SAMPLING AND ANALYSIS PLAN ADDENDUM: WELL VIDEO SURVEYS

PREPARED FOR

2014 Groundwater Investigation
Fremont County, Pavillion, Wyoming
Wyoming Department of Environmental Quality
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OCTOBER 1, 2014

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1. INTRODUCTION

This Sampling and Analysis Plan Addendum (SAP Addendum) describes procedures to be followed by Acton • Mickelson • Environmental, Inc. (AME), during video surveys of water-supply wells.

This SAP Addendum follows submittal of the *Sampling and Analysis Plan, 2014 Groundwater Investigation, Fremont County, Pavillion, Wyoming* (SAP) by AME on June 6, 2014, which described procedures for collection of groundwater samples at private water-supply wells and methods to be utilized by analytical laboratories. The SAP was submitted to the Wyoming Department of Environmental Quality, Water Quality Division, Ground Water Section (WDEQ). The first of two sampling events was completed in June 2014; the second event was completed on August 21, 2014.

2. OBJECTIVES

The objective of the work is to assess the private water-supply wells listed in **Table 1** with regard to the following criteria:

- Depth
- Screened interval
- Material type and condition of the casing and screen
- Presence of scaling, sediment, or bacteria
- Well integrity
- Color and clarity of the water
- Gas intrusion
- Water inflow zones
- Other similar observations that may relate to potential water-quality issues

Note that some information may be unobtainable due to well construction or other factors.

3. BACKGROUND

Pavillion is a town of 231 residents in west-central Wyoming (**Figure 1**), which became the subject of a U.S. Environmental Protection Agency (EPA) groundwater investigation in 2008 when residents contacted the EPA about smells, tastes, and adverse changes in the water quality of their domestic wells.

The EPA conducted sampling from March 2009 to April 2012, including:

- March 2009 (Phase 1): Aqueous samples from 35 domestic and 2 municipal wells

- January 2010 (Phase 2): Groundwater samples from 17 domestic, 4 stock, and 2 municipal wells

  - A filter sample from a reverse osmosis system
  - Surface-water and sediment samples from 5 locations along Five-Mile Creek
  - Gas and produced water/condensate samples from 5 production wells
  - Groundwater samples from 3 shallow monitoring wells
  - Soil samples near the perimeter of 3 known pit locations

- June 2010 (Phase 3): Installation of 2 deep monitoring wells to differentiate potential deep versus shallow sources of groundwater contamination
  - September 2010: Gas samples from the well casings of MW01 and MW02
  - October 2010: Groundwater samples from MW01 and MW02 and 3 domestic wells

- April 2011 (Phase 4): Resampling of MW01, MW02, and 8 domestic and 3 stock/irrigation wells

- April 2012 (Phase 5): EPA sampling of MW-1 and MW-2 and six domestic wells

The EPA released the results of their sampling at a public meeting in November 2011, followed by a draft investigation report in December 2011. The draft report integrated multiple lines of reasoning to formulate an explanation that constituents associated with hydraulic fracturing were at least partially to blame for resident complaints about drinking-water quality.

Questions were subsequently raised about the methodology and interpretation of data in the draft report, leading to U.S. Geological Survey sampling of MW-1 and MW-2 in 2012, multiple extensions of the public comment period on the draft report, and agreement by the EPA in June 2013 to forego finalization of their draft report in favor of further investigation by the State of Wyoming.

4. WATER-SUPPLY WELL VIDEO SURVEYS

4.1 Overview and Schedule

Video surveys will be conducted on selected private water-supply wells, approximately eight (8) wells, during the early fall of 2014. Video surveys will be performed under non-pumping conditions and also under pumping conditions in wells that are equipped with a pump.

Concurrent with the video surveys, AME and WDEQ personnel will interview each well owner regarding the maintenance history, operational issues or events, surface issues that may affect the well, and water quality within the well. The interview will follow a questionnaire developed in advance of the work.

Access to the wells for video surveys has been obtained by WDEQ in advance, using written access agreements.

4.2 Selection of Water-Supply Wells for Video Surveys

On May 21 and 22, 2014, AME personnel completed a reconnaissance of water-supply wells included in the sampling program, and on June 10 through 20 and August 12 through 21, 2014 completed the first and second groundwater sampling events, respectively. Information from the site reconnaissance and subsequent groundwater sampling for each well to be video-surveyed is provided in **Table 1**.

In general, wells were selected for the video survey based on the following characteristics:

- Included in the groundwater sampling set of wells
- Well head is accessible (e.g., not in a pit or covered/obstructed by a permanent structure)
- Equipped with a minimum 1-inch-diameter access port or other larger opening, or,
- Equipped with a bolted sanitary well cap that may be removed for access to the casing without requiring disconnection of piping

Water-supply wells LD02, PGDW05, PGDW20, PGDW23, PGDW41A, PGDW41B, PGDW44, and PGDW49 were selected for video surveys (**Figure 2**). Photographs of water-supply wellhead configurations are provided in Appendix A.

Personnel from WDEQ, AME, and BESST, Inc. (BESST) will conduct further reconnaissance of wells not initially selected for video survey, to assess whether additional wells can be included in the video survey. This further reconnaissance will be conducted during the video survey timeframe.

4.3 Video Surveys

Video surveys will be performed at the water-supply wells listed in **Table 1**. At wells equipped with sanitary well caps, access for the video camera will be assessed once the cap is removed. All equipment and wellheads will be decontaminated prior to the work as described in the attached BESST Work Plan included as Appendix B and in Section 5 below.

Video surveys will be performed by BESST using a GeoVision™ Nano Camera in conjunction with a nano rotating mirror. This video camera system is 0.75 inch in diameter, allowing for surveys of water-supply wells without removing pumps or other equipment from the casing. Obstacles, including but not limited to pumps, wiring, and other pump related equipment, may limit the depth to which the camera system can be lowered in the well. As a result, the depth to which the camera system can be lowered in each well will be determined by WDEQ, in consultation with AME and BESST, in the field based upon observations made prior to or during lowering of the camera system. The goal is to lower the camera system to the target depth, or as deep as possible without endangering the camera system or pump and associated equipment. Video will be performed under non-pumping conditions and also under pumping conditions in wells that are equipped with a pump. Further information on the video surveys is provided in the BESST Work Plan, presented as Appendix B.

5. EQUIPMENT DECONTAMINATION PROCEDURES

Tools and equipment used to remove access port plugs and sanitary well caps will be disinfected prior to use by a solution of sodium hypochlorite. In advance of removing access port plugs or sanitary well caps, they will be cleaned with an Alconox detergent wash and distilled water rinse followed by saturation with a 1 percent solution of sodium hypochlorite. The procedure for decontaminating and disinfecting well heads and tools is included in Appendix C.

The video camera system and cable will be decontaminated and disinfected prior to deployment into and upon removal from boreholes by an Alconox detergent wash and distilled water rinse followed by saturation with a 1 percent solution of sodium hypochlorite (Appendix B).

Two equipment blanks will be obtained for laboratory analysis to check that contaminants are not introduced into the wells from the downhole video equipment. The first equipment blank will be collected prior to conducting the video survey in the first well. The second sample will be collected at a random time during later well video events. The equipment blanks will be analyzed for the list of parameters included as Appendix D. The equipment blanks will be collected by AME personnel as outlined in the BESST Work Plan, presented as Appendix B, and in accordance with procedures in the SAP.

Details of decontamination and disinfection procedures are provided in the BESST Work Plan, presented as Appendix B.

6. REPORTING

Results of the video survey will be provided in *Preliminary Report No. 2 – Downhole Video and Well Owner Interviews*, which will include a written interpretation of well construction and water conditions observed in surveyed wells, and as described in State Engineer's Office data when available, as outlined in the objectives. The report will include a tabular summary of observations in each well by depth. The information will also be included in the Preliminary Final Draft Report. Video electronic files on DVDs or other WDEQ-approved electronic media will be provided with the report.

7. REMARKS

This SAP Addendum represents our professional opinions, which are based in part on client-supplied and currently available information and are arrived at in accordance with accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended. This report was prepared solely for the use of our client. Any reliance on the information contained herein by third parties shall be at such parties' sole risk.

8. REFERENCES

AME. 2014. *Sampling and Analysis Plan, 2014 Groundwater Investigation, Fremont County, Pavillion, Wyoming*. Submitted to the Wyoming Department of Environmental Quality. June 6.

