EG&G MOUND-22-03-10-02-01-9506080002

Environmental Restoration Program

MONITORING WELL SURVEY OPERABLE UNIT 2, MAIN HILL PHASE I TECHNICAL MEMORANDUM

MOUND PLANT
MIAMISBURG, OHIO

February 1995

FINAL

(Revision 0)

Department of Energy
Ohio Field Office

Environmental Restoration Program
EG&G Mound Applied Technologies

CONTENTS

EXECUTIVE SUMMARY ES-1

1. INTRODUCTION 1-1
   1.1. SITE BACKGROUND 1-1
   1.1. OBJECTIVES 1-3
   1.3. EXISTING MONITORING WELLS 1-3
   1.4. COMPARISON OF STANDARDS 1-6
      1.4.1. TEGD 1-8
      1.4.2. ASTM 1-8

2. SUMMARY OF ACTIVITIES 2-1
   2.1. BORING LOG/MONITORING WELL CONSTRUCTION REVIEW 2-1
   2.2. FIELD IMPLEMENTATION 2-6
      2.2.1. Well Reconnaissance Survey 2-6
      2.2.2. Video Inspection Survey 2-7
      2.2.3. Natural Gamma Logging 2-7

3. RESULTS 3-1
   3.1. WELL CONSTRUCTION SURVEY 3-1
   3.2. VIDEO INSPECTION SURVEY 3-6
      3.2.1. Well Number 0003 3-6
      3.2.2. Well Number 0034 3-6
      3.2.3. Well Number 0112 3-7
      3.2.4. Well Number 0114 3-7
      3.2.5. Well Number 0115 3-7
      3.2.6. Well Number 0116 3-7
      3.2.7. Well Number 0312 3-7
      3.2.8. Well Number 0324 3-8
      3.2.9. Well Number 0724 3-8
   3.3. NATURAL GAMMA LOGGING 3-8
      3.3.1. Well Number 0003 3-8
      3.3.2. Well Number 0112 3-8
      3.3.3. Well Number 0114 3-10
      3.3.4. Well Number 0115 3-10
      3.3.5. Well Number 0116 3-10
      3.3.6. Well Number 0312 3-10
      3.3.7. Well Number 0324 3-10

4. SUMMARY AND CONCLUSIONS 4-1

5. REFERENCES 5-1

APPENDIX A BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS
APPENDIX B VISUAL INSPECTION LOG FORMS
APPENDIX C VIDEO INSPECTION OVERSIGHT FORMS
APPENDIX D NATURAL GAMMA LOG OVERSIGHT FORMS

FIGURES

1.1. Site Location 1-2
1.2. Mound Plant and Main Building 1-4
1.3. Main Hill Monitoring Well Locations 1-7

2.1. Surveyed Monitoring Wells 2-8

3.1. Natural Gamma Log for Well 0033 3-9
3.2. Natural Gamma Log for Well 0112 3-11
3.3. Natural Gamma Log for Well 0114 3-12
3.4. Natural Gamma Log for Well 0115 3-13
3.5. Natural Gamma Log for Well 0116 3-14
3.6. Natural Gamma Log for Well 0312 3-15
3.7. Natural Gamma Log for Well 0324 3-16

4.1. Recommended Wells to be Used in RI/FS 4-6

TABLES

I.1. Comparison of TEGD and ASTM Well Construction Guidelines 1-9

II.1. Summary of Well Construction Details 2-2

III.1. Summary of Well Reconnaissance Survey 3-2

IV.1. Summary of OU-2 RI/FS Existing Monitoring Well Use 4-2

LIST OF ACRONYMS
MOUND PLANT, ER PROGRAM

AEC	Atomic Energy Commission
ASTM	American Society of Testing and Materials
CERCLA	Comprehensive Environmental Response, Conservation, and Liability Act
CPS	counts per second
DOE	U.S. Department of Energy
EG&G	EG&G Mound Applied Technologies
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration (Program)
ERDA	Energy Research and Development Administration
FFA	Federal Facility Agreement
ICF KE	ICF Kaiser Engineers, Inc.
NPL	National Priority List
OU	Operable Unit
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SD	Sewage Disposal Plant
SNAP	Space Nuclear Auxiliary Power
SOPs	Standard Operating Procedures
TEGD	Technical Eforcement Guidance Document

EXECUTIVE SUMMARY

Mound Plant is a research and manufacturing facility for the production of radioactive power sources and military detonators. It is located in Miamisburg, Ohio and is operated by EG&G Mound Applied Technologies for the Department of Energy (DOE). Mound Plant was placed on the Comprehensive Environmental Response, Conservation, and Liability Act (CERCLA) National Priority List (NPL) in November of 1989 and a Federal Facility Agreement (FFA) was signed between the Department of Energy and the Environmental Protection Agency (EPA) in October of 1990. In response to being placed on the NPL, Mound was divided into Operable Units (OU) to simplify program management. The Main Hill of Mound Plant is Operable Unit 2.

A remedial investigation of Operable Unit 2 was started in April, 1994. The first part of the investigation, Phase I, was conducted to collect information to help in preparing the scope of the remaining phases of the investigation. As part of the Phase I reconnaissance, an evaluation of the condition of existing monitoring wells was performed.

The monitoring well reconnaissance of Operable Unit 2 (OU-2), Main Hill, was performed during the summer of 1994. The objective of the reconnaissance was to identify monitoring wells that could be used for groundwater sampling during subsequent phases of the remedial investigation. A field reconnaissance was performed to evaluate the surface condition of the wells and to check the water levels. Boring logs and well construction diagrams were also reviewed. Both of these tasks were performed to compare the well construction to applicable standards. In addition, several wells were geophysically logged and video taped to obtain data on the screened interval, bentonite seal, and water level where no data existed. The data collected was used to evaluate the wells suitability for future use.

Several wells could not be located during the field reconnaissance. Other wells were identified that should be abandoned if not being used by other programs. Of the existing wells, 22 should provide useful water level data and seven are suitable for use in obtaining groundwater samples.

Section 1

1. INTRODUCTION

1.1. SITE BACKGROUND

The EG&G Mound facility originated as part of the Manhattan Engineer District in 1943; its purpose was to determine the chemical and metallurgical properties of polonium (DOE 1986). The work was performed for the U.S. Army at several locations in Dayton, Ohio, by Monsanto Research Corporation (MRC 1985). In 1946, 182 acres were purchased for the permanent Mound Plant site on the outskirts of Miamisburg, in Montgomery County, Ohio (Figure 1.1). In 1948, work from several locations in Dayton, Ohio were moved to the facility, and in January 1949, operations involving radionuclides began. Investigations involving uranium, protactium-231, and plutonium-239 were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, a thermoelectric generator fueled with polonium-210 was invented and patented. The first space nuclear auxiliary power (SNAP) generator, a SNAP-3A fueled with polonium-210, was demonstrated in 1959. Development of plutonium-238 heat sources was started at the Mound facility in 1961; heat sources fueled with plutonium-238 have been developed and fabricated for use in thermoelectric generators, for lunar experiments, weather satellites, navigational satellites, and spacecraft.

In late 1954, the Mound facility began receiving thorium ore and sludges consisting of thorium hydroxide, thorium oxalate, and thorium oxide. Approximately 6,000 drums were received in variably-damaged, 55-gallon drums. From 1955 to 1965, the thorium was repackaged about three times, and the drums were stored in large groups (DOE 1991). The thorium ores and sludges were never processed at the Mound facility and were completely removed in 1974. The first of several programs requiring tritium-handling technology was initiated in 1958. Currently, the Mound facility has an extensive capability for handling and studying tritium and tritium compounds for weapons and nonweapons applications.

In the early 1970s, as national concerns about the environment and the conservation of resources grew, the Mound facility expanded its comprehensive programs in environmental control, waste management, and energy conservation. In January 1975, the Mound facility formally came under the jurisdiction of the Energy Research and Development Administration (ERDA) upon dissolution of the Atomic Energy Commission (AEC). The Mound facility is now an integrated research, development, and production facility that operates in support of the DOE weapons and energy programs.

The Mound facility was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List (NPL) in November, 1989. Pursuant to the facility's NPL status, the DOE signed a CERCLA Section 120 Federal Facility Agreement (FFA) with the U. S. Environmental

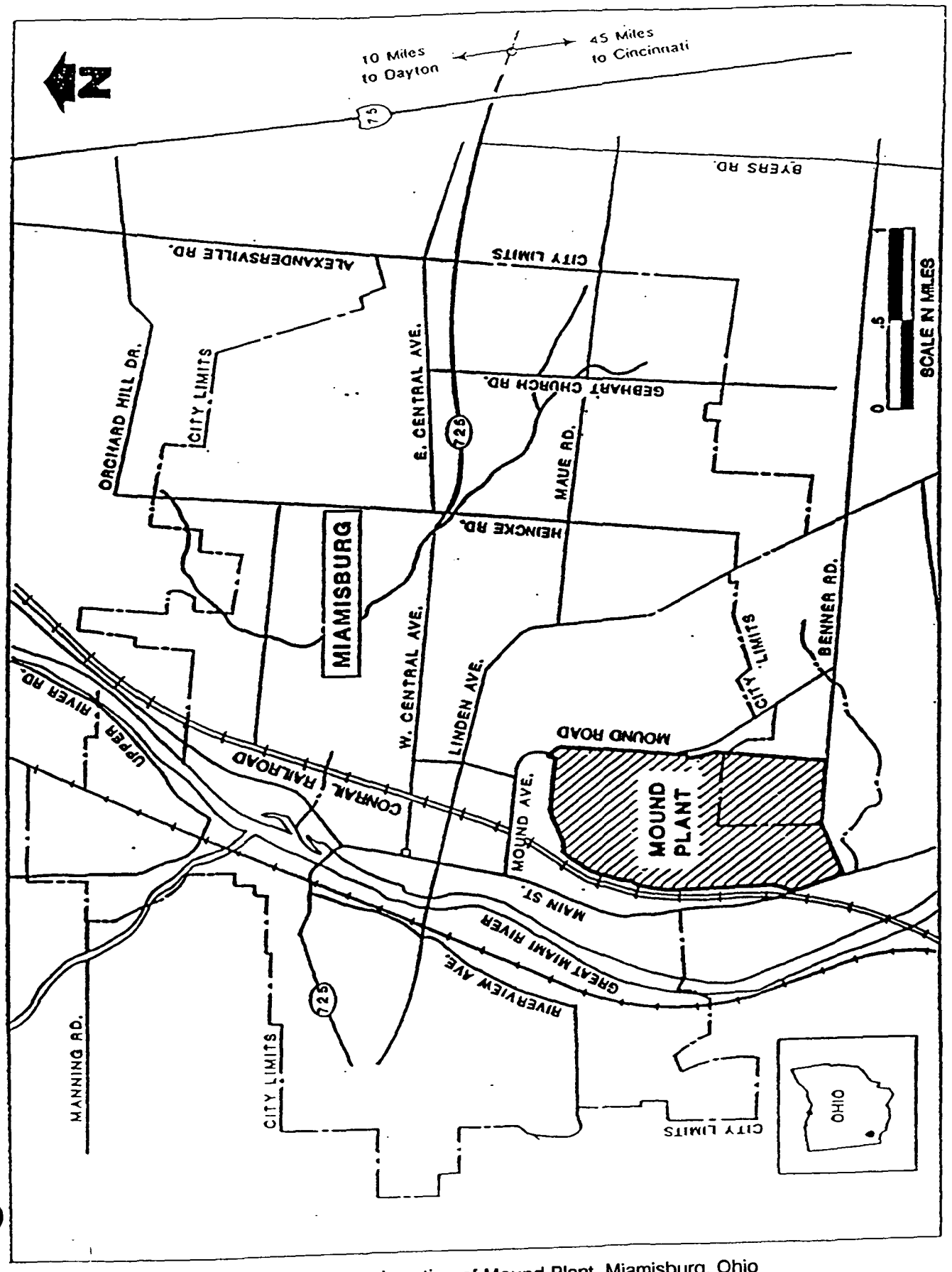


Figure 1.1. Location of Mound Plant, Miamisburg, Ohio

Protection Agency (EPA) that became effective in October 1990 (Administrative Docket Number V-W-90-C-075).

In response to being placed on the NPL, an Environmental Restoration (ER) Program was initiated by Mound to fulfill its obligation under the FFA. The site was divided into Operable Units (OUs) to simplify the investigation and program management (DOE 1992). The Main Hill of the Mound Plant (Figure 1.2) is OU-2 and comprises the portion of the site where the majority of the research and manufacturing took place. As part of the remedial investigation/feasibility study (RI/FS) being conducted under CERCLA, the Ohio Environmental Protection Agency requested that the DOE conduct an evaluation of existing monitoring wells to ensure compliance with standards for aquifer protection against cross contamination.

1.2. OBJECTIVE

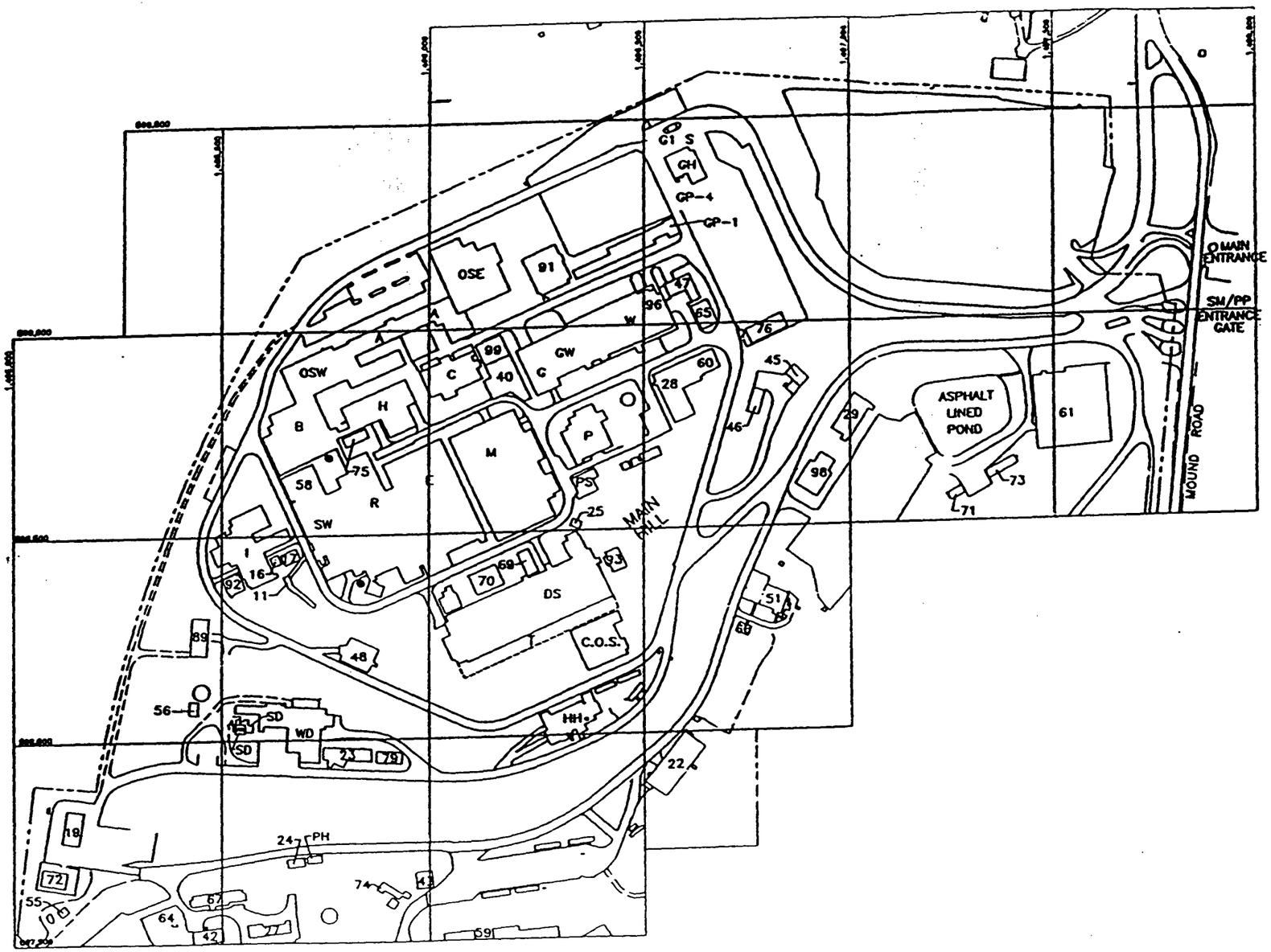
The objective of the OU-2 RI/FS is to define the nature and extent of the contamination found on Main Hill, characterize the risks to human health and the environment posed by exposure to the various affected medium, to evaluate the potential remedies that could reduce these risks to acceptable levels, and to determine the affect of potential releases of contaminants to groundwater, particularly where groundwater flows from the Main Hill at the Hillside Seeps. The objective of this evaluation of existing monitoring wells is to assess which wells can potentially be used in the RI/FS, which wells, with rehabilitation, can potentially be used in the RI/FS, and which wells should be abandoned. The evaluation will include all existing monitoring wells within OU-2, and selected monitoring wells outside of OU-2 for their use strictly in the analysis of groundwater flow within OU-2.

1.3. EXISTING MONITORING WELLS

A total of 33 monitoring wells have been installed within the OU-2 area over the last 19 years. For the purpose of this technical memorandum, any well from which an environmental sample or water level measurement has, or can be, collected is considered a monitoring well. The evaluation of existing monitoring wells is based on well construction information from the following documents:

- "Operable Unit 9, Site Scoping Report: Volume 2 - Geologic Log and Well Information Report [FINAL]." U.S. Department of Energy, Albuquerque Field Office, Albuquerque, New Mexico. May 1992.

- "Operable Unit 9, Site Scoping Report: Volume 2 Addendum - Stratigraphic and Lithologic Logs [FINAL]." U.S. Department of Energy, Albuquerque Field Office, Albuquerque, New Mexico. May 1992.



N

0 75 150 300
Scale in Feet

NOTES:

1. THE ELECTRONIC BASE MAP DATA FILE WAS OBTAINED BY ICF KAISER ENGINEERS, CINCINNATI, OHIO, FROM ROY F. WESTON, INC., ALBUQUERQUE, NEW MEXICO, WHO OBTAINED IT FROM WOOLPERT CONSULTANTS, INC., DAYTON, OHIO. THE DATA WERE PHOTOGRAMMETRICALLY COMPILED FROM AERIAL PHOTOGRAPHY DATED 12/08/85.

2. WESTON CONVERTED MOUND PLANT COORDINATES TO OHIO STATE PLANE COORDINATES USING AN ALGORITHM PROVIDED BY OAK RIDGE NATIONAL LABORATORY, GRAND JUNCTION PROJECT OFFICE.

LEGEND:

- 53 STRUCTURES
- PAVED ROADWAY
- UNPAVED ROADWAY
- MOUND PLANT BOUNDARY

Figure 1.2. Mound Plant Areas and Main Building

- "Operable Unit 9, Site-Wide Well Decommissioning and Abandonment Program Plan [DRAFT]." U.S. Department of Energy, Albuquerque Field Office, Albuquerque, New Mexico. October 1992.

- "Remedial Investigation/Feasibility Study, Operable Unit 9, Hydrogeologic Investigation Well Information Report [DRAFT]." U.S. Department of Energy, Albuquerque Field Office, Albuquerque, New Mexico. June 1993.

There have been four groundwater investigations that resulted in the installation of the 33 monitoring wells within OU-2. A potable water standards project was conducted during 1975 and 1976 to characterize the tritium contamination of groundwater at the Mound facility (Dames and Moore 1976a). The potable water standards project resulted in the installation of eight monitoring wells between 1975 and 1976. There is little to no documentation for the monitoring wells installed during 1975. The wells installed during 1976 were installed in boreholes drilled by either mud rotary or auger techniques; they generally consisted of 3-inch inside diameter PVC casing with 2-foot long steel well screens at the bottom. There is no information about the backfill around the well screen. A 2-foot thick layer of bentonite pellets was installed in the annulus above the well screen. The annulus was then backfilled with drill cuttings, a second bentonite seal placed at the ground surface, and soil was mounded around the casing to induce runoff. Protective casings were installed around some of the wells, but they were apparently not locked. There is no documentation regarding whether the wells were developed.

A Buried Valley aquifer evaluation was conducted in 1976 to characterize the tritium groundwater contamination off of the Mound facility (Dames and Moore 1976b). Two monitoring wells were installed within OU-2 using mud rotary drilling techniques as part of the study. The wells were constructed of 3-inch PVC casing with 2-foot long steel well screens on the bottom. The boreholes were backfilled with gravel to within three feet of the ground surface and sealed with bentonite pellets to the surface. A 6-inch nominal diameter locking steel casing was grouted in place for protection. There is no documentation regarding whether the wells were developed.

As part of two ER Program field investigations, 13 monitoring wells have been installed within OU-2 between 1987 and 1993. These wells were located, installed, and developed according to specifications in the DOE work plans (DOE 1987, 1989) and ER Program Standard Operating Procedures (SOPs). The SOPs are based on regulations and guidelines by RCRA and CERCLA (DOE 1988; EPA 1986; EPA 1988). The depth of wells and length of well screens varies, however all wells are constructed with stainless steel screens and riser pipe. All of the wells except two, have 4-inch nominal diameter risers and screens; the other two wells have 2-inch nominal diameter risers and screens.

During 1986 a groundwater assessment was initiated to help define the geologic environment and stratigraphy of the Main Hill in connection with tritium-contaminated seeps (DOE 1989). Several observation test pits and trenches were dug on the Main Hill to provide more detail on the stratigraphy and hydrogeology than could be provided by boreholes. A total of ten monitoring wells were installed in test pits between 1986 and 1987. Most of the wells were constructed of 4-inch PVC casing with 0.5-inch diameter holes drilled in the lower three feet of the riser and wrapped with fine wire mesh. The wells were placed in the bottom portion of the pit, usually at the center. The pits were backfilled with pea gravel to within approximately four feet of the ground surface, a 2-foot layer of washed sand was placed over the pea gravel, and a 2-foot layer of clay was placed above the sand up to the ground surface. On the west side of SW Building a group of three wells were completed in one long trench to form a tritium capture system. Two of the wells were constructed of 72-inch diameter precast concrete pipe open at the bottom, and one was constructed of 8-inch diameter PVC pipe and a 3-foot long PVC well screen. A fourth well, west of SW Building but not placed within the tritium capture system trench, was also constructed of 8-inch diameter PVC. The 8-inch diameter wells had a 3-foot long PVC well screen at the bottom. The capture system trench was backfilled with sand and gravel up to approximately two feet below the ground surface. A layer of clay was compacted over the sand and gravel, and the top was covered with asphalt since the trenches were in the middle of a roadway. The tritium capture system was completed in October 1987.

The locations of all 33 monitoring wells are shown on Figure 1.3. The well symbol on the figure indicates which wells were installed as part of which program/investigation. There are no monitoring wells in the center of OU-2.

1.4. COMPARISON STANDARDS

The evaluation of the OU-2 monitoring wells included comparing each wells' construction with the accepted standards, the EPA's "Groundwater Monitoring Technical Enforcement Guidance Document" (TEGD), dated September 1986, and the American Society of Testing and Materials' (ASTM) "Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers" (ASTM D 5092-90). Both of these guidance documents state that site-specific conditions should be applied to monitoring well construction and installation to determine the selected material, construction, and installation techniques. For the purpose of this task, the ASTM standard will apply when the TEGD conflicts with the ASTM standard or where the TEGD is less specific.

