Canal Creek Study Area
Aberdeen Proving Ground - Edgewood Area, Maryland

GROUNDWATER MONITORING WELL ASSESSMENT FINAL WORK PLAN

ABERDEEN PROVING GROUND

Environmental Management Program

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October 1993

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CONVERSATION RECORD

TIME: 1300 DATE: 8/31/93

TYPE: ☐ VISIT ☐ CONFERENCE ☑ TELEPHONE ☑ INCOMING ☐ OUTGOING

Location of Visit/Conference:

ROUTING	
NAME/SYMBOL	INT
Kirchner SFC	
Montgomery BCMC	

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: Steve Hirsh

ORGANIZATION (Office, dept., bureau, etc.): EPA Reg'n III RPM

TELEPHONE NO:

SUBJECT: Plans for CBL and video and Packing testing for Canal Creek wells.

SUMMARY: Hirsh has no problems with beginning subject work IAW previous cmts expressed at meeting on Canal Creek draft RI workplan 7/29/93. Work will be commencing this week. Plan was mailed to him on Monday.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION: John Wrobel

SIGNATURE: John Wrobel

DATE: 8/31/93

ACTION TAKEN

SIGNATURE

TITLE

DATE

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1.0 INTRODUCTION

Jacobs Engineering Group Inc. (JEG) has been contracted by Environmental Management Operations (EMO)[1] to develop and implement a Groundwater Monitoring Well Assessment Plan for Canal Creek in the Edgewood Area of Aberdeen Proving Ground (APG-EA). The task will be performed under the provisions of Master Agreement 071914-A-D7, Task Order 142133. The project consists of assessing the condition of existing groundwater monitoring wells in the Canal Creek Area prior to a groundwater sampling program. The following Work Plan describes the technical approach that will be used to conduct field work for the project.

1.1 PURPOSE AND SCOPE

Integrity of some monitoring wells installed at APG-EA has come into question because of problems with well completions that were detected in wells at the O-field Study Area during a recent sampling event. Because of this, EPA and APG-DSHE officials have requested a well integrity assessment for a percentage of 168 monitoring wells installed at the Canal Creek Study Area (14 by USATHAMA, 152 by USGS). Results of the well assessment will be used to determine if these wells were completed in a fashion that minimizes the potential for either cross-contamination of aquifers or leakage of water from the surface into the well.

Assessment of well integrity will include a combination of downhole video surveying inside the well, packer testing of the riser casing, and cement bond logging. Downhole video surveys will be performed on 168 monitoring wells prior to conducting other tests. Packer testing is scheduled for 14 USATHAMA-installed wells. Additional USGS-installed wells will be added to the packer testing schedule if video evidence shows cracks, casing separations, or other conditions in a well that show potential for casing leaks. Cement bond log (CBL) data will be used to determine integrity of well completion materials on the outside of a well. CBLs will be run on 14 USATHAMA wells, 37 USGS wells penetrating more than one water-bearing stratum, and a percentage of the remaining wells. If any USGS well fails the CBL, all unscheduled wells will be integrity tested with the CBL. Details of testing procedures and the initial well testing schedule are presented in Section 4.

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[1]EMO is operated for the U.S. Department of Energy by Battelle Memorial Institute.

Well integrity assessments will determine if a tested monitoring well represents a valid sampling point for ongoing studies of groundwater contamination. Recommendations derived from individual well assessment results will include one of the following:

1) no further testing and including the tested well as a valio groundwater sampling point,
2) rehabilitating the well including fishing (removing) obstructions, clearing sediment, and redeveloping, or
3) abandoning of the well in accordance with applicable State of Maryland and Harford County requirements for well abandonment.

Analysis of the assessment results from wells scheduled for testing will be used to determine if integrity of the remaining wells should be tested to assure validity of future groundwater sampling programs.

1.2 REGULATORY CONSIDERATIONS

The task is being performed under the purview of the U.S. Army, EPA *Region III*, and the Maryland Department of the Environment (MDE). Field work and data evaluation will be conducted in accordance with guidance from the U.S. Environmental Protection Agency (EPA) Region III. Use of radioactive sources in downhole geophysical investigations is governed by rules and regulations of the U.S. Nuclear Regulatory Commission (NRC), MDE Office of Toxics-Environmental Science & Health, and Aberdeen Proving Ground Radiation Safety Office.

2.0 SITE BACKGROUND

The Canal Creek project site (Figure 2-1) is located in the Edgewood Area of Aberdeen Proving Ground (APG-EA) in Harford County, Maryland. The project site is generally defined as the portion of APG-EA between the Westwood and Kings Creek/Beach Point areas. The AMTRAK railroad line defines the north boundary of the project site. The south boundary of the site is defined by the range area boundary fence on the northern end of Gunpowder Neck. Zone 18 Universal Transverse Mercator (UTM) coordinates of the approximate center of the project area are 4,361,500 meters north and 387,000 meters east on the Edgewood, Maryland 7.5 minute topographic map.

Through the course of historical groundwater evaluations, 168 monitoring wells have been installed in the Canal Creek area. A limited investigation of groundwater contamination was conducted by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) in 1983. Fourteen monitoring wells were completed in the area. The Hydrogeologic Assessment (HGA) for the Canal Creek area was completed by the U.S. Geological Survey (USGS) in 1991. One-hundred fifty-two monitoring wells were installed during the investigation to characterize groundwater in the area.

Current knowledge suggests that actual measurements of sand packs and bentonite seals were not taken when the USGS monitoring wells were constructed. Well completion material volumes were calculated based on borehole diameter and depth. Allowances were generally not considered for borehole caving and washout problems when sand pack volume calculations were made. Grout or bentonite was observed in well screen slots of some wells in downhole video surveys of several wells conducted by USGS.