TABLE 1

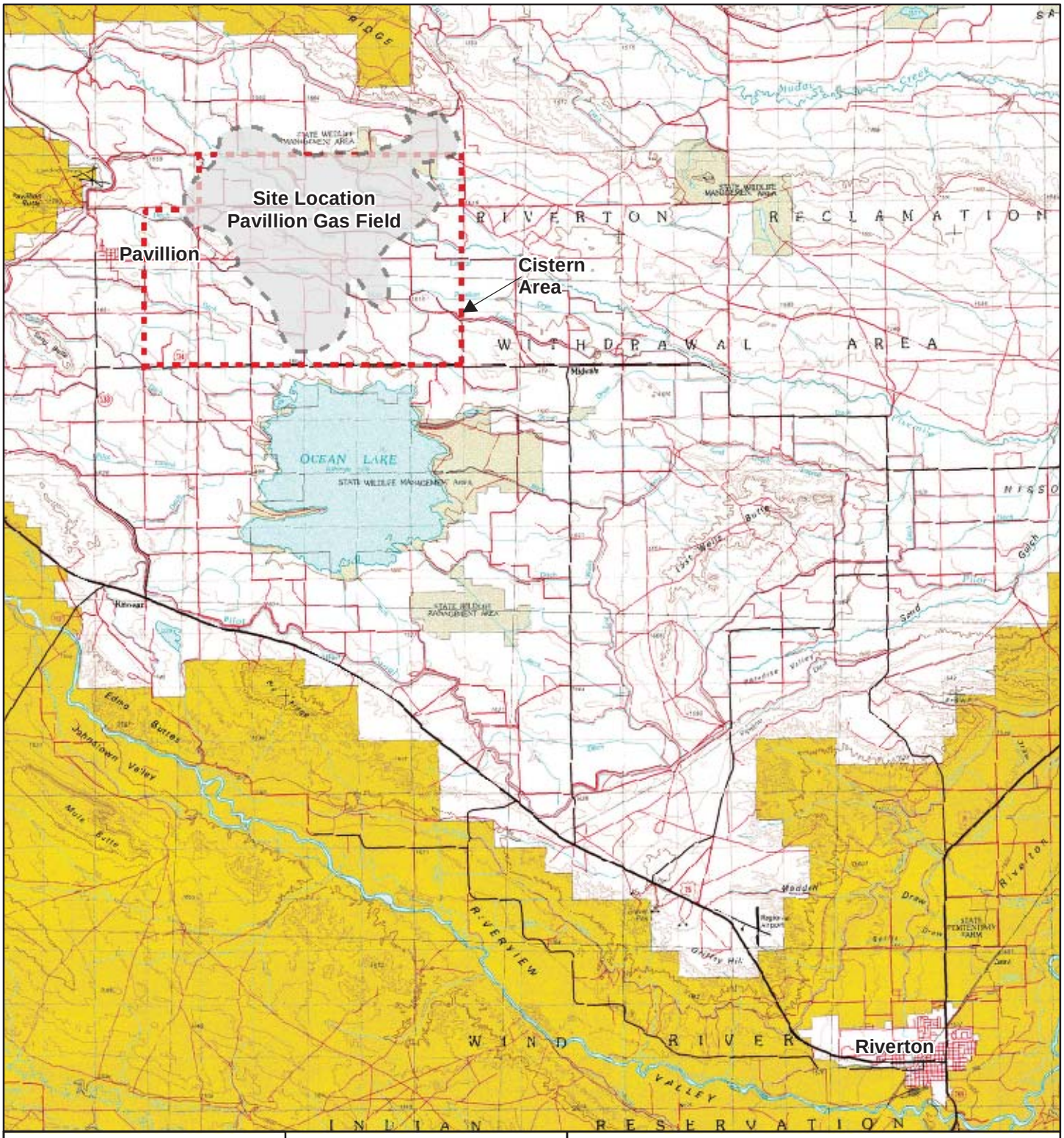
WATER-SUPPLY WELLS SELECTED FOR VIDEO SURVEYS

Well ID	Latitude	Longitude	Original Well Use	Well Status	Well Location and Surrounding Land Use	Total Depth	Casing Diamater	Casing Material	Pump Type	Depth to Water	Measurement Method	Well Head Description	Remarks	Access Port	Video Camera Access
LD02	43.251542	-108.591198	Never used	Not used	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and farming equipment.	610	6	PVC	None	166.1	Acoustic	6-inch PVC casing with 6-inch PVC well cap. No pump in well. No piping from well. Slip cap can be removed.	Well has never been in production because of odor. Well is not plumb which caused EPA downhole sampling pump to become stuck, leading to difficult removal. EPA used bailer to purge. (?)	Y	Yes. Requires removal of PVC slip cap.
PGDW05	43.258851	-108.612630	Domestic supply	In use, low yield	Well is located within lawn adjacent to residence. Adjacent land use surrounding residence is agricultural and livestock use.	210	7	Steel	Submersible	-	-	7-inch diameter metal casing. Pitless adapter with 1-inch pipe. Top of well riser is near ground surface in vault and could be removed for video w/o entering vault. 5-bolt aluminum watertight well cap.	Well is water supply to house. Owner said well has lost production capacity and runs dry. EPA sampled at wellhead by removing well cap and mechanically lifting pump and from faucet in mudroom. Coordinates for sample spigot are offset 10.5 feet to N of spigot.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW20	43.251666	-108.591265	Domestic supply	Not used	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and farming equipment. Cow manure present on ground around well.	380	5	Steel	Submersible	166	Estimated from LD02	5-inch metal casing. Pitless adapter that goes to pump house. 4-bolt ABS watertight well cap. No access port.	Was used as domestic well for residence; however, cistern system was installed at residence (has RO system and pressure tank with booster pumps). Well original TD 410 feet collapsed to 380 feet. Hydrant was EPA sampling point. OWNER HAS TO ADJUST PUMPHOUSE VALVES PRIOR TO OUR SAMPLING. Horse manure in corral. Cistern installed at residence.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW23	43.248660	-108.622587	Domestic supply	In use	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and property is sloped.	475	5	PVC	Submersible	120	Estimated from well log	6-inch PVC casing. Pitless adapter goes to pressure tank under house. Has freezeless yard hydrant within 5-feet of wellhead. Has 4-bolt ABS watertight well cap. There is no access port	Septic is located north of house.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW41A	43.262126	-108.637860	Domestic supply	Stock, irrigation	Well is located near residence. Originally was told there was a single well. Two wells were identified. Open access to well. Adjacent land use surrounding residence is agricultural use and livestock use. Owners had cattle die after drinking well water.	376	6	PVC	Submersible	-		7-foot vault houses pump breakers and pressure tanks from wells 41a and 41b. 6-inch PVC casing. Pitless adapter goes to vault containing breaker, valves, and pressure tanks. Has 4-bolt ABS watertight well cap without access port.	Cistern installed at residence. Owners report cattle died after drinking well water.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW41B	43.262139	-108.637845	Domestic supply	Stock, irrigation	Well is located near residence. Originally was told there was a single well. Two wells were identified. Open access to well. Adjacent land use surrounding residence is agricultural use and livestock use. Owners had cattle die after drinking well water.	70	8	PVC	Submersible	-	-	7-foot vault houses pump breakers and pressure tanks from wells 41a and 41b. 8-inch PVC casing. Pitless adapter goes to vault containing breaker, valves, and pressure tanks. Has 4-bolt ABS watertight well cap without access port.	Cistern installed at residence. Owners report cattle died after drinking well water.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.

TABLE 1

WATER-SUPPLY WELLS SELECTED FOR VIDEO SURVEYS

Well ID	Latitude	Longitude	Original Well Use	Well Status	Well Location and Surrounding Land Use	Total Depth	Casing Diamater	Casing Material	Pump Type	Depth to Water	Measurement Method	Well Head Description	Remarks	Access Port	Video Camera Access
PGDW44	43.250277	-108.626442	Stock, irrigation	In use	Access to well is limited and would require partial removal of wood floor to access wellhead. Adjacent land use surrounding residence is agricultural use and property is sloped.	750	9	Steel	Submersible	278	Acoustic	Well is 9-inch diameter steel casing. Pitless adapter to black plastic piping manifold. No well cap or seal present (need to unscrew wood floor for access to well for open access to well). Pressure tank plumbed on opposite side of plastic manifold and is after sampling location.	Former Shell exploratory well. Hydrant was EPA sampling point. Able to supply drinking water for 750 head of horses during summer per owner.	Y	Yes. Direct access to well.
PGDW49	43.255080	-108.618107	Stock supply	In use	Well is at location of livestock holding pen, and cow manure is present. Adjacent land use surrounding residence is agricultural and livestock use.	50	6	Steel	Submersible	10.1	Acoustic	6-inch metal well casing. No pitless adapter. Cast iron well cap with 3/4-inch access port. Piping above well cap.	Cow manure on ground around well.	Y	Yes. Lift and slide well cap to allow access.



N

0 7,000 14,000

Feet

FIGURE 1

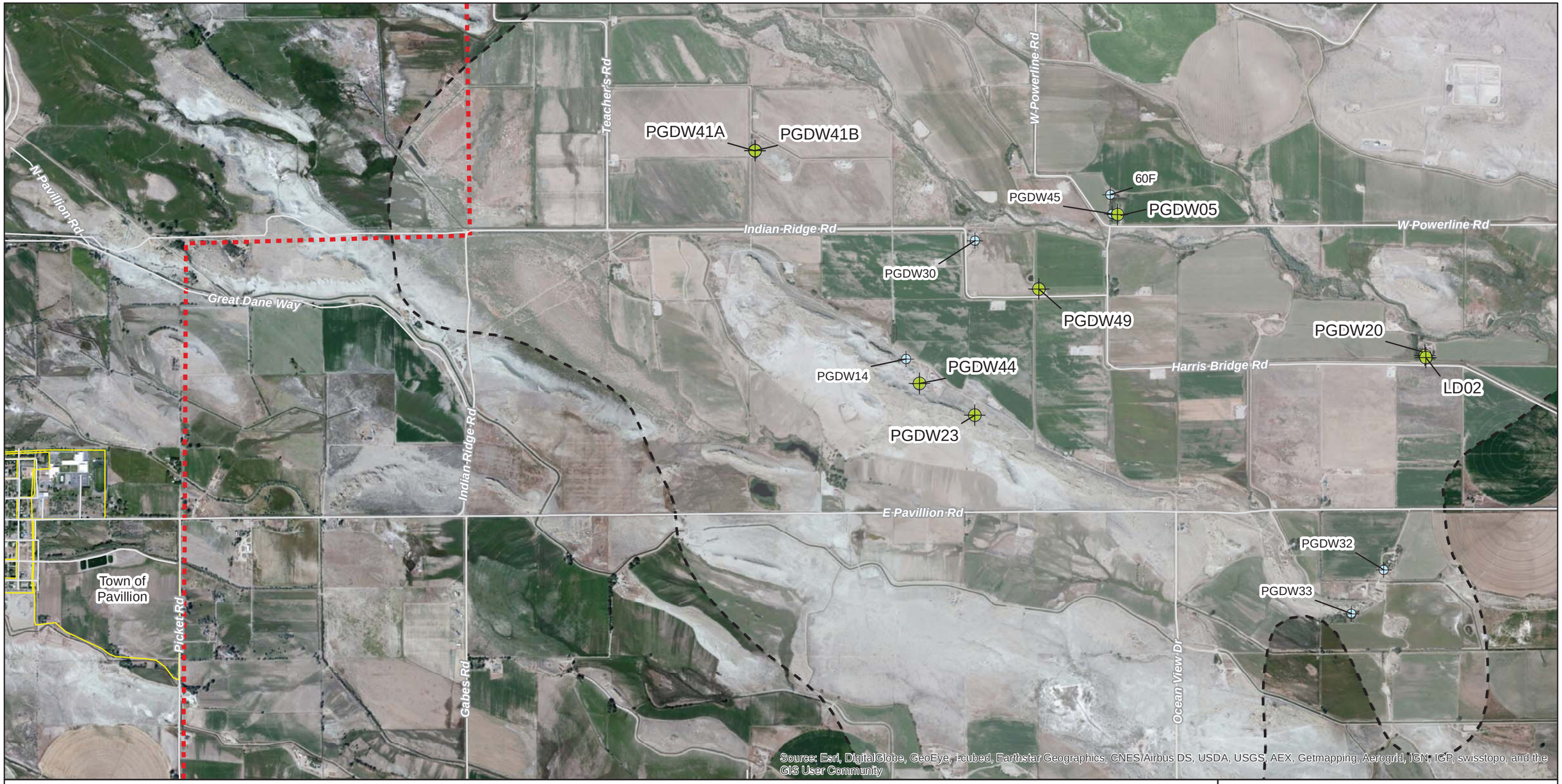
SITE LOCATION

Pavillion 2014 Groundwater Investigation
Freemont County, Wyoming

AME
Engineers and Earth Scientists

1107 Investment Blvd., #290, El Dorado Hills, California 95762 (916) 939-7550

2014-07-09 T:\90081_Pavillion\SAP_ADD\MXD\Fig01_Site_Location_Map.mxd JW



LEGEND

PGDW20 — WATER-SUPPLY WELL LOCATION AND DESIGNATION SELECTED FOR DOWNHOLE VIDEO SURVEY

PGDW32 — WATER-SUPPLY WELL LOCATION AND DESIGNATION NOT INCLUDED IN DOWNHOLE VIDEO SURVEY

MAJOR ROADS AND HIGHWAYS

CISTERN AREA

PAVILLION GAS FIELD

N

0 900 1800

1 in = 1,800 feet

Notes:
1. Water-supply well locations were collected with sub-meter GPS equipment by AME, 2014.
2. All other locations provided by WY DEQ; locations and dimensions are approximate.

