APPENDIX II

MONITORING WELL SAMPLING PROCEDURE

The greatest source of inadvertent sample contamination is through incorrect handling by field personnel. The levels of concern are minute, as compared to a waste sample, and extreme care is needed. This will usually slow down the speed of sample collection, but the reliability of test results is increased proportionally.

Water standing in a well may not be a true representation of water quality in the aquifier . Changes in temperature and pressure, contact with air, and prolonged contact with well casing materials can all affect the chemical quality of the water. Therefore, before sampling, the well must be evacuated (purged).

WELL EVACUATION PROCEDURE

Any item coming in contact with the inside of the well casing or the well water should be kept in a clean container and handled only with gloved hands. Always start with the least contaminated well.

For wells with rapid recovery, which cannot be evacuated, 3 well volumes will be removed. This reflects the present technology in which the goal is to clear standing water without diluting any potential plume by drawing in pure water.

A. Assemble Equipment

1. Place a plastic sheet, such as a painter's drop cloth, around the well as a work area. Unlock protective well casing.

2. Bring steel measuring tape and electric sounder to the plastic sheet. The sounder probe and tape have been precleaned in the lab and wrapped in foil. Unwrap without touching them.

3. Put on new gloves. Unlock and remove well cap. Place it top-down on a corner of the plastic sheet.

B. Calculate the volume of water to be evacuated:

1. Use the electric sounder ("m-scope") to measure the distance from top of the casing to top of water.

2. Use the steel tape to measure the distance from top of casing to the bottom of the well or use total depth data provided by company.

3. Subtract #1 from #2 to obtain the height (h) of the column of water in the well.

4. Multiply h times the appropriate conversion factor to obtain the volume of water in the well in gallons.

   a. For a 2-inch inside diameter well,
      h x 0.1623 = Volume (gal)

   b. For a 4-inch inside diameter well,
      h x 0.6 = Volume (gal)

5. Evacuate 3 X Volume (gal) to obtain a representative sample.

6. Clean the steel measuring tape and electric sounder probe by rinsing with methanol followed by distilled water. Wrap in foil for use on the next well. If acetone is used, be sure to allow all apparatus to dry thoroughly before proceeding to next well. Do not use methanol if it is a suspected contaminant.

C. Evacuate the Well

1. Bring 2 dishpans and a measuring container to the plastic sheet and line one dishpan with aluminum foil.

2. Bring the bailer, which has been precleaned in the laboratory and wrapped in foil, to the plastic sheet. Unwrap it without touching the bailer.

3. Bring the roll of bailer cord to the sheet. This roll has also been covered with foil to keep it clean. Place it in the unlined dishpan and unwrap it without handling the rope.

4. At this point both bailer-handler and helper should put on a new pair of gloves.

5. The end of the bailer rope is tied to the top of the bailer. Use foil where needed to assure that the rope does not touch any item while in use.

6. The bailer is lifted and lowered carefully into the well until it is submerged.

7. The bailer is raised in a hand over hand manner and the rope is allowed to fall into the polyethylene dishpan lined with foil.

8. Pour groundwater from bailer into the measuring container. Repeat bailing procedure until a 3 X volume (gal) (see B4 and 5) has been evacuated. If the bailer touches the container, line the lip with aluminum foil.

9. If the well goes dry before 3 volumes is obtained, then sample when the well has recovered sufficiently to provide a sample volume. Some wells require 24 hours for recovery and settling.

10. Save the evacuated water in the measuring container for proper* disposal. Do not pour on the ground next to the well.

11. The rope is untied from the bailer and the portion used is cut off for discard.

12. The used gloves, the used rope, the bailer foil, dishpan foil and the plastic sheet are rolled up and discarded in the large trash bag provided.

D. Proceed with sampling procedure or if well requires a recovery period before sampling, replace well cap and lock protective casing. In general allow 24 hours for well water stabilization. Where recharge is rapid and water is clear of sediment, this waiting period may be shortened.

SAMPLING PROCEDURE

A. Bailed Samples:

1. Place a plastic sheet such as a painter's drop cloth, around the well as a work area, to prevent sample bottle contact with the ground. Unlock the protective well casing.

2. Bring 2 dishpans to the sheet and line on with aluminum foil.

3. Arrange sample bottles on the sheet. Place waste water container in vicinity of well.

4. Bring the bailer, which has been precleaned in the laboratory and wrapped in foil to the plastic sheet. Unwrap it without touching the bailer.