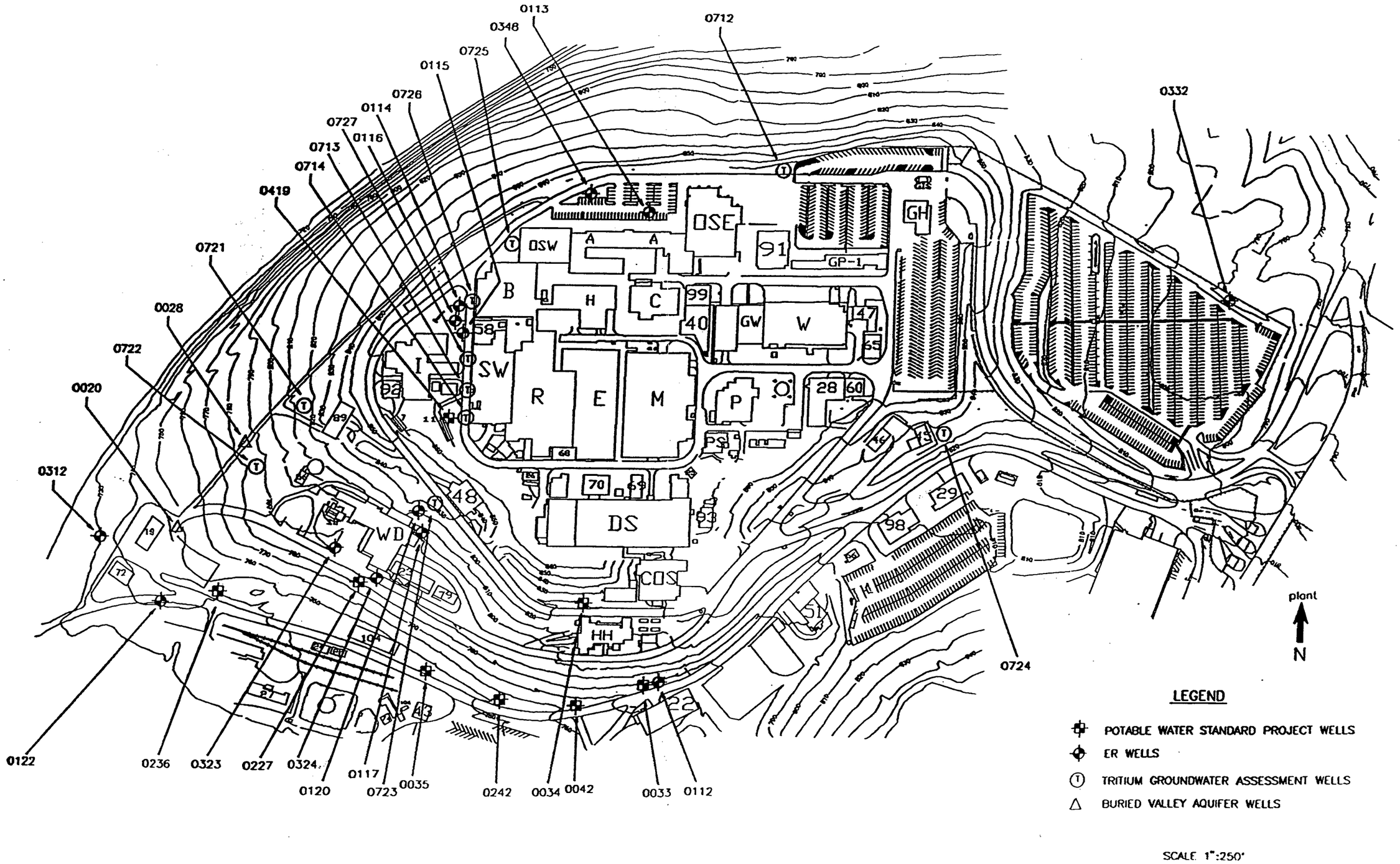


Figure 1.3. Main Hill Monitoring Well Locations

1.4.1. TEGD

The TEGD describes what the EPA deems to be essential components of a ground water monitoring system that meets the goals of RCRA. The document is divided into six chapters which contain discussions on the following:

- Characterization of site hydrogeology;
- Location and number of ground water monitoring wells;
- Design, construction, and development of ground water monitoring wells;
- Content and implementation of the sampling and analysis plan;
- Statistical analysis of ground water monitoring data; and
- The content and implementation of the assessment plan.

The TEGD states that much of the purely technical content, especially regarding site characterization, well design and construction, and assessment of ground water contamination, is germane to non-RCRA programs as well as permitted facilities (EPA 1986). The third chapter of this document, dealing with design, construction, and development of monitoring wells, is generally generic, and often discusses the majority of general site conditions that might be encountered. There are some discussions where the guidance is more specific and restrictive, e.g., the environments in which different types of casing and screen materials may be used, and how to determine whether the well development is complete and the well suitable for use.

1.4.2. ASTM

The ASTM standard D 5092-90 is a document which describes a practice for the design and installation of ground water monitoring wells in aquifers to promote 1.) durable and reliable construction, 2.) extraction of representative ground water quality samples, and 3.) efficient site hydrogeological characterizations. The guidelines established by the document are affected by both governmental regulations and site specific geological, hydrogeological, climatological, topographical, and subsurface chemistry conditions. The standard promotes the development of a conceptual hydrogeologic model prior to monitoring well design and installation (ASTM 1993). While the standard provides guidance about how to select well construction materials and installation techniques based on site specific conditions, some of the selection processes are very detailed, e.g., the selection of the filter pack material and the proper gradation of the filter pack. ASTM D 5092-90 discusses the same major topics as does the TEGD, a comparison of the major topics is summarized in Table I.1.

Table I.1. Comparison of TEGD and ASTM Well Construction Guidelines

SPECIFICATION	TEGD	ASTM
Drilling Method	A function of site-specific geologic conditions. Discusses applicability of hollow stem augers, solid stem augers, cable tool, air rotary, water rotary, and mud rotary drilling techniques to the installation of RCRA monitoring wells. TEGD does not preclude the use of any particular drilling technique, but does point out potential interferences that could be caused by the different techniques.	Dependent upon site geology, hydrology, and intended use of the data. Does not mention specific methods, but discusses to avoid introducing fluids into borehole, selecting fluids that are introduced to have minimal impact, control drill cuttings at ground surface, remove as much drilling fluid as possible prior to well installation, and air rotary rigs should be equipped with an oil air filter.
Casing and Screen Materials	Consider geochemistry, anticipated lifetime of monitoring program, well depth, chemical parameters to be monitored, and site-specific factors. Should specify Fluorocarbon resins (i.e., Teflon®) or stainless steel for use in saturated zone when monitoring VOCs for a 30-year period. Where high corrosion potential exists, fluorocarbon resins are preferred over stainless steel. PVC may be used if only trace metals or non-VOCs are anticipated. Other materials may be utilized on a site-specific basis based on demonstrated research.	Screens should be new, machine-slotted or continuous wrapped wire-wound and composed of materials most suited for the monitoring environment and site characterization findings. Riser should be new and composed of materials that will not alter the quality of the water samples for the constituents of concern and that are appropriate for the monitoring environment. Very specific details about the handling and installation of well screens and risers.
Mixing Casing and Screen Materials	Combinations of materials may be used consistent with the TEGD. Avoid combinations using dissimilar metals.	Not discussed.
Screen Slot Size	The screen should be sized to (1) allow sufficient groundwater to flow into the well; (2) minimize the passage of formation materials into the well; and (3) ensure sufficient structural integrity to prevent collapse of the screen. Screen should be sized to ensure that formational material is prohibited from passing through the well during development and should be commercially manufactured.	Screen slot size should be determined relative to the grain size of the formation and the gradation of the filter pack material. The slot size should retain at least 90% and preferably 99% of the filter pack. An entire section is devoted to determining the gradation of the filter pack material
Casing/Screen Diameter	Normally 2 or 4-inch ID. Can be larger to accommodate purging or sampling equipment or where well is screened in a deep formation.	Minimum of 2-inch ID.

SPECIFICATION	TEGD	ASTM
Joins	Flush threaded or have the ability to be connected by another mechanical method that does not introduce contaminants such as glue or solvents into the well.	Threaded are preferred. Glued or solvent welded joints are *not* recommended.
Filter Pack	Should be chemically inert (e.g., quartz sand, silica, or glass beads), well rounded, and dimensionally stable. Do not used filter fabric. Natural pack is acceptable under certain conditions. Extend no more than two feet above top of screen.	Hard durable siliceous particles that are uniformly graded to permit only the finest soil grains to enter the screen during development. Detailed discussion describes how to select gradation of filter pack material based on grain size analysis of formation material. Extend the filter pack a minimum of two feet above the top of the well screen or 20 % of the screen length. No mention of the use of filter fabric. Also discusses secondary filter pack material placed above a bentonite seal to keep grout from entering the bentonite or above the primary filter pack to keep the bentonite from entering the primary filter pack. Very specific details about the installation of filter packs.
Bentonite Pellet Annular Sealant	Must prevent migration of contaminants to sampling zone from surface or intermediate zones and prevent cross contamination between strata and chemically compatible with anticipated waste. Permeability one to two orders of magnitude less than surrounding formation. Example includes placing a minimum of two feet of sodium bentonite pellets over filter pack. Generally dropped down the borehole or between the well riser and inside of hollow stem augers, use a tamping device to reduce possibility of bridging.	Compatible with geologic, hydrogeologic, and climatic conditions and any man-induced conditions. Bentonite can be powered, granular, pelletized or chipped sodium montmorillonite. Diameter of pellets or chips should be less than one-fifth the width of the annular space into which they are placed. Seal should be 3 to 5 feet. Placed with either a tremie pipe or by dropping down the annular space. Use a tamping device to minimize bridging.
Grout Annular Sealant	Approximately 2 to 5% (by weight) of bentonite should be added to portland cement to make grout which is placed over the bentonite pellet seal and up to just below the frost line. A tremie pipe should be used below the water table. Expanding cement should be used above the frost line.	Either bentonite based grout (remains flexible) or cement based grout. Bentonite based grout consists of adding about 1 pound of bentonite to 1 gallon of water and allowing it to fully hydrate, then adding about 2 pounds of cement. Cement based grout consists of first adding a 94 pound bag of Portland Cement to 6 to 7 gallons of water, then adding 0 to 10 percent (by weight) bentonite. Should be placed through a tremie pipe.

SPECIFICATION	TEGD	ASTM
Annular Spacing	Annular space should have a *spacing differential* of 3 to 5 inches.	Minimum radius of two inches between riser and outer casing/borehole.
Protective Casing	Well should be completed to prevent either tampering with the well or the entrance of foreign material. The annular space from just below the frost line to the ground surface, and a well apron (minimum 3-foot radius), should be made with concrete. The well apron should be a minimum of 4 inches thick.	May be made of aluminum, steel, stainless steel, cast iron, or structural plastic. Inside diameter should be a minimum of 2 inches and preferably 4 inches larger than nominal riser diameter. Should extend from below the frost line to approximately 6 inches above well riser tip. Should have a ¼-inch weep hole drilled in the casing 6 inches above the ground surface. Base should be set in concrete, surface completion is dependent upon potential for frost heave.
Well Development	Develop wells to be clay- and silt-free by a variety of methods that produce reversals or surges in flow. Do not use air to develop the well. If well continues to yield turbid samples after development, follow a detailed procedure to determine whether the well can be used.	Develop wells until pH, temperature, and specific conductivity readings have stabilized and the water is visually clear of suspended solids. Discusses several specific methods to remove finer grained material from well screen and filter pack and improve hydraulic characteristics of filter pack and hydraulic communication between well and formation. Start slowly and gently and increase in vigor as well is developed. Avoid pumping air into filter pack and adjacent formation.
Well Documentation	List of 24 bulleted items to be included in documentation.	Brief reference to boring logs and well completion diagrams. Does not specify details to be included in boring logs and well completion diagrams.

Section 2

2. SUMMARY OF ACTIVITIES

The evaluation of the existing OU-2 monitoring wells consists of 1.) reviewing the available documentation describing the monitoring well designs, construction, installation, and development, and 2.) implementing a field program to observe all monitoring well conditions and to video inspect (downhole) and natural gamma log select wells where documentation is incomplete or to verify the documented conditions. The evaluation program considers the potential use of any given well, i.e., some wells are not suitable for providing representative ground water quality samples, but may be suited for providing water level elevation data. Table II.1 lists all the monitoring wells which the boring log/well construction details were reviewed; the table presents the well construction details for each monitoring well reviewed.

2.1. BORING LOG/MONITORING WELL CONSTRUCTION REVIEW

A total of 45 boring logs/monitoring well construction diagrams were reviewed to evaluate whether the existing wells can be used for the OU-2 RI/FS. The boring logs/monitoring well construction diagrams used in this review process are presented in Appendix A. The review included looking at the well construction to determine whether the well is in compliance with the TEGD or ASTM guidelines (necessary if the well is to be used to collect representative groundwater quality samples), whether the well can still be used in the OU-2 RI/FS for purposes other than groundwater sampling, and to determine when the well can not be used for any purpose and should be abandoned.

The two significant differences between the TEGD and ASTM guidelines are:

1) the well casing and screen material (the TEGD stresses the use of Teflon® or stainless steel and approves PVC in very limited situations; ASTM states that wells are commonly composed of PVC, stainless steel, fiberglass, or Teflon® materials, and that the selected material should not alter the quality of water samples for the constituents of concern and are appropriate for the monitoring environment), and

2) well development (the TEGD states that the development method should cause reversal of flow [no compressed air methods are allowed] and the well should produce silt and clay free water [turbidity of five nephelometric turbidity units or less]; ASTM also stresses the use of development methods which causes reversal of flow [the guidelines do allow the use of compressed "filtered" air in certain situations] and the development is completed once pH, temperature, and specific conductivity readings stabilize and the water is visually clear).

The TEGD also provides guidance regarding the evaluation of existing wells which states that wells that are turbid or have insufficient information might have to be replaced (ASTM D 5092-90 deals only with the installation of new monitoring wells).

Table II.1. Summary of Well Construction Details (Page 1 of 4)

Well ID	Date Installed	Coordinates (ft.)	Borehole Diameter (in)	Casing Diameter (in)	Casing[1] Elev. (NGVD)	Borehole Elev. (NGVD)	Borehole Depth (ft.)	Top of Screen (ft.)	Screen Length (ft.)	Elevation of Well Screen (NGVD)		Well[2] Status	Program[3]	Meet[4] TEGD	Well[5] Material	Screen Material	Log	Source[6]
										From	To							
0020	1975	N 597829.62 E 1495207.61	?[7]	1.50	749.18	746.69	19.00	17.00	2.00	729.69	727.69	Found	BVAE	No	PVC (F)	?	No	5/92
0028	1975	N 598108.72 E 1495264.28	?	1.00	786.84	784.37	40.00	40.00	2.00	744.37	742.37	Found	BVAE	No	PVC (F)	?	No	5/92
0033	05/13/76	N 597967.49 E 1496503.49	?	3.00	776.74	773.51	33.50	31.50	2.00	742.01	740.01	Found	PWSP	No	PVC	Steel	Yes	5/92
0034	05/26/76	N 598082.49 E 1496257.79	?	3.00	818.71	818.10	20.00	17.00	3.00	801.10	798.10	Found	PWSP	No	PVC	Steel	Yes	5/92
0035	05/13/76	N 597762.46 E 1495934.95	?	3.00	?	746.10	20.00	17.00	2.00	729.10	727.10	Aband on	PWSP	No	PVC	Steel	Yes	5/92
0042	1975	N 597834.49 E 1496351.36	?	1.50	762.28	761.20	25.00	?	?	?	?	Found	PWSP	No	PVC (F)	?	No	5/92
0111	11/17/87	N 597971.10 E 1496733.11	8.00	4.00	779.02	777.54	67.00	57.00	10.00	720.54	710.54	?	ER	Yes	SS	SS	Yes	5/92
0112	11/18/87	N 597974.29 E 1496515.90	8.00	4.00	773.84	772.28	35.50	25.50	10.00	746.78	736.78	Found	ER	Yes	SS	SS	Yes	5/92
0113	11/16/87	N 599083.16 E 1495916.58	8.00	4.00	873.30	874.04	58.00	38.50 52.00	3.00 3.00	835.54 822.04	832.54 819.04	Found	ER	Yes	SS	SS	Yes	5/92
0114	11/11/87	N 598615.69 E 1495593.29	8.00	4.00	872.14	872.61	55.00	36.50 49.50	3.00 3.00	836.11 823.11	833.11 820.11	Found	ER	Yes	SS	SS	Yes	5/92
0115	11/10/87	N 598602.38 E 1495604.15	8.00	4.00	872.30	872.73	42.00	30.50	9.50	842.23	832.73	Found	ER	Yes	SS	SS	Yes	5/92
0116	11/02/87	N 598607.41 E 1495599.68	8.00	4.00	871.66	872.61	89.00	69.80	10.00	802.81	792.81	Found	ER	Yes	SS	SS	Yes	5/92
0117	12/02/87	N 598073.89 E 1495765.36	8.00	2.00	801.82	800.62	17.50	5.50	10.00	795.12	785.12	NA	ER	Yes	SS	SS	Yes	5/92
0119	11/13/87	N 597543.67 E 1495848.78	8.00	4.00	741.41	740.20	43.00	32.70	10.00	707.50	697.50	?	ER	Yes	SS	SS	Yes	5/92
0120	12/04/87	N 598125.35 E 1495747.04	8.00	2.00	821.03	819.85	33.00	20.50	10.00	799.35	789.35	NA	ER	Yes	SS	SS	Yes	5/92
0122	11/19/87	N 597637.00 E 1495225.06	8.00	4.00	742.35	740.38	41.00	31.50	10.00	708.88	698.88	Aband on	ER	Tes	SS	SS	Yes	5/92

Table II.1. Summary of Well Construction Details (Page 2 of 4)

Well ID	Date Installed	Coordinates (ft.)	Borehole Diameter (in)	Casing Diameter (in)	Casing[1] Elev. (NGVD)	Borehole Elev. (NGVD)	Borehole Depth (ft.)	Top of Screen (ft.)	Screen Length (ft.)	Elevation of Well Screen (NGVD)		Well[2] Status	Program[3]	Meet[4] TEGD	Well[5] Material	Screen Material	Log	Source[6]
										From	To							
0227	5/27/76	N 597909.38 E 1495689.53	6.00	3.00	785.00	783.40	31.50	29.30	2.00	754.10	752.10	Found	PWSP	No	PVC	Steel	Yes	5/92
0236	1975	N 597700.00 E 1495385.00	?	3.00	?	?	?	?	?	?	?	Lost	PWSP	No	PVC (F)	?	No	5/92
0242	05/13/76	N 597765.89 E 1496159.17	6.00	3.00	754.56	752.80	13.00	11.00	2.00	741.80	739.80	Found	PWSP	No	PVC	Steel	Yes	5/92
0312	12/13/89	N 597747.67 E 1495031.74	8.00	4.00	731.30	729.27	33.60	21.80	10.00	707.47	697.47	Found	ER	Yes	SS	SS	Yes	5/92
0314	8/3/89	N 597414.47 E 1495713.64	8.00	4.00	742.71	741.00	44.80	33.00	10.00	708.00	698.00	?	ER	Yes	SS	SS	Yes	5/92
0318	8/9/89	N 598643.83 E 1497216.68	8.00	4.00	810.53	808.20	30.30	18.30	10.00	789.90	779.90	?	ER	Yes	SS	SS	Yes	5/92
0322	4/1/93	N 598865.46 E 1497201.16	8.00	4.00	809.84	808.07	55.00	44.70	10.00	763.37	753.37	?	ER	Yes	SS	SS	Yes	6/93
0323	2/7/93	N 597941.22 E 1495591.01	8.00	4.00	783.88	784.35	20.00	13.00	5.00	771.35	766.35	Found	ER	Yes	SS	SS	Yes	6/93
0324	2/8/93	N 597926.59 E 1495701.00	8.00	4.00	782.92	783.10	25.00	15.00	5.00	768.10	763.10	Found	ER	Yes	SS	SS	Yes	6/93
0332	4/2/93	N 599505.71 E 1497447.41	8.00	4.00	792.11	792.55	35.00	22.00	10.00	770.55	760.55	Found	ER	Yes	SS	SS	Yes	6/93
0345	2/5/93	N 597625.59 E 1496496.46	8.00	4.00	754.32	752.03	45.00	35.00	5.00	717.03	712.03	?	ER	Yes	SS	SS	Yes	6/93
0346	4/3/93	N 597626.90 E 1496107.04	8.00	4.00	742.92	743.54	53.00	41.00	5.00	702.54	697.54	?	ER	Yes	SS	SS	Yes	6/93
0348	?	N 599090.15 E 1495797.13	?	3.00	?	?	?	?	?	?	?	Found	?	No	Steel	?	Yes	ICF
0385	4/17/93	N 597628.33 E 1494975.13	8.00	4.00	723.11	723.84	40.00	21.00	5.00	702.84	697.84	?	ER	Yes	SS	SS	Yes	6/93
0395	2/22/93	N 598433.07 E 1496869.76	8.00	4.00	801.17	801.48	95.00	60.00	10.00	741.48	731.48	?	ER	Yes	SS	SS	Yes	6/93
0419	05/26/76	N 598413.05 E 1495683.78	6.00	3.00	?	873.50	19.00	17.00	2.00	856.50	854.50	Lost	PWSP	No	PVC	Steel	Yes	5/92

Table II.1. Summary of Well Construction Details (Page 3 of 4)

Well ID	Date Installed	Coordinates (ft.)	Borehole Diameter (in)	Casing Diameter (in)	Casing[1] Elev. (NGVD)	Borehole Elev. (NGVD)	Borehole Depth (ft.)	Top of Screen (ft.)	Screen Length (ft.)	Elevation of Well Screen (NGVD)		Well[2] Status	Program[3]	Meet[4] TEGD	Well[5] Material	Screen Material	Log	Source[6]
										From	To							
0712	1987	N 599350.00 E 1496181.00	Pit	4.00	?	?	23.00	20.00	3.00	?	?	Lost	GTA	No	PVC	PVC	Yes	5/92
0713	1987	N 598467.00 E 1495687.00	Trench	72.00	872.80	872.80	12.00	NA	NA	NA	NA	Lost	GTA	No	Precast Conc.	NA	No	5/92
0714	1987	N 598392.00 E 1495709.00	Trench	72.00	872.80	872.80	23.00	NA	NA	NA	NA	Lost	GTA	No	Precast Conc.	NA	Yes	5/92
0721	1987	N 598278.00 E 1495358.00	Pit	3.00	?	?	?	?	?	?	?	Found	GTA	No	PVC (F)	?	Yes	5/92
0722	1987	N 598066.00 E 1495324.00	Pit	4.00	?	?	24.50	21.50	3.00	?	?	Found	GTA	No	PVC	?	No	5/92
0723	12/3/86	N 598154.00 E 1495766.00	Pit	4.00	?	?	21.00	18.00	3.00	?	?	NA	GTA	No	PVC	PVC	Yes	5/92
0724	12/6/86	N 598876.00 E 1496923.00	Pit	4.00	?	?	23.00	20.00	3.00	?	?	Found	GTA	No	PVC	PVC	Yes	5/92
0725	1987	N 598865.00 E 1495639.00	Pit	?	?	?	?	?	?	?	?	Lost	GTA	No	?	?	Yes	5/92
0726	1987	N 598675.00 E 1495614.00	Pit	8.00	872.80	872.80	?	?	?	?	?	Lost	GTA	No	PVC	PVC	No	5/92
0727	1987	N 598533.00 E 1495654.00	Trench	8.00	872.80	872.80	23.00	20.00	3.00	852.80	849.80	Lost	GTA	No	PVC	PVC	Yes	5/92
P021	1/21/93	N 597693.93 E 1496001.61	8.00	2.00	745.74	743.66	33.00	26.00	5.00	717.66	712.66	?	ER	ASTM	PVC	PVC	Yes	6/93
P022	1/12/93	N 597536.53 E 1495316.65	8.00	2.00	728.92	728.89	70.00	60.00	10.00	668.89	658.89	?	ER	ASTM	PVC	PVC	Yes	6/93
P023	1/18/93	N 597529.54 E 1495319.45	8.00	2.00	728.64	728.62	47.00	42.00	5.00	686.62	681.62	?	ER	ASTM	PVC	PVC	Yes	6/93

Table II.1. Summary of Well Construction Details (Page 4 of 4)

Well ID	Date Installed	Coordinates (ft.)	Borehole Diameter (in)	Casing Diameter (in)	Casing[1] Elev. (NGVD)	Borehole Elev. (NGVD)	Borehole Depth (ft.)	Top of Screen (ft.)	Screen Length (ft.)	Elevation of Well Screen (NGVD)		Well[2] Status	Program[3]	Meet[4] TEGD	Well[5] Material	Screen Material	Log	Source[6]
										From	To							

Notes: Monitoring wells 0113 and 0114 have two distinct screen intervals, seperated in the annulus by bentonite seals.

1 NGVD - National Geodetic Vertical Datum

2 Well Status:
Found - Well was located and identified during the field reconnaissance program.
Lost - Well was not located during field reconnaissance program. Well is presumed to be abandoned, however, there is no documentation of the abandonment.
Abandon - Well was abandoned in accordance with the proper procedures with the proper documentation.
NA - Not accessible (well is in decontamination and decommissioning exclusion zone).

3 Program:
BVAE - Buried Valley Aquifer Evaluation
PWSP - Potable Water Standards Project
ER - Environmental Restoration Program
GTA - Groundwater Tritium Assessment

4 Meet TEGD:
ASTM - Does not meet TEGD criteria, but does meet ASTM criteria.

5 Well Material:
PVC (F) - Polyvinyl chloride - identified during field reconnaissance program (type of material not stated on boring log).
PVC - Polyvinyl chloride
SS - stainless steel

6 Source:
5/92 - DOE "Operable Unit 9, Site Scoping report: Volume 2 - Geologic Log and Well Information Report." May 1992.
6/93 - DOE "Remedial Investigation/Feasibility Study, Operable Unit 9, Hydrogeologic Investigation Well Information Report." June 1993.
ICF - Boring log is presented in 6/93 document, but no well construction details are presented on boring log. Some initial information was collected during the field reconnaissance.

7 No information is available.

None of the monitoring wells installed as part of either the Buried Valley aquifer evaluation project, the potable water standards project, or the groundwater tritium assessment project are in compliance with the TEGD or the ASTM guidelines. The apparent noncompliance is due to at least one of the following:

- insufficient well construction information;
- lacking annular seal above well screen;
- lacking appropriate surface seal;
- no documentation regarding well development, if done.

Most of the wells installed as part of the ER program were specifically constructed to be in compliance with the TEGD. Three of the ER wells evaluated outside of OU-2 are constructed with 2-inch PVC and the identification numbers start with the letter P (for piezometer). These wells, because of the PVC, are not considered to be in compliance with the TEGD, but are considered to be in compliance with the ASTM guidelines. Table II.1 presents a column which indicates, for each well, whether the well is in compliance with the TEGD or not (the table indicates that the three ER piezometers are in compliance with ASTM).

2.2. FIELD IMPLEMENTATION

2.2.1. Well Reconnaissance Survey

The well reconnaissance survey was divided between the existing wells within OU-2, and the selected existing wells outside of OU-2. On May 31, 1994 a field reconnaissance survey was conducted for all existing wells within OU-2. On July 25, 1994 a field reconnaissance survey was conducted for the 12 existing monitoring wells just outside of OU-2. Both surveys consisted of completing a visual inspection log form which includes the following:

- Identifying each well location on the map, and confirming that the well still exists.
- The exterior condition of the well and surface seal/concrete pad was observed.
- A photoionization detector (PID) reading was taken of the well opening.
- The diameter and material of the well casing was observed.
- The depth to water and total depth of the well were measured (also not the location from which the measurements were taken).
- Observations regarding the general condition of the well were made.