FIGURE 2

WATER-SUPPLY WELLS SELECTED FOR DOWNHOLE VIDEO SURVEYS

Pavillion 2014 Groundwater Investigation
Freemont County, Wyoming

AME
Engineers and Earth Scientists

1107 Investment Blvd., #290, El Dorado Hills, California 95762 (916) 939-7550

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APPENDIX A

Photographs of Supply Well Heads

Well LD02

Well PGDW05

Well PGDW20

Well PGDW23

Well PGDW41A

Well PGDW41B

05.22.2014 14:49
Well PGDW44

Well PGDW49

APPENDIX B

BESST, Inc. Work Plan: Pavillion Task 8

BESST INC.
GLOBAL SUBSURFACE TECHNOLOGIES

Work Plan:
Pavillion Task 8
Fall 2014

I. Project Summary

The purpose of this profiling event is to conduct video inspection of approximately eight domestic water wells to document and evaluate well construction and integrity, and provide expert opinion on potential water quality issues due to well construction or other observed conditions.

II. Introduction

BESST Inc. will perform downhole video camera surveys using a ¾ inch GeoVision™ Nano Camera in conjunction with a nano rotating mirror to allow a side scan of the sides of the well.

The video camera surveys will be performed under pumping and non-pumping conditions (when applicable).

In accordance with BESST Inc. Standard Operating Procedures (SOP) and outlined in Section IV: Procedures/Scope of Work, all equipment and materials will be decontaminated and disinfected prior to deployment into borehole and upon removal to prevent bacteriological cross-contamination as well as to inhibit introduction of other constituents of concern.

This SOP establishes a uniform process for disinfecting any equipment that could contaminate a groundwater source. ***Proper cleaning and disinfectant of equipment will eliminate or minimize potential microbial contamination of ground water, well casings, screens and pumps and subsurface gravel packs and strata.*** **Two (2) equipment blanks will be collected as described in Section IV.**

III. Goals/Objectives

At a minimum the following items for each well in this study will be observed and documented through video and subsequent reporting. Any other unusual or notable findings will also be provided and discussed.

- Well depth
- Screened interval
- Well integrity
- Material type
- Casing condition
- Color and clarity of water
- Absence or presence of scaling, sediment, and microbial biofilms
- Gas intrusion
- Groundwater inflow
- Other similar observations that may relate to potential water quality issues

The final report will include field notes, a written interpretation of the well construction and water conditions observed in the well as outlined above, as well as any information related to potential water quality issues and contaminant sources. The report will include a tabular summary of each well on observations by depth.

Video electronic files will be provided on DVDs or other approved media.

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IV. Procedures/Scope of Work

Mobilization and Set-up

BESST staff will arrive in Pavillion at a yet to be determined time, in early fall of 2014.

Well Site Access

BESST Inc. staff will have access to site as described in Appendix A Table 1: Pavillion Well Details provided by AME.

Decontamination and Disinfection Procedure

BESST Inc. staff will take the following steps with use of all equipment that will come in contact with the groundwater well including the video camera and any supporting cables or accessories to prevent contamination. One team member ("decon lead") will be specifically assigned to handle the disinfection and decontamination of the equipment while an additional team member ("video lead") will deploy the equipment.

The team will implement the following procedures prior to conducting the video survey in each water supply well:

1. Ensure that camera/cable system is wrapped in parafilm and stored in the transport case when not in use to prevent contamination.
2. Prevent equipment from contacting the ground or other surfaces through the use of disposal plastic sheeting once removed from its transportation box or case.
3. Ensure all video camera equipment including winch and cables are visibly clean of debris prior to decontamination and disinfection.
4. Prior to deployment downhole, wipe down all tools and equipment with new, clean Scott shop towels soaked with Alconox anionic detergent. A clean, decontaminated tub will be used to clean the camera cable as it is lowered into the well. The tub will be cleaned with Alconox detergent, rinsed with distilled water and disinfected with a solution of 1% sodium hypochlorite prior to being used to clean the camera and cable. The spool and winch will be cleaned and rinsed to the extent practicable with Alconox detergent, triple rinsed with distilled water and disinfected with a 1% sodium hypochlorite solution. The tub will be decontaminated and disinfected in between each use. Alternatively, clean new plastic sheeting may be used to line the tub each time it is used instead of the decon/disinfection procedure.
5. Unwound cable will be pulled through Alconox detergent in the cleaned tub before it enters the well. The tub will be placed between the camera spool and the counting wheel.
6. Triple rinse the camera and unwound cable with distilled water after the cable leaves the soaking tub. The triple rinsing will be performed by spraying the camera and cable with distilled water from a spray bottle. The initial pH and chlorine residual of the distilled water prior to rinsing will be tested as a control.
7. Cleaning validation of Alconox will be performed through pH measurement of rinse water. PH 1-14 test paper litmus strips will be used to confirm no significant change in the pH.
8. Disinfect all equipment including camera and supporting cables prior to deployment downhole with a solution of 1% sodium hypochlorite. The solution will be applied directly to the equipment with a squeeze wash bottle and then swabbed with a new, clean Scott shop towel to ensure maximum coverage.
9. Triple rinse the camera and cable following the disinfection step with distilled water as described in #6.
10. Run the camera and cable into the well using a new, clean shop towel to remove any excess liquid present on the equipment.

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11. During the retrieval process, all equipment including camera and supporting cables will be sprayed via squeeze wash bottle with the 1% sodium hypochlorite solution and swabbed with a new, clean Scott shop towel as a further preventive measure to avoid any contamination.
12. All rinse water produced during this procedure will be captured in a catchment tray and then transferred to a covered 5 gallon container with lid.
13. Chlorine in rinse water will be neutralized through the stepped addition of potassium metabisulfite until chlorine residual is below detection. Neutralization will be validated through chlorine test strips. This step is to prevent any damage to vegetation due to the presence of chlorine.
14. All fluids resulting from decontamination and disinfection procedures will be discharged to the ground surface at a location approved by the well owner after neutralization if applicable.
15. Field staff directly handling equipment will wear new, clean nitrile gloves.

Two equipment blanks will be obtained for laboratory analysis to confirm that contaminants are not introduced into the wells from the downhole video equipment. The first equipment blank will be collected prior to videoing the first well. The second sample will be collected at a random time during later well video events. The equipment blank will be analyzed for the list of parameters included as Appendix D in the SAP Addendum. The equipment blanks will be collected by AME personnel in accordance with procedures in the AME Sampling and Analysis Plan (SAP).

The team will implement the following procedures in advance of collection of each equipment blank:

1. Transfer the camera/cable following the triple rinse described in Step 9 above into a dedicated tub. This tub can be decontaminated and disinfected as described above using organic-free de-ionized water supplied by the contract laboratory, or be lined with new, clean plastic.

2. Conduct a rinse of the camera/cable with a volume of organic-free de-ionized water supplied by the contract laboratory sufficient to allow collection of the samples required for analyses of the parameters specified in Appendix D of the SAP Addendum. The minimum volume required for the analyses specified is estimated at approximately 9 liters.

3. AME personnel will collect an equipment blank from this rinse water using a peristaltic pump with tubing dedicated for each equipment blank.

4. The samples will be collected by AME personnel in accordance with the SAP.

Preparation of Alconox Solution:

A fresh 1% solution (10 grams per liter) will be made by mixing 10 grams of Alconox powdered precision cleaner per liter of distilled water.

Preparation of Sodium Hypochlorite Solution

Using only NSF/ANSI approved “fragrance free” bleach:

- **If using 5% Sodium Hypochlorite (bleach),** blend one (1) part 5% bleach with 4 parts distilled water in a corrosion resistant spray canister.
- **If using 8% Sodium Hypochlorite (bleach),** blend one (1) part 8% bleach with 7 parts of distilled water in a corrosion resistant spray canister.

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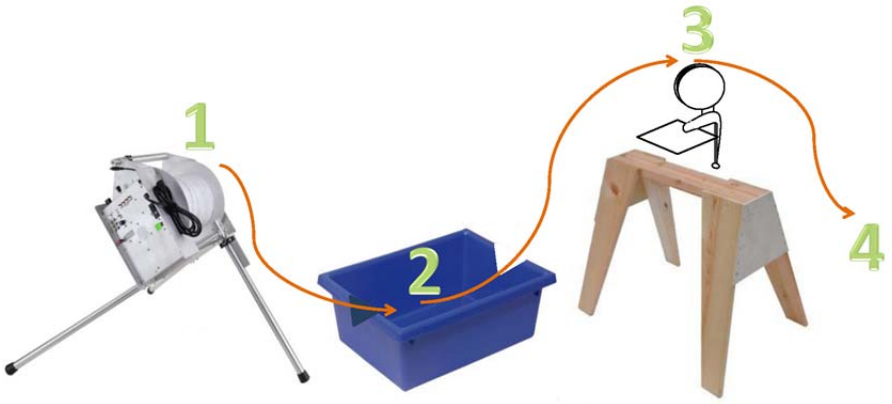
Well Site Equipment Placement Plan

BESST Inc. Staff will set up the clean equipment according to the following placement plan. This plan maximizes the efficiency of decontamination procedures with camera survey operations (see figure below).

1. Set up the camera spool at a distance no greater than 10 ft from the sawhorse and counting wheel. The camera spool connects to the counting wheel with a 13 ft long cable. The video (CD) recorder, power, and viewing screen are connected with cables less than 5 ft long.
2. The soaking tub (see decontamination step 5) will be placed between the counting wheel (3) and the camera spool (1).
3. The camera cable will be pulled through the counting wheel (3) before it enters the well.
4. The clean camera and camera cable are lowered down the well.



Video Camera Survey

BESST Inc. staff will perform approximately eight (8) separate video camera surveys under non-pumping conditions during the video camera descent and under pumping conditions, if a pump is present, during the video camera ascent as described below.

As discussed in Section 4.3 of the SAP Addendum, pumps and other obstructions will be present in the wells. Care must be taken to prevent the camera and other equipment from being stuck in the hole. While the goal is to video as deep as possible in every well, the depth may be limited to obstructions. The onsite WDEQ personnel, in consultation with AME and BESST personnel, will be responsible for making the decision as to how deep it is safe to proceed.

The video logging tool is a downward looking camera with integral light emitting diodes (LEDs) to provide illumination. The video camera survey will be conducted using the GeoVision Nano Camera. This tool is connected to a single triaxial cable containing the video and power conductors. The cable is also used to measure the depth of the camera.

