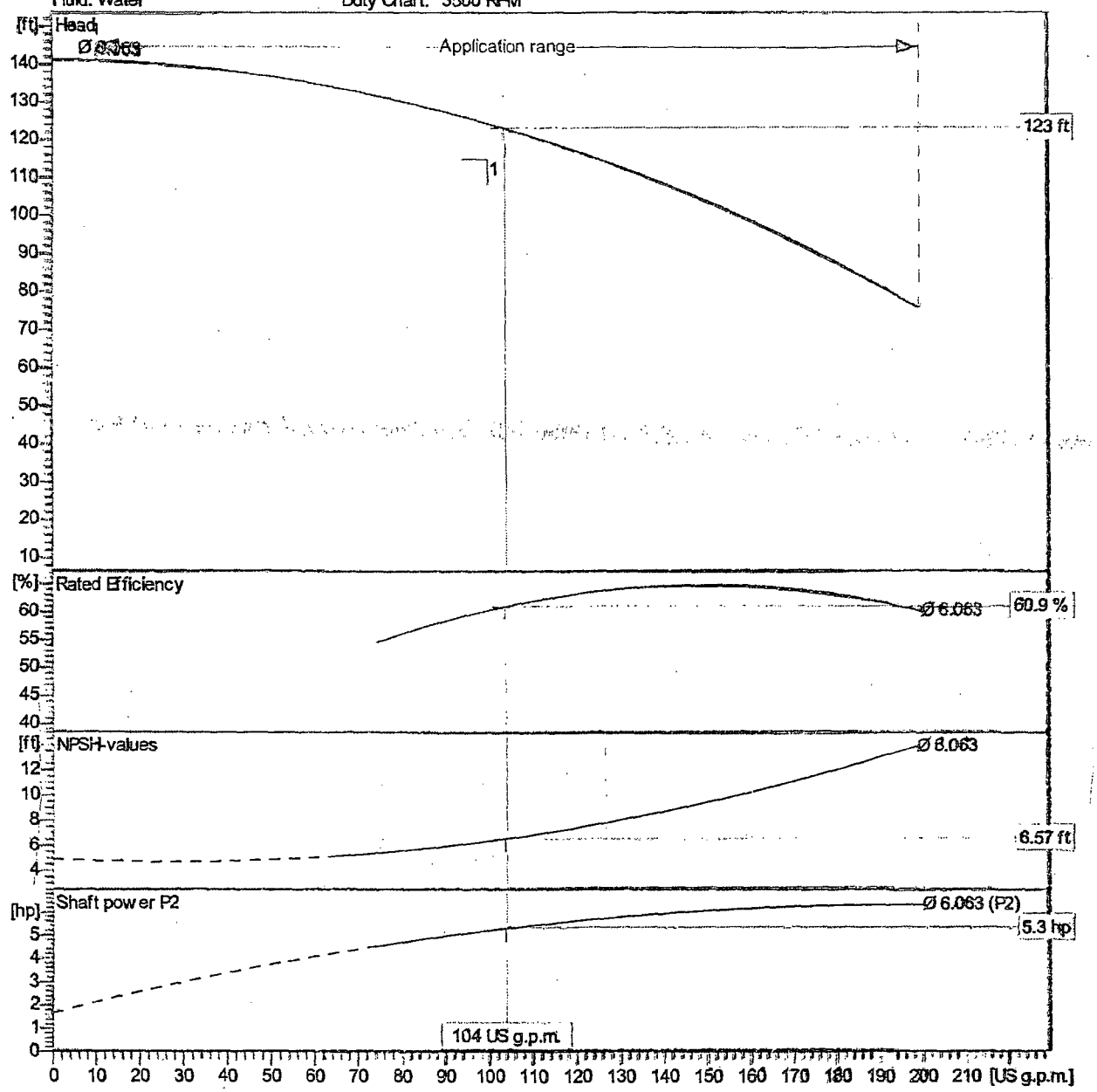
Performance Data

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Fluid: Water Duty Chart: 3500 RPM



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Equipment and Materials Schedule

Item 2

AC Tech

(800) 894-0412 (208) 368-0415 (Fax)
info@ctiautomation.net

Product Selection Guide
New Products
User Manuals
Software
Catalogs
Datasheets
How To/FAQs
Product Articles

Stock Check

Part No:

OR
Manufacturer:

SEARCH
Search Tips

Can't find a part number?
E-mail Us.

Standard Duty NEMA 1 (IP31)

- Brochure/Catalog
- Operating Instructions

The SMVector NEMA 1 (IP31) is the most common and cost effective drive enclosure for a wide range of applications including packaging, material handling / conveying, positive displacement pumping, and HVAC systems. The power ranges of the SMVector with NEMA 1 (IP31) include:

- 120/240V - 1Phase Input, up to 1.5 HP (1.1 kW)
- 200/240V - 1 or 3 Phase Input, up to 3.0 HP (2.2 kW)
- 200/240V - 3 Phase Input, up to 20 HP (15 kW)
- 400/480V - 3 Phase Input, up to 60 HP (45 kW)
- 480/600V - 3 Phase Input, up to 60 HP (45 kW)

Standard Duty

If you are looking for **AC Tech SMVector Drives**, please call us at **(800) 894-0412** or email us at **info@ctiautomation.net** we will do our best to help you find the AC Tech SMVector NEMA 1 VFD that you are looking for at the most competitive prices possible. If you are searching for AC Tech SMVector NEMA 4 Inverter technical information (data-sheets) please use the datasheets or product selection guide page links.

Washdown Duty NEMA 4X (IP65)

- Brochure/Catalog
- Operating Instructions

The SMVector NEMA 4X (IP65) is available in two enclosure materials for indoor only use and for indoor/outdoor use. These rugged enclosure options are ideal for many industries including food / beverage, waste water, chemical metering and processing, and pharmaceuticals. The power ranges of the SMVector in NEMA 4X include:

- 120/240V - 1Phase Input, up to 1.5 HP (1.1kW)
- 200/240V - 1 or 3 Phase Input, up to 3.0 HP (2.2 kW)
- 200/240V - 3 Phase Input, up to 20 HP (15 kW)
- 400/480V - 3 Phase Input, up to 30 HP (22 kW)
- 480/600V - 3 Phase Input, up to 30 HP (22 kW)

Washdown Duty

NEMA 4X (IP65) with Integral Disconnect

- Brochure/Catalog
- Operating Instructions

The SMVector with Integral Disconnect is available in a rugged NEMA 4X (IP65) indoor enclosure ideal for many industries including food / beverage, waste water, chemical metering and processing, pharmaceuticals and more. The integral disconnect switch offers the ability to isolate the motor for maintenance and servicing. Also the disconnect switch handle is lockable and is made of red and yellow materials for high visibility. The power ranges of the SMVector in NEMA 4X with Integral Disconnect include:

LEESON Drives

The SM Series Vector Control is designed for easy installation into your control panel. The compact size of this control, along with its contactor style design, takes up little room in your control panel and makes it easy to wire to. This control is easy to program and has auto tuning to make sure you get all the performance you need. It is designed for either Vector or V/Hz mode.

Hitachi Drives

The L100-M Series Inverter Drive features state-of-the-art circuitry and components to provide high performance. The housing footprint is exceptionally small, given the size of the corresponding motor. The Hitachi L100 product line includes more than a dozen inverter models to cover motor sizes from 1/4 horsepower to 10 horsepower, in either 230 VAC or 460 VAC power input versions.

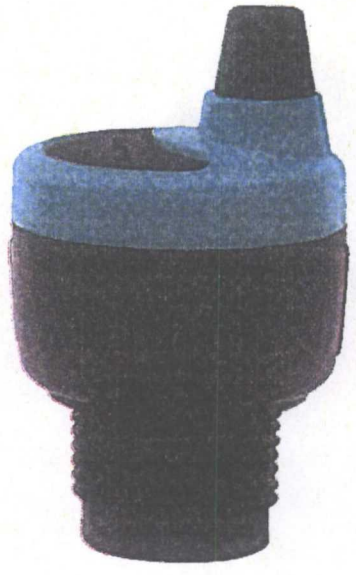
Hp	kW	I_N [A]	Model	Size	Model	Size
120/240V* - 1 Phase Input (3 Phase Output)						
0.5	0.37	2.4	ESV371N01SXC	R1	ESV371N01SMC	AA1
1	0.75	4.2	ESV751N01SXC	R1	ESV751N01SMC	AA1
1.5	1.1	6.0	ESV112N01SXC	R2	ESV112N01SMC	AA2
0.5	0.37	2.4	ESV371N01SXE	R1	ESV371N01SMC	AA1
1	0.75	4.2	ESV751N01SXE	R1	ESV751N01SMC	AA1
1.5	1.1	6.0	ESV112N01SXE	R2	ESV112N01SMC	AA2
*120/240V models provide 0-230V output even with 120V input applied.						
Power		**Output Current**	**NEMA4X Indoor [C] / Outdoor [E]**		**NEMA4X w/Disconnect Indoor**	
Hp	**kW**	**I_N [A]**	**Model**	**Size**	**Model**	**Size**
200/240V - 1 or 3 Phase Input (3 Phase Output)						
0.5	0.37	2.4	ESV371N02YXC	R1	ESV371N02YMC	AA1
1	0.75	4.2	ESV751N02YXC	R1	ESV751N02YMC	AA1
1.5	1.1	6.0	ESV112N02YXC	R2	ESV112N02YMC	AA2
2	1.5	7.0	ESV152N02YXC	R2	ESV152N02YMC	AA2
3	2.2	9.6	ESV222N02YXC	S1	ESV222N02YMC	AD1
0.5	0.37	2.4	ESV371N02YXE	R1	ESV371N02YMC	AA1
1	0.75	4.2	ESV751N02YXE	R1	ESV751N02YMC	AA1
1.5	1.1	6.0	ESV112N02YXE	R2	ESV112N02YMC	AA2
2	1.5	7.0	ESV152N02YXE	R2	ESV152N02YMC	AA2
3	2.2	9.6	ESV222N02YXE	S1	ESV222N02YMC	AD1
*Filter versions are also available in 1-phase: Replace the "YX" in the Model Part Number with an "SF". **Filter versions are also available in 1-phase: Replace the "YM" in the Model Part Number with an "SL".						
Power		**Output Current**	**NEMA4X Indoor [C or D] / Outdoor [E or F]**		**NEMA4X w/Disconnect Indoor**	
Hp	**kW**	**I_N [A]**	**Model**	**Size**	**Model**	**Size**
200/240V - 3 Phase Input (3 Phase Output)						
5	4	16.5	ESV402N02TXC	V1	ESV402N02TMC	AC1
7.5	5.5	23	ESV552N02TXD	T1	ESV552N02TMD	AB1
10	7.5	29	ESV752N02TXD	T1	ESV752N02TMD	AB1
15	11	42	ESV113N02TXD	W1	ESV113N02TMD	AF1
20	15	54	ESV153N02TXD	W1	ESV153N02TMD	AF1
5	4	16.5	ESV402N02TXE	V1	ESV402N02TMC	AC1
7.5	5.5	23	ESV552N02TXF	T1	ESV552N02TMD	AB1
10	7.5	29	ESV752N02TXF	T1	ESV752N02TMD	AB1
15	11	42	ESV113N02TXF	W1	ESV113N02TMD	AF1
20	15	54	ESV153N02TXF	W1	ESV153N02TMD	AF1

Equipment and Materials Schedule

Item 3

UCL-510 — Transmitter/Multipoint Switching Combo

- 49-inch (1.25m) range. Compact sensor with 2˝ dead band and beam width are optimized for small tank applications
- 1˝ NPT mounting
- Reliable, non-contact alternative to float and conductivity level sensors for corrosive, sticky or dirty media
- Outputs continuous level and provides full pump or valve control
- PVDF transducer for corrosive liquid media



The UCL-510 is a general purpose ultrasonic sensor providing non-contact level detection up to 49.2˝ (1.25m), with 4 relays for switch or control functions and continuous level measurement. This compact unit offers a non-contact alternative to our float or conductance sensors in small tank chemical feed or handling applications when corrosive, sticky or dirty media is involved.

The configuration software, supplied with the sensor, provides flexible system integration or retrofit of existing level devices with configuration control. Integral level automation functions can further reduce system costs through the reduction of external control hardware. The analog output enables local tank level indication, remote PLC monitoring or automation fuctions. Gems UCL-510 is the non-contact solution for small tank level switch, control and measurement.

Specifications

Range	49.2˝ (1.25 m)
Accuracy	0.125˝ (3 mm)
Resolution	0.019˝ (0.5 mm)
Beam Width	2˝ (5 cm)
Dead Band	2˝ (5 cm)
Supply Voltage	24VDC (loop)
Loop Resistance	400Ω max.
Consumption	0.5W
Signal Output	4-20 mA, two-wire (when loop powered)
Contact Type	(4) SPST relays 1A
Loop Fail-Safety	4 mA, 20 mA, 21 mA, 22 mA or hold last
Relay Fail-Safety	Power loss: Hold last; Power on: Open, close or hold last
Hysteresis	Selectable
Configuration Software	PC Windows® USB 2.0
Temp. Comp.	Automatic over range
Process Temp.	20°F to 140°F (-7°C to +60°C)
Ambient Temp.	-31°F to +140°F (-35°C to +60°C)
Pressure	MWP = 30 PSI
Enclosure	Type 6P encapsulated, corrosion resistant & submersible
Encl. Material	PC/ABS FR
Strain Relief Mat.	Santoprene®
Trans. Material	PVDF
Cable Length	48˝ (1.2 m)
Cable Jacket Mat.	Polyurethane
Process Mount	1˝ NPT (1˝ G)
Mount. Gasket	Viton®
Classification	General Purpose
Approvals	CE, cFMus

Typical Applications

- Water and Waste Water
- Control Automation
- Chemical Feed
- Food and Beverage
- Acids, Inks, Paints
- Slurries

Control and Switch Functions

- 2 pumps with 2 alarms
- 1 pump with 3 alarms
- 2 pumps (lead-lag) with 2 alarms
- 2 pumps (duplexing) with 2 alarms
- 4 level switch points

Versatile Application

Controller

- Auto fill/empty
- Can control 2 pumps/valves
- Lead/lag
- Duplex
- Unused relays may be used as additional alarms

The UCL-510 feature programmable level intelligence and can be reconfigured for different sensing duties (such as switch actuation points) after installation. This is an advantage over our float or conductivity type sensors. The user-friendly configuration software provides un-matched accuracy and programming for control applications. Multi-function relay control, coupled with 4-20 mA output generates amazing control capabilities. Advanced signal processing techniques provides the UCL-510 with next generation digital processing for control. The UCL-510 is level control made simple.

Switching

- High level alarm (1-4)
- Low level alarm (1-4)
- Any combination of high and/or low alarms

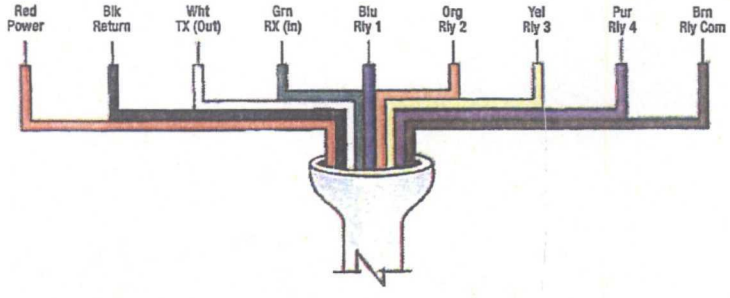
The UCL-510 provides a non-contact alternative to our float and conductivity probes multipoint level switches. It combines 4 built in SPST relays, with a selectable hysteresis that eliminates relay chatter from turbulent media. Additionally, non-contact sensors are immune to the performance issues influenced by changes in a media's specific gravity.

Continuous Transmitter

- Adjustable 4-20 mA output
- Reversible output
- Interface directly to local display and/or to PLC, SCADA, DCS systems
- Remote displays/controllers can increase relay functionality

The UCL-510 is a good non-contact alternative to our XT float type transmitters for challenging media that can damage moving parts. The UCL-510 is for sticky, scaling or corrosive media. It provides exceptional measurement accuracy (0.125"), resolution (0.019") and repeatability ensuring overall system performance reliability.

Wiring



How To Order

Select by Part Number.

Description	Part Number
UCL-510 Transmitter/Multipoint Switch with Configuration Software and Fob	225100
Replacement/Additional Configuration Fob	227100

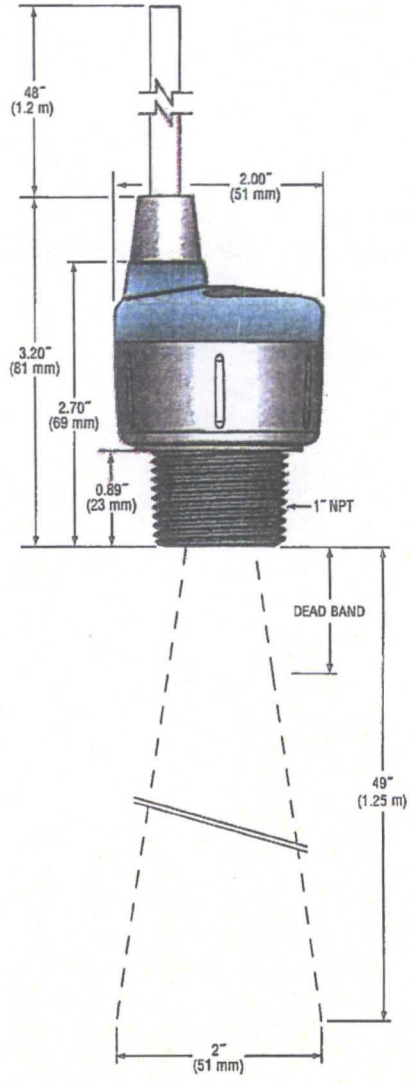
Configuration Software

- Free download @ GemsSensors.com/software
- Windows XP or 2000 compatible; USB 2.0 connection
- Provides configuration, file management (saving, printing, backup), and troubleshooting

The user interface allows you to take complete visual control of your set-up and configuration. Using simple menus and visual representations, the confusion of target calibration are gone. Once you have completed your configuration design, simply click "Write to Unit" and the UCL-510 is configured. It also enables multiple UCL-510's to be configured with just a click of the button. It even generates viewable and printable PDF wiring diagrams of your configurations to simplify and ensure proper field installation.

Gems supplies the USB Fob required to use the configuration software with each UCL-510 sensor. Replacements or additional Fobs may be ordered separately.

Dimensions



Equipment and Materials Schedule

Item 4

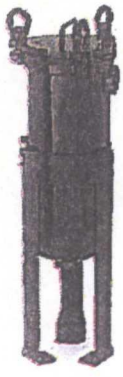
Bag Filter Vessel Housing Assemblies & Filter Bags

#10 Polypropylene Bag Housings

#20 Polypropylene Bag Housings

Steel High Flow Bag GP Housings

Steel ASME Coded Bag AC Housings



Steel Strap Band Bag Filter Housings

Stainless Steel

PBH-410 Specs:
> Polypropylene
> Lightweight
> Resists Corrosion
> Up to 50 gpm
> Up to 100 deg F
> Up to 100 psi
> From $135-$150

PBH-420 Specs:
> Polypropylene
> Lightweight
> Resists Corrosion
> Up to 50 gpm
> Up to 100 deg F
> Up to 90 psi
> From $158-$178

High Flow Specs:
> Steel
> Adjustable Legs
> Viton Cover Seal
> Up to 220 gpm
> Up to 300 deg F
> Up to 200 psi
> From $493-$2100

ASME UM Stamp:
> Steel
> Adjustable Legs
> Hinged Cover
> Up to 220 gpm
> Up to 300 deg F
> Up to 150 psi
> From $1249-$3255

Steel Strap Band:
> Steel
> Adjustable Legs
> Easy to Use
> Up to 220 gpm
> Up to 300 deg F
> Up to 150 psi
> From $432-$2266

PBH-410-1
(1" Inlet/Outlet)
$139.99 Each

PBH-410-15
(1.5" Inlet/Outlet)
$149.99 Each

PBH-420-1
(1" Inlet/Outlet)
$167.99 Each

PBH-420-15
(1.5" Inlet/Outlet)
$177.99 Each

Replacement Bags:
Use 4" W x 8-5/8" L Filter Bags below

Replacement Bags:
Use 4" W x 18" L Filter Bags below

PBH-410 Parts & Accessories:

PBR-410-BK 10" Replacement Basket

144357 Replacement Ball Valve

PBH-420 Parts & Accessories:

PBR-420-BK 20" Replacement Basket

144357 Replacement Ball Valve

Aluminum

OK if pH 6.5-8.5 & TDS under 500

GP801AL2
Filter Bag Size #1
7" W x 16.5" L Bag
100 psi 90 gpm 2"

GP802AL2
Filter Bag Size #2
7" W x 32" L Bag
100 psi 200 gpm 2"

GP802AL3
Filter Bag Size #2
7" W x 32" L Bag
100 psi 220 gpm 3"

GP503AL1.25
Filter Bag Size #3
4.1" W x 8" L Bag
200 psi 20 gpm

Carbon Steel

Ok with high pH

AC801CS2
Filter Bag Size #1
7" W x 16.5" L Bag
(2.0 Cubic Feet)
15" Basket
90 GPM thru 2" Pipe

AC802CS3
Filter Bag Size #2
7" W x 32" L Bag
(4.4 Cubic Feet)
30" Basket
220 GPM thru 3" Pipe

PL88 #1 Series
7" W x 16.5" L Bag
(2.0 Cubic Feet)
15" Basket
220 GPM

Carbon 2" NPT
Carbon 2" Flange
Carbon 3" Flange
304 SS 2" NPT
304 SS 2" Flange
304 SS 3" Flange
316 SS 2" NPT
316 SS 2" Flange
316 SS 3" Flange

PL88 #2 Series
7" W x 32" L Bag
(4.4 Cubic Feet)
30" Basket
220 GPM

Carbon 2" NPT

Pentek AC8024S3 ASME Coded 304 Stainless Steel Filter Bag Housing

3" Inlet/Outlet; 304 Stainless Steel; Use Filter Bag Size #2

- Features
- Specs
- Replacements

- Pentek AC8024S3 ASME Filter Bag Housing Specs:
- **Housing Material:** 304 Stainless Steel
- **Basket:** Stainless Steel
- **Maximum Flow Rate:** 220 GPM
- **Inlet/Outlet Size:** 3"
- **Maximum Pressure:** 150 PSI
- **Maximum Water Temperature:** 300 F
- **Filter Bag Size:** 2
- **Leg Type:** Band Clamp
- **Diameter:** 8.0 Inches
- **Dimension A (In.):** 6 Inches
- **Dimension B (In.):** 42 Inches
- **Dimension C (In.):** 45-5/16 Inches
- **Dimension D (In.):** 22 Inches
- **Standards:** ASME Coded Section VIII Div.1

Equipment and Materials Schedule

Item 5

HP®2000SS Liquid Phase Adsorber

Applications

The HP®2000SS is a carbon adsorber designed for high pressure, high temperature, or corrosive liquid phase treatment applications where stainless steel materials of construction are required. Applications for the HP®2000SS include:

- Process purification – byproduct removal, decolorization
- Wastewater treatment
- Chemical spill cleanups
- Storage tank cleanouts

Installation, Startup and Operation

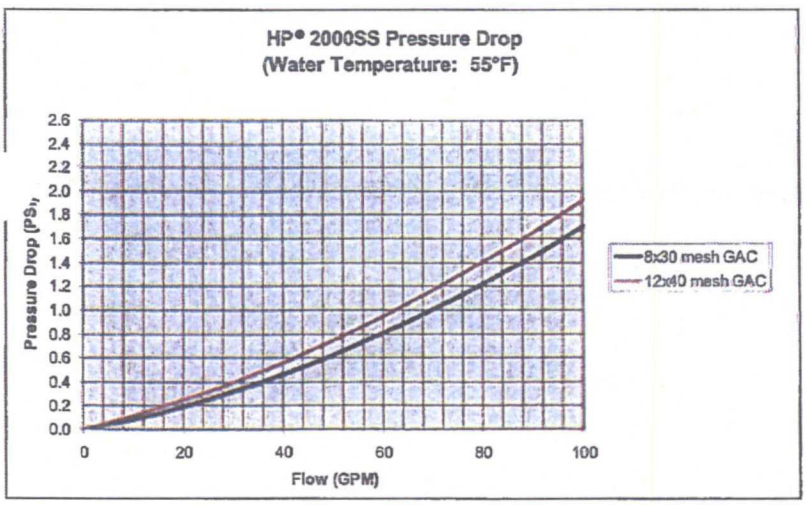
Siemens can provide a total service package that includes utilizing OSHA trained personnel providing on-site carbon changeouts, packaging and transportation of spent carbon for recycling at our reactivation facilities, where the organic contaminants are thermally destroyed.

We provide instructions on sampling the spent carbon and completion of our spent carbon profile form. Spent carbon acceptance testing can be performed at our certified laboratory. When requested a certificate of reactivation will be issued.

Benefits and design features

- Ready to use adsorber, simple installation and operation
- ASME code section VIII (stamped) vessel
- 316SS construction
- Suitable for applications to 125 psig and 200° F
- Flanged process connections
- Rupture Disc for pressure relief
- 1" drain port and 3" media outlet port
- Top 14"x18" manway allows for easy internal inspection
- Fork channels and lifting lugs provided for movement/placement of unit on site
- Adsorber is UN/DOT approved transportation container for RCRA hazardous spent carbon

Specifications: HP® 2000SS	
Dimensions, diameter x overall height (approx.)	54" x 98"
Inlet connection	3" flanged
Outlet connection	3" flanged
Drain / sample connection	1" flanged
Vent connection	2" flanged with rupture disc
Media outlet	3" flanged
Top manway	14"x18" elliptical
Internal distributors	316SS
Carbon fill volume (cu. ft.)	68
Cross sectional area (sq. ft.)	15.9
Approximate carbon weight (lbs.)	2,000
Empty weight (lbs.)	1,500
System operating weight (lbs.)	7,300
Pressure, psig (max.)	125
Temperature, deg. F (max)	200
Maximum flow rate (gpm)	100
Contact time at max flow (minutes)	5



Warning

Safety Note: Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.

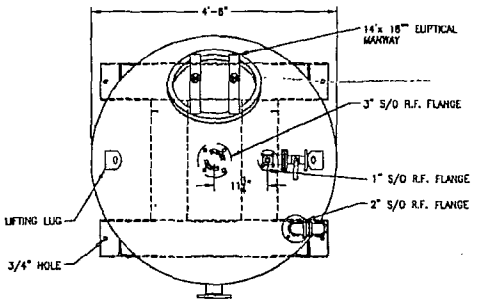
All information presented herein is believed reliable and in accordance with accepted engineering practices. Siemens makes no warranties as to completeness of information. Users are responsible for evaluating individual product suitability for specific applications. Siemens assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products.

