SPRING 2003

GROUNDWATER PLUME

SNAPSHOT SAMPLING PROJECT

WORK PLAN

April 2003

Document No. GWSNAP-03.1-WP

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PADC-2003-00066

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1.0 Introduction

Since the 1950s, approximately 1400 groundwater monitoring wells have been installed at the Rocky Flats Environmental Technology Site (RFETS; the Site). Groundwater monitoring activities conducted in the early- to mid-1990s included the sampling of essentially all existing wells. These wells had been installed to monitor the water table, characterize various Operable Units (OUs), estimate background concentrations, or for other reasons. The analytical data from these wells showed the presence of several large volatile organic compound (VOC) contaminant plumes.

Since the mid-1990s, groundwater sampling at RFETS has been performed at far fewer wells. Reasons for the decrease in scope included financial considerations, recognition of the fact that groundwater contamination at the Site does not migrate very rapidly, and the desire to target leading edges of known groundwater plumes and their pathways to surface water. These wells are identified in the Integrated Monitoring Plan (IMP), which is updated annually and targets selected buildings, cleanup actions, surface water drainages, the eastern boundary of the RFETS, and contaminant pathways to surface water. While the result is a more cost-effective program that monitors plume migration and focuses on protection of surface water, wells within plume interiors and in other locations have not been sampled for many years. The current understanding of groundwater VOC contamination at the Site is therefore based on a mix of older and more recent data.

As the Site nears final closure, unnecessary wells will be abandoned. Therefore, as final closure of the Site nears, the opportunity for a final, large-scale assessment of groundwater conditions in and around the main contaminant plumes will be lost.

As described in this Work Plan (WP), the Spring 2003 (FY03) Groundwater Plume Snapshot Sampling Project (Snapshot) takes advantage of this opportunity by collecting VOC data that will provide a comprehensive "snapshot" of VOC concentrations – that is, a VOC dataset that is representative of a large number of locations (371 wells) during a relatively short time period (i.e., 3-4 months rather than spread across a decade). These data will assist current modeling efforts and environmental restoration planning. This project will include non-IMP wells within and around the Industrial Area (IA) and associated VOC plumes. For maximum success, this project is intended to be performed during the high-water period (2nd calendar quarter), otherwise many more wells would be dry.

This project is being implemented by the Kaiser-Hill (K-H) Water Programs Group of the Environmental Systems and Stewardship organization at RFETS. Actual sampling may be performed by field personnel attached to the Analytical Services Division (ASD). All activities performed under this WP will conform to the Groundwater Monitoring Program Health and Safety Plan (HASP).

2.0 Data Quality Objectives

The data quality objective (DQO) process consists of seven steps and is designed to be iterative; the outputs of one step may influence prior steps and cause them to be refined. Each of the seven steps are described below for the Snapshot project. Data requirements to support these investigations were developed and are implemented in the project using criteria established in *Guidance for the Data Quality Objective Process*, QA/G-4 (EPA 1994).

2.1 State the Problem

The current understanding of VOC contamination in groundwater at the RFETS is based on data from various locations, which were not collected concurrently. That is, the most recent data from some wells are from the early 1990s, while data from other wells are as recent as 2003. Using these data can present problems because earlier data may be less reliable or have detection limits that are too high to

support useful evaluation. Further, conditions may have changed considerably since those older data were collected.

As the Site nears final closure and all but the critical, post-closure monitoring wells are abandoned, the opportunity to obtain a robust analytical dataset from as many wells as possible and representing a short time period (a period of about 3 months) will be lost. These data are needed to both provide a final "snapshot" of VOC plumes at the Site as well as to support contaminant modeling and environmental restoration efforts currently underway.

2.2 Identify the Decision

Decisions to be made using data collected from the groundwater monitoring wells sampled for this project include:

- Are plume configurations depicted in recent documents (e.g., the 2001 Annual Rocky Flats Cleanup Agreement [RFCA] Groundwater Monitoring Report) representative of current conditions?
- Have plume configurations and/or concentrations changed markedly since the older data were collected?
- Have individual contaminant distributions changed markedly since the older data were collected?
- Should additional sampling (e.g., for VOCs or other analytes) be performed at some of the non-IMP wells?
- Should the IMP be revised to add or remove certain wells?
- Are additional wells needed to provide an adequate post-closure monitoring network?
- Is natural attenuation, via biodegradation of VOCs, occurring to a significant degree at RFETS; and if so, where?

2.3 Identify Inputs to the Decision

Inputs to the decision include laboratory analytical results from groundwater samples collected from existing and newly installed monitoring wells. The parameters of interest include VOCs and selected field parameters. Data collected via the Snapshot will be merged with data collected from routine (IMP) groundwater monitoring activities to develop a more complete and current database of VOC results.

Further inputs to the decision include water level measurements from existing monitoring wells, which can be used to delineate groundwater flow directions for interpretation of contaminant transport.

2.4 Define the Boundaries

The investigative boundaries and rationale are detailed in Sections 1 and 2 of this WP and are shown, via the wells identified for Snapshot sampling, on Plate 1. In general, the boundaries are defined by known VOC plumes in and around the IA. These plumes are shown on "composite" VOC plume maps that have been presented in recent Annual RFCA Groundwater Monitoring Reports (e.g., DOE 2000, 2001, and 2002) and include the central IA, East Trenches/OU 2 area, 903 Pad/Ryan's Pit area, Solar Evaporation Ponds area, Property Utilization and Disposal (PU&D) Yard/Present Landfill area, and smaller areas along the southern margin of the IA.

2.5 Decision Rule

If VOCs are detected in a well, that well will probably be contained within plume outlines mapped by Water Programs staff. (Data qualifiers and other considerations may support excluding the well from the plume outlines.) If concentrations differ markedly from previous data (especially with respect to

established Action Levels), an evaluation of potential impacts to surface water will be performed. If the various parameters measured to assess redox potential indicate natural attenuation may be occurring in a well, this may affect the evaluation. (For example, additional sampling that focused on indicators of biodegradation would be warranted, the results of which could affect considerations of groundwater treatment.) The IMP will be reviewed and revised as necessary for the 2004 version in order to reflect the improved understanding resulting from the Snapshot.

2.6 Limits on Decision Errors

Additional characterization, if required, will be based upon an evaluation of data collected under this WP compared with historical data and other data from the area around each well. An evaluation of data quality will be performed on laboratory data utilizing precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters and data validation. Data validation typically is performed on 25% of the laboratory analytical data, while the remaining 75% are verified. Groundwater monitoring will be performed in accordance with this WP, appropriate task-specific Standard Operating Procedures (SOPs), and the current RFETS IMP (DOE 2003).

2.7 Optimize the Design

If further characterization is required to evaluate or confirm results obtained through the sampling activities described in this WP, such as resampling of selected wells, installation of additional wells, or collection of additional analytes, these activities will be conducted under a separate WP or the IMP.

3.0 Methodology

This section describes how the list of wells to be sampled for this WP was created and how the wells are to be sampled.

3.1 Snapshot Well Selection

Criteria used to generate the list of wells to be sampled for the Snapshot included data availability, well location and construction, and inclusion in the IMP.

Wells lacking VOC data more recent than December 31, 2000 were identified via an automated query of the Soil and Water Database (SWD). The resulting list was reviewed and wells that were not in or immediately adjacent to areas of VOC groundwater contamination were removed from the list. Wells whose diameter was less than 0.5" were also removed (with two exceptions, both of which have provided ample groundwater for VOC samples in the past).