The completed visual inspection log forms are presented in Appendix B. The location of all monitoring wells inspected are shown on Figure 2.1.

2.2.2. Video Inspection Survey

On July 12 and 13, 1994, Colog, Inc. of Golden, Colorado, conducted a video inspection survey of nine of the existing monitoring wells within OU-2. The purpose of the video inspection was to assess the condition of the wells; provide specific information regarding the exact depth and material type of the well screen; and to confirm details presented in the boring log/monitoring well construction details. The video inspection is obtained with a thin downhole camera and lighting system. The system, manufactured by Laval Underground Surveys, is a stand-alone system utilizing an armored video coaxial cable, winch, control console, and a high-resolution 1 ⅝-inch black-and-white camera. Beneath the water table, the video camera requires clear water to image the well casing and screen. The depth from the top of the well casing is displayed on the video screen. The camera descended down the wells at approximately 10 feet per minute. A video inspection survey oversight form was completed for each monitoring well. In addition to recording information about the video inspection equipment, other well construction information was recorded, e.g., depth to top of screen. The completed video inspection survey oversight forms for all nine monitoring wells are presented in Appendix C.

2.2.3. Natural Gamma Logging

Natural gamma logs provide measurements of the natural radioactivity of nearby geologic materials. A natural gamma log tool detects the radiation from materials from up to about one foot away from the tool, however, logging through steel or PVC casing has a damping effect on the recorded natural gamma values. Most rocks and soils are radioactive to some degree, igneous and metamorphic rocks more so that sedimentary rocks. Finer grained materials (clays) are much more radioactive than coarser grained materials (sands or gravels). Consequently, the natural gamma log can be used to locate the position of a bentonite seal because the measurements of radioactivity in fine clay will be higher than in the sand backfill around the screen.

On July 12 and 13, 1994, Colog, Inc. of Golden, Colorado, conducted a natural gamma log of seven monitoring wells within OU-2. Monitoring well (0724) was not logged because the gamma probe was unable to pass through a bend in the well casing, well (0034) was not logged because there was some type of contaminant (it appeared to be oil) in the well.

The natural gamma log is a continuous digital recording of activity levels (measured as discrete counts per second [CSP]) with depth measured by a scintillation sodium-iodide detector manufactured by Mt.

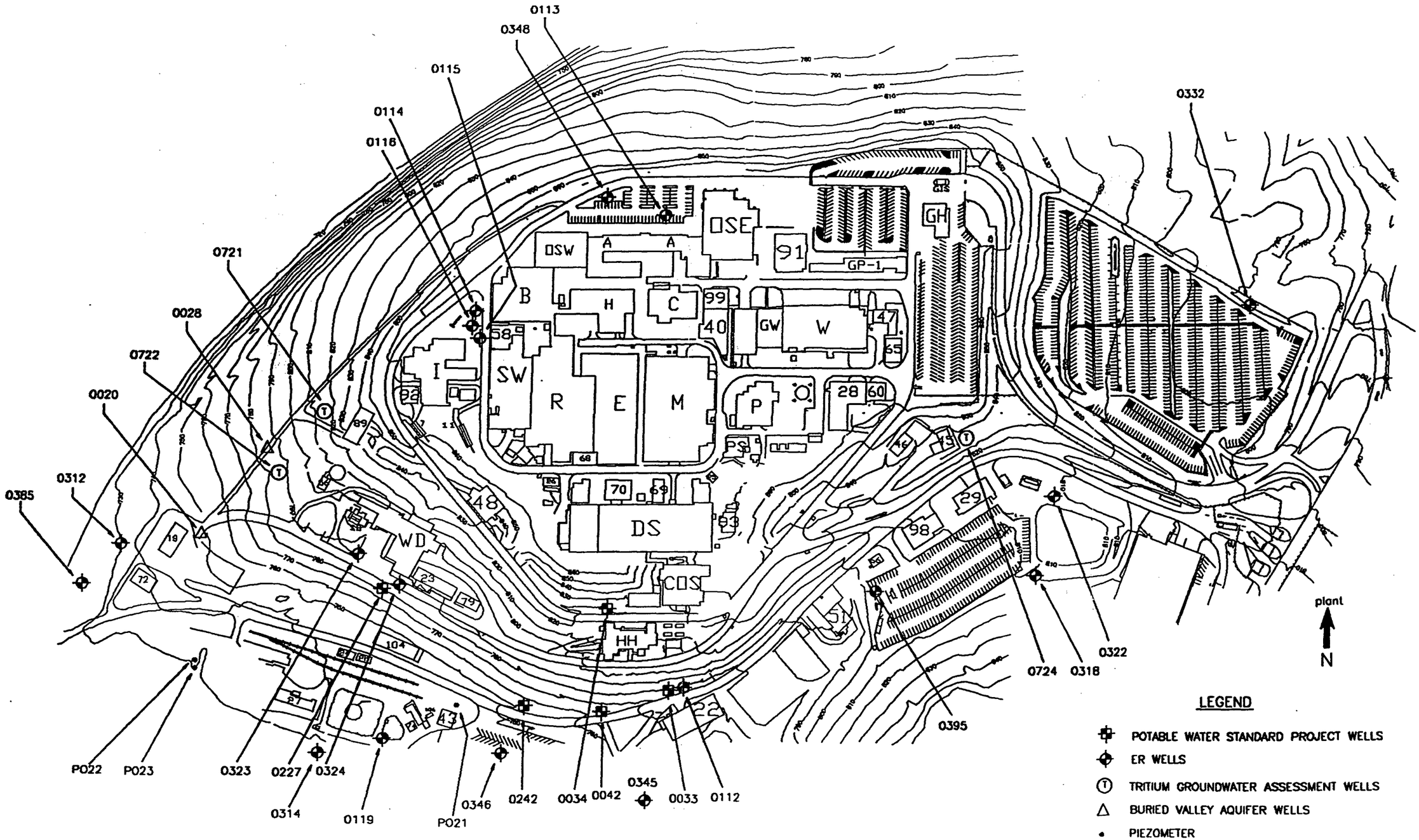


Figure 2.1. Inspected Monitoring Wells

Sopris Instruments. The gamma probe descended down the wells at approximately 15 feet per minute. A natural gamma logging oversight form was filled out for each monitoring well. In addition to recording information about the gamma logging equipment, calibration notes, e.g., the length of a repeat section made, if any, at the location, was recorded. The natural gamma logging oversight forms for all seven monitoring wells are presented in Appendix D.

Section 3

3. RESULTS

3.1. WELL RECONNAISSANCE SURVEY

Three of the 33 existing monitoring wells within OU-2 were inaccessible. Monitoring wells 0117, 0120, and 0723 are within an area undergoing decontamination and decommissioning (D&D). Access will not be available until the D&D work is complete (time of completion is unknown at the time of writing this memorandum).

Seven of the 33 existing monitoring wells within OU-2 could not be located (monitoring wells 0419, 0712, 0713, 0714, 0725, 0726, and 0727). There were no indications whether the wells were abandoned or not. The area in which wells 0713, 0714, 0726, and 0727 were located (roadway on the west side of SW Building) had apparently been paved recently. A small area of exposed bentonite was found in the area of well 0419. There was a pile of soil near the location of monitoring well 0236, and there were pieces of 3-inch PVC (the diameter and type of material that 0236 was reportedly constructed from) within the pile of soil. Approximately 150 east of the 0236 map location was a piece of 8-inch diameter PVC with "0236" written on the side, however, neither the coordinates nor the diameter of the second location match with the documented location and installation of well 0236. The RI/FS, OU 9, Hydrogeologic Investigation Well Information Report, dated June 1993, states that monitoring well 0122 was properly abandoned, and that monitoring well 0035 (an older well) could not be located and was presumed to be abandoned.

Neither the two monitoring wells installed as part of the Buried Valley aquifer evaluation project (0020 and 0028) nor the five monitoring wells installed as part of the potable water standards project (0033, 0034, 0042, 0227, and 0242), had surface seal or concrete pads, and the five potable water standards project wells had no protective casings. The three groundwater tritium contamination assessment wells that were located, 0721, 0722, and 0724 had neither surface seals, concrete pads, nor protective casings. No problems were noted with the surface construction of any of the ER wells.

Table III.1 presents a comparison of the depth noted on the well construction log to the well depth measured during this assignment, the height of the water column in each well, and the relationship of the water level in the well to the well screen interval. The water column was less than one foot in five of the 20 monitoring wells within OU-2 that were surveyed (0042, 0114, 0115, 0242, and 0323).

All of the 12 "offsite" monitoring wells planned to support the OU-2 RI/FS were installed as part of the ER program. One of the 12 "offsite" monitoring wells (0111) was inaccessible because it is located in a D&D exclusion zone. The well cap on one of the other "offsite" monitoring wells (0395) was sealed, and

Table III.1. Summary of Well Reconnaissance Survey (Page 1 of 4)

Well ID	Log Well Depth (ft.)[1]	Field Well Depth (ft.)[2]	Well Depth Diff. (ft.)[3]	Casing Elev. (NGVD)	Top of Screen (ft.)	Screen Length (ft.)	Top of Screen Elev. (NGVD)	Bottom of Screen Elev. (NGVD)	Depth to Water (ft.)	Water Elev. (NGVD)	Water Level Above Top of Screen (ft.)[4]	Water Column Height (ft.)
0020	19.00	19.95	-0.95 (1.54)	749.18	17.00	2.00	729.69	727.69	11.88	737.30	7.61	8.07
0028	40.00	41.02	-1.02 (1.45)	786.84	40.00	2.00	744.37	742.37	12.56	774.28	29.91	28.46
0033	33.50	25.11	8.39 (11.62)	776.74	31.50	2.00	742.01	740.01	20.01	756.73	14.72	5.10
0034	20.00	20.05	-0.05 (0.56)	818.71	17.00	3.00	801.10	798.10	16.50	802.21	1.11	3.55
0042	25.00	25.24	-0.24 (0.84)	762.28	?[5]	?	?	?	25.13	737.15	?	0.11
0111	67.00	NA[6]	NA	779.02	57.00	10.00	720.54	710.54	NA	NA	NA	NA
0112	35.50	36.91	-1.41 (0.15)	773.84	25.50	10.00	746.78	736.78	28.27	745.57	-1.21	8.64
0113	56.50	55.26	1.24 (0.50)	873.30	38.50 52.00	3.00 3.00	835.54 822.04	832.54 819.04	51.41	821.89	-0.15	3.85
0114	53.00	52.40	0.60 (0.13)	872.14	36.50 49.50	3.00 3.00	836.11 823.11	833.11 820.11	52.28	819.86	-3.25	0.12
0115	41.00	40.14	0.86 (0.43)	872.30	30.50	9.50	842.23	832.73	39.25	833.05	-9.18	0.89
0116	83.00	80.06	2.94 (1.99)	871.66	69.80	10.00	802.81	792.81	58.51	813.15	10.34	21.55

Table III.1. Summary of Well Reconnaissance Survey (Page 2 of 4)

Well ID	Log Well Depth (ft.)[1]	Field Well Depth (ft.)[2]	Well Depth Diff. (ft.)[3]	Casing Elev. (NGVD)	Top of Screen (ft.)	Screen Length (ft.)	Top of Screen Elev. (NGVD)	Bottom of Screen Elev. (NGVD)	Depth to Water (ft.)	Water Elev. (NGVD)	Water Level Above Top of Screen (ft.)[4]	Water Column Height (ft.)
0117	16.50	NA	NA	801.82	5.50	10.00	795.12	785.12	NA	NA	NA	NA
0119	42.50	43.64	-1.14 (0.07)	741.41	32.70	10.00	707.50	697.50	22.73	719.18	11.68	21.41
0120	33.00	NA	NA	821.03	20.50	10.00	799.35	789.35	NA	NA	NA	NA
0227	31.50	32.65	-1.15 (0.45)	785.00	29.30	2.00	754.10	752.10	17.18	767.82	13.72	15.47
0242	13.00	15.28	-2.28 (-0.52)	754.56	11.00	2.00	741.80	739.80	15.10	739.46	-2.34	0.18
0312	32.50	33.57	-1.07 (0.96)	731.30	21.80	10.00	707.47	697.47	30.85	700.45	-7.02	2.72
0314	43.00	45.47	-2.47 (-0.76)	742.71	33.00	10.00	708.00	698.00	41.72	700.99	-7.01	3.75
0318	28.50	30.46	-1.96 (0.37)	810.53	18.30	10.00	789.90	779.90	17.45	793.08	3.18	13.01
0322	54.50	56.34	-1.84 (-0.07)	809.84	44.70	10.00	763.37	753.37	33.40	776.44	13.07	22.94
0323	18.00	17.04	0.96 (0.49)	783.88	13.00	5.00	771.35	766.35	16.93	766.95	-4.40	0.11
0324	20.00	19.34	0.66 (0.48)	782.92	15.00	5.00	768.10	763.10	13.47	769,45	1.35	5.87

Table III.1. Summary of Well Reconnaissance Survey (Page 3 of 4)

Well ID	Log Well Depth (ft.)[1]	Field Well Depth (ft.)[2]	Well Depth Diff. (ft.)[3]	Casing Elev. (NGVD)	Top of Screen (ft.)	Screen Length (ft.)	Top of Screen Elev. (NGVD)	Bottom of Screen Elev. (NGVD)	Depth to Water (ft.)	Water Elev. (NGVD)	Water Level Above Top of Screen (ft.)[4]	Water Column Height (ft.)
0332	32.00	32.30	-0.30 (-0.74)	792.11	22.00	10.00	770.55	760.55	17.34	774.77	4.22	14.96
0345	40.00	42.12	-2.12 (0.17)	754.32	35.00	5.00	717.03	712.03	27.73	726.59	9.56	14.39
0346	46.00	45.41	0.59 (-0.03)	742.92	41.00	5.00	702.54	697.54	16.49	726.43	23.89	28.92
0348	?	115.95	?	?	?	?	?	?	53.96	?	?	61.99
0385	26.00	24.68	1.32 (0.59)	723.11	21.00	5.00	702.84	697.84	dry	dry	dry	0.00
0395	70.00	NA/WW[7]	NA/WW	801.17	60.00	10.00	741.48	731.48	NA/WW	NA/WW	NA/WW	NA/WW
0721	24.50	23.65	0.85	?	21.50	?	?	?	22.11	?	?	1.54
0722	21.00	26.86	-5.86	?	18.00	3.00	?	?	14.74	?	?	12.12
0723	21.00	NA	NA	?	18.00	3.00	?	?	NA	NA	NA	NA
0724	23.00	24.63	-1.63	?	20.00	3.00	?	?	19.95	?	?	4.68
P021	31.00	33.04	-2.04 (0.04)	745.74	26.00	5.00	717.66	712.66	19.09	726.65	8.99	13.95
P022	70.00	70.04	-0.04 (-0.01)	728.92	60.00	10.00	668.89	658.89	47.78	681.14	12.25	22.26

Table III.1. Summary of Well Reconnaissance Survey (Page 4 of 4)

Well ID	Log Well Depth (ft.)[1]	Field Well Depth (ft.)[2]	Well Depth Diff. (ft.)[3]	Casing Elev. (NGVD)	Top of Screen (ft.)	Screen Length (ft.)	Top of Screen Elev. (NGVD)	Bottom of Screen Elev. (NGVD)	Depth to Water (ft.)	Water Elev. (NGVD)	Water Level Above Top of Screen (ft.)[4]	Water Column Height (ft.)
P023	47.00	47.00	0.00 (0.02)	728.64	42.00	5.00	686.62	681.62	44.21	684.43	-2.19	2.79

Notes: NGVD - National Geodetic Vertical Datum

1 Log Well Depth - The bottom of the well depth taken from the monitoring well construction diagrams. This is not always the same as the Log Borehole Depth because the bottom of some wells were set above the bottom of the borehole.

2 Field Well Depth - These depths were measured from the top of the well casing, which is at an elevation different than the ground surface.

3 Well Depth Difference - A negative value indicates the well is deeper than the construction logs indicate, a positive value indicates that the bottom of the well is not as deep as described in the construction log. The value in paraenthesis is the well depth difference based on the elevation difference, if known, of the ground surface and the top of the well casing.

4 Water Level Above Top of Screen - Positive values indicate the well screen is completely submerged, negative values indicate that a portion of the well screen is above the water table.

5 ? - No information is available from referenced documents.

6 NA - Not accessible (well is in decontamination and decommissioning exclusion zone).

7 NA/WW - Depths to water and bottom of the well could not be measured because the well cap was sealed.

therefore, the depths to water and the bottom of the well could not be measured. No water was detected in "offsite" monitoring well 0385.

The difference between the well depth shown on the well construction log and the field measured well depth is an indication of the amount, if any, of sediment collecting in the well. In general, the wells have a few tenths, to a little over one foot, of sediment in the bottom. Monitoring well 0033 has over eight feet of silt in the bottom of the well. The difference between reported well depths and measured well depth at monitoring well 0033, however was over eight feet. This indicates either a typical sediment accumulation in the well or an error in reporting well depth or a problem with the well integrity.

3.2. VIDEO INSPECTION SURVEY

The following provides brief observations made from the video inspection survey for the monitoring wells. *All measurements are reported from the top of the well casing.*

3.2.1. Well Number 0033

The depth to water was observed at approximately 20 feet. The depth to the top of sediment was 24.8 feet. The bottom of the well, based on video camera refusal, was 25.2 feet deep (the boring log indicates that the bottom of the well is 33.5 feet). The top of the well screen was not observed. At 21.9 feet a dark material was noted on the left side of the well casing. At 23.2 feet the water became very dark and it was difficult to see any details. The depth to the top of the sediment and bottom of the well (video camera refusal) were noted from the response of the cable rather than observations made from the video.

3.2.2. Well Number 0034

The depth to fluid was observed at approximately 16.1 feet. At 9.4 feet some staining/discoloration was noted on the right side of the well casing. At 13.0 feet the staining/discoloration was on all sides of the well casing. Just before the camera entered the fluid, a few drops of fluid fell onto the water surface, but beaded up, indicating that the fluid seen by the video was not water, but some type of floating product. The video was stopped and the camera pulled from the well. The end of the camera was coated with what appeared to be unused motor oil.

3.2.3. Well Number 0112

The top of the well screen was observed at approximately 26.5 feet, and the depth to water at approximately 28.2 feet. The depth to the bottom of the well screen, and the bottom of the well, was observed at approximately 36.4 feet. A slight amount (less than 0.1 feet) of sediment was noted at the bottom of the well.

3.2.4. Well Number 0114

Two screens were observed in this monitoring well. The depth to the top of the first well screen was at approximately 35.5 feet; the depth to the bottom was at approximately 38.5 feet. The depth to the top of the second well screen was at 49.0 feet and the bottom at 52.0 feet. The depth to water in the well was 52.3 feet (0.3 feet below the bottom of the deeper well screen). The bottom of the well was observed at 52.5 feet.

3.2.5. Well Number 0115

The depth to the top of the well screen was observed at approximately 30.5 feet and the depth to water was at approximately 39.1 feet. Some type of fabric (it appeared to be a plastic bag) was observed at 39.8 feet; the bottom of the well (video camera refusal) was at 40.0 feet. No sediment was observed in the well, however, the fabric blocked the view of the very bottom of the well.

3.2.6. Well Number 0116

The depth to water was observed at approximately 59.0 feet, and the depth to the top of the well screen was at approximately 70.1 feet. The depth to the bottom of the well screen, and the bottom of the well, was 79.8 feet. A slight amount (less than 0.1 feet) of sediment was observed at the bottom of the well.

3.2.7. Well Number 0312

The depth to the top of the well screen was observed at approximately 22.9 feet, and the depth to water was 31.0 feet. The depth to the bottom of the well screen could not be observed on the video because the water was turbid. The bottom of the well was 33.8 feet based on video camera refusal.

3.2.8. Well Number 0324

The depth to water was observed at approximately 13.8 feet, and the depth to the top of the well screen was observed at approximately 14.9 feet. The depth to the bottom of the well screen was 19.4 feet. The depth to the bottom of the well was 19.5 feet. Approximately 0.3 feet of sediment was observed at the bottom of the well.

3.2.9. Well Number 0724

The depth to water was observed at approximately 19.3 feet, and the depth to the top of the well screen was 23.3 feet. The depth to the bottom of the well screen, and to the bottom of the well, was 24.4 feet. No sediment was observed inside of the well, however, the bottom of the well screen was not capped and pea gravel could be seen at the bottom of the well.

3.3. NATURAL GAMMA LOGGING

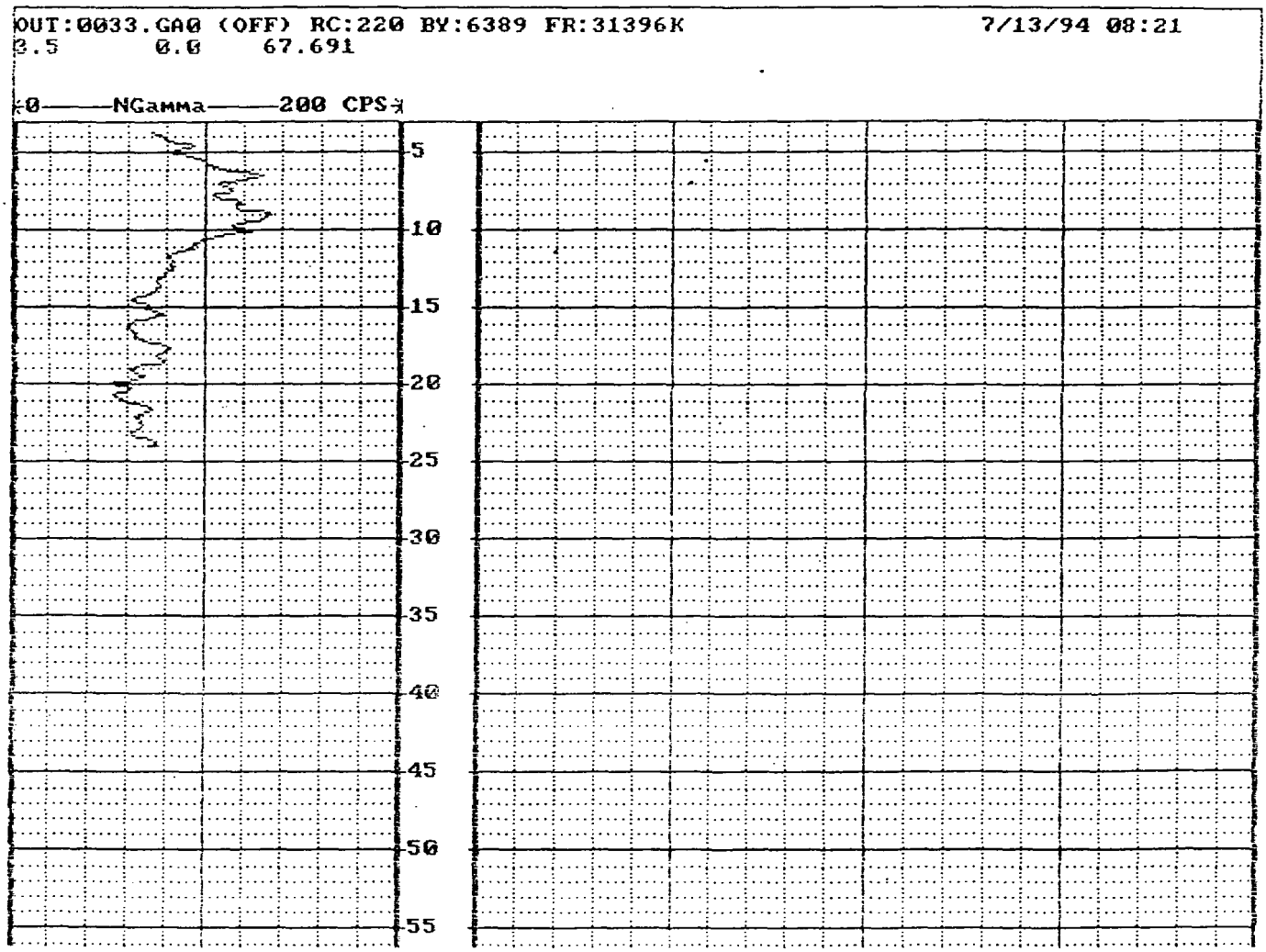
The following provides observations made from the natural gamma logs recorded for the monitoring wells. All measurements are made from the top of the well casing. The bottom of the probe unit is about 1.5 feet below the actual detection device. Therefore, the bottom of the logs terminate about 1.5 feet above bottom of the well.

3.3.1. Well Number 0033

There is a large increase in activity measured between six and 12 feet below the well top. Between zero and 12 feet below the surface, the lithology is described only as Fill, and, therefore, it is possible that the type of fill material may be different (probably an increase in clay content) in the bottom six feet. The probe was not able to penetrate the bottom eight feet of the well and, therefore, unable to confirm the presence of the bentonite seal above the well screen. The natural gamma log for 0033 is shown on Figure 3.1.

3.3.2. Well Number 0112

There is a peak in the log at about 10 feet, however, the lithologic description does not indicate any changes at this depth. The next peak in the log is between 18.5 and 20.5 feet which is apparently the bentonite seal above the well screen; the boring log indicates the seal is located at a depth of approximately 17 to 19 feet below the surface. The last peak in the log is between 28 and 30 feet. The lithologic description says the lithology is uncertain and assumes there is interbedded limestone and


OUT:0033.GA0 (OFF) RC:220 BY:6389 FR:31396K
7/13/94 08:21
3.5 0.0 67.691
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
55

shale. This last peak probably indicates there is a shale layer between 28 and 30 feet. The natural gamma log for 0112 is shown on Figure 3.2.