5. Bring the roll of bailer cord to the sheet. This spool has also been covered generously with foil to keep it clean. Place it in the unlined dishpan and unwrap it without handling the rope.

   Selection of inert rope is important. New nylon rope is available from several manufacturers. Where organic contaminants are of interest it may be advisable to use teflon rope for the first 10 feet of cord and discard after each well. However, the value of this may be offset by the additional handling required.

6. Take a pair of gloves and unlock and remove the well-cap. Place it top-down on a corner of the plastic sheet.

7. At this point both bailer-handler and helper should put on a new pair of gloves.

8. The end of the bailer rope is tied to the top of the bailer. The rope must not touch anything but clan aluminum foil. use foil where needed.

9. The bailer is lifted and lowered carefully into the well until it is submerged.

10. The helper will unscrew the appropriate sample caps and place them top down on the plastic sheet without touching the interiors or dislodging any teflon discs inside the caps.

11. The bailer is raised in a hand over hand manner and the rope is allowed to fall into the polyethylene dishpan lined with foil. The first bailer-full is discarded into the waste container.

12. The samples are poured into the bottles without bubbles, and are filled to the top without headspace. The helper can hold the bottle and be responsible for recapping without touching the interior of the cap, and screwing down tightly. It is not good practice to leave samples in the sun. They should be removed to the ice chest as soon as possible.

13. The organic samples are the most delicate and should be collected first. A sample for volatile analysis must be filled so that the vial has a meniscus. The cap is slid over it and closed so that no bubble can be seen when the sample vial is upended. The volatile samples are always collected in pairs.

    The other organics usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace.

    If a sample is to be collected for dissolved metals it will not have preservative and should be collected next. It there is a sediment problem this sample should be collected right after the volatile samples in order to minimize the sediment requiring removal.

    Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the helper's gloves and thus pass to other caps and bottles.

    Do not allow the bailer to touch any sample bottles, or allow any rope end or gloved fingers to contact the sample well water while pouring.

14. All remaining sample bottles should now be carried to the ice chest where they are labeled, placed in zip-loc bags, and iced down.

15. The labels can be pre-filled out leaving less work and time delay at the site.

    The label must have:

    Name of facility
    Date of sampling and time
    Sample description (monitoring well ID and "up" or "down"
    Sampler's name

    Additionally, mark each sample bottle with an identification number using red glass-marking crayon which is resistant to water. Bottle caps are good places to add an I.D. This is a precaution in case labels get wet or come off during transport.

16. The well cap is replaced and locked. Lock the protective well casing.

17. The rope is untied form the bailer and all used rope is discarded.

18. The used gloves, the used rope, the bailer foil, dishpan foil and the plastic sheet are folded up and discarded in the large trash bag provided.

19. Proceed to the next well repeat.

    NOTE: It is good practice to take an extra set of sample bottles to the field in case of breakage or accidental contamination.

B. BAILER CLEANING

The best procedure is one bailer for one well. However, when this is not possible a single bailer may be cleaned between wells as follows: (Use of any other solvents will interfere with test results).

1. The sampler, without removing gloves, will untie the rope and will open the bailer to allow the helper to pour distilled water into and around the bailer. This will be shaken and poured out.

2. The helper will then pour spectrograde isopropanol into and around the bailer. It is again shaken and poured out.

3. A final rinse is now performed with distilled water in copious amounts into and around the bailer.

4. A fresh piece of aluminum foil is placed on the plastic sheet and the bailer is placed in it. The foil is folded around it for carrying.

5. It is important to sample the upgradient well first and then proceed to the more contaminated wells.

6. The bailer is then returned to the laboratory for a thorough cleaning and foil wrapping.

NOTE 1: For wells that are badly contaminated with insoluble wastes field cleaning is not recommended.

NOTE 2: If isopropanol appears in the test, a resampling will have to be done.

C. SPLIT SAMPLES

In order to keep sample handling to a minimum the parallel splitting procedure should be used.

Parallel Split

1. The 2 sample bottles for a given test are lined up and caps removed.

2. One bailer-full is poured into one bottle, and the next bailer-full is poured into the other bottle, alternating until the 2 sample bottles are full. They are then capped as usual.

3. The 2 sample bottles for another test are then lined up, and filled as in 2).

4. This procedure is continued until all test bottles for a given well are filled for both parties.