USATHAMA monitoring wells were constructed using methods that are inconsistent with currently accepted well construction procedures (i.e., no bentonite seal above the sand pack, well screens hand slotted with a hacksaw, and glued casing joints). Although these wells were completed using such techniques, their position on the site is critical to monitoring migration of contamination.

The following section describes protocols and general safety requirements that will be used while conducting the proposed field work. These include: hours of site work, work in restricted areas, security badges, vehicle access, photography of project activities, general safety procedures with respect to unexploded ordnance (UXO), and on-site communication.

3.1 SITE LOGISTICS

Several protocols will be followed to ensure the safety of individuals onsite as well as to maintain adequate communication with Army operations prior to and during field investigations. Specific safety and security measures may involve the U.S. Army Technical Escort Unit (TEU); the use of personal protective equipment (PPE); and communications with the APG Emergency Operations Center, Chemical Research Development and Engineering Center Security Office (Security), and the Edgewood Fire Department. These measures are addressed in this section. Coordination, notification, and emergency response contacts and telephone numbers are given in Table 3-1.

3.1.1 General Requirements

Prior to the beginning of sampling activities, JEG will mobilize an office trailer to the site and position the trailer in a location to be determined by APG-DSHE. Normal APG-EA working hours are 0800 to 1630 hours. JEG sampling crews will work from 0800 to 1700 hours. If working hours for groundwater sampling in unrestricted areas must be extended into the evening or on weekends, the JEG site manager will coordinate hours for extended work with APG Security and APG-DSHE.

3.1.2 Restricted Areas

Most of the monitoring wells in the Canal Creek area are in areas of open unrestricted access. Escorts and security badges will not be necessary while working in these areas.

Table 3-1. Contacts and Telephone Numbers

NAME	ORGANIZATION	TELEPHONE
John Wrobel*	APG-Directorate of Safety, Health, and Environment	(410) 671-4840 or (410) 671-3320
Bob Crouse	APG-DSHE Installation Safety Division	(410) 671-3157
Mark Montgomery	EMO (Battelle) Program Manager	(916) 852-7172
Gary Grimm	EMO (Battelle) On-site Coordinator	(410) 676-0200
Cristopher Barrett	CBDA Security	(410) 671-2842
Sgt. Linwood White	APG-EA Military Police Operations	(410) 671-2222 or (410) 671-2125
Francine Gordon	JEG Project Manager	(202) 789-7290
Bruce Kirchner	JEG Task Manager	(202) 789-7290
Terry Briggs	JEG Corporate Health and Safety Officer	(303) 595-8855
George Moore	JEG Washington Operations Health and Safety Coordinator	(202) 789-7290
APG-EA Emergency Phone Number		17 (Installation Phones Only) (410) 676-0960
Maryland State Police		911 (Emergency Only)

* Primary DSHE Point of Contact - Site Coordinator

Security is strictly enforced at fenced building sites and areas which are fenced around the perimeter. These sites are conspicuously posted as restricted areas and are well guarded and patrolled. Stringent precautions are taken to ensure security in these areas due to the nature of everyday activities. Security check points, badges, and possible escort requirements are components of the security procedures at fenced sites.

Access to wells and groundwater sampling work in restricted areas will be limited to time between 0800 and 1600 hours. Escorts will be provided by APG-DSHE on an as-needed basis for work in restricted areas. Coordination of escort requirements, lead time needed for escort requests, and escort availability will be between the JEG Site Manager and the APG-DSHE Representative. Well sites for which escorts and special security arrangements must be made include:

CC-11,	Chemical Area Storage Yard (CASY);
CC-12, 126, 127, 128, 129, 135	Buildings E35XX and E37XX areas;
CC-36	Building E52XX area;
CC-101C, 124	Weide Field (airstrip);
CC-104, 136,	Building E31XX area, and;
CC-139, 140	Building E57XX area (storage igloos).

3.1.3 Security Badges

Team members are not required to possess security badges while working in unrestricted areas of APG-EA. JEG will provide JEG personnel with baseball caps, hard hats, or shirts that have the "JE" logo, "Jacobs," or "Jacobs Engineering Group" clearly printed on the article. This will provide a means of preliminary identification.

JEG field team members will obtain contractor badges to minimize the need for an APG-DSHE escort. Forty-five to sixty days are required for issuance of a contractor badge after security papers are completed by the party requesting a badge. Primary JEG field personnel have already submitted the forms necessary to obtain contractor badges.

Temporary visitor badges will be issued to team members working in restricted areas. Temporary visitor badges are issued at the gate to the restricted area. APG Security issues contractor security badges A notice from JEG will be submitted to APG-DSHE at least two weeks in advance for proper personnel clearance to obtain a temporary visitor badge.

An escort from APG-DSHE will be required to accompany JEG personnel wearing temporary visitor badges in restricted areas. Security requirements specify that no more than three people with visitor badges may be escorted by an individual possessing a permanent security badge. A field team member with a temporary badge must be accompanied by the designated escort at all times in restricted areas.

3.1.4 Vehicle Access

Vehicle passes will be obtained as needed for all vehicles used in the sampling project. Generally, APG-EA is open to privately-owned civilian and contractor vehicles. Passes for such vehicles are not required. Privately-owned vehicles (POVs) are not permitted in restricted areas. Only contractor vehicles will be permitted into restricted areas for project activities. Passes for contractor vehicles will be obtained at the restricted area gate, if required.

