LLNL Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 2.1: Pre-sample Purging of Wells—Revision: 6

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1.0 PURPOSE

The purpose of this SOP is to identify well purging (evacuation) procedures that will ensure enough stagnant water in the well is replaced by ground water so a representative sample of the aquifer can be collected. In some situations, it may be possible to obtain a representative sample from the aquifer without prior purging.

2.0 APPLICABILITY

This SOP procedure provides guidelines for field personnel to purge wells adequately and appropriately by using sampling devices, such as a bailer, bladder pump, electric submersible pump, or a specific-depth grab sampling device prior to sample collection.

3.0 REFERENCES

3.1 Barcelona, M. J., J. P. Gibb, J. A. Helfrich, and E. E. Garske (1985), *Practical Guide to Ground Water Sampling*, U.S. Government Printing Office, Washington, D.C. (EPA/600/2-85/104).

3.2 Korte, N. and P. Kearl (1984), *Procedures For The Collection and Preservation of Ground Water and Surface Water Samples and for the Installation of Monitoring Wells*, U.S. Department of Energy, Grand Junction, Colo.

3.3 Morrison, R. D. (1983), *Ground Water Monitoring Technology, Procedures, Equipment and Applications*, TIMCO Manufacturing, Inc., 85-90.

3.4 Morse, S. I. (1997), San Francisco Bay Regional Water Quality Control Board, Toxics Cleanup Division; letter to Interested Parties. Subject: *Utilization of Non-Purge Approach for Sampling of Monitoring Wells Impacted by Petroleum Hydrocarbons, BTEX, and MTBE,* File: 1123.64, January 31, 1997.

3.5 Robbins, G. A., and J. M. Martin-Hayden (1991), Mass Balance Evaluation of Monitoring Well Purging: Part 1. Theoretical Models and Implications for Representative Sampling," *J. Contam. Hydrol.* 8, 203–224.

3.6 Schilling K. E. (1995), Low-Flow Purging Reduces Management of Contaminated Groundwater, *Environmental Protection*, December 1995.

3.7 U.S. EPA (1992), *RCRA Ground-Water Monitoring: Draft Technical Guidance*, Washington, D.C. (EPA/530-R-93-001).

3.8 U.S. EPA (1995), Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, *Ground Water Issue*, EPA/540/S-95/504.

3.9 U.S. EPA (1995), Use of Low-Flow Methods for Ground Water Purging and Sampling: An Overview, *Quick Reference Advisory* (December 1995).

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel are responsible for the safe completion of evacuation and collection of purge water, when necessary from monitor wells according to guidelines set forth by this procedure, as well as other associated SOPs. The wells to be purged on a frequent basis are declared in the quarterly Sampling Plan provided by the Sampling Coordinator (SC).

5.3 Field Support Personnel

The field support personnel are responsible for providing necessary equipment, collection devices, and general field support, which enables sampling personnel to perform field activities in a timely and efficient manner.

5.4 Sampling Coordinator (SC)

The SC's responsibility is to supply a quarterly Sampling Plan. In addition to providing a quarterly Sampling Plan, the SC may provide a specific sample plan for each day (Daily Operations Guide [DOG], Attachment A). The technical information required for purging wells may also be provided by the SC in the Well Specification Table, Technical Information Spreadsheet or as part of electronically generated Ground Water Sampling Data Sheets.

5.5 Subproject Leader (SL)

The SL is responsible for the overall investigation, planning, and assessment and remediation within a study or treatment facility area.

6.0 PROCEDURE

6.1 Procedure Exception

Tritium is considered a conservative contaminant (i.e., it will not volatilize [fractionate] or change activity appreciably upon contact with the atmosphere) therefore, pre-sample purging is not necessary. SOP 2.9, "Sampling for Tritium in Ground Water," discusses tritium sampling in more detail. Also, pre-sample purging of low-yielding monitor wells is covered under SOP 2.7, "Pre-sample Purging and Sampling of Low-Yielding Monitor Wells."

6.2 Dedicated Sampling Devices

6.2.1 In some cases, monitor wells are not equipped with a dedicated sampling device. If the well is not fitted with a dedicated sampling device, the procedure and/or temporary equipment required for well evacuation is determined by the SC and appropriate personnel.

6.2.2 Frequently sampled monitor wells have dedicated sampling pumps and associated equipment necessary to purge and sample the well. Discharge and sampling Ts are dedicated and are stored inside the steel protective casing. At Site 300, control boxes for electric submersible pumps up to 1.5 horsepower (hp) are also dedicated and are locked inside the protective casing. At Livermore Site, portable control boxes are to be used on all pumps. In wells where a specific-depth grab sampling device is used, the dedicated equipment (due to its compact nature) may be stored either in the locked stovepipe or at a remote location. Installation of dedicated pumps is described in SOP 2.8, "Installation of Dedicated Sampling Pumps."

6.3 Preparation

6.3.1 Prior to commencement of field activities, perform preparation activities described in SOP 4.1, "General Instructions for Field Personnel." Personnel shall meet all training requirements, review the appropriate Site Safety Plan (SSP), and

all applicable SOPs, Operational Safety Procedures (OSPs), and Integration Work Sheets (IWSs) prior to performing work. Current copies of all relevant documents shall be retained by the field personnel.

6.3.2 Review all pertinent sampling information, such as the quarterly Sampling Plan, Well Specification Table, Technical Information Spreadsheet, and electronically generated Ground Water Sampling Data Sheets (if applicable) provided by the SC. The plan contains the following information:

- Locations to be sampled.
- Proposed sampling methods (See Attachment B, Methodology Sampling Codes).
- Requested analyses.
- Contract analytical laboratory (CAL) to which samples are to be sent for analyses.
- Estimated amount of purge water to be collected.
- Current technical information for each well.

6.3.3 Obtain appropriate data collection forms i.e., Chain-of-Custody (CoC) forms, Ground Water Sampling Data Sheets (Attachment C, C-1, C-2, C-3), assigned Document Control Logbook, labels, and any necessary shipping forms. Instructions for completing the logbook entries and field forms are provided in SOP 4.2, "Sample Control and Documentation. Consult with the SC for the appropriate pre-sample purging method to apply to the site if it is not indicated on the sampling plan.