The result was a list that included several IMP water quality wells. These were reviewed against the sampling schedule for the quarter in which the Snapshot is to be conducted. If already scheduled for IMP sampling during the 2nd calendar quarter of 2003, they were removed from the Snapshot list; if not scheduled for IMP sampling during that quarter, they were retained in the list for Snapshot sampling only. The reason for this was to maximize the chances of obtaining samples from those few IMP wells that were retained in the Snapshot list.

Finally, a small number of wells was added to the resulting Snapshot list based on their location with respect to plumes, to complement data collected from other wells in the list.

Wells identified for sampling in the Sampling and Analysis Plan for Groundwater Monitoring of the Industrial Area Plume (K-H 2001) were then added to the Snapshot list. This addition was made to satisfy the requirements of that document, which called for a second round of sampling to be performed

at each of the wells identified. For convenience, efficiency, and maximum data usability, sampling of these wells will be performed in the same time period and to the same requirements as other Snapshot wells.

All wells to be sampled via the Snapshot are listed in Appendix 1.

3.2 Groundwater Sampling Methods

All non-IMP wells sampled as part of this WP shall be purged and sampled using low-flow (micropurge) techniques in accordance with SOP RMRS/OPS-PRO.113, Groundwater Sampling, and RMRS/OPS-PRO.108, Measurement of Groundwater Field Parameters, with the modifications specified in this WP. Sampling of IMP wells is performed by pumping or bailing as described in these SOPs, but should include measurement of additional redox-sensitive field parameters (items 5 through 10 in the list of parameters presented in Section 3.3.2). Addition of these field parameters to the normal IMP sampling activities will help to maximize the data usability of the analytical results obtained.

Four piezometers installed for B-Pond dam evaluations will also be sampled for the Snapshot. A review of documentation summarizing their installation, together with conversations with Water Operations personnel who routinely visit these piezometers, indicate they are appropriate for sampling. The ASD Groundwater Supervisor shall notify Water Operations personnel (x4176) when a general timeframe to sample them has been selected to discuss any issues that may impact the scheduling of field activities at these locations. Notification shall be repeated upon actual start and completion of Snapshot activities. (This is to ensure any unusual water levels measured by Water Operations in these piezometers can be evaluated against the dates of sampling to assess the cause[s] of the unusual data.) Although Water Operations personnel report they have removed automated instrumentation from all dam piezometers, they also indicate some may remain. If present, it would consist of tubing and may be removed and disposed. The sampling crew shall inform Water Operations if any downhole items are found.

There are conflicts between this WP and the Fiscal and Calendar Year 2003 Well Abandonment and Replacement Program Work Plan Addendum (F&CY03 WARP WPA). Specifically, that WPA identifies pre-abandonment sampling – including analytical suites and priorities – to be performed at a number of the wells scheduled to be abandoned as part of the work scope. While most of these wells are scheduled for VOC collection, some are not; and in some cases the VOCs are not listed as the highest priority in the WPA. In the event of conflicts between the requirements of these documents, the Snapshot WP shall take precedence: The pre-abandonment suites shall be adjusted to reflect VOCs as the highest priority for wells included in the Snapshot list. Wells in the Snapshot list that also require additional analyte collection for pre-abandonment purposes are identified in Appendix 1 in case sampling crews are able to maximize efficiency by collecting the entire Snapshot/pre-abandonment suite in the same sampling event.

Collection of any additional analytes from wells scheduled for pre-abandonment sampling need not be performed using low-flow methods. If the crew desires (for example, to save time), the remainder of the pre-abandonment suite may be collected using traditional (e.g., bailer) methods. This is left to the crew's discretion, unless the ASD Groundwater Supervisor or Water Programs Snapshot Lead wishes to provide specific instruction. Except as specifically modified by this WP, all sampling shall be performed with due care and attention to quality, in accordance with SOP RMRS/OPS-PRO.113.

3.2.1 Purging and Sample Collection

A peristaltic pump shall be used to purge most wells and collect most samples, but exceptions will apply in some instances. First, if a well is equipped with a dedicated bladder pump, that pump shall be used instead of a peristaltic pump. Second, if the water level in the well is too deep to enable effective sampling with a peristaltic pump, a bladder pump shall be used to sample the well. Third, if the water level is too deep for a peristaltic pump and the well is too narrow for a bladder pump, the well shall be purged and sampled very carefully (so as not to agitate the water and cause VOC loss or a change in

redox conditions) using a bailer. Such instances should be few, as most small-diameter wells in Appendix 1 are less than 20' deep, and even deeper wells may be purged and sampled with a peristaltic pump if the water level remains sufficiently high.

Where peristaltic or bladder pumps are used, drawdown in the well shall be carefully monitored using a water level sounder, and shall be minimized to ensure true micropurging techniques are being used and to allow warning of dewatering conditions. The water level sounder shall be lowered gently into the water column to minimize aeration of the water.

Where a peristaltic pump is used, the intake of the pump shall be set 1' above the bottom of the screen. This is to maintain consistency among all wells, whether sampled with peristaltic or bladder pump.

Criteria to be used to determine when the purge is complete shall not be tied to a volume calculated from the initial well volume, but rather to stabilization of parameters 1 through 4 in the list in the following section. This includes any wells that, because they cannot be pumped, must be bailed.

The number of wells in which bladder pumps will be needed (due to water depth) is not known, but may be significant. Therefore, it may be most efficient or necessary to set up a bladder pump with sufficient tubing to sample a number of these wells, and then to thoroughly decon the pump and tubing per applicable SOPs between each use. In such instances, the following issues shall be carefully considered and addressed:

1. The pump shall be lowered into the well very slowly and carefully so as to minimize agitation of well waters.
2. The pump intake shall be positioned approximately one foot above the bottom of the screen so as to be consistent with other dedicated pumps.
3. Pumped waters shall be stabilized per the SOP and this WP, and samples shall be collected.
4. Immediately after removal from a well, all interior and exterior portions of the pump, tubing, and cable shall be thoroughly decontaminated with a Liquinox and distilled or deionized water wash followed by a distilled or deionized water rinse. Because of the potential for cross-contamination and the difficulty in disassembly and reassembly of these pumps, sampling crews shall pay extremely close attention to and shall be especially thorough in this activity. Decon of interior surfaces shall be performed by pumping a sufficient volume of the wash solution, i.e., at least three full volumes, through the pump and tubing, followed by pumping distilled water until suds are no longer visible. Crevices, openings, connections, braided cables, and other points which may harbor contamination shall receive special attention. Equipment rinse samples (Section 4) shall be collected from bladder pumps as well as peristaltic pumps.
5. Pumps and tubing shall be transported in fresh, clean, fully-enclosing plastic bags. Bags shall not be used if any holes are present or if any foreign matter is inside them. Everything must fit inside the bags; no components shall be transported in the open air.
6. After removing the pump and tubing from the bags at the next well, and immediately prior to installing the pump in that well, the outer surface of all components (pump, tubing, cables, etc.) shall be rinsed with distilled or deionized water. Excess water shall be gently shaken off the equipment, then it may be installed in the well.