3.1.5 Camera Passes and Site Photographs

The US EPA strongly suggests complete photo-documentation of all CERCLA site activities. JEG will comply with the suggestion to the extent allowed by APG-DSHE. All JEG personnel who will be in possession of still or video cameras while on site will be required to carry a camera pass. Camera passes will be obtained by each individual at the office of the APG-EA Provost Marshal, building E5141. Photographs taken during the project will be limited to documentation of project-related activities. If it is necessary to document field activities or monitoring well conditions in restricted areas, the APG-DSHE escort will perform the photography. Only one camera per field team will be permitted in restricted areas. The APG-DSHE escort will maintain custody of cameras while sampling in restricted areas. Buildings and structures in sensitive and restricted areas of APG-EA will not be photographed.

3.1.6 Unexploded Ordnance

Unexploded ordnance (UXO) could be encountered at APG-EA. Common ordnance items include grenades, mortar rounds, artillery shells, fuzes with bursters, land mines, and rockets. These items were usually painted to military specifications and labelled to identify the contents (i.e. VX, GB, H, or CS). Weather and the environment may have obliterated markings and paint. Shapes of the ordnance items will be the most common method for determining if UXO occurs at the wellsite. Figure 3-1 shows some of the more common types of ordnance which could be found at APG-EA.

It is unlikely that field teams will encounter UXO at Canal Creek area monitoring well sites. In the event suspected UXO is encountered, all work will immediately cease at that location and the JEG Site Manager will be notified immediately. The field team will clearly mark the suspected UXO location with brightly colored survey ribbon and evacuate the area. The JEG site manager will call the APG Security emergency phone number (17 on APG installation phones, or 676-0960 on civilian phones) and report the discovery of suspected UXO. The JEG site manager will also notify the APG-DSHE site coordinator to report the suspected UXO discovery. TEU or U.S. Army Explosive Ordnance Disposal (EOD) will identify and remove the suspected UXO to provide field teams a clear area at the monitoring well. Work at the monitoring well site will proceed only after the suspected UXO has been removed and permission to resume work has been granted by TEU or EOD.

3.1.7 Onsite Communication

Commercial telephone lines and a two-way radio base station will be available at the JEG office location. Each field team will carry hand-held, two-way radios for communication from sampling sites to the JEG field office. If necessary, a portable cellular telephone will be made available for landline communication from any sampling site in the area.

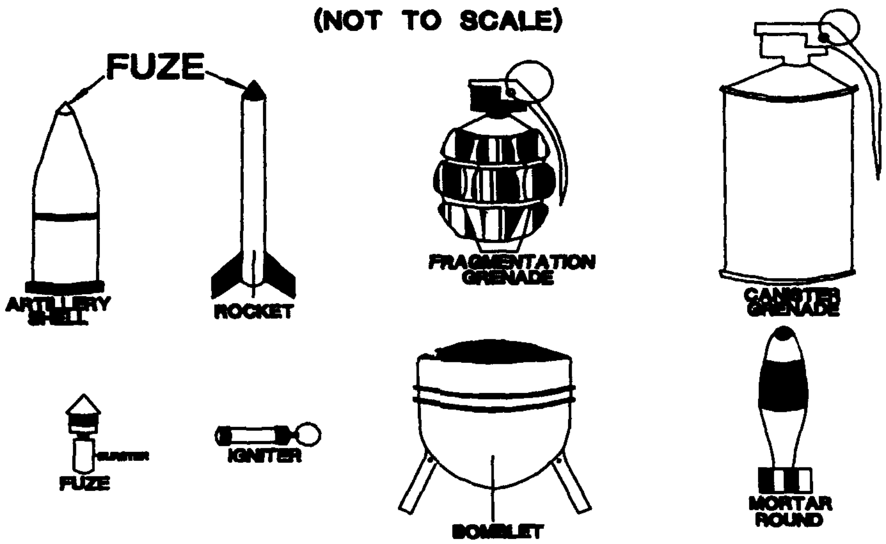

Figure 3-1. Examples of Common UXO

Standardized procedures will be employed by field teams to assure consistency of data quality. The following section describes methods to be used while conducting the proposed field work. The methods include: personal health protection, site safety procedures, groundwater sampling protocols, procedures for decontamination of equipment, and methods for collection and disposal of investigation-derived waste. Where applicable, references to the U.S. Army Corps of Engineers Waterways Experiment Station (WES) standard operating procedures (SOPs) are provided. Applicable quailty assurance measures and SOPs are covered in the Canal Creek Area Groundwater Monitoring Plan, Volume II (QAPP).

Downhole video surveys, packer tests, and geophysical cement bond logs (CBLs) are reliable techniques to assess monitoring well integrity. These techniques will be used on monitoring wells selected during a meeting with EPA, MDE, APG-DSHE, and JEG. Based on EPA comments, a schedule of testing (Table 4-1) has been prepared to show initial testing that will be performed on the monitoring wells. Figure 3-2 of the Groundwater Monitoring Plan, Volume I (FSP) shows the location of the 168 monitoring wells in the Canal Area.

Operation of testing equipment will follow standard industry protocols and manfacturer instructions. Special provisions for using the equipment are provided in Appendix A as proposed SOPs.

4.1 DOWNHOLE VIDEO SURVEYING

Downhole video surveys will be conducted on all USATHAMA and USGS monitoring wells to assess interior well casing and screen conditions prior to any additional testing. Downhole video equipment will be operated by Jacobs personnel familiar with the operation of such equipment. Downhole video equipment will be leased from a source capable of supplying the downhole video camera, sufficient cable to survey the deepest on-site monitoring well (202 feet), and a video cassette recorder. After the video surveying is completed, Jacobs will prepare a list of USGS wells to be subjected to further well integrity assessment. All video surveys will be recorded on video cassette tapes. These tapes will be maintained in the project files. Significant findings will be noted in field logbooks and recorded on diagrammatic well logs. Results of the video surveys will be communicated to EMO in weekly progress reports. Downhole video survey protocols are provided in Appendix A.