The cable and tool will be raised through the use of a winch supported on a tripod base (see photo below) measuring 24” x 24” x 19”.

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As described in the Goals and Objectives Section, the video lead will document and determine the well construction and current physical state of each well. The following items, at a minimum, for each well in this study will be observed and documented through video:

- Well depth
- Screened interval(s)
- Well integrity
- Material type
- Casing condition
- Color and clarity of water
- Absence or presence of scaling, sediment, and microbial biofilms
- Gas intrusion
- Groundwater inflow if noted
- Other similar observations that may relate to potential water quality issues

Field observations of the site and well conditions will be made and documented in field notes at the time of the video survey. The order of events for camera deployment after decontamination and disinfection with respect to pump operation and water level measurement can be divided into three components as follows:

A: Static Survey

1. Deploy camera unit. See decontamination procedure (pg. 3)
2. Film well to the total depth, or deepest possible depth
3. Film well while pulling camera up to two (2) ft above water level in preparation for next survey component.

B: Draw Down Survey: Static to Pumping Water Level

4. Turn pump on while camera is two (2) feet above water and film/view and time draw down inside well as it proceeds. Follow draw down with camera as water level drops. Make notes during field observation and when complete proceed to the next step.
5. Film the dropping water level. Observe the water surface for gas bubbles. The pump may need to be turned on and off several times for observation process. If this is the case, time how long it takes for draw down to stabilize each time. Note: After draw down to stable pumping water level is determined, immerse camera into water about 1 foot and look for bubbles. Keep the camera in the water when pump is turned off and allow well to recover. Then turn pump back on with

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camera still immersed in the water and look for bubbles. Perform this step as many times as necessary until either bubbles are observed or the video lead is certain no bubbles are present.

C: Dynamic Survey

6. Turn pump off. This is to prevent the camera from being pulled into the pump as it passes by the intake.
7. Lower camera past pump motor (if possible) and then turn pump back on. The distance the camera is lowered past the pump before restart will be determined by the field team on a well by well basis. Wait for draw down to stabilize using the time recorded above in Step 5 to determine when to begin the dynamic survey. This step also identifies the depth of the pump for reference.
8. During the dynamic survey the pump will be turned on and off at points determined by the downhole video lead.
9. Continue to film and lower the camera into the well to the deepest possible depth while pumping. Raise camera while continuing to record to an elevation below the pump intake. This elevation will be determined by the field team on a well by well basis.
10. With camera at the elevation described in Step 9 above, turn pump off to prevent camera from being pulled into the intake and raise camera to an elevation above the pump. This elevation will be determined by the field team on a well by well basis. When the camera is at the determined elevation above the pump, turn pump back on and continue recording as camera is removed from well.
11. Decontaminate camera cable while pulling out of the well. See decontamination procedure (pg. # 4 Step 11)

Refer to the following appendices for detailed health safety and data information on the products and equipment to be used:

- Appendix B: Product Data Sheet: Nano Camera
- Appendix C: Product Data Sheet: Nano Rotating Mirror
- Appendix D: Alconox MSDS, Sodium Hypochlorite MSDS, Potassium Metabisulfite MSDS
- Appendix E: Alconox Technical Bulletin

V. Timetable

	Description of Work	Start and End Dates
Phase One	Mobilize	Mob TBD
Phase Two	Perform access and video camera surveys	Mob date and Mob date plus 5 days
Phase Three	Review video and prepare report	Mob date plus 9 days and Mob date plus 20 days
Phase Four	Internal review; deliver field notes, video electronic files and preliminary findings to AME	Mob date plus 23 days and Mob date plus 27 days
Phase Five	Incorporate comments and deliver final report to AME	Mob date plus 34days

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VI. Key Personnel

BESST Inc. Team

Project Manager/Decon Lead: Debra Cerda dcerda@bessstinc.com (512) 785-6813
Downhole Video Lead: Kim Miles kmiles@besstinc.com (907) 723-0686
Technical Support: Noah Heller nheller@besstinc.om

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TABLE 1

WATER-SUPPLY WELLS SELECTED FOR VIDEO SURVEYS

Well ID	Latitude	Longitude	Original Well Use	Well Status	Well Location and Surrounding Land Use	Total Depth	Casing Diamater	Casing Material	Pump Type	Depth to Water	Measurement Method	Well Head Description	Remarks	Access Port	Video Camera Access
LD02	43.251542	-108.591198	Never used	Not used	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and farming equipment.	610	6	PVC	None	166.1	Acoustic	6-inch PVC casing with 6-inch PVC well cap. No pump in well. No piping from well. Slip cap can be removed.	Well has never been in production because of odor. Well is not plumb which caused EPA downhole sampling pump to become stuck, leading to difficult removal. EPA used bailer to purge. (?)	Y	Yes. Requires removal of PVC slip cap.
PGDW05	43.258851	-108.612630	Domestic supply	In use, low yield	Well is located within lawn adjacent to residence. Adjacent land use surrounding residence is agricultural and livestock use.	210	7	Steel	Submersible	-	-	7-inch diameter metal casing. Pitless adapter with 1-inch pipe. Top of well riser is near ground surface in vault and could be removed for video w/o entering vault. 5-bolt aluminum watertight well cap.	Well is water supply to house. Owner said well has lost production capacity and runs dry. EPA sampled at wellhead by removing well cap and mechanically lifting pump and from faucet in mudroom. Coordinates for sample spigot are offset 10.5 feet to N of spigot.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW20	43.251666	-108.591265	Domestic supply	Not used	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and farming equipment. Cow manure present on ground around well.	380	5	Steel	Submersible	166	Estimated from LD02	5-inch metal casing. Pitless adapter that goes to pump house. 4-bolt ABS watertight well cap. No access port.	Was used as domestic well for residence; however, cistern system was installed at residence (has RO system and pressure tank with booster pumps). Well original TD 410 feet collapsed to 380 feet. Hydrant was EPA sampling point. OWNER HAS TO ADJUST PUMPHOUSE VALVES PRIOR TO OUR SAMPLING. Horse manure in corral. Cistern installed at residence.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW23	43.248660	-108.622587	Domestic supply	In use	Well is located near residence. Open access to well. Adjacent land use surrounding residence is agricultural use and property is sloped.	475	5	PVC	Submersible	120	Estimated from well log	6-inch PVC casing. Pitless adapter goes to pressure tank under house. Has freezeless yard hydrant within 5-feet of wellhead. Has 4-bolt ABS watertight well cap. There is no access port	Septic is located north of house.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW41A	43.262126	-108.637860	Domestic supply	Stock, irrigation	Well is located near residence. Originally was told there was a single well. Two wells were identified. Open access to well. Adjacent land use surrounding residence is agricultural use and livestock use. Owners had cattle die after drinking well water.	376	6	PVC	Submersible	-		7-foot vault houses pump breakers and pressure tanks from wells 41a and 41b. 6-inch PVC casing. Pitless adapter goes to vault containing breaker, valves, and pressure tanks. Has 4-bolt ABS watertight well cap without access port.	Cistern installed at residence. Owners report cattle died after drinking well water.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.
PGDW41B	43.262139	-108.637845	Domestic supply	Stock, irrigation	Well is located near residence. Originally was told there was a single well. Two wells were identified. Open access to well. Adjacent land use surrounding residence is agricultural use and livestock use. Owners had cattle die after drinking well water.	70	8	PVC	Submersible	-	-	7-foot vault houses pump breakers and pressure tanks from wells 41a and 41b. 8-inch PVC casing. Pitless adapter goes to vault containing breaker, valves, and pressure tanks. Has 4-bolt ABS watertight well cap without access port.	Cistern installed at residence. Owners report cattle died after drinking well water.	N	Yes. Requires removal of 4-bolt well cap. The well will require additional accessment once the cap is removed to determine whether conducting the downhole video will be attempted.

TABLE 1

WATER-SUPPLY WELLS SELECTED FOR VIDEO SURVEYS

Well ID	Latitude	Longitude	Original Well Use	Well Status	Well Location and Surrounding Land Use	Total Depth	Casing Diamater	Casing Material	Pump Type	Depth to Water	Measurement Method	Well Head Description	Remarks	Access Port	Video Camera Access
PGDW44	43.250277	-108.626442	Stock, irrigation	In use	Access to well is limited and would require partial removal of wood floor to access wellhead. Adjacent land use surrounding residence is agricultural use and property is sloped.	750	9	Steel	Submersible	278	Acoustic	Well is 9-inch diameter steel casing. Pitless adapter to black plastic piping manifold. No well cap or seal present (need to unscrew wood floor for access to well for open access to well). Pressure tank plumbed on opposite side of plastic manifold and is after sampling location.	Former Shell exploratory well. Hydrant was EPA sampling point. Able to supply drinking water for 750 head of horses during summer per owner.	Y	Yes. Direct access to well.
PGDW49	43.255080	-108.618107	Stock supply	In use	Well is at location of livestock holding pen, and cow manure is present. Adjacent land use surrounding residence is agricultural and livestock use.	50	6	Steel	Submersible	10.1	Acoustic	6-inch metal well casing. No pitless adapter. Cast iron well cap with 3/4-inch access port. Piping above well cap.	Cow manure on ground around well.	Y	Yes. Lift and slide well cap to allow access.

GeoVISION™

Borehole Video Systems

www.AlleghenyInstruments.com
Jeff.Hoffer@AlleghenyInstruments.com
800·255·1353 - 540·468·3740

GeoVISION™ Nano Camera

Video Camera
GS-0010

The GeoVISION™ Nano camera is the smallest diameter production borehole video inspection camera made today. The Nano camera is a mere 3/4 inch (2 cm) in diameter and is designed for use in boreholes as small as one inch (2.5 cm) in diameter and at depths up to 2000 feet (600 meters).

The Nano camera has standard NTSC resolution with an aspect ratio of 4:3. Illumination is provided by six high intensity white LEDs. The Nano camera is rated for use up to 1,000 psi and can be used with Light-Duty, Heavy-Duty and Deluxe winches.

The Nano camera can also be used with the Nano Auto Rotating Mirror to allow a side scan of the bore wall. The Nano Auto Rotating Mirror can be set to rotate continuously or to rotate approximately 20°, pause for a few seconds and then continue rotating. The pause in rotation allows maximum resolution for recording the video image.

Specifications:

Weight	10.1 Ounces (286 g)
Dimensions	10-1/4” long x 3/4” diameter (26 cm x 2 cm)
Standard Lens	2.97 mm
Angle of View (in air)	~130°
Aperture	F2.0
CCD	1/3” Sony Super HAD CCD II
Video Format	NTSC
Aspect Ratio	4:3
Horizontal Resolution	550 Lines
Effective Pixels	768 Horizontal x 494 Vertical
Minimum Illumination	0.05 Lux.
Operating Temperature	-40° F ~ 122° F (-40° C~50° C)
Light Source	6 High Intensity White LEDs
Maximum Depth	2000 Feet Underwater (600 meters)
Maximum Pressure	1000 psi
Current Draw	190 mA
Window Material	Sapphire
Exposure Control	No

Compatibility:

Products	**Notes:**
Winch	
Deluxe	
Heavy-Duty	
Light-Duty	
Cable Length	
325 feet (100 meters)	Deluxe, Heavy-Duty or Light-Duty winch.
650 feet (200 meters)	Deluxe or Heavy-Duty winch.
1,000 feet (300 meters)	Deluxe or Heavy-Duty winch.
1,650 feet (500 meters)	Deluxe winch.
2,000 feet (600 meters)	Deluxe winch.