6.3.4 Contaminant information is provided in the quarterly Sampling Plan or by the SC and should be reviewed prior to sampling. At Livermore Site, the SC checks the most recent analytical results prior to providing guidance to sampling personnel as part of the DOG (Attachment A). The SC will also provide contaminant information for newly completed installations that may not appear on the plan.

6.3.5 Obtain appropriate materials to conduct field work according to Attachment D, Equipment Checklist.

6.3.6 The number and type of sample containers needed for the sampling event should be obtained from the sample bottle inventory. The appropriate personnel should keep a sufficient stock of sample containers on hand. Field personnel should also maintain an inventory of supplies (i.e., disposable 0.45□ fiber filters, trip blanks, field blank water (ordered from the CAL), plastic bags, etc.), to ensure adequate sampling supplies are available at all times.

6.4 Purge Water Collection

At Site 300, the field support personnel must ensure that wells have sufficient collection drums available at the well head for purge water containment (SOP 4.7B, "Site 300 Treatment and Disposal of Well Development and Well Purge Fluids"). The quantity of purge water to be collected for each well is listed in the quarterly Sampling Plan or calculated by the SC for newly installed monitor wells.

The Livermore Site field personnel will tow a collection tanker with the sampling vehicle and when necessary, the SC may provide a specific order of wells to be sampled. Tankers and drums filled with purge water may not be left at the well location and will be logged and disposed of daily, when possible according to SOP 4.7A, "Livermore Site Treatment and Disposal of Well Development and Well Purge Fluids."

6.5 Operation

6.5.1 A Well Entry Logbook is kept in each well. Whenever a well is entered for any reason, record the date, the purpose, name of the operator, and any water level obtained in the logbook. Replace the logbook in the well when operations are complete. A logbook should be replaced when damaged. The damaged logbook should be given to the Data Management Team (DMT) for archival.

6.5.2 Calculate and record the amount of water in the well (casing volume) as described in steps A through E (see Attachment C, "Ground Water Sampling Data Sheets"):

A. Record the well ID, date, and Document Control Logbook number on the appropriate Ground Water Sampling Data Sheet.

B. Unlock the steel protective casing and obtain depth to water (in tenths of feet) in the well. Record this information on the appropriate Ground Water Sampling Data Sheet and the Well Entry Logbook as discussed previously.

C. Subtract the depth to water from the depth of casing (in tenths of feet). Refer to the Technical Information Spreadsheet provided by the Livermore Site SC for the depth of casing. Make sure both measurements are referenced to the same point of measurement (POM). Record this result as water in casing (feet) on the appropriate Ground Water Sampling Data Sheet. Note: All well specification data are provided on the electronically generated Ground Water Sampling Data Sheets when performing quarterly sampling at Site 300.

D. The casing diameter for each well can be found in the Well Specification Table and/or the Technical Information Spreadsheet or the electronically generated Ground Water Sampling Data Sheets maintained by the SCs. The casing diameter should be recorded on the appropriate Ground Water Sampling Data Sheet.

Casing/Discharge line Diameter	Volume Factor
1.0 in.	0.041
1.5 in.	0.092
2 in.	0.163
3 in.	0.37
3.5 in.	0.50
4 in.	0.65
4.25 in.	0.74
4.5 in.	0.83
5 in.	1.00
6 in.	1.47
8 in.	2.61
10 in.	4.08

Note: For a discharge-line diameter not listed, consult the SC.

E. Multiply the feet of water in casing by the volume factor for each casing diameter. The result represents the amount of water in a single casing volume and should be recorded as Gallons/Casing Vol. on the appropriate Ground Water Sampling Data Sheet.

F. When conducting low-volume sampling assume that the discharge line is filled with water. Use the casing depth and multiply by the appropriate volume factor to determine the amount of purge water to evacuate.

6.5.3 Field parameter measurements (pH, specific conductance, and temperature) are collected at specific intervals during the purging of a monitor well or at sample collection time based on the sampling methodology being used (See Attachment B, Methodology Sampling Codes).

A. 3-volume sampling event: field parameter measurements (pH, specific conductance, and temperature) recorded at the end of each casing volume.

B. 90% of one casing volume: 90% of one volume divided by three equal measurements.

C. Low volume: If purging a maximum of 2 to 3 discharge lines prior to sampling, field parameter measurements should be collected at sample collection time, when possible.

D. Specific-Depth Grab Samples: Consult the SC and Hydrogeologist for purging requirements. Field parameter measurements should be collected at sample collection time, when possible.

E. Domestic Well Grab Samples: Consult the SC and Hydrogeologist for purging requirements. Field parameter measurements should be collected at sample collection time, when possible.

6.5.4 Bailer Operation

Where approved by the SC, it is acceptable to use a Teflon, stainless steel, polyethylene, or polyvinyl chloride (PVC) bailer. Attachment E is a schematic of a typical bailer. Collection of an equipment blank sample may be necessary when using a reusable bailer, consult SOP 4.9, "Collection of Field QC Samples" for this determination.

A. The retrieval line should be securely attached to the bailer. A new rope should be used at each well, unless the bailer is dedicated. Dedicated bailers should be checked for cracks and breaks and replaced when necessary.

B. Lower the bailer gently into the well and begin water removal. Avoid unnecessary agitation of the water. Collect or dispose of purged water in acceptable containers as specified in SOP 4.7A or SOP 4.7B.

C. Field measurements of pH, specific conductance, and temperature should be taken at least once per casing volume purged, as described in SOP 2.2, "Field Measurements on Surface and Ground Waters." Depth to water and visual observations, such as clarity and offgassing should also be made and recorded at each volume interval. If it is suspected that the well may go dry prior to the removal of three casing volumes, at least two sets of field measurements should be taken during the removal of the first casing volume.