4.2 PACKER TESTING

Packer tests of monitoring well riser casings are designed to determine the potential for leakage of water into a well from sources other than the monitored aquifer. Packer testing methods used for this project are modified from standard packer test techniques. Packer tests will be performed on the 14 USATHAMA wells to assess leakage potential of glued casing joints. USGS wells may be added to the packer testing list if the downhole video survey of a well shows evidence of cracks or separations in the riser casing. Findings from the packer tests will be noted in logbooks and communicated to EMO in a weekly progress report. Riser casing packer test protocols are provided in Appendix A.

4.3 CEMENT BOND LOGGING

Cement Bond Logs (CBLs) are used to evaluate the condition and placement of well completion materials using geophysical techniques. The most commonly used geophysical technique for acquiring a CBL is sonic logging. This type of log relies on contrasting acoustic signal travel time characteristics of fluid in the well, well casing, and well completion materials in order to properly interpret the log. Monitoring wells in the Canal Creek Area are completed with PVC pipe and cement/bentonite grout mixtures which do not transmit acoustic energy as well as neat cement grouts and steel casing. This makes determination of well completion integrity highly subjective if sonic logs alone are used for the CBL. Therefore, sonic logs will be augmented with dual-spaced, focused γ-γ density logging to properly evaluate the condition of well completion materials.

Initially, density and sonic CBLs will be run on the 14 USATHAMA wells, at least 10 percent of the USGS wells constructed in water table (surficial) aquifers, all wells identified in USGS reports as grout-contaminated, and 37 USGS wells which penetrate more than one aquifer. Remaining USGS wells will be logged if one of the scheduled wells shows that completion materials were not placed properly in the well.

The logging subcontractor will possess the necessary Nuclear Regulatory Commission, or equivalent state agency, licenses to carry and use radioactive sources for performing the γ-γ

density CBLs. Results of the CBLs will be recorded on standard well logging paper and, if possible, on computer diskette which will be maintained in the project files. Significant findings will be noted in logbooks and on diagrammatic well logs. Results of the CBLs will be communicated to EMO in a weekly progress report. Cement bond logging protocols are provided in Appendix A.

4.4 SAFETY CONCERNS

Field team members will take precautions to minimize their exposure to organic vapors which may be present in the headspace of the well. Full-facepiece, air-purifying respirators with GMC-H cartridges will be used when the well is opened. PID and FID readings will be taken immediately upon opening the well. Personal protective equipment (PPE) will be worn to prevent contact with the groundwater. Gloves will be changed or decontaminated between wells to reduce the risk of cross-contaminating monitoring wells. Specific health and safety measures are provided in the Canal Creek Area Groundwater Monitoring Plan, Volume III (HASP).

4.5 DECONTAMINATION PROCEDURES

Tapwater used for initial cleaning of downhole equipment and decontamination rinse water will be obtained from the designated water supply source. Applicable procedures in QAPP SOP 005 will be used for decontaminating all reusable downhole sampling equipment. Decontamination wastewater will be containerized in 55-gallon drums at the decon pad.

4.6 INVESTIGATION-DERIVED WASTE DISPOSAL

Investigation-derived wastes that will be generated during the execution of the project include: equipment decontamination water, PPE, and uncontaminated solid waste such as cardboard boxes, paper, etc. Care will be taken in the field to segregate these wastes so that disposal costs may be minimized. The proposed procedure for disposing of each category of waste is discussed below.

4.6.1 Decontamination Water

Decontamination water will initially be containerized in a tank near the decontamination area. At the end of field activities, the contents of the tank will be sampled for priority pollutant constituents and pretreatment parameters listed for the APG-EA sewage treatment plant. If it is determined that the decontamination water meets the pretreatment standard, the water will be disposed of by dumping the water into the APG-EA sanitary sewer at a point designated by the APG-EA treatment plant manager. If the decontamination water can be classified as hazardous waste, the water will be disposed of as such by APG.

4.6.2 PPE and Solid Wastes

It is unlikely that PPE and solid waste will constitute a hazardous waste. Every effort will be made to keep the volume of this material to a minimum. All disposable sampling equipment (equipment wrappings, tubing, hoses, etc.) and PPE will be sealed in plastic bags and placed in an APG dumpster for disposal at a landfill.