Accessories:

Additional Lights
Auxiliary Single Light
Auxiliary Fixed Eight Light
Auxiliary Adjustable Eight Light
Camera Mounted Options
Nano Rotating Mirror

GeoVISION™

Borehole Video Systems

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Nano Rotating Mirror

Side looking mirror

GS-0012

The GeoVISION™ Nano Rotating Mirror gives the Nano camera the ability to scan the bore wall. Its extremely small size allows it to work in bores as small as one inch in diameter. The mirror is motor driven and rotates automatically. It can be set to rotate continuously or to rotate 20º, pause for about a second and then rotate again. The pause allows for the best possible video and allows for high quality still images to be made from the video.

The Nano Rotating Mirror runs on two CR2 lithium batteries and is rated for use to depths up to 2,000 feet (600 meters) underwater.

Specifications:

Weight	10 Ounces (280 grams)
Diameter	1.75 inche (4.5 cm)
Length	9.25 inches (24.5 cm)
Maximum Depth	2,000 feet (600 meters)
Operating Voltage	6 VDC
Batteries	2 x CR2 Lithium

Compatibility:

GeoVISION™ Nano Camera

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date: 31.12.2013 **Revision:** 31.12.2013

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: ALCONOX**

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the mixture:** Cleaning material/ Detergent

· **1.3 Details of the supplier of the Safety Data Sheet**
· **Manufacturer/Supplier:**
Alconox, Inc.
30 Glenn St., Suite 309
White Plains, NY 10603
Phone: 914-948-4040
· **Further information obtainable from:** Product Safety Department

· **1.4 Emergency telephone number:**
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**

GHS05 corrosion
Eye Dam. 1; H318: Causes serious eye damage.

GHS07
Skin Irrit. 2; H315: Causes skin irritation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**

Xi; Irritant
R38-41: Irritating to skin. Risk of serious damage to eyes.
· **Information concerning particular hazards for human and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

· **2.2 Label elements**
· **Labelling according to Regulation (EC) No 1272/2008**
The product is classified and labelled according to the CLP regulation.

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· **Hazard pictograms**

GHS05

· **Signal word:** Danger

· **Hazard-determining components of labelling:**
sodium dodecylbenzene sulfonate

· **Hazard statements**
H315: Causes skin irritation.
H318: Causes serious eye damage.

· **Precautionary statements**
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P264: Wash thoroughly after handling.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310: Immediately call a POISON CENTER or doctor/physician.
P321: Specific treatment (see on this label).
P362: Take off contaminated clothing and wash before reuse.
P332+P313: If skin irritation occurs: Get medical advice/attention.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.

· **Hazard description:**

· **WHMIS-symbols:**
D2B - Toxic material causing other toxic effects

· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS Long Term Health Hazard Substances**
None of the ingredients is listed.

· **2.3 Other hazards**

· **Results of PBT and vPvB assessment**

· **PBT:** Not applicable.

· **vPvB:** Not applicable.

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3 Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:**		
CAS: 68081-81-2	sodium dodecylbenzene sulfonate Xn R22; Xi R36 Acute Tox. 4, H302; Eye Irrit. 2, H319	10-25%
CAS: 497-19-8 EINECS: 207-838-8 Index number: 011-005-00-2	Sodium Carbonate Xi R36 Eye Irrit. 2, H319	2,5-10%
CAS: 7722-88-5 EINECS: 231-767-1	tetrasodium pyrophosphate substance with a Community workplace exposure limit	2,5-10%
CAS: 151-21-3 EINECS: 205-788-1	sodium dodecyl sulphate Xn R21/22; Xi R36/38 Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2, H319	2,5-10%

· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.
· **4.2 Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

(Contd. on page 4)

(Contd. of page 3)

· **5.2 Special hazards arising from the substance or mixture:** No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information:** No further relevant information available.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Product forms slippery surface when combined with water.
· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Clean the affected area carefully; suitable cleaners are:
Warm water
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling**
Prevent formation of dust.
Keep receptacles tightly sealed.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Protect from humidity and water.
· **7.3 Specific end use(s):** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
7722-88-5 tetrasodium pyrophosphate	
REL (USA)	5 mg/m³
TLV (USA)	TLV withdrawn
EV (Canada)	5 mg/m³

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· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Respiratory protection:**
Not required under normal conditions of use.
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
· **Material of gloves**
Butyl rubber, BR
Nitrile rubber, NBR
Natural rubber, NR
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses

· **Body protection:** Protective work clothing

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9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Powder
Colour:	White
· **Odour:**	Odourless
· **Odour threshold:**	Not determined.
· **pH-value (10 g/l) at 20 °C:**	9,5 (- NA for Powder form)
· **Change in condition**	
Melting point/Melting range:	Not Determined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Ignition temperature:**	
Decomposition temperature:	Not determined.
· **Self-igniting:**	Product is not self-igniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not applicable.
· **Density at 20 °C:**	1,1 g/cm³
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with water:**	Soluble.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Solvent content:**	
Organic solvents:	0,0 %
Solids content:	100 %
· **9.2 Other information**	No further relevant information available.

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10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **10.3 Possibility of hazardous reactions**
Reacts with acids.
Reacts with strong alkali.
Reacts with strong oxidizing agents.
· **10.4 Conditions to avoid:** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
Carbon monoxide and carbon dioxide
Phosphorus compounds
Sulphur oxides (SOx)

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **On the skin:** Irritant to skin and mucous membranes.
· **On the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Irritant
Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability:** No further relevant information available.
· **12.3 Bioaccumulative potential:** Not worth-mentioning accumulating in organisms
· **12.4 Mobility in soil:** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water.
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.

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· **vPvB:** Not applicable.
· **12.6 Other adverse effects:** No further relevant information available.

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

14 Transport information

· **14.1 UN-Number** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.2 UN proper shipping name** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.3 Transport hazard class(es)** · **DOT, ADR, IMDG, IATA, ICAO** · **Class**	Not Regulated
· **14.4 Packing group** · **DOT, ADR, IMDG, IATA, ICAO**	Not Regulated
· **14.5 Environmental hazards:** · **Marine pollutant:**	No
· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	Not Regulated

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15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.
· **Section 313 (Specific toxic chemical listings):**
None of the ingredients is listed.
· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.
· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.
· **IARC (International Agency for Research on Cancer)**
None of the ingredients is listed.
· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.
· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.
· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

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· **Canada**

· **Canadian Domestic Substances List (DSL)**	
All ingredients are listed.	
· **Canadian Ingredient Disclosure list (limit 0.1%)**	
None of the ingredients is listed.	
· **Canadian Ingredient Disclosure list (limit 1%)**	
497-19-8	Sodium Carbonate
7722-88-5	tetrasodium pyrophosphate
151-21-3	sodium dodecyl sulphate

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Relevant phrases**
H302: Harmful if swallowed.
H312: Harmful in contact with skin.
H315: Causes skin irritation.
H319: Causes serious eye irritation.

R21/22: Harmful in contact with skin and if swallowed.
R22: Harmful if swallowed.
R36: Irritating to eyes.
R36/38: Irritating to eyes and skin.

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road) IMDG: International Maritime Code for Dangerous Goods DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)

ALLIED UNIVERSAL CORPORATION

Headquarters: 3901 NW 115th Avenue, Miami, Florida 33178 Phone: (305) 888 - 2623

MATERIAL SAFETY DATA SHEET

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR § 1910.1200.

TODAY'S DATE: 09/06/07 MSDS NUMBER: 0001

24 HOUR EMERGENCY CHEMICAL SPILL OR RELEASE PHONE NUMBERS:

Allied Universal Corp. *at* ***1-305-483-7732*** *(Digital Beeper) and/or* ***CHEMTREC*** *at* ***1-800-424-9300***

SECTION 1 CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Sodium Hypochlorite

Product Names: Aqua Guard Chlorinating Sanitizer, Aqua Guard Bleach, Liquid Chlorine Solution, Liquid Bleach, Hypochlorite, Hypo and Chlorine Bleach.

Listed Strengths: 10.5%, 12.5% and 15% **CAS Number:** 7681-52-9

Date MSDS Revised: August 2007 (previous revision 11/04)

Product Use: Disinfectant and sanitizer, see product label for all approved uses & instructions.

NSF Approval: Yes. Certified to NSF/ANSI Standard 60. Maximum use in Potable Water is 84 mg/L for 12.5% bleach and 100 mg/L for 10.5% bleach.

NSF Non-Food Compounds Approval: Yes

SECTION 2 HAZARD INGREDIENTS/IDENTITY INFORMATION

Hazardous Ingredient(s): % (w/w) as Sodium Hypochlorite : 10.5-16%

Exposure Standards: None established for Sodium Hypochlorite, as Chlorine exposure standards are:

PEL (OSHA):	1 ppm as Cl_2	**STEL (OSHA):**	3 ppm as Cl_2
TLV (ACGIH):	0.5 ppm as Cl_2	**TWA (ACGIH):**	0.5 ppm as Cl_2
WEEL (AIHA):	2 mg/m3, 15 minute TWA as Cl_2	**STEL (ACGIH):**	1 ppm as Cl_2

Emergency Overview: May cause burns to the eyes, skin and mucous membranes.

SECTION 3 PHYSICAL/CHEMICAL CHARACTERISTICS

Alternate Name(s):	Bleach
Chemical Name:	Sodium Hypochlorite
Chemical Family:	Oxidizing Agent
Molecular Formula:	Na-O-Cl
Form:	Liquid
Appearance:	Water clear to a slight greenish-yellow, or light yellow aqueous solution
Odor:	Chlorine odor
pH:	11-14, dependent upon % weight as Sodium Hypochlorite
Vapor Pressure:	Not available
Vapor Density (Air=1):	Not available
Boiling Point:	Approximately 230º F (110º C)
Freezing Point:	14 F(8% w/w Cl_2 solution), 7 F(10% w/w Cl_2 solution), -3 F (12% w/w Cl_2 solution)
Solubility (Water):	Completely Soluble
Solubility (Other):	Reacts with Many Organic Solvents
Density:	Appx. 10 lbs. per gallon
Evaporation Rate:	Not Available
Specific Gravity:	1.126 (8% w/w Cl_2 solution), 1.163 (10% w/w Cl_2 solution), 1.202 (12% w/w Cl_2 solution), 1.25 (15% w/w Cl_2 solution)
Molecular Weight:	74.5

SECTION 4 STABILITY & REACTIVITY DATA

Chemical Stability	**Stable** __X__	**Unstable** _____

Incompatibility (Conditions to Avoid): Stability decreases with heat and light exposure.