3.3.3. Well Number 0114

There are three distinct peaks below 30 feet which correspond, within one foot, with the three bentonite seals placed in the annulus for the two separate well screens. The natural gamma log for 0114 is shown on Figure 3.3.

3.3.4. Well Number 0115

There is a peak at around 15 feet which probably represents a 1.5 foot layer of shale described in the well log at a depth from 15 to 16.5 feet. Another peak occurs between 25.5 and 27.5 feet, which probably indicates the presence of the bentonite seal (26.5 to 28.5 feet in the well log) above the well screen. The natural gamma log for 0115 is shown on Figure 3.4.

3.3.5. Well Number 0116

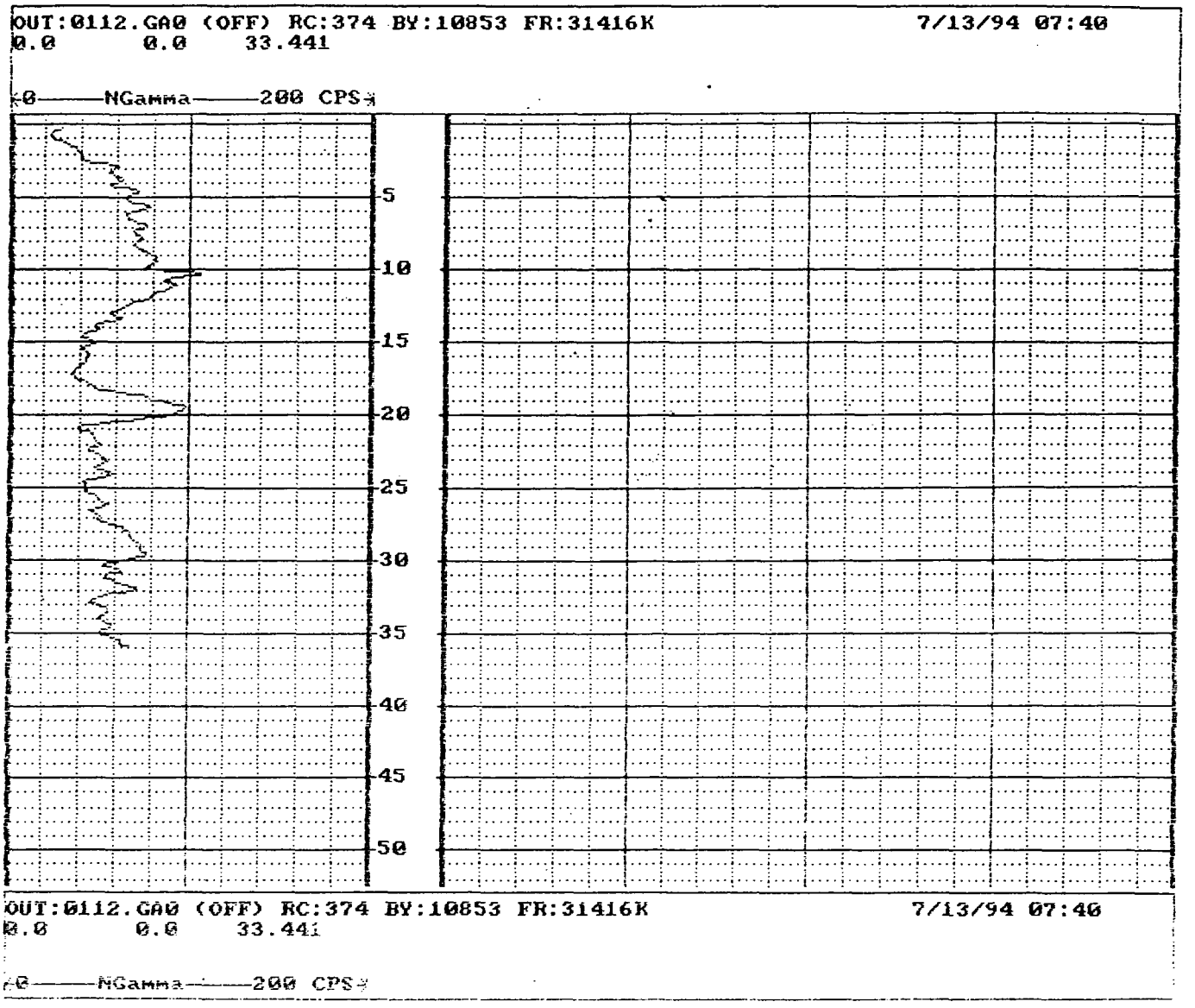
The log has no significant peaks, although the log generally shows between 40 to 60 CPS down to 40 feet, and then ranges between 60 and 100 CPS from 40 to 60 feet, and between 60 and 80 CPS below 60 feet. There is no peak at the approximate depth of the bentonite seal above the well screen (65 to 69 feet), however, that does not indicate there is no seal. The natural gamma log for 0116 is shown on Figure 3.5.

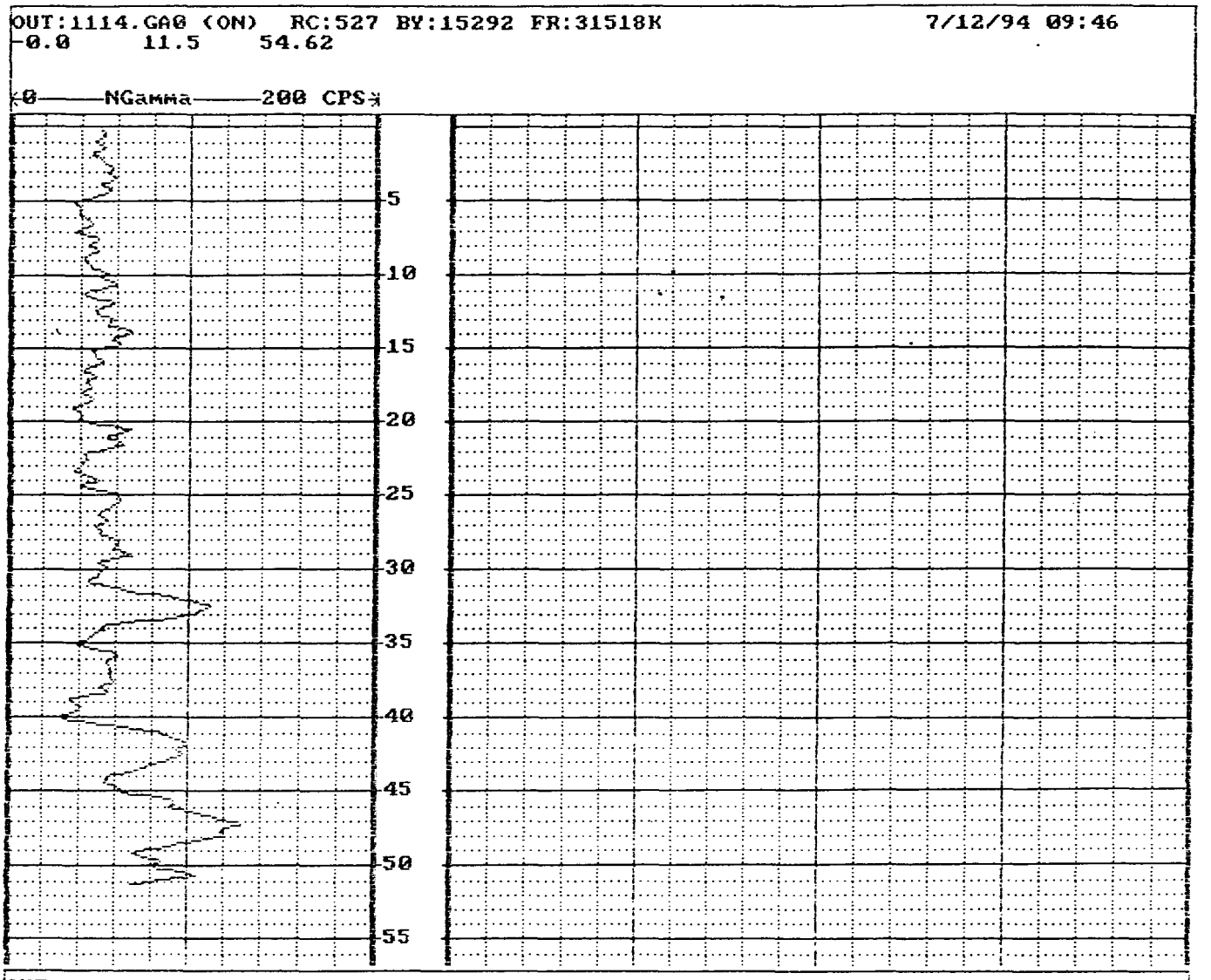
3.3.6. Well Number 0312

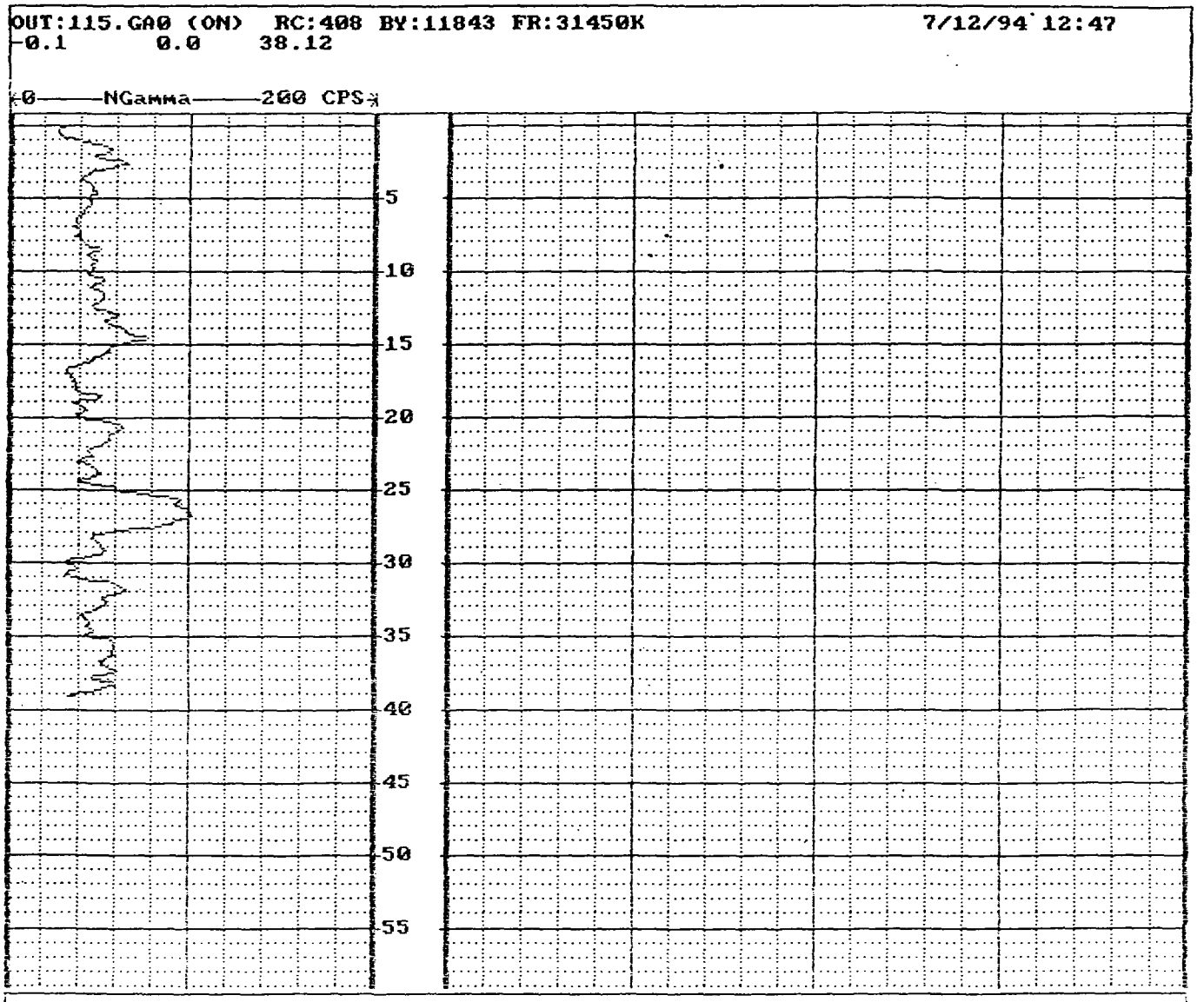
The first peak is approximately four feet deep, but does not correspond with any specific lithologic descriptions (the top 17 feet was described in the well log as sandy clay). The second peak is between 17 and 20.5 feet and corresponds well with the bentonite seal (16.5 to 18.5 feet on the boring log) just above the well screen. The natural gamma log for 0312 is shown on Figure 3.6.

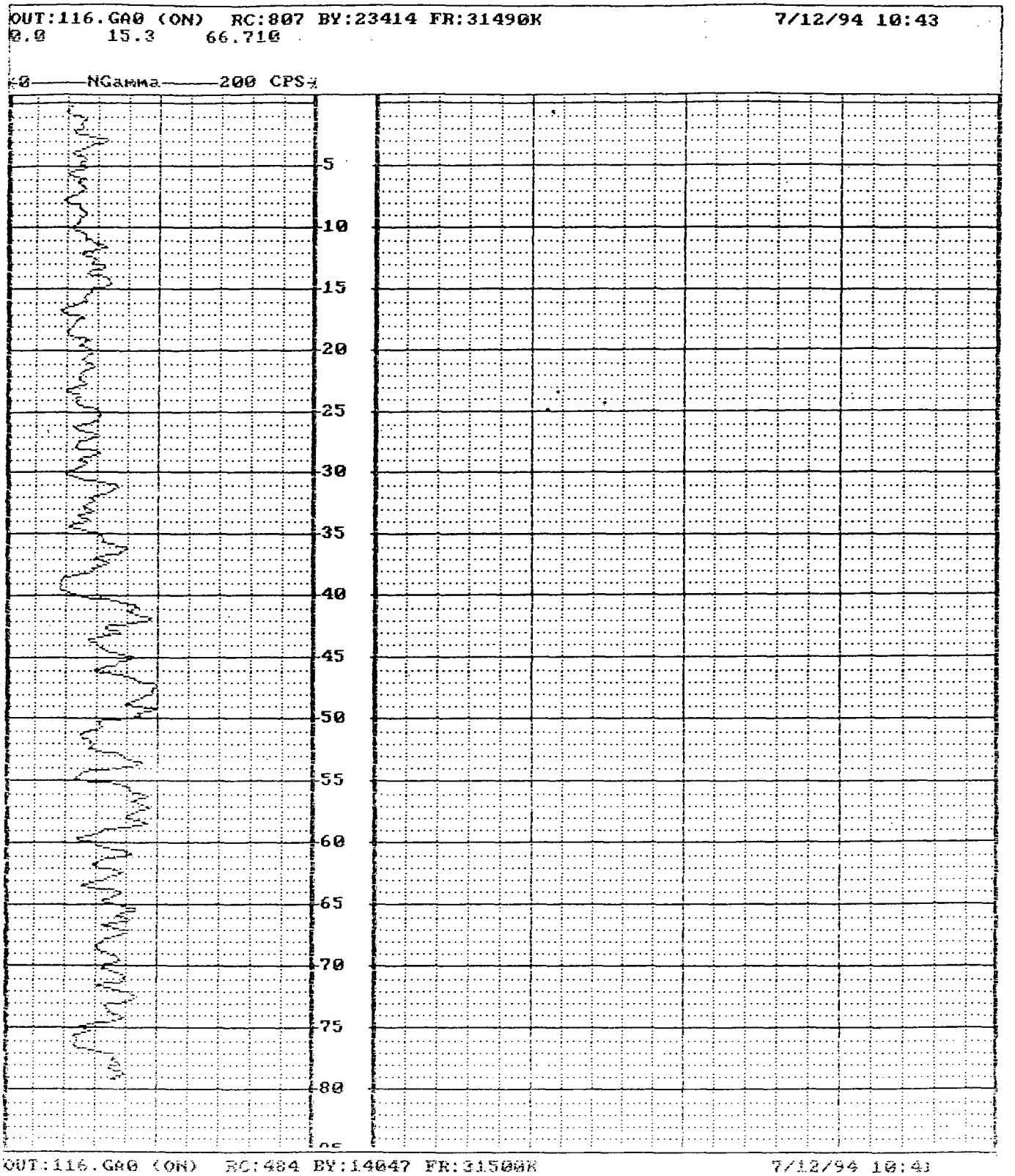
3.3.7. Well Number 0324

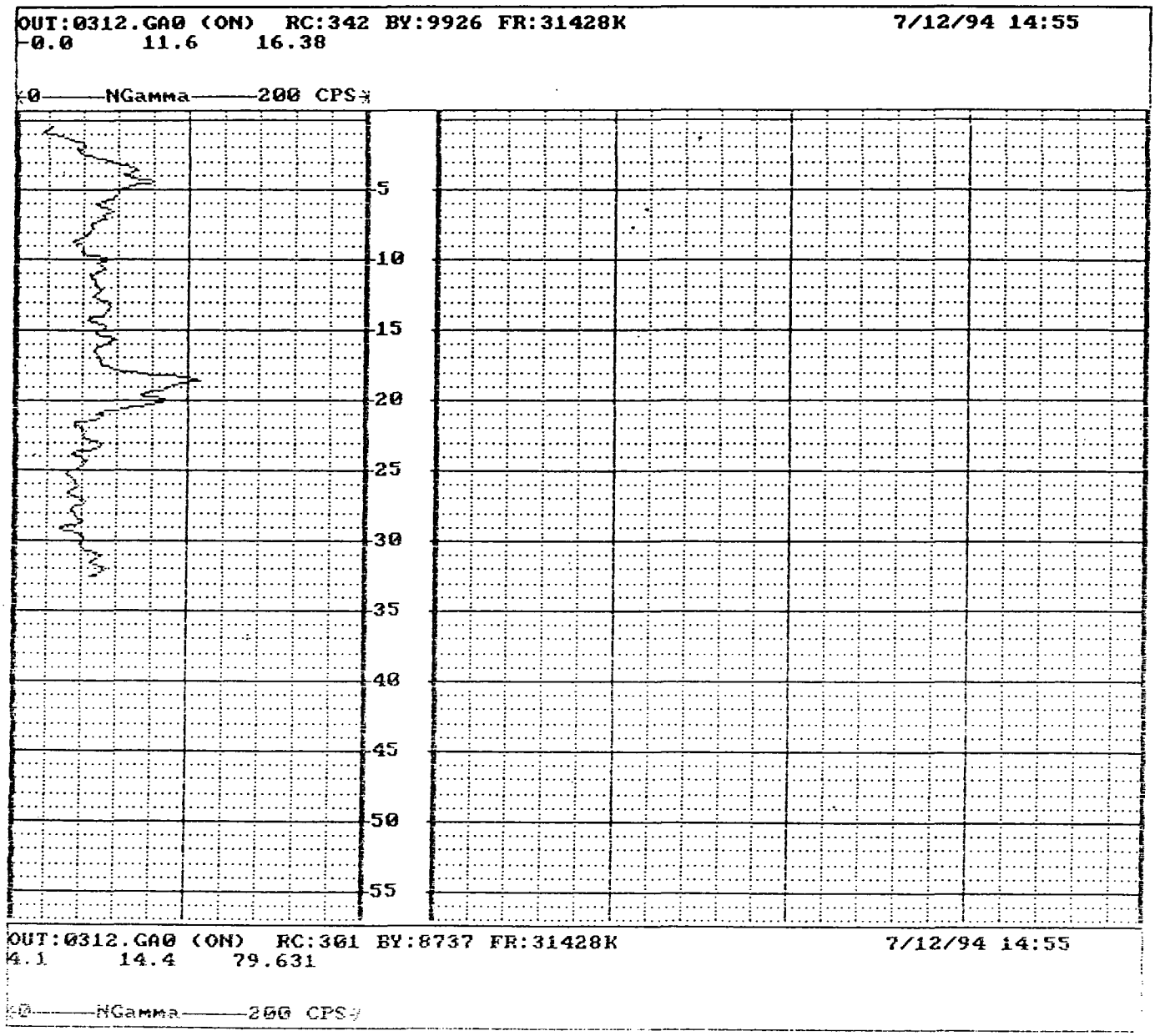
There is one broad peak between six and 11 feet which corresponds with the lithologic description of clay grading to silty clay between six and 13 feet. The bentonite seal is probably part of this peak since it was placed between 10 and 13 feet. The natural gamma log for 0324 is shown on Figure 3.7.

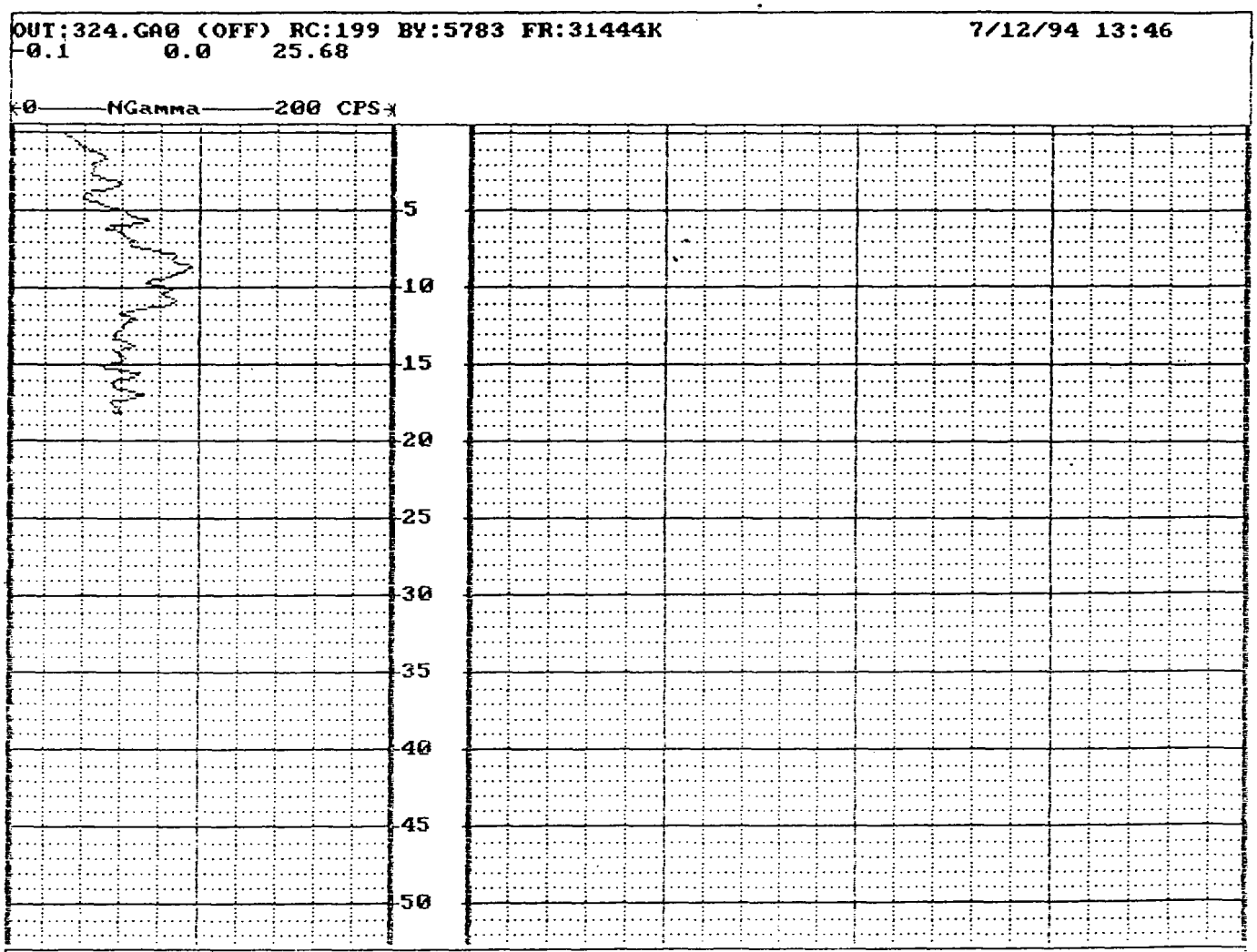

OUT:0112.GA0 (OFF) RC:374 BY:10853 FR:31416K
7/13/94 07:40
0.0 0.0 33.441
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
OUT:0112.GA0 (OFF) RC:374 BY:10853 FR:31416K
7/13/94 07:40
0.0 0.0 33.441
0 NGamma 200 CPS


OUT:1114.GA0 (ON) RC:527 BY:15292 FR:31518K
7/12/94 09:46
-0.0 11.5 54.62
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
55
OUT:1114.GA0 (ON) RC:481 BY:13958 FR:31520K
7/12/94 09:46
4.6 14.3 56.885
0 NGamma 200 CPS
OUT:1114.GA0 (ON) RC:464 BY:13465 FR:31520K
7/12/94 09:46
6.3 14.5 33.385
0 NGamma 200 CPS


OUT:115.GA0 (ON) RC:408 BY:11843 FR:31450K
7/12/94 12:47
-0.1 0.0 38.12
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
55
OUT:115.GA0 (ON) RC:342 BY:9929 FR:31452K
7/12/94 12:47
6.5 15.2 43.230
0 NGamma 200 CPS


OUT:116.GA0 (ON) RC:807 BY:23414 FR:31490K
7/12/94 10:43
0.0 15.3 66.710
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
OUT:116.GA0 (ON) RC:484 BY:14047 FR:31500K
7/12/94 10:41
32.9 15.1 63.70
0 NGamma 200 CPS


OUT:0312.GA0 (ON) RC:342 BY:9926 FR:31428K
7/12/94 14:55
-0.0 11.6 16.38
0 NGamma 200 CPS
5
10
15
20
25
30
35
40
45
50
55
OUT:0312.GA0 (ON) RC:301 BY:8737 FR:31428K
7/12/94 14:55
4.1 14.4 79.631
0 NGamma 200 CPS



OUT:324.GA0 (OFF) RC:199 BY:5783 FR:31444K
7/12/94 13:46
-0.1 0.0 25.68
0 NGamma 200 CPS

Section 4

4. SUMMARY AND CONCLUSIONS

A total of 45 boring logs/monitoring well construction diagrams were reviewed to evaluate whether the existing wells can be used for the OU-2 RI/FS. The review assesses whether the well is in compliance with TEGD or ASTM guidelines (which is necessary if the well is to be used to collect representative groundwater quality samples), whether the well can still be used in the OU-2 RI/FS for something other than groundwater sampling, and whether the well should be recommended for abandonment.