Table 4-1. Initial Well Assessment Testing Schedule

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTV	PKR[1]	[illegible]
TOTAL USGS WELLS COMPLETED IN SURFICIAL OR WATER TABLE AQUIFER ([illegible])										
1	CC-101A	4	14	5	10	S	SURFICIAL AQUIFER WELL	✓		
2	CC-10A	4	17	12	17	S	SURFICIAL AQUIFER WELL	✓		
3	CC-114A	4	20	12	17	S	SURFICIAL AQUIFER WELL	✓		
4	CC-124A	4	19	13	18	S	SURFICIAL AQUIFER WELL	✓		
5	CC-126A	4	24	13	18	S	SURFICIAL AQUIFER WELL	✓		
6	CC-127A	4	18	6	11	S	SURFICIAL AQUIFER WELL	✓		
7	CC-128A	4	14	6	11	S	SURFICIAL AQUIFER WELL	✓		
8	CC-129A	4	33	17.5	22.5	S	SURFICIAL AQUIFER WELL	✓		
9	CC-12A.1	4	24	14	19	S	SURFICIAL AQUIFER WELL	✓		
10	CC-131A	4	18	11.5	16.5	S	SURFICIAL AQUIFER WELL	✓		
11	CC-132A	4	18	11	16	S	SURFICIAL AQUIFER WELL	✓		
12	CC-133A	4	24	15	20	S	SURFICIAL AQUIFER WELL	✓		
13	CC-135A	4	33	14	19	S	SURFICIAL AQUIFER WELL	✓		
14	CC-1A	4	27	22	27	S	SURFICIAL AQUIFER WELL	✓		
15	CC-20A	4	16	11	16	S	SURFICIAL AQUIFER WELL	✓		
16	CC-20B	4	34	25	30	S	SURFICIAL AQUIFER WELL	✓		
17	CC-22A	4	27	22	27	S	SURFICIAL AQUIFER WELL	✓		
18	CC-23A	4	21	16	21	S	SURFICIAL AQUIFER WELL	✓		
19	CC-29A	4	15	7.7	15	S	SURFICIAL AQUIFER WELL	✓		
20	CC-32A	4	19	10.5	15.5	S	SURFICIAL AQUIFER WELL	✓		

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTS	PKR	CBL
21	CC-32B	4	43	21	26	S	SURFICIAL AQUIFER WELL	✓		
22	CC-33A	4	19	11	16	S	SURFICIAL AQUIFER WELL	✓		
23	CC-33B	4	70	62	67	S	SURFICIAL AQUIFER WELL	✓		
24	CC-33B.1	4	48	41	46	S	SURFICIAL AQUIFER WELL	✓		
25	CC-34A[3]	4	22	14	19	S	SURFICIAL AQUIFER WELL	✓		✓
26	CC-35A	4	50	24	29	S	SURFICIAL AQUIFER WELL	✓		
27	CC-36A	4	26	10	15	S	SURFICIAL AQUIFER WELL	✓		
28	CC-5A	4	20	15	20	S	SURFICIAL AQUIFER WELL	✓		
29	CC-8A	4	52	46	52	S	SURFICIAL AQUIFER WELL	✓		
30	CC-9A	4	13	8	13	S	SURFICIAL AQUIFER WELL	✓		
31	CC-138A	4	12	5	10	I	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
32	CC-19A	4	11	6	11	I	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
33	CC-111A	4	32	25	30	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
34	CC-111B	4	43	31	36	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
35	CC-112A	4	39	29	34	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
36	CC-113A	4	40	30	35	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
37	CC-122A	4	43	22	27	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
38	CC-13A	4	29	24	29	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
39	CC-13B	4	56	51	56	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
40	CC-14A	4	30	25	30	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
41	CC-14B	4	55	50	55	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
42	CC-15A[3]	4	24	19	24	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		✓

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTW	PKR[1]	[illegible]
43	CC-16A	4	23	18	23	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
44	CC-16B[3]	4	38	33	38	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		✓
45	CC-17A	4	24	19	24	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
46	CC-17B	4	35	30	35	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
47	CC-21A	4	35	30	35	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
48	CC-25A	4	27	22	27	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
49	CC-25B	4	45	40	45	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
50	CC-26A	4	20	15	20	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
51	CC-26B	4	40	35	40	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
52	CC-27A	4	23	18	23	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
53	CC-27B	4	40	35	40	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
54	CC-28A	4	21	16	21	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
55	CC-28B	4	50	45	50	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
56	CC-2A	4	36	31	36	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
57	CC-31A	4	37	25	30	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
58	CC-37A	4	43	23	28	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
59	CC-38A	4	48	34	39	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
60	CC-39A	4	29	20	25	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
61	CC-39B	4	63	35	40	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
62	CC-40A	4	34	26	31	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
63	CC-41A	4	57	39	44	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
64	CC-42A	4	49	22	38	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQU	REMARKS	[illegible]	[illegible]	[illegible]
65	CC-43A	4	57	33	38	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		
66	CC-44A	4	37	16	21	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓		

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	[illegible]	[illegible]	[illegible]
TOTAL USGS WELLS PENETRATING MORE THAN ONE AQUIFER (37)										
67	CC-8B	4	80	75	80	I	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
68	CC-101B	4	28	17	22	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
69	CC-101C	4	56	45	50	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
70	CC-114B	4	44	36	41	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
71	CC-114C	4	64	53	58	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
72	CC-124B[3]	4	74	67	72	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
73	CC-12A	4	145	132	137	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
74	CC-12B	4	170	160	165	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
75	CC-19B	4	58	53	58	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
76	CC-1B	4	52	47	52	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
77	CC-1C	4	72	67	72	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
78	CC-20C	4	59	54	59	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
79	CC-20D	4	74	68	73	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
80	CC-22B	4	50	45	50	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
81	CC-22C	4	70	65	70	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
82	CC-23B	4	57	52	57	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
83	CC-29B	4	47	42	47	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
84	CC-36B	4	44	39	44	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
85	CC-36C	4	62	56	61	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
86	CC-36D	4	93	88	93	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
87	CC-5B	4	59	54	59	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	[illegible]	[illegible]	[illegible]
88	CC-5C	4	85	73.5	85	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
89	CC-8C	4	95	89.5	94.5	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
90	CC-8D	4	115	110	115	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
91	CC-9B	4	123	118	123	CC	WELL PENETRATES SURFICIAL AQUIFER	✓		✓
92	CC-1D	4	154	149	154	LC	WELL PENETRATES SURFICIAL AND CANAL CREEK AQUIFER	✓		✓
93	CC-1E	4	173	168	173	LC	WELL PENETRATES SURFICIAL AND CANAL CREEK AQUIFER	✓		✓
94	CC-1F[3]	4	198	183	188	LC	WELL PENETRATES SURFICIAL AND CANAL CREEK AQUIFER	✓		✓
95	CC-8E	4	202	197	202	LC	WELL PENETRATES SURFICIAL AND CANAL CREEK AQUIFER	✓		✓
96	CC-16C[3]	4	88	83	88	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
97	CC-16D[3]	4	120	115	120	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
98	CC-17C	4	103	98	103	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
99	CC-26C	4	149	144	149	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
100	CC-28C	4	137	120	125	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
101	CC-2B	4	145	140	145	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
102	CC-2C[3]	4	187	175	180	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓
103	CC-6C	4	123	115	120	LC	WELL PENETRATES CANAL CREEK AQUIFER	✓		✓

