64801

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May 6, 1993

Four Winds Plaza
c/o John K. Dema, Esquire
Law Offices of John K. Dema
1236 Strand Street, Suite 103
Christiansted, St. Croix
U.S. Virgin Islands 00820

Re: Tutu Wells Site Tank Sampling

Dear Jack:

Enclosed please find a copy of the letter sent to EPA requesting a sampling of the two tanks located behind the space leased by Western Auto.

ENSR has requested that the owner of Four Winds Plaza or a representative sign the attached access agreement and return it to: ENSR Consulting & Engineering, 35 Nagog Park, Acton, MA 01720.

Thank you for your cooperation in this matter. If you have any questions please feel free to call.

Sincerely,

John R. Coon

JRC/jmeg
Enclosures
cc: ENSR

ACCESS AGREEMENT

WHEREAS, ENSR CORPORATION ("ENSR") has been retained by WESTERN AUTO ("CLIENT") to perform certain environmental services and analysis on property owned by FOUR WINDS PLAZA PARTNERSHIP ("OWNER") at Estate Anna's Retreat, St. Thomas, U.S. Virgin Islands (the "Site"); and

WHEREAS, the environmental services to be performed by ENSR and ENSR's subcontractors may include drilling, boring, excavation and other subsurface activity, sampling and the use of heavy equipment (collectively the "Services"), all of which involve an inherent risk to the property of OWNER; and

WHEREAS, OWNER understands the risks involved with the Services and desires to grant ENSR the right to enter its premises for the purpose of conducting the Services.

NOW, THEREFORE, for and in consideration of the mutual covenants and conditions contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, ENSR and OWNER hereby agree as follows:

1. OWNER grants ENSR full access to the Site for the purposes of performing the Services for CLIENT;

2. OWNER will cooperate fully with ENSR and will take all actions necessary to allow ENSR to complete the Services in the most expeditious manner possible;

3. ENSR will take all reasonable precautions necessary to minimize damage to the Site; provided, however, that all cost of correction, repair and replacement, except insofar as caused by the negligence of ENSR, will be borne by OWNER;

4. Prior to the performance of the Services, OWNER shall provide ENSR with the identity, description and location of all subsurface facilities, obstructions or improvements to OWNER's Site in writing. ENSR, shall have no responsibility or liability to OWNER for any damage arising from any failure to accurately identify and locate such subsurface facilities, obstructions or improvements.

5. In no event shall ENSR take title to or be liable for disposal or remediation costs associated with any hazardous or non-hazardous wastes, substances or materials (including, without limitation, any excavated soils, debris, media, soil borings, drilling mud, or drill cuttings resulting from the Services) that existed on the Site prior to the date that the Services are performed ("Pre-existing Waste"). In the event that the Services include the removal and/or disposal of Pre-existing Waste, OWNER shall provide appropriate disposal identification numbers, select the appropriate disposal site(s) and sign all required manifests, disposal contracts and other documentation necessary to allow ENSR to complete the Services in a timely manner. Client agrees to look solely to the disposal facility and/or transportation concern for any damages arising from improper transportation or disposal of the Pre-existing Waste.

SIGNED this _____ day of _____, 1993.

	OWNER
ENSR CORPORATION	_____
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____

TUT 006 1521

ENSR STANDARD OPERATING PROCEDURE

Number: 7110 Date of Issue: 1st Quarter, 1984

Title: Surface Soil Sampling

Organizational Acceptance	Authorization	Date
Originator	Charles S Martin	3/2/84
Department Manager	Arthur S Jagoda	3/2/84
Divisional Manager	Edward Noyes	3-2-84
Group Quality Assurance Officer	Judith A Pittenger	3-2-84
Other		

Revisions	Changes	Authorization	Date
1	Update	SAJ	3/1/84
		CEM	3/2/84
		ASL	3/2/84
		EM	3-2-84

STANDARD OPERATING PROCEDURE

Title: Surface Soil Sampling

Date: 1st Qtr 19
Number: 7110
Revision: 1

1.0 General Applicability

This SOP describes the methods used for obtaining surface soil samples for physical analysis or quality/chemical analysis. This SOP also describes the procedures for using the various types of sampling equipment, which include shovels, trowels, and hand augers. The equipment may be constructed of special materials (for example, stainless steel, inert plactics) according to specific project requirements.

2.0 Equipment Descriptions:

2.1 shovel - long or short handle type. Used for penetrating the upper surface and/or obtaining soil samples directly.