Sample collection shall proceed in accordance with methods set forth in RMRS/OPS-PRO.113, Groundwater Sampling, as modified herein. Vials for VOC analysis shall be filled to zero headspace and chilled immediately after collection to 4 degrees Celsius (4°C). All samples shall be handled, preserved, transported, and shipped in accordance with RMRS/OPS-PRO.069 (Containing, Preserving, Handling, and Shipping Soil and Water Samples) and PRO-908-ASD-004 (Onsite Transfer and Offsite Shipment of Samples).

3.2.2 Field Parameters

Most field parameters shall be measured using a flow-through cell attached to a YSI multiparameter probe. For some parameters, this will not be feasible; a Hach DR2010 (or newer) spectrophotometer and appropriate test kit shall be used to measure them.

In addition to the standard micropurge suite of field parameters defined in SOP RMRS/OPS-PRO.108, Measurement of Groundwater Field Parameters, several redox-sensitive parameters shall be measured. Field parameters shall be measured in accordance with the appropriate instrument or test kit manufacturer's instructions.

If dilution is required to bring the sample water into range for the instrument and/or method, care shall be taken in decontaminating dilution equipment, measuring aliquots, and minimizing oxygenation of the sample and diluting waters, especially if the dilution is for the measurement of sulfide or ferrous iron. Dilution equipment shall be decontaminated immediately prior to use and shall be rinsed with sample water after decontamination to acclimate it to the sample water. The results of pre-dilution measurements shall be recorded, as shall successive dilutions and the calculations and volumes used to form the diluted sample. These data shall be included on the sampling form (SOP RMRS/OPS-PRO.113).

The following list comprises all parameters to be measured and defines the method to be used:

	Parameter	Method
1.	Water temperature	YSI
2.	pH	YSI pH probe
3.	Specific conductance	YSI conductivity probe
4.	Turbidity	YSI turbidity probe
5.	Dissolved oxygen (DO) (mg/L)	YSI oxygen probe
6.	Oxidation/Reduction Potential (ORP)	YSI using Pt working electrode vs. Ag/AgCl reference
7.	Ferrous iron	DR2010 spectrophotometer phenanthroline method
8.	Iron (II+III)	DR2010 FerroVer method
9.	Sulfide	DR2010 methylene blue method
10.	Sulfate	DR2010 SulfaVer method
11.	Total alkalinity	Orion Total Alkalinity reagent

Appearance, odor, time, volume purged, and water level (drawdown) shall also be monitored and recorded as the purging and sampling proceeds. The presence or absence of the "rotten-eggs" odor of hydrogen sulfide is of special interest.

The first four parameters listed above (temperature, pH, specific conductance, and turbidity) shall be used to determine and confirm stabilization has been achieved. While not used for stabilization purposes, the fifth and sixth (DO and ORP) shall be recorded at the same frequency as the first four parameters listed above.

The last five parameters listed above (both iron measurements, both sulfur measurements, and alkalinity) shall be measured at the end of the purge. Of these five, ferrous iron and sulfide (numbers 7 and 9 above) shall be measured first to obtain the best results for these redox-sensitive parameters. No samples shall be collected, nor shall the last five parameters be measured, until all of the first four parameters have stabilized to the limits defined in RMRS/OPS-PRO.108 and RMRS/OPS-PRO.113. Special exceptions to these field parameter requirements exist for wells that may dewater, as discussed in the next section.

3.2.3 Dewatering Wells

If micropurging techniques are performed correctly and the well is receiving ample recharge, no well will dewater. However, if even the minimum pump rate causes drawdown to the point that well dewatering is deemed very probable or certain, special considerations and instructions shall apply.

- To ensure the potential for dewatering is known in advance of it actually occurring, the water level in the well will be monitored throughout the purge. (This is also done to confirm micropurging techniques are being used in wells that will support their use.)

- If dewatering appears probable (based on a comparison of the pump rate, an educated guess of how much additional volume might be needed to reach parameter stabilization, the volume needed for samples, and the calculated volume of water still present in the well), the crew shall notify the ASD Groundwater Supervisor in case special alternate instructions are warranted. The ASD Groundwater Supervisor shall consult with the Water Programs Snapshot Lead as appropriate.

- As dewatering becomes imminent, unless instructed otherwise by the ASD Groundwater Supervisor the crew shall perform the appropriate actions to address the following priorities (listed in the order of importance):
  1. VOC sample collection;
  2. Collection/measurement of special field parameters (parameters 7 through 11 in the list above);
  3. Stabilization of field parameters (parameters 1 through 4 above).

As indicated, the highest priority is to collect the analytical samples. Therefore, if dewatering appears imminent, purging shall cease while there is still sufficient water for the VOC sample. Any water remaining after sample collection may be used for the special field parameters. It would be acceptable to slowly lower the peristaltic pump intake to the bottom of the screen in order to maximize the volume recovered from the well. However, stagnant water within the sump shall not be used for any of the top three priorities listed above.

If the well dewaters despite the crew's best efforts, they shall immediately notify the ASD Groundwater Supervisor, who shall notify the Water Programs Snapshot Lead. The crew shall then perform a ten-minute recharge calculation in accordance with RMRS/OPS-PRO.113. The crew shall immediately relay the results to the ASD Groundwater Supervisor, who shall consult with the Water Programs Snapshot Lead as appropriate for guidance. The crew may be directed to continue purging, to collect final field parameters and samples, or to return within the following 24 hours to collect final field parameters and samples.

3.2.4 Dry and Technically-Dry Wells

Non-IMP Snapshot wells that are completely or technically dry shall be visited only once. Determination of technically-dry status (i.e., the well contains no water above the bottom of the screen) shall be made very carefully to ensure wells that might produce samples are not inadvertently eliminated from sampling activities.

3.2.5 Shipment and Analysis of Samples

Samples shall be shipped using the same handling, shipping, and turnaround-time requirements as are used for routine samples.

Samples shall be analyzed by appropriate laboratories selected by ASD, using the same analytical method used for routine (IMP) VOC analysis (i.e., method SW846-8260).

4.0 Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) samples shall be collected to support the Snapshot. The standard ratio of real to QA/QC samples, as applied to the Groundwater Monitoring Program, shall also apply to the Snapshot. This ratio is one duplicate and one equipment rinse sample per twenty real samples.

Duplicate samples shall be collected from the same water as real samples, alternating to fill a real sample vial, then a duplicate sample vial, then a real sample vial, and so on. Equipment rinse samples shall be collected from the same equipment used to collect the samples, immediately after that equipment has been decontaminated. This equipment shall be used to transfer distilled or deionized water (i.e., via pumping or bailing, as appropriate) to sample vials. Collection of the equipment rinse samples shall be performed in the field, at the well from which the real samples were collected.

All activities shall be performed in accordance with the applicable SOPs and other pertinent Site procedures and requirements. Timely, accurate, and complete documentation of activities, measurements, results, observations, and other relevant aspects shall be recorded in field logbooks and/or field forms included in the SOPs, as appropriate.

Quality assessments (field audits) of Snapshot field activities may be performed at any time, with or without advance notice, by the Groundwater Supervisor and/or the Water Programs Snapshot Lead. Field visits or quality assessments may also be performed by other individuals associated with the Snapshot through their supervisory responsibilities, data needs, contractual associations, or Site QA/QC responsibilities.

Any deviations from SOPs or this WP that pertain to the Snapshot sampling shall be documented in detail and discussed within 24 hours with the ASD Groundwater Supervisor, who shall relay the information to the Water Programs Snapshot Lead as soon as possible in case resampling the well or other recovery actions are necessary.