Siemens Industry, Inc.
11711 Reading Road
Red Bluff, CA 96080

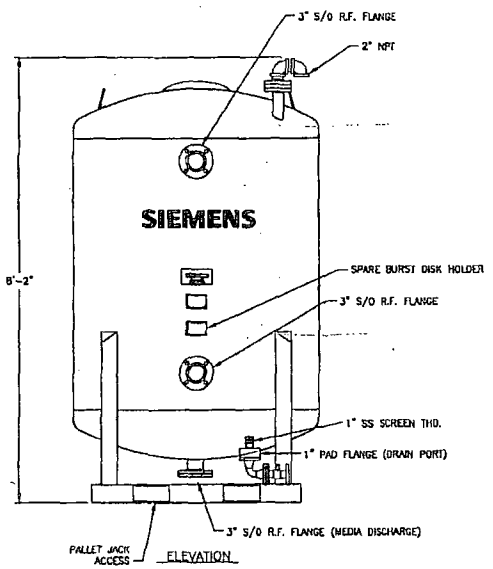
866-613-5620

www.siemens.com/es

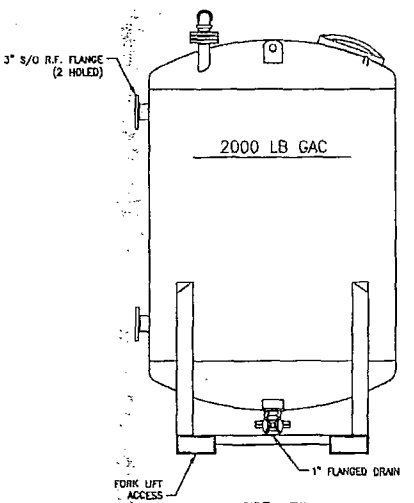
Subject to change without prior notice
Order No.: WS-HP2000SS-DS - 1011
Printed in USA



TOP VIEW



ELEVATION



SIDE VIEW

NOTES: UNLESS SPECIFIED OTHERWISE

1. DESIGN DATA:
   PRESSURE VESSEL-125 PSIG (MAX), 200°F
   ASME CODE STAMPED MAX FLOW 100 GPM
   68 CU. FT. ACTIVATED CARBON
2. MATERIAL:
   316L SS
3. APPROXIMATE WEIGHTS:
   EMPTY VESSEL : ..... 1,500 LBS
   SHIPPING WITH MEDIA: ..... 3,500 LBS
   OPERATIONAL (WATER) : ..... 7,300 LBS
4. EPDM GASKET MATERIAL

DESIGNER	DATE	TITLE	HP2000 SS 125 PSI
AR	9-29-11		
CHECKER	DATE	CLIENT	
ENGINEER	DATE	SIEMENS Water Technologies RED BLUFF, CA	
APPROVER	DATE		
FILE		PROJECT	HP200059-SALES
WORLD WIDE		SHEET	1 OF 1
		REV	0

SIZE: BORDER-0109-24X36D1 | UNIT: INCH | BAR = 1" AT PLOT SCALE | REV | DESCRIPTION | DATE | DRN | CHKD | APVD | ECN

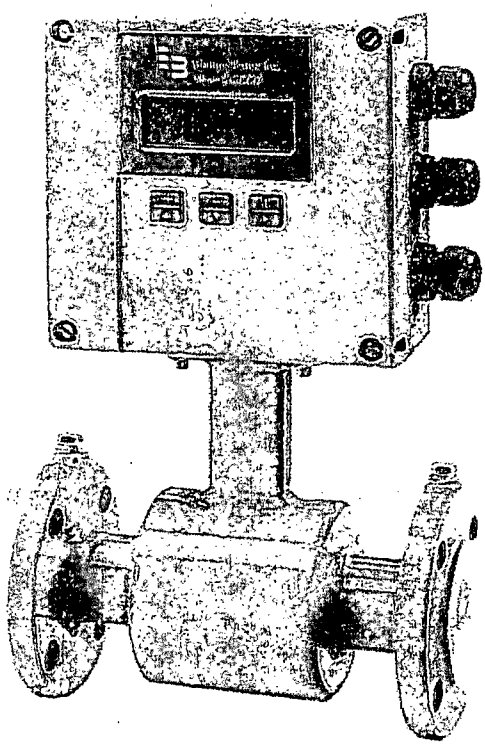
Equipment and Materials Schedule

Item 6

Badger Meter

M-Series® Mag Meter

Model M-2000

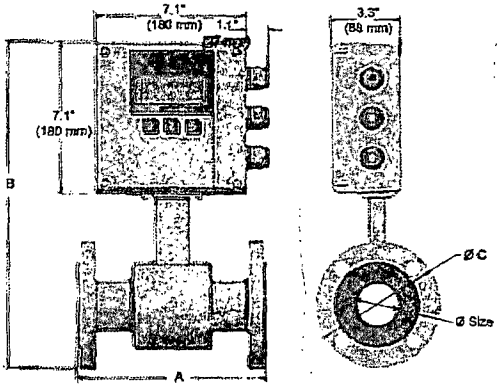


IMPORTANT:
This manual contains important information.
READ AND KEEP FOR REFERENCE.

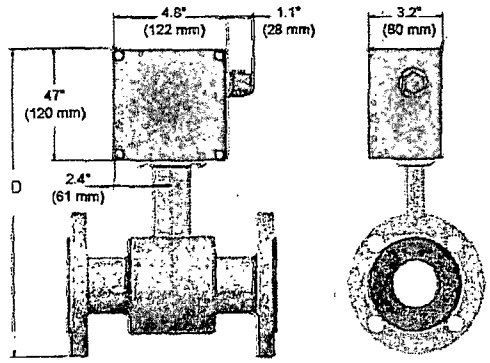
IOM-175-03 (4-11)
PN: 53400-190 Rev 3

Installation & Operation Manual

Appendix: Detector Specifications



Meter with M-2000 amplifier



Meter with junction box for remote M-2000 amplifier

Size		A		B		C		D		Est. Weight with M-2000		Flow Range LPM		Flow Range GPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg	min	max	min	max
1/4	6	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.063	20	0.02	5
5/16	8	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.114	34	0.03	9
3/8	10	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.177	53	0.05	14
1/2	15	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.416	125	0.11	33
3/4	20	6.7	170	14.2	361	3.9	99	11.5	293	13	5.5	0.75	225	0.2	59
1	25	8.9	225	14.4	366	4.3	108	11.7	298	18	8.0	1.20	350	0.3	93
1 1/4	32	8.9	225	15.2	386	4.6	117	12.5	318	20	9.0	2.00	575	0.5	152
1 1/2	40	8.9	225	15.4	390	5.0	127	12.7	322	21	9.5	3.00	900	0.8	239
2	50	8.9	225	15.9	403	6.0	152	13.2	335	26	11.5	4.70	1400	1	373
2 1/2	65	11.0	280	17.1	434	7.0	178	14.4	366	52	23.5	8	2400	2	631
3	80	11.0	280	17.3	440	7.5	191	14.7	372	54	24.5	12	3600	3	956
4	100	11.0	280	18.4	466	9.0	229	15.7	398	56	25.5	19	5600	5	1493
5	125	15.8	400	19.6	498	10.0	254	16.9	430	58	26.0	30	8800	8	2334
6	150	15.8	400	20.6	524	11.0	279	17.9	456	60	27.0	40	12700	11	3361
8	200	15.8	400	22.5	572	13.5	343	20.4	518	86	39.0	75	22600	20	5975
10	250	19.7	500	26.8	681	16.0	406	24.1	613	178	81.0	120	35300	30	9336
12	300	19.7	500	28.9	734	19.0	483	26.2	666	207	94.0	170	50800	45	13444
14	350	19.7	500	30.8	782	21.0	533	28.2	716	258	117	230	69200	60	18299
16	400	23.6	590	33.7	856	23.5	597	31.0	788	306	139	300	90400	80	23901
18	450	23.6	590	35.0	890	25.0	635	32.4	822	400	181	380	114000	100	30250
20	500	23.6	590	38.2	969	27.5	699	35.5	901	493	224	470	140000	125	37346
22	550	23.6	590	39.6	1005	29.5	749	36.9	937	523	237	570	170000	150	45188
24	600	23.6	590	42.2	1071	32.0	813	39.5	1003	552	251	680	200000	180	53778
28	700	23.6	590	46.2	1173	36.5	927	44.0	1118	648	294	920	275000	240	73100
30	750	31.5	800	48.3	1228	39.0	984	45.7	1161	702	319	1060	315000	280	84000
32	800	31.5	800	52.2	1325	41.4	1015	49.5	1257	768	349	1200	361000	320	95600
36	900	31.5	800	55.3	1405	46.0	1168	54.1	1374	848	385	1500	457000	400	121000
40	1000	31.5	800	60.0	1525	50.2	1230	57.4	1457	922	419	1900	565000	500	149300
42	1050	36.0	914	66.0	1675	53.0	1346	63.4	1610	1198	499	2100	620000	550	164600
48	1200	39.4	1000	69.9	1775	59.4	1455	67.2	1707	1208	549	2700	814000	720	215100
54	1400	39.4	1000	78.5	1995	68.4	1675	75.9	1927	1362	619	3700	1100000	980	292700

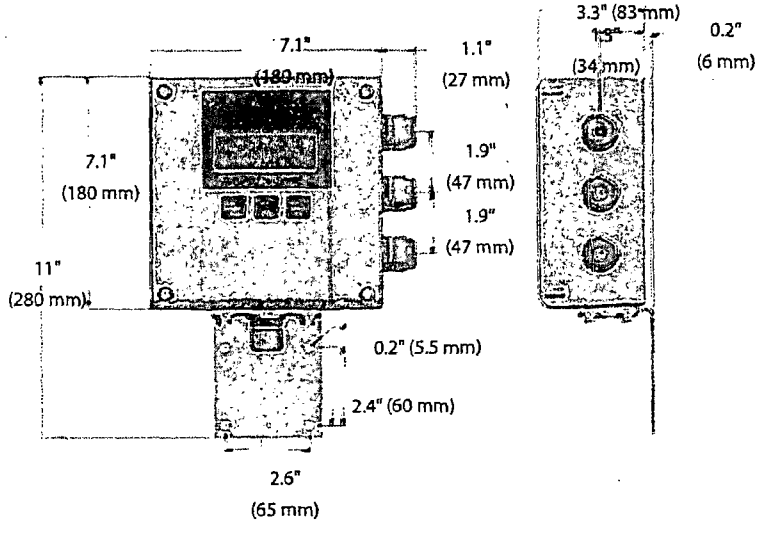
Flow Range: 0.1 - 39.4 fps (0.03-12 m/s)
Sizes: 1/4 inch to 54 inches (6 mm to 1400 mm)
Min. Conductivity: ≥ 5 micromhos/cm
Accuracy:
± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s)
± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)
Electrode Materials: Standard: Alloy C
Optional: 316 stainless steel, gold/platinum plated, tantalum, platinum/rhodium
Liner Material: PFA up to 3/8 inch, PTFE 1/2 inch to 24 inches, Soft and Hard Rubber from 1 to 54 inches, Halar® from 14 to 40 inches
NSF Listed: Models with hard rubber liner 4-inch size and up; PTFE liner - All sizes.

Fluid Temperature:
With Remote Amplifier:
PFA, PTFE & Halar 311°F (155°C)
Rubber 178°F, (80°C)
With Meter Mounted Amplifier:
PFA, PTFE & Halar 212°F (100°C)
Rubber 178°F, (80°C)
Pressure Limits:
Maximum allowable non-shock pressure and temperature ratings for steel pipe flanges, according to American National Standard ANSI B16.5. (Example: 150-pound flanges, rated 285 PSI at ambient temperature.) (Example: 300-pound flange rated 740 PSI at ambient temperature.)
Coil Power: Pulsed DC
Ambient Temperature: -4°F to 140°F (-20°C to 60°C)

Pipe Spool Material: 316 stainless steel
Meter Housing Material: Carbon steel welded
Flanges: Carbon steel - Standard (ANSI B16.5 Class 150 RF)
316 stainless steel - Optional
Meter Enclosure Classification: NEMA 4X (IP66)
Optional: Submersible NEMA 6P (remote amplifier required)
Junction Box Enclosure Protection:
(for remote amplifier option) Powder coated die-cast aluminum, NEMA 4 (IP65)
Cable Entries: 1/2-inch NPT Cord Grip
Optional Stainless Steel Grounding Rings:

Meter Size	Thickness (of one ring)
up through 10 inches	.135 inch
12 to 20 inches	.187 inch

Appendix: Amplifier Specifications



Power Supply:
AC supply (85-265 VAC)
Typical power: 20 VA or 15 Watts
Max. power: 26 VA or 20 Watts
Optional DC supply (10-36 VDC)
Typical power: 10 Watts
Max. power: 14 Watts

Accuracy: ± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s)
± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)

Repeatability: ± 0.1 percent

Flow Range: 0.10 to 39.4 ft/s (0.03 to 12 m/s)

Fluid Conductivity: Minimum 5.0 micromhos/cm

Flow Direction: Unidirectional or bidirectional two separate totalizers (programmable)

Totalization: Programmable/resettable
Unidirectional: T1, T2
Bidirectional: T+ (Fwd), T- (Rev), Tn (Net)

Minimum Fluid Conductivity: 5.0 micromhos/cm

Processing: 32-bit DSP

Analog Output: 4-20 mA, 0-20 mA, 0-10 mA, 2-10 mA (programmable and scalable)
Voltage sourced 24 VDC – isolated
Maximum loop resistance < 800 ohms

Digital Outputs: Four total, configurable
24 VDC sourcing active output (up to two),100 mA total, 50 mA each; sinking open collector output (up to four), 30 VDC Max, 100 mA each; AC solid-state relay (up to two), 48 VAC, 500 mA max.

Pulse Outputs: Scalable up to 10 kHz, passive open collector up to 10 kHz, active switched 24 VDC. Up to two outputs (forward and reverse). Pulse width programmable from 1-1,000 ms or 50 percent duty cycle.

Frequency Output: Scalable up to 10 kHz, open collector up to 1 kHz, solid-state relay

Misc Outputs: High/low flow alarm (0-100 percent of flow), error alarm, empty pipe alarm, flow direction, preset batch alarm, 24 VDC supply

Noise Dampening: Programmable 0-30 seconds.

Empty Pipe Detection: Field tunable for optimum performance based on specific application

Excitation Frequency: 1 Hz, 3.75 Hz, 7.5 Hz or 15 Hz (factory optimized to pipe diameter)

Digital Input: Max. 30 VDC (programmable – positive zero return, external totalizer reset or preset batch start)

Units of Measure: Ounces, pounds, liters, US gallon, imperial gallon, barrel, hectoliter, megagallon, cubic meters, cubic feet, acre feet

Galvanic Separation: 250 volts

Low-flow-cutoff: Programmable 0-10 percent of max. flow

LCD Display: 4 x 20 character display with backlight

Programming: Three-button, external manual or remotely

Housing: Cast aluminum, powder-coated paint

Housing Rating: NEMA 4X (IP66)

Mounting: Meter mount or remote wall mount (bracket supplied)

Cable Connection: 1/2-inch NPT Cord Grip (three)

Ambient Temperature: -4 to 140° F (-20 to 60° C)

Serial Communication: RS232 – Modbus RTU or remote display

Logging: Power loss totalization

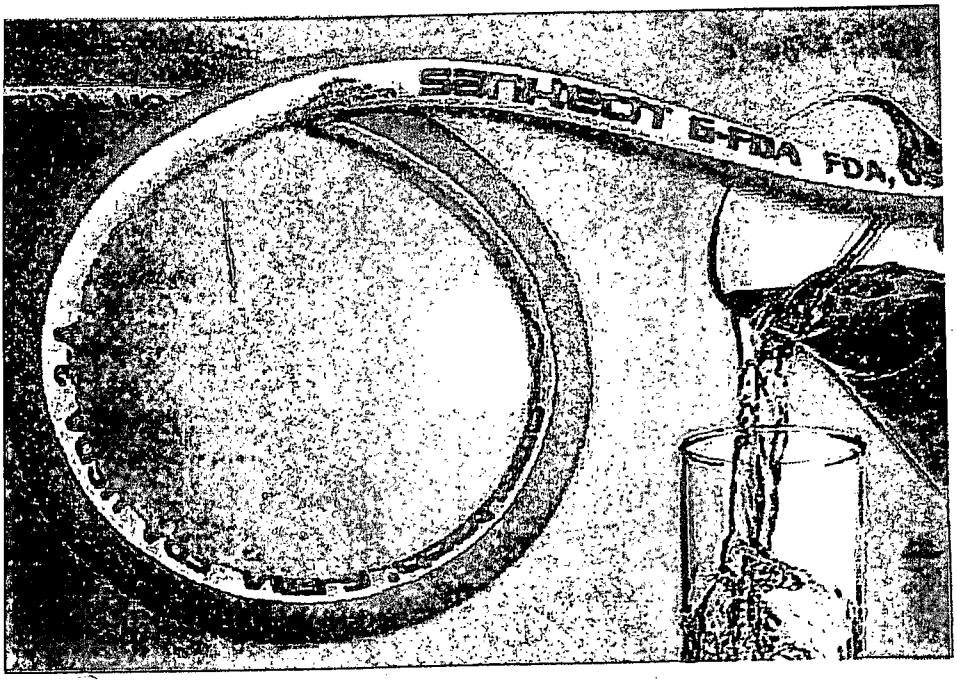
Relative Humidity: Up to 90 percent non-condensing

Locations: Indoor and outdoor

Equipment and Materials Schedule

Item 7

Sani-Tech® G-FDA



High temperature food grade rubber hose

Features/Benefits

- Sanitary suction and discharge hose
- White EPDM liner
- EPDM cover and reinforcements designed to withstand rough handling and high temperatures
- Full vacuum rating
- Food oil and ozone resistant
- Custom laylines available
- Specially designed to handle oil-based materials
- Imparts no taste or odor

Temperature Rating

- -40°F to +300°F (-40°C to +148°C)

Typical Applications

- High purity water
- Bulk food transfer
- Beverage
- Dairy
- Cosmetics
- CIP applications

Available End Connections

- PermaSeal® crimp-style fittings
- Over 40 fitting styles available in a wide range of materials
- 316L stainless steel standard material of construction

High Temperature EPDM Suction and Discharge Service

Sani-Tech® G-FDA is built for higher temperatures and more chemically demanding applications. It boasts our highest temperature rating for any non-fluoropolymer-lined rubber covered hose.

The non-PVC, non-butyl, FDA-approved, all EPDM liner will not impart any taste or odor.

A robust dual-helix wire reinforcement allows the EPDM liner to withstand full vacuum, making it the best EPDM-lined hose for suction and discharge service.

SAINT-GOBAIN
PERFORMANCE PLASTICS

ni-Tech® G-FDA Hose Specifications

Part Number	Inside Diameter		Outside Diameter		Max. Working Pressure*	Minimum Bend Radius**		Vacuum	Burst Pressure	Weight	Max. Length
	in.	mm	in.	mm	PSI	in.	mm	in. Hg	PSI	lb./ft.	ft.
GFDA-0500	.500	12.7	.931	23.6	150	2.50	63.5	29.9	600	0.23	100
GFDA-0750	.750	19.1	1.182	30.0	150	3.75	95.3	29.9	600	0.31	100
GFDA-1000	1.000	25.4	1.500	38.1	150	4.00	101.6	29.9	600	0.391	100
GFDA-1500	1.500	38.1	2.090	53.1	150	5.00	127.0	29.9	600	0.81	100
GFDA-2000	2.000	50.8	2.600	66.0	150	6.00	152.4	29.9	600	1.16	100
GFDA-2500	2.500	63.5	3.173	80.6	150	7.00	177.8	29.9	600	1.70	100
GFDA-3000	3.000	76.2	3.718	94.4	150	8.00	203.2	29.9	600	1.96	100
GFDA-4000	4.000	101.6	4.781	121.4	150 1	1.00	279.4	29.9	600	3.01	100

*Based on ambient condition on exterior of hose. Elevated temperatures and characteristics of medium being transferred can affect working pressures and burst pressures.

**Measured on the inner surface of the curved portion. Data is based on static applications. For dynamic or cyclic applications, consult factory.

Industry Approvals and Compliances
- FDA
- USDA
- 3-A

Construction
- Inner tube: white EPDM
- Cover: gray EPDM bonded to liner with dual-helix wire reinforcement

Temperature Rating
- -40°F to +300°F
- -40°C to +148°C

Maximum Length
- 50 feet (GFDA-2500)
- 60 feet (all other sizes)

Distributed By:

Saint-Gobain Performance Plastics
460 Milltown Road
Bridgewater, NJ 08807
Tel: (800) 435-3992
Fax: (908) 575-0459

SAINT-GOBAIN
PERFORMANCE PLASTICS

Our products are manufactured under a quality management system registered and complying with 3-A Sanitary Standards where noted and with ISO 9001:2000, which has been independently certified by BVQI.

PermaSeal®, Pure-Fit® and Sani-Tech® are registered trademarks.

FSC Mixed Sources

The Progressive Fish-Culturist 48:301–302, 1986

Potential for Nitrosamine Formation in Seven Fishery Chemicals

S. L. ABIDI, V. K. DAWSON, AND R. C. HUBLEY, JR.

U.S. Fish and Wildlife Service
National Fishery Research Laboratory
Post Office Box 818
La Crosse, Wisconsin 54602, USA

Abstract.—In recent years, nitrosamines have been reported as possible causes of cancer, mutations, or birth defects. Inasmuch as these compounds may be formed by the interaction of certain amines with nitrite in the aquatic environment, we evaluated seven fishery chemicals for their potential to form nitrosamines: the experimental fish toxicant digeranylethanolamine (GD-174); the four therapeutants Terramycin, erythromycin, Hyamine 1622, and Hyamine 3500; and the two tracer dyes rhodamine B and rhodamine WT. The results indicate that the controlled use of the seven fishery chemicals in natural environments will not lead to the formation of nitrosamines.

A wide range of nitrosamine structures, several of which occur in foodstuffs (Crosby and Sawyer 1976), have been reported to cause cancer, mutations, or birth defects (Olajos 1977). Reactions between nitrite and certain amine compounds in an aquatic environment might be expected to result in the formation of nitrosamine, and Meyers and Hendricks (1982) reported that several nitrosamines caused cancer in fish. As part of a Congressional mandate, the U.S. Environmental Protection Agency (1977) required that all pesticides—including fishery chemicals—be tested for their potential to form nitrosamines by interaction with nitrite.

The objective of the present work was to determine if nitrosamines were formed either in water or in fish treated with certain chemicals used in fish culture or management. The chemicals selected were the experimental carp toxicant digeranylethanolamine (GD-174); the four therapeutants Terramycin, erythromycin, Hyamine 1622, and Hyamine 3500; and the two tracer dyes rhodamine B and rhodamine WT. Several other fishery chemicals were excluded from this study because their molecular structure did not contain the nitrogen group involved in the formation of nitrosamines.

Methods

All reagents and solvents used were analytical grade. Inorganic and organic salts were obtained from Alpha Products, Danvers, Massachusetts; sodium alkanesulfonate from Eastman Kodak, Rochester, New York; 2-propanol from Aldrich, Milwaukee, Wisconsin; solvents for high performance liquid chromatography and silica gel from J. T. Baker, Philipsburg, New Jersey; and other chromatographic solvents from Burdick and Jackson Laboratories, Muskegon, Michigan.

Fishery chemicals used in this study and their respective suppliers were as follows: GD-174 (technical), Glidden Durkee Corporation; Terramycin (technical) and erythromycin (technical), Sigma Chemical Company; Hyamine 1622 (50% liquid) and Hyamine 3500 (technical and 50% liquid), Rohm and Haas; and rhodamine B (powder) and rhodamine WT (20% aqueous solution), E. I. du Pont de Nemours Company.

Nitrosamine detection involved the use of gas chromatography (GC), high performance liquid chromatography (HPLC), and thermal energy analysis (TEA). Instrument characteristics used were those of Abidi (1982, 1984).

Before the experiments, we examined all products and reagents for possible contamination with nitrosamines, using steam distillation, extraction, ion exchange chromatography, and GC–TEA analysis procedures described by Abidi (1982).

Inspection for nitrosamine formation was conducted in water from the laboratory wells and the Black River, Wisconsin. The chemicals were allowed to interact for 24 h and samples were taken at intervals of 0.5, 2, 3, 6, 12, or 24 h, as appropriate for the compound under study. Nitrite-N was added at a rate of either 10 or 100 μg/L above its background levels. Resulting nitrite-N levels in the test solutions were 10, 20, 30, 100, 110, or 120 μg/L. Temperature was maintained at 20, 50, or 90°C and pH at 2, 5, or 7.

Whole-body homogenates of fish exposed to fishery chemicals and nitrite were checked for nitrosamine formation by tissue extraction, cleanup by column and thin-layer chromatography, and analysis by HPLC–TEA. Results of analyses were confirmed by GC–mass spectrometry (Abidi 1984).

Results and Discussion

There was no evidence of nitrosamine contamination in any of the fishery chemicals or reagents (level of detection 0.1 ng/g). Nitrosamines were not formed during reactions of nitrate with Terramycin, erythromycin, or the Hyamines. Forced reactions of three compounds—GD-174 and rhodamines B and WT—resulted in the formation of traces of nitrosamines under rigorous laboratory conditions of low pH and high temperature (Table 1), but no nitrosamines were found under conditions that normally occur in the natural environment. S. M. Johnson and T. R. Steinheimer (paper read at the American Chemical Society national meeting, 1984) also found that nitrosamines were not formed with rhodamine WT during simulated and actual field studies. The rate of nitrosamine formation from all three compounds was significantly greater at pH 5.0 than at pH 7.0. However, the most important factor that governed nitrosamine formation was the concentration of nitrite present.

A new nitrosamine derived from GD-174, isolated and identified as *N*-nitrosogeranylethanolamine by S. L. Abidi (paper read at the American Chemical Society national meeting, 1980), was observed in whole-body homogenates of fish treated with GD-174, but only at low concentrations (<0.5 ng/g).

Of the chemicals evaluated, three produced trace concentrations of nitrosamines only when the medium was highly enriched with nitrite-N at more than 100 μg/L. Concentrations of nitrite that were required for the formation of nitrosamines are unlikely to occur in nature because nitrite is unstable in natural water systems and is readily oxidized to nitrate by nitrifying bacteria. Waters with concentrations of nitrite high enough to allow nitrosamine formation would be considered heavily polluted and unacceptable for discharge, culture waters, or potable waters. Also, the conditions of high temperature (90°C) and low pH needed to form nitrosamines are not likely to be present in natural or fish culture water systems. We conclude that the controlled use of the seven fishery chemicals in natural environments will not lead to the formation of nitrosamines.

TABLE 1.—Formation of nitrosamines from reactions of fishery chemicals with nitrite. Reaction conditions were: nitrite : amine ratio, 3; temperature, 90°C; pH, 4.5; reaction preiod, 2 h.

Fishery chemical	Yield (g/mole amine)[a]	Nitrosamine formed
GD-174	18.1	*N*-nitrosogeranylethanolamine
Terramycin	ND	
Erythromycin	ND	
Hyamine 1622	ND	
Hyamine 3500	ND	
Rhodamine B	1.9	Diethylnitrosamine
Rhodamine WT	3.0	Diethylnitrosamine

[a] ND = None detected (limit of detection 0.1 ng/g).