2.2 trowel - basic garden variety, which resembles a small shovel. Constructed of steel or polypropylene (plastic)*. The blade of a trowel is generally flat and 5 to 6 inches in length. A scoop (blade has curved edges versus flat) may be substituted if necessary. Both can be purchased with volume calibrations.*

2.3 Hand auger - This tool consists basically of a short spiral-bladed metal rod (Auger) attached to a handle. Clockwise rotation of the T handle initiates the cutting process. Most of the loose soil is discharged upwards as the auger moves downwards. However, if the soil is cohesive some of it will stick to the auger flight providing a collectable sample at a measurable depth. Samples of surface soil can also be collected using a tube sampler which will be attached to the end of the auger rods and advanced into the soil to extract a sample.

3.0 Responsibilities

The project geologist/engineer will be responsible for the proper use and maintenance of all types of equipment used for obtaining surface soil samples; and the collection, labelling, handling and storage of all samples until further chain of custody procedures are undertaken.

4.0 Supporting Materials

- Sample containers/Labels
- Sample Logs/Boring Logs
- Decontamination materials (if required)*
- Field notebook
- Six-foot folding rule or tape measure for depth measurement

*Requirements for inert materials, decontamination, or calibrated sampling tools may be required depending upon the purpose of the sampling. These requirements will be detailed in a project-specific sampling plan.

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TUT 006 1523

STANDARD OPERATING PROCEDURE

Title: Surface Soil Sampling

Date: 1st Qtr 198
Number: 7110
Revision: 1

5.0 Method or Protocol

5.1 General Procedures

Specific sampling equipment and methodology will be dictated by the characteristics of the soil to be sampled, the type of soil samples required by the project and the analytical procedures to be employed. Soil samples obtained at the surface may be collected using a shovel or trowel. The type of analysis requested (e.g., grain-size distribution, physical, chemical) may require specific soil amounts or the use of specialized sampling equipment. Sampling to obtain uniform coverage within a specified area will require the use of an area grid. These considerations will be followed based upon specific project requirements defined in the project sampling plan.

A hand auger can be used to extract shallow soil samples up to three (3) feet below the surface. Representative samples will be collected directly from the auger flight as it is withdrawn from the ground, or from the tube sampler attached to the end of the rods and advanced into the soil.

The location of sample points will be determined on a project specific basis.

5.2 Standard Procedures

5.2.1 Select the specific sampling location. Construct a sampling grid if necessary. Remove all surface materials that are not to be included samples, for example, rocks, twigs, leaves.

5.2.2 Select type of sampler required to obtain the correct sample. At the surface, use a shovel, trowel or tube sampler; below surface, use a hand auger or tube sampler.

5.2.3 Obtain a sufficient quantity of soil for the desired chemical or physical analyses.

5.2.4 When using the hand auger, auger the hole to the required depth, then slowly remove the auger and collect the soil sample from the auger flight itself at the point corresponding to the required depth. Reinsert and continue augering if deeper samples are required. In addition, a tube sampler can be attached to the auger rods after augering to the desired depth, inserted into the open bore, and then advanced into the deposits at the base of the boring. If sampling is needed in sandy or non-cohesive soil, a shovel may be necessary to obtain samples.

5.2.5 Cap the sample container; attach label; seal container (if analysis for volatile chemical species is anticipated). Record all observations such as visual soil description in a field book or on a surface soil sample log. Complete chain of custody records. Utilize proper storage procedures (see SOP 7510).

5.2.6 Decontaminate the sampler between collection points. Decontamination procedures will be performed as identified in SOP 7600 Decontamination unless otherwise specified.

5.2.7 Initiate proper procedures for delivery of the samples to the designated laboratory. This includes packaging, and shipping with chain of custody forms (see SOP 7510).

6.0 Documentation

Various forms are required to ensure that adequate documentation is made of the sample collection activities. These forms include:

- field log books
- sample logs
- chain of custody forms
- shipping forms

The field book will be maintained as an overall log of all samples collected throughout the study. These documents will be retained in the appropriate project files.

SURFACE SOIL SAMPLE LOG

PROJECT NO. _____ PROJECT LOCATION _____

SAMPLE POINT NO. _____

DATE _____ TIME _____

SAMPLE POINT DESCRIPTION/DESIGNATION _____

_____

SAMPLE COLLECTION:

EQUIPMENT USED _____

NO. OF SAMPLES COLLECTED _____ CONTAINER SIZE _____

SAMPLE NO.	DEPTH	TYPE OF MATERIAL	ANALYSIS REQUES.
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

COMMENTS _____

_____

_____

LAB DESIGNATION _____

SHIPPING BOX NO. _____

COLLECTOR'S NAME _____

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ENSR STANDARD OPERATING PROCEDURE

Number: 7130 Date of Issue: March 12, 1984

Title: Ground-Water Sample Collection from Monitoring Wells

Organizational Acceptance	Authorization	Date
Originator	Christopher Carlo	3-13-84
Department Manager	Austin Lazarus	3/13/84
Divisional Manager	Edward Rhoad	3-13-84
Group Quality Assurance Officer	Scott M. Whittemore	3-13-84
Other		