APPENDIX 1

SNAPSHOT SAMPLING WELL LIST

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
00193	P	7	10	20	2.2	22.2	22.2	4	PVC	7.9	8.8
00197*	J	7	4.5	9.4	0	9.4	10.4	0.75	PVC	3.4	5.2
00198	M	8	11.4	16.2	0.2	16.4	16.4	0.75	PVC	10.4	8.6
00291	N	9	44	54	2	56	58	2	PVC	42.4	16
00298	M	8	7.5	12.3	0.2	12.5	12.5	0.75	PVC	6.3	2.6
00391	N	8	16.8	21.8	2	23.8	27	2	PVC	16.4	16.9
00397*	K	11	4	9	2	11	11	2	PVC	3	1
00398	M	8	10	14.8	0.2	15	16	0.75	PVC	8.6	9.3
00498	M	8	9	13.8	0.2	14	14	0.75	PVC	7.8	9.7
00598	M	8	10.4	20.2	0.2	20.4	20.4	0.75	PVC	9	15.9
00697	L	7	3	8	2	10	12	2	PVC	2.5	4.1
00698	N	8	13.2	18	0.2	18.2	18.2	0.75	PVC	12.2	10
00798	N	8	9.1	13.9	0.2	14.1	14.1	0.75	PVC	7.7	5
00891	O	8	7.9	17.9	2	19.9	23.9	2	PVC	7.3	18.2
00898	N	8	11.1	15.9	0.2	16.1	16.1	0.75	PVC	10.1	4.1
00998	N	8	5	9.8	0.2	10	12.1	0.75	PVC	3.8	4.6
01098	N	8	7.4	12.2	0.2	12.4	12.4	0.75	PVC	6.4	
01197	I	11	13	28	2	30	31	2	PVC	11	28
01198	N	8	10.4	20.2	0.2	20.4	20.4	0.75	PVC	9.3	18.8
01291	O	8	5.3	13.3	2	15.3	18.9	2	PVC	4.8	12.9
01297	I	11	14	34	2	36	36.5	2	PVC	11	34.1
01298	N	8	13.3	18.1	0.2	18.3	18.3	0.75	PVC	12.1	16.3
01391	M	9	6	14	2	16	22	2	PVC	5.5	14.5
01398	N	8	4	8.8	0.2	9	10.1	0.75	PVC	2.9	6.4
01491	M	9	14	24	2	26	30.5	2	PVC	11.7	1.6
01498	N	8	5	9.8	0.2	10	10.2	0.75	PVC	4	6.4
01597	J	12	14.6	29.6	2	31.6	31.6	2	PVC	11	28.5
01598	N	8	3	8	0.2	8.2	10.2	0.75	PVC	2.2	7
01698	N	8	11.2	16	0.2	16.2	16.2	0.75	PVC	10.2	15.3
01791	N	9	10	18	2	20	24.2	2	PVC	9.1	8
01797	J	11	12	22	2	24	30	2	PVC		22
01798	N	8	3	7.8	0.2	8	8	0.75	PVC	2	5
0187	K	8	3.38	11.83	0.25	12.08	14.87	2	316 SS	3.02	11.8

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
01897	J	11	13	22.8	0.2	23	24	0.75	PVC	1.9	23.2
01898	N	8	3.2	8	0.2	8.2	8.2	0.75	PVC	2.1	3.2
01991	N	9	28.8	38.8	2	40.8	44.8	2	PVC	26.8	29.4
01997	K	11	7	12	2	14	14.8	2	PVC	7	12
01998	N	8	2.5	4.3	0.2	4.5	8	0.75	PVC	1.5	2.4
02091	N	9	15.6	30.6	2	32.6	36.2	2	PVC	12.8	16.1
02098	N	8	2.9	4.7	0.2	4.9	6.1	0.75	PVC	2	3
02191	N	9	8	13	2	15	20.8	2	PVC	6	13.5
02198	O	8	3	7.8	0.2	8	12	0.75	PVC	2	4.5
02298	O	8	3.3	8.1	0.2	8.3	8.3	0.75	PVC	2.3	4.6
02398	O	10	5.7	10.5	0.2	10.7	10.7	0.75	PVC	4.6	4.2
02491	N	9	11.8	16.8	2	18.8	24.2	2	PVC	10.8	8.5
02498	P	10	6.7	11.5	0.2	11.7	22	0.75	PVC	5.6	12
02591	Q	10	42.1	49.1	2	51.1	54.4	2	PVC	41.1	39.8
02598	P	10	10.9	20.7	0.2	20.9	22.3	0.75	PVC	9.8	5.8
02697	P	10	16.14	26.14	2.26	28.4	28.4	2	PVC	14	24.8
02698	P	10	8.2	18	0.2	18.2	18.2	0.75	PVC	7.1	3.4
02797	Q	10	31.31	41.35	2.25	43.6	43.6	2	PVC	28	39.3
02798	P	10	4	8.8	0.2	9	14.6	0.75	PVC	3	2.6
02891	O	9	6	9	2	11	14.9	2	PVC	5	9.1
02897	Q	10	21.74	36.75	2.25	39	39	2	PVC	19.6	37.3
02898	P	11	3.9	13.7	0.2	13.9	13.9	0.75	PVC	2.9	2
02991	N	9	42	52	2	54	57.9	2	PVC	35	15.8
03091	O	9	35	50	2	52	57.4	2	PVC	33	17.3
03191	O	9	11.2	21.2	2	23.2	27.4	2	PVC	10.7	21.1
03198	M	10	7	12	0	12	12	0.75	PVC	5.75	7.8
03298	M	10	20	25	0	25	25	0.75	PVC	18	23
03391	N	10	29.9	39.9	2	41.9	46.1	2	PVC	26.9	10.8
03398	N	10	14	19	0	19	19	0.75	PVC	12	16.5
03498	L	11	11	16	0	16	16	0.75	PVC	10	13
03591	O	9	20.1	30.1	2	32.1	37.7	2	PVC	19.7	30.1
03598	Q	11	4	13.8	0.2	14	16.2	0.75	PVC	3	4
03691	O	10	30	40	2	42	46	2	PVC	27	7.5