Incompatibility (Materials to Avoid): May react violently with strong acids. Other incompatibles include strong caustics, ammonia, urea, reducing agents, organics, ether and oxidizable materials. Reaction with metals (nickel, iron, cobalt and copper) may produce oxygen gas, which supports combustion. May react with organohalogen compounds to

form spontaneously combustible compounds. May react explosively with nitro- and chloro-organic compounds as well as acids and reducing agents. Acidification liberates chlorine gas.		
Hazardous Decomposition or Byproducts: Chlorine gas. Decomposes with heat and reacts with acids. Hazardous gases/vapors produced are hypochlorous acid, chlorine and hydrochloric acid. Composition depends upon temperature and decrease in pH. Additional decomposition products, which depend on pH, temperature and time, are sodium chloride and chlorate, and oxygen.		
No Mechanical Shock or Impact	**No Static Discharge**	**Oxidizer: No if <12% by weight, Yes if > than 12% by weight**
Hazardous Polymerization	**May Occur _____**	**Will Not Occur __X__**

Note: Sodium Hypochlorite reacts violently with amines and ammonium salts. Solutions are reactive with common cleaning products such as toilet bowl cleaners, rust removers, vinegar, acids, organics and ammonia products to produce hazardous gases such as chlorine and other chlorinated species.

SECTION 5 POTENTIAL HEALTH EFFECTS AND FIRST AID INFORMATION

GENERAL: May cause immediate pain. Exposure to the skin may cause sensitization or other allergic responses. If the eye is not irrigated immediately after it has been exposed permanent eye damage may occur. Strict adherence to first aid measures following any exposure is essential. SPEED IS ESSENTIAL!

ROUTE(S) OF ENTRY AND POTENTIAL HEALTH EFFECTS	***EMERGENCY & FIRST AIDE PROCEDURES***
INHALATION: Strong irritating to mucous membranes in the nose, throat and respiratory tract. Prolonged contact can cause chronic irritation, pulmonary edema and central nervous system depression. Repeated inhalation exposure may cause impairment of lung function and permanent lung damage.	**If inhaled,** move expose person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. If breathing is difficult, have trained person administer oxygen. Call a poison control center or medical physician for further treatment advice. Have the product label or MSDS with you when calling or going for medical treatment.
SKIN CONTACT: Prolonged and repeated exposure to dilute solutions often causes irritation, redness, pain and drying and cracking of the skin. Human evidence has indicated that an ingredient in this product can cause skin sensitization. Depending upon the concentration and how soon after exposure the skin is washed with water, skin contact may cause burns and tissue destruction.	**If on skin or clothing,** take off all contaminated clothing and rinse skin immediately with plenty of water for 15-20 minutes. If irritation persists, repeat flushing. Do not transport victim unless the recommended irrigation period is completed unless flushing can be continued during transport. Call a poison control center or medical physician for treatment advice. Have the product label or MSDS with you when calling or going for medical treatment.
EYE CONTACT: Strongly irritating to eyes. Exposure to vapor can cause tearing, conjunctivitis and burning of the eyes. Eye contact may cause a corneal injury. The severity of the effects depend on the concentration and how soon after exposure the eyes are washed with water. In severe exposure cases, glaucoma, cataracts and permanent blindness may occur.	**If in eyes,** hold eye open and rinse slowly and gently with plenty of water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye for 10-15 minutes. Do not transport victim until the recommended flushing period is completed unless irrigation can be continued during transport. Call a poison control center or medical physician for further treatment advice. Have the product label and/or MSDS with you when calling or going to medical treatment.
INGESTION: Corrosive. Can cause severe corrosion of and damage to the gastrointestinal tract (including mouth, throat, and esophagus). Exposure is characterized by nausea, vomiting, abdominal pain, diarrhea, bleeding, and/or tissue ulceration.	**If swallowed,** call poison control center or medical physician immediately for treatment advice. Have the product label or MSDS with you when calling or going for medical treatment. Have exposed person sip a glass of water if able to swallow, and dilute immediately by giving milk, melted ice cream, starch paste or antacids such as milk of magnesia. Avoid sodium bicarbonate because of carbon dioxide release. DO NOT INDUCE VOMITING, LAVAGE OR ACIDIC ANTIDOTES unless told to do so by poison control center or medical physician. DO NOT give anything by mouth to an unconscious person. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water.

NOTE TO PHYSICIAN(S): Pre-existing medical conditions may be aggravated by exposures affecting target organs. There are no known chronic effects. Probable mucosal damage may contraindicate the use of gastric lavage. In addition to the alkalinity of this product, the continued generation of chlorine gas after ingestion can damage further the stomach mucous, depending on the amount ingested. Consideration may be given to removal of the product from the stomach, taking care to avoid perforation of esophagus or stomach. An ounce of 1% sodium thiosulfate or milk of magnesia is helpful.

SECTION 6 TOXICOLOGICAL DATA

ANIMAL DATA: Inhalation 0.25-hour LC50 - 10.5 mg/L in rats; Acute Dermal LD50 - 10,000 mg/kg in rabbits; Acute Oral LD50 - 8910 mg/kg in rats

SUMMARY: The concentrated solution is corrosive to skin, and a 5% solution is a severe eye irritant. Solutions containing more than 5% available chlorine are classified by DOT corrosive (please see section 10 of this MSDS). Toxicity described in animals from single exposures by ingestion include muscular weakness, and hypoactivity. Repeated ingestion exposure in animals caused an increase in the relative weight of adrenal glands in one study, but no pathological changes were observed in two other studies. Long-term administration of compound in drinking water of rats caused depression of the immune system. No adverse changes were observed in an eight week dermal study of a 1% solution in guinea pigs. Tests in animals demonstrate no carcinogenic activity by either the oral or dermal routes. Tests in bacterial and mammalian cell cultures demonstrate mutagenic activity.

CARCINOGENICITY: None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as carcinogen.

MUTAGENICITY: Sodium Hypochlorite has been shown to produce damage to genetic material when tested in vitro. Studies in vivo have shown no evidence of mutagenic potential for this material. It is judged that the risk of genetic damage is insignificant for sodium hypochlorite because of its biological activity, lack of mutagenicity in vivo, and failure to produce carcinogenic response.

SECTION 7 FIRE AND EXPLOSION HAZARD DATA

Flash Point: This product does not flash	**Flammable Limits (Lower):** Not Applicable	
Flammable Limits (Upper): Not Applicable	**Auto Ignition Temperature:** Not Applicable	
Decomposition Temperature: Not Applicable	**Rate of Burning:** Not Available	
Explosive Power: Not Available	**Sensitivity to Mechanical Impact:** Not expected to be sensitive to mechanical impact	**Sensitivity to Static Discharge:** Not expected to be sensitive to static discharge
Fire and Explosion Hazards: This material is non-flammable but is decomposed by heat and light, causing a pressure build-up which could result in an explosion. When heated, it may release chlorine gas or hydrochloric acid. Vigorous reaction with oxidizable or organic materials may result in fire.	**Extinguishing Media:** Use agents appropriate for surrounding fire. Foam, dry chemical, carbon dioxide, water fog or spray. If leak or spill has not ignited, use water spray to disperse the vapors and to protect persons attempting to stop the leak.	
Fire Fighting Procedures: Water spray should be used to cool containers and may be used to knock down escaping vapor. Remove storage vessels from the fire zone.	**Fire Fighting Protective Equipment:** Full protective clothing, including a NIOSH approved self-contained breathing apparatus, must be worn in a fire involving this material. Toxic gas vapors are produced upon decomposition.	

SECTION 8 ECOLOGICAL INFORMATION

The toxicity and corrosivity of this product is a function of concentration and the concentration's pH.

ECOTOXICOLOGICAL INFORMATION: Toxic to aquatic life. 96-hour LC50: fathead minnows: 0.090-5.9 mg/L, bluegill sunfish: 0.10-2.48 mg/L, shore crab: 1.418 mg/L, grass shrimp: 52.0 mg/L, scud: 0.145-4.0 mg/L, water flea: 2.1 mg/L.

ENVIRONMENTAL EFFECTS: Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers. May be an aesthetic nuisance due to color. Mammals and birds, exposed wildlife would be subject to skin irritation and burns due to the corrosive nature of this material.

SECTION 9 DISPOSAL CONSIDERATIONS

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State, and Local regulations. Do not burn. Do not flush to surface water or sanitary sewer system. If pH of material is equal to or greater than a 12.5, the material is a RCRA Hazardous Waste D002, corrosive.

SECTION 10 TRANSPORT INFORMATION

U.S. DOT Basic Shipping Description: Hypochlorite Solutions, 8, UN1791, III

U.S. DOT Hazardous Substance: Yes, RQ 100 pounds (Sodium Hypochlorite)

U.S. DOT Marine Pollutant: No

U.S. DOT Required Label: Corrosive (see column 6, 49 CFR §172.101)

U.S. DOT Packaging Exception: Yes, if package meets the criteria of a limited quantity or consumer commodity as defined by 49 CFR §171.8, §173.144 and .154, and §172.312 and .316

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Transportation Emergency Phone Numbers: *CHEMTREC 1-800-424-9300*

SECTION 11 PRECAUTIONS FOR SAFE HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Take all precautions to avoid personal contact. Keep container closed except when transferring material. Locate safety shower and eyewash station close to chemical handling area. Use normal good industrial hygiene and housekeeping practices, wash thoroughly after handling. Store in a cool, dry, well-ventilated area, away from incompatibles (minimum distance of 20-25 feet per NFPA Code 1) and direct sunlight. Keep container properly labeled at all times. Vented containers must be used and must be kept closed when not

being used. Long-term storage is impossible without decomposition. Only use containers made from tinted glass, polyethylene & FRP. Keep out of reach of children.

PROCESS HAZARDS: Not Available

STORAGE TEMPERATURE: Store containers below 29°C and above freezing point. Do not expose sealed containers above 40°C. Try to store in the dark at the lowest possible temperature, but keep from freezing, to slow-down decomposition.

SECTION 12 EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Full handling precautions should be taken at all times. Provide good room ventilation plus local exhaust at points of emission and low level floor exhaust in immediate handling area. Where engineering controls are not feasible, use adequate local exhaust ventilation wherever mist, spray or vapor may be generated.

PERSONAL PROTECTIVE EQUIPMENT:

Eye: Use chemical safety goggles when there is potential for contact (splashing), faceshield recommended – ANSI Z87.1

Skin: Gloves and protective clothing (apron, boots, and bodysuits) made from rubber, vinyl, neoprene or PVC. Standard work clothing closed at the neck and wrist while wearing impervious equipment.