References

Abidi, S. L. 1982. Detection of diethylnitrosamine in nitrite-rich water following treatment with rhodamine flow tracers. Water Research 16:199–204.

Abidi, S. L. 1984. Chromatographic investigations of the configurational and geometrical isomerism of allylic n-terpenyl-n-hydroxyethyl-nitrosamines. Journal of Chromatography 288:277–292.

Crosby, N. T., and R. Sawyer. 1976. Determination of nitrosamines in food products. Residue Reviews 64:77.

Meyers, T. R., and J. D. Hendricks. 1982. A summary of tissue lesions in aquatic animals induced by controlled exposures to environmental contaminants, chemotherapeutic agents, and potential carcinogens. U.S. National Marine Fisheries Service Marine Fisheries Review 44(12):1–17.

Olajos, E. J. 1977. Biological interactions of N-nitroso compounds. Ecotoxicology and Environmental Safety 1:175.

U.S. Environmental Protection Agency. 1977. EPA requires registrants and applicants of pesticide products containing N-nitroso contaminants to submit analyses of that pesticide. Federal Register 42(189): 51640–51641.

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811 S. First St., Artesia, NM 88210
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1000 Rio Brazos Road, Aztec, NM 87410
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1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Los Lobos Renewable Power, LLC (Cyrq Energy/ Lightning Dock Geothermal H1-01, LLC)	Contact: Nick Goodman
Address 136 South Main Street, Salt Lake City, Utah	Telephone No. 801.875.4200
Facility Name Not on a facility, on Geothermal Road	Facility Type Geothermal power exploration location

Surface Owner	Mineral Owner	API No.
Rosette Inc.	Not applicable, not on a location	Not applicable, not on a location

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	West Line	County
	7	25S	19W					Hidalgo

Latitude 32° 08.88' **Longitude** 108° 50.221' N

NATURE OF RELEASE

Type of Release: Chevron RPM 15-40W motor oil	Volume of Release five gallons	Volume Recovered: 4.0 gallons
Source of Release: Five-gallon can of motor oil falling from pickup truck bed onto roadway	Date and Hour of Occurrence 8/6/2012 approximately 1545	Date and Hour of Discovery 8/6/2012 approximately 1545
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	Mr. Carl Chavez and Mr. Randy Dade of NMOCD Environmental Bureau and Mr. Michael Smith of BLM Las Cruces District Office and the New Mexico Environment Department were informed by telephone and or email.	
By David Janney, AMEC, Albuquerque, NM	Date and Hour of Report: August 7, 2012, approximately 1100	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* Cause of problem was a faulty tailgate latch on a Thermasource pickup truck that allowed a five-gallon can of 15-40W motor oil in the bed of a slowly moving pickup truck to fall out and spill onto a gravel roadway.

Describe Area Affected and Cleanup Action Taken.* The affected area of the gravel roadway was approximately 15 square feet. A berm of absorbent material was use to contain the spill and additional absorbent was used to absorb the free oil. Once the oil had been absorbed, the absorbent material and as much of the stained soil beneath it as possible were removed and stockpile on plastic at the LDG 53-7 location pending proper disposal by Thermasource. Approximately ¼ cubic yard of stained soil/gravel was removed and stockpiled on plastic for subsequent disposal by Thermasource, the drilling contractor. Thermasource will contract for proper disposal and supply Los Lobos with documentation of proper disposal.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
Date: 8/16/2012 Phone: 505.821.1801		

Attach Additional Sheets If Necessary

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Address 136 South Main Street, Salt Lake City, Utah	Telephone No. 801.875.4200
Facility Name Not on a facility, on Geothermal Road	Facility Type Geothermal power exploration location

Surface Owner	Mineral Owner	API No.
Rosette, Inc.	Not applicable, not on a location	Not applicable, not on a location

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	West Line	County
	7	25S	19W					Hidalgo

Latitude 32° 08.906' **Longitude** 108° 50.284' N

NATURE OF RELEASE

Type of Release: Chevron RPM 15-40W motor oil	Volume of Release five gallons	Volume Recovered: 4.5 gallons
Source of Release: Five-gallon can of motor oil falling from pickup truck bed onto roadway	Date and Hour of Occurrence 8/6/2012 approximately 1545	Date and Hour of Discovery 8/6/2012 approximately 1545
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	Mr. Carl Chavez and Mr. Randy Dade of NMOCD Environmental Bureau and Mr. Michael Smith of BLM Las Cruces District Office and the New Mexico Environment Department were informed by telephone and or email.	
By David Janney, AMEC, Albuquerque, NM	Date and Hour of Report: August 7, 2012, approximately 1100	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* Cause of problem was a faulty tailgate latch on a Thermasource pickup truck that allowed a five-gallon can of 15-40W motor oil in the bed of a slowly moving pickup truck to fall out and spill onto a roadway.

Describe Area Affected and Cleanup Action Taken.* The affected area of the hard gravel roadway was approximately 15 square feet. A berm of absorbent material was use to contain the spill absorb the free oil. Once the oil had been absorbed, the absorbent material and as much of the stained soil as possible was removed and stockpile on plastic at the LDG 53-7 location pending proper disposal by Thermasource. Approximately 10 gallons of absorbent material was used to absorb this spill. It was removed and placed into a spill material bin pending proper disposal. Thermasource will contract for proper disposal and supply Los Lobos with documentation of proper disposal

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
Date: 8/16/2012 Phone: 505.821.1801		

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Address 136 South Main Street, Salt Lake City, Utah	Telephone No. 801.875.4200
Facility Name Not on a facility, on Geothermal Road	Facility Type Geothermal power exploration location

Surface Owner	Mineral Owner	API No.
Rosette, Inc.	Not applicable, not on a location	Not applicable, not on a location

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	West Line	County
	7	25S	19W					Hidalgo

Latitude 32° 08.912' **Longitude** 108° 50.111' N

NATURE OF RELEASE

Type of Release: Chevron RPM 15-40W motor oil	Volume of Release five gallons	Volume Recovered: 4.5 gallons
Source of Release: Five-gallon can of motor oil falling from pickup truck bed onto roadway	Date and Hour of Occurrence 8/6/2012 approximately 1545	Date and Hour of Discovery 8/6/2012 approximately 1545
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By David Janney, AMEC, Albuquerque, NM	Date and Hour August 7, 2012, approximately 1100	
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Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
Date: 6/16/2012 Phone: 505.821.1801		

Attach Additional Sheets If Necessary

AFFIDAVIT REGARDING
LIGHTNING DOCK GEOTHERMAL PROJECT

I, Nicolas Goodman, a resident of Utah being duly sworn, attest:

1. I am the Chief Executive Officer of Cyrq Energy, Inc. (Cyrq). Cyrq owns the project companies, Lightning Dock Geothermal HI-01, LLC and Los Lobos Renewable Power, LLC, which are developing the Lightning Dock geothermal project.

2. Cyrq is currently finalizing the design for the Lightning Dock geothermal project. Such equipment does not include the water cooling tower that was originally proposed with the project in 2008, or any similar water cooling tower. Cyrq's plans have changed, and the project design now includes an air cooled system which does not use water to cool the plant.

3. At this time, Cyrq does not plan, intend nor expect to construct a water cooling tower for use at the Lightning Dock geothermal project.

4. Cyrq also owns a geothermal power plant in Thermo, Utah. Due to the quality of the geothermal fluids at the Thermo power plant, no anti-scaling, anti-corrosion or other treatment additives are needed, and none are added to the geothermal fluid. The quality of the geothermal fluids at Lightning Dock is similar—if not better—quality than at Thermo. We do not believe that any anti-scaling, anti-corrosion or other treatment additives will be needed at Lightning Dock. We do not anticipate adding anything to the geothermal fluids at Lightning Dock.

Further affiant sayeth naught.

Nicholas Goodman

Nicholas Goodman

STATE OF New Mexico)
ss.)
COUNTY OF Bernalillo)

The foregoing Affidavit was subscribed and sworn to before me by Nicolas Goodman, on this 15 day of January, 2013.

Notary Public

My Commission expires: 8-23-14

OFFICIAL SEAL
CHARLES G. DAVIS
Notary Public
State of New Mexico
My Comm. Expires 8-23-14

Annual Geothermal Well Report

DISCHARGE PERMIT GTHT-001
Los Lobos Renewable Power, LLC

Nick Goodman, CEO
136 South Main Street, Ste. 600
Salt Lake City, UT 84101

David W. Janney, PG
Senior Geologist | Agent for Los Lobos Renewable Power, LLC
AMEC Environment and Infrastructure
8519 Jefferson, NE
Albuquerque, NM 87113

January 31, 2013

Los Lobos Renewable Power, LLC
2012 Annual Geothermal Well Report

Los Lobos Renewable Power, LLC ("Los Lobos") hereby submits its 2012 Annual Geothermal Well Report pursuant to ¶21(P) of its Discharge Permit, dated July 1, 2009.

Background

Overview. Los Lobos is the operator for two BLM Geothermal Resources Leases, NM-34790 (2,500.96 acres) and NM-108801 (640.00 acres), in Hidalgo County, New Mexico. Los Lobos and its sister company, Lightning Dock Geothermal HI-01, LLC ("LDG") (both of which are owned by Cyrq Energy, Inc.), are in the process of developing the Lightning Dock geothermal resource to use geothermal fluids to generate electricity on a utility scale. Los Lobos expects the first phase of the power plant to be built and become operational in calendar year 2013. All wells intended for use in the first phase have been drilled (LDG 45-7, 47-7, 53-7, 55-7, and 63-7).

Technology. Los Lobos plans to use a binary-cycle technology, which does not require steam (water vapor) to turn a turbine. Instead, geothermal heat warms a working fluid, which vaporizes at a lower temperature than water. This working fluid, when vaporized, turns the turbine to generate electricity. Thus, the technology involves two closed loops.

In the first closed loop, the hot geothermal fluid is pumped to the surface via a production well. The hot geothermal fluid—contained in a pipeline—enters the power plant at over 250° F and flows through a heat exchanger that transfers the heat to a working fluid. Subsequently, 100% of the spent geothermal fluid, cooled slightly to between 140° F -160° F, is re-injected via an injection well into the same geothermal source it came from. The fluid is then naturally reheated to be used again and again. From the point where the geothermal fluid leaves the geothermal reservoir to the point where it returns to the reservoir, it remains in a pipe, under pressure and in the fluid phase the whole time. It does not flash or comingle with the working fluid, shallow freshwater aquifers, or air. Nothing is added to the fluid, there is no surface ponding, no holding tanks, no evaporative losses. The fluid is contained in a pipe or well casing during its entire journey, it is chemically unaltered, and is never exposed to the atmosphere.

The second closed loop contains the working fluid. The working fluid, too, is continuously contained in pipes. The working fluid gathers heat from the heat exchanger, vaporizes, turns the turbine, becomes cooled via the air-cooling fans, and then returns to the heat exchanger to recycle again and again. Please see Figure 1.

Los Lobos anticipates that, at phase two of project build-out (which will expand power-production capacity to 10 MWh), the total volume of geothermal fluid displaced from the geothermal reservoir and suspended in steel well casing or power plant pipes at any given time will be approximately 0.69 Acre Feet (or ~225,000 gallons).

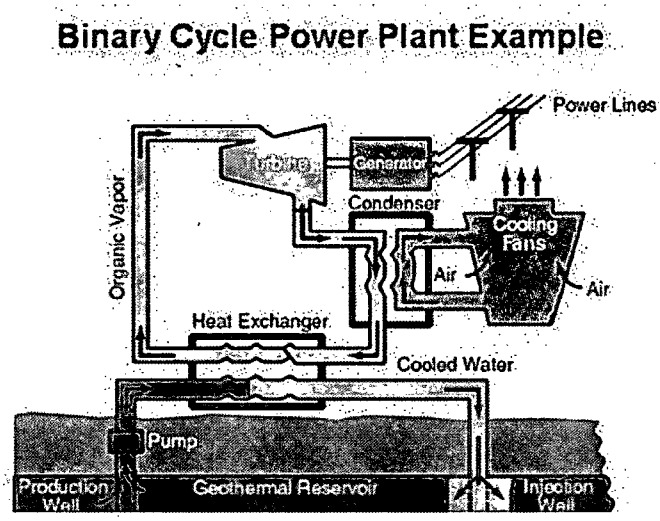

Figure 1

Because the fluids are constantly recycling through the geothermal reservoir at a steady rate, Los Lobos expects the geothermal reservoir to maintain equilibrium once the project is up and running.

Public Interest. The Lightning Dock Geothermal project uses geothermal fluids to generate electricity on a utility scale. By contract, this electricity will be sold to PNM and used by New Mexico customers. This project is in the public interest because geothermal heat is a renewable source of energy. In addition, geothermal heat is constant. Therefore it provides base load (i.e., 24/7) power, unlike wind and solar. Unlike other base-load sources of energy such as coal and natural gas, geothermal electricity is produced with no emissions.

No Waste. Because the Lightning Dock Geothermal project relies on a geothermal closed-loop system, resulting in no net depletion of the geothermal reservoir, and is constantly returning the thermally depleted fluids to the geothermal reservoir for reheating, the project is in the interest of conservation. Further, the project prevents waste because the geothermal fluids will be beneficially used to generate electricity that will be used by New Mexico customers.

Correlative Rights. Existing leases in the Lightning Dock geothermal area are: Los Lobos/LDG (3,140.96 acres of geothermal resources leased from BLM), Rosette, Inc. (313.59 acres of geothermal resources leased from NM State Land Office) and AmeriCulture, Inc. (10 acres of geothermal resources leased from NM State Land Office). In addition, the McCants family owns at least 240 acres of property with mineral rights in the Lightning Dock geothermal area. The Lightning Dock Geothermal project protects correlative rights and allows each leaseholder and owner their just and equitable share of recoverable geothermal resources.

Discharge Permit Requirements

1. **Cover Sheet.** Please see cover page.

2. **Comprehensive summary of all geothermal well operations, including description and reason for any remedial or work; include G-103s.** The following geothermal wells have been drilled: LDG 45-7, 47-7, 53-7, 55-7, and 63-7. None of these wells have been placed on production or injection at this time. Power plant start-up is anticipated in 4th Qtr of 2013. In 2012, Los Lobos performed a workover of well LDG 45-7. The G-103 and Cleanout and Completion Handbook are included at **Tab 1**.

3. **Production and injection volumes, including a running total to be carried over each year (summary of the monthly filed production and injection reports, forms G-108 and G-110).** The following geothermal wells are drilled and awaiting placement on production or injection: LDG 45-7, 47-7, 53-7, 55-7, and 63-7. None of these wells have been placed on production or injection at this time. Power plant start-up is anticipated in 4th Qtr of 2013 and Los Lobos will commence filing monthly production and injection reports, forms G-108 and G-110, at that time.

4. **Copies of chemical analyses in accordance with Permit Condition 20 (Water Quality Monitoring Program).** Los Lobos expects the first phase of the power plant to be built and become operational in calendar year 2013. Thus, Los Lobos intends to begin implementing Discharge Permit Condition 20 during 2013 (e.g., ground water monitoring programs and further establishing "background").

5. **A copy of any mechanical integrity test chart in accordance with Permit Condition 2l.H.** A mechanical integrity test was performed on Well LDG 63-7 in August of 2012. The well was pressure tested at 1,000 psi for 30 minutes with passing results. Please note that no packer was needed for this test because the well was tested during well drilling and a cement plug was used in lieu of a packer. Please see **Tab 2** for the properly signed and dated circular test chart and calibration, graph, and Excel spreadsheet with details of the testing.

6. **A copy of the annual subsidence survey data results.** Power plant start-up is anticipated in 4th Qtr of 2013. Los Lobos intends to survey well top-of-casing and ground elevations during 2013 so that it can timely begin subsidence monitoring its water quality monitoring program at power plant start-up.

7. **Brief explanation describing deviations from normal production methods.** The following geothermal wells are drilled and awaiting placement on production or injection:

LDG 45-7, 47-7, 53-7, 55-7, and 63-7. None of these wells have been placed on production or injection at this time and there has been no deviation from normal production methods.

8. **Copies of any leaks and spill reports submitted in accordance with Permit Condition 15.** Please see **Tab 3** for copies of spill reports submitted by Los Lobos in 2012.

9. **A copy of analytical data results from annual groundwater monitoring including the QA/QC Laboratory Summary.** Since production has not begun the monitoring well network has not been installed. Los Lobos expects that the monitoring wells will be installed in the third or fourth quarter of 2013. Los Lobos intends to implement sampling of the other wells included in Table 3 of the Discharge Permit when it establishes the groundwater monitoring program. Permit Condition 21.D requires sample collection from each production and injection wells. Laboratory analytical sheets for samples collected from LDG 45-7, 53-7, 55-7, and 63-7 are included. Please note that these samples include single-phase samples collected by ASTM Method E 947-83 and dual phase samples collected by ASTM Method E 1675-95. Results for the dual phase samples include the "flashed brine" and "total fluid." Analytical results for LDG 45-7 include single phase fluid flashed brine and total fluid. Please note that while concentrations of analytes vary with each of these methods there is generally less than a 10 percent difference in these results. Please see **Tab 4** for these results.

10. **An updated Area of Review (AOR) summary when any new wells are drilled within 1/4 mile of any UIC Class V Geothermal Injection Well (see (20.6.2 NMAC).** Los Lobos drilled and completed LDG 63-7 in 2012 and it is a permitted UIC Class V Geothermal Injection Well. Los Lobos is not aware of any new wells drilled within 1/4 mile of LDG 63-7.

11. **Miscellaneous section to include any other issues that should be brought to OCD's attention.** (A) Pursuant to ¶15 of the Discharge Permit, please know that Los Lobos anticipates the following modification to the process permitted by the Discharge Permit: Los Lobos plans to use air-cooling instead of water-cooling in power plant operations. This should result in a significant change affecting the permitted discharge of water contaminants. With air-cooling, no discharge of water contaminants is anticipated. Please see **Tab 5** (affidavit of Nicholas Goodman). (B) On December 11, 2012, the New Mexico Public Regulation Commission approved a Geothermal Power Purchase and Sale Agreement between PNM and LDG for electricity generated at the Lightning Dock Geothermal project.

12. **Certification Form.** Please see following page.

January 31, 2013

David K. Brooks
Assistant General Counsel
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Los Lobos Renewable Power, LLC ("Los Lobos")
2102 Annual Geothermal Well Report

Dear Mr. Brooks:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

I further certify that I am a principal executive officer of at least the level of vice-president for Los Lobos.

Yours sincerely,

Nicholas Goodman

Name: Nicholas Goodman

Title: CEO

michelle@mhenrie.com
505-842-1800
P.O. Box 7035 ▫ Albuquerque, New Mexico ▫ 87194-7035
126 E. DeVargas ▫ Santa Fe, New Mexico ▫ 87501

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

Form C-103
Adopted 10-1-78
Revised 10-1-78

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N. M. O. M.		
U. S. G. S.		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

5. Indicate Type of Lease: State ☐ Fee ☐
5.a State Lease No.: NM 34790

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☒ Temp. Observation ☐ Low-Temp Thermal ☐ Injection/Disposal ☐
7. Unit Agreement Name: NA
2. Name of Operator: Lightning Dock Geothermal HI-01, LLC
8. Farm or Lease Name:
3. Address of Operator: 136 S. Main Street, Ste 600, Salt Lake City, UT 84101
9. Well No.: LDG 45-7
4. Location of Well: Unit Letter 2360 Feet From The South Line and 2278 Feet From The West Line, Section 7 Township 25S Range 19W NMPM.
10. Field and Pool, or Wildcat: Lightning Dock Geothermal
15. Elevation (Show whether DF, RT, GR, etc.)
12. County: Hidalgo

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG & ABANDONMENT ☐
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☒		OTHER	

17. Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 203.

RECEIVED
MAR 16 2012
NMOCD ARTESIA

Move on location and rig-up pump pull rig
Pull pump for reconditioning
Rig-down and move off pump pull rig
Move on and rig-up drilling rig
Clean out well
Rig-up geophysical loggers and log well
Rig-down loggers
Run slotted liner
close master valve, rig-down and move off location

Please see the attached LDG 45-7 Cleanout & Completion Program by Capuano Engineering Consultants for the details of this program.

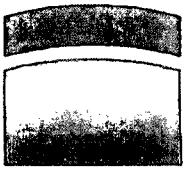
This G-103 has been accepted with "Like Approval by BLM" After the BLM Change on Page 7, with that correction, This G-101 is accepted and Approved.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED _____ TITLE Attorney for Operator DATE 3/16/2012

APPROVED BY _____ TITLE Dist II Supervisor DATE 03/16/2012

CONDITIONS OF APPROVAL, IF ANY:



Cyrq

Lightning Dock
geothermal

LDG 45-7
Cleanout &
Completion Program

Designed and Prepared By:

Capuano
Engineering
Consultants

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

CAPUANO
ENGINEERING
CONSULTANTS

3883 Airway Drive
Suite 210
Santa Rosa, CA 95403
TELEPHONE: (707) 575-8740

Drilling Program	
Operating Company	Lightning Dock Geothermal HI-01, LLC
Field	Lightning Dock
Well	45-7
Location	Hidalgo County, NM
Well Type	Production Well
Drilling Engineer	Louis Capuano III
Date of Issue	February 29, 2012

		Signature	Date
Prepared	Louis Capuano III		
	Drilling Engineer	Capuano Engineering Consultants	
Accepted	Michael Hayter		
	Project Management	Cyrq Energy	

Table of Contents

Section:

Cyrq – Lightning Dock Geothermal Pump Removal and Cleanout Program 45-7

Section A: General Well Information

Well Information Table	
Lightning Dock Geothermal HI-01, LLC	45-7
Location	Section: 7, Township: 25S, Range: 19W County: Hidalgo County State: NM
Elevation	GL: 4202'
	KB: 13'
Final Total Depth	2900' MD
Surface UTM Coordinates	32° 8'39.89" N, 108°50'16.15" W
Bottom Hole Target	64.4'S and 1.9' E of surface location
Target Zone:	Volcanic Tuff

Section	Maximum Depth of Section		Casing
OH	MD	TVD	
36"	48'	48'	30", 139 ppf, J-55 Welded Line Pipe
26"	411'	411'	20", 94 ppf, J-55, BTC Casing
17-1/2"	1680'	1679'	13-3/8", 54.5 ppf, K-55, BTC Casing
12-1/4"	2900'	2899'	9-5/8", 36 ppf, K-55, BTC Slotted Liner w/ TOL at 1600'

Wellhead Information	
Flange Size	Pressure Test (psi)
13-3/8" SOW x ANSI 12", 400 Series	1000

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

Overview:

LDG 45-7 is a pumped production well. The well was drilled from Dec 2010 to Feb 2011. However, the completion was delayed by logging and wellbore problems. The object of this operation is to complete the original plan for the well. The bottom hole section from 1680' to TD at 2900' is open hole completion. There is a 12" line shaft pump installed in the wellbore to 960'. The pump has three different strings of pipe that are (starting with the inner most shaft) the drive shaft, the lubricator string and the pump casing. This workover operation will begin with the removal of the line shaft pump. Once the pump is removed a BOP stack including a master valve will be placed on the wellhead. The BOP will be tested before proceeding into the wellbore. The well will then be cleaned out to a total depth of 2900'. Once clean out has occurred the well will be logged for fracture identification. After logging the rig will complete the well with a slotted 9-5/8" liner. The liner will be set on bottom with a liner adapter on top.

Safety, Hazards and Special Considerations:

Section B: Pump Removal Program

During the removal of the pump cool water must be flowed down the backside of the wellbore in order to keep the well killed. If no water is kept flowing down the annular space, the well will become active and want to flow.

It is essential to handle the pump motor, bearings, seals and bells with the up most care. These pieces of equipment are very fragile and can be damaged easily.

The lubrication string will be filled with oil. This oil needs to be collected and contained. Standard clamps, rings, hoses and storage containers should be utilized to prevent contamination. Be aware when breaking the connection that the string will be full of oil.

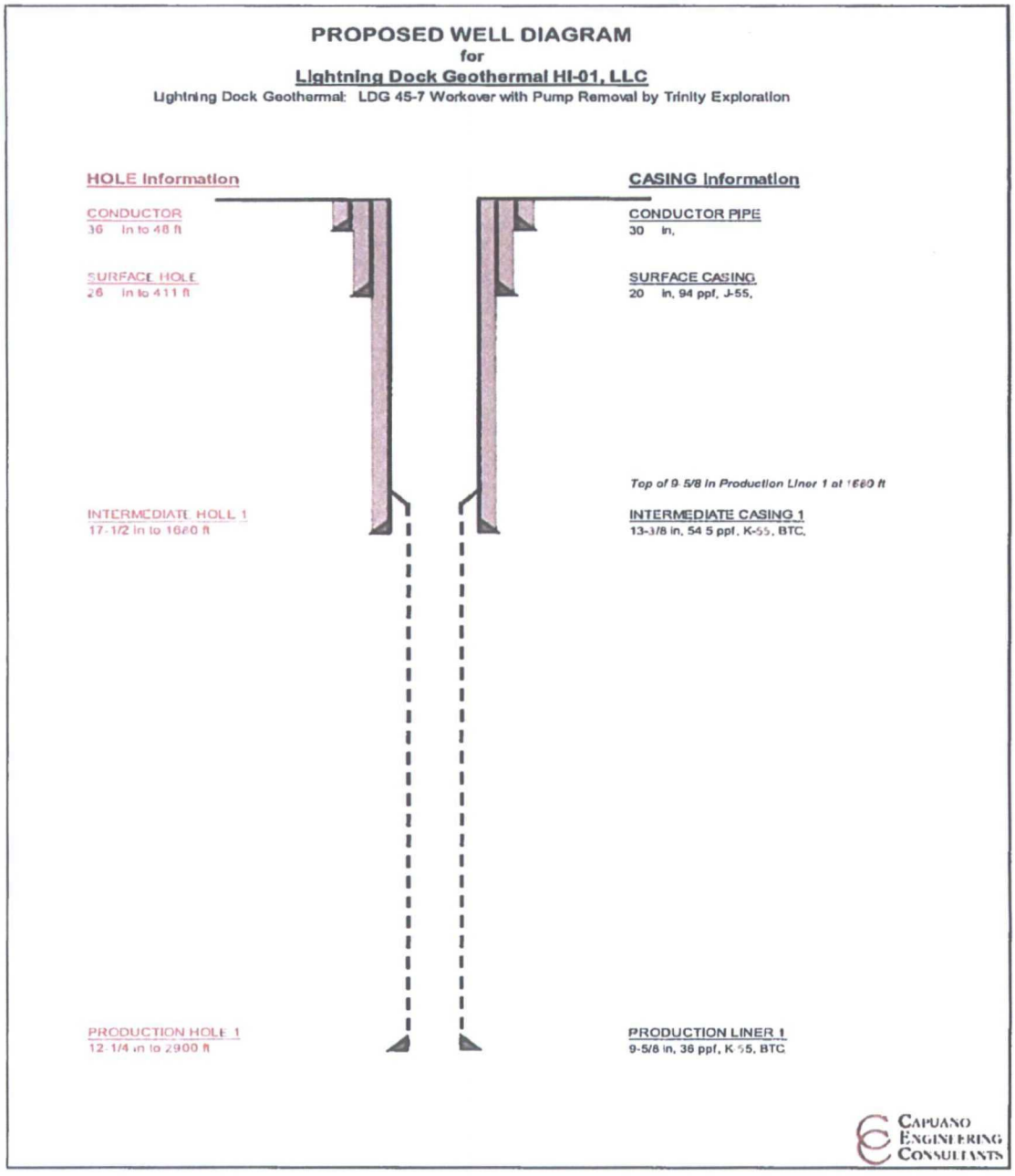
Section C: Cleanout of 12-1/4" Hole and Placement of 9-5/8" Slotted Liner Program

The original 12-1/4" hole section was not completed with any type of slotted or perforated casing. The potential of a bridge to exist in the wellbore is very high and as the well is flowed more often the potential of future bridges grows every day. So a clean out run to bottom is needed to ensure that the hole is in gage and the wellbore is clean.