Revisions	Changes	Authorization	Date
1	• Sect. 3.0 - Equipment checklists have been added.	SMW	9-5-86
	• Sect. 4.4 - The use of electronic sounding devices has been removed from procedures for obtaining water-level measurements.	CEM	9-11-86
	• Sect. 4.5 - Some unneccessary steps have been deleted from procedures for decontamination.		
	• Sect. 5.0 - The volume of ground water for purging wells has been changed from 4 to 10 volumes to 3 to 10 volumes.		
	• Sect. 6.2 - A more detailed description of bailing was added.		
	• Additional figures have been added.	Em	9-10-86
	• Miscellaneous rewording and renumbering for clarification.		

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Title: Ground-Water Sample Collection from Monitoring Wells

1.0 Applicability

This Standard Operating Procedure (SOP) is concerned with the collection of valid and representative samples from ground-water monitoring wells. The scope of this document is limited to field operations and protocols applicable during ground-water sample collection.

2.0 Responsibilities

The site coordinator or his delegate will have the responsibility to oversee and ensure that all ground-water sampling is performed in accordance with the project-specific sampling program and this SOP. In addition, the site coordinator must ensure that all field workers are fully apprised of this SOP. The field team is responsible for proper sample handling as specified in SOP 7510, Handling and Storage of Samples.

3.0 Supporting Materials

The list below identifies the types of equipment which may be used for a range of ground water-sampling applications. From this list, a project-specific equipment list will be selected based upon project objectives, the depth to ground-water, purge volumes, analytical parameters and well construction. The types of sampling equipment are as follows:

- Purging/Sample Collection

  Bailers
  Centrifugal Pump
  Submersible Pump
  Peristaltic Pump

- Sample Preparation/Field Measurement

  pH Meter
  Specific Conductance Meter
  Filtration Apparatus
  Water-Level Measurement Equipment

Additional equipment to support sample collection and provide baseline worker safety will be required to some extent for each sampling task. The additional materials are separated into two primary groups: general equipment which is reusable for several samplings, and materials which are expendable.

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- General

  Project-specific sampling program
  Deionized-water dispenser bottle
  Methanol-dispenser bottle
  Site-specific Health & Safety equipment (gloves, respirators, goggles)
  Field data sheets and/or log book
  Preservation solutions
  Sample containers
  Buckets and intermediate containers
  Coolers
  First-Aid kit

- Expendable Materials

  Bailer Cord
  Respirator Cartridges
  Gloves
  Water Filters
  Chemical-free paper towels
  Plastic sheets

Equipment checklists have been developed to aid in field trip organization and should be used in preparation for each trip.

4.0 Water-Level Measurement

4.1 Introduction

Prior to obtaining a water-level measurement, cut a slit in one side of the plastic sheet and slip it over and around the well, creating a clean surface onto which the sampling equipment can be positioned. This clean working area should be a minimum of eight feet square. Care will be taken not to kick, transfer, drop, or in any way let soil or other materials fall onto this sheet unless it comes from inside the well. Do not place meters, tools, equipment, etc. on the sheet unless they have been cleaned first with a clean rag.

After unlocking and/or opening a monitoring well, the first task will be to obtain a water-level measurement. Water-level measurements will be made using an electronic or mechanical device. Electronic measurement devices will be used in all wells wherein a clearly audible sound cannot be produced with a mechanical device.

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4.2 Well Security

Unlock and/or open the monitoring well. Enter a description of condition of the security system and protective casing on the Ground-Water Sample Collection Record shown in Figure 1.

4.3 Measuring Point

Check for the measuring point for the well. The measuring point location should be clearly marked on the outermost casing or identified in previous sample collection records. If no measuring point can be determined, a measuring point should be established. Typically the top (highest point) of the protective or outermost well casing will be used as the measuring point. The measuring point location should be described on the Ground-Water Sample Collection Record and should be the same point used for all subsequent sampling efforts.

4.4. Measurement

To obtain a water-level measurement lower a clean steel, fiberglass tape into the monitoring well. Care must be taken to assure that the water-level measurement device hangs freely in the monitoring well and is not adhering to the wall of the well casing. The water-level measuring tape will be lowered into the well until the audible sound of the unit is detected or the light on an electronic sounder illuminates. At this time the precise measurement should be determined (to hundredth of a foot) by repeatedly raising and lowering the tape to converge on the exact measurement. The water-level measurement should be entered on the Ground-Water Sample Collection Record. As well point of measurement should be indicated; i.e., top of protective casing, top of pueriser, ground level.

4.5 Decontamination

The measurement device shall be decontaminated immediately after use with a methanol soaked towel. Generally only that portion of the tape which enters the water table should be cleaned. It is important that the measuring tape is never placed directly on the ground surface.