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS			
						TOTAL [illegible] WELLS (14)				
104	C01	4		16	26.1	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
105	C02	2		11	21	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
106	C03	4		15	25	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
107	C04	2		5	15	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
108	C05	4		5	15	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
109	C06	2		18	28	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
110	C07	4		15	25	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
111	C08	4		15	25	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
112	C09	2		25	35	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
113	C10	4		8	18	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
114	C11	2		5	15	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
115	C12	4		12.5	22.5	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
116	C13	4		8	18	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓
117	C14	2		15	25	CC	AQUIFER IS NEAR SURFACE, WATER TABLE AQUIFER	✓	✓	✓

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTV	PKR[1]	CBL[2]
REMAINING USGS WELLS FOR LATER CONSIDERATION (51)										
118	CC-139A	4	101	61	66	LC	WELL COLLARED STRATIGRAPHICALLY BELOW CC AQUIFER	✓		
119	CC-140A	4	89	81	86	LC	WELL COLLARED STRATIGRAPHICALLY BELOW CC AQUIFER	✓		
120	CC-102A	4	74	65	70	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
121	CC-102B	4	89	81	86	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
122	CC-102C	4	118	100	105	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
123	CC-104A	4	87	76	81	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
124	CC-104B	4	99	91	96	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
125	CC-104C	4	129	99	129	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
126	CC-106A	4	96	90	95	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
127	CC-107A[3]	4	58	51	56	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
128	CC-107B	4	88	66	71	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
129	CC-108A	4	60	55	60	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
130	CC-108B[3]	4	74	68	73	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
131	CC-109A	4	47	36	41	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
132	CC-109B[3]	4	69	59	64	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
133	CC-110A[3]	4	53	40	45	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
134	CC-113B	4	64	51	56	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
135	CC-115A	4	60	43	48	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
136	CC-117A	4	83	78	83	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
137	CC-117B	4	103	95	100	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTV	PKR[1]	CBL[2]
138	CC-118A	4	39	32	37	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
139	CC-118B	4	59	51	56	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
140	CC-11A	4	138	133	138	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
141	CC-11B	4	161	156	161	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
142	CC-120A	4	64	55	60	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
143	CC-120B[3]	4	74	65	70	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
144	CC-121A	4	93	68	93	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
145	CC-121B	4	105	91	96	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
146	CC-123A	4	91	77	82	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
147	CC-123B	4	109	101	106	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
148	CC-130A	4	41	32	37	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
149	CC-130B	4	54	47	52	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
150	CC-133B	4	74	60	65	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
151	CC-134A	4	79	70	75	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
152	CC-134B	4	99	93	98	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
153	CC-136A	4	104	98	103	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
154	CC-136B	4	144	133	138	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
155	CC-18A	4	52	47.5	52	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
156	CC-18B	4	70	65	70	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
157	CC-30A	4	42	36	41	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
158	CC-3A[3]	4	140	135	140	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
159	CC-3B	4	165	160	165	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		

Table 4-1. Initial Well Assessment Testing Schedule (cont.)

	WELL	ID	TD	SCREENED INT.		AQ.	REMARKS	DTV	PKR[1]	CBL[2]
160	CC-4A[3]	4	83	78	83	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
161	CC-4B[3]	4	99	88	99	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
162	CC-6A[3]	4	63	58	63	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		✓
163	CC-6B	4	86	81	86	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
164	CC-7A	4	90	85	90	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
165	CC-7A.1	4	73	56	63	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
166	CC-7B	4	107	102	107	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
167	CC-W6	4	90	55	90	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		
168	CC-W7	4	140	119	139	CC	UPPER AQUIFER MISSING, OR INSUFFICIENT DATA	✓		

1. A well will be selected for Packer Testing (PKR) if analysis of Downhole Television (DTV) shows evidence of cracks, separations, or other non-deforming damage in the riser casing.

2. Ten percent (10%) of the surficial or water table aquifer wells will be scheduled for Cement Bond Logging (CBL) after review of the Downhole Television survey. All other wells not originally selected for CBL testing will be tested with the CBL if one of the selected wells should fail (verbal communication, EPA 7/29/93).

3. Denotes well suspected of grout contamination in well screen. Each such well will be CBL tested after DTV surveys are completed.

5.0 REPORTING REQUIREMENTS

JEG will submit three types of reports during the course of the project. A weekly letter report will detail progress of the project and recommendations for further testing of monitoring wells based upon initial data evaluations in order to complete a comprehensive well assessment. A monthly report will detail progress of the project from a performance and cost perspective. A final project report will be submitted at the end of the project and will present the findings of the investigation. The reports will be submitted directly to EMO for evaluation and distribution to the proper agencies.