A well reconnaissance survey was conducted of all the existing monitoring wells within OU-2 and 12 selected monitoring wells located near OU-2. The survey assessed the condition of the wells and collected specific data to help evaluate whether the wells could be used in the RI/FS. Table IV.1 summarizes the review and survey data and provides well specific rationale for either using, or possibly abandoning, the well. The table indicates whether the well would be used for either water elevation data and/or water quality sampling. The table also presents the type of well rehabilitation necessary for the well to be used in the OU-2 RI/FS. Wells listed for abandonment in this technical memorandum will be fully evaluated, including a review of groundwater quality data, prior to abandonment in accordance with procedures outlined in Operable Unit 9 Sitewide Well Decommissioning and Abandonment Program Plan, Draft (Revision 0), dated October 1992. The locations of the wells suggested for use in the RI/FS are presented in Figure 4.1.

A total of 10 monitoring wells within OU-2 could not be located after extensive searching and are either abandoned or destroyed. Three wells within OU-2 and one just outside of OU-2 are not accessible because they are within exclusion zones established for ongoing decontamination and decommissioning projects. The depth to water and bottom of well could not be measured in one well just outside of OU-2 because the well wizard cap is glued in place and can not be removed for access to the inside of the well. Of the remaining 30 wells which were surveyed, six had no, or very little, water in the well and are assumed to be screened above the saturated groundwater zone (recommended for abandonment). One additional well had two separate screened intervals which could potentially permit cross contamination of the groundwater (also recommended for abandonment). Three wells, plus one well which is inaccessible, were constructed in large trenches and have no seal slightly above the top of the well screen. These wells were installed as part of a groundwater tritium assessment and remediation project and can not provide the same type of data as all the other monitoring wells (recommended for abandonment). One of the monitoring wells had over eight feet of sediment (six feet higher than the well screen) indicating probable faulty well construction (recommended for abandonment). One well is known to be contaminated with a floating product; this well will be evaluated separately during Phase II of the RI.

Table IV.1. Summary of OU-2 RI/FS Existing Monitoring Well Use (Page 1 of 4)

	Monitoring Well Use for OU-2 RI/FS			
Well ID	Water Levels	Water Quality Samples	Rationale	Further Action
0020	Yes	No	Does not meet TEGD/ASTM criteria for water quality samples. Screen is close to water table - water elevation data will be useful in establishing water table contours.	Redevelopment to remove sediment. Surface seal/concrete pad. Replace protective casing.
0028	Yes	No	Does not meet TEGD/ASTM criteria for water quality samples. Screen is nearly 30 feet below water level in well - water elevation data may be useful in establishing deeper piezometric contours.	Redevelopment to remove sediment. Surface seal/concrete pad. Replace protective casing.
0033	No	No	Does not meet TEGD/ASTM criteria for water quality samples.	Not recommended for use in RI/FS. Evaluate in Phase III for possible abandonment.
0034	No	No	The contamination in this well will be investigated as a separate task in Phase 2 of the OU-2 RI/FS. Consideration of the use of this well will be determined at the end of that task.	To be evaluated as a separate task in Phase II.
0042	No	No	Only 0.11 feet of water in well. Screen is apparently above the saturated zone.	Collection of monthly water level measurements for one year to further evaluate this well.
0111	Yes	No	Currently not accessible. Well construction meets TEGD/ASTM criteria - may be useful for water elevation data once access has been gained.	Reevaluate upon access.
0112	Yes	Yes	Well construction meets TEGD/ASTM criteria for water quality samples. Screen intersects water table.	Redevelopment to remove sediment.
0113	No	No	Well has two screens; the upper 3-foot screen is approximately 17 feet above the bottom of the well and approximately 13 feet above the water table. The double screens provide a potential pathway for cross contamination.	Consider for abandonment.

Table IV.1. Summary of OU-2 RI/FS Existing Monitoring Well Use (Page 2 of 4)

	Monitoring Well Use for OU-2 RI/FS			
Well ID	Water Levels	Water Quality Samples	Rationale	Further Action
0114	No	No	Only 0.11 feet of water in well. Screen is apparently above the saturated zone. The double screens provide a potential pathway for cross contamination.	Consider for abandonment.
0115	No	No	Only 0.89 feet of water in the well. Elevation of water is nearly 20 feet higher that water elevation in nearby 0116. Screen is apparently above the saturated zone.	Collection of monthly water level measurements for one year to further evaluate this well.
0116	Yes	Yes	Well construction meets TEGD/ASTM criteria for water quality samples. Screen is nearly 22 feet below water level in well - water elevation data may be useful in establishing deeper piezometric contours.	Redevelopment to remove sediment.
0117	Yes	Yes	Currently not accessible. Well construction meets TEGD/ASTM criteria for water quality samples. May be useful for both water elevation data and water quality data once access has been gained.	Reevaluate upon access.
0119	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
0120	Yes	Yes	Currently not accessible. Well construction meets TEGD/ASTM criteria for water quality samples. May be useful for both water elevation data and water quality data once access has been gained.	Reevaluate upon access.
0227	Yes	No	Does not meet TEGD/ASTM criteria for water quality samples. Screen is approximately 10 feet lower in elevation than adjacent 0324, and water elevation is about 2 feet lower than in 0324; the wells might be considered a nested pair.	Redevelopment to remove sediment. Surface seal/concrete pad. New protective casing.
0242	No	No	Only 0.18 feet of water in well. Screen is apparently above the saturated zone.	Collection of monthly water level measurements for one year to further evaluate this well.
0312	Yes	Yes	Well construction meets TEGD/ASTM criteria for water quality samples. Screen intersects water table.	Redevelopment to remove sediment.

Table IV.1. Summary of OU-2 RI/FS Existing Monitoring Well Use (Page 3 of 4)

	Monitoring Well Use for OU-2 RI/FS			
Well ID	Water Levels	Water Quality Samples	Rationale	Further Action
0314	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
0318	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	Redevelopment to remove sediment.
0322	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
0323	No	No	Only 0.11 feet of water in well. Screen is apparently above the saturated zone.	Collection of monthly water level measurements for one year to further evaluate this well.
0324	Yes	Yes	Well construction meets TEGD/ASTM criteria for water quality samples. Screen very close to water table, can be used with well 0227 as a nested pair.	Redevelopment to remove sediment.
0332	Yes	Yes	Well construction meets TEGD/ASTM criteria for water quality samples. Screen very close to water table.	None
0345	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	Redevelopment to remove sediment.
0346	Yes	No	Well construction meets TEGD/ASTM criteria - well will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
0348	Yes	No	Very little information on this well to date, however, water level measurements are accessible from this well. Can determine how to utilize water elevation data once well construction details are reviewed.	Reevaluate after reviewing well construction details.

Table IV.1. Summary of OU-2 RI/FS Existing Monitoring Well Use (Page 4 of 4)

	Monitoring Well Use for OU-2 RI/FS			
Well ID	Water Levels	Water Quality Samples	Rationale	Further Action
0385	No	No	No water was detected within the well. Screen is apparently above the saturated zone.	Collection of monthly water level measurements for one year to further evaluate this well.
0395	Yes	No	Well construction meets TEGD/ASTM criteria - there is a well wizard sampling system installed, but the top is sealed. Once a method for determining the depth to water is established (or the cap can be removed), the well will provide useful water elevation data.	Reevaluate upon access for water level measurements.
0721	No	No	This well was placed into a very large trench excavation as part of a remediation system. The water level in this well is not representative of the water table (the water level could be artificially high since the trench might act to collect water which can not flow out as quickly as it comes in).	Not recommended for use in RI/FS
0722	No	No	See 0721	See 0721
0723	No	No	See 0721	See 0721
0724	No	No	See 0721	See 0721
P021	Yes	No	Piezometer construction meets ASTM criteria - piezometer will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
P022	Yes	No	Piezometer construction meets ASTM criteria - piezometer will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None
P023	Yes	No	Piezometer construction meets ASTM criteria - piezometer will provide useful water elevation data. Well is located outside of OU-2 and will be evaluated for possible sampling based on OU-9 and OU-5 sampling activities.	None

Note: **Bold** monitoring well numbers indicate the well is intended to be used for the OU-2 RI/FS.

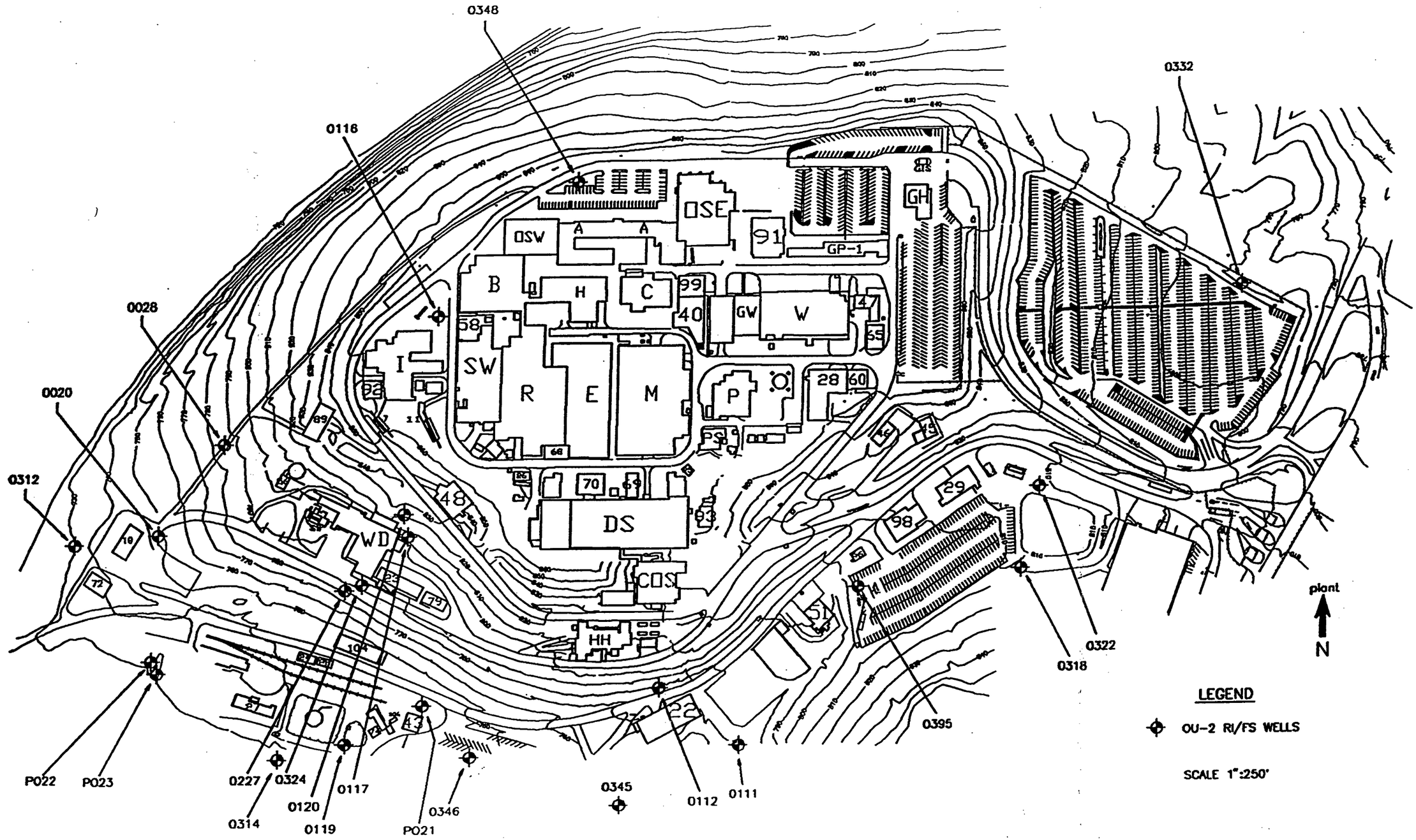


Figure 4.1. Recommended Wells to be used in RI/FS

There are a total of 22 existing monitoring wells within, and near, OU-2 that will be used to provide water elevation data for the RI/FS. Four of the wells are currently inaccessible but are expected to provide useful data. A total of 11 monitoring wells (nine surveyed and two currently inaccessible) are within OU-2; a total of 11 monitoring wells (nine surveyed and two currently inaccessible) are just outside OU-2. Seven (five surveyed and two currently inaccessible) of the 11 monitoring wells within OU-2 will be used for collecting water quality samples. Of the 11 monitoring wells outside of OU-2, nine appear to be suitable for the collection of groundwater quality data. These wells will be evaluated for current sampling activities and incorporated into the OU-2 RI/FS in Phase III sampling activities.

The 0700 series wells are used to monitor the tritium capture system and were not designed for groundwater monitoring. Therefore, these wells should not be used in the RI/FS for water level measurement or the collection of groundwater quality data.

Section 5

5. REFERENCES

ASTM 1993, "Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers." Annual Book of ASTM Standards, Volume 4.08. ASTM D 5092-90. 1993.

Dames and Moore 1976a, "Potable Water Standards Project, Mound Laboratory." Prepared for Monsanto Research Corporation. August 17, 1976.

Dames and Moore 1976b, "Evaluation of the Buried Valley Aquifer Adjacent to Mound Laboratory." Prepared for Monsanto Research Corporation. December 20, 1976.

DOE 1987, "Phase 2: Installation Generic Monitoring Plan/Remedial Investigation Plan - Stage 2 Supplement Mound [DRAFT]." U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. September 1987.

DOE 1988, "Standard Operating Procedures." Environmental Restoration Program, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. May 1988.

DOE 1989, "Remedial Investigation Plan, Mound Plant, Task AL-MD-1, Groundwater Stage 3 Supplement [DRAFT]." U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico. September 1989.

DOE 1991, "Site Scoping Report: Volume 6 - Photo-History Report", U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico, May 1991.

DOE 1992, "Remedial Investigation/Feasibility Study Operable Unit 9, Site-Wide Work Plan (Final)". U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico, May 1992.

EPA 1986, "RCRA Groundwater Monitoring Technical Enforcement Guidance Document." U.S. Environmental Protection Agency, Washington, D.C. OSWER-9950.1. September 1986.

EPA 1988, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA." U.S. Environmental Protection Agency, Washington, D.C. Directive 9355.3-01. October 1988.

APPENDIX A

BORING LOGS AND MONITORING WELL CONSTRUCTION

COLOG INC
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 0033
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 13, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 77.57'
DEPTH REF: TOP OF CASING

CUSTOMER TD: 33.5'
COLOG TD: 25.5'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				3" PVC		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 20.0'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm at Deg

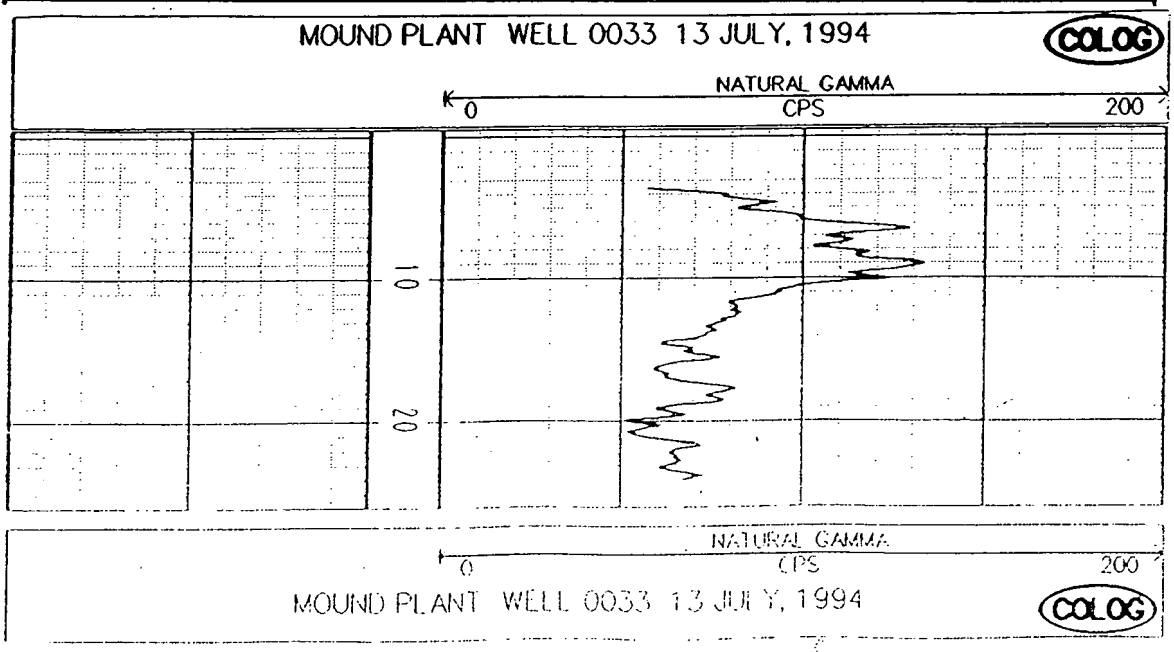
GENERAL DATA

LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT MODEL	PROBE S.N.	UPHOLE S.N.	LOGGING DIG INT FEET	SPEED FT./MIN.	DETECTOR TYPE	SPACING Tx-Rx FEET	Rx-Rx FEET	SOURCE TYPE	SIZE CURIE	LOGGED INTERVAL FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					24.0'	0'	24.0'



COLOG INC
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 0312
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 12, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 733.20' DEPTH REF: TOP OF CASING

CUSTOMER TD: 33.6'
COLOG TD: 33.8'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 31.0'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm at Deg

GENERAL DATA

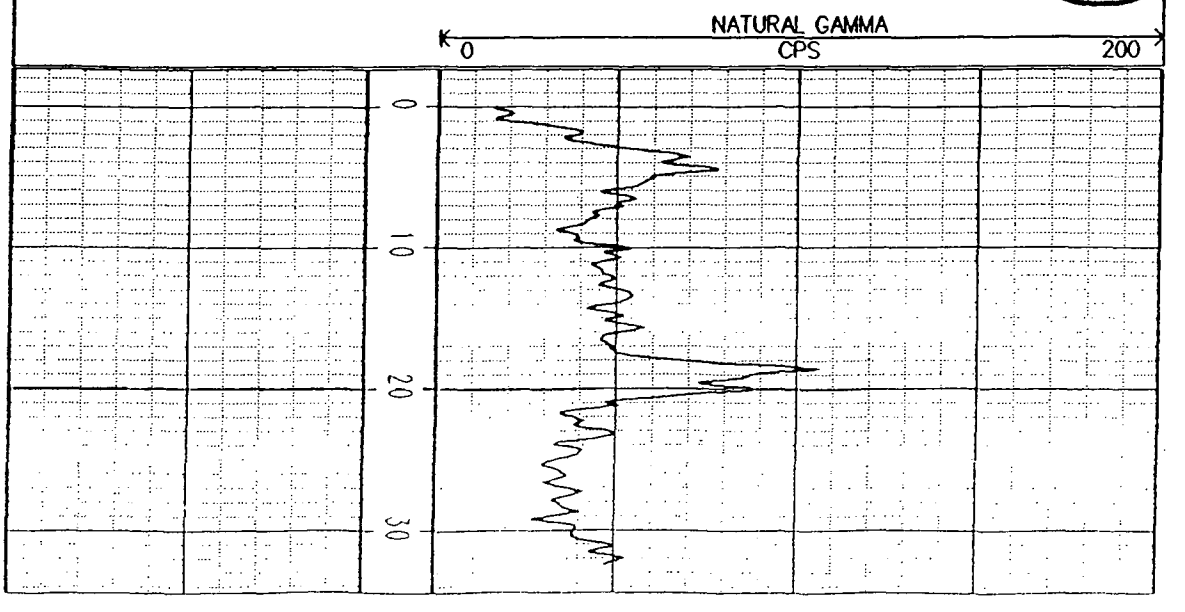
LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					32.5'	0'	32.5'

MOUND PLANT WELL 0312 12 JULY, 1994



COLOG INC

BOREHOLE GEOPHYSICS

17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 0112
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 13, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 775.20'
DEPTH REF: TOP OF CASING

CUSTOMER TD: 35.5'
COLOG TD: 37.2'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 28.3'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm at Deg

GENERAL DATA

LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

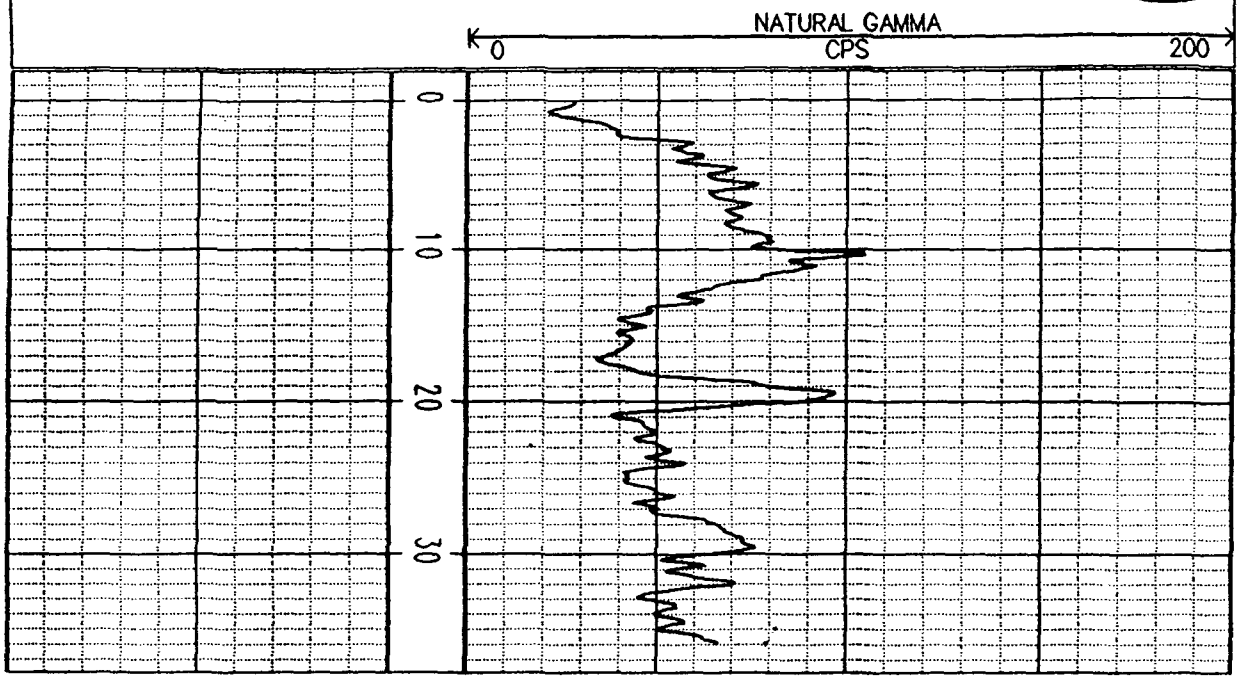
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN.	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					35.9'	0'	35.9'

SOURCE S.N.(S):
CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): 0112.FIN
REMARKS:

MOUND PLANT WELL 0112 13 JULY, 1994

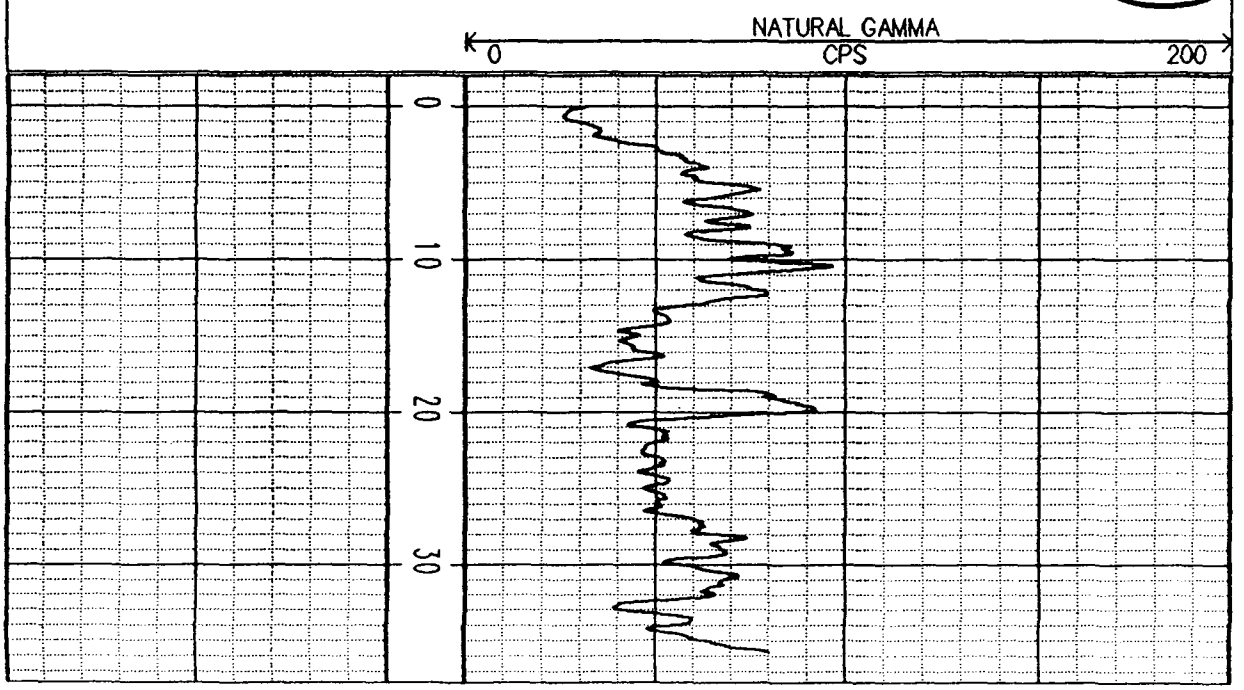
COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 0112 13 JULY, 1994
COLOG