5.0 Purge-Volume Computation

All monitoring wells to be purged prior to sample collection. Depending upon the ease of purging, 3 to 10 volumes of ground water to be determined by hydrogeologing prior to sampling present in a well

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shall be withdrawn prior to sample collection or one volume if well can be purged dry. The volume of water present in each well shall be computed based on the length of water column and well casing diameter. The water volume shall be computed using Figure 2.

6.0 Well-Purging Methods

6.1 Introduction

Purging must be performed for all ground-water monitoring wells prior to sample collection in order to remove stagnant water from within the well casing and ensure that a representative sample is obtained. The following sections explain the proper procedures for purging and collecting water samples from monitoring wells.

Three general types of equipment are used for well purging: bailers, surface pumps, or down-well submersible pumps.

In all cases pH and/or specific conductance will be monitored during purging. Field parameter values will be entered on the Ground-Water Sample Collection Record along with the corresponding purge volume.

6.2 Bailing

In many cases bailing is the most convenient method for well purging. Bailers are constructed using a variety of materials; generally, PVC stainless steel, and Teflon®. Care must be taken to select a specific type of bailer that suits a study's particular needs. Teflon® bailers are generally most "inert" and are used most frequently. Keep in mind the diameter of each monitoring well so that the correct size bailers are taken to the site. It is preferable to use one bailer per well; however, field decontamination is a relatively simple task if required.

Bailing presents two potential problems with well purging. First, increased suspended solids may be present in samples as a result of the turbulence caused by raising and lowering the bailer through the water column. High solids concentrations may require that total suspended solids (TDS) and the chemical character of solids be evaluated during sample analyses. Second, bailing may not be feasible for wells which require that greater than twenty (20) gallons be removed during purging. Such bailing conditions mandate that long periods be spent during purging and sample collection or that centrifugal pumps be used. All ground-water collected from monitoring wells for subsequent volatile organic compound analyses shall be collected using bailers, regardless of the purge method.

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6.3 Surface Pumping

Ground-water withdrawal using pumps located at the ground surface is commonly performed with centrifugal or peristaltic pumps.

All applications of surface pumping will be governed by the depth to the ground-water surface. Peristaltic and centrifugal pumps are limited to conditions where ground water need only be raised through approximately 20 feet of vertical distance. The lift potential of a surface pumping system will depend upon the net positive suction head of the pump and the friction losses associated with the particular suction line, as well as the relative percentage of suspended particulates.

Surface pumping can be used for many applications of well purging and ground-water sample collection. In all cases, pumping cannot be used for the collection of samples to be analyzed for volatile organic compounds (VOCs).

6.3.1 Peristaltic Pump

Peristaltic pumps provide a low rate of flow typically in the range of 0.02-0.2 gallons/min (75-750 ml/min). For this reason, peristaltic pumps are not particularly effective for well purging. Peristaltic pumps are suitable for purging situations where disturbance of the water column must be kept minimal for particularly sensitive analyses. Peristaltic pumps are most often used in conjunction with field filtering of samples and therefore can be used to obtain water samples for direct filtration at the wellhead.

6.3.2 Centrifugal Pump

Centrifugal pumps are designed to provide a high rate of pumping, in the range of 10-40 gallons per minute (gpm), depending on pump capacity. Discharge rates can also be regulated somewhat provided the pump has an adjustable throttle.

When centrifugal pumps are used, samples should be obtained from the suction (influent) line during pumping by an entrapment scheme as shown in Figure 3. Construction of this sampling scheme is relatively simple and will not be explained as part of this SOP. It is suggested that if samples cannot be obtained before going through the pump, that samples be obtained by using a bailer once pumping has ceased. Collecting samples from the pump discharge is not recommended.

6.3.3 Submersible Pump

Submersible pumps provide an effective means for well purging and in some cases sample collection. Submersible pumps are particularly useful for situations where the depth to water table is greater than twenty (20-30) feet and the depth or diameter of the well requires that a large purge volume be removed during purging.

ERT uses the Johnson-Keck pump model SP-81 which has a 1.75 inch diameter pump unit. The pump diameter restricts use to monitoring wells which have inside diameters equal to or greater than two (2) inches. As with other pump-type purge/sample collection methods, submersible pumps will not be used for the collection of samples for analyses of volatile organic compounds. Submersible pumps should never be used for well development as this <u>will</u> seriously damage the pump.

7.0 Sample Collection Procedures

7.1 Bailing

Obtain a clean/decontaminated bailer and a spool of polypropylene rope or equivalent bailer cord. Using the rope at the end of the spool tie a bowline knot or equivalent through the bailer loop. Test the knot for security and the bailer itself to ensure that all parts are intact prior to inserting the bailer into the well.