The rig will encounter lost circulation and should expect to handle the problem with aerated water. At no time will mud be used during the clean out of the hole. Mud will plug the producing formation and could permanently damage the well. Aerated water should be used as the drilling fluid.

Cyrq – Lightning Dock Geothermal
Pump Removal and Cleanout Program
45-7

Wellbore Schematic



Section B: Pump Removal Program

Spoke w/ Louis Capuano III. These depths are a mid-point 45-7 was not deepen below 2900' M. S. 03/14/2012 1530 PM MT

~~12-1/4" Hole Section to 4000' MD / 3406' TVD (9-5/8" Slotted Liner):~~

Safety / Hazards Considerations in This Section:
During the removal of the pump cool water must be allowed to flow down the backside of the wellbore in order to keep the well killed. If no water is kept flowing down the annular space, the well will become active and want to flow.

It is essential to handle the pump motor, bearings, seals and bells with the up most care. These pieces of equipment are very fragile and can be damaged easily.

The lubrication string will be filled with oil. This oil needs to be collected and contained. Standard clamps, rings, hoses and storage containers should be utilized to prevent contamination. Be aware when breaking the connection that the string will be full of oil.

Program:

1. Rig up pump pulling unit on location and over the 45-7 pump head.
2. Remove pump motor and set aside.
   2.1. Secure shaft with dog collar.
3. Use power tongs to unscrew pump casing and shafts.
   3.1. Cut off strapped ¼" tubing and try to save on spool.
   3.2. Keep drive shaft inside of lubrication string and lubrication string inside of the pump casing.
      - Keep all shafts within each other and stack joints.
   3.3. Continue to remove pump until Bells are at surface.
   3.4. Lay down bells and housing.
4. Rig down pump pulling unit.
5. Carefully stack and haul off pump equipment for refurbishing.
6. At all times continue to flow cool water down the wellbore.

Section C: Cleanout of 12-1/4" Hole and Placement of 9-5/8" Slotted Liner

Safety / Hazards Considerations in This Section:
The original 12-1/4" hole section was not completed with any type of slotted or perforated casing. The potential of a bridge to exist in the wellbore is very high and as the well is flowed more often the potential of future bridges grows every day. So a clean out run to bottom is needed to ensure that the hole is in gage and the wellbore is clean.

The rig will encounter lost circulation and should expect to handle the problem with aerated water. At no time will mud be used during the clean out of the hole. Mud will plug the producing formation and could permanently damage the well. Aerated water should be used as the drilling fluid.

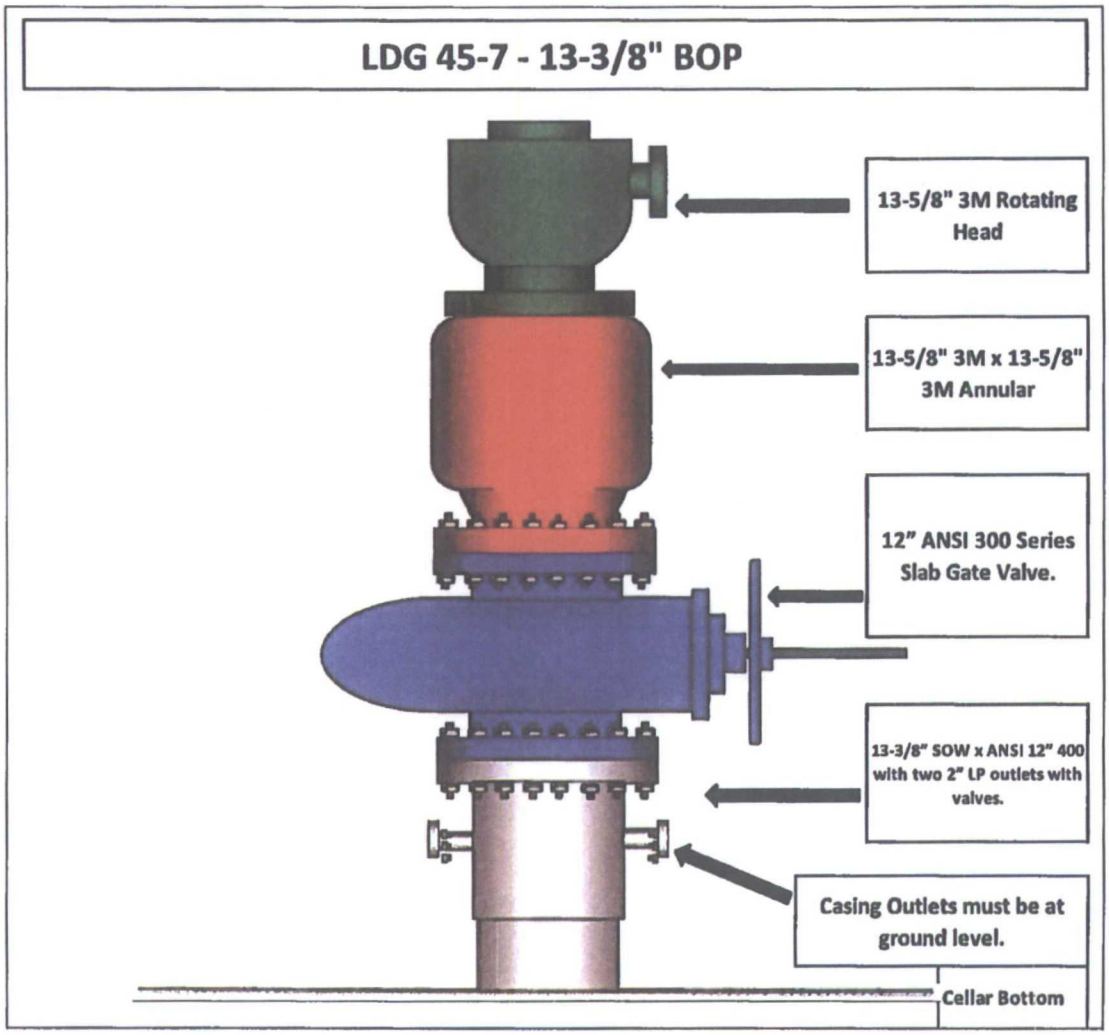
Bit & Hydraulics Program		**Mud Program**	
Bit Type	12-1/4" Tri-cone	Mud Weight	8.3
Nozzles	3 x 26	Mud Type	Water
IADC Code	5-1-7 to 6-1-7	Funnel Vis	< 40
RPM	75 – 100 RPM	YP	< 20
Pump Rate	300 – 600 gpm	PH	7
Expected Formations	Tuff, Limestone and Sandstone	Filtrate	< 5
		Solids	< 2% by Volume
12-1/4" Cleanout BHA	12-1/4" Bit, 1 x 6-3/4" DC, 12-1/4" String Stabilizer, 6 x 6-3/4" DC, Jar, 2 x 6-3/4" DC, XO, 10 x 4" HWDP		

Drilling:

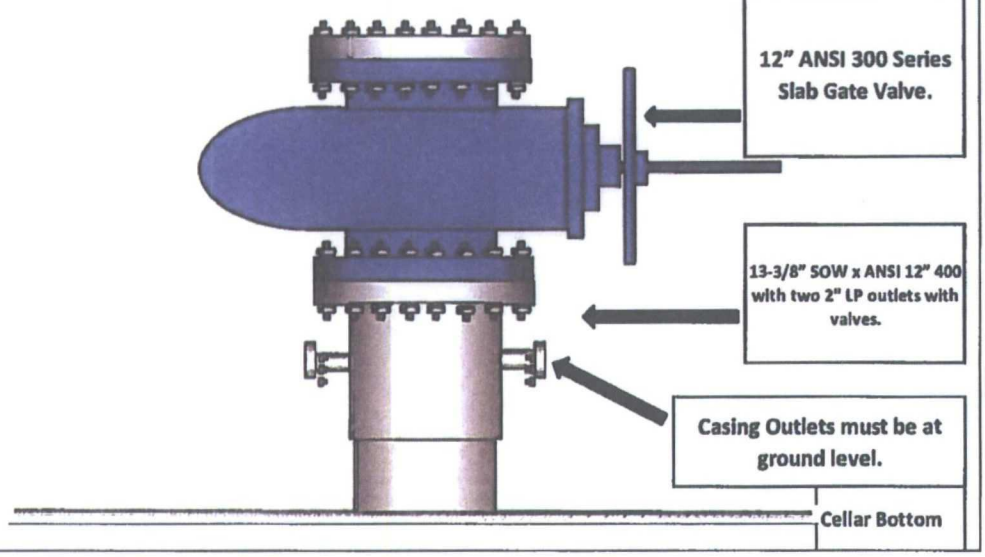
1. Rig up drilling rig over 45-7.
2. Nipple up BOP stack as follows:
   2.1. 12" 300 Series Master Valve.
   2.2. 12" 300 Series x 12" 900 Series Spool.
   2.3. 12" 900 Series Pipe Rams
   2.4. 12" 900 Series Flow Tee.
   2.5. 12" 900 Series Rotating Head
3. Function test BOPs.

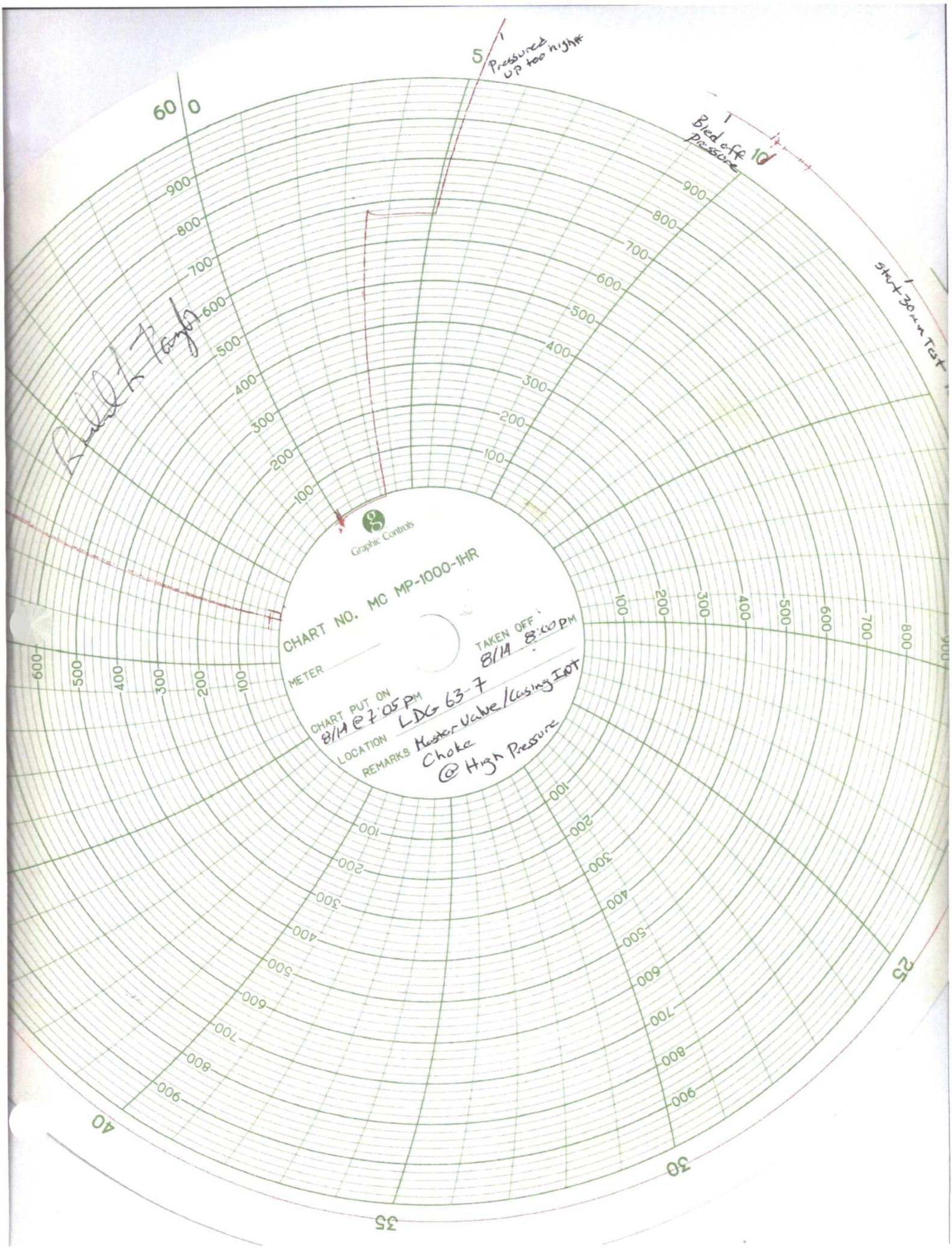
4. Build Blooie Line and muffler system.
5. Hook up aerated drilling system.
6. Test Master Valve and Choke System.
7. Make up 12-1/4" Conventional BHA and run to the 1st joint of drill pipe.
8. Space out tool joint and test Pipe Rams and Casing.
9. Continue to RIH to the shoe of the 13-3/8" casing at 1680'.
10. Trip in to the well to 2900'.
    - 10.1. Cleanout and ream any tight sections or bridges that are encountered.
    - 10.2. Make all connections off bottom and never let the pipe sit on bottom without circulation and rotation.
    - 10.3. Continue to use clean water as a drilling fluid.
    - 10.4. Use aerated fluid for cuttings carrying capacity.
11. Once at 2900' pull out of the hole.
12. Rig up loggers and log the well.
    - 12.1. The loggers should be running a FMI log, Pressure/Temperature and possibly gamma or sonic.
13. Rig down loggers.
14. Trip back to bottom with assembly to ensure that the hole is still in gage.
15. Pull out of the hole.
16. Run approximately 1300' of 9-5/8", 36 ppf, K-55, BTC perforated liner on a 13-3/8" x 9-5/8" liner adapter.
    - 16.1. Plan liner for an 80' liner lap with blank casing.
      - The bottom 4 joints and the top 3 joints should be blank.
      - The rest of the liner is slotted.
    - 16.2. Adjust the amount of perforated liner based on the final TD.
    - 16.3. Equip liner with a drillable guide shoe.
    - 16.4. Weld the bottom four joints of casing.
    - 16.5. Run liner in the hole on 4" drill pipe.
    - 16.6. Tag bottom and pick up 3'.
    - 16.7. Set liner adapter, release running tool and pull out of the hole.
17. Close Master Valve and Rig Down.

Section D: BOP Wellhead Diagrams



LDG - 45-7 -Final Wellhead




Pressured up too high
Bled off Pressure
Start 30 min Test
Graphic Controls
CHART NO. MC MP-1000-1HR
METER
TAKEN OFF 8/14 8:00 PM
CHART PUT ON 8/14 @ 7:05 PM
LOCATION LDG 63-7
REMARKS Master Valve/Casing Int
Choke
@ High Pressure

Tech Cal Recorder Calibration Report

Technology & Calibration, Inc.
"When Quality Counts"

Report Number: 70748

Established 1984

CERTIFICATE OF CALIBRATION

Tech Cal Recorder , S/N# : 02899

Issued To:

Cyrq Energy, Inc.
Satlt Lake City, UT

This is to certify that this pressure and/or temperature recorder has been manufactured and calibrated in accordance with Technology & Calibration, Inc.'s quality assurance program, current revision. All measurements are traceable to the National Institute of Standards and Technology (NIST). Certified in accordance with ANSI/NCSL, Z540-1 and ISO 10012-1. All calibrations performed at 72 degrees F. plus or minus 4 degrees F. and less than 65% relative humidity. The collective uncertainty of the measurement standards does not exceed 25% of the acceptable tolerance for each characteristic of the measuring and test equipment being certified.

Model: 1B100 **Serial Number:** 02899 **PO Number:** 35569

Pen 1
Range 1000.00 **Units** PSI

Standard	Actual	Error
0.00	0.00	0.00%
200.00	200.00	0.00%
400.00	400.00	0.00%
600.00	600.00	0.00%
800.00	800.00	0.00%
1000.00	1000.00	0.00%

*Accuracy +/- .5% of Range

Pen 2
Range N/A **Units** N/A

Standard	Actual	Error
0.00	N/A	0.00%
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR

*Accuracy +/- .5% of Range

Pen 3
Range N/A **Units** N/A

Standard	Actual	Error
0.00	N/A	0.00%
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR
0.00	N/A	ERR

*Accuracy +/- .5% of Range

NIST Traceable Standard(s)

Manufacture	Serial Number	Range	Accuracy	Recall Date
Instrulab	3506/12916	-218°C – 660°C	+/- .05°C	10/12/2013
Chandler Engineering	22028	100-30,000 PSI	+/- .020 % OR	04/24/2013
Ametek	15544	5-15,000 PSI	+/- .025 % OR	04/09/2013

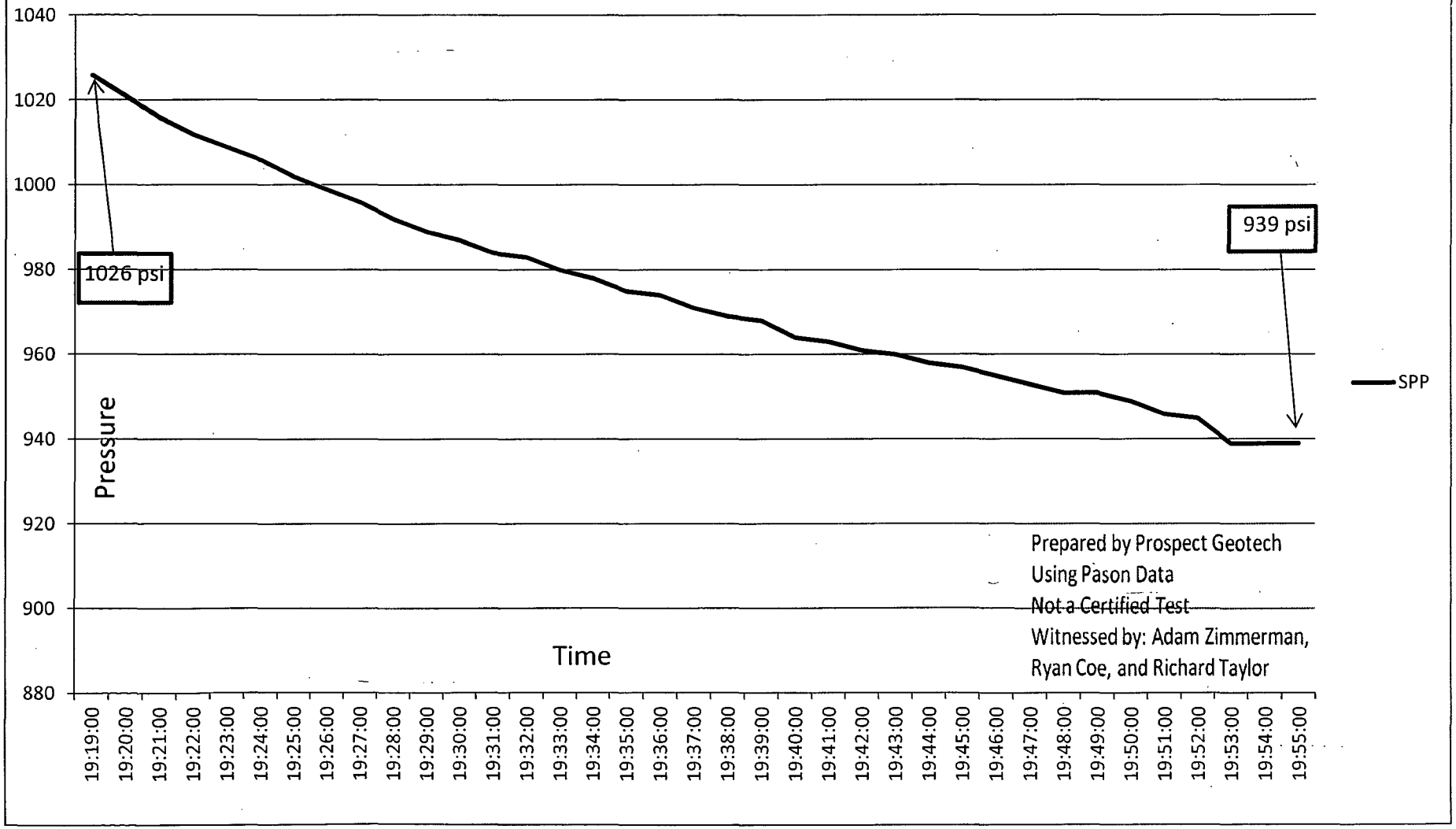
NIST#'s 836/8366608, 836/259990, 248833, 822/254480

Calibration Date August 13, 2012 **Recall Date** August 13, 2013

Calibrated By:
C. Swailes

Approval By:
N. Green, QA Mgr.

LDG 63-7 Master Valve, Choke, and Casing Integrity
High Pressure Test, 8/14/12



Pason PENLESS Drilling Recorder
'VELL: Lightning Dock LDG 63-7 THERMASOURCE 102
)ATE: 2012-Aug-14
TIME: 19:18:00
HOURS: 0.64
MINUTES P 1

TIME	SPP
19:19:00	1026
19:20:00	1021
19:21:00	1016
19:22:00	1012
19:23:00	1009
19:24:00	1006
19:25:00	1002
19:26:00	999
19:27:00	996
19:28:00	992
19:29:00	989
19:30:00	987
19:31:00	984
19:32:00	983
19:33:00	980
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19:47:00	953
19:48:00	951
19:49:00	951
19:50:00	949
19:51:00	946
19:52:00	945
19:53:00	939
19:54:00	939
19:55:00	939

MHenrie | Land ▫ Water ▫ Law

March 22, 2012

Director Jami Bailey
Division Director
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Carl Chavez
Environmental Bureau
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Los Lobos Renewable Power

Dear Director Bailey and Mr. Chavez:

Enclosed per your request, please find a form C-141 relating to my client's injection of tracer dye into the shallow geothermal aquifer near its proposed power plant facility in Hidalgo County, New Mexico. I recognize that your office needs information about the injection given AmeriCulture's complaint. I also understand that there is not a "perfect fit" form for this situation, which seems to be novel in many ways. So, per your guidance, we have prepared the form C-141 and also attached some additional information to provide your office with requested information.

In this letter, I specifically wanted to address what I consider to be a grey area in regulations. I also wanted to answer your question about communications with the State Engineer's Office.

Los Lobos' Discharge Permit for the geothermal project states as follows:

> **15. Spill Reporting**: The owner/operator shall report all unauthorized discharges, spills, leaks and releases and shall conduct corrective actions pursuant to WQCC Regulation 20.6.2.1203 NMAC and 19.15.29 NMAC. The owner/operator shall notify both the OCD District Office and the Santa Fe Office within 24 hours and file a written report within 15 days. The owner/operator shall notify OCD of any fire, break, leak, spill or blowout at any geothermal drilling, producing, transporting, treating, and disposal or utilization facility in the State of New Mexico by the person operating or controlling the facility pursuant to 19.14.36.8 NMAC.

michelle@mhenrie.com
505-842-1800
P.O. Box 7035 ▫ Albuquerque, New Mexico ▫ 87194-7035
126 E. DeVargas ▫ Santa Fe, New Mexico ▫ 87501

The above-cited regulations are (a) the Water Quality Control Commission Regulations for Ground and Surface Water Protection and (b) the Oil and Gas Regulations for Release Notification. The EPA has given New Mexico primacy in water quality issues. The Water Quality Control Act gives NMED jurisdiction over most water quality issues. Some water quality issues have been delegated to OCD. Reading the above-cited Regulations together, I understand them to say that where OCD has jurisdiction, notice of "spills" etc. is to OCD and follows OCD requirements, not NMED's. Both regulations discuss corrective actions, and both cite to the same triggering standards for clean up: either "toxic pollutants" or exceedance of the thresholds stated at 20.6.2.3103 NMAC. In addition, there are separate Geothermal Regulations specific to "Fire, Breaks, Leaks, Spills and Blowouts" at 19.14.36.8 NMAC, which don't trigger at amounts less than 25 barrels.

I want to reiterate that I do not believe that this situation involves "toxic pollutants" or any exceedance of the thresholds stated at 20.6.2.3103 NMAC. Nevertheless, as you will see in the form C-141, corrective or remedial actions have been taken. Those actions have been taken (a) to address community concerns and (b), specifically with regard to AmeriCulture, pursuant to a contractual indemnity provision.

With that backdrop, I fully recognize that there were several uncertainties about whether and how to permit a tracer test in a low temperature geothermal aquifer. One question is how to characterize the injection of an EPA-approved tracer dye like Rhodamine WT. In your letter, you were express (and I appreciated the clarification) that your office is not now asserting that the tracer test was an "unauthorized" discharge or release. Absent the clarification, I would be concerned that use of form C-141 suggests that such an injection is a "release" per the Oil and Gas Regulations (oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixtures of those chemicals or contaminants that occur during drilling, producing, storing, disposing, injecting, transporting, servicing or processing and to establish reporting procedures. 19.15.29.6 NMAC). In recent communications with NMED Staff, I understand that their office often receives Notices of Intent to discharge for tracer tests so they know what is going on—but these tests do not necessarily require a permit. Going forward, for tracer tests in geothermal aquifers, we might suggest such a path for OCD.

I think another uncertainty stems from the situation involving a low-temperature geothermal aquifer. As between the State Engineer and the OCD, the Legislature has given a dividing line: 250° F. So, for use of water under 250° F, the Water Code governs and water rights are required. But what about determinations relating to geothermal water quality under the Water Quality Act? Does the temperature matter? I have heard different positions on this issue.

From your letter, I appreciated a third area of uncertainty. Your office apparently characterized the tracer test as a matter of "aquifer delineation." This helped me understand why your office thought that the State Engineer's Office should be involved because the State Engineer manages the waters of the State.

However, in my experience with the Office of the State Engineer, they do not permit the injection of tracer dye—which, in their eyes, is a water quality issue, not a water rights issue. My client relied on my experience, and I am not aware of any discussions with anyone from the State Engineer's Office about this issue prior to the test.