D. When applicable, purge a minimum of three casing volumes, or until the pH, temperature, and specific conductance of the discharge water stabilize. Stabilization is reached when no upward or downward trends are apparent (pH is within 0.1 pH unit, temperature is within 0.5°C, and specific

conductance is within plus or minus 3%). When sampling wells under RCRA (Resource Conservation and Recovery Act) guidelines, an additional set of field measurements should be taken at 2-minute to 3-minute intervals at the end of the third well casing volume and prior to sample collection as described in SOP 2.7. As discussed previously, it is not always necessary to purge multiple casing volumes prior to sample collection. In instances where the SC has indicated that a grab sample is adequate, a specific-depth grab sample or bailed grab sample may be substituted for the 3 casing volume pre-sample purge, or other low-volume techniques.

E. If the well does not produce three casing volumes of water, SOP 2.7 should be consulted.

6.5.5 Bladder Pump (Gas-Operated Positive Displacement Pump) Operation

A. On the sanitary seal of the wellhead, two quick-connect fittings should be visible. The discharge/sampling tube is suspended from the sanitary seal down into the well casing. See Attachment F for wellhead completion details.

B. Start up the gas-powered compressor controller assembly. In some cases, a compressed nitrogen cylinder may be used as a power source. Attach the compressor to the quick-connect fitting on the controller, ensuring the exhaust is downwind from the well. Remove the discharge/sampling tube and attach to the discharge quick-connect. Adjust bladder pump controller per equipment operation manual.

C. Begin water removal. If possible, the rate should be set so the screen section of the casing is not exposed to air. Collect or dispose of purged water in acceptable containers as specified in SOP 4.7A or 4.7B.

D. Measure the rate of discharge (Q) frequently by first determining the length of time in one cycle. The cycle begins when water first appears at the discharge tube and ends when it appears at the tube a second time. Then, using a graduated cylinder for measurement, note the amount of water collected (usually less than 500 ml/cycle). Divide 60 seconds (sec.) by the cycle time. Take this figure and multiply it by the mls collected. Multiply this figure by the conversion factor .264. Example: Cycle time = 17 sec. and ml/cycle = 500 ml; 60 divided by 17 = 3.5 × .500 = 1.76 × .264 = .465 gpm.

E. Take field measurements of pH, specific conductance, and temperature, flow rate (Q), depth to water and any visual observations such as offgassing, etc., at frequencies listed above in Section 6.5.3, and as described in SOP 2.2 (for exceptions to this frequency list, consult the SC). If it is suspected that water discharge will cease, due to the well going dry, at least two sets of field measurements should be taken during the removal of the first casing volume.

F. When applicable, purge a minimum of three casing volumes, or until the pH, temperature, and specific conductance of the discharge water stabilize. Stabilization is reached when no upward or downward trends are apparent (pH is within 0.1 pH unit, temperature is within 0.5°C, and specific conductance is within plus or minus 3%). When sampling wells under RCRA (Resource Conservation and Recovery Act) guidelines, an additional set of field measurements should be taken at 2-minute to 3-minute intervals at the end of the third well casing volume and prior to sample collection as described in SOP 2.7. As discussed previously in Section 4.5, it is not

always necessary to purge multiple casing volumes prior to sample collection.

G. If water discharge ceases prior to the removal of three casing volumes, SOP 2.7, should be consulted.

6.5.6 Electric Submersible Pump Operation

The dedicated pump assembly and sealed electric drive motor are submersed in the well. The pump is suspended by the discharge pipe, safety cable, and electric lead wires which are held in place by the sanitary seal. A portable generator provides power for the pump. On the sanitary seal of the wellhead, a capped discharge pipe and a capped sounding tube should be visible. The electrical cable to the pump is also fitted through the sanitary seal. The cable either has a dedicated control box or is completed with an outlet for a portable control box. See Attachment G and Attachment H for wellhead completion details.

A. Place the generator downwind from the well. According to the manufacturer's recommendation the well should be purged at a discharge rate of no less than 1.2 gpm when using an electric submersible pump. Water levels should be monitored frequently to ensure the water level does not drop below the top of the screened interval, when possible. Attach the dedicated sample tee (found inside the protective steel casing) to the discharge pipe. Plug the control box into the generator and start generator. Adjust the discharge rate so that the well will yield water without exposing the screen by partially closing the ball valve on the sample tee. If using a rheostat equipped pump, the discharge rate is controlled by the pump speed control knob on the controller unit. Purge the well as described above (Section 6.5.4 C, E, F, and G). Electrical equipment should never be used in the rain.

6.5.7 Specific-Depth Grab Sampling Device Operation

A well with a dedicated system (Attachment I), such as the EasyPump, will include (at the surface) a spool with a pre-measured length of motor lead, attached to a low-voltage pump. There will be a quick disconnect low-voltage female plug adapter attached to the spool. The pump, motor lead and spool will be stored within the stovepipe. The field personnel will attach a disposable sample capture chamber (modified double check-valve bailer) to the pump intake and affix the spool to a portable reel assembly. The device is lowered to a pre-determined depth specified by the SC and/or appropriate personnel, usually the mid-point of the screened interval. A low-voltage control box/power supply is then attached. The SC will have advised full or low-flow setting. These flow rates vary from 250 milliliters per minute at low flow to 8 liters per minute. The desired flow rate is set and the field personnel will activate the pump for a duration sufficient to "purge" or triple rinse the interior of the sample capture portion. The pump is deactivated, isolating the sample by means of dual check valves. The device is retrieved and the sample is obtained (refer to SOP 2.4, Section 6.5.6).

6.5.8 Portable Pump Assemblies

Bladder, electric submersible pumps, and specific-depth grab sampling devices are available as portable units. Portable pumps should be thoroughly decontaminated prior to use according to SOP 4.5, "General Equipment Decontamination." Collection of an equipment blank sample may be necessary when using a portable purging device. Consult SOP 4.9, "Collection of Field QC Samples" for this determination.

A. Slowly lower the pump assembly down until the pump is at the middle of the screened interval. On low-yielding aquifers, the pump should be placed just above the bottom of the well so that it can be completely evacuated. Refer to the Well Specification Table to find the screened interval of the well or check with the SC on placement of the pump intake.

B. For bladder pumps, attach the gas tube to the gas-powered controller compressor unit. Ensure that the unit is downwind from the well.

C. For electric submersible pumps, plug the control box to the appropriately rated generator. Ensure that the generator is downwind from the well.

D Lower the specific-depth grab sample to middle of screened interval when possible and refer to 6.5.7 for operating instructions.