5.1 WEEKLY PROGRESS REPORTS

Progress reports detailing weekly results of well assessment activity will be submitted by JEG to EMO in a memorandum format. Information contained in the reports will include identification of tested wells, types of testing performed, and recommendations for immediate action concerning any wells that may need additional testing to complete the integrity assessment.

5.2 MONTHLY PERFORMANCE AND COST REPORTS

JEG will submit monthly Performance and Cost letter reports during the course of the project. Each report will detail the technical status and progress of the project to date; labor utilization and costs by labor category; other direct costs (ODCs) incurred for the project; and variances to labor and ODCs projected in a management report which has already been submitted to EMO. Performance and Cost reports will also include a projection of accomplishments for the next month.

5.3 MONITORING WELL ASSESSMENT REPORT

At the conclusion of the project, JEG will prepare a report of the groundwater monitoring well assessment results. The report will be submitted to EMO within 60 calendar days of the collection of the final test. The format of the report will be as follows:

Introduction

- Report objective and criteria
- Governing documents and regulations
- Summary of report contents

Observations and Summary

- Downhole video survey data
- Packer testing results
- Cement bond log summaries
- Recommendations

Tables

- Summary of well status and recommended actions

Appendix

- Annotated Well Location Map.

6.0 REFERENCES

Lorah, Michelle M. and Don A. Vroblesky, 1989, *Inorganic and Organic Groundwater Chemistry in the Canal Creek Area of Aberdeen Proving Ground, Maryland*, U.S. Geological Survey Water Resources Investigations Report, 89-4022.

Nemeth, G., J.M. Murphy, Jr., and J,M, Zarzycki, 1983, *Environmental Survey of the Edgewood Area of Aberdeen Proving Ground,* Report No. DRXTH-AS-FR-82185, U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, MD.

Oliveros, James P. and Patrice Gernhardt, 1989, *Hydrogeologic Data for the Canal Creek Area, Aberdeen Proving Ground, MD, April 1986 - March 1988.* U.S. Geological Survey Open File Report 89-387, Towson, MD

Oliveros, James P. and Don A, Vroblesky, 1989, *Hydrology of the Canal Creek Area, Aberdeen Proving Ground, Maryland,* U.S. Geological Survey Water Resources Investigations Report 89-4021, Aberdeen, MD.

U.S. Geological Survey, 1992, *Contamination of Groundwater, Surface Water, and the Unsaturated Zone and Evaluation of Selected Pumpage Scenarios in the Canal Creek Area of Aberdeen Proving Ground, Maryland, Volume I and II, Draft,* Open File Report.

Appendix A. Downhole Equipment Operating Procedures

1.0 Scope and Application

A Downhole Video Survey is designed to provide visual evidence of conditions inside a monitoring well. The test can be performed in either water table (surficial) or confined aquifer wells.

2.0 Material

a. Downhole television camera system with electronic depth indicator or graduated cable and ancillary equipment to operate the video controller, winch, and video tape recorder.
b. Video cassette recorder with tapes.
c. Measuring tape.
d. Logbook.

3.0 Procedure

The following procedure describes how to set up and run a downhole video system:

3.1 Prepare the well site and set up all equipment in a manner such that no downhole equipment comes into contact with the ground or other potential contaminants. All gasoline- or diesel-powered equipment shall be set up at least 15 feet downwind from the well with exhaust pipes pointed away from the work area.

3.1.1 All downhole equipment shall be decontaminated prior to use in the test in accordance with applicable procedures in QAPP SOP 005.

3.2 Start video equipment and verify that all components are operating properly. **NOTE** -Most downhole television cameras are extremely light sensitive and should only be operated in low light conditions while the camera is being tested.

3.3 Measure the amount of riser casing sticking up above the ground surface. Record this measurement in the field logbook.

3.4 Lower the camera into the well to a starting point approximately equal to the elevation of the ground surface.

3.5 Set the electronic depth indicator to zero or record the depth reading at the top of the riser casing on the graduated cable.

3.6 Start the video cassette recorder. Note the starting point on the tape counter in the field logbook.

3.7 Lower the camera slowly into the well (approximately five feet per minute). Stop lowering the camera at any area of particular interest (cracks, casing separations, well screens, etc.). Record a short segment of this feature before continuing to lower the camera to the bottom of the well. Note tape counter and depth readings in the field logbook.

3.8 Stop recording when the camera reaches the bottom of the well (sooner if an obstruction is encountered). Record tape counter and depth information in the field logbook.

3.9 Turn the video camera off and gently remove it from the well.

3.10 All downhole equipment shall be decontaminated after use in the test in accordance with applicable procedures in QAPP SOP 005.

4.0 Maintenance

All video and support equipment shall be maintained in accordance with manufacturer preventive maintenance schedules.

5.0 Precautions

If volatile organic contamination of a well is suspected, air space in the monitoring well shall be monitored for organic vapors with a PID or FID immediately after uncapping the well. Record PID readings in the field logbook. Note that although incidental odors should be noted in the logbook, it is unwise from a health and safety standpoint to routinely "sniff test" air space in monitoring wells for contaminants.

Downhole video cameras are shock sensitive. Do not attempt to knock obstructions out of the way or force (spud) the camera through squeezed sections of a damaged well.

6.0 References

None.

RISER CASING PACKER TEST

Date: 19 August 1993
Effective:
Supersedes:

1.0 Scope and Application

Loosely assembled casing joints and fractures in the riser pipe are potential pathways for leakage of water (surface or underground) into a monitoring well casing. This would cause possible dilution or addition of contaminants in the monitored zone of interest.