After my client performed this tracer test, I talked with several State Engineer employees who confirmed that my understanding was correct, including WRAP Director, John Romero. That being said, this tracer test involved more than dye injection—it also involved flushing. The State Engineer's Office does need to permit the use of water to flush the dye, and I am now working with the District III Office of the State Engineer to come into compliance on this issue.

Please let us know if we can provide any more information.

Yours sincerely,

Michelle Henrie
Attorney for Lightning Dock Geothermal HI-01, LLC and Los Lobos Renewable Power, LLC

cc. OCD District II Office, Artesia

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
t III
io Brazos Road, Aztec, NM 87410
t IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company	Los Lobos Renewable Power, LLC	Contact	Mike Hayter (801) 875-4200 or
Address	136 S. Main, Ste. 600, Salt Lake City, UT 84101	Telephone No.	David Janney (505) 821-1801
Facility Name	Lightning Dock\	Facility Type	Geothermal

Surface Owner State Trust Land	Mineral Owner State (Lessee is Rosette, Inc.)	API No. None

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	6	25 S	19 W	345'	South line	930'	East line	Hidalgo

Latitude 32.152859°N **Longitude** 108.830964°W

NATURE OF RELEASE

Type of Release Minor	Volume of Release 400 gallons (9.53 barrels)	Volume Recovered 0
Source of Release Tracer dye injected for testing	Date and Hour of Occurrence January 23, 2012, noon-1:00 PM	Date and Hour of Discovery Approx. February 16, 2012
Was Immediate Notice Given? ☒ Yes (Prior Notice) ☐ No ☐ Not Required	If YES, To Whom? Work Plan sent by David Janney(AMEC), to Randy Dade and Craig Shapard (Artesia OCD) and Carl Chavez (Santa Fe OCD) on January19, 2012; follow up telephone discussion by Michael Hayter (Los Lobos RP, LLC) and David Janney (AMEC) to Jami Bailey, David Brooks, and Carl Chavez (Santa Fe OCD) on January 19, 2012, at approximately 1:30 PM.	
By Whom? David Janney, AMEC	Date and Hour See above	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	
If a Watercourse was Impacted, Describe Fully.* N/A		

Describe Cause of Problem and Remedial Action Taken.* Injection of tracer dye in Rosette's State Well #7 (State Engineer well number A-36-A S17) for tracer test.

ose for Test. During pump testing of Well LDG 45-7 in December 2011, monitoring of Rosette State Well #7 suggested that this well could be ected with Well LDG 45-7. The tracer test was conducted for aquifer delineation to determine whether there is any relationship between wells drilled in the shallow geothermal outflow (such as Rosette State Well #7) and wells drilled into the deep geothermal aquifer (such as Wells LDG 45-7 and 53-7).

Tracer Dye Chemical Constituents. An MSDS and additional information about Rhodamine WT is contained at Exhibit 1. Operator does not know the percentage of pure Rhodamine WT provided by the supplier, and reasonably believes that chemical constituents included impurities to some degree.

Injection of Tracer Dye. 50 kilos of tracer dye was dissolved in a tank containing 400 gallons of fresh water. This solution was injected into Rosette State Well #7. During tracer injection, the wellhead pressure never went above 20 psi on the wellhead.

Flushing of Tracer Dye. The solution was first flushed with 800 gallons of water. Then, over a period of seven days, fresh water was injected into Rosette State Well #7 in the following approximate amounts: (a) 24,000 gallons of trucked water, and (b) 2,250,000 gallons of water from a water storage tank owned by Rosette, Inc. The source of injected water was one to three cold freshwater wells owned by Rosette, Inc., State Engineer well numbers A-36-A-S10, A-36-A-S11, and A-36-A-S14, which are connected by pipeline to the water storage tank owned by Rosette, Inc. During water injection, the wellhead pressure never went above 30 psi. After approximately 24 hours, injection was by gravity without any added pressure.

Test Results and Dye Discovery. During closed-loop testing, which started prior to the tracer test and was conducted through February 3, 2012, there was no tracer from Rosette State Well #7 found in Wells LDG 45-7 and 53-7. On or about February 16, 2012, we understand that a neighboring property owner, AmeriCulture, Inc., discovered tracer dye in the geothermal fluid it was using from a nearby well, Rosette State Well #1, which is the same shallow geothermal outflow into which the dye was injected. Operator was not made aware of the discovery until February 22, 2012.

Investigative Action: Sampling. Operator learned of community concern that the tracer dye may be migrating to non-geothermal water wells used for drinking water and agriculture. On February 29 and March 1, 2012, Dr. Gregory P. Miller, Geochemical, LLC. conducted a sampling and analysis program to evaluate the presence of tracer dye in potable water and agricultural wells. Sixteen wells were sampled. Dye fluorescence analysis was conducted in the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 2, 2012. Laboratory analysis with a tracer dye detection limit of 0.1 parts per billion was used to test the water. Tracer dye was detected only in geothermal wells within 800 feet of the dye tracer test injection well. The remaining 14 agricultural and potable water wells did not contain dye tracer. Dr. Miller's report is attached as Exhibit 2.

Remedial Action: Treatment. In addition, Operator understands that the holding ponds used for raising tilapia fish at AmeriCulture's facility have been tinted with a pink hue. Pursuant to a Joint Facility Joint Facility Operating Agreement (JFOA) dated September 6, 1995, Operator must reasonably nnify AmeriCulture against harms arising out of its activities undertaken pursuant to the JFOA. For this reason, Dr. Gregory P. Miller, Geochemical, , visited the AmeriCulture facility on March 1, 7, and 13, 2012 to discuss and plan for water treatment to remove the tracer dye. Dr. Miller verified the feasibility of carbon treatment in hot water at the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 5, 2012. Dr. Miller then began working with Calgon Carbon Corporation and Siemens on March 6, 2012, to determine treatment options. Kenneth Hale from AMEC visited the AmeriCulture facility on March 13, 2012 to begin designing a water treatment system that will use carbon filtration to remove tracer dye from the geothermal water before it enters into the AmeriCulture facility. This treatment system and treatment program were offered to AmeriCulture on March 20, 2012. See Exhibit 3.

Additional Remedial Concerns. To Operator's knowledge, tracer dye is not a "toxic pollutant" as defined in 20.6.2.7 NMAC nor have the standards of 20.6.2.3103 NMAC been exceeded. However, Operator has received from AmeriCulture an article, Exhibit 4, which indicates that Rhodamine WT, when combined with nitrites, could possibly form Diethylnitrosamine. (Several Nitrosamines are on the "toxic pollutant" list, but Diethylnitrosamine is not). Nitrites could exist in AmeriCulture's fish ponds. See Exhibit 4. Because the proposed treatment system and treatment program will remove the tracer dye before geothermal water enters the AmeriCulture facility, this concern for possible formation of Diethylnitrosamine is being addressed as well. Dr. Miller offered to sample the AmeriCulture fish ponds for Nitrosamines on March 1, 7, and 13, 2012, and was not permitted to do so.

Describe Area Affected and Cleanup Action Taken.* Through the sampling program described above, the affected area has been identified. The affected area is solely the shallow geothermal aquifer only in geothermal wells within 800 feet of the dye tracer test injection well. No drinking water or irrigation wells have been affected.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: M. Hayter	OIL CONSERVATION DIVISION
Printed Name: Michael Hayter	Approved by Environmental Specialist:
Title: Director	Approval Date: / Expiration Date:
E-mail Address: michael.hayter@cyrqenergy.com	Conditions of Approval: / Attached ☐
Date: 3/21/2012 Phone: 801-875-4700	

* Attach Additional Sheets If Necessary

Presto Dyechem Co
60 North Front St
Philadelphia, PA 19106
215-627-1864

Material Safety Data Sheet

July 15, 2011

SECTION I - Material Identity

Item Name	Fluorescent Red Dye
Part Number/Trade Name	Acid red 52
Chemical Formula	C27 H30 N2 O7 S2.Na
CAGE Code	25521
Part Number Indicator	A
MSDS Number	189644
HAZ Code	B

SECTION II - Manufacturer's Information

Manufacturer Name	Presto Dyechem Co
Street	60 North Front St
City	Philadelphia
State	PA
Country	US
Zip Code	19106
Emergency Phone	215-627-1864
Information Phone	215-627-1864

MSDS Preparer's Infomation

Date MSDS Prepared/Revised	01/01/2006
Active Indicator	Y

SECTION III - Physical/Chemical Characteristics

Appearance/Odor	Red POWDER
Boiling Point	NA
Melting Point	NA
Vapor Pressure	NA
Vapor Density	NA
Specific Gravity	1
Solubility in Water	COMPLETE
Container Type	R
Container Pressure Code	1
Temperature Code	4
Product State Code	S

SECTION IV - Fire and Explosion Hazard Data

Flash Point Method	NA
Lower Explosion Limit	NA
Upper Explosion Limit	NA
Extinguishing Media	WATER, DRY CHEMICAL, CO2
Special Fire Fighting Procedures	WEAR SCBA
Unusual Fire/Explosion Hazards	NONE

SECTION V - Reactivity Data

Stability	YES
Stability Conditions to Avoid	WILL PRECIPITATE WITH ACIDS
Materials to Avoid	OXIDIZING AGENTS
Hazardous Decomposition Products	BURNING WILL PRODUCE OXIDES OF CARBON AND NITROGEN
Hazardous Polymerization	NO
Polymerization Conditions to Avoid	WILL NOT OCCUR

SECTION VI - Health Hazard Data

Route of Entry: Skin	YES
Route of Entry: Ingestion	YES
Route of Entry: Inhalation	YES
Health Hazards - Acute and Chronic	NONE DOCUMENTED
Carcinogenity: NTP	NO
Carcinogenity: IARC	NO
Carcinogenity: OSHA	NO
Explanation of Carcinogenity	NONE
Symptoms of Overexposure	NOT KNOWN
Medical Cond. Aggravated by Exposure	NONE KNOWN
Emergency/First Aid Procedures	[EYES] FLUSH WITH WATER [SKIN] WASH WITH SOAP AND WATER [INHAL] MOVE TO FRESH AIR. [INGEST] DILUTE WITH WATER, INDUCE VOMITING.

SECTION VII - Precautions for Safe Handling and Use

Steps if Material Released/Spilled	WEAR APPROPRIATE SAFETY EQUIPMENT. CONTAIN AND CLEAN UP SPILL. CONTAIN LIQUIDS USING ABSORBANTS, SWEEP POWDERS CAREFULLY MINIMIZING DUSTING. SHOVEL ALL SPILL MATERIAL INTO DISPOSAL DRUM.
Neutralizing Agent	NR
Waste Disposal Method	BURY OR INCINERATE ACCORDING TO FEDERAL, STATE AND LOCAL REGULATIONS. CONTAINERS SHOULD BE TRIPLE RINSED ACCORDING TO FEDERAL REGULATIONS.
Handling and Storage Precautions	HANDLE THIS PRODUCT WITH CARE

	AND AVOID PERSONAL CONTACT.
Other Precautions.....	NR

SECTION VIII - Control Measures

Respiratory Protection.....	NIOSH APPROVED RESPIRATOR MOLDEX 2200
Ventilation.....	LOCAL EXHAUST
Protective Gloves.....	RUBBER
Eye Protection.....	SAFETY GLASSES WITH SIDE SHIELDS
Other Protective Equipment.....	WEAR APRON/COVERALLS TO MINIMIZE SKIN CONTACT
Work Hygenic Practices.....	WASH THOROUGHLY AFTER HANDLING

SECTION IX - Label Data

Protect Eye.....	YES
Protect Skin.....	YES
Protect Respiratory.....	YES
Chronic Indicator.....	NO
Contact Code.....	SLIGHT
Fire Code.....	1
Health Code.....	0
React Code.....	0
Specific Hazard and Precaution.....	NO TARGET ORGANS LISTED FOR CHRONIC EXPOSURES

SECTION X - Transportation Data

Container Quantity.....	1
Unit of Measure.....	GM

SECTION XI - Site Specific/Reporting Information

Volatile Organic Compounds (P/G).....	0
Volatile Organic Compounds (G/L).....	0

SECTION XII - Ingredients/Identity Infomation

Color Index #.....	45100
Ingredient Name.....	Xanthene
CAS Number.....	3520-42-1
Proprietary.....	NO
Percent.....	0
OSHA PEL.....	NE
ACGIH TLV.....	NE

sole responsibility of the user. All materials that may present unknown health hazards are described herein. We cannot guarantee that these are the only hazards that exist.

J N SHOMAKER & ASSOCIATES, INC.
WATER-RESOURCE AND ENVIRONMENTAL CONSULTANTS
2611 BROADBENT PARKWAY NE
ALBUQUERQUE, NEW MEXICO 87107
(505) 345-3407, FAX (505) 345-9920
www.shomaker.com

February 23, 2012

Michelle Henrie, Attorney at Law
126 East DeVargas
Santa Fe, New Mexico 87501

by email: michelle@mhenrie.com

Re: Cyrq Energy, dye tracers in groundwater

Dear Michelle:

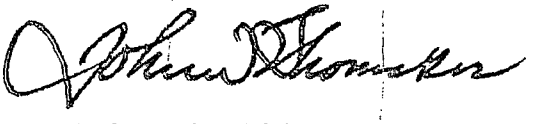
You asked about the use of dye tracers, and Rhodamine WT in particular, in water-resource studies. Tracer studies have been used for many years to measure groundwater velocities, and are described in standard textbooks on groundwater.[1] Both the U.S. Environmental Protection Agency (EPA) and the U.S. Geological Survey have conducted and published many studies using dye-tracers in a wide variety of their groundwater and surface-water investigations, and many other studies are reported in the scientific literature. The University of New Mexico Water Resources Program is currently conducting a dye-tracer study in Albuquerque, to determine the disposition of septic-tank effluent and the timing of its arrival at the water table.

Rhodamine WT is an EPA-approved fluorescent dye used for aquifer characterization, as a water tracer in surface and groundwater systems, and a means of measuring various hydraulic parameters.[2] It is also NSF-approved for use in such studies.

Our firm has used Rhodamine as a tracer to mark the drilling water during the drilling of a supply well, to provide a means of determining when well-development was essentially complete.

Sincerely,

JOHN SHOMAKER & ASSOCIATES, INC.



John W. Shomaker, Ph.D.

Cc: Nicholas Goodman, Cyrq Energy
Michael Hayter, Cyrq Energy

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[1] See, e.g., Freeze, R.A., and Cherry, J.A., 1979, Groundwater: Englewood Cliffs, NJ, Prentice-Hall, Inc., 604 p., at p. 427..

[2] See, e.g., Stone, A.T., 2000, Specialty chemicals in the environment: American Chemical Society, Symposia papers presented before the Div. of Environmental Chemistry, Preprints of Extended Abstracts, v. 40, no. 1, pp. 167-169.

Results of Groundwater Sampling For a Dye Tracer Conducted February 29 and March 1, 2012

Cotton City, Hidalgo County, New Mexico

March 5, 2012

Prepared for:

Michelle Henrie, Attorney
MHenrie
PO Box 7035, Albuquerque, New Mexico 87194-7035
126 E. DeVargas. Santa Fe, New Mexico 87501

GEOCHEMICAL, LLC
PO Box 1468, Socorro, NM 87801

EXHIBIT
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Executive Summary

A dye tracer test was conducted in geothermal wells located near Cotton City, Hidalgo County, New Mexico in late January 2012. The purpose of the test was to determine the physical properties of the geothermal reservoir. Public concern was expressed that the tracer may be migrating to non-thermal water wells used for domestic use and agriculture. A sampling and analysis program was conducted to evaluate the presence of dye in potable water and agricultural wells. Sixteen wells were sampled at distances from under 200 feet to over 7 miles from the dye tracer injection point. Laboratory analysis with a detection limit of 0.1 parts-per-billion (ppb) dye was used to test the water.

Dye tracer was detected only in geothermal wells within 800 feet of the dye tracer test injection well. The remaining 14 agricultural and potable water wells did not contain dye tracer.

Introduction

A dye tracer test was conducted at the Cyrq Energy Lightning Dock geothermal project located near Cotton City, Hidalgo County, New Mexico in late January 2012. The appearance of dye tracer was noted in other thermal wells adjacent to the tracer test. When dye tracer was noted in these other wells public concern was expressed that the tracer may be migrating to non-thermal wells used for agriculture and private water supply.

Geochemical, LLC was retained for a fast-track sampling and analysis program to evaluate the presence of dye tracer in selected wells in the vicinity of the geothermal dye tracer test. The major objective of the program was to confirm the presence or absence of dye tracer in private wells used for potable water. All Geochemical, LLC activities were conducted by the Principal of the company, Dr. Gregory P. Miller, or under his direct observation.

Sampling Locations

Sampling locations were selected through coordination with:

- Ed Kerr, Hidalgo County Commissioner;
- Kacie Peterson and Steve Harman, on-site representatives of Cyrq Energy;
- Damon Seawright of AmeriCulture, a thermal water user adjacent to the test site; and,
- Dale Burgett, a thermal water user adjacent to the test site.

Sample sites were first chosen on the basis of public interest – well owners that had expressed a desire to have their well(s) tested to either Cyrq Energy or the County Commissioners' office. The county also arrainged for Geochemical, LLC to sample water at the adjacent AmeriCulture facility. Additionally, Cyrq Energy sought permission for Geochemical, LLC to sample wells operated by Dale Burgett.

The greatest constraint on the number and locations of groundwater samples was time. Public and regulatory interest in the distribution of dye tracer in groundwater in the vicinity of the tracer test required immediate answers. Accordingly, the sampling program was limited to existing wells. An additional constraint on selecting sampling locations was the availability of wells for sampling. Wells without operating pumps were excluded as time constraints prevented installation of appropriate pumps and/or power supplies.

Sixteen wells were sampled during the February 29 and March 1, 2012 effort. The locations of the sampled wells are depicted in **Figure 1** and **Figure 2**. Well locations are determined from handheld field GPS readings, inspection using Google Earth, and cross checks with the New Mexico Office of the State Engineer's WATERS database. **Table 1** lists the well locations, users and sampling information.

Sampling Methods

The rapid response required for this activity precluded development and peer-review of a sampling and analysis plan. The sampling program relied on professional experience and judgment to collect groundwater samples representative of aquifer condition. Two sampling techniques were used: purging and sampling by time; and, purging and sampling according to indicators of geochemical stabilization.

Groundwater sampling with the highest quality level is accomplished using wells, screens, casing and pumps designed for the purpose, in an array that is designed to answer a specific question. In this project, adaptations were required to use existing wells and pumps.

Samples were collected at nine domestic wells from a threaded spigot (hose bib) to which a pre-cleaned (bleach), deionized water rinsed, air-dried nylon threaded hose barb is attached. The hose barb is fitted with new vinyl tubing of sufficient length for the sampler to have a work area (3 to 8 feet). The hose bib is opened and the rate adjusted to approximately 1-2 gallons per minute. Flow from the tubing is directed to a ¼ gallon polyethylene container that is fitted within a 5 gallon polyethylene pail. Flow rate is gauged using the 5 gallon pail and timed to the minute.

Flow into the smaller container is monitored for the "field parameters" of pH, Specific Conductance (to 10 uS/cm), Temperature (to 0.2 °C), and Oxidation-Reduction Potential (ORP to 1 mV). Field parameters are measured frequently using calibrated instrumentation and recorded. Calibrations were conducted using the manufacturer instructions before each field day with a calibration check performed at the end of the day.

The use of parameter stabilization is a preferred practice in groundwater sampling because it is a chemical rather than volumetric method of determining when the water discharging from the well is representative of the aquifer. Ideally, running calculations are made evaluating the rate

of change of stability criteria. Here, parameter stabilization was evaluated using professional judgment rather than by calculation to limit time on each well to about 30 minutes. Purge volumes before stabilization varied from 20 to 45 gallons.

After parameter stabilization a sample is collected from the flowing groundwater stream at the end of the vinyl tubing in a 500 ml high-density polyethylene bottle, rinsing the bottle and cap with flowing sample three times prior to sample collection. Bottles were labeled uniquely with indelible marker, water-tight bagged individually, and placed on ice immediately after collection. Samples have remained in Dr. Miller's custody from sampling through the date of this report.

Unlike the domestic wells, the five non-thermal agricultural wells and two thermal wells sampled did not have convenient sampling ports or hose bibs. It was not possible to use the hose bib and tubing apparatus, or practical to collect a series of field parameter measurements on these wells. In these cases the wells sampled were either running at the time of arrival, or were run on arrival - discharging to the ground or tanks for sufficient time to clear water contained in the casing and distribution line. Samples from these six wells were either collected directly into sample containers, or were collected in a new clean 5 gallon pail and sub-sampled from the pail. In all cases, samples and bottles are handled as described in the preceding paragraph (rinsing, labeling and preservation as described above).

Clean sampling procedures were used to the extent practical. Sampling equipment was new and unused ,or had been cleaned or stored clean prior to starting the sampling program. Disposable, powder-free Nitrile gloves were donned for all sampling equipment and instrument handling. Glove changes were made just prior to bottle handling and sampling. Tubing was always discarded between samples. All disposable sampling equipment (5-gallon pails, hose bibs, ¼ gallon containers) were discarded when contact with visible dye was noted. Dr. Miller avoided inadvertent contact with dye by remaining away from equipment and areas used for tracer test preparation.

Dye Detection and Quantification Analysis Method

Dye tracers are uniquely useful in hydrology studies because they are visible to the naked eye at very low concentrations (~1 ppb) and are detectable at much smaller concentrations using spectroscopy. Spectrophotometers measure the wavelength of light emitted by dyes when excited with another light source. Dyes differ in the wavelengths that they are excited by and

emit. The presence or absence of a dye can be determined by fluorescence (emission) at a particular wavelength.

Dye fluorescence analysis was conducted in the laboratory of Dr. Bruce Thompson, University of New Mexico, on March 2, 2012. The analysis was conducted by a research assistant under the supervision of Dr. Thompson. Dr. Miller was present for all analytical procedures conducted on the 16 groundwater samples with Dr. Thompson's review of the methods.

A Varian Cary Eclipse Fluorescence Spectrophotometer was used. A dye standard was prepared from material from the January 2012 dye tracer study, as supplied by Cyrq Energy. Commercial tracer dyes vary in the amount of pure dye contained in the bulk chemical. Dye standards prepared in the lab were assigned a concentration using the assumption that the dye is 100% pure, and are thus relative concentrations. This assumption is always conservative in that relative concentrations are always greater than true concentrations. The detection limit determined for this effort was 0.1 ppb relative concentration using maximum excitation. A linear calibration curve using medium excitation was prepared using 1.0, 10.1 and 101 ppb relative concentration standards for quantitative analysis of samples with visible dye (>> 1 ppb relative).

Results

Table 1 presents the analytical results for the sampled wells. Two samples of thermal water had quantifiable dye tracer at concentrations of 38.6 and 87.0 ppb relative to pure dye. No agricultural or domestic (potable) wells had detectable dye tracer (<0.1 ppb relative concentration).

Summary

A rapid response sampling program was conducted on to test for dye tracer in non-thermal groundwater near the site of a geothermal system dye tracer test. Sixteen wells were sampled, two thermal and 14 non-thermal. Dye detections were confined to thermal waters. Dye tracer was not found in non-thermal water.

Table 1. Wells sampled for dye tracer near Cotton City, Hidalgo County, New Mexico.

Sample ID[1]	Sample Date	Sample Time	Dye Concentration (ppb)[2]	OSE Well Number[3]	UTM Easting (meters)[4]	UTM Northing (meters)[4]	Sampling Method	Water User
A0141	29-Feb-12	1200	ND	A0141	12701727	3562522	Stabilization	Clyde Mahan
A0145	29-Feb-12	1248	ND	A0145	12703265	3561269	Stabilization	Linda Ventimiglia
A0055	29-Feb-12	1343	ND	A0055	12700745	3562570	Stabilization	Myra Mahan
MT01	29-Feb-12	1439	ND		12701139	3562401	Stabilization	Mark Thomas
GK01	29-Feb-12	1550	ND		12702990	3568589	Timed Purge	Greg Kerr
A0018	29-Feb-12	1601	ND	A0018	12702974	3570885	Stabilization	Ed Kerr
AC Hot	29-Feb-12	1724	87.0		12704503	3559223	Timed Purge	Damon Seawright
AC Cold	29-Feb-12	1740	ND		12702046	3558968	Timed Purge	Damon Seawright
A0091	1-Mar-12	930	38.6	A0091	12704509	3559405	Timed Purge	Dale Burgett
A0012	1-Mar-12	1016	ND	A0012	12702522	3556942	Stabilization	Colt Rudiger
A0276	1-Mar-12	1120	ND	A0276	12701958	3553368	Stabilization	Jim Victor
VVC	1-Mar-12	1200	ND	A0253	12699959	3559275	Stabilization	Valley View Church
A0083	1-Mar-12	1313	ND	A0083	12702078	3558948	Stabilization	McCant
DB1	1-Mar-12	1400	ND		12701671	3558907	Timed Purge	Dale Burgett
DB2	1-Mar-12	1414	ND		12701687	3558872	Timed Purge	Dale Burgett
DB3	1-Mar-12	1426	ND		12701680	3558866	Timed Purge	Dale Burgett

[1] Sample ID used for analytical work and Figure 1

[2] Relative to original dye concentration of 100%

[3] Some OSE well numbers unresolved by the date of this report

[4] Readings by handheld GPS, NAD 83

Figure 1. Map showing wells sampled for dye tracer near Cotton City, Hidalgo County, New Mexico on February 29 and March 1, 2012. Wells depicted in red are geothermal. The two geothermal wells are also the only locations where dye tracer was found. Not all wells are depicted in the center of the figure for clarity. See Figure 2 for detail of the Figure 1 center.

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Figure 2. Detail of center section of Figure 1. Dye tracer was not detected in all domestic and agricultural wells (blue) shown here. The injection point, State Well 7, lies about 200 feet north of thermal well A0091.

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Lightning Dock Geothermal HI-01, LLC
Kearns Building, Suite 600
136 South Main Street
Salt Lake City, UT 84101

March 20, 2012

Mr. Damon Seawright
President
AmeriCulture, Inc.
25 Tilapia Trail
Animas, NM 88020

Re: Water Quality Remediation Services

Dear Mr. Seawright,

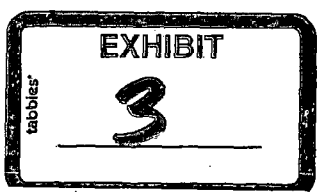
This letter agreement (this "Agreement"), if signed by you, as authorized representative of AmeriCulture, Inc. (together with its shareholders, directors, officers, and successors in interest, "AmeriCulture"), on or before March 31, 2012, sets forth the agreement between AmeriCulture and Lightning Dock Geothermal HI-01, LLC ("LDG"), with respect to certain water quality remediation services we will provide in connection with LDG's injection in January 2012 of Rhodamine-WT tracer dye into a geothermal well near AmeriCulture's property (the "Occurrence"). In this Agreement, AmeriCulture and LDG are each a "Party" and, together, may be referred to as the "Parties."