E. Purge the well and collect the purge water as described above under Section 6.5.4 C, E, F, and G.

6.6 Post Operation

6.6.1 Perform post operation activities as described in SOP 4.1.

6.6.2 Make copies of the Document Control Logbook pages (upon request) and Ground Water Sampling Data Sheets. Hand carry or mail copies to the SC and Technical Release Representative (TRR) daily.

6.6.3 The SC will deliver the original Ground Water Sampling Data Sheets to the Data Management Team (DMT) for archive. The SC will provide copies to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.

7.0 QA RECORDS

7.1 Ground Water Sampling Data Sheets

7.2 Document Control Logbooks

7.3 Well Entry Logbooks

8.0 ATTACHMENTS

Attachment A—Daily Operations Guide

Attachment B—Methodology Sampling Codes

Attachment C—Livermore Site and Site 300 Ground Water Sampling Data Sheets (C-1, C-2, C-3)

Attachment D—Equipment Checklist

Attachment E—Schematic of a Typical Bailer and Stop-Cock

Attachment F—Wellhead Completion and Pump Placement for Bladder Pumps

Attachment G—Wellhead Completion (at the Livermore Site) and Pump Placement for Electric Submersible Pumps

Attachment H—Wellhead Completion at Site 300.

Attachment I—Well with Specific-Depth Grab Sampling Device

Attachment A

Daily Operations Guide

Daily Operations Guide (DOG) Q3 2003

Date: _____

Doc. Control Num.:_____

Location	Collect	Comments	Analysis
			Initials:

Attachment A. Daily Operations Guide (DOG) form.

Attachment B

Methodology Sampling Codes

Methodology Sampling Codes

90ES: 90% of 1 casing volume + Electric Submersible

90RF: 90% of 1 casing volume + Redi-Flo

90BP: 90% of 1 casing volume + Bladder Pump

90BA: 90% of 1 casing volume + Bailer

Note: Where a well will not sustain sufficient flow (with the pump that is dedicated to that location) to achieve 3 volumes.

3VES: Normal + Electric Submersible

3VRF: Normal + Redi-Flo

3VBP: Normal + Bladder Pump

3VBA: Normal + Bailer

3VBC: Normal Purge for Barcads

Note: 3VES is used in locations specified by the SL. An example would be guard wells.

LVES: Low-Volume + Electrical Submersible

LVRF: Low-Volume + Redi-Flo

LVBP: Low-Volume + Bladder Pump

Low-Volume + Solo Pump

Note: Instances where a location will not sustain flow sufficient to perform a 90% pre-sample purge or where waste minimization is a key factor in determining the sampling method.

GRWL: Grab using Water Level Indicator (Tritium)

GRES: Grab + Electrical Submersible

GRRF: Grab + Redi-Flo

GRBP: Grab + Bladder Pump

GRBA: Grab + Bailer

GROT: Grab + Other (no purge device, i.e., spring sampling or offsite surveillance)

GRSP: Grab + Solo Pump

Note: Where water column in wells is insufficient for other methods or for tritium sampling.

SDEP: Specific Depth using Easy Pump

OTSM: Other sampling methodology

Note: For sampling in any location specified by the SL or SC.

Attachment B. Methodology sampling codes.

Attachment C

Livermore Site & Site 300
Ground Water Sampling Data Sheets

Livermore Site:

C1: Specific-Depth Grab Sample

C-2: 3-Volume/Low-Volume

Site 300:

C-3: Ground Water Sampling Data Sheet

_____ Quarter 2003 Specific-Depth Grab Sample

Well ID: _____

Date: _____ Doc. Control Num.: _____

Sampling Device: EP / Other

Dedicated / Portable

Depth of Casing: _____

Depth to Water: _____

Screened Interval (from POM): _____

Device Intake (from POM): _____

Pump Run Time: _____

Casing Diameter	Gallons/ft
2"	0.163
3.5"	0.500
4"	0.653
4.5"	0.826
5"	1.020
6"	1.469
8"	2.611

Sample ID	Time	QC Sample ID	Time

pH: _____ Temp: _____ SC: _____

Comments: _____

Meter	Serial #	Calibrated
pH	_____	yes/no
SC	_____	yes/no

Project: Livermore Site - LGIV
Analytical Lab (1)
Analytical Lab (2)
Samplers Initials/Employer: _____/ERD

Requested Analyses

VOCs, Metals, etc.

- O E601/ __ □ 40 mL VOAs/0 preservatives (pres.)
- O E602/ __ □ 40 mL VOAs/0 pres.
- O E624/ __ □ 40 mL VOAs/0 pres.
- O E8080:PCB / 1 □ 1 L amber/0 pres.
- O E245.2 / 1 □ 500 mL or 1 L plastic/nitric
- O Other: _____

Rad

- O E906/ 3 □ 40 VOA/amber/0 pres.
- O E900/ 1 □ 1 L plastic
- O E903 + 904/2 □ 1 L plastic
- O E913.0/ __ □ 250 mL glass
- O AS:UISO/ __ □ 1 L plastic
- O Other: _____

_____ Quarter 2003 3 Volume/Low Volume

Well ID: _____

Date: _____ Doc. Control Num.: _____

Sampling Device: ES / RF / BP / TB / PB / Other

Dedicated / Portable (G, Y, R, B)

Depth of Casing: _____ POM = _____

Depth to Water: _____ SI = _____

Water Column (ft): _____ Intake = _____

Time Pump On: _____

Time Pump Off: _____

Casing Diameter/gal/ft

2"	3.5"	4.5"	5"	6"	8"
0.163	0.500	0.826	1.020	1.469	2.611

Casing Volume (gal): _____

Initial Flow Rate (gpm): _____

Measured by: grad. cyl. / flow meter / other

Treatment Facility: _____

Min	Time	gpm	Gal	Volume	pH	Temp C	SC	OG	Depth to water

Meter	Serial #	Calibrated
pH		yes/no
S.C.		yes/no
Other		

Project: Livermore Site - LGIV

Analytical Lab (1)

Analytical Lab (2)

Samplers Initials/Employer: ____/ERD

Sample ID: _____ Time: _____ NTU:

QC Sample ID: _____ Time: _____

Requested Analyses

VOCs, Metals, Etc.