MOUND PLANT WELL 0112 (REPEATS)

COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 0112 (REPEATS)
COLOG

COLOG INC
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 114
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 12, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 873.51'
DEPTH REF: TOP OF CASING

CUSTOMER TD: 55'
COLOG TD: 52.7'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 52.2'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm: at Deg

GENERAL DATA

LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

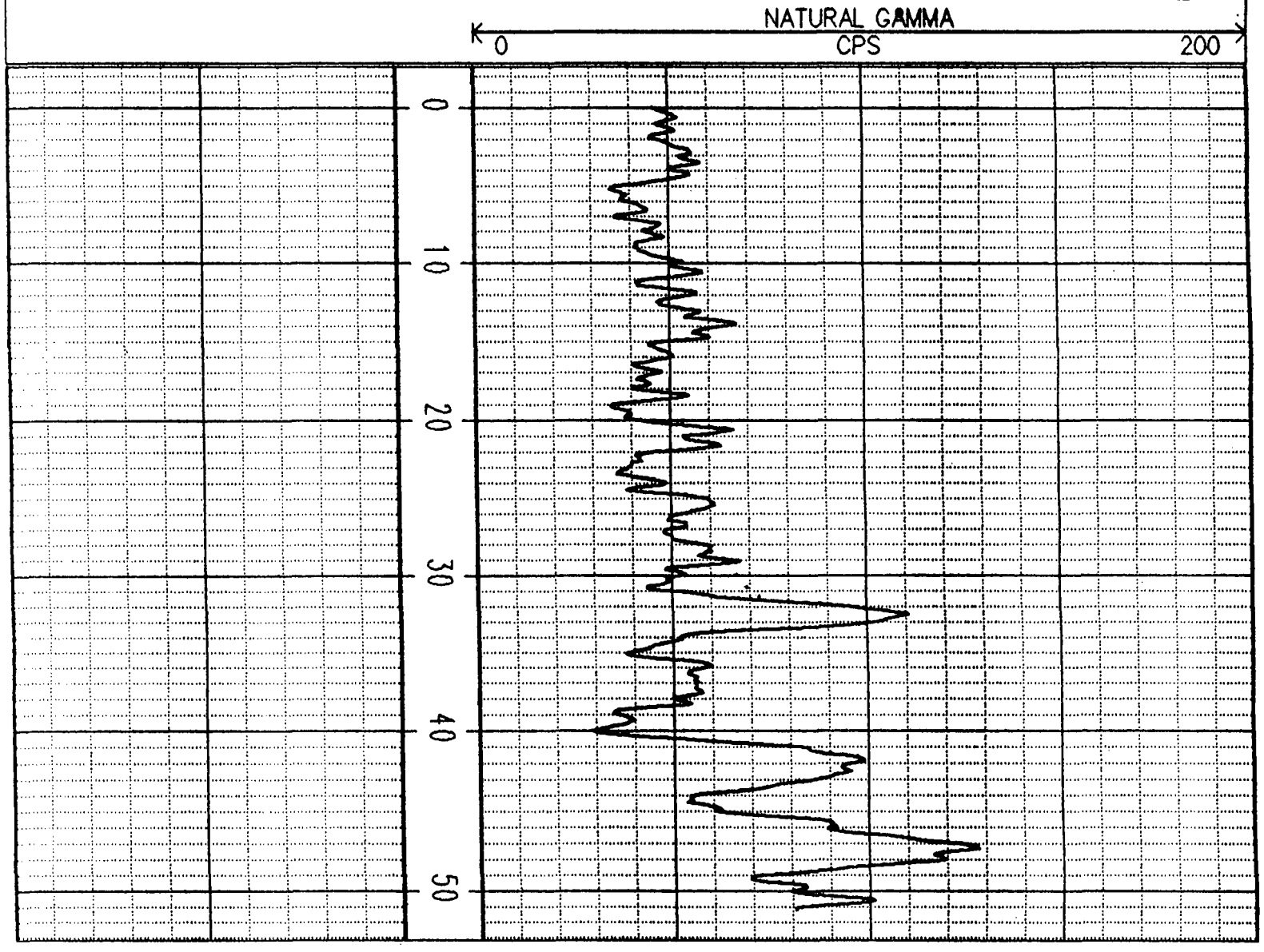
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN.	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					52.3'	0'	52.3'

SOURCE S.N.(S):
CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): 114.FIN
REMARKS:

MOUND PLANT WELL 114 12 JULY, 1994

COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 114 12 JULY, 1994
COLOG

COLOG INC.
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 115
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 12, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 873.55'
DEPTH REF: TOP OF CASING

CUSTOMER TD: 42'
COLOG TD: 40.4'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 39.1'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm: at Deg

GENERAL DATA

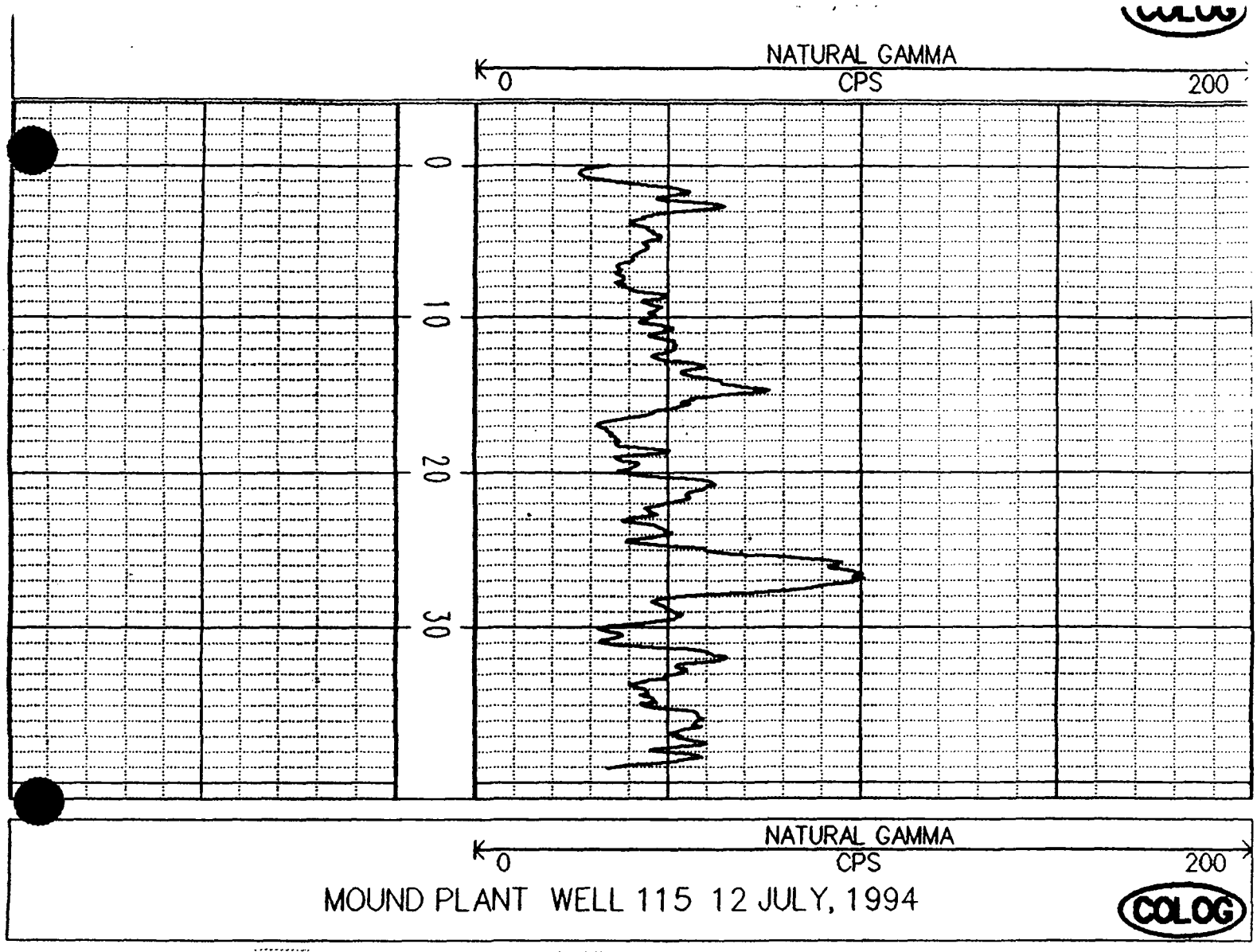
LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN.	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					39.1'	0'	39.1'

SOURCE S.N.(S):
CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): 115.FIN
REMARKS:


NATURAL GAMMA
0
CPS
200
0
10
20
30
NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 115 12 JULY, 1994
COLOG

COLOG INC.
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 116
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 12, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 873.05' DEPTH REF: TOP OF CASING

CUSTOMER TD: 89'
COLOG TD: 80.5'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 59.0'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm at Deg

GENERAL DATA

LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

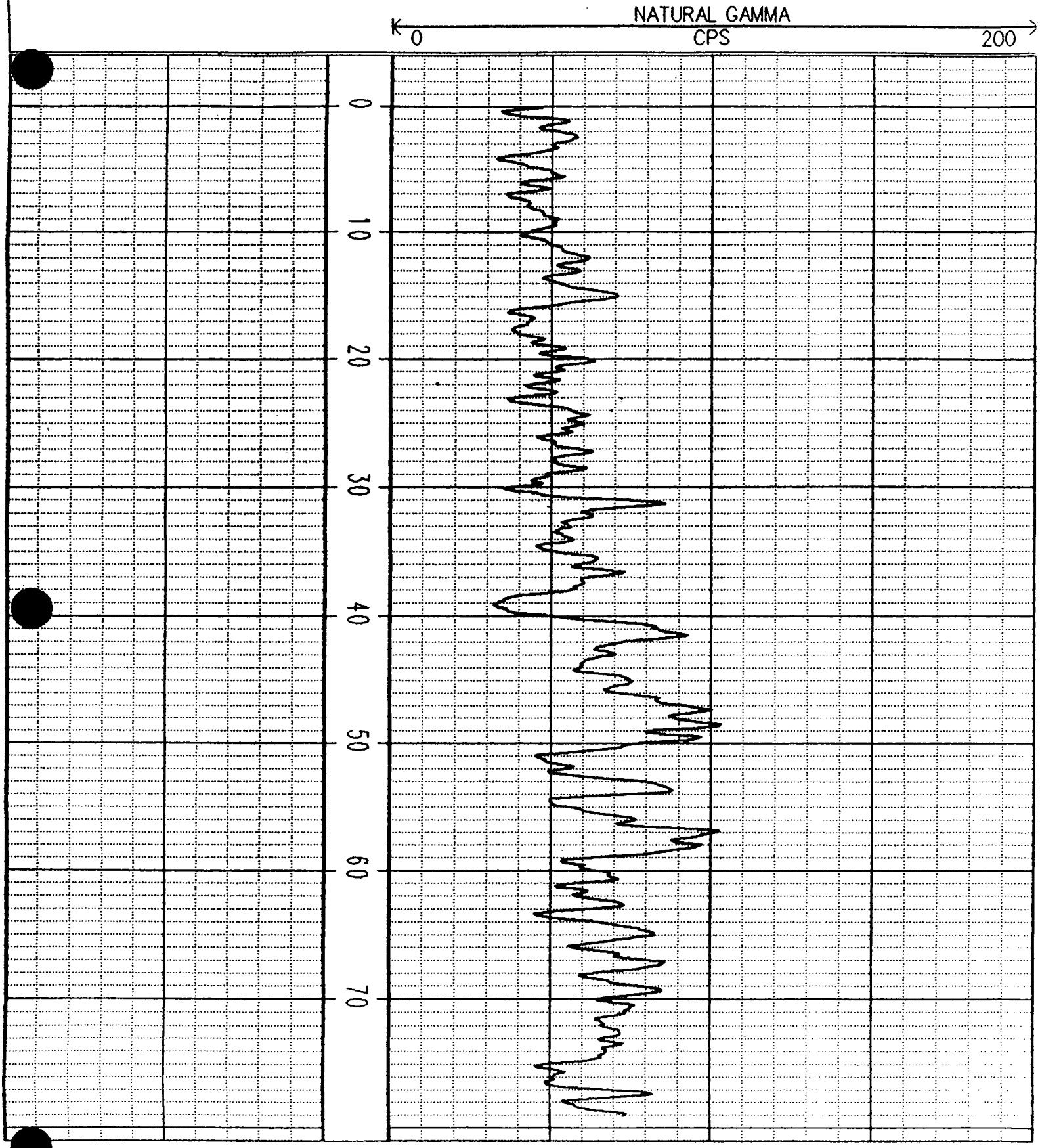
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN.	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					79.2'	0'	79.2'

SOURCE S.N.(S):
CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): 116.FIN
REMARKS:

MOUND PLANT WELL 116 (REPEAT)

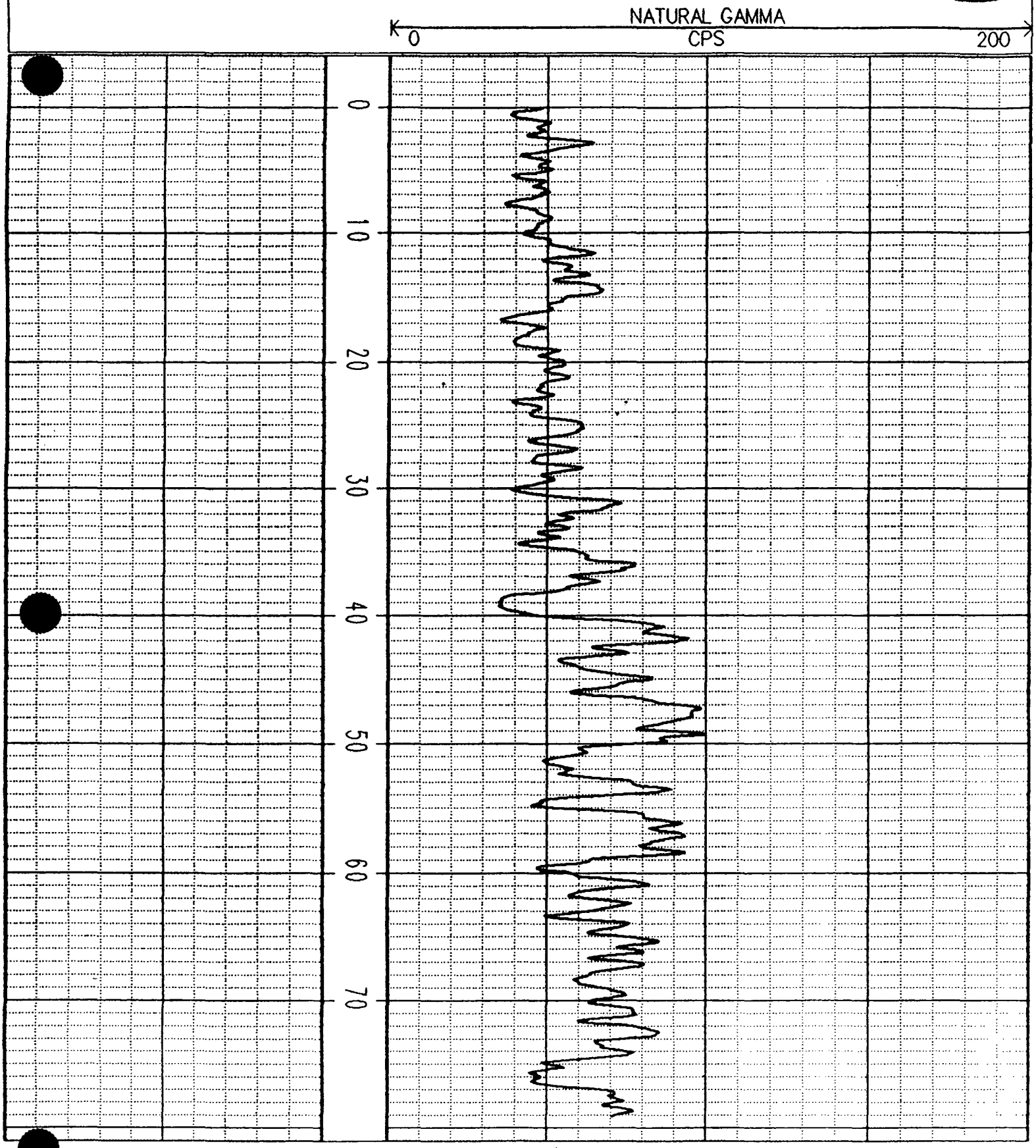
COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 116 (REPEAT)
COLOG

MOUND PLANT WELL 116 12 JULY, 1994

COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 116 12 JULY, 1994
COLOG

COLOG INC
BOREHOLE GEOPHYSICS
17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

WELL: 324
LOGS: NATURAL GAMMA

PROJECT: MOUND PLANT
CLIENT: ICF KAISER
LOCATION: MIAMISBURG

DATE: JULY 12, 1994
COUNTY: MONTGOMERY
STATE: OHIO

BOREHOLE DATA

DRILLING CONTRACTOR:
ELEV: 782.92'
DEPTH REF: TOP OF CASING

CUSTOMER TD: 25'
COLOG TD: 19.5'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1				4" STEEL		
2						
3						
4						

DRILL METHOD:
HOLE MEDIUM:
VISCOSITY:

DATE DRILLED:
FLUID LEVEL: 13.4'
WEIGHT:

TIME SINCE CIRC:
MUD TYPE:
Rm: at Deg

GENERAL DATA

LOGGING ENGINEER: MIKE WILLARD
CLIENT REP: JAMIE OLBERDING
OTHER SERVICES: BOREHOLE VIDEO

INSTRUMENTS: MGX CONSOLE
UNIT/TRUCK: TRUCK 10

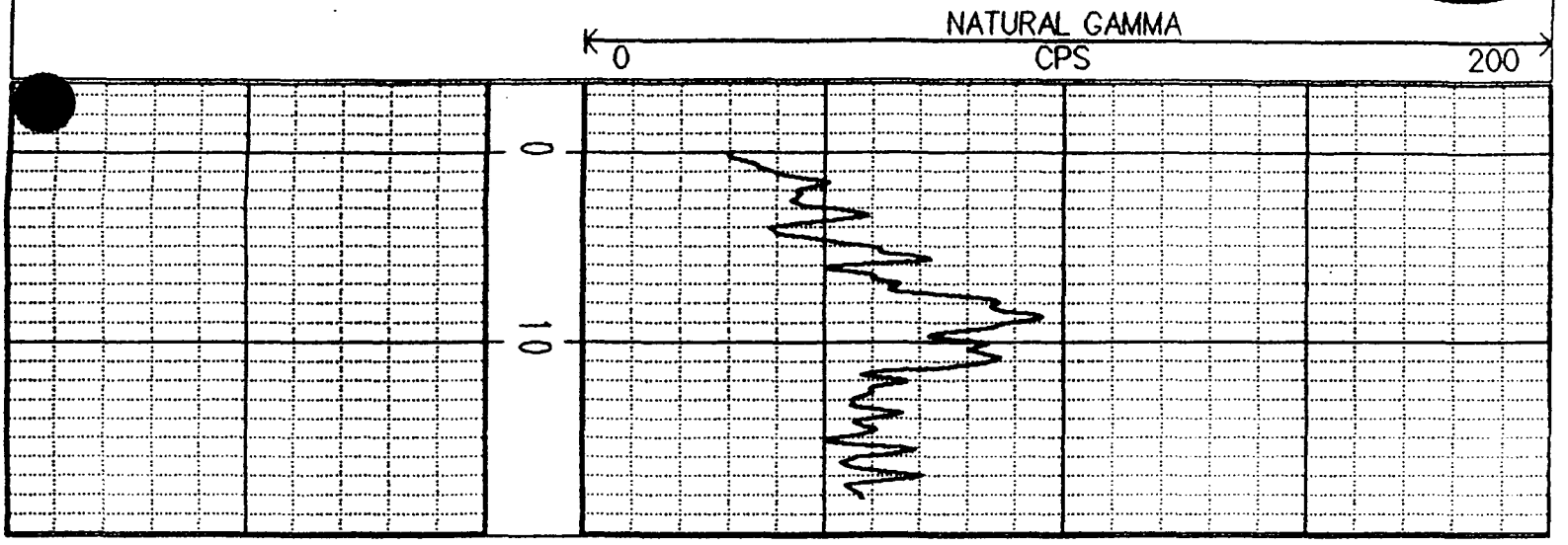
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN.	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
NAT GAMMA	1	HLP/S	2029	0144	0.1'	15	NaI					18.2'	0'	18.2'

SOURCE S.N.(S):
CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): 324.FIN
REMARKS:

MOUND PLANT WELL 324 12 JULY, 1994

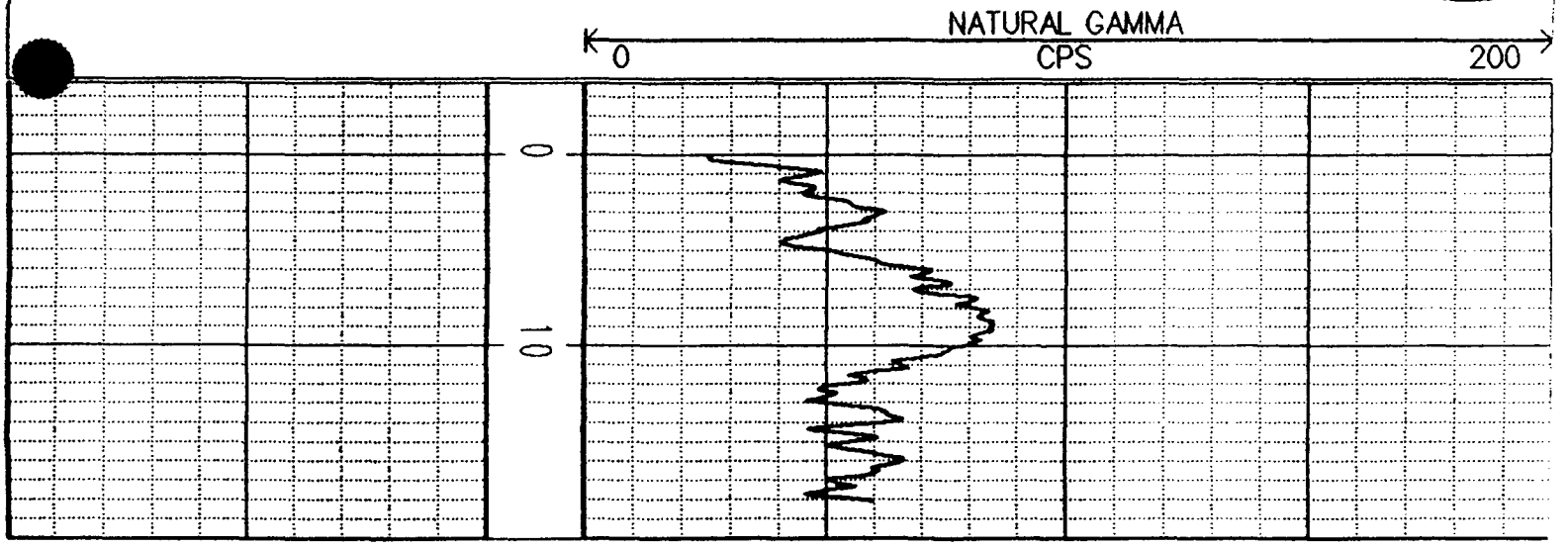
COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 324 12 JULY, 1994
COLOG

MOUND PLANT WELL 324 (REPEAT)

COLOG



NATURAL GAMMA
0
CPS
200
MOUND PLANT WELL 324 (REPEAT)
COLOG

Appendix B

APPENDIX B

VISUAL INSPECTION LOG FORMS

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0314

LOCATION: South side of Plant Drainage Ditch across road from Test Fire

DIAMETER: 4" DEPTH OF WELL: ~~47.43~~ BES 45.47

DEPTH OF WELL MEASURED FROM: TOC 47.94' TOIC ~~47.43~~ BEL 45.47

MOUNT: FLUSH ____ STAND ✓ Depth to water 41.72'

PLUMBNESS OF PROTECTIVE CASING (angle): 90°

PROTECTIVE CASING: YES ✓ NO ____

WAS THE WELL LOCKED: YES ✓ NO ____

IS CASING ABOVE GROUND: Yes 2.2' stand pipe

GUARD POST IN PLACE AROUND STAND WELLS: No

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD:
Good

CONDITION OF THE CRISTY BOX:
Good

CONDITION OF THE STAND PIPE:
Good

OTHER COMMENTS:
Well has a bubbler in it

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0336

LOCATION: South of Mound Ave & East of Railroad Tracks in gravel area of Top Design

DIAMETER: 4" DEPTH OF WELL: ~~99.72'~~ BGS 113.8

DEPTH OF WELL MEASURED FROM: TOC 100.03' TOIC ~~99.72'~~ BGS 113.8

MOUNT: FLUSH ✓ STAND ____ Depth to water 25.49'

PLUMBNESS OF PROTECTIVE CASING (angle): ____

PROTECTIVE CASING: YES ____ NO ____

WAS THE WELL LOCKED: YES ____ NO ____

IS CASING ABOVE GROUND: ____

GUARD POST IN PLACE AROUND STAND WELLS: ____

ARE CAPS ON FLUSH WELLS SEALED: YES ✓ NO ____

CONDITION OF THE CONCRETE PAD:

CONDITION OF THE CRISTY BOX:

CONDITION OF THE STAND PIPE:

OTHER COMMENTS: HAS well Wizard in well

OU2 WELL RECON LOG
VISUAL INSPECTION

HNU 0.6
LEL —

WELL I.D.: 0114

LOCATION:
WEST OF ROADWAY PAST SW BUILDING

DIAMETER: 4" SS

DEPTH OF WELL: 52.40 FROM TOIC

DEPTH TO H2O 52.28

TO GROUND SURFACE 53.03

DEPTH OF WELL MEASURED FROM: TOC ____ TOIC X

MOUNT: FLUSH X STAND ____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES ____ NO ____

WAS THE WELL LOCKED: YES ✓ NO ____

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: NO

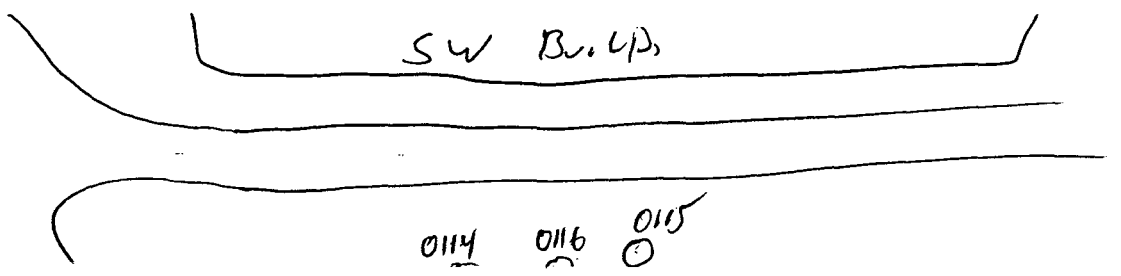
ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD:
GOOD

CONDITION OF THE CRISTY BOX:
GOOD

CONDITION OF THE STAND PIPE:
GOOD

OTHER COMMENTS:
IMMEDIATE GROUT HAS SUB-SIDED TO APPROX 3' BELOW GR. SURFACE



HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0116

LOCATION: WEST OF ROADWAY PAST SW BUILD.