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
03698	Q	11	5	14.8	0.2	15	15	0.75	PVC	3.9	4.6
03791	O	10	38	48	2	50	54.41	2	PVC	34.4	4.9
03998	M	8	3	7.8	0.2	8	10	0.75	PVC	2	8
04098	M	8	2.9	7.7	0.2	7.9	14.1	0.75	PVC	2	6
04191	O	9	7.1	17.1	2	19.1	25	2	PVC	6	17.1
04198	M	8	8	12.8	0.2	13	18.1	0.75	PVC	6.9	11.6
04291	O	9	18.1	23.1	2	25.1	30.5	2	PVC	17.6	17
04298	N	8	4	5.8	0.2	6	6	0.75	PVC	2.9	
04491	O	9	17	27	2	29	33.5	2	PVC	14.3	27
04691	P	9	33.9	43.9	2	45.9	49.9	2	PVC	33.4	43.9
04891	P	9	29.7	39.7	0	39.7	45.8	2		29	39.7
05191	P	9	36	46	2	48	50.6	2	PVC	35.5	44.8
05291	P	9	25.1	35.1	2	37.1	41	2	PVC	23	34.4
05293	L	10	2.7	7.7	2	9.7	10.3	2	PVC	1.9	6.6
06191	Q	10	22.1	32.1	2	34.1	38.2	2	PVC	20	32
07891	O	9	18	28	2	30	31	2	PVC	16.3	27.5
07991	O	9	16.1	26.1	2	28.1	36.5	2	PVC	13.4	26
08091*	O	9	11.3	16.3	2	18.3	22.9	2	PVC	9	16.1
08291	O	9	6	14	2	16	20	2	PVC	5.5	14
08391	P	9	28	38	2	40	44	2	PVC	25.5	37.2
08491	O	9	6	16	2	18	23	2	PVC	5.4	16
08591	P	9	32	42	2	44	48.9	2	PVC	29.7	40.7
09691	N	8	6	14	2	16	20	2	PVC	5.5	3.1
10092	M	7	5.21	18.77	1.83	20.6	20.6	2	PVC	4.6	18.6
10192	L	7	4.93	16.84	1.87	18.71	20.1	2	PVC	4.42	16.4
10197	M	10	12.45	16.45	0	16.45	16.45	0.75	PVC	12.5	13.7
10292	L	7	17.98	22.71	1.61	24.32	25.9	2	PVC	16.98	15.2
10392	K	7	5.52	25.2	1.56	26.76	28.2	2	PVC	5	24.8
10492	K	7	25.88	30.33	1.6	31.93	32.5	2	PVC	24.5	22.6
10594	N	12	4.45	7.9	2.55	10.45	10.45	2	PVC	3.5	7.9
10694	P	12	3.7	5.7	2.3	8	10.9	2	PVC	3.1	5.7
1086	J	12	3.29	23.78	0	23.78	27	2	316 SS	2.8	23
1087	M	8	3.5	12	0	12	17	2	316 SS	3	11.3

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
10892	K	7	18.53	23.39	1.58	24.97	25.5	2	PVC	17.5	15.5
11094	J	7	2.4	6.75	3	9.75	9.75	2	PVC	1.4	6.5
11397	N	9	9.2	13.2	0	13.2	15.6	0.75	PVC	8	8
11491	O	10	10.3	25.3	2	27.3	27.3	2	PVC	8	
11691	O	10	18.5	33.5	2	35.5	35.5	2	PVC	15.9	9.5
11697	N	10	26.5	30.5	0	30.5	30.5	0.75	PVC	25	26.1
11897	N	9	6.9	10.7	0	10.7	18	0.75	PVC	6	6.3
12291	M	9	7.1	14.1	2	16.1	16.1	2	PVC	6	2
12391	P	10	58.4	68.4	2	70.4	76	2	PVC	56.1	36.5
12491	O	10	45	60	2	62	65.9	2	PVC	41.7	30
1287	N	8	4.91	10.01	0.24	10.25	16	2	316 SS	4.5	3.5
12891	P	9	25.5	35.5	2	37.5	40.6	2	PVC	23.5	37
12991	N	9	19.5	34.5	2	36.5	37	2	PVC	18.6	16.1
13391	Q	10	29	39	2	41	41	2	PVC	26.5	38.6
13491	N	9	19	29	0.5	29.5	29.5	2	PVC	13	29.4
13591	N	9	6	16	2	18	18	2	PVC	5.5	16
1487	N	8	19	24.05	0.25	24.3	32.4	2	316 SS	18	5.2
15199	N	10	4.3	9.3	2	11.3	11.3	2	PVC	3.5	5
15299	N	10	6	9	2	11	11	2	PVC	4.3	8.9
15399	N	10	4.3	7.3	2	9.3	9.3	2	PVC	3.5	7.2
15499	N	10	5.5	10.5	2	12.5	12.7	2	PVC	4.5	6.4
1586	M	11	4.09	14.44	0	14.44	18	2	316 SS	3	12.5
1886	M	11	3.74	7.5	0	7.5	10.5	2	316 SS	3	8
1987	N	9	3.5	11.65	0.24	11.89	16.05	2	316 SS	3	10.8
20098	L	11	12.3	22	0.30	22.3	22.3	0.75	PVC	10	18
20191	O	10	37	57	2	59	76	2	PVC	34.1	33.1
20198	L	11	5	9.8	0.20	10	16	0.75	PVC	4	9.5
20291	O	10	18	33	0.3	33.3	33.3	2	PVC	16	33.1
20398	K	11	10.4	22.9	0.30	23.2	23.2	0.75	PVC	3.5	19
20491	O	10	16.6	31.6	1.3	32.9	32.9	2	PVC	14.6	
20591	N	9	4.1	24.1	0.5	24.6	24.6	2	PVC	3.6	24.5
20598	K	11	5.7	15.2	0.3	15.5	21	0.75	PVC	4.7	14.5
20691	N	9	4.5	24.5	0.5	25	25.8	2	PVC	3.8	24.5

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
20698	K	11	12	21.6	0.3	21.9	24	0.75	PVC	9.9	20.4
20791	N	9	29.5	34.5	2	36.5	37.9	2	PVC	28.7	24.5
20891	O	9	21.7	63.7	0.3	64	64	2	PVC	18	19.4
20898	K	11	7.8	15.8	0.30	16.1	16.1	0.75	PVC	7	15.6
20991	O	9	21	63	2	65	70	2	PVC	18.5	19.4
21091	O	9	19	63	2	65	68	2	PVC	17	15
21191	O	10	35.8	57.8	0.2	58	58	2	PVC	29	31.7
21198	K	10	14.7	29.1	0.3	29.4	29.5	0.75	PVC	8	28
21298	K	10	10.1	19.7	0.3	20	21	0.75	PVC	9	19.1
21398	K	10	7.1	13.7	0.3	14	16	0.75	PVC	6	13.1
21498	K	10	6	10.7	0.3	11	15	0.75	PVC	5	9.9
21598	K	10	6.1	13.7	0.3	14	15	0.75	PVC	5	13
21698	K	10	5.9	15.5	0.3	15.8	20	0.75	PVC	4.8	13
21798	J	10	16.1	25.7	0.3	26	26	0.75	PVC	15	24
2187	M	9	3.255	10.405	0.15	10.555	17	2	316 SS	3	8
21898	J	10	12.2	21.7	0.30	22	22	0.75	PVC	11	18.3
21998	J	10	12.2	19.7	0.30	20	20	0.75	PVC	11.5	
22098	J	10	10.4	24.7	0.30	25	25	0.75	PVC	6.5	26.8
22198	L	11	7.6	17.2	0.4	17.6	20	0.75	PVC	6.5	22.7
22298	L	11	6.5	16.1	0.30	16.4	20	0.75	PVC	5.5	16.6
2286	L	10	3.2	11.2	0	11.2	26	2	316 SS	2.5	11
23196	O	8	15	25	2.5	27.5	27.5	2	PVC	14.5	27
24097	P	10	8.29	18.06	0.16	18.22	18.22	0.75	PVC	7	5.5
2487	N	9	3.5	13.6	0.25	13.85	18.6	2	316 SS	3	15.1
2587	N	9	17.5	43.45	0.25	43.7	47	2	316 SS	17	16.5
2686	L	10	3.75	11	0	11	17	2	316 SS	3.1	10.5
2687	O	9	4	13.45	0.25	13.7	18	2	316 SS	4	14.5
2787	P	9	3.5	43	0.25	43.25	46.7	2	316 SS	3	44.2
2986	M	10	2.83	8.77	0	8.77	22.5	2	316 SS	2.5	8.5
30002			4.4	16.4	0.1	16.5	17	1	PVC	3	0.6
30200	K	11	5.02	27.9	0.1	28	28	0.75	PVC	4.5	1.8
30300	L	11	5.34	19.9	0.1	20	20	0.75	PVC	4.5	15.9
30400	L	12	5.3	29.9	0.1	30	30	0.75	PVC	4.5	5.4