- O E601/ __ □ 40 mL VOAs/0 pres.
- O E602/ __ □ 40 mL VOAs/0 pres.
- O E624/ __ □ 40 mL VOAs/0 pres.
- O E8080:PCB/ 1 □ 1 L amber/0 pres.
- O E245.2/1 □ 500 mL or 1 L plastic/nitric

Rad

- O E906/ 3 □ 40 VOA/amber/0 pres.
- O E900/ 1 □ 1 L plastic
- O E903 + 904/2 □ 1 L plastic
- O E913.0/ __ □ 250 mL glass
- O AS:UISO/ __ □ 1 L plastic

ALL GROUND WATER SAMPLING DATA

Target Sample Date: 01-Apr-2001 Month: 5 Norm Qtr: 2 Norm Year: 2001

Date _____ LOG# _____ Well ID: NC7-69

LAB_LOC_ID: NC7-69-3VES Doc. Control Num.: _____

PURGING METHOD: GF Sample Status: 3VES CONTAMINANT PRESENT: ND

SCREENED INTERVAL: 128.400 – 148.400 PUMP INTAKE DEPTH: 146.30

DEPTH OF CASING: 148.800 CASING DIAMETER: 4.50

DEPTH TO WATER _____ VOLUME FACTOR: 0.826

WATER IN CASING (ft): _____ CASING VOL (Gal/Time): _____

TIME PUMP ON: _____ INITIAL FLOW RATE (Q=GPM): _____

TIME PUMP OFF: _____ MEASURED BY: GRAD. CYL. /BUCKET /FLOW METER & OTHER

TIME	Q	GAL PURGED	WELL VOLUMES	PH	TEMP C	SC	MV	OG	DTW

METER SERIAL # CALIBRATED SAMPLERS INITIAL/EMPLOYER _____

PROJECT: 3EMG

pH _____ 8908079 _____ YES/NO

SC _____ 8908079 _____ YES/NO

ORP _____ 8908079 _____ YES/NO

SAMPLE ID: (VERIFY) _____ TIME COLLECTED: _____

ANALYTICAL LAB	REQUESTED ANALYSES	QUANTITY	TYPE OF CONTAINERS
CALTEST	E200.7:K	1 □ 1L	PLASTIC
CALTEST	E300.0:NO3	1 250 □ mLs	PLASTIC
CALTEST	E601	6 40 □ m1s	VOA VIAL
CALTEST	E8330:R+H	1 □ 1L	NM AMBER GLASS
CALTEST	WGMGMET3	1 □ 1L	PLASTIC
TNURICH	AS:UISO	2 □ 1L	PLASTIC
TNURICH	E900	2 □ 1L	PLASTIC
TNURICH	E200.7	4 □ 40 m1s	VOA

Note:

Attachment D

Equipment Checklist

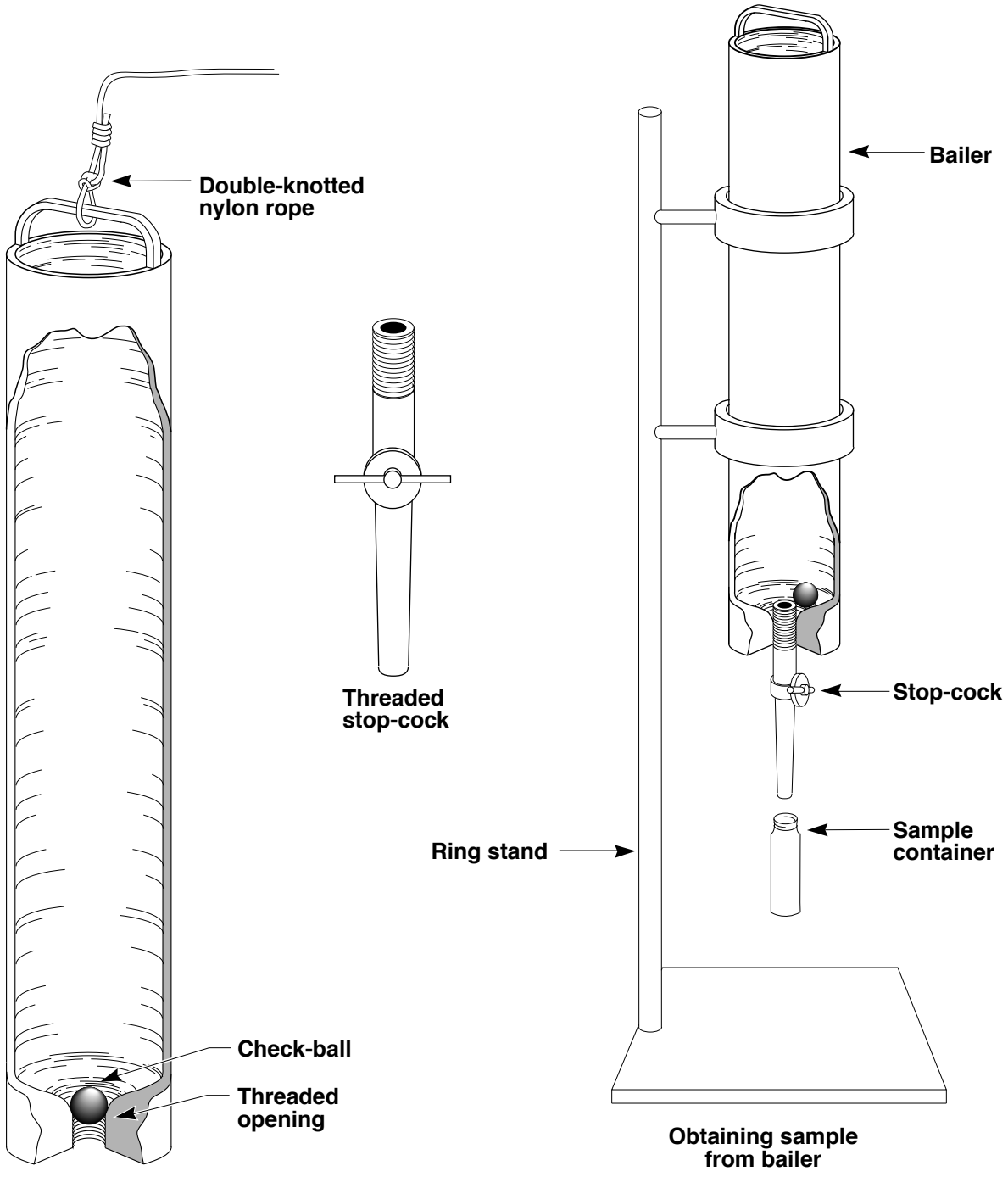
Equipment Checklist

The purpose of the list presented below is to aid field personnel in identifying those supplies necessary to conduct a particular field operation. It is not intended to be all inclusive. It is the responsibility of field personnel to determine and obtain the supplies required for successful performance of assigned tasks.