A Riser Casing Packer Test is designed to provide data for determining potential leakage in the riser casing of a groundwater monitoring well. The test can be performed in either water table (surficial) or confined aquifer wells.

2.0 Material

a. Inflatable or mechanical packer sized to fit the well bore and ancillary equipment to operate the packer.
b. Measuring tape or other approved device to verify depth of packer set.
c. Water pump to remove water from above the packer.
d. Electronic water level meter with accuracy to 0.01 feet.
e. Water from an approved source.
f. 55-gallon drums.
g. Logbook.

3.0 Procedure

The following procedure describes how to set up and run a riser casing packer test after depth to the top of the well screen has been verified:

3.1 Prepare the well site and set up all equipment in a manner such that no downhole equipment comes into contact with the ground or other potential contaminants. All gasoline- or diesel-powered equipment shall be set up at least 15 feet downwind from the well with exhaust pipes pointed away from the work area.

3.1.1 All downhole equipment shall be decontaminated prior to use in the test in accordance with applicable procedures in QAPP SOP 005.

3.2 Set the packer approximately 1 foot above the top of the well screen. Use caution when setting the packer to avoid damage to the well casing. Record packer depth in the field logbook.

3.3 Measure the height of the water column above the packer. Record this measurement in the field logbook.

3.4 Perform the riser casing packer test as follows:

3.4.1 In water table aquifer monitoring wells:

3.4.1.1 If the height of the water column above the packer is less than one-half the height of the riser casing, add approved water to within one foot of the top of the riser casing.

3.4.1.2 If the height of the water column is greater than one-half the height of the riser casing, pump the water to within six inches of the top of the packer. All water removed from a well shall be pumped into drums and staged at the wellsite for later disposal.

3.4.1.3 Monitor water level changes in the riser casing every 10 minutes for at least two hours. Record all water level readings in the field logbook.

3.4.1.4 For monitoring wells in which water was added, pump water from the riser casing to the top of the packer. All water removed from a well shall be pumped into drums and staged at the wellsite for later disposal.

3.4.2 In confined aquifer monitoring wells:

3.4.2.1 Pump water from the riser casing to within six inches of the top of the packer. All water removed from a well shall be pumped into drums and staged at the wellsite for later disposal.

3.4.2.3 Monitor water level changes in the riser casing every 10 minutes for at least two hours. Record all water level readings in the field logbook.

3.5 Remove packer and any other downhole equipment used for the test.

3.6 Cap and secure monitoring well.

3.7 All downhole equipment shall be decontaminated after use in the test in accordance with applicable procedures in QAPP SOP 005.

4.0 Maintenance

All testing and support equipment shall be maintained in accordance with manufacturer preventive maintenance schedules.

5.0 Precautions

If volatile organic contamination of a well is suspected, air space in the monitoring well shall be monitored for organic vapors with a PID or FID immediately after uncapping the well. Record PID readings in the field logbook. Note that although incidental odors should be noted in the logbook, it is unwise from a health and safety standpoint to routinely "sniff test" air space in monitoring wells for contaminants.

6.0 References

None.

1.0 Scope and Application

Cement Bond Logs (CBLs) are designed to evaluate the placement of completion materials on the outside of a groundwater monitoring well using downhole geophysical logging equipment in a completed well. The test can be performed in either water table (surficial) or confined aquifer wells.

2.0 Material

a. Geophysical logging equipment.
b. Logbook.

3.0 Procedure

The following procedure describes how to set up and rur a cement bond log:

3.1 Prepare the well site and set up all equipment in a manner such that no downhole equipment comes into contact with the ground or other potential contaminants. All gasoline- or diesel-powered equipment shall be set up at least 15 feet downwind from the well with exhaust pipes pointed away from the work area.

3.1.1 All downhole equipment shall be decontaminated prior to use in the test in accordance with applicable procedures in QAPP SOP 005.

3.2 Start the geophysical equipment and verify that all components are operating properly.

3.2.1 Calibrate all instruments prior to use according to manufacturer specifications. Record calibration results in the field logbook.

3.3 Measure the amount of riser casing sticking up above the ground surface. Record this measurement in the field logbook.

3.4 Lower the geophysical probe into the well to a starting point approximately equal to the elevation of the ground surface or the probe reference depth.

3.5 Set the electronic depth indicator to zero or the probe reference depth.

3.6 Lower the probe into the well until the bottom of the well is reached. Note depth readings in the field logbook.

3.8 Begin logging up the well at a speed prescribed by the logging equipment manufacturer (usually 15 to 25 feet per minute).

3.9 Turn the geophysical equipment off and gently remove it from the well.

3.10 All downhole equipment shall be decontaminated after use in the test in accordance with applicable procedures in QAPP SOP 005.

4.0 Maintenance

All geophysical and support equipment shall be maintained and calibrated in accordance with manufacturer schedules.

5.0 Precautions

If volatile organic contamination of a well is suspected, air space in the monitoring well shall be monitored for organic vapors with a PID or FID immediately after uncapping the well. Record PID readings in the field logbook. Note that although incidental odors should be noted in the logbook, it is unwise from a health and safety standpoint to routinely "sniff test" air space in monitoring wells for contaminants.

Geophysical probes are shock sensitive. Do not attempt to knock obstructions out of the way or force (spud) the probe through squeezed sections of a damaged well.

Some geophysical logging techniques utilize radioactive sources to provide the log data. Care shall be taken to minimize exposure to the geophysical logging equipment operator and bystanders. All rules and requlations of the Nuclear Regulatory Commission or equivalent state agency shall be followed at all times while using radiactive sources.

6.0 References

None.