Respiratory (*Specify Type*): A NIOSH/MSHA approved air purifying respirator with an acid gas cartridge or canister may be permissible under circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is potential for uncontrolled releases, exposure levels are not known, or other circumstances where air purifying respirators may not provide adequate protection.

Other: Eyewash, shower station (ANSI Z358.1) must be provided within the immediate work area.

SECTION 13 ACCIDENTAL RELEASE MEASURES

Ventilate enclosed area. Collect product for recovery or disposal. For release to land, contain discharge by constructing dikes or applying inert absorbent; for release to water, utilize damming and/or water diversion to reduce the spread of contamination; and, for release to air, vapors may be suppressed by the use of a water fog. All run-off water must be captured for treatment and disposal. Collect contaminated soil and water, and absorbent for disposal. Notify applicable government authority if release is reportable or could adversely affect the environment. Please follow all Local, State and Federal Laws for clean-up and disposal of all contaminated material. **Deactivating Chemicals:** Sodium Sulfite, Sodium Thiosulfate and Sodium Bisulfite.

SECTION 14 REGULATORY INFORMATION

OSHA CLASSIFICATION, 29 CFR §1900-1910:

Physical Hazards: Reactivity **Health Hazards**: Acute - Skin Sensitizer, Corrosive

CERCLA AND SARA REGULATIONS, 40 CFR §300-373:

Reportable Quantity = 100 lb. **CERCLA Hazardous Material:** Yes

Title III Hazard Classifications: Acute - yes, Chronic - no, Fire - yes, Reactivity - yes & Sudden Release of Pressure - No. This product may be reportable under the requirements of 40 CFR §370.

SARA Extremely Hazardous Substance: No **SARA Toxic Chemical:** No **CA Prop 65:** No

FDA 21 CFR 178.1010: Yes, Approved as Sanitizer

NSF Whitebook (former USDA Approval) Listing: Aqua Guard Chlorinating Sanitizer 10.5% - 3D, B1, B2, D1, D2, G4, G7, GX, Q4, **Aqua Guard Bleach 12.5% -** 3D, B1, B2, D1, D2, G4, GX, Q4

EPA "CLEAN AIR ACT": This product does not contain nor is it manufactured with ozone depleting substances. It is not defined as a Hazardous Air Pollutant per 40 CFR 112.

EPA Pesticide: The 10.5% and 12.5% sodium hypochlorite products are registered with the U.S. EPA as a pesticide, as required under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). It is a violation of Federal law to use this product for pesticidal applications in a manner inconsistent with the FIFRA labeling.

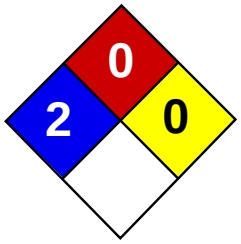
NPCA-HMIS RATING: HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 2

NFPA RATING:NONE AT THIS TIME

SECTION 15 REFERENCES

Suppliers' Material Safety Data Sheets and EPA Labeling Requirements
Olin and OxyChem Sodium Hypochlorite Handbook
Chlorine Institute Sodium Hypochlorite Pamphlet #96
Chlorine Institute Product Stewardship Bulletins for Sodium Hypochlorite

This information contained herein, while not guaranteed, is offered only as a guide to the handling of this specific material and has been prepared in good faith by product knowledgeable personnel. This information is not intended to be all-inclusive as to the manner and conditions of use, handling and storage. Other factors may involve other or additional safety or performance considerations. Though Allied Universal Corporation is happy to respond to questions regarding safe handling of Allied's products, safe handling and use remains the responsibility of the product's consumers and/or customers. No warranty of merchantability or fitness for purpose, or any other kind, express or implied, is made regarding performance, stability or otherwise. Allied Universal Corp. will not be liable for any damages, losses, injuries or consequential damages that may result from the use of or reliance on any information contained herein. No suggestions for use are intended as, and nothing herein shall be construed as a recommendation to infringe any existing patents or violate any federal, state or local laws, rules, regulations or ordinances.



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Potassium metabisulfite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Potassium metabisulfite

Catalog Codes: SLP3214, SLP5026, SLP2203

CAS#: 16731-55-8

RTECS: TT4920000

TSCA: TSCA 8(b) inventory: Potassium metabisulfite

CI#: Not available.

Synonym: Dipotassium pyrosulfite; Dipotassium disulfite; Dipotassium metabisulfite; Potassium disulfite; Pyrosulfurous acid, dipotassium salt

Chemical Name: Potassium Pyrosulfite

Chemical Formula: K2-S2-O5

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Potassium metabisulfite	16731-55-8	100

Toxicological Data on Ingredients: Potassium metabisulfite LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation (lung irritant). Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When heated to decomposition it emits toxic fumes of sulfur oxides and potassium sulfate. It may ignite during milling or grinding (when powdering it).

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline powder. Crystals solid.)

Odor: Sulfurous. Sulffur dioxide odor

Taste: Not available.

Molecular Weight: 222.31 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: Decomposition temperature: 150°C (302°F)

Critical Temperature: Not available.

Specific Gravity: Density: 2.34 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 2.3 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Easily soluble in cold water, hot water. Soluble in acids and alkaline. Insoluble in alcohol

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, air

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Liberates sulfur dioxide in contact with acids. Air sensitive. Moisture sensitive. It oxidizes to in air to sulfate, more readily in presence of moisture.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation (lung irritant). Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects based on animal test data. May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract irritation. May cause asthmatic attacks due to allergic sensitization of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with abdominal pain, nausea, vomiting and diarrhea. May cause allergic/hypersensitivity/ anaphylactoid reaction. Some asthmatics are said to be sensitive to minute amounts of sulfites in foods. It may cause a worsening of asthma in asthmatics. Individuals sensitive to sulfides may experience stomach upset , tightness in the chest, or wheezing. Extremely large concentrations may produce central nervous system, seizures, hypotension, tachycardia, and cardiovascular collapse.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Potassium metabisulfite

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not yet classified under WHMIS (Canada)

DSCL (EEC):
R31- Contact with acids liberates toxic gas. R36/37/38- Irritating to eyes, respiratory system and skin. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:21 PM

Last Updated: 05/21/2013 12:00 PM

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White Plains NY 10603 USA
Tel.914.948.4040
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24 Hour Emergency Number (CHEM-TEL) (800) 255-3924 in U.S.

(e-mail) cleaning@alconox.com

(URL) http://www.alconox.com
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- Concentrated to save you money
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- Penetrating wetting power to save you time
- Replaces corrosive acids and hazardous solvents
- Free rinsing to give you reliable results and no interfering residues
- Use to pass your cleaning validation tests for lab accreditation and plant inspection approval

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDAfor use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDAcertified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-in-place. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

Convenient Sizes:	**Alconox Cat. #**
Case 9 x 4 lb. Boxes	**1104**
25 lb. Carton	**1125**
50 lb. Carton	**1150**
100 lb. Drum	**1101**
300 lb. Drum	**1103**
Case 12 Box 50 x 1/2 oz.	**1112**
1 lb. makes 13 gal. cleaning solution	

Alconox is available from leading laboratory, hospital, clinical and industrial suppliers. To find a distributor for Alconox, Inc. detergents, visit “Find Dealer” at the website. To request FREE samples visit our Sample Request at www.alcnox.com, write or call Alconox, Inc. today.

ALCONOX

Critical-cleaning detergents for laboratory, healthcare and industrial applications

30 Glenn Street
White Plains NY 10603 USA
Tel.914.948.4040
Fax.914.948.4088

24 Hour Emergency Number (CHEM-TEL) (800) 255-3924 in U.S.

(e-mail) cleaning@alconox.com

(URL) http://www.alconox.com
- **distributors**
- **technical information**
- **free samples**
- **new developments**

PHYSICAL DATA	TYPICAL VALUE
pH of 1% solution	9.5
Flash Point (degrees F)None	
Phosphate Content (as Phosphorus)7.3%	
Organic Carbon (% calculated w/w)11%	
Fragrance Content	0%
Surface Tension 1% Sol'n (Dyne/cm)	32
Percent active ingredients	100%

Color: White and cream colored flakes
Form: Powder
Solubility in Water: To 10% (w/w) at ambient temperature
Hard WaterEffectiveness: Highly Effective
Biodegradability: Biodegradable
Foam Tendency: High Foaming
Shelf Life: Two years from the date of manufacture

Chemical Description

Alconox consists primarily of a homogeneous blend of sodium linear alkylaryl sulfonate, alcohol sulfate, phosphates, carbonates. Alconox is anionic in nature.

Cleaning Validation Methods:

Test a parameter of rinse water before and after rinsing the cleaned surface. No significant change in the parameter indicates no detectable residue. Parameters measured include: pH, conductivity, UV, TOC, HPLC, sodium concentration, phosphorus concentration, anionic surfactant concentration using inexpensive detergent water testing kits, surface tension, and surface analysis. Pharmaceutical Cleaning Validation references are available in the tech info section of www.alconox.com.

Health Safety Information:

OSHAHazardous Ingredients: None
RCRAHazard Class: Non-hazardous
Flammability: Non-flammable
Latex Content: None in detergent, packaging materials or adhesives.
Oral Toxicity: LD_{50} > 5000 mg/kg oral rat
No ingredient defined as an oral toxicant by OSHA
Eye Irritation: Mild to Moderate eye irritant if not rinsed
Inhalation Toxicity: Non-irritating solution, powder a potential irritant
VOC Content: 0%
Carcinogenicity:
NTP = No **IARC** = No **OSHA** = No
All ingredients in Alconox are listed in TSCAinventory.USDANSF cat A1

Precautions:

No special precautions other than good industrial hygiene and safety practices employed with any industrial chemical (see Directions). AMaterial Safety Data Sheet is available at www.alconox.com or by calling fax-on-demand at 914-948-4040 and following the prompts. Use fax document # 0311.

Contact Alconox, Inc. for purchase specifications. Typical data is not a specification.

While the information in this report should not be considered to be a product warranty, we urge you to investigate, test and verify the suitability of Alconox detergents for your specific application. We, of course, can not give permission to use, or recommend the use of, our detergents where they infringe patents. No representation or warranty is made as to the safety of products or materials mentioned under the Federal Food Additives Amendment of 1958.

MS 02.10.01.00.06.1©2006 Alconox, Inc.

APPENDIX C

Standard Operating Procedures

STANDARD OPERATING PROCEDURE

GROUNDWATER LEVEL MEASUREMENT, ACOUSTIC METER

1. Scope and Application

This is a technical procedure for measuring groundwater levels with an acoustic water level meter. This method is applicable where downhole equipment such as pumps, pump cables, and discharge lines are present in the well, and the well is not equipped with a sounding tube. This method is also appropriate where the depth to water in a well is greater than the length of readily available electronic water level meters.

To use this method, the well must be fitted with an access port at least 5/8 inches in diameter in an accessible location. If torque arrestors, wire shields, or other equipment are present that cover more than half the area of the casing, erroneous readings may result.