____ Alconox (detergent)
____ All applicable documents (i.e., Sampling Plan, Well Specification Table, SOPs, QAPP, Site Safety Plan (SSP), Site maps, etc.)
____ Air tight plastic bags
____ Appropriate sample containers
____ Appropriate shipping documents
____ Bagged cubed or blue ice
____ Bailer and cotton or nylon bailing rope
____ Barricades/traffic cones/traffic vest
____ Beakers
____ Bound logbook
____ Bubble wrap or necessary packaging
____ Calculator
____ Chain-of-Custody (CoC) forms
____ Clipboard
____ Cold weather gear/rain suit (if necessary)
____ Coolers
____ Distilled (organic-free) water
____ Drinking water
____ Duct tape
____ Ear plugs
____ Field forms
____ First aid kit
____ Fittings (i.e., quick disconnect fittings for well wizards)
____ Generator
____ Graduated cylinder/bucket
____ Hat and work gloves
____ Pens, pencils, permanent markers
____ pH, specific conductance, temperature meters and flow cell (ASTM approved)
____ Personal protective equipment
____ Preprinted labels
____ Radio, cell phone
____ Safety shoes/boots
____ Sample-tee
____ Snake guards
____ Stop watch
____ Sun screen
____ Tape measure (tenths)
____ Temperature blank
____ Teflon tape
____ Tool box
____ Trip blanks/field blanks
____ Volume conversion chart
____ Water level indicator

Attachment E

Schematic of a Typical Bailer and Stop-Cock



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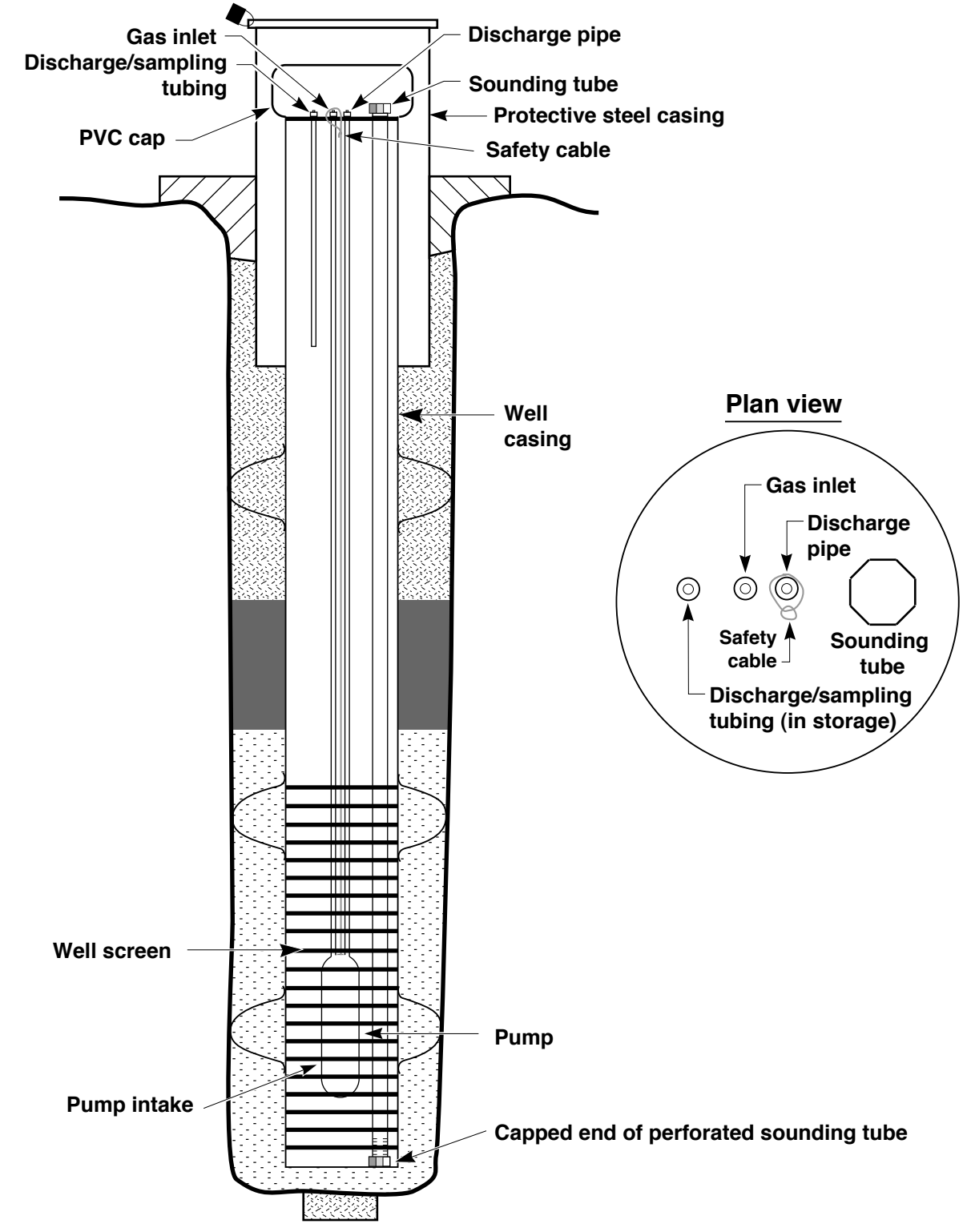
Attachment E. Schematic of a Typical Bailer and Stop-cock.