Remove the protective foil wrapping from the bailer, and lower the bailer to the bottom of the monitoring well and cut the cord at a proper length. Boiler rope should never touch the ground surface at any time during the purge routine.

Raise the bailer by grasping a section of cord using each hand alternately in a "rocking" action. This method requires that the samplers' hands be kept approximately 2-3 feet apart and that the bailer rope is alternately looped onto or off each hand as the bailer is raised and lowered.

Bailed ground water is poured from the bailer into a graduated bucket to measure the purged water volume.

For slowly recharging wells, the bailer is generally lowered to the bottom of the monitoring well and withdrawn slowly through the entire water column. Rapidly recharging wells should be purged by varying the level of bailer insertion to ensure that all stagnant water is removed. The water column should be allowed to recover

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to 70-90% of its static volume prior to collecting a sample. Water samples should be obtained from midpoint or lower within the water column.

Samples collected by bailing will be poured directly into sample containers from bailers which are full of fresh ground water. During sample collection, bailers will not be allowed to contact the sample containers.

7.2 Peristaltic Pump

Place a new suction and discharge line to the peristaltic pump. Silicon tubing must be used through the pump head. A second type of tubing may be attached to the silicon tubing to create the suction and discharge lines. Such connection is advantageous for the purpose of reducing tubing costs, but can only be done if airtight connections can be made. Tygon tubing will not be used when performing well purging or collecting samples for organic analysis. The suction line must be long enough to extend to the static ground-water surface and reach further should drawdown occur during pumping.

Measure the length of the suction line and lower it down the monitoring well until the end is in the upper 2-5 inches of the water column present in the well. Start the pump and direct the discharge into a graduated bucket.

Measure the pumping rate in gallons per minute by recording the time required to fill a selected volume of a bucket. Flow measurement shall be performed three times to obtain an average rate.

The pumping shall be monitored to assure continuous discharge. If drawdown causes the discharge to stop, the suction line will be lowered very slowly further down into the well until pumping restarts.

Measurements of pH and specific conductance will be made periodically during well purging. All readings will be entered on the Ground-Water Sample Collection Record.

Samples will be collected after the required purge volume has been withdrawn and the field parameters (pH and Specific Conductance) have stabilized.

When the sample bottles are prepared, each shall be filled directly from the discharge line of the peristaltic pump. Care will be taken to keep the pump discharge line from contacting the

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sample bottles. Ground-water samples requiring filtration prior to placement in sample containers, will be placed in intermediate containers for subsequent filtration or filtered directly using the peristatic pump.

At each monitoring point when use of the peristaltic pump is complete, all tubing including the suction line, pump head and discharge line must be disposed of. In some cases where sampling will be performed frequently at the same point, the peristaltic pump tubing may be retained between each use in a clean zip-lock plastic bag.

7.3 Centrifugal Pump

7.3.1 Direct Connection Method (Note: This method requires that the well casing be threaded at the top.)

Establish direct connection to the top of the monitoring well if possible using pipe connections, extensions, and elbows, with Teflon® tape wrapping on all threaded connections. If the centrifugal pump will subsequently be used for sample collection, a sample isolation chamber will be placed in the suction line configuration as shown in Figure 3.

Prime the pump by adding tap water to the pump housing until the housing begins to overflow.

Start the pump and direct the discharge into a graduated bucket or a bucket of known capacity (>2.5 gallons).

Start the pump and measure the pumping rate in gallons per minute by recording the time required to fill the graduated bucket. Flow measurement should be checked periodically to determine if pumping rates are continuous, fluctuating, or diminishing. If discharge stops, the pump will be throttled back to determine if pumping will restart at a lower rate. If pumping does not restart, the pump should be shut off to allow the well to recharge.

Measurements of pH and specific conductance will be made periodically during well purging. All readings will be entered on the Ground-Water Sample Collection Record. Samples will be collected after the required purge volume has been withdrawn and the field parameters (pH and Specific Conductance) have stabilized. Samples should be collected from an in-line discharge valve or with a bailer. The pump should be properly decontaminated between wells.

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7.3.2 Down-Well Suction-Line Method

Lower a new suction line into the well. The suction line will have a total length great enough to extend to the water table and account for a minimum of five (5) feet of drawdown. Note should be made that drawdown may exceed the depth where pumping will terminate as a result of a limitation derived from suction-line conditions and the lift potential of the pump. All connections should be made using Teflon® ferrules and Teflon® thread wrapping tape. Run the pump as per Section 7.3.1.

At each monitoring well when use of a centrifugal pump is complete, all suction line tubing should be disposed of properly.