This Agreement is being entered into pursuant to that certain Joint Facility Operating Agreement dated September 6, 1995 (the "JFOA"), that delineates the Parties' mutual rights and responsibilities with regard to the geothermal resource under their respective properties. Section IV.B.4 of the JFOA obligates LDG to indemnify AmeriCulture against harms arising out of any activities of LDG permitted by the JFOA.

AmeriCulture operates a commercial tilapia production facility (the "Tilapia Farm") on property located in Hidalgo County, and has alleged that the Occurrence has resulted in some or all of the tilapia fish being raised and sold by AmeriCulture being tinted with a pink hue. This Agreement lays out our mutual responsibilities with regard to remediating any harm caused as a result of the Occurrence.

1. LDG's Provision of a Water Treatment System.

Promptly after the full execution of this Agreement, and subject to any events of force majeure, LDG shall supply and install, and shall thereafter operate and maintain, a water treatment system ("System") substantially in the form as described in Exhibit A hereto, for the purpose of reducing Rhodamine-WT concentrations in the water used to cultivate fish at the Tilapia Farm.



The System will be owned by LDG, and the supply, construction, operation, and maintenance of the System shall be without cost to AmeriCulture, provided that AmeriCulture fully cooperates, assists and allows LDG and its agents and contractors to access AmeriCulture property as necessary and as more fully described in paragraph 2 below.

LDG will periodically monitor and test the quality of the water entering into AmeriCulture's tilapia fish tanks and the operation of the System to ensure its continued functioning. LDG shall have the right to maintain and alter the System as necessary to ensure the water being used to cultivate fish at the Tilapia Farm is substantially free of Rhodamine-WT. The Parties agree to evaluate the effectiveness of the System at least every two years and to make a determination of whether the System continues to be needed.

LDG shall have the right, in its sole discretion, to terminate its obligations under this paragraph 1 if (a) AmeriCulture ceases operation of the Tilapia Farm, or (b) AmeriCulture breaches any of its obligations under this Agreement. In the event that LDG elects to terminate its obligations pursuant to the foregoing sentence, it has the right, but not the obligation, to dismantle and remove the System.

2. AmeriCulture's Consideration.

AmeriCulture agrees, without condition, qualification or payment, to provide LDG and its representatives, contractors and subcontractors, access at all reasonable times to AmeriCulture's property as necessary for the implementation of LDG's obligations under paragraph 1 above, including but not limited to (a) constructing, operating, monitoring, maintaining and implementing the System; (b) conducting investigations relating to contamination at or near the Tilapia Farm; (c) obtaining water samples from the Tilapia Farm and related wells as frequently as weekly; and (d) assessing the need for, planning, or implementing additional response actions at or near the Tilapia Farm.

In further consideration of LDG's obligations hereunder, AmeriCulture restates and reaffirms the JFOA.

3. Non-Disparagement.

AmeriCulture agrees that it will not directly or indirectly make, repeat or publish any false or disparaging, negative, unflattering, or accusatory remarks or references, whether oral or in writing, regarding LDG, its officers, directors, employees and affiliates, in any dealings with third parties including any members of the press or media, and LDG's customers, potential customers, suppliers, contractors and employees.

4. Complete and Binding Agreement; Amendments.

This Agreement sets forth all of the terms and conditions of the agreement between the Parties concerning the subject matter hereof and supersedes any prior oral communications. This Agreement may be amended only by a written document signed by the Parties.

5. Severability.

In the event that any of the provisions of this Agreement are found by a judicial or other tribunal to be unenforceable, the remaining provisions of this Agreement will remain enforceable.

6. Nonadmission.

This Agreement is being entered into solely for the purpose of settling disputed claims, and shall not be construed as: (a) an admission by LDG of any (i) liability or wrongdoing to AmeriCulture, (ii) breach of any agreement, or (iii) violation of a statute, law or regulation; or (b) a waiver of any defenses as to those matters within the scope of this Agreement. LDG specifically denies any liability or wrongdoing with respect to the Occurrence, and AmeriCulture agrees that it will not state, suggest or imply the contrary to anyone, either directly or indirectly, whether through counsel or otherwise.

7. Governing Law.

This Agreement shall be governed by New Mexico law.

8. Dispute Resolution; Waiver of Jury Trial.

Any dispute that arises in connection with this Agreement and that is not resolved informally by the Parties within thirty (60) days after notice of the dispute is given to a Party may be referred by either Party to the American Arbitration Association for arbitration. The arbitration shall be conducted by one (1) mutually agreeable, impartial arbitrator in Albuquerque, New Mexico. The award of the arbitrator shall be final and binding upon the Parties without right of appeal to the courts. Notwithstanding the foregoing, any Party may seek injunctive relief to prevent immediate harm arising from the breach of the other Party's obligations hereunder. To the fullest extent permitted by law, each of the Parties hereby waives any right to trial by jury with respect to any dispute arising out of or relating to the enforcement, interpretation or existence of this Agreement which may be brought in a court of law.

9. Costs.

Each Party shall pay its own costs and fees, including attorneys' fees and other legal fees in connection with and enforcement of this Agreement.

10. Counterparts.

This Agreement may be signed by the Parties in multiple counterparts, each of which shall constitute an original, but all of which together shall be deemed one and the same instrument. No Party to this Agreement shall be bound hereby until a counterpart of this Agreement has been executed by all Parties hereto.

[SIGNATURES FOLLOW ON NEXT PAGE]

Sincerely,

LIGHTNING DOCK GEOTHERMAL HI-01, LLC

Nicholas Goodman

Printed: Nicholas Goodman

Title: Chief Executive Officer

Date: March 20, 2012

Acknowledged and Agreed,

AMERICULTURE, INC.

_____

Printed: Damon Seawright

Title: President

Date: March ___, 2012

EXHIBIT A - DESCRIPTION OF WATER TREATMENT SYSTEM

[SEE ATTACHED]

Water Treatment System – Rhodamine Removal
AmeriCulture Facility, New Mexico
CERQ Energy

Concept Summary

The water treatment system will reduce the rhodamine concentration in the process water using granular activated carbon (GAC) as an adsorbent. GAC adsorbent of rhodamine has been bench tested (by others) and is considered an efficient media for rhodamine removal from high temperature water. The water temperature has been reported to range from 180 to 240 degrees F. The new water treatment system will tie into the existing 3" carbon steel (CS) line that runs from the existing well to the existing, 12-inch diameter CS standpipe. The tie-in will be achieved with 3" galvanized steel (GS) piping. Hot (geothermal) well water (180-240°F), will be diverted to a 5,000 gallon, vertical, surge tank where steam will be permitted to vent and large particles will be permitted to settle out of suspension. The surge tank will be fitted with a steam vent to prevent over pressurization, as well as a manway and drain valve to facilitate the removal of settled solids. The process stream will flow from the surge tank through a 3" GS line, to a pump regulated at a flow rate of approximately 100 gallons per minute at 50 psi, to match the incoming flow rate during production well operations. An identical, redundant pump will be installed in parallel to allow servicing of the pumps without having to shut down the entire system. A level transmitter located in the surge tank will control the variable frequency drive of the operating pump to maintain a proper water operating level in the tank, balancing process flow to production flow. A low level set point will be established for low water pump shut off. A high level set point will also be established to activate a local, high water alarm light. A magnetic flow meter with a local, flow indicator and a pressure indicator will be located downstream of the pumps.

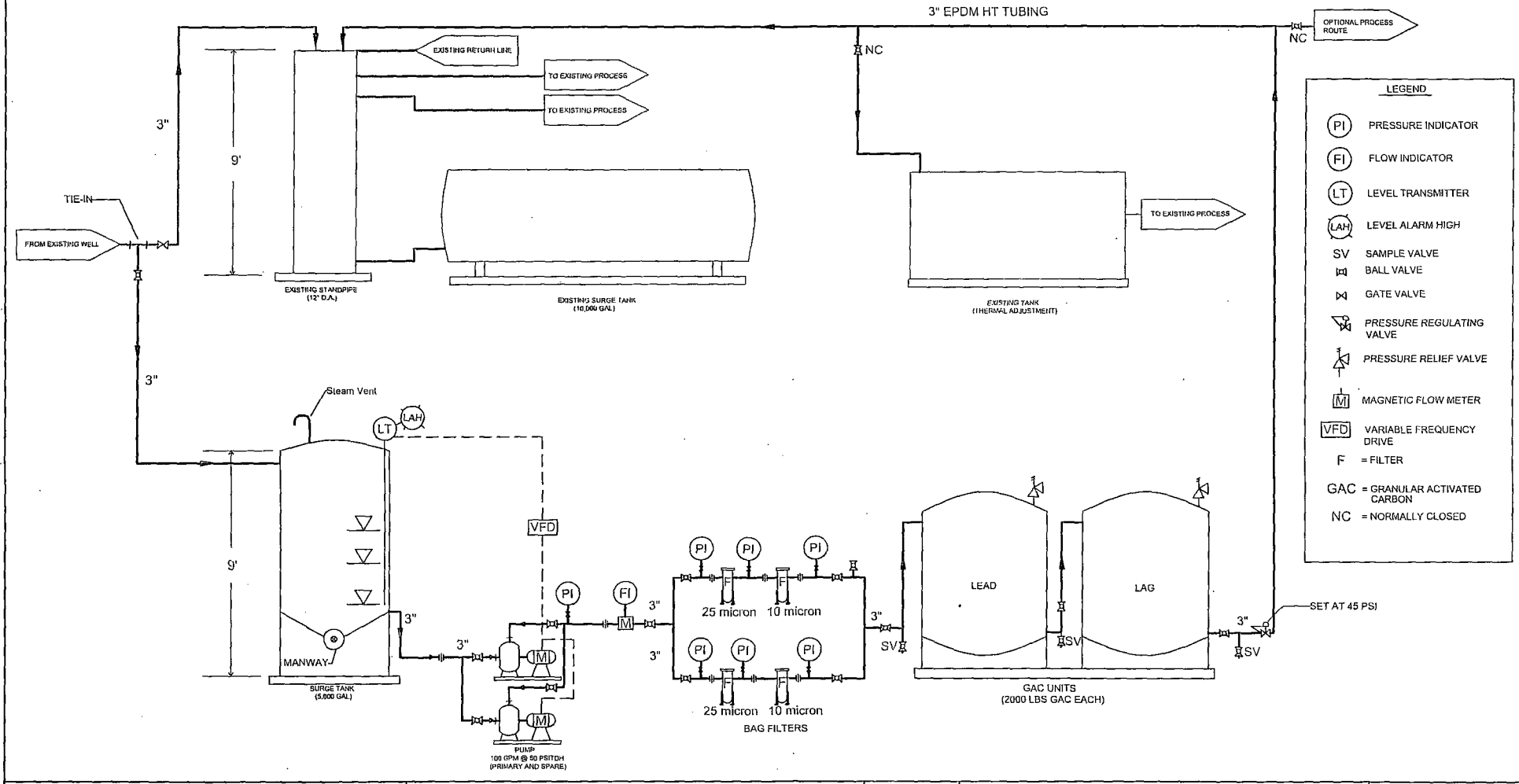
The water from the pump will flow through a 3" line to a bank of two bag filters. The first bag filter will have a filter element of 25 microns, and the second will have a filter element of 10 microns. A second bank of identical filters will be installed in parallel in order to allow filter element changes without system shutdown. A pressure indicator will be located before and after each filter housing to provide a means of monitoring filter performance and indicating when filter changes are necessary. The filters will remove large particulates anticipated to accumulate in the surge tank. Removal of these particulates will increase the life of the GAC media.

After passing through the filters, the water will flow through a 3" line to two GAC vessels installed in series. Each vessel will contain 2000 lbs of GAC. The first vessel, or Lead vessel, will remove the majority of the rhodamine in the water, and the second vessel, or Lag, will polish the stream to ensure that rhodamine levels are below detection limits. When the media in the lead vessel reaches rhodamine breakthrough, the media will be refreshed, and placed back online as the new lag vessel. The old lag vessel will be plumbed to become the new lead vessel. Sample valves will be located before, between, and after the GAC units allowing the operator to analyze the performance of the units and to determine media replacement schedules.

A pressure regulator will be located downstream of the GAC units in order to keep the system pressurized and prevent steam flashing within the treatment system. After the pressure regulator, the process stream will be directed either to the existing standpipe or the existing thermal adjustment tank, as needed, before being delivered to the existing process by the facility operator.

The new water treatment components will be installed on a concrete pad near the tie-in point adjacent to the existing standpipe and surge tank. A 20 ft X 20 ft X 8 inch pad is anticipated. The components will be assembled and connected in the field with galvanized steel fittings and EDPM high temperature hose.

Figure 1 shows the General Process Flow Diagram for the system, Table 1 contains an Equipment and Materials Schedule, and Appendix A contains Manufacturer's Data Sheets for the equipment and materials.



CLIENT: CYRQ ENERGY	DWN BY: KWJ	PROJECT: AMERICULTURE FACILITY PROJECT	DATE: 03/16/12
	CHK'D BY: DAK		PROJECT NO: 1151700102
AMEC Environment & Infrastructure, 8519 Jefferson, NE, Albuquerque, NM 87113	DATUM: N/A	TITLE: GENERAL PROCESS FLOW DIAGRAM RHODAMINE / WATER TREATMENT SYSTEM	REV. NO.:
	PROJECTION: NTS		FIGURE NO. 1
	SCALE: AS SHOWN		

Water Treatment System - Rhodamine Removal
AmeriCulture Facility, New Mexico
CERQ Energy

Table 1. Equipment and Materials Schedule

Item	Description	Model	Qty	Unit
1	Goulds Pumps™ Frame Mounted End Suction Stainless Steel Pump	4SHFMR2C2	2	Ea
2	AC Tech™ Variable Frequency AC Drive	ESV552N02TXD	1	Ea
3	Gems Sensors and Controls™ Ultrasonic Level Transmitter	UCL-510	1	Ea
4	Pentek™ Bag Filter Assembly	AC8024S3	4	Ea
5	Siemens Water Technologies™ Granular Activated Carbon Vessels	HP®2000SS	2	Ea
6	Badger Meter™ Magnetic Flow Meter	M Series, 3-Inch	1	Ea
7	Sani-Tech® High Temperature Food Grade Hose	GFDA-2000, 3000	TBD	LF

Equipment and Materials Schedule

Item 1

GOULDS PUMPS

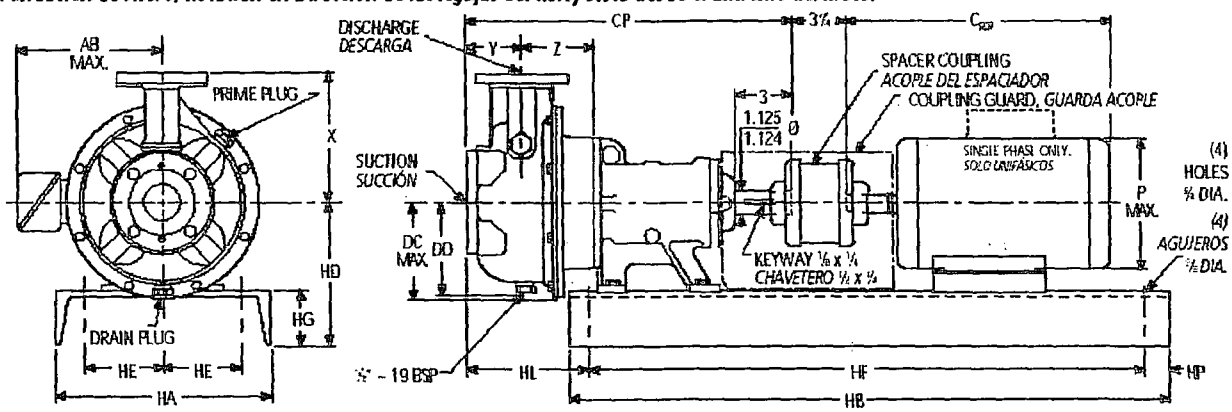
Unit Dimensions

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Channel Steel Bedplate, Clockwise Rotation Viewed from Drive End;
Fundación de Acero, Rotación en Dirección de las Agujas del Reloj Visto desde el Extremo del Motor



Dimension	Value	Dimension	Value
AB	7 3/8	HG	3
C ref	18	HP	1
CP	16 1/2	P max	9 5/8
CPmax	16 1/2	X	6 3/8
DC	5	Y	3 1/4
DD	4 3/4	Z	3 5/8
HA	12		
HB	31		
HD	8 1/4		
HE	4 1/4		
HF	29		

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2012-03-15

GOULDS PUMPS

Submittal Data

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Engineering Data

Pump Code: 4SHFRM2C2
Pump Size: 1 1/2 x 2 1/2 - 6
Pump Max Horsepower: 6.3437 hp
Pump Horsepower at Rating Point: 5.30 hp
Pump Shut Off Head: 141 ft
Motor Speed: 3450 rpm
Max. Temperature: 212 °F
Liquid: Water
Motor Code: H11142
System Input Power: 3~ 460 V
Motor Rated Horsepower: 7.50 hp
Max. Frequency 60
Electrical Enclosures: TEFC
Motor Standard: NEMA
Suction Flange Standard: ANSI
Suction Flange Rating: Class 150
Suction Size: 2 1/2" 316SS
Discharge Flange Standard: ANSI
Discharge Flange Rating: Class 150
Discharge: 1 1/2" 316SS
Approximate Net Weight: 99 lb
Impeller Size: 6 1/16"
Impeller Construction: Closed
Impeller Type: Radial impeller
Impeller Material:
316L Stainless Steel
Sense of Rotation: Clockwise from the drive end
Shaft Seal: Carbon/Sil-Carbide/EPR

Standard Equipment / Capability:

Close coupled or frame mounted end suction pump.
All liquid handling components of AISI 316L statinless steel.
Flanged connections to mate with standard ANSI 150 lb raised face flange.
Discharge is top centerline for piping flexibility.
Close coupled version uses standard NEMA JM frame motors.
Frame mounted version uses standard NEMA T frame motors.
Uses standard John Crane Type 21 mechanical seal.
Maximum working pressures to 230 PSI
Maximum temperatures to 250 F
Enclosed impeller with replaceable wear ring for high efficiency and long pump life.

GOULDS PUMPS

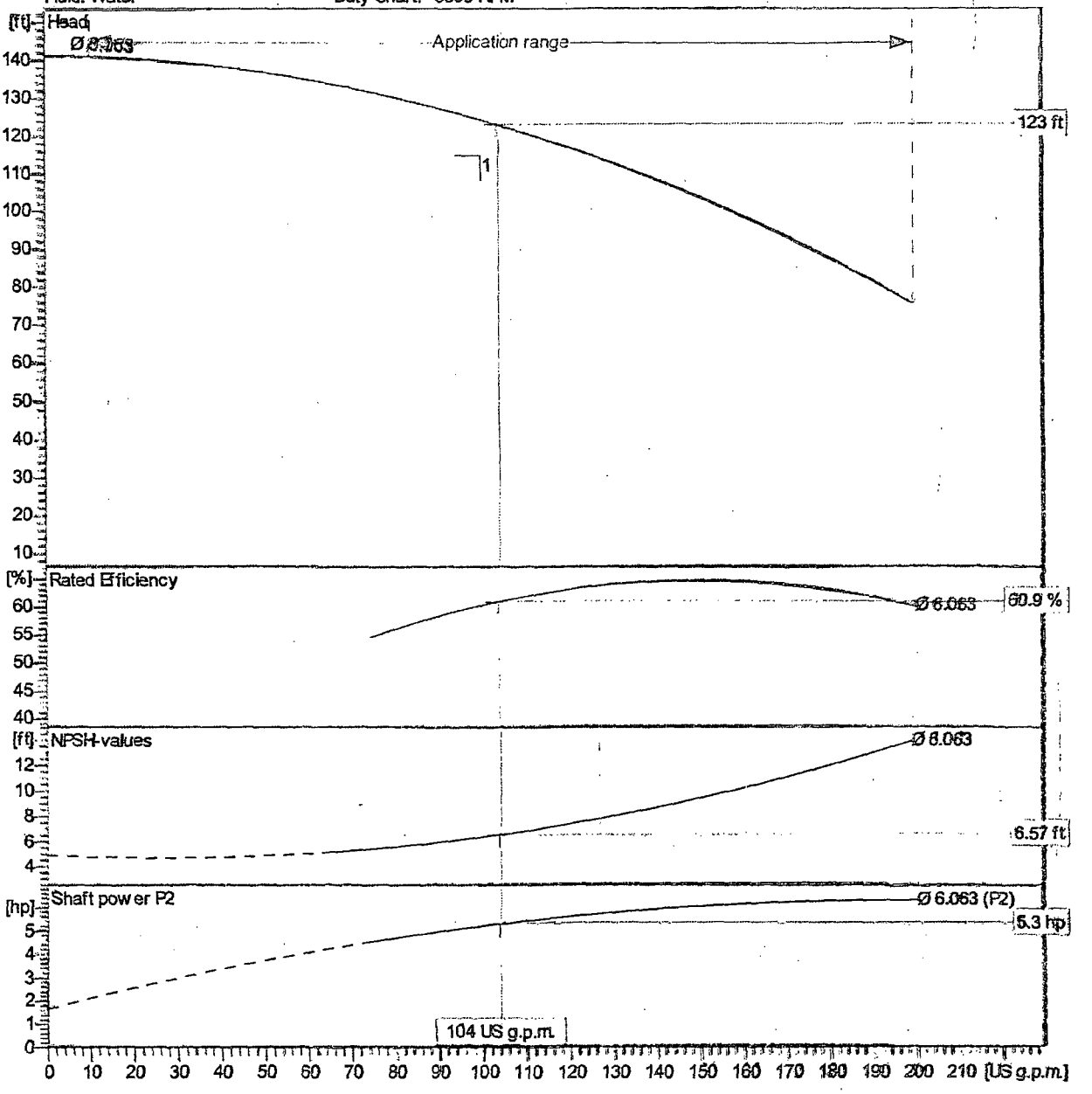
Performance Data

SSH Frame Mounted
End Suction Stainless Steel Pumps
MODEL : 4SHFRM2C2

Hydraulic Data					Motor Data	SSH S Group	Qty.
Maximum Flow	Flow at Duty Point	Maximum TDH	TDH at Duty Point	$NPSH_R$	Voltage / Phase / Enclosure	Model	
199 US g.p.m.	100 US g.p.m.	141 ft	115 ft	7 ft	460V 3PH TEFC	4SHFRM2C2	1

Submittal Prepared for: _____ Job: _____
Engineer: _____ Contractor: _____
Submittal Prepared by: Wood, Jack Company: _____
Submittal Date: 2012-03-15 Approved by: _____ Date: _____

Fluid: Water Duty Chart: 3500 RPM



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2012-03-15

Equipment and Materials Schedule

Item 2

AC Tech

(800) 894-0412 (208) 368-0415 (Fax)
info@ctiautomation.net

Product Selection Guide
New Products
User Manuals
Software
Catalogs
Datasheets
How To/FAQs
Product Articles

Standard Duty NEMA 1 (IP31)

- Brochure/Catalog
- Operating Instructions

The SMVector NEMA 1 (IP31) is the most common and cost effective drive enclosure for a wide range of applications including packaging, material handling / conveying, positive displacement pumping, and HVAC systems. The power ranges of the SMVector with NEMA 1 (IP31) include:

- 120/240V - 1Phase Input, up to 1.5 HP (1.1 kW)
- 200/240V - 1 or 3 Phase Input, up to 3.0 HP (2.2 kW)
- 200/240V - 3 Phase Input, up to 20 HP (15 kW)
- 400/480V - 3 Phase Input, up to 60 HP (45 kW)
- 480/600V - 3 Phase Input, up to 60 HP (45 kW)

Standard Duty

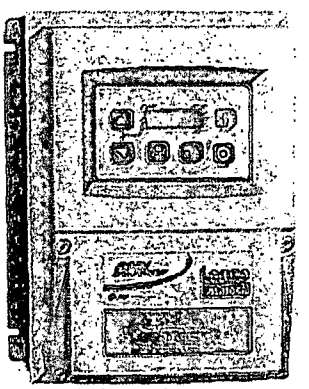
If you are looking for **AC Tech SMVector Drives**, please call us at **(800) 894-0412** or email us at info@ctiautomation.net we will do our best to help you find the AC Tech SMVector NEMA 1 VFD that you are looking for at the most competitive prices possible. If you are searching for AC Tech SMVector NEMA 4 Inverter technical information (data-sheets) please use the datasheets or product selection guide page links.

Washdown Duty NEMA 4X (IP65)

- Brochure/Catalog
- Operating Instructions

The SMVector NEMA 4X (IP65) is available in two enclosure materials for indoor only use and for indoor/outdoor use. These rugged enclosure options are ideal for many industries including food / beverage, waste water, chemical metering and processing, and pharmaceuticals. The power ranges of the SMVector in NEMA 4X include:

- 120/240V - 1Phase Input, up to 1.5 HP (1.1kW)
- 200/240V - 1 or 3 Phase Input, up to 3.0 HP (2.2 kW)
- 200/240V - 3 Phase Input, up to 20 HP (15 kW)
- 400/480V - 3 Phase Input, up to 30 HP (22 kW)
- 480/600V - 3 Phase Input, up to 30 HP (22 kW)



Washdown Duty

NEMA 4X (IP65) with Integral Disconnect

- Brochure/Catalog
- Operating Instructions

The SMVector with Integral Disconnect is available in a rugged NEMA 4X (IP65) indoor enclosure ideal for many industries including food / beverage, waste water, chemical metering and processing, pharmaceuticals and more. The integral disconnect switch offers the ability to isolate the motor for maintenance and servicing. Also the disconnect switch handle is lockable and is made of red and yellow materials for high visibility. The power ranges of the SMVector in NEMA 4X with Integral Disconnect include:

Part No:

OR

Manufacturer:

SEARCH

Search Tips

Can't find a part number? E-mail Us.

LEESON Drives

The SM Series Vector Control is designed for easy installation into your control panel. The compact size of this control, along with its contactor style design, takes up little room in your control panel and makes it easy to wire to. This control is easy to program and has auto tuning to make sure you get all the performance you need. It is designed for either Vector or V/Hz mode.

Hitachi Drives

The L100-M Series Inverter Drive features state-of-the-art circuitry and components to provide high performance. The housing footprint is exceptionally small, given the size of the corresponding motor. The Hitachi L100 product line includes more than a dozen inverter models to cover motor sizes from 1/4 horsepower to 10 horsepower, in either 230 VAC or 460 VAC power input versions.