Attachment F

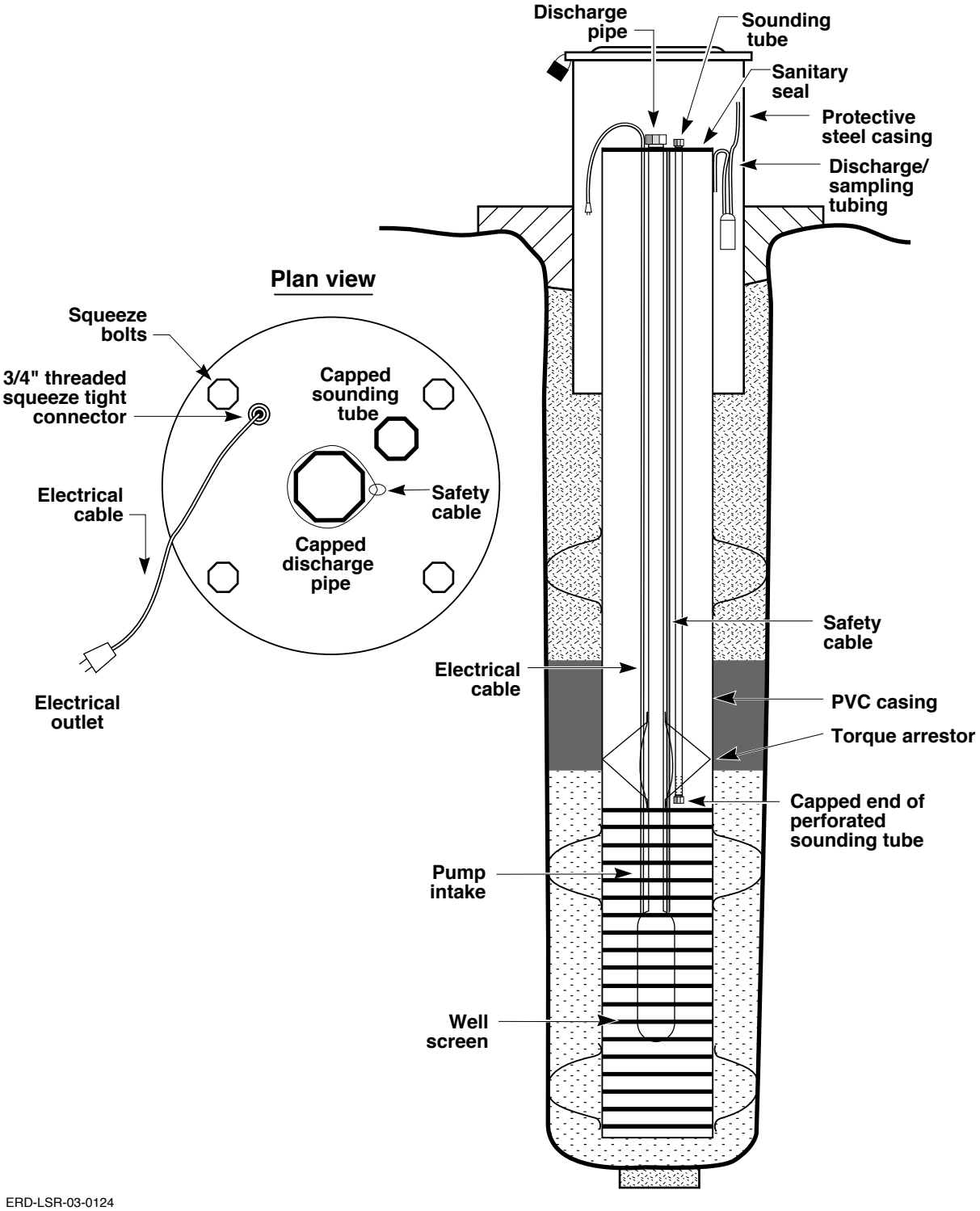
Wellhead Completion and Pump Placement for Bladder Pumps



Attachment F. Wellhead completion and pump placement for bladder pumps.

Attachment G

Wellhead Completion (at the Livermore Site) and Pump Placement for Electric Submersible Pumps