DIAMETER: 4" SS

DEPTH OF WELL: 80.06 TO TOIC

DEPTH TO H2O 58.51'

TO GROUND SURFACE 81.21'

DEPTH OF WELL MEASURED FROM: TOC ____ TOIC X

MOUNT: FLUSH X STAND ____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO ____

WAS THE WELL LOCKED: YES X NO ____

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES X NO ____

CONDITION OF THE CONCRETE PAD:
GOOD

CONDITION OF THE CRISTY BOX:
GOOD

CONDITION OF THE STAND PIPE:
GOOD

OTHER COMMENTS: TOIC IS APPROX. 2' below GROUND SURFACE

Hot U 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0115

LOCATION: WEST OF Roadway PAST SW BLD.

DIAMETER: 4" SS

DEPTH OF WELL: 40.14 From TOIC

DEPTH TO WATER 39.25'

TO GROUND SURFACE
TOTAL DEPTH 40.98'

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH X STAND____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES X NO____

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES X NO____

CONDITION OF THE CONCRETE PAD: GOOD

CONDITION OF THE CRISTY BOX: GOOD

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: T.O.I.C. APPROX 14" below GROUND SURFACE

HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: ~~0713~~? * POOR ON SIDE OF PVC CASING

LOCATION: NORTH-EAST CORNER OF BLD. 17

DIAMETER: 6" PVC DEPTH OF WELL: 6.87 DRY

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): ____

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES ____ NO X

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: ____

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: * NOT A WELL MUST BE A SUMP FROM A BST PIT.

HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0034

LOCATION: NORTH OF HH BLDG.

DIAMETER: 3" PVC

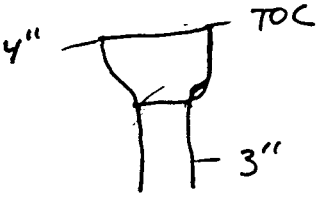
DEPTH OF WELL: 20.05 FROM TOC

DEPTH TO H2O 16.50'

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): GOOD



PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES X NO ____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: WELL WIZARD CAP (NOTHING INSIDE)

OU2 WELL RECON LOG
VISUAL INSPECTION

HNU 0.6
LEL —

WELL I.D.: 0227

LOCATION: SOUTH OF WD

DIAMETER: 3" PVC DEPTH OF WELL: 32.65 DEPTH TO H2O 17.18

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): LEANING TO NORTH APPROX. 2-3°

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES X NO ____

IS CASING ABOVE GROUND: YES 4.5'

GUARD POST IN PLACE AROUND STAND WELLS: NO

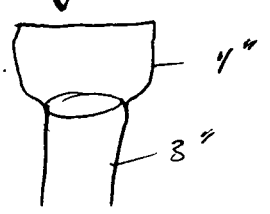
ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: —

OTHER COMMENTS: CAP IS WELL WIZARD TYPE



HanV 0.8
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0324

LOCATION: SOUTH OF WD

DIAMETER: 4" PVC DEPTH OF WELL: 19.34 DEPTH TO H_2O 13.47

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X *

MOUNT: FLUSH X STAND____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES X NO____

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES X NO____

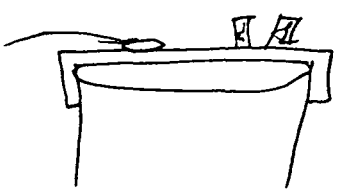
CONDITION OF THE CONCRETE PAD: YES - GOOD

CONDITION OF THE CRISTY BOX: GOOD

CONDITION OF THE STAND PIPE: —

OTHER COMMENTS: * WELL HAS WELL WIZARD INSIDE WELL
ALL MEASUREMENTS TAKEN FROM TOP OF CAP

LOCATION OF MEASUREMENTS



OU2 WELL RECON LOG
VISUAL INSPECTION

HNU 0.7
LEL —

WELL I.D.: 0323

LOCATION: SOUTH OF WD

DIAMETER: 4" SS DEPTH OF WELL: 17.04 DEPTH TO WATER 16.93

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH X STAND____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES X NO____

IS CASING ABOVE GROUND: YO

GUARD POST IN PLACE AROUND STAND WELLS: YO

ARE CAPS ON FLUSH WELLS SEALED: YES X NO____

CONDITION OF THE CONCRETE PAD: GOOD

CONDITION OF THE CRISTY BOX: GOOD

CONDITION OF THE STAND PIPE: —

OTHER COMMENTS: HAS BAILER HANGING IN WELL FROM CAP ON SS BAILING COND.

HaW 0.6
LCR —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0724

LOCATION: EAST OF BUILD. 45

DIAMETER: 3" PVC DEPTH OF WELL: 24.63 DEPTH TO WATER 19.95

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): TOWARDS MONTH 1-2°

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES X NO ____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

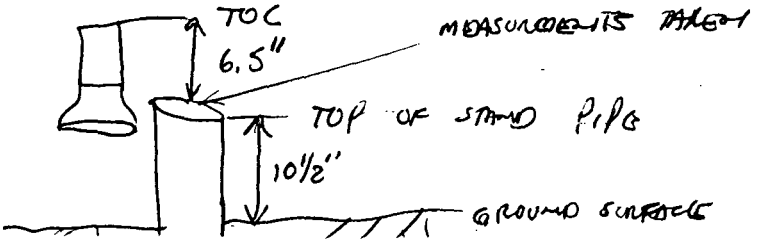
CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: — MEASUREMENT TAKEN 10.5" ABOVE GROUND SURFACE TOP OF STAND PIPE

OTHER COMMENTS: * TOP PART OF WELL CAN BE REMOVED MEASUREMENTS TAKEN AT TOP OF STAND PIPE

TOP OF CASING ELEVATION IS 6½" LOWER WITH BROKEN CAP REMOVED



HNU 0.8
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0112

LOCATION: SE OF HH ON ROADWAY PAST TEST FIRE

DIAMETER: 4" SS DEPTH OF WELL: 36.91 DEPTH TO H2O 28.27

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X *

MOUNT: FLUSH____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES Y NO____

WAS THE WELL LOCKED: YES Y NO____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

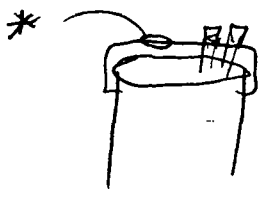
ARE CAPS ON FLUSH WELLS SEALED: YES____ NO____

CONDITION OF THE CONCRETE PAD: GOOD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS:
* AS WELL WIZARD IN WELL MEASUREMENTS TAKEN FROM TOP OF CAP



HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0033

LOCATION: SE OF HH ON ROADWAY PAST RET FAME

DIAMETER: 3" PVC DEPTH OF WELL: 25.11 DEPTH TO H2O 20.01

DEPTH OF WELL MEASURED FROM: TOC Y TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES ✓ NO ____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

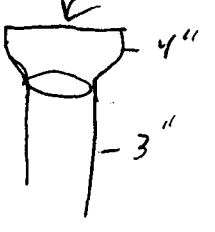
ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS:
* HAS WELL WIZARD CAP NOTHING INSIDE



HNU 0.6
CER —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0042

LOCATION: SOUTH OF HH ON ROADWAY PAST TEST TANKS

DIAMETER: 1.5" PVC DEPTH OF WELL: 25.24 DEPTH TO WATER 25.13

DEPTH OF WELL MEASURED FROM: TOC ____ TOIC X

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES ____ NO X

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: PIEZO - 1.5" PVC INSIDE 3" PRO-CASING WITH NO LOCK, SCREW ON LID.

HOW 0.8
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0242

LOCATION: REST FACE PARKING LOT ON NORTH SIDE OF ROADWAY

DIAMETER: 3" PVC DEPTH OF WELL: 15.28 DEPTH TO H2O 15.10

DEPTH OF WELL MEASURED FROM: TOC Y TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIT

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES Y NO ____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

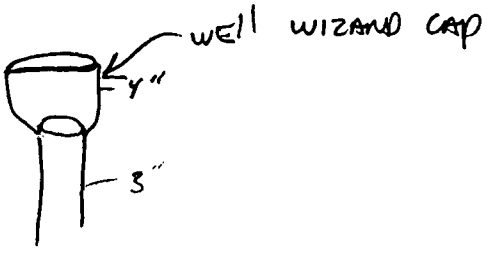
ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: WELL WIZARD CAP NOTHING INSIDE



HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0236

LOCATION: Roadway 150' WEST OF 22

DIAMETER: 8" PVC DEPTH OF WELL: 22.63 DEPTH TO H2O 4.39

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES ____ NO X

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS:

* WELL IS 100'± EAST OF MAP LOCATION & MARKED ON INSIDE OF CAP.

** IN LOCATION OF WRONG WELL IS LOCATED ON MAP THERE IS A 3" PVC PIPE LAYING ON GROUND WITH (2) 1" PVC PIPES INSIDE IT. PIPES ARE LAYING ON A PILE A SOIL THAT MAY HAVE BEEN DUMPED ON WELL.

HNV 0.8
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0312

LOCATION: NORTH OF BLD. 19 & 72

DIAMETER: 4" SS

DEPTH OF WELL: 33.57

DEPTH TO H_2O 30.85

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES X NO____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES____ NO____

CONDITION OF THE CONCRETE PAD: V. GOOD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: BAILER HANGING FROM CAP

Hall 0-6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0020

LOCATION: SOUTH-EAST CORNER OF 19

DIAMETER: 1.5" PVC DEPTH OF WELL: 19.95 DEPTH TO H_2O 11.88

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): LEANING 10° TO WEST

PROTECTIVE CASING: YES____ NO X

WAS THE WELL LOCKED: YES____ NO X

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES____ NO____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: SEE ABOVE

OTHER COMMENTS: 3" STEEL PROTECTIVE CASING

HWN 0.6
CEC —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0028

LOCATION: GRAVEL ROAD NORTH-WEST OF BLDG 59

DIAMETER: 1" PVC DEPTH OF WELL: 41.02 DEPTH TO H2O 12.56

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES____ NO X

WAS THE WELL LOCKED: YES____ NO X

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES____ NO____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: 3" STEEL PIPE CASING

HNU 0.8
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0722

LOCATION: GRAVEL ROAD NORTH-WEST OF 89

DIAMETER: 8" PVC DEPTH OF WELL: 26.86 DEPTH TO H2O 14.74

DEPTH OF WELL MEASURED FROM: TOC Y TOIC ____

MOUNT: FLUSH ____ STAND Y

PLUMBNESS OF PROTECTIVE CASING (angle): 1-2° NW

PROTECTIVE CASING: YES ____ NO Y

WAS THE WELL LOCKED: YES ____ NO Y

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: WELL HAS ELECTRIC GOING INTO WELL, TO PUMP
THATS HANGING ? IN WELL

HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0721

LOCATION: MONTH EAST OF 89 ON GRAVEL ROADWAY

DIAMETER: 3" PVC DEPTH OF WELL: 23.65 DEPTH TO H2O 22.11

DEPTH OF WELL MEASURED FROM: TOC X TOIC ____

MOUNT: FLUSH ____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES ____ NO X

WAS THE WELL LOCKED: YES X NO ____

IS CASING ABOVE GROUND: YES

GUARD POST IN PLACE AROUND STAND WELLS: NO

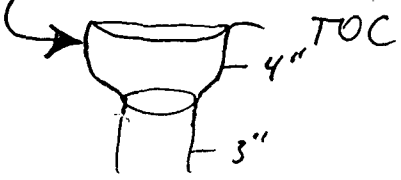
ARE CAPS ON FLUSH WELLS SEALED: YES ____ NO ____

CONDITION OF THE CONCRETE PAD: NO PAD

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: well (WEARD CAP) NOTHING INSIDE



OU2 WELL RECON LOG
VISUAL INSPECTION

HNU 0.8
CER —

WELL I.D.: 0332

LOCATION: LOWER PARKING LOT

DIAMETER: 4" PVC DEPTH OF WELL: 32.30 DEPTH TO H2O 17.34

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH X STAND____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES X NO____

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: ____

ARE CAPS ON FLUSH WELLS SEALED: YES X NO____

CONDITION OF THE CONCRETE PAD: GOOD

CONDITION OF THE CRISTY BOX: GOOD

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: WELL WIZARD PUMP INSIDE

LOCATION WHERE MEASUREMENTS WERE TAKEN (TOIC)

HNU 0.6
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0348

LOCATION: DOE PARKING LOT WEST OF OSE

DIAMETER: 3" STEEL DEPTH OF WELL: 115.95 DEPTH TO H2O 53.96

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH____ STAND X

PLUMBNESS OF PROTECTIVE CASING (angle): STRAIGHT

PROTECTIVE CASING: YES X 10" STEEL NO____

WAS THE WELL LOCKED: YES____ NO____

IS CASING ABOVE GROUND: YES 11"

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES____ NO____

CONDITION OF THE CONCRETE PAD: POOR

CONDITION OF THE CRISTY BOX: —

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: HAS 1.0" STEEL PIPE ON SIDE WELL WITH PSI GAUGE AND ¼" HOSE

HNU 08
LEL —

OU2 WELL RECON LOG
VISUAL INSPECTION

WELL I.D.: 0113

LOCATION: DOE PARKING LOT WEST OF OSE

DIAMETER: 4" SS DEPTH OF WELL: 55.26 DEPTH TO H2O 51.41

DEPTH OF WELL MEASURED FROM: TOC____ TOIC X

MOUNT: FLUSH X STAND____

PLUMBNESS OF PROTECTIVE CASING (angle): —

PROTECTIVE CASING: YES X NO____

WAS THE WELL LOCKED: YES____ NO X

IS CASING ABOVE GROUND: NO

GUARD POST IN PLACE AROUND STAND WELLS: NO

ARE CAPS ON FLUSH WELLS SEALED: YES X NO____

CONDITION OF THE CONCRETE PAD: GOOD VERY SMALL

CONDITION OF THE CRISTY BOX: GOOD

CONDITION OF THE STAND PIPE: GOOD

OTHER COMMENTS: —

APPENDIX C

VIDEO INSPECTION OVERSIGHT FORMS

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 116 DATE: 7/12/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (camera is B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ~ 10'/min
What is reference point for all depth measurements?: TOIC 873.05'

Depth to water?: 59.0'
Depth to the top of the screen?: 70.1'
Depth to the bottom of the screen?: 79.8'
Depth to bottom of the well?: 79.8'
Was there sediment at the bottom of the well?: fairly clean. sediment (silt) on bottom

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:
57.2' something on left side of screen wall (looks gray)
, fairly clear water

Feet of water in well 20.8'

EG&G MOUND OU2 RI/FS

VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 312 DATE: 7/12/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (Camera B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/min
What is reference point for all depth measurements?: TOIC 433.20

Depth to water?: 31.0'
Depth to the top of the screen?: 22.9' -28.2'
Depth to the bottom of the screen? 27.8'
Depth to bottom of the well?: 33.8'
Was there sediment at the bottom of the well?: Couldn't see water was turbid

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:
moisture on sides of casing
Stick or something stuck to side of casing
water is very murky (turbid)

Bailer pulled from well the last two feet were a rust color. The bailer is sitting on bottom of the well and not hanging

hnu- background 2 reading 2

.4

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 304 DATE: 7/12/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laral
Video Probe Model Number: ~~[illegible]~~ 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (Camera B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/min
What is reference point for all depth measurements?: T o/c 788.92'

Depth to water?: ~~[illegible]~~' 13.8'
Depth to the top of the screen?: ~~[illegible]~~' 14.9'
Depth to the bottom of the screen?: ~~[illegible]~~ 19.4'
Depth to bottom of the well?: ~~[illegible]~~ 19.5'
Was there sediment at the bottom of the well?: yes ± 3 inches of sediment in bottom

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 114 DATE: 7/12/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: LAVAL
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (CAMERA IS BW)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/MIN
What is reference point for all depth measurements?: TOIC 873.51

Depth to water?: 52.3'
Depth to the top of the screen?: 35.5' - 49.0'
Depth to the bottom of the screen?: 38.5 - 52.0'
Depth to bottom of the well?: 52.5'
Was there sediment at the bottom of the well?: yes (silt)

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen: CASING BELOW SCREEN HAS DIFFERENT SHINE - STEEL

49' another screen (top) 52'0. bottom of casing.
bugs in water of well

Feet of water in well 0.20'

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 115 DATE: 7/12/94

Name of Contractor: Cdog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 009 0 789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (camera is B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): 10'/Min.
What is reference point for all depth measurements?: TDIC 873.55'

Depth to water?: 39.1'
Depth to the top of the screen?: 30.5'
Depth to the bottom of the screen?: 40'
Depth to bottom of the well?: 40.0'
Was there sediment at the bottom of the well?: Can't tell plastic bag covering bottom

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen: OK

Moisture is on sides of casing

39.8' plastic bag? sitting on bottom of well

Total Feet of water in well 0.90'

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 724 DATE: 7/13/94

Name of Contractor: Colog
Name of Operator: Mike Willard.

Manufacturer of Video Probe:
Video Probe Model Number:
Video Probe Serial Number:

Manufacturer of Video Processor:
Video Processor Model Number:
Video Processor Serial Number:

Manufacturer of Color Monitor:
Color Monitor Model Number:
Color Monitor Serial Number:

Manufacturer of Video Cassette Recorder:
Video Cassette Recorder Model Number:
Video Cassette Recorder Serial Number:

Logging Speed (feet/minute): ± 10'/min
What is reference point for all depth measurements?: TOIC ?

Depth to water?: 19.3'
Depth to the top of the screen?: 23.3' Screen is perforated pipe drilled holes/not slotted screen
Depth to the bottom of the screen?: 24.4'
Depth to bottom of the well?: 24.4'
Was there sediment at the bottom of the well?: gravel in bottom

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:
well and water look clean.
bottom filled w/ gravel not ASTM constructed well
possible sump for inersceptor trenches.

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 0034 DATE: 7/13/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (Camera B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/min
What is reference point for all depth measurements?: TOIC 818.71'

Depth to water?: 16.1'
Depth to the top of the screen?: N/A
Depth to the bottom of the screen?: N/A
Depth to bottom of the well?: N/A
Was there sediment at the bottom of the well?: N/A

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:

9.4' Staining discouration on right side of screen
13.0' Staining and discouration ~~on~~ on all sides of casing
16.1' Water surface droplets of oil can be seen

Stopped after 16.1' didn't want to contaminate the probe
The oil that came off the probe looked like pure motor oil

Did not go to Bottom of Well

EG&G MOUND OU2 RI/FS

VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 0033 DATE: 7/13/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (camera B/W)
Color Monitor Model Number: 9541-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/min.
What is reference point for all depth measurements?: TOIC 777.57

Depth to water?: 20.0'
Depth to the top of the screen?: N/A
Depth to the bottom of the screen?: N/A
Depth to bottom of the well?: 25.2
Was there sediment at the bottom of the well?: yes

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:

unidentified floating object 20.2'

21.9' Black stuff on left side of screen
23.2' water is dark
24.8' sediment

EG&G MOUND OU2 RI/FS
VIDEO INSPECTION SURVEY OVERSIGHT FORM

WELL NUMBER: 112 DATE: 7/13/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Manufacturer of Video Probe: Laval
Video Probe Model Number: 9403
Video Probe Serial Number: 0090789

Manufacturer of Video Processor: N/A
Video Processor Model Number: N/A
Video Processor Serial Number: N/A

Manufacturer of Color Monitor: Sony (camera B/W)
Color Monitor Model Number: 9544-2
Color Monitor Serial Number: N/A

Manufacturer of Video Cassette Recorder: Sony
Video Cassette Recorder Model Number: SLV-393
Video Cassette Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 10'/Min
What is reference point for all depth measurements?: TOIC 775.20'

Depth to water?: ~~28.0'~~ 28.2'
Depth to the top of the screen?: 26.5'
Depth to the bottom of the screen?: 36.4'
Depth to bottom of the well?: 36.4'
Was there sediment at the bottom of the well?: yes

Note any observations that you or the operator can make regarding the condition and quality of the well casing and well screen:
moisture on sides of well casing
remove well wizard put in plastic bag for temporary storage
water was fairly clear considering the removal of the wizard.

APPENDIX D

NATURAL GAMMA LOG OVERSIGHT FORMS

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 116 DATE: 7/12/94

Name of Contractor: CAog

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: ok

Check cable/rope for excessive wear: ok

Manufacturer of Gamma Probe: Mt. Sopris Inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: ~~N/A~~ 2009

Manufacturer of Logging Instrument: Mt. Sopris Inst.