7.4 Submersible Pump

Prior to using a submersible pump, a check will be made of well diameter and alignment. A 1.75 inch diameter decontaminated cylindrical tube should be lowered to the bottom of each monitoring well to determine if the alignment or plumbness of a well is adequate to accommodate the submersible pump. All observations will be entered in the Ground-Water Sample Collection Record.

Slowly lower the submersible pump into the monitoring well taking notice of any roughness or restrictions within the riser.

Count the graduations on the pump discharge line and stop lowering when the stainless steel portion is below the uppermost section of the static water column within monitoring well. Secure the discharge line and power cord to the well casing.

Connect the power cord to the power source (i.e., rechargeable battery pack or auto battery monitor) and turn the pump on (forward mode). When running, the pump can usually be heard by listening near the well head.

Voltage and amperage meter readings on the pump discharge must be checked continuously. The voltage reading will decline slowly during the course of a field day representing the use of power from the battery. Amperage readings will vary depending upon the depth to water table. Amperage readings greater than 10 amps usually indicate a high solids content in the ground water which may cause pump clogging and serious damage. If a steady increase

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in amperage is observed, the pump should be shut off, allowed to stop, switched to the reverse mode, stopped again and then placed in forward mode. If high amperage readings persist, the pump should be withdrawn and checked using the large upright cylinder and tap water. Ground-water conditions such as high solids may require that an alternate purge/sample method be used.

Drawdown must also be monitored continuously by remaining near the well at all times and listening to the pump. When drawdown occurs, a metallic rotary sound will be heard as the pump intake becomes exposed and ceases to discharge water, but continues to run. The pump should be lowered immediately to continue pumping water within the uppermost section of the static water column. NOTE: The submersible pump cannot be allowed to run while not pumping for more than five seconds or the pump motor will burn out.

If drawdown continues to the extent that the well is pumped dry, the pump should be shut off and the well allowed to recharge. This on/off cycle may need to be repeated several times in order to purge the well properly.

Measurements of the pumping rate, pH, and specific conductance should be made periodically during well purging. All readings and respective purge volumes should be entered on the Ground-Water Sample Collection Record.

While pumping is on-going and when sample bottles are prepared, bottles will be filled directly from the discharge line of the pump taking care not to touch sample bottles to the discharge line.

At each monitoring well when use of the submersible pump is complete, the pump, discharge line and power cord shall be decontaminated according to the procedures contained in the SOP for Decontamination.

8.0 Sample Preparation

8.1 Introduction

Prior to sample transport or shipment, ground-water samples may require filtration and/or preservation dependent on the specific type of analysis required.

Specific preservation techniques are described in the EPA document, Handbook for Sampling and Sample Preservation of Water and Wastewater (EPA-600/4-82-029). The EPA manual and laboratory manager should be consulted during the planning stage of the project. Project-specific sampling plans shall be assembled using the approved procedures obtained from the EPA manual.

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8.2 Filtration

Ground-water samples collected for dissolved metals analyses will be filtered prior to being placed in sample containers. Ground-water filtration will be performed using a peristaltic pump and a 0.45 micron, water filter. Typically the water filters are 142 mm in diameter and are usually placed in 142 mm polycarbonate housings.

The filtration of ground-water samples shall be performed either directly from the monitoring well or from intermediate sample containers such as decontaminated buckets. In either case, well purging shall be performed first. Fresh ground water shall then be filtered and discharged from the filtration apparatus directly into sample containers. For most dissolved metal analyses, pH adjustment of the sample is also required and shall be performed after filling the sample bottles. This is generally accomplished using laboratory supplied compounds such as sulfuric or nitric acid and sodium hydroxide.

9.0 Documentation

A number of different documents must be completed and maintained as a part of ground-water sampling effort. The documents provide a summary of the sample-collection procedures and conditions, shipment method, the analyses requested and the custody history. The list of documents is:

- Ground-water sample collection record
- Sample labels
- Chain of custody forms and tape
- Shipping receipts

Sample labels shall be completed at the time each sample is collected and will include the information listed below. A sample label is shown in Figure 4.

- Client or project name
- Sample number
- Designation (i.e., identification of sample point no.)
- Analysis
- Preservative (e.g., filtration, acidified pH<2 HNO_3)
- Sample-collection date
- Sampler's name

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Figure 5 displays the chain of custody record used by ERT. The chain of custody form is the record sample collection and transfer of custody. Information such as the sample collection date and time of collection, sample identification and origination, client or project name shall be entered on each chain of custody record. In accordance with 40 CFR 261.4(d) the following information must accompany all ground water samples which are known to be non-hazardous and to which U.S. Department of Transportation and U.S. Post Office regulations do not apply. Such information is:

- sample collector's name, mailing address and telephone number,
- analytical laboratory's name, mailing address and telephone number,
- quantity of each sample,
- date of shipment, and
- description of sample.