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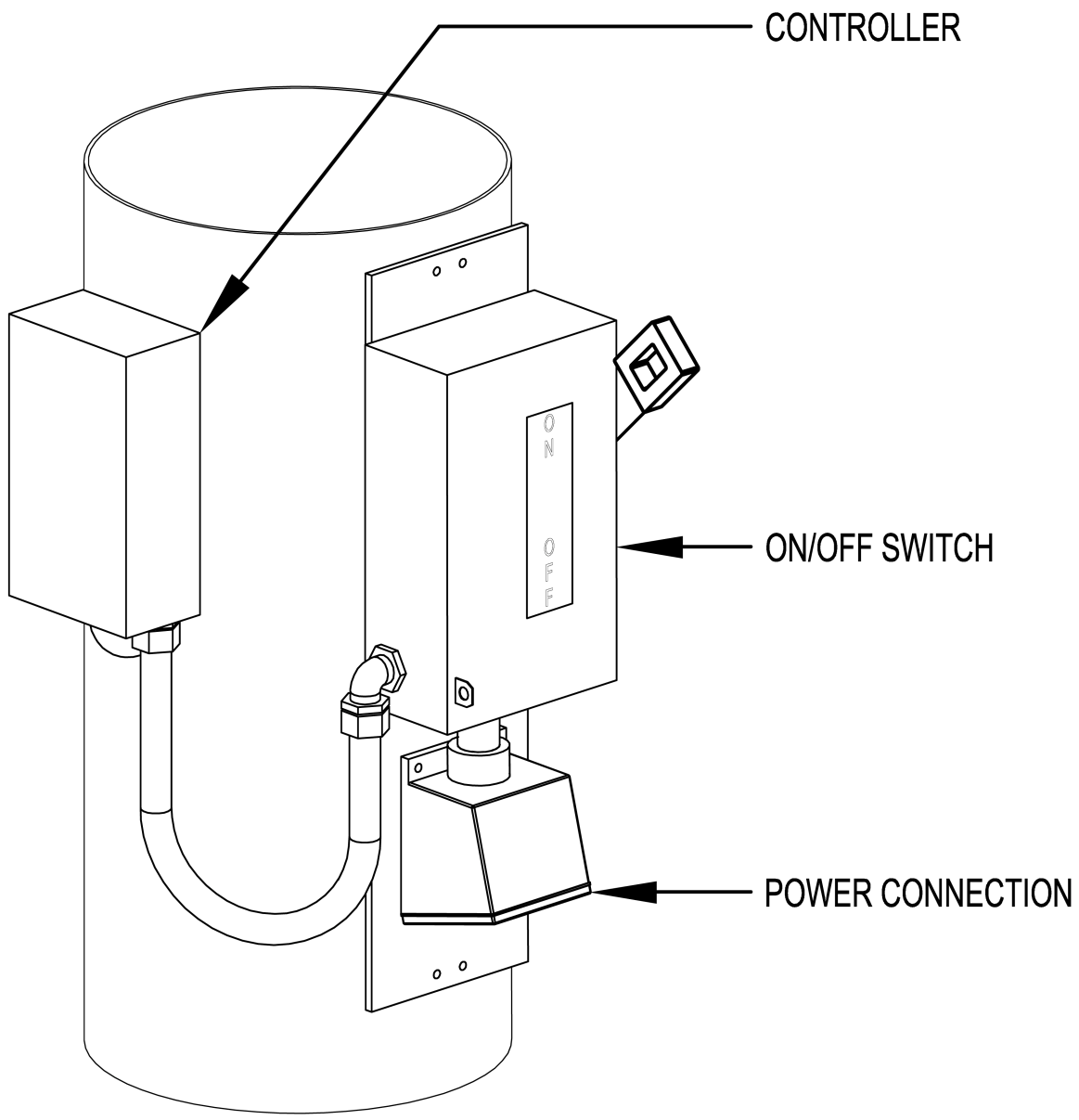
Attachment G. Wellhead completion (at the Livermore Site) and pump placement for electric submersible pumps.

Attachment H

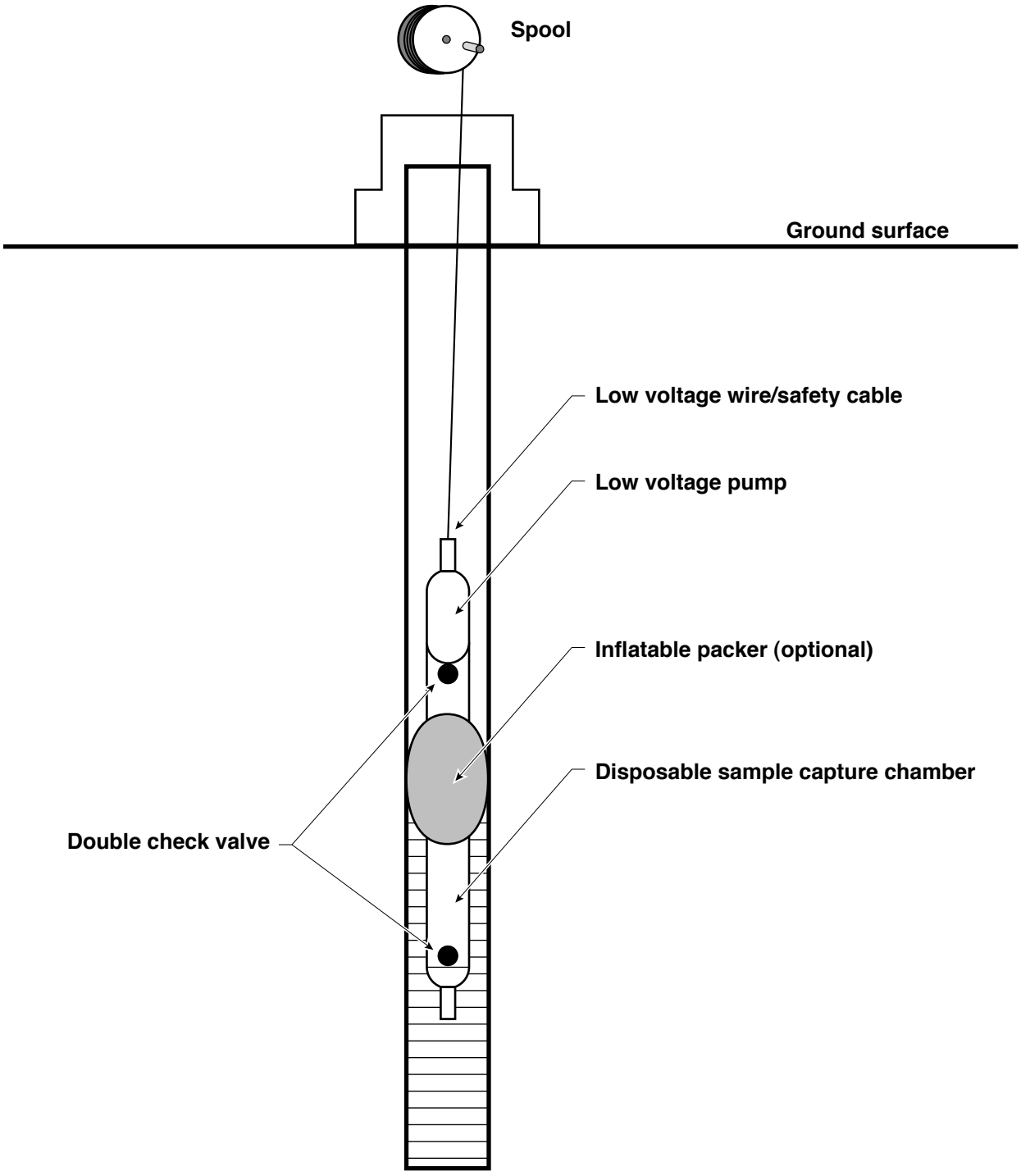
Wellhead Completion at Site 300



Attachment H. Wellhead completion at Site 300.

Attachment I

Well with Specific-Depth Grab Sampling Device



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Attachment I. Well with specific depth grab sampling device.