In monitoring wells without downhole equipment, use of an electronic water level meter is recommended.

2. Equipment

2.1 Acoustic water level meter

2.2 Optional cap for water level meter for open casings

2.3 Wrench or other tools to open access port

2.4 Disposable nitrile gloves

2.5 Detergent/water mix in a spray bottle, distilled water in a spray bottle, and disposable paper towels

3. Procedure

3.1 Review the Job Safety Analysis for this task.

3.2 Inspect and Open Access Port on the Well Head

- Don disposable gloves
- Inspect well completion (including sanitary seal) and note condition on field form
- Remove fluid and debris before opening the access port
- Note damage or debris/ fluid on field form

3.3 Collect Depth to Groundwater Measurement

- Depending on the meter, turn it on and set the temperature to match the approximate air temperature in the well casing. Refer to maps and tables supplied in the meter manual.
- Insert the measuring duct (sound wave guide) of the meter into the access port, so that the duct extends through the seal.
- Momentarily press power button and record the reading.
- In an uncased well, add the cap to the measuring duct to close off the open top of the casing.

3.4 Close Access Port

- Replace the cap on the access port and verify it is secure.

3.5 Decontaminate Meter

- Spray the probe and the section of tape that was submerged with the detergent/water mix, and rinse using the spray bottle with water.
- Use paper towels along with detergent/water mix to remove LPH or grease if present, and rinse.

4. References

AME. 2013. JSA Groundwater Level Measurements

U.S. Geological Survey. 2006. *Collection of water samples (ver. 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A4*, September 2006, accessed January 16, 2014, at http://pubs.water.usgs.gov/twri9A4/

STANDARD OPERATING PROCEDURE

GROUNDWATER LEVEL AND APPARENT LIQUID PHASE HYDROCARBON THICKNESS MEASUREMENT

1. Scope and Application

This is a technical procedure for measuring groundwater levels and apparent liquid phase hydrocarbons (LPH) thickness. For sites where LPH may be present, the static water level and apparent LPH thickness in each well will be measured with an electronic interface probe prior to purging or sampling.

Where downhole equipment such as pumps, pump cables, and discharge lines are present in the well, and the well is not equipped with a sounding tube, use of an acoustic water level meter is strongly recommended (see separate SOP). Also, if level meter with a tape is used in a water-supply well, additional equipment disinfection procedures are required.

2. Equipment

2.1 Conductance probe level meter with tape marked on 0.01 foot increments

2.2 Electronic interface meter (where LPH may be present) with tape marked on 0.01 foot increments

2.3 Socket wrenches or other tools to access well

2.4 Pry bar for well lid

2.5 Key to unlock the padlock on the well head

2.6 Disposable neoprene gloves

2.7 Detergent/water mix in a spray bottle, distilled water in a spray bottle, and disposable paper towels

2.8 Disposable clear plastic bailer (where LPH may be present) and cord

3. Procedure

3.1 Review the Job Safety Analysis for this task.

3.2 Inspect and Clean up Well Head

- Don disposable gloves
- Inspect well completion (including well box lid and bolts for traffic boxes) and note condition on field form
- Open well box lid

- Inspect well box for damage and presence of debris and fluid
- Remove fluid and debris before unlocking and removing well cap
- Note damage or debris/ fluid on field form

3.2 Collect Depth to Groundwater and LPH Measurements

- Turn on the meter and check the meter for proper functioning by pressing the test button.
- Locate the reference point on the casing, which may be marked with a notch. If no reference point is visible, measure from the north side of the casing.
- Slowly lower the tape of the interface probe until a tone is emitted. Prevent the probe tip from contacted the ground or the interior of the well box.
- If the first encountered substance is LPH, lower the tape until the tone corresponding to water is emitted.
- At this point, the mark on the tape opposite the permanent reference point on the top of the well casing will be read to the nearest 0.01 foot.
- Repeat the measurement by slowly raising and lowering the tape. Measurements should agree within 0.01 to 0.02 foot. If not repeat a third time.
- Record the reading to the nearest 0.01 foot as depth to water.
- Slowly raise the tape until the tone for LPH ceases, which is the top of the LPH.
- Repeat the measurement by slowly raising and lowering the tape. Measurements should agree within 0.01 to 0.02 foot. If not repeat a third time.
- Record this reading to the nearest 0.01 foot as depth to LPH.

3.3 Collect LPH Sample (if applicable)

- Gently lower the bailer approximately one-half the bailer length past the air/LPH interface.
- Retrieve the bailer.
- Note the appearance (color, opacity, "freshness") of the LPH on field notes.

3.4 Collect Depth to Groundwater Measurement

- Locate the reference point on the casing, which may be marked with a notch. If no reference point is visible, measure from the north side of the casing.
- Slowly lower the tape of the conductance probe until a tone is emitted (typically a steady tone).

- At this point, the mark on the tape opposite the permanent reference point on the top of the well casing will be read to the nearest 0.01 foot.
- Repeat the measurement by slowly raising and lowering the tape. Measurements should agree within 0.01 to 0.02 foot. If not repeat a third time.
- Record this reading to the nearest 0.01 foot as depth to water.

3.5 Close Well Head

- Replace well cap securely and replace lock.
- Replace well box and verify that bolts are secure.

3.6 Decontaminate Meter

- Spray the probe and the section of tape that was submerged with the detergent/water mix, and rinse using the spray bottle with water.
- Use paper towels along with detergent/water mix to remove LPH or grease if present, and rinse.

4. References

AME. 2013. JSA Groundwater Level Measurements

ASTM. 2007. Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well). D 4750.

U.S. Geological Survey. 2006. *Collection of water samples (ver. 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A4*, September 2006, accessed January 16, 2014, at http://pubs.water.usgs.gov/twri9A4/

STANDARD OPERATING PROCEDURE

DISINFECTION OF WATER-SUPPLY WELL HEAD

1. Scope and Application

This is a procedure for disinfecting water-supply well heads (e.g. sanitary well caps, sanitary well seals equipped with access ports) and associated hand tools used to open the well head prior to performing work inside the casing. Work inside the casing may include visual inspection of the well casing from an opened well head, downhole video surveys, or removing or replacing pumps. The objective of this procedure is to prevent the introduction of microorganisms into the well casing.

Any equipment introduced into the well casing must also be disinfected. Those procedures are provided in a separate Standard Operating Procedure (SOP).

For groundwater level measurements in a water-supply well, use of an acoustic water level meter is recommended to limit the introduction of items into the well casing (see separate SOP). If a level meter with a tape is used in a water-supply well, equipment disinfection is required.

2. Equipment

2.1 Clean distilled water, conveyed in a 5-gallon container if treated distilled water is not available on site

2.2 Non-phosphate detergent (e.g. Alconox™ Liquinox™)

2.3 Sodium hypochlorite solution, non-scented household bleach. Most household bleach is 5 to 7 % sodium hypochlorite (50,000 to 70,000 ppm). Use bleach that has not been opened more than 60 days.

2.4 Stiff bristle brush or whisk broom

2.5 Bucket and brush for detergent solution wash

2.6 Garden pump sprayer, minimum 2 gallon, or bucket and brush for rinse

2.7 Spray bottle for bleach solution: hand sprayer generally adequate for well heads less than approximately 1 foot diameter, otherwise garden pump sprayer recommended

2.8 Disposable neoprene gloves

2.9 Clean rags and/or paper towels

2.10 New plastic bag or dedicated container for disinfected tools

2.11 New 6-by-6-foot plastic sheeting to use as drop cloth around well head base

3. Procedure

3.1 Review the Job Safety Analysis for this task.

3.2 Prepare Cleaning Solutions in Advance

- Don disposable gloves
- Mix the liquid detergent with clean distilled water
- Prepare a fresh 1% bleach solution for use on the well head. Add 1 part bleach to 4 parts distilled water if using 5% household bleach, or add 1 part bleach to 6 parts distilled water if using 7% household bleach.
- Prepare a fresh 50 ppm (0.05 %) bleach solution for decontamination of tools in advance (optional). Add 1 milliliter (mL) of bleach for each 1 liter of distilled water. (The 50 ppm bleach solution is optional for the tool contamination; it is less caustic but requires 30-minute contact time.)

3.2 Disinfect Tools

- Don disposable gloves.
- Remove visible dirt and grease with a clean rag or paper towels.
- Wash the tools in the detergent solution using a brush. Also wash the dedicated tool container if it is re-used.
- Rinse the tools (and tool container if re-used) in distilled water.
- Spray the tools (and tool container if re-used) with the bleach solution. If the 50 ppm bleach solution is used, maintain contact for 30 minutes.

3.3 Disinfect the Well Head

- Don disposable gloves
- Install 6-by-6-foot plastic sheeting over well head and onto ground around base of well as a drop cloth to contain dirt, debris, and overspray of cleaning solutions while cleaning and disinfecting and to provide dust protection around well head.
- Remove visible dirt and debris from the well head with the bristle brush or whisk broom. Remove visible grease with a clean rag or paper towels.
- Don new disposable gloves
- Wash the well head with the detergent solution using a brush.
- Rinse the well head with distilled water by swabbing with a brush or using a sprayer.

- Spray the well head with the 1% bleach solution. Avoid overspray on nearby landscaping plants.

4. References

ASTM. 2002. Standard Practices for Decontamination of Field Equipment Used at Waste Sites. D 5088.

Myers, Donna N. et al.., 2014, *Fecal Indicator Bacteria: U.S. Geological Survey Techniques of Water-Resources Investigations,* book 9, chap. A7, section 7.1, May 2014, Version 2.1, accessed May 28, 2014, at http://water.usgs.gov/owq/FieldManual/Chapter7/7.1.html

APPENDIX D

Equipment Blank Analyte List

APPENDIX D

EQUIPMENT BLANK ANALYTE LIST

Group	Analysis	Method
General chemistry	Oil and grease, petroleum (non-polar)	EPA1664A
Microorganisms	E. Coli	SM 9223B
Microorganisms	Total coliform	SM 9223B
Microorganisms	Iron reducing bacteria	BART™ Bioreactor
Microorganisms	Sulfate reducing bacteria	BART™ Bioreactor
Semivolatile organics	Acrylamide	SW846 8316
Semivolatile organics	Diesel range organics, with and without SGCU	SW846 8015D
Semivolatile organics	Nitrogen- and phosporus-containing pesticides	EPA 507
Semivolatile organics	Organochlorine pesticides	EPA 8081
Semivolatile organics	Organophosphorus compounds	EPA 8141B
Semivolatile organics	Semivolatile organic compounds	SW846 8270C
Volatile organics	Gasoline range organics	SW846 8015D
Volatile organics	Volatile organic acids: acetate, butyrate, lactate, propionate, pyruvate	HPLC Microbac 830-MBA
Volatile organics	Volatile organic compounds	SW846 8260B w/ 5035 prep