The chain of custody forms provide a location for entry of the above-listed information.

10.0 References

EPA, Handbook for Sampling and Sample Preservation of Water and Wastewater EPA-600/4-82-029, September 1982.

Geotrans, Inc. RCRA Permit Writer's Manual, Ground-Water Protection prepared for U.S. EPA. Contract No. 68-01-6464, October 1983.

Code of Federal Regulations, Chapter 40 (Section 261.4(d).

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Figure 1

ENSR

Well No. _____

GROUND WATER SAMPLE COLLECTION RECORD

Job No. _____ Date: _____

Location: _____ Time: S _____

Weather Conds.: _____ F _____

1. WATER LEVEL DATA: (from ToC) ToC Elevation (from LS) _____

a. Total Well Length (+ TC) _____ (known, meas.) Tape Corr. (TC) _____

b. Water Table Elev. (+ TC) _____ Well Dia. _____

c. Length of Water Column _____ (a-b)

2. WELL PURGING DATA:

a. Purge Method _____

b. Required Purge Volume (@ ____ well volumes) _____

c. Field Testing: Equipment Used _____

Volume Removed	T°	PH	Spec. Cond.	Color

3. Sample Collection: Method _____

Container Type	Preservation	Analysis Req.

Comments: _____

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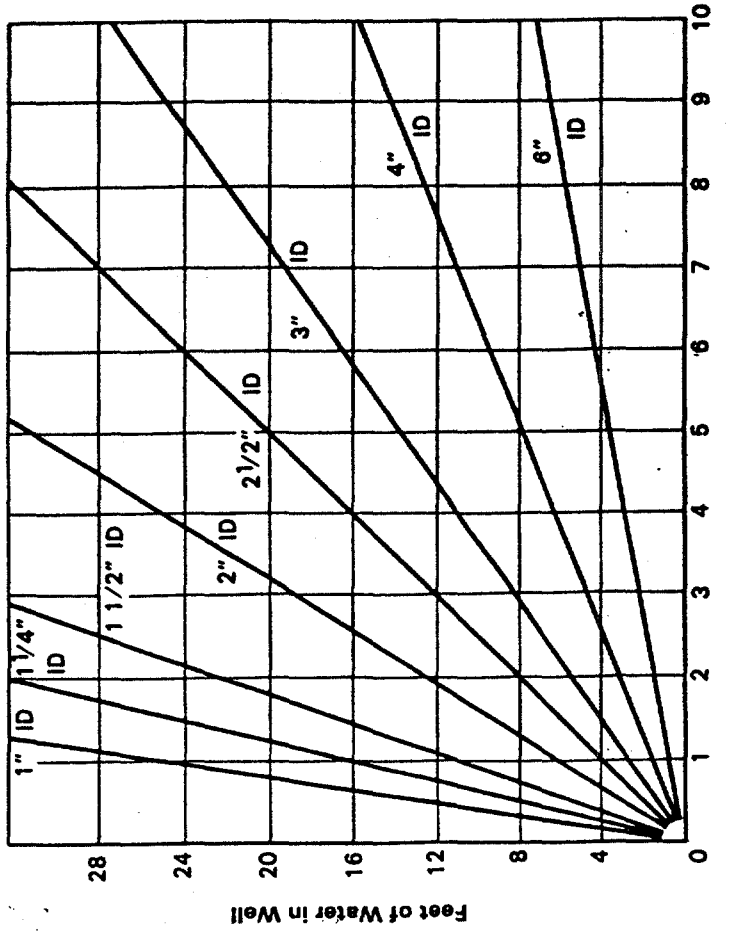
Volume/Linear Ft. of Pipe		
ID(in)	Gal	Liter
1/4	0.003	0.010
3/8	0.006	0.022
1/2	0.010	0.039
3/4	0.023	0.087
1	0.041	0.154
2	0.163	0.618
3	0.367	1.39
4	0.653	2.47
6	1.47	5.56