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ~16~~15~~'/min

Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___

What is the digital recording interval?: 0.10'

What is reference point for all depth measurements?: TOC 873.05'

Was there any vertical depth error noted?: yes recorded at ~~89.5~~ 89.0'

What was total depth of hole?: ~~79.2~~' 80.5'

What was length of gamma log?: ~~79.0~~' 80.3'

Was a repeat section made for this borehole?: (Y) N

What was the length of the repeat section?: entire well

Was there any discrepancy between gamma log and repeat section?: Y (N)

Describe any discrepancy: N/A

Was there any calibration made to the probe or any other equipment?: Y (N)

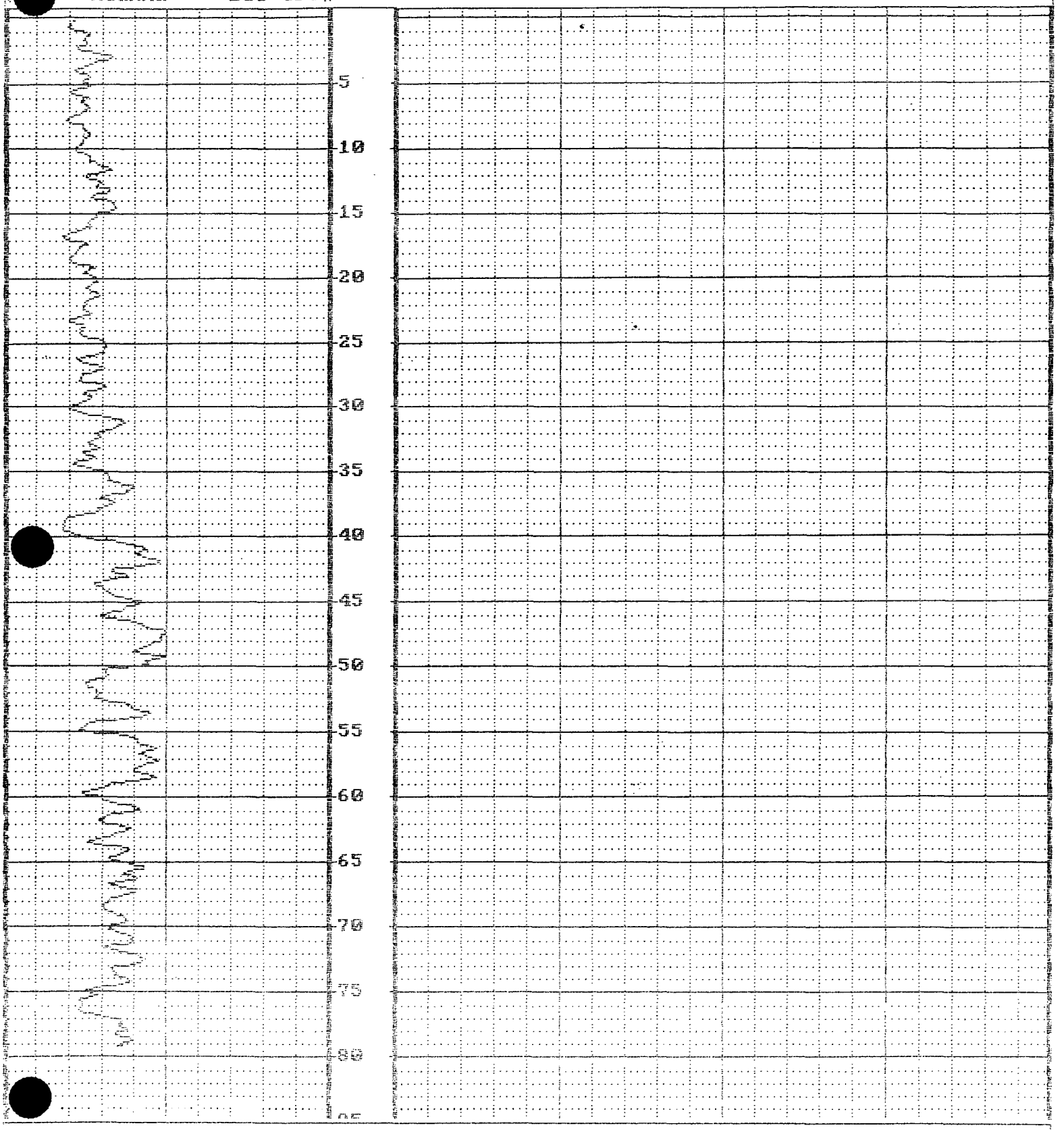
Describe calibration: (Calib. in house)

Note any other observations:

Background 1; Reading 1 - hrs

OUT:116.GA0 (ON) RC:807 BY:23414 FR:31490K 7/12/94 10:43
3.0 15.3 66.710

NGamma 200 CPS



OUT:116.GA0 (ON) RC:484 BY:14847 FR:31500K 7/12/94 10:41
33.3 15.1 63.70

NGamma 200 CPS

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 0034 DATE: 7/13/94

Name of Contractor: Colog
Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: OK
Check cable/rope for excessive wear: OK

Manufacturer of Gamma Probe: Mt. Sopris Inst.
Gamma Probe Model Number: N/A
Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris Inst.
Logging Instrument Model Number: N/A
Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.
Data Recorder Model Number: N/A
Data Recorder Serial Number: N/A

Logging Speed (feet/minute): N/A
Was Logging Speed continuous over entire borehole?: Y N ___ other N/A
What is the digital recording interval?: N/A

What is reference point for all depth measurements?: TOIC 818.71
Was there any vertical depth error noted?: N/A
What was total depth of hole?: 20.0'
What was length of gamma log?: N/A

Was a repeat section made for this borehole?: Y (N)
What was the length of the repeat section?: N/A
Was there any discrepancy between gamma log and repeat section?: Y (N)
Describe any discrepancy: N/A

Was there any calibration made to the probe or any other equipment?: Y (N)
Describe calibration: Calib in house.

Note any other observations:

DID NOT DO. DID NOT WANT TO CONTAMINATE THE PROBE

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 312 DATE: 7/12/94

Name of Contractor: Colog

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: OK

Check cable/rope for excessive wear: OK

Manufacturer of Gamma Probe: Mt. Sopris Inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris Inst.

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A.

Logging Speed (feet/minute): ±145'/min

Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___

What is the digital recording interval?: N/A

What is reference point for all depth measurements?: TOIC 733.20

Was there any vertical depth error noted?: yes well measured 33.6'

What was total depth of hole?: 33.8'

What was length of gamma log?: 33.8'

Was a repeat section made for this borehole?: Y (N)

What was the length of the repeat section?: N/A

Was there any discrepancy between gamma log and repeat section?: Y N

Describe any discrepancy: ___

Was there any calibration made to the probe or any other equipment?: Y (N)

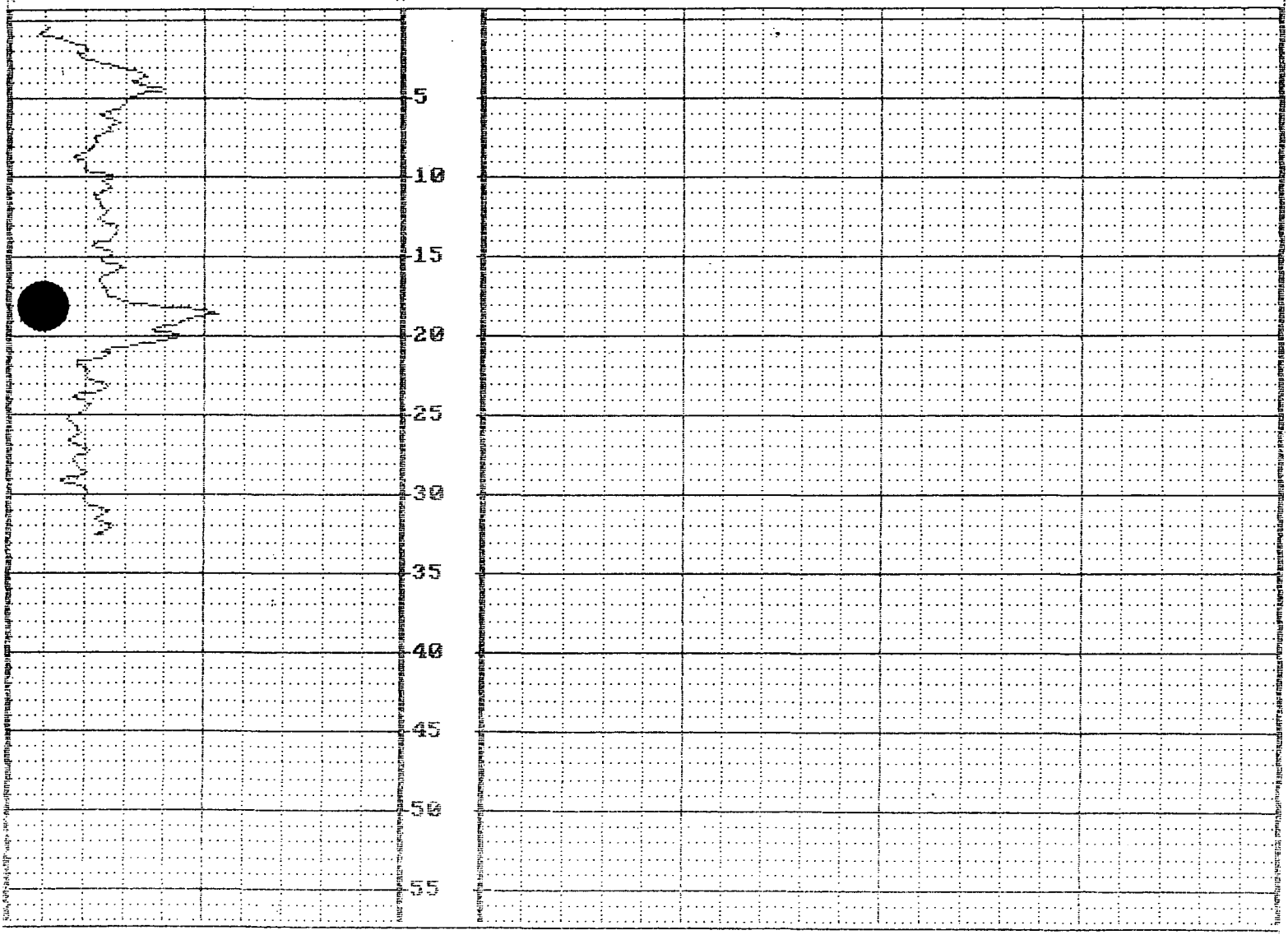
Describe calibration: (Calib. in house)

Note any other observations:

gamma probe had orangish-red algae on probe.

OUT:0312.GA0 (ON) RC:342 BY:9926 FR:31428K 7/12/94 14:55
-0.0 11.6 16.38

0——NGamma——200 CPS



OUT:0312.GA0 (ON) RC:301 BY:8737 FR:31428K 7/12/94 14:55
0 14.4 79.631

0——NGamma——200 CPS

1.3

EG&G MOUND OU2 RI/FS
NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 324 DATE: 7/12/94

Name of Contractor: CAlog
Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: ok
Check cable/rope for excessive wear: ok

Manufacturer of Gamma Probe: Mt. Sopris Inst.
Gamma Probe Model Number: N/A
Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris Inst.
Logging Instrument Model Number: N/A
Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.
Data Recorder Model Number: N/A
Data Recorder Serial Number: N/A

Logging Speed (feet/minute): 44 ft/min.
Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___
What is the digital recording interval?: N/A

What is reference point for all depth measurements?: TOIC 782.92'
Was there any vertical depth error noted?: yes. marked at 25.0'
What was total depth of hole?: 19.5
What was length of gamma log?: 19.5

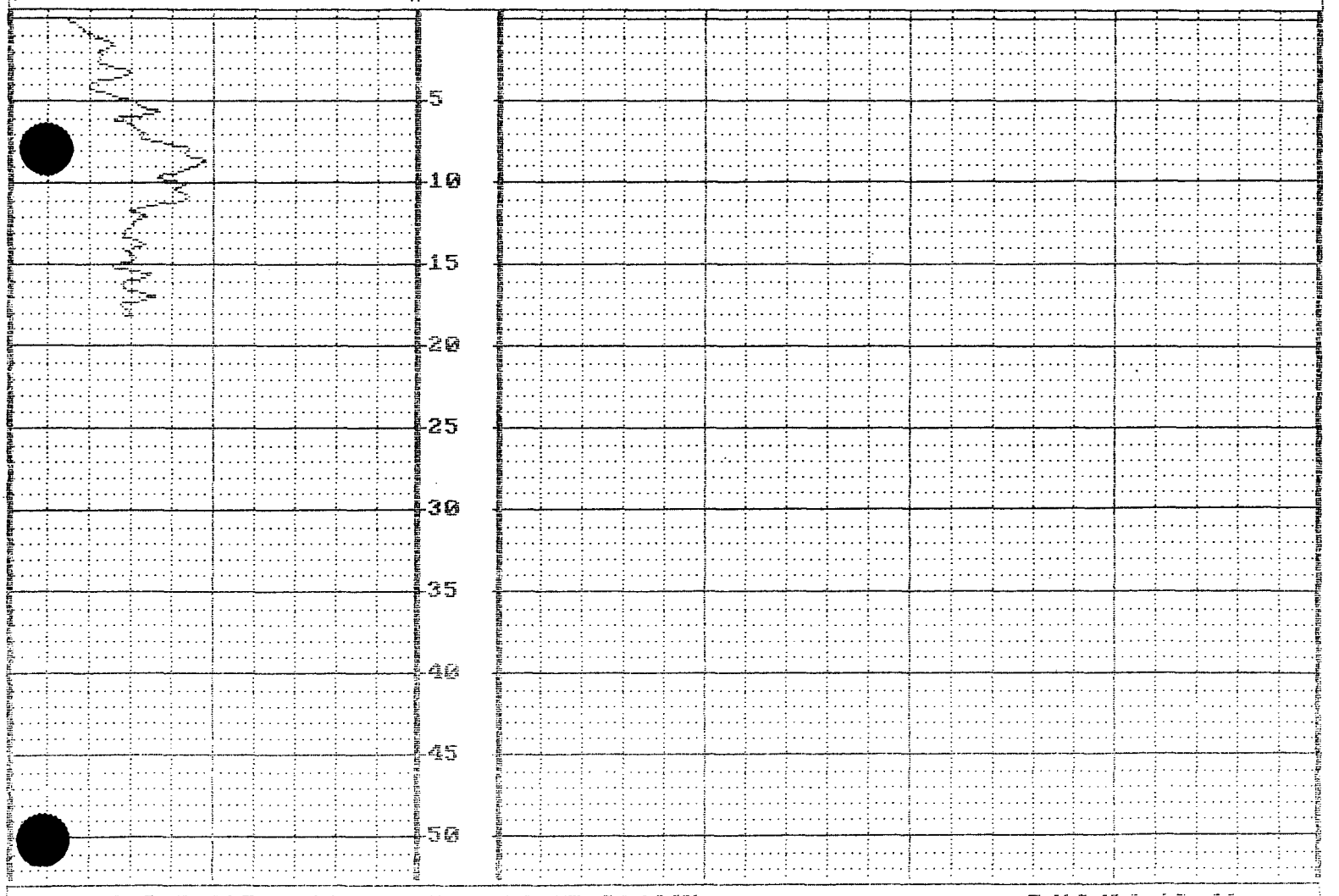
Was a repeat section made for this borehole?: (Y) N
What was the length of the repeat section?: entire well
Was there any discrepancy between gamma log and repeat section?: Y N
Describe any discrepancy: ___

Was there any calibration made to the probe or any other equipment?: Y (N)
Describe calibration: (calb. in house)

Note any other observations: ___

OUT:324.GA0 (OFF) RC:199 BY:5783 FR:31444K 7/12/94 13:46
-0.1 0.0 25.68

0 NGamma 200 CPS



OUT:324.GA0 (OFF) RC:199 BY:5783 FR:31444K 7/12/94 13:46
-0.1 0.0 25.68

0 NGamma 200 CPS

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 114 DATE: 7/12/94

Name of Contractor: Craig

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: ok

Check cable/rope for excessive wear: OK

Manufacturer of Gamma Probe: MT. SOPRIS INST.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: ~~N/A~~ 2029

Manufacturer of Logging Instrument: MT. SOPRIS INST

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: MT. SOPRIS INST.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 15'/min

Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___

What is the digital recording interval?: 0.10'

What is reference point for all depth measurements?: TOIC 873.51'

Was there any vertical depth error noted?: YES RECORDED TD @ 55'

What was total depth of hole?: ~~52.2'~~ ~~SAME~~ 52.5'

What was length of gamma log?: ~~[illegible]~~ 52.3'

Was a repeat section made for this borehole?: Y (N)

What was the length of the repeat section?: ___

Was there any discrepancy between gamma log and repeat section?: Y N

Describe any discrepancy: ___

Was there any calibration made to the probe or any other equipment?: Y (N)

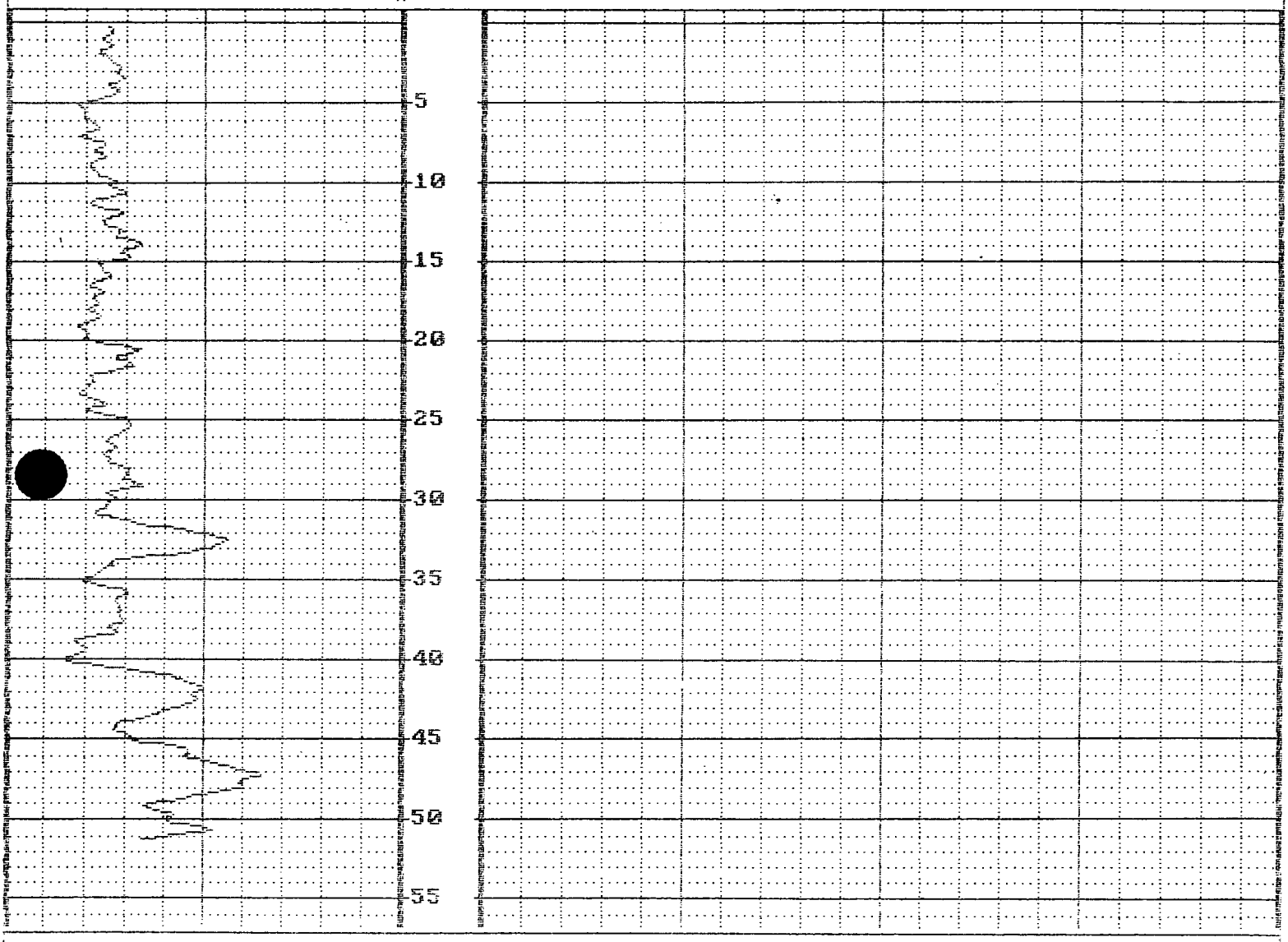
Describe calibration: (CALIB. IN HOUSE)

Note any other observations:

Background 1; Reading 1 - nnu

OUT:1114.GA0 (ON) RC:527 BY:15292 FR:31518K 7/12/94 09:46
-0.0 11.5 54.62

0——NGamma——200 CPS



OUT:1114.GA0 (ON) RC:481 BY:13958 FR:31520K 7/12/94 09:46
4.6 14.3 56.885

0——NGamma——200 CPS

OUT:1114.GA0 (ON) RC:464 BY:13465 FR:31520K 7/12/94 09:46
6 14.5 33.385

0——NGamma——200 CPS

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 724 DATE: 7/13/94

Name of Contractor: Colog

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: OK

Check cable/rope for excessive wear: OK

Manufacturer of Gamma Probe: Mt. Sopris Inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris Inst.

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 1 /min.

Was Logging Speed continuous over entire borehole?: Y N ___ other N/A

What is the digital recording interval?: N/A

What is reference point for all depth measurements?: N/A

Was there any vertical depth error noted?: N/A

What was total depth of hole?: N/A

What was length of gamma log?: N/A

Was a repeat section made for this borehole?: Y N

What was the length of the repeat section?: N/A

Was there any discrepancy between gamma log and repeat section?: Y N

Describe any discrepancy: N/A

Was there any calibration made to the probe or any other equipment?: Y N

Describe calibration: N/A

Note any other observations:

* Did not use the gamma probe because of a kink in the top 4 feet of the pipe

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 115 DATE: 7/12/94

Name of Contractor: Colog

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: OK

Check cable/rope for excessive wear: OK

Manufacturer of Gamma Probe: Mt. Sopris inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris inst.

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris inst.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ~15'/min

Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___

What is the digital recording interval?: 0.10'

What is reference point for all depth measurements?: TOIC 873.55'

Was there any vertical depth error noted?: yes, plastic bag was in bottom

What was total depth of hole?: 42.0'

What was length of gamma log?: 40.4'

Was a repeat section made for this borehole?: Y (N)

What was the length of the repeat section?: N/A

Was there any discrepancy between gamma log and repeat section?: Y N

Describe any discrepancy: N/A.

Was there any calibration made to the probe or any other equipment?: Y (N)

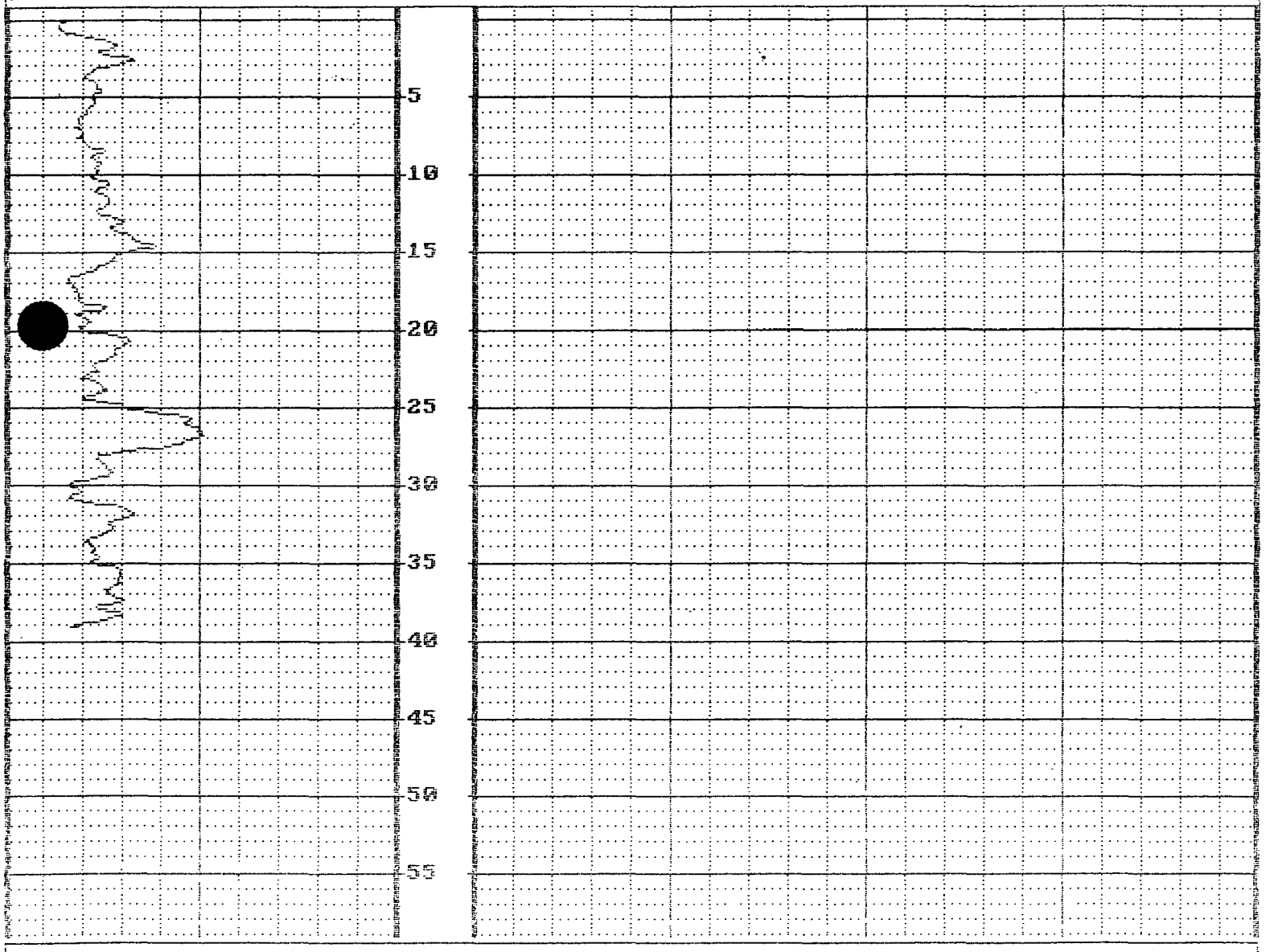
Describe calibration: (Calib. in house)

Note any other observations:

Background 1 Reading 1 - hnu

OUT:115.GA0 (ON) RC:408 BY:11843 FR:31450K 7/12/94 12:47
-0.1 0.0 38.12

0 NGamma 200 CPS



OUT:115.GA0 (ON) RC:342 BY:9929 FR:31452K 7/12/94 12:47
15.2 43.230

0 NGamma 200 CPS

EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 0033 DATE: 7/13/94

Name of Contractor: Colog

Name of Operator: mike Colog

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: ok

Check cable/rope for excessive wear: ok

Manufacturer of Gamma Probe: Mt. Sopris Inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris Inst.

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris Inst.

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ±15'/min

Was Logging Speed continuous over entire borehole?: Y N ___ other ___

What is the digital recording interval?: 0.10'

What is reference point for all depth measurements?: TOIC 777.57

Was there any vertical depth error noted?: yes marked at 3.35'

What was total depth of hole?: 33.5'

What was length of gamma log?: 25.3'

Was a repeat section made for this borehole?: Y (N)

What was the length of the repeat section?: —

Was there any discrepancy between gamma log and repeat section?: Y N

Describe any discrepancy: N/A