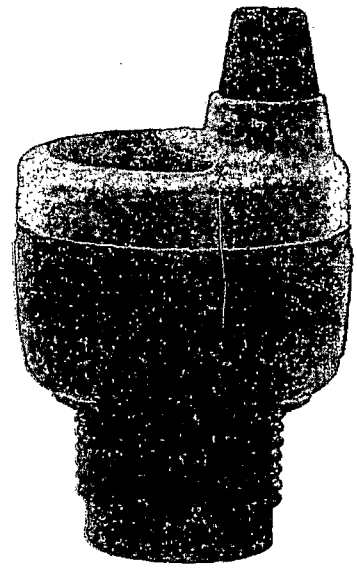
Hp	kW	I_N [A]	Model	Size	Model	Size
120/240V* - 1 Phase Input (3 Phase Output)						
0.5	0.37	2.4	ESV371N01SXC	R1	ESV371N01SMC	AA1
1	0.75	4.2	ESV751N01SXC	R1	ESV751N01SMC	AA1
1.5	1.1	6.0	ESV112N01SXC	R2	ESV112N01SMC	AA2
0.5	0.37	2.4	ESV371N01SXE	R1	ESV371N01SMC	AA1
1	0.75	4.2	ESV751N01SXE	R1	ESV751N01SMC	AA1
1.5	1.1	6.0	ESV112N01SXE	R2	ESV112N01SMC	AA2
*120/240V models provide 0-230V output even with 120V input applied.						
Power		**Output Current**	**NEMA4X Indoor [C] / Outdoor [E]**		**NEMA4X w/Disconnect Indoor**	
Hp	**kW**	**I_N [A]**	**Model**	**Size**	**Model**	**Size**
200/240V - 1 or 3 Phase Input (3 Phase Output)						
0.5	0.37	2.4	ESV371N02YXC	R1	ESV371N02YMC	AA1
1	0.75	4.2	ESV751N02YXC	R1	ESV751N02YMC	AA1
1.5	1.1	6.0	ESV112N02YXC	R2	ESV112N02YMC	AA2
2	1.5	7.0	ESV152N02YXC	R2	ESV152N02YMC	AA2
3	2.2	9.6	ESV222N02YXC	S1	ESV222N02YMC	AD1
0.5	0.37	2.4	ESV371N02YXE	R1	ESV371N02YMC	AA1
1	0.75	4.2	ESV751N02YXE	R1	ESV751N02YMC	AA1
1.5	1.1	6.0	ESV112N02YXE	R2	ESV112N02YMC	AA2
2	1.5	7.0	ESV152N02YXE	R2	ESV152N02YMC	AA2
3	2.2	9.6	ESV222N02YXE	S1	ESV222N02YMC	AD1
*Filter versions are also available in 1-phase: Replace the "YX" in the Model Part Number with an "SF". **Filter versions are also available in 1-phase: Replace the "YM" in the Model Part Number with an "SL".						
Power		**Output Current**	**NEMA4X Indoor [C or D] / Outdoor [E or F]**		**NEMA4X w/Disconnect Indoor**	
Hp	**kW**	**I_N [A]**	**Model**	**Size**	**Model**	**Size**
200/240V - 3 Phase Input (3 Phase Output)						
5	4	16.5	ESV402N02TXC	V1	ESV402N02TMC	AC1
7.5	5.5	23	ESV552N02TXD	T1	ESV552N02TMD	AB1
10	7.5	29	ESV752N02TXD	T1	ESV752N02TMD	AB1
15	11	42	ESV113N02TXD	W1	ESV113N02TMD	AF1
20	15	54	ESV153N02TXD	W1	ESV153N02TMD	AF1
5	4	16.5	ESV402N02TXE	V1	ESV402N02TMC	AC1
7.5	5.5	23	ESV552N02TXF	T1	ESV552N02TMD	AB1
10	7.5	29	ESV752N02TXF	T1	ESV752N02TMD	AB1
15	11	42	ESV113N02TXF	W1	ESV113N02TMD	AF1
20	15	54	ESV153N02TXF	W1	ESV153N02TMD	AF1

Equipment and Materials Schedule

Item 3

UCL-510 — Transmitter/Multipoint Switching Combo

- 49-inch (1.25m) range. Compact sensor with 2˝ dead band and beam width are optimized for small tank applications
- 1˝ NPT mounting
- Reliable, non-contact alternative to float and conductivity level sensors for corrosive, sticky or dirty media
- Outputs continuous level and provides full pump or valve control
- PVDF transducer for corrosive liquid media



The UCL-510 is a general purpose ultrasonic sensor providing non-contact level detection up to 49.2˝ (1.25m), with 4 relays for switch or control functions and continuous level measurement. This compact unit offers a non-contact alternative to our float or conductance sensors in small tank chemical feed or handling applications when corrosive, sticky or dirty media is involved.

The configuration software, supplied with the sensor, provides flexible system integration or retrofit of existing level devices with configuration control. Integral level automation functions can further reduce system costs through the reduction of external control hardware. The analog output enables local tank level indication, remote PLC monitoring or automation fuctions. Gems UCL-510 is the non-contact solution for small tank level switch, control and measurement.

Specifications

Range	49.2˝ (1.25 m)
Accuracy	0.125˝ (3 mm)
Resolution	0.019˝ (0.5 mm)
Beam Width	2˝ (5 cm)
Dead Band	2˝ (5 cm)
Supply Voltage	24VDC (loop)
Loop Resistance	400Ω max.
Consumption	0.5W
Signal Output	4-20 mA, two-wire (when loop powered)
Contact Type	(4) SPST relays 1A
Loop Fail-Safety	4 mA, 20 mA, 21 mA, 22 mA or hold last
Relay Fail-Safety	Power loss: Hold last; Power on: Open, close or hold last
Hysteresis	Selectable
Configuration Software	PC Windows® USB 2.0
Temp. Comp.	Automatic over range
Process Temp.	20°F to 140°F (-7°C to +60°C)
Ambient Temp.	-31°F to +140°F (-35°C to +60°C)
Pressure	MWP = 30 PSI
Enclosure	Type 6P encapsulated, corrosion resistant & submersible
Encl. Material	PC/ABS FR
Strain Relief Mat.	Santoprene®
Trans. Material	PVDF
Cable Length	48˝ (1.2 m)
Cable Jacket Mat.	Polyurethane
Process Mount	1˝ NPT (1˝ G)
Mount. Gasket	Viton®
Classification	General Purpose
Approvals	CE, cFMus

Typical Applications

- Water and Waste Water
- Control Automation
- Chemical Feed
- Food and Beverage
- Acids, Inks, Paints
- Slurries

Control and Switch Functions

- 2 pumps with 2 alarms
- 1 pump with 3 alarms
- 2 pumps (lead-lag) with 2 alarms
- 2 pumps (duplexing) with 2 alarms
- 4 level switch points

Versatile Application

Controller

- Auto fill/empty
- Can control 2 pumps/valves
- Lead/lag
- Duplex
- Unused relays may be used as additional alarms

The UCL-510 feature programmable level intelligence and can be reconfigured for different sensing duties (such as switch actuation points) after installation. This is an advantage over our float or conductivity type sensors. The user-friendly configuration software provides un-matched accuracy and programming for control applications. Multi-function relay control, coupled with 4-20 mA output generates amazing control capabilities. Advanced signal processing techniques provides the UCL-510 with next generation digital processing for control. The UCL-510 is level control made simple.

Switching

- High level alarm (1-4)
- Low level alarm (1-4)
- Any combination of high and/or low alarms

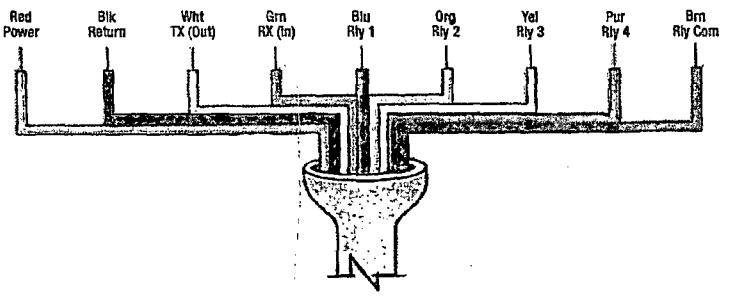
The UCL-510 provides a non-contact alternative to our float and conductivity probes multipoint level switches. It combines 4 built in SPST relays, with a selectable hysteresis that eliminates relay chatter from turbulent media. Additionally, non-contact sensors are immune to the performance issues influenced by changes in a media's specific gravity.

Continuous Transmitter

- Adjustable 4-20 mA output
- Reversible output
- Interface directly to local display and/or to PLC, SCADA, DCS systems
- Remote displays/controllers can increase relay functionality

The UCL-510 is a good non-contact alternative to our XT float type transmitters for challenging media that can damage moving parts. The UCL-510 is for sticky, scaling or corrosive media. It provides exceptional measurement accuracy (0.125"), resolution (0.019") and repeatability ensuring overall system performance reliability.

Wiring



How To Order

Select by Part Number.

Description	Part Number
UCL-510 Transmitter/Multipoint Switch with Configuration Software and Fob	225100
Replacement/Additional Configuration Fob	227100

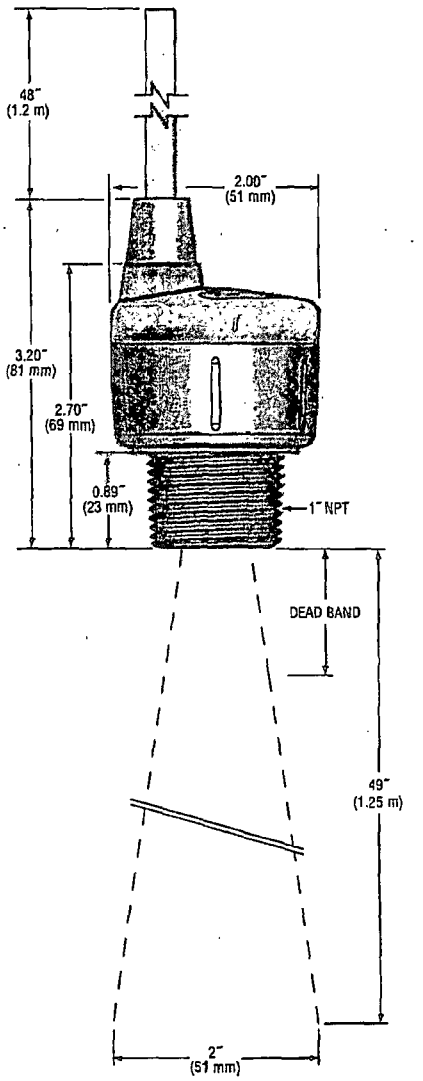
Configuration Software

- Free download @ GemsSensors.com/software
- Windows XP or 2000 compatible; USB 2.0 connection
- Provides configuration, file management (saving, printing, backup), and troubleshooting

The user interface allows you to take complete visual control of your set-up and configuration. Using simple menus and visual representations, the confusion of target calibration are gone. Once you have completed your configuration design, simply click "Write to Unit" and the UCL-510 is configured. It also enables multiple UCL-510's to be configured with just a click of the button. It even generates viewable and printable PDF wiring diagrams of your configurations to simplify and ensure proper field installation.

Gems supplies the USB Fob required to use the configuration software with each UCL-510 sensor. Replacements or additional Fobs may be ordered separately.

Dimensions

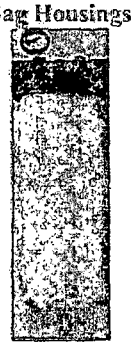


Equipment and Materials Schedule

Item 4

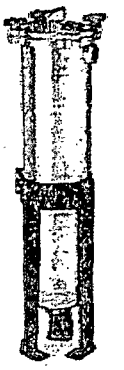
Bag Filter Vessel Housing Assemblies & Filter Bags

#10 Polypropylene Bag Housings



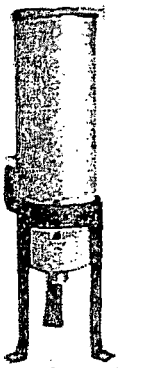
#20 Polypropylene Bag Housings

Steel High Flow Bag GP Housings



Steel ASME Coded Bag AC Housings

Steel Strap Band Bag Filter Housings



Stainless Steel

PBH-410 Specs:
> Polypropylene
> Lightweight
> Resists Corrosion
> Up to 50 gpm
> Up to 100 deg F
> Up to 100 psi
> From $135-$150

PBH-420 Specs:
> Polypropylene
> Lightweight
> Resists Corrosion
> Up to 50 gpm
> Up to 100 deg F
> Up to 90 psi
> From $158-$178

High Flow Specs:
> Steel
> Adjustable Legs
> Viton Cover Seal
> Up to 220 gpm
> Up to 300 deg F
> Up to 200 psi
> From $493-$2100

ASME UM Stamp:
> Steel
> Adjustable Legs
> Hinged Cover
> Up to 220 gpm
> Up to 300 deg F
> Up to 150 psi
> From $1249-$3255

Steel Strap Band:
> Steel
> Adjustable Legs
> Easy to Use
> Up to 220 gpm
> Up to 300 deg F
> Up to 150 psi
> From $432-$2266

PBH-410-1
(1" Inlet/Outlet)
$139.99 Each

PBH-410-15
(1.5" Inlet/Outlet)
$149.99 Each

PBH-420-1
(1" Inlet/Outlet)
$167.99 Each

PBH-420-15
(1.5" Inlet/Outlet)
$177.99 Each

Replacement Bags:
Use 4" W x 8-5/8" L Filter Bags below

Replacement Bags:
Use 4" W x 18" L Filter Bags below

PBH-410 Parts & Accessories:

PBR-410-BK 10" Replacement Basket

144357 Replacement Ball Valve

PBH-420 Parts & Accessories:

PBR-420-BK 20" Replacement Basket

144357 Replacement Ball Valve

Aluminum

OK if pH 6.5-8.5 & TDS under 500

GP801AL2
Filter Bag Size #1
7" W x 16.5" L Bag
100 psi 90 gpm 2"

GP802AL2
Filter Bag Size #2
7" W x 32" L Bag
100 psi 200 gpm 2"

GP802AL3
Filter Bag Size #2
7" W x 32" L Bag
100 psi 220 gpm 3"

GP503AL1.25
Filter Bag Size #3
4.1" W x 8" L Bag
200 psi 20 gpm

Carbon Steel

Ok with high pH

AC801CS2
Filter Bag Size #1
7" W x 16.5" L Bag
(2.0 Cubic Feet)
15" Basket
90 GPM thru 2" Pipe

AC802CS3
Filter Bag Size #2
7" W x 32" L Bag
(4.4 Cubic Feet)
30" Basket
220 GPM thru 3" Pipe

PL88 #1 Series
7" W x 16.5" L Bag
(2.0 Cubic Feet)
15" Basket
220 GPM

Carbon 2" NPT
Carbon 2" Flange
Carbon 3" Flange
304 SS 2" NPT
304 SS 2" Flange
304 SS 3" Flange
316 SS 2" NPT
316 SS 2" Flange
316 SS 3" Flange

PL88 #2 Series
7" W x 32" L Bag
(4.4 Cubic Feet)
30" Basket
220 GPM

Carbon 2" NPT

Pentek AC8024S3 ASME Coded 304 Stainless Steel Filter Bag Housing

3" Inlet/Outlet; 304 Stainless Steel; Use Filter Bag Size #2

- Features
- Specs
- Replacements

- Pentek AC8024S3 ASME Filter Bag Housing Specs:
- **Housing Material:** 304 Stainless Steel
- **Basket:** Stainless Steel
- **Maximum Flow Rate:** 220 GPM
- **Inlet/Outlet Size:** 3"
- **Maximum Pressure:** 150 PSI
- **Maximum Water Temperature:** 300 F
- **Filter Bag Size:** 2
- **Leg Type:** Band Clamp
- **Diameter:** 8.0 Inches
- **Dimension A (In.):** 6 Inches
- **Dimension B (In.):** 42 Inches
- **Dimension C (In.):** 45-5/16 Inches
- **Dimension D (In.):** 22 Inches
- **Standards:** ASME Coded Section VIII Div.1

Equipment and Materials Schedule

Item 5

HP®2000SS Liquid Phase Adsorber

Applications

The HP®2000SS is a carbon adsorber designed for high pressure, high temperature, or corrosive liquid phase treatment applications where stainless steel materials of construction are
required. Applications for the HP®2000SS include:

- Process purification – byproduct removal, decolorization
- Wastewater treatment
- Chemical spill cleanups
- Storage tank cleanouts

Installation, Startup and Operation

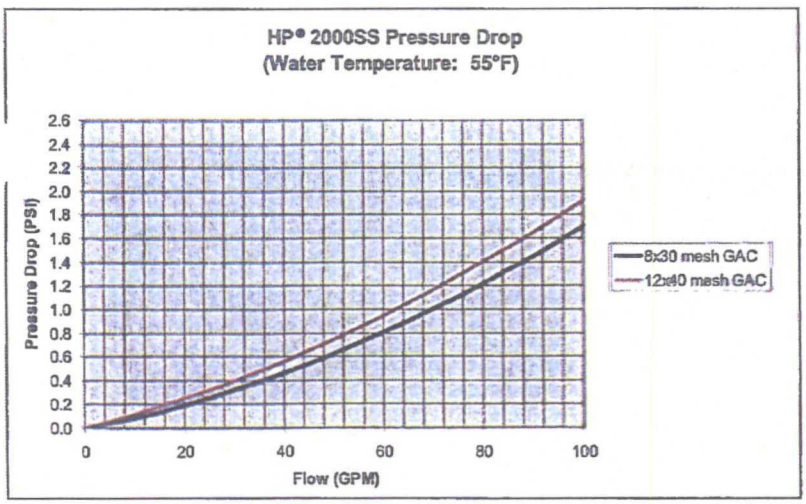
Siemens can provide a total service package that includes utilizing OSHA trained personnel providing on-site carbon changeouts, packaging and transportation of spent carbon for recycling at our reactivation facilities, where the organic contaminants are thermally destroyed.

We provide instructions on sampling the spent carbon and completion of our spent carbon profile form. Spent carbon acceptance testing can be performed at our certified laboratory. When requested a certificate of reactivation will be issued.

Benefits and design features

- Ready to use adsorber, simple installation and operation
- ASME code section VIII (stamped) vessel
- 316SS construction
- Suitable for applications to 125 psig and 200° F
- Flanged process connections
- Rupture Disc for pressure relief
- 1" drain port and 3" media outlet port
- Top 14"x18" manway allows for easy internal inspection
- Fork channels and lifting lugs provided for movement/placement of unit on site
- Adsorber is UN/DOT approved transportation container for RCRA hazardous spent carbon

Specifications: HP® 2000SS	
Dimensions, diameter x overall height (approx.)	54" x 98"
Inlet connection	3" flanged
Outlet connection	3" flanged
Drain / sample connection	1" flanged
Vent connection	2" flanged with rupture disc
Media outlet	3" flanged
Top manway	14"x18" elliptical
Internal distributors	316SS
Carbon fill volume (cu. ft.)	68
Cross sectional area (sq. ft.)	15.9
Approximate carbon weight (lbs.)	2,000
Empty weight (lbs.)	1,500
System operating weight (lbs.)	7,300
Pressure, psig (max.)	125
Temperature, deg. F (max)	200
Maximum flow rate (gpm)	100
Contact time at max flow (minutes)	5



Warning

Safety Note: Wet activated carbon readily adsorbs atmospheric oxygen. Dangerously low oxygen levels may exist in closed vessels or poorly ventilated storage areas. Workers should follow all applicable state and federal safety guidelines for entering oxygen depleted areas.

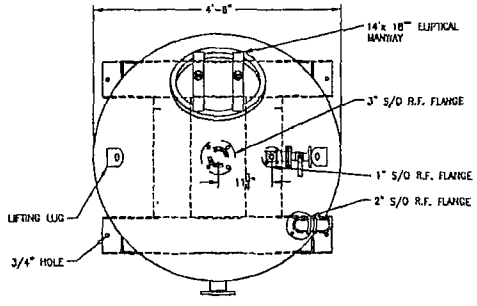
All information presented herein is believed reliable and in accordance with accepted engineering practices. Siemens makes no warranties as to completeness of information. Users are responsible for evaluating individual product suitability for specific applications. Siemens assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products.

Siemens Industry, Inc.
11711 Reading Road
Red Bluff, CA 96080

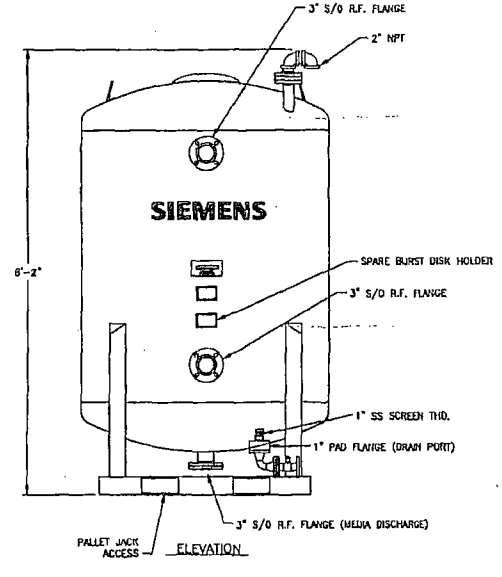
56-613-5620

www.siemens.com/es

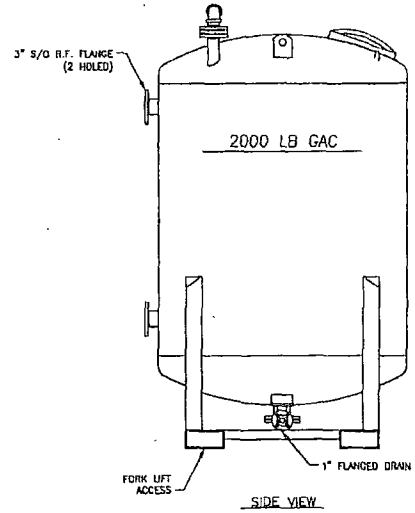
Subject to change without prior notice
Order No.: WS-HP2000SS-DS - 1011
Printed in USA



TOP VIEW



ELEVATION



SIDE VIEW

NOTES: UNLESS SPECIFIED OTHERWISE

1. DESIGN DATA:
   PRESSURE VESSEL–125 PSIG (MAX), 200°F
   ASME CODE STAMPED MAX FLOW 100 GPM
   68 CU. FT. ACTIVATED CARBON
2. MATERIAL:
   316L SS
3. APPROXIMATE WEIGHTS:
   EMPTY VESSEL : ..... 1,500 LBS
   SHIPPING WITH MEDIA: ..... 3,500 LBS
   OPERATIONAL (WATER) : ..... 7,300 LBS
4. EPDM GASKET MATERIAL

DESIGNER	AM	DATE 1-28-11
CHECKED		DATE
ENGINEER		DATE
MANAGER		DATE
FILE		
WORLD	NONE	

TITLE: HP2000 SS 125 PSI

CLIENT:

SIEMENS Water Technologies RED BLUFF, CA

PROJECT	CODE	DRAWING	SHEET	REV
		HP200053-SALES	1 OF 1	0

STD: BORDER-0103-24X36G1

BAR = 1" AT FULL SCALE

REV	DESCRIPTION	DATE	DSN	DRN	CHKD	APVD	ECN

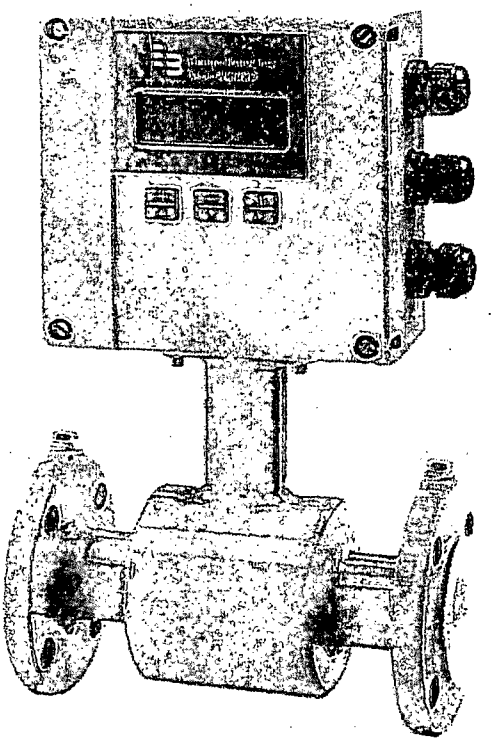
Equipment and Materials Schedule

Item 6

Badger Meter

M-Series® Mag Meter

Model M-2000

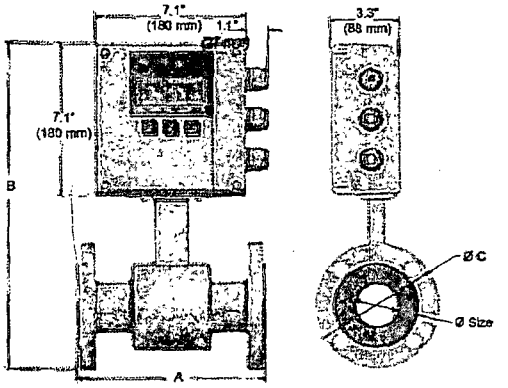


IMPORTANT:
This manual contains important information.
READ AND KEEP FOR REFERENCE.