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
30500	L	12	5.11	30.9	0.1	31	31	0.75	PVC	4.5	5.9
30600	L	12	5.15	30.9	0.1	31	31	0.75	PVC	4.15	1.8
30700	L	12	5.02	27.9	0.1	28	28	0.75	PVC	4.5	1
30800	K	12	2.85	21.9	0.1	22	22	0.75	PVC	2.35	6.9
30991	M	7	5.1	9.9	2.35	12.25	12.25	2	PVC	5	8.8
31491	L	7	13.9	18.9	2.4	21.3	21.5	2	PVC	11.75	16.5
3186	L	11	2.46	17.32	0	17.32	22	2	316 SS	2.4	0.5
31891	L	7	16.59	18.59	2.41	21	21.6	2	PVC	14.6	17.2
3287	P	9	36.03	46.58	0.25	46.83	51.7	2	316 SS	35.5	46.2
33491	L	8	6.68	8.69	2.41	11.1	11.4	2	PVC	6.1	8
33691	L	8	6.19	8.11	2.49	10.6	10.9	2	PVC	6.1	7.8
3387	O	9	15	20	0.25	20.25	24.5	2	316 SS	14.4	19
33891	L	7	6.7	8.7	2.4	11.1	11.6	2	PVC	6	8.1
34591	M	8	6.9	8.9	2.4	11.3	11.3	2	PVC	6	8.2
34791	M	8	6	8	2.42	10.42	11	2	PVC	5.9	8
35391	K	8	6.1	8.11	2.39	10.5	10.5	2	PVC	5.5	6
35991	K	8	8.68	13.7	2.4	16.1	16.1	2	PVC	6.5	12.2
36191	L	8	9.52	14.6	2.4	17	17	2	PVC	7.4	14
36391	L	8	17.43	27.41	2.39	29.8	29.8	2	PVC	14.75	26.4
36691	L	8	15.83	25.83	2	27.83	28.33	2	PVC	13.67	25
3686	N	10	3.5	6.49	0.01	6.5	10.2	2	316 SS	2.5	5.5
36991	L	8	6.62	8.62	2	10.62	11.3	2	PVC	6	8
37191	L	8	11.12	21.07	2	23.07	23.8	2	PVC	9.2	20.5
37591	L	8	7.6	12.6	2	14.6	14.7	2	PVC	5.6	12
37691	M	8	6.51	16.5	2	18.5	19	2	PVC	5.5	16.2
37891	L	8	43.2	53.2	2	55.2	56.4	2	PVC	40	4.7
37991	L	8	45.2	55.2	2	57.2	57.5	2	PVC	43	6.9
38191	L	8	10	15	2	17	18.2	2	PVC	8.1	14.7
38291	L	8	6.7	8.7	2	10.7	11.4	2	PVC	6	8.4
38891	M	7	7.3	9.3	2	11.3	14.2	2	PVC	6.6	9
38991	M	7	26.8	36.8	2	38.8	56	2	PVC	24.8	19.5
39191	L	8	32.8	42.8	2	44.8	46.5	2	PVC	30	7.1
39291	L	7	33.95	43.95	2	45.95	55.5	2	PVC	31.7	10.8

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
40193	M	11	12	22	12.1	34.1	26	1	PVC	10	21.4
40991	O	12	5.9	7.4	2.33	9.73	10.1	2	PVC	5.3	7.4
4186	P	9	3.9	44.7	0	44.7	45.06	2	316 SS	2.79	44.6
41993	L	10	4.5	14.5	2	16.5	20	1	PVC	4	7.6
42393	L	10	3	13	2	15	15.1	1	PVC	3	8.1
4286	O	9	6.12	29.7	0	29.7	35	2	316 SS		28.3
4287	M	13	3	6.36	0.24	6.6	12.4	2	316 SS	2.5	6.1
42893	L	10	5.8	11.95	0	11.95	12	2			7.2
42993	L	10	6	16	2	18	18.4	1	PVC	5.5	12.9
43293	M	10	9	14	2	16	18.4	1	PVC	8.5	10
44202			5.4	30.3	0.1	30.4	31.5	1	PVC	4.9	
4487	M	8	1.5	3.5	0.2	3.7	7	2	316 SS	1.25	3.2
45391	L	7	12.7	17.7	2.5	20.2	20.7	4	PVC	11.7	
45593	L	11	3	5.5	0	5.5	6	2	PVC		1
45793	L	11	2	4	2	6	8.5	1	PVC	1.5	4
45893	L	11	8	18	2	20	22.1	1	PVC	7	9
45993	L	11	2.5	5	2	7	7.5	1	PVC	2	4.3
46093	L	11	4	7	0	7	7	2	SS		
46193	L	11	2	7	2	9	10	1	PVC	1.5	2.2
46293	L	11	3	8	2	10	12.3	1	PVC	2.7	8
46393	M	11	12.5	22.5	2	24.5	24.5	1	PVC	10.5	22
4887*	L	7	3.5	10.05	0.25	10.3	14.7	2	316 SS	3	10
4987	M	7	1.8	4.75	0.25	5	10	2	316 SS	1.3	9
50092	N	7	5.3	10.3	2.8	13.1	14.8	2	PVC	3.3	10.2
50299	N	8	9.8	14.3	0.3	14.6	14.6	2	PVC	9.1	2.4
50399	K	8	17.1	22.1	0.4	22.5	22.5	2	PVC	15.8	20.7
5087	M	8	3.5	13.5	0.2	13.7	26	2	316 SS	3	12.5
51193	N	7	5.15	7.65	2.35	10	10	2	PVC		7.1
5287	L	8	3.5	20.25	0.25	20.5	28	2	316 SS	3	20
54494	L	11	9.9	19.9	2.1	22	22.4	1	PVC	7.5	4.9
5487	L	7	1.33	4.53	0.15	4.68	10	2	316 SS	1.25	4
5587*	L	7	3.35	7.35	0.15	7.5	12	2	316 SS	3	5.5
5687	L	10	3.52	9.67	0.25	9.92	13.4	2	316 SS	3	9.4