(b) Volume Factors



(a) Graphical Explanation

Figure 2 Purge Volume Computation

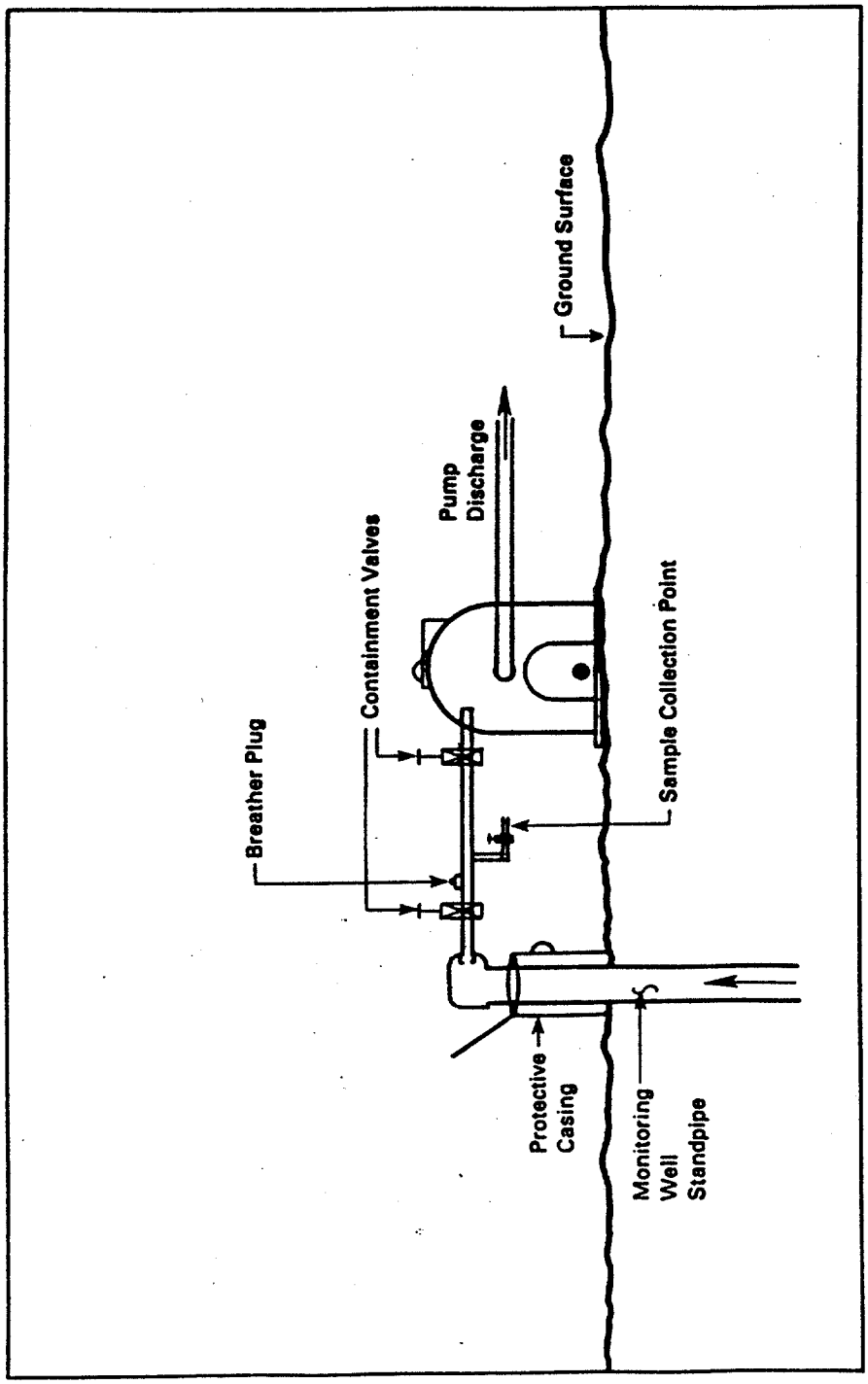


Figure 3 Down Well Suction Line Configuration

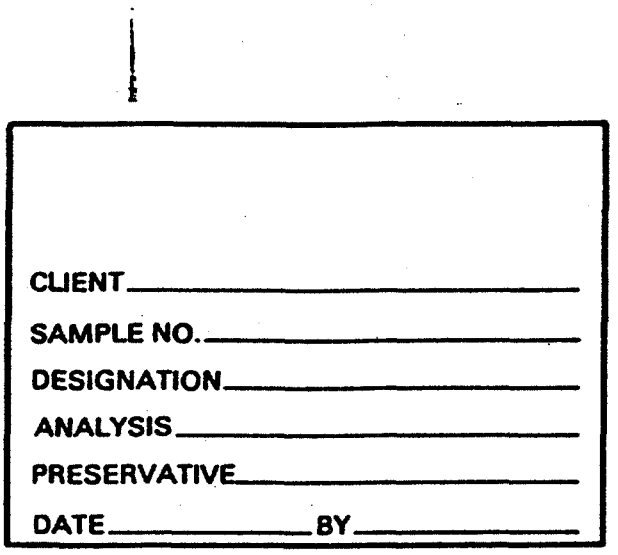


Figure 4 Sample Container Label

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CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location	ANALYSES
Project No.	Field Logbook No.	
Sampler: (*Signature*)	Chain of Custody Tape No.	

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample							REMARKS

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*)	Date	Time
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time
SAMPLE COLLECTOR	ANALYTICAL LABORATORY				
				No.	

1974-3-84

Figure 5 Sample Chain-of-Custody Record

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