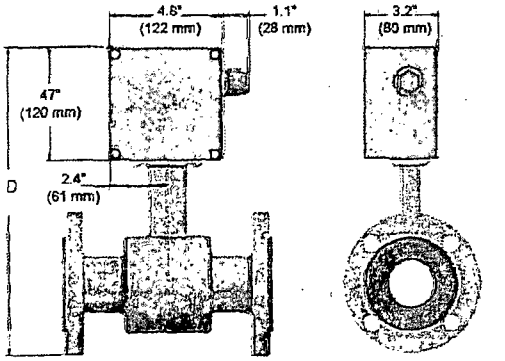
IOM-175-03 (4-11)
PN: 53400-190 Rev 3

Installation & Operation Manual

Appendix: Detector Specifications



Meter with M-2000 amplifier



Meter with junction box for remote M-2000 amplifier

Size		A		B		C		D		Est. Weight with M-2000		Flow Range			
												LPM		GPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg	min	max	min	max
1/4	6	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.063	20	0.02	5
5/16	8	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.114	34	0.03	9
3/8	10	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.177	53	0.05	14
1/2	15	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.416	125	0.11	33
3/4	20	6.7	170	14.2	361	3.9	99	11.5	293	13	5.5	0.75	225	0.2	59
1	25	8.9	225	14.4	366	4.3	108	11.7	298	18	8.0	1.20	350	0.3	93
1 1/4	32	8.9	225	15.2	386	4.6	117	12.5	318	20	9.0	2.00	575	0.5	152
1 1/2	40	8.9	225	15.4	390	5.0	127	12.7	322	21	9.5	3.00	900	0.8	239
2	50	8.9	225	15.9	403	6.0	152	13.2	335	26	11.5	4.70	1400	1	373
2 1/2	65	11.0	280	17.1	434	7.0	178	14.4	366	52	23.5	8	2400	2	631
3	80	11.0	280	17.3	440	7.5	191	14.7	372	54	24.5	12	3600	3	956
4	100	11.0	280	18.4	466	9.0	229	15.7	398	56	25.5	19	5600	5	1493
5	125	15.8	400	19.6	498	10.0	254	16.9	430	58	26.0	30	8800	8	2334
6	150	15.8	400	20.6	524	11.0	279	17.9	456	60	27.0	40	12700	11	3361
8	200	15.8	400	22.5	572	13.5	343	20.4	518	86	39.0	75	22600	20	5975
10	250	19.7	500	26.8	681	16.0	406	24.1	613	178	81.0	120	35300	30	9336
12	300	19.7	500	28.9	734	19.0	483	26.2	666	207	94.0	170	50800	45	13444
14	350	19.7	500	30.8	782	21.0	533	28.2	716	258	117	230	69200	60	18299
16	400	23.6	590	33.7	856	23.5	597	31.0	788	306	139	300	90400	80	23901
18	450	23.6	590	35.0	890	25.0	635	32.4	822	400	181	380	114000	100	30250
20	500	23.6	590	38.2	969	27.5	699	35.5	901	493	224	470	140000	125	37346
22	550	23.6	590	39.6	1005	29.5	749	36.9	937	523	237	570	170000	150	45188
24	600	23.6	590	42.2	1071	32.0	813	39.5	1003	552	251	680	200000	180	53778
28	700	23.6	590	46.2	1173	36.5	927	44.0	1118	648	294	920	275000	240	73100
30	750	31.5	800	48.3	1228	39.0	984	45.7	1161	702	319	1060	315000	280	84000
32	800	31.5	800	52.2	1325	41.4	1015	49.5	1257	768	349	1200	361000	320	95600
36	900	31.5	800	55.3	1405	46.0	1168	54.1	1374	848	385	1500	457000	400	121000
40	1000	31.5	800	60.0	1525	50.2	1230	57.4	1457	922	419	1900	565000	500	149300
42	1050	36.0	914	66.0	1675	53.0	1346	63.4	1610	1198	499	2100	620000	550	164600
48	1200	39.4	1000	69.9	1775	59.4	1455	67.2	1707	1208	549	2700	814000	720	215100
54	1400	39.4	1000	78.5	1995	68.4	1675	75.9	1927	1362	619	3700	1100000	980	292700

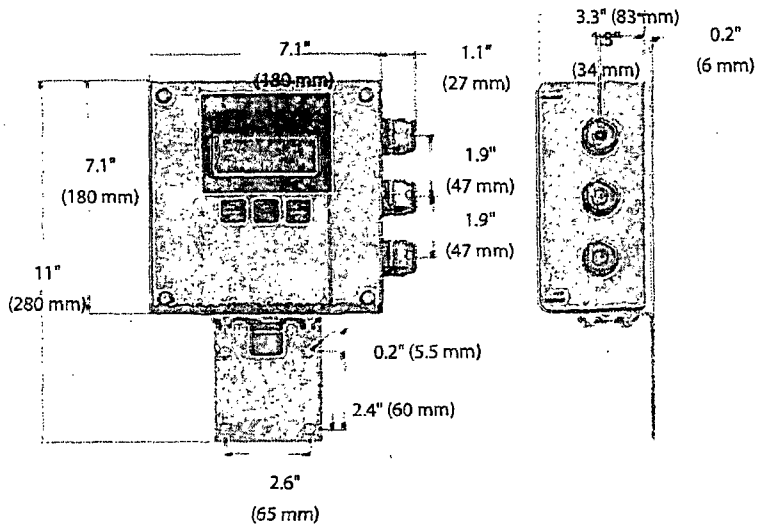
Flow Range: 0.1 - 39.4 fps (0.03-12 m/s)
Sizes: 1/4 inch to 54 inches (6 mm to 1400 mm)
Min. Conductivity: ≥ 5 micromhos/cm
Accuracy:
± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s)
± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)
Electrode Materials: Standard: Alloy C
Optional: 316 stainless steel, gold/platinum plated, tantalum, platinum/rhodium
Liner Material: PFA up to 3/8 inch, PTFE 1/2 inch to 24 inches, Soft and Hard Rubber from 1 to 54 inches, Halar® from 14 to 40 inches
NSF Listed: Models with hard rubber liner 4-inch size and up; PTFE liner - All sizes.

Fluid Temperature:
With Remote Amplifier:
PFA, PTFE & Halar 311°F (155°C)
Rubber 176°F, (80°C)
With Meter Mounted Amplifier:
PFA, PTFE & Halar 212°F (100°C)
Rubber 178°F, (80°C)
Pressure Limits:
Maximum allowable non-shock pressure and temperature ratings for steel pipe flanges, according to American National Standard ANSI B16.5. (Example: 150-pound flanges, rated 285 PSI at ambient temperature.) (Example: 300-pound flange rated 740 PSI at ambient temperature.)
Coil Power: Pulsed DC
Ambient Temperature: -4°F to 140°F (-20°C to 60°C)

Pipe Spool Material: 316 stainless steel
Meter Housing Material: Carbon steel welded
Flanges: Carbon steel - Standard (ANSI B16.5 Class 150 RF)
316 stainless steel - Optional
Meter Enclosure Classification: NEMA 4X (IP66)
Optional: Submersible NEMA 6P (remote amplifier required)
Junction Box Enclosure Protection:
(for remote amplifier option) Powder coated die-cast aluminum, NEMA 4 (IP65)
Cable Entries: 1/2-inch NPT Cord Grip
Optional Stainless Steel Grounding Rings:

Meter Size	Thickness (of one ring)
up through 10 inches	.135 inch
12 to 20 inches	.187 inch

Appendix: Amplifier Specifications



Power Supply:
AC supply (85-265 VAC)
Typical power: 20 VA or 15 Watts
Max. power: 26 VA or 20 Watts
Optional DC supply (10-36 VDC)
Typical power: 10 Watts
Max. power: 14 Watts

Accuracy: ± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s)
± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)

Repeatability: ± 0.1 percent

Flow Range: 0.10 to 39.4 ft/s (0.03 to 12 m/s)

Fluid Conductivity: Minimum 5.0 micromhos/cm

Flow Direction: Unidirectional or bidirectional two separate totalizers (programmable)

Totalization: Programmable/resettable
Unidirectional: T1, T2
Bidirectional: T+ (Fwd), T- (Rev), Tn (Net)

Minimum Fluid Conductivity: 5.0 micromhos/cm

Processing: 32-bit DSP

Analog Output: 4-20 mA, 0-20 mA, 0-10 mA, 2-10 mA (programmable and scalable)
Voltage sourced 24 VDC – isolated
Maximum loop resistance < 800 ohms

Digital Outputs: Four total, configurable
24 VDC sourcing active output (up to two),100 mA total, 50 mA each; sinking open collector output (up to four), 30 VDC Max, 100 mA each; AC solid-state relay (up to two), 48 VAC, 500 mA max.

Pulse Outputs: Scalable up to 10 kHz, passive open collector up to 10 kHz, active switched 24 VDC. Up to two outputs (forward and reverse). Pulse width programmable from 1-1,000 ms or 50 percent duty cycle.

Frequency Output: Scalable up to 10 kHz, open collector up to 1 kHz, solid-state relay

Misc Outputs: High/low flow alarm (0-100 percent of flow), error alarm, empty pipe alarm, flow direction, preset batch alarm, 24 VDC supply

Noise Dampening: Programmable 0-30 seconds.

Empty Pipe Detection: Field tunable for optimum performance based on specific application

Excitation Frequency: 1 Hz, 3.75 Hz, 7.5 Hz or 15 Hz (factory optimized to pipe diameter)

Digital Input: Max. 30 VDC (programmable – positive zero return, external totalizer reset or preset batch start)

Units of Measure: Ounces, pounds, liters, US gallon, imperial gallon, barrel, hectoliter, megagallon, cubic meters, cubic feet, acre feet

Galvanic Separation: 250 volts

Low-flow-cutoff: Programmable 0-10 percent of max. flow

LCD Display: 4 x 20 character display with backlight

Programming: Three-button, external manual or remotely

Housing: Cast aluminum, powder-coated paint

Housing Rating: NEMA 4X (IP66)

Mounting: Meter mount or remote wall mount (bracket supplied)

Cable Connection: 1/2-inch NPT Cord Grip (three)

Ambient Temperature: -4 to 140° F (-20 to 60° C)

Serial Communication: RS232 – Modbus RTU or remote display

Logging: Power loss totalization

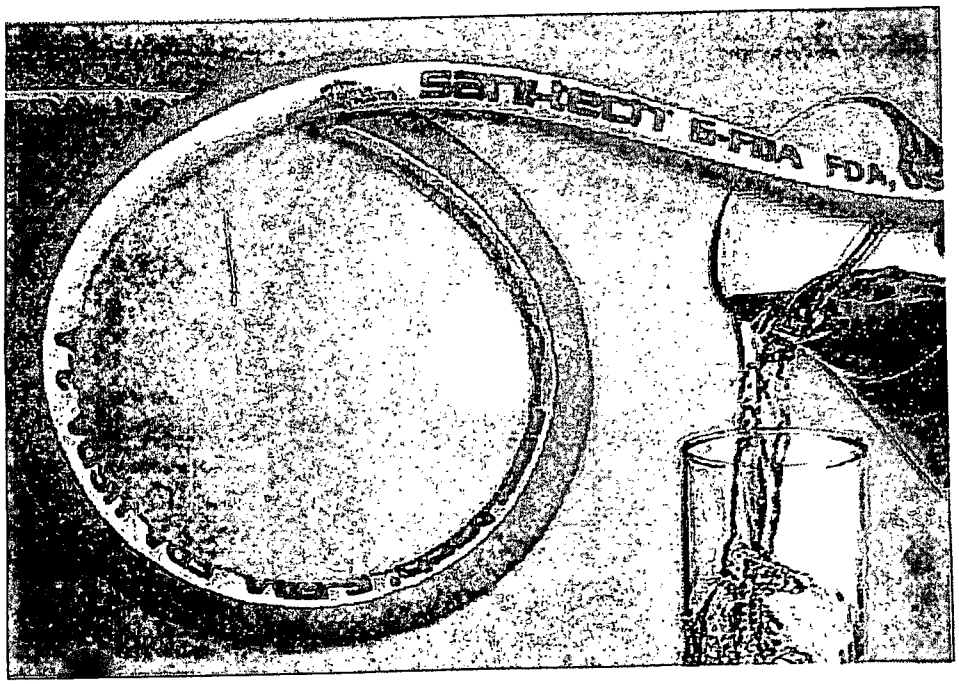
Relative Humidity: Up to 90 percent non-condensing

Locations: Indoor and outdoor

Equipment and Materials Schedule

Item 7

Sani-Tech® G-FDA



High temperature food grade rubber hose

Features/Benefits

- Sanitary suction and discharge hose
- White EPDM liner
- EPDM cover and reinforcements designed to withstand rough handling and high temperatures
- Full vacuum rating
- Food oil and ozone resistant
- Custom laylines available
- Specially designed to handle oil-based materials
- Imparts no taste or odor

Temperature Rating

- -40°F to +300°F (-40°C to +148°C)

Typical Applications

- High purity water
- Bulk food transfer
- Beverage
- Dairy
- Cosmetics
- CIP applications

Available End Connections

- PermaSeal® crimp-style fittings
- Over 40 fitting styles available in a wide range of materials
- 316L stainless steel standard material of construction

High Temperature EPDM Suction and Discharge Service

Sani-Tech® G-FDA is built for higher temperatures and more chemically demanding applications. It boasts our highest temperature rating for any non-fluoropolymer-lined rubber covered hose.

The non-PVC, non-butyl, FDA-approved, all EPDM liner will not impart any taste or odor.

A robust dual-helix wire reinforcement allows the EPDM liner to withstand full vacuum, making it the best EPDM-lined hose for suction and discharge service.

SAINT-GOBAIN
PERFORMANCE PLASTICS

...i-Tech® G-FDA Hose Specifications

Part Number	Nominal Inside Diameter		Nominal Outside Diameter		Standard Coil Length	Minimum Bend Radius		Maximum Working Pressure*		Vacuum Rating	Weight
	in.	mm	in.	mm	ft.	in.	mm	psig	kPa	in. Hg	lbs./ft.
GFDA-0500	.500	12.7	.931	23.6	150	2.50	63.5	29.9	600	0.23	100
GFDA-0750	.750	19.1	1.182	30.0	150	3.75	95.3	29.9	600	0.31	100
GFDA-1000	1.000	25.4	1.500	38.1	150	4.00	101.6	29.9	600	0.391	100
GFDA-1500	1.500	38.1	2.090	53.1	150	5.00	127.0	29.9	600	0.81	100
→ GFDA-2000	2.000	50.8	2.600	66.0	150	6.00	152.4	29.9	600	1.16	100
GFDA-2500	2.500	63.5	3.173	80.6	150	7.00	177.8	29.9	600	1.70	100
→ GFDA-3000	3.000	76.2	3.718	94.4	150	8.00	203.2	29.9	600	1.96	100
GFDA-4000	4.000	101.6	4.781	121.4	150 1	1.00	279.4	29.9	600	3.01	100

*Based on ambient condition on exterior of hose. Elevated temperatures and characteristics of medium being transferred can affect working pressures and burst pressures.

**Measured on the inner surface of the curved portion. Data is based on static applications. For dynamic or cyclic applications, consult factory.

Industry Approvals and Compliances
- FDA
- USDA
- 3-A

Construction
- Inner tube: white EPDM
- Cover: gray EPDM bonded to liner with dual-helix wire reinforcement

Temperature Rating
- -40°F to +300°F
- -40°C to +148°C

Maximum Length
- 50 feet (GFDA-2500)
- 60 feet (all other sizes)

Distributed By:

Saint-Gobain Performance Plastics
460 Milltown Road
Bridgewater, NJ 08807
Tel: (800) 435-3992
Fax: (908) 575-0459

SAINT-GOBAIN PERFORMANCE PLASTICS

Our products are manufactured under a quality management system registered and complying with 3-A Sanitary Standards where noted and with ISO 9001:2000, which has been independently certified by BVQI.

PermaSeal®, Pure-Fit® and Sani-Tech® are registered trademarks.

FSC Mixed Sources

The Progressive Fish-Culturist 48:301–302, 1986

Potential for Nitrosamine Formation in Seven Fishery Chemicals

S. L. ABIDI, V. K. DAWSON, AND R. C. HUBLEY, JR.

U.S. Fish and Wildlife Service
National Fishery Research Laboratory
Post Office Box 818
La Crosse, Wisconsin 54602, USA

Abstract.—In recent years, nitrosamines have been reported as possible causes of cancer, mutations, or birth defects. Inasmuch as these compounds may be formed by the interaction of certain amines with nitrite in the aquatic environment, we evaluated seven fishery chemicals for their potential to form nitrosamines: the experimental fish toxicant digeranylethanolamine (GD-174); the four therapeutants Terramycin, erythromycin, Hyamine 1622, and Hyamine 3500; and the two tracer dyes rhodamine B and rhodamine WT. The results indicate that the controlled use of the seven fishery chemicals in natural environments will not lead to the formation of nitrosamines.

A wide range of nitrosamine structures, several of which occur in foodstuffs (Crosby and Sawyer 1976), have been reported to cause cancer, mutations, or birth defects (Olajos 1977). Reactions between nitrite and certain amine compounds in an aquatic environment might be expected to result in the formation of nitrosamine, and Meyers and Hendricks (1982) reported that several nitrosamines caused cancer in fish. As part of a Congressional mandate, the U.S. Environmental Protection Agency (1977) required that all pesticides—including fishery chemicals—be tested for their potential to form nitrosamines by interaction with nitrite.

The objective of the present work was to determine if nitrosamines were formed either in water or in fish treated with certain chemicals used in fish culture or management. The chemicals selected were the experimental carp toxicant digeranylethanolamine (GD-174); the four therapeutants Terramycin, erythromycin, Hyamine 1622, and Hyamine 3500; and the two tracer dyes rhodamine B and rhodamine WT. Several other fishery chemicals were excluded from this study because their molecular structure did not contain the nitrogen group involved in the formation of nitrosamines.

Methods

All reagents and solvents used were analytical grade. Inorganic and organic salts were obtained from Alpha Products, Danvers, Massachusetts; sodium alkanesulfonate from Eastman Kodak, Rochester, New York; 2-propanol from Aldrich, Milwaukee, Wisconsin; solvents for high performance liquid chromatography and silica gel from J. T. Baker, Philipsburg, New Jersey; and other chromatographic solvents from Burdick and Jackson Laboratories, Muskegon, Michigan.

Fishery chemicals used in this study and their respective suppliers were as follows: GD-174 (technical), Glidden Durkee Corporation; Terramycin (technical) and erythromycin (technical), Sigma Chemical Company; Hyamine 1622 (50% liquid) and Hyamine 3500 (technical and 50% liquid), Rohm and Haas; and rhodamine B (powder) and rhodamine WT (20% aqueous solution), E. I. du Pont de Nemours Company.

Nitrosamine detection involved the use of gas chromatography (GC), high performance liquid chromatography (HPLC), and thermal energy analysis (TEA). Instrument characteristics used were those of Abidi (1982, 1984).

Before the experiments, we examined all products and reagents for possible contamination with nitrosamines, using steam distillation, extraction, ion exchange chromatography, and GC–TEA analysis procedures described by Abidi (1982).

Inspection for nitrosamine formation was conducted in water from the laboratory wells and the Black River, Wisconsin. The chemicals were allowed to interact for 24 h and samples were taken at intervals of 0.5, 2, 3, 6, 12, or 24 h, as appropriate for the compound under study. Nitrite-N was added at a rate of either 10 or 100 μg/L above its background levels. Resulting nitrite-N levels in the test solutions were 10, 20, 30, 100, 110, or 120 μg/L. Temperature was maintained at 20, 50, or 90°C and pH at 2, 5, or 7.

Whole-body homogenates of fish exposed to fishery chemicals and nitrite were checked for nitrosamine formation by tissue extraction, cleanup by column and thin-layer chromatography, and analysis by HPLC–TEA. Results of analyses were confirmed by GC–mass spectrometry (Abidi 1984).

Results and Discussion

There was no evidence of nitrosamine contamination in any of the fishery chemicals or reagents (level of detection 0.1 ng/g). Nitrosamines were not formed during reactions of nitrate with Terramycin, erythromycin, or the Hyamines. Forced reactions of three compounds—GD-174 and rhodamines B and WT—resulted in the formation of traces of nitrosamines under rigorous laboratory conditions of low pH and high temperature (Table 1), but no nitrosamines were found under conditions that normally occur in the natural environment. S. M. Johnson and T. R. Steinheimer (paper read at the American Chemical Society national meeting, 1984) also found that nitrosamines were not formed with rhodamine WT during simulated and actual field studies. The rate of nitrosamine formation from all three compounds was significantly greater at pH 5.0 than at pH 7.0. However, the most important factor that governed nitrosamine formation was the concentration of nitrite present.

A new nitrosamine derived from GD-174, isolated and identified as *N*-nitrosogeranylethanolamine by S. L. Abidi (paper read at the American Chemical Society national meeting, 1980), was observed in whole-body homogenates of fish treated with GD-174, but only at low concentrations (<0.5 ng/g).

Of the chemicals evaluated, three produced trace concentrations of nitrosamines only when the medium was highly enriched with nitrite-N at more than 100 μg/L. Concentrations of nitrite that were required for the formation of nitrosamines are unlikely to occur in nature because nitrite is unstable in natural water systems and is readily oxidized to nitrate by nitrifying bacteria. Waters with concentrations of nitrite high enough to allow nitrosamine formation would be considered heavily polluted and unacceptable for discharge, culture waters, or potable waters. Also, the conditions of high temperature (90°C) and low pH needed to form nitrosamines are not likely to be present in natural or fish culture water systems. We conclude that the controlled use of the seven fishery chemicals in natural environments will not lead to the formation of nitrosamines.

TABLE 1.—Formation of nitrosamines from reactions of fishery chemicals with nitrite. Reaction conditions were: nitrite : amine ratio, 3; temperature, 90°C; pH, 4.5; reaction preiod, 2 h.

Fishery chemical	Yield (g/mole amine)[a]	Nitrosamine formed
GD-174	18.1	*N*-nitrosogeranylethanolamine
Terramycin	ND	
Erythromycin	ND	
Hyamine 1622	ND	
Hyamine 3500	ND	
Rhodamine B	1.9	Diethylnitrosamine
Rhodamine WT	3.0	Diethylnitrosamine

[a] ND = None detected (limit of detection 0.1 ng/g).

References

Abidi, S. L. 1982. Detection of diethylnitrosamine in nitrite-rich water following treatment with rhodamine flow tracers. Water Research 16:199–204.

Abidi, S. L. 1984. Chromatographic investigations of the configurational and geometrical isomerism of allylic n-terpenyl-n-hydroxyethyl-nitrosamines. Journal of Chromatography 288:277–292.

Crosby, N. T., and R. Sawyer. 1976. Determination of nitrosamines in food products. Residue Reviews 64:77.

Meyers, T. R., and J. D. Hendricks. 1982. A summary of tissue lesions in aquatic animals induced by controlled exposures to environmental contaminants, chemotherapeutic agents, and potential carcinogens. U.S. National Marine Fisheries Service Marine Fisheries Review 44(12):1–17.

Olajos, E. J. 1977. Biological interactions of N-nitroso compounds. Ecotoxicology and Environmental Safety 1:175.

U.S. Environmental Protection Agency. 1977. EPA requires registrants and applicants of pesticide products containing N-nitroso contaminants to submit analyses of that pesticide. Federal Register 42(189): 51640–51641.

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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Los Lobos Renewable Power, LLC (Cyrq Energy/ Lightning Dock Geothermal H1-01, LLC)	Contact: Nick Goodman
Address 136 South Main Street, Salt Lake City, Utah	Telephone No. 801.875.4200
Facility Name Not on a facility, on Geothermal Road	Facility Type Geothermal power exploration location

Surface Owner	Mineral Owner	API No.
Rosette Inc.	Not applicable, not on a location	Not applicable, not on a location

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	West Line	County
	7	25S	19W					Hidalgo

Latitude 32° 08.88' **Longitude** 108° 50.221' N

NATURE OF RELEASE

Type of Release: Chevron RPM 15-40W motor oil	Volume of Release five gallons	Volume Recovered: 4.0 gallons
Source of Release: Five-gallon can of motor oil falling from pickup truck bed onto roadway	Date and Hour of Occurrence 8/6/2012 approximately 1545	Date and Hour of Discovery 8/6/2012 approximately 1545
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	Mr. Carl Chavez and Mr. Randy Dade of NMOCD Environmental Bureau and Mr. Michael Smith of BLM Las Cruces District Office and the New Mexico Environment Department were informed by telephone and or email.	
By David Janney, AMEC, Albuquerque, NM	Date and Hour of Report: August 7, 2012, approximately 1100	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* Cause of problem was a faulty tailgate latch on a Thermasource pickup truck that allowed a five-gallon can of 15-40W motor oil in the bed of a slowly moving pickup truck to fall out and spill onto a gravel roadway.

Describe Area Affected and Cleanup Action Taken.* The affected area of the gravel roadway was approximately 15 square feet. A berm of absorbent material was use to contain the spill and additional absorbent was used to absorb the free oil. Once the oil had been absorbed, the absorbent material and as much of the stained soil beneath it as possible were removed and stockpile on plastic at the LDG 53-7 location pending proper disposal by Thermasource. Approximately ¼ cubic yard of stained soil/gravel was removed and stockpiled on plastic for subsequent disposal by Thermasource, the drilling contractor. Thermasource will contract for proper disposal and supply Los Lobos with documentation of proper disposal.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
Date: 8/16/2012 Phone: 505.821.1801		

Attach Additional Sheets If Necessary

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Surface Owner	Mineral Owner	API No.
Rosette, Inc.	Not applicable, not on a location	Not applicable, not on a location

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	South Line	Feet from the	West Line	County
	7	25S	19W					Hidalgo

Latitude 32° 08.906' **Longitude** 108° 50.284' N

NATURE OF RELEASE

Type of Release: Chevron RPM 15-40W motor oil	Volume of Release five gallons	Volume Recovered: 4.5 gallons
Source of Release: Five-gallon can of motor oil falling from pickup truck bed onto roadway	Date and Hour of Occurrence 8/6/2012 approximately 1545	Date and Hour of Discovery 8/6/2012 approximately 1545
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	Mr. Carl Chavez and Mr. Randy Dade of NMOCD Environmental Bureau and Mr. Michael Smith of BLM Las Cruces District Office and the New Mexico Environment Department were informed by telephone and or email.	
By David Janney, AMEC, Albuquerque, NM	Date and Hour of Report: August 7, 2012, approximately 1100	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

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Describe Area Affected and Cleanup Action Taken.* The affected area of the hard gravel roadway was approximately 15 square feet. A berm of absorbent material was use to contain the spill absorb the free oil. Once the oil had been absorbed, the absorbent material and as much of the stained soil as possible was removed and stockpile on plastic at the LDG 53-7 location pending proper disposal by Thermasource. Approximately 10 gallons of absorbent material was used to absorb this spill. It was removed and placed into a spill material bin pending proper disposal. Thermasource will contract for proper disposal and supply Los Lobos with documentation of proper disposal

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
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Rosette, Inc.	Not applicable, not on a location	Not applicable, not on a location

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Latitude 32° 08.912' **Longitude** 108° 50.111' N

NATURE OF RELEASE

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By David Janney, AMEC, Albuquerque, NM	Date and Hour August 7, 2012, approximately 1100	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

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Signature: David W. Janney	OIL CONSERVATION DIVISION	
Printed Name: David Janney, PG	Approved by Environmental Specialist:	
Title: Agent for Los Lobos Renewable Power, LLC	Approval Date:	Expiration Date:
E-mail Address: david.janney@amec.com	Conditions of Approval:	Attached ☐
Date: 6/16/2012 Phone: 505.821.1801		

Attach Additional Sheets If Necessary

AFFIDAVIT REGARDING
LIGHTNING DOCK GEOTHERMAL PROJECT

I, Nicolas Goodman, a resident of Utah being duly sworn, attest:

1. I am the Chief Executive Officer of Cyrq Energy, Inc. (Cyrq). Cyrq owns the project companies, Lightning Dock Geothermal HI-01, LLC and Los Lobos Renewable Power, LLC, which are developing the Lightning Dock geothermal project.

2. Cyrq is currently finalizing the design for the Lightning Dock geothermal project. Such equipment does not include the water cooling tower that was originally proposed with the project in 2008, or any similar water cooling tower. Cyrq's plans have changed, and the project design now includes an air cooled system which does not use water to cool the plant.

3. At this time, Cyrq does not plan, intend nor expect to construct a water cooling tower for use at the Lightning Dock geothermal project.

4. Cyrq also owns a geothermal power plant in Thermo, Utah. Due to the quality of the geothermal fluids at the Thermo power plant, no anti-scaling, anti-corrosion or other treatment additives are needed, and none are added to the geothermal fluid. The quality of the geothermal fluids at Lightning Dock is similar—if not better—quality than at Thermo. We do not believe that any anti-scaling, anti-corrosion or other treatment additives will be needed at Lightning Dock. We do not anticipate adding anything to the geothermal fluids at Lightning Dock.

Further affiant sayeth naught.

Nicholas Goodman

Nicholas Goodman

STATE OF New Mexico)
ss.)
COUNTY OF Bernalillo)

The foregoing Affidavit was subscribed and sworn to before me by Nicolas Goodman, on this 15 day of January, 2013.

Notary Public

My Commission expires: 8-23-14

OFFICIAL SEAL
CHARLES G. DAVIS
Notary Public
State of New Mexico
My Comm. Expires 8-23-14