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
57094	I	7	24	34	2.00	36	37.5	2	PVC	22	34
5786	I	7	2.5	6.5	0.25	6.75	12	2	316 SS		6
57894	I	7	5	10	0	10	10	0.5	PVC		
58294	J	7	2	5	0	5	9	0.5	PVC	1.8	3
58394	J	7	3.4	5.4	2	7.4	9.5	2	PVC	2.9	5.3
58494	J	7	5	10	0.00	10	13	0.5	PVC	2	12.75
58694	J	7	2	5	0	5	9	0.5	PVC	1.8	2.2
58793	H	7	14.8	24.8	2.5	27.3	28.4	2	PVC	12.2	24.6
58794	J	7	2	5	0	5	9	0.5	PVC	1.8	1.95
59194	I	7	26	36	2	38	46	2	PVC	24	33.4
59294	I	7	15	17	2	19	32	2	PVC	10	14
59393	I	7	2.5	7.5	2.5	10	12.4	2	PVC	2	7.5
59493	I	7	7.9	12.9	2.85	15.75	19.3	2	PVC	3	14.9
59593	I	7	3	13	2.85	15.85	17.9	2	PVC	2.5	13
59594	I	7	27.6	37.6	2	39.6	41	2	PVC	25.5	37.5
59694	I	7	6	16	2	18	20	2	PVC	4	16.1
59794	I	7	11	21	2	23	25.2	2	PVC	10	15.5
59893	J	7	9.6	14.6	0.00	14.6	14.6	0.4	Teflon		
60099	K	10	5	9.8	0.2	10	11	0.75	PVC	4.5	9
60194	N	8				9.9	9.9				
60195	N	10	6	11	0	11	11	0.75	PVC		10.4
60294	N	8				8.92	8.92				
60295	O	10	6.3	16.2	0	16.2	16.2	0.75	PVC		14
60394	N	8				14.87	14.87				
60395	O	10	3.4	8.3	0	8.3	8.3	0.75	PVC		6
60494	N	8	7	10	0.76	10.76	10.76				
60495	N	10	8.5	18.4	0	18.4	18.4	0.75	PVC		16
60594	N	8				20.77	20.77				
60595	N	10	6.2	11.2	0	11.2	11.2	0.75	PVC	4	9
60694	N	8				14.56	14.56				
60695	P	10	9	13.9	0	13.9	13.9	0.75	PVC	7	13
60794	N	8	12	13	0.57	13.57	13.57				
60795	Q	11	3.1	8.1	0	8.1	8.1	0.75	PVC		5

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
60799	K	9	4.87	9.74	0.15	9.89	12.2	0.75	PVC	3.87	5.3
6086	L	7									9
60894	N	8				9.45	9.45				
60895	Q	11	3	7.9	0	7.9	7.9	0.75	PVC		5
60993	I	7	3	8	0.2	8.2	8	0.5	PVC		3.9
60994	N	8	8	11.25	0.41	11.66	11.66				
60995	Q	11	2.1	7.1	0	7.1	7.1	0.75	PVC		4
61093	I	7	3	13	0.1	13.1	13	0.5	PVC		9
61094	N	8	12	14.75	0.15	14.9	14.9				
61095	N	10	4.3	14.3	0	14.3	14.3	0.75	PVC		12.5
61194	N	8				14.46	14.46				
61293	I	7	3	8	2.85	10.85	12	2	PVC	2.5	7
61294	N	8				12.25	12.25				
61295	L	7	5.4	10.4	0	10.4	10.4	0.75	PVC	3	8
61394	N	8	10.5	13	0.37	13.37	13.37				
61494	N	8	12.5	13.75	0.75	14.5	14.54				
61495	J	11	7.2	12.2	0	12.2	12.2	0.75	PVC	4	11.5
61594	N	8	18.1	19.1	0.7	19.8	19.77				
61595	K	11	6	10.9	0	10.9	10.9	0.75	PVC	4	10
61695	J	11	4.5	14.4	0	14.4	14.4	0.75	PVC	2.5	11.5
62095	Q	9	4.9	14.8	0	14.8	14.8	0.75	PVC		10
62195	Q	9	2.5	6.5	0	6.5	6.5	0.75	PVC	2	4
62395	R	11	5.5	10.4	0	10.4	10.4	0.75	PVC		8
62893	J	7	9.8	14.8	0.00	14.8		0.4	Teflon		
63093	G	7	7	22	2.8	24.8	24.8	2	PVC	5.8	19.6
63193	J	7	11.1	21.1	0.00	21.1	21.1	0.5	PVC		16
63293	N	7	4.98	7.62	0	7.62		0.5	PVC		
63393	N	7	2.86	4.5	0	4.5		0.5	PVC		
63395	O	10	3.1	8	0	8	8	0.75	PVC	2	6
63493	N	7	4.87	9.85	0	9.85		0.5	PVC		
63893	I	7	7.95	12.9	0	12.9		0.5	PVC		
63993	I	7	7.75	12.75	0	12.75		0.5	PVC		
64093	I	7	8	13	0	13		0.5	PVC		

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
6886	K	7	1.5	3.5	0	3.5	9	2	316 SS	1	2.8
70099*	L	11	10.7	20.7	1.3	22	10	2	PVC		
70299*	L	11	26.09	36.1	1.4	37.5	10.1	2	PVC	24.9	24.3
71102			23.81	33.9	0.1	34	34.5	1	PVC	23.31	22
71202			26.99	33.9	0.1	34	34.31	1	PVC	26.3	25.3
71394	H	7	5.6	10.6	2	12.6	13.6	2	PVC	3.6	10.5
71494	J	7	35	40	2	42	48.1	2	PVC	32.9	5.3
76192	N	10	4	6	2	8	14	2	PVC	3	6
76292	M	10	9.2	19.2	2	21.2	21.2	2	PVC	8.8	8.5
76792	L	12	3.5	5.5	2.3	7.8	12.2	2	PVC	3	6.3
77392*	L	12	3.9	6.9	2	8.9	13.8	2	PVC	3.2	7
77492	K	11	12.1	22.1	2	24.1	24.1	2	PVC	11.4	22.5
84002	I	8	7.7	27.9	0.10	28	28.7	1	PVC	6	24.2
84102	J	8	7.79	24.7	0.10	24.8	25.5	1	PVC	6	16.2
84202	K	8	6.98	23.9	0.10	24	25	1	PVC	5.48	18.3
84302	K	8	6.4	18.4	0.10	18.5	19	1	PVC	4.8	12.4
84402	J	9	8.4	23.4	0.10	23.5	24	1	PVC	6.5	17.5
84502	K	9	7.89	22.9	0.10	23	23.5	1	PVC	6	12.7
84602	I	9	9.76	26.35	0.15	26.5	27.5	0.75	PVC	8	20.5
84702	I	9	9.99	26.9	0.10	27	27.5	1	PVC	8	20.8
84802	I	9	7.91	29.7	0.10	29.8	30.2	1	PVC	6	25.2
84902	I	9	8.04	29.9	0.10	30	30.5	1	PVC	6	24.7
85002	I	10	9.5	31.4	0.10	31.5	32	1	PVC	7.5	25.6
85102	I	9	9.8	31.9	0.10	32	32.3	1	PVC	7	26
85202	I	9	6.3	28.4	0.10	28.5	29.2	1	PVC	5	24
85302	I	9	11.8	33.9	0.10	34	34.5	1	PVC	10	24
90199*	N	8	5.8	10.8	2.3	13.1	14	2	PVC	3.6	8.8
92399	O	10	9.15	13.95	0.3	14.25	14.1	0.75	PVC	7	11
B206689	L	12	8.7	18.17	1.24	19.41	21.7	4	PVC	7.3	3.7
B206889	L	12	8	17.45	0.75	18.2	19.5	4	PVC	7	3
B208089	M	11	3.4	12.9	1.26	14.16	22.2	4	PVC	2.88	12.2
B208589	M	11	3.23	3.99	1.08	5.07	9.6	4	PVC	2.5	3.6
B208689	M	11	12.32	21.8	1.27	23.07	28.4	4	PVC	11.3	7.3

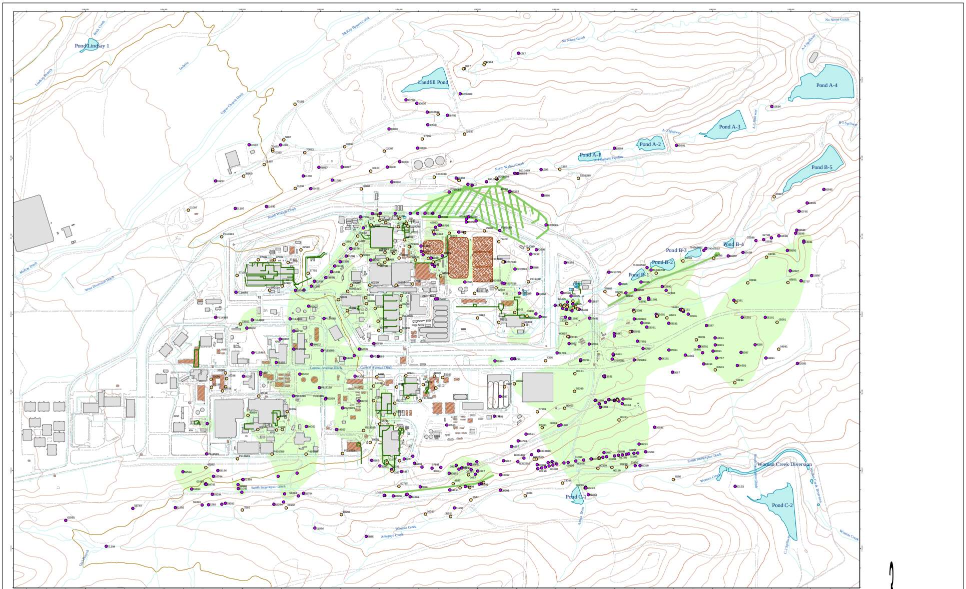
Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
B210389	M	11	13.61	23.07	1.28	24.35	28.5	4	PVC	12.6	8.6
B210489	M	11	2.98	7.41	1.26	8.67	28.1	4	PVC	2.3	7
B213789	N	10	2.46	6.9	1.35	8.25	9.4	2	PVC	2	6.4
B218789	N	9	9.06	28.5	1.3	29.8	42.3	4	PVC	8	28
B220189	O	9	12.91	14.86	1.24	16.1	18	2	PVC	7.7	15
B303390	M	8	6.05	8	1.25	9.25	10.8	2	PVC		8
B303490	M	8	5.55	7.5	0.58	8.08	11.2	2	PVC		7.5
B303590	M	8	7.7	9.7	1	10.7	17.8	2	PVC		9.7
B303690	M	8	12.06	16.5	3.8	20.3	20.8	2	PVC		17.2
P114689	K	9	17.83	22.24	1.26	23.5	26	2	PVC	16.55	22
P114789	J	9	21.81	26.23	1.47	27.7	31	2	PVC	21.1	26
P114889	J	9	9.89	14.3	1.25	15.55	18	2	PVC	8.66	13.8
P114989	I	9	33.59	38	1.30	39.3	43.5	2	PVC	32.6	37.5
P115489	J	9	22.09	26.5	1.25	27.75	31	2	PVC	20.7	26
P115589	J	9	25.05	29.48	1.22	30.7	33.6	2	PVC	24.05	29
P115689	K	9	16.23	20.2	1.11	21.31	23.5	2	PVC	14.9	19.7
P119389	I	10	12.5	16.9	1.31	18.21	26	2	PVC	11.5	16.4
P207389	L	10	10.53	15.18	1.08	16.26	23.3	4	PVC	9.35	7
P207689	M	10	3.64	13.1	1.26	14.36	18.2	4	PVC	3	12.6
P207789	M	10	17.9	27.34	1.29	28.63	32.3	4	PVC	16.9	12.9
P207889	M	10	3.26	7.7	1.25	8.95	10.5	4	PVC	2.5	8.5
P209189	L	10	13.3	35.01	1.07	36.08	38.3	4	PVC	12.3	10.3
P209589	M	11	9.07	18.52	1.25	19.77	30.3	4	PVC	8.07	4.1
P209789	M	10	3	12.5	1.25	13.75	17.5	4	PVC	2.5	12
P209889	L	11	8.89	18.33	1.3	19.63	23.9	4	PVC	7.9	3.9
P210089	L	11	12.2	21.5	1.43	22.93	28	4	PVC	11.2	7.2
P213689	K	9	9.08	13.5	1.30	14.8	23	2	PVC	8.1	13
P215789	K	9	14.53	18.5	1.09	19.59	22	2	PVC	13	18
P218289	J	8	9.54	23.5	1.22	24.72	33	4	PVC	8.2	23
P219589	M	10	21.27	25.7	1.29	26.99	35	2	PVC	20.1	17.2
P219989	O	9	20.02	24.45	1.26	25.71	25.86	2	PVC	18.9	
P313489	K	8	16.71	21.1	1.27	22.37	24	2	PVC	15	20.6
P314089	K	9	5.37	9.79	1.27	11.06	19	2	PVC	4.1	9.3

Location	Grid		Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Sump Length (ft)	TD of Casing (ft bgs)	TD of Boring (ft bgs)	Casing ID (in)	Casing Material	Top of Filter Pack (ft bgs)	Top of Bedrock (ft bgs)
P320089	K	8	14.38	18.81	1.27	20.08	20.9	2	PVC	13	18.8
P414189	J	9	14.09	18.5	1.28	19.78	28	2	PVC	13	18
P416289	I	8	19.07	23.5	1.27	24.77	43	2	PVC	18.07	23
P416589	I	8	27.04	31	1.1	32.1	36.5	2	PVC	26.05	30.5
TH046592**	O	10	6	18.5	0.5	19	32	2	PVC		25
TH046792**	O	10	6.5	14	2	16	19.7	2	PVC		14
TH046992**	O	10	10	25	2	27	31	2	PVC		25
TH047092**	O	10	6	11	2	13	16.5	2	PVC		11

Explanation:

ft bgs	Feet below ground surface
TD	Total depth
ID (in)	Internal diameter (in inches)
SS	Stainless steel
77392*	Well is in the IMP, but not for 2nd, quarter 2003 *or* VOCs are not part of the routine suite
2787	Also requires pre-abandonment sampling
TH046592**	Dam Piezometer: requires notification of Water Operations (x4176) immediately prior to and following sampling
Blank cells	Details missing from source database. If well is found to be too narrow for sampling (i.e., 1/4"), contact Groundwater Supervisor for instruction

display at 1:3456
plots at 1"=300'



Legend

- IMP Water Quality Sampling Locations *
- Snapshot Sampling Locations
- footing drains
- Solar Evaporation Ponds (SEPs)
- Lakes and ponds
- Streams, ditches, or other drainage features
- Composite VOC Plume (> 1 ppb, selected VOCs)

- Paved roads
- Dirt Roads
- Trails

Topographic Contours -
- 500-foot
- 100-foot
- 20-foot

* Wells 00197, 00397, 08091, 4887, 5587, 77392, and 90199 would not normally be sampled this quarter. However, they will be scheduled for sampling to support the Snapshot Sampling project. Wells 70099 and 70299 will be sampled for VOCs in addition to their IMP suite.

300 0 300 600 900

Scale in Feet

scale: 1" = 300'

Plate 1
Snapshot Sampling
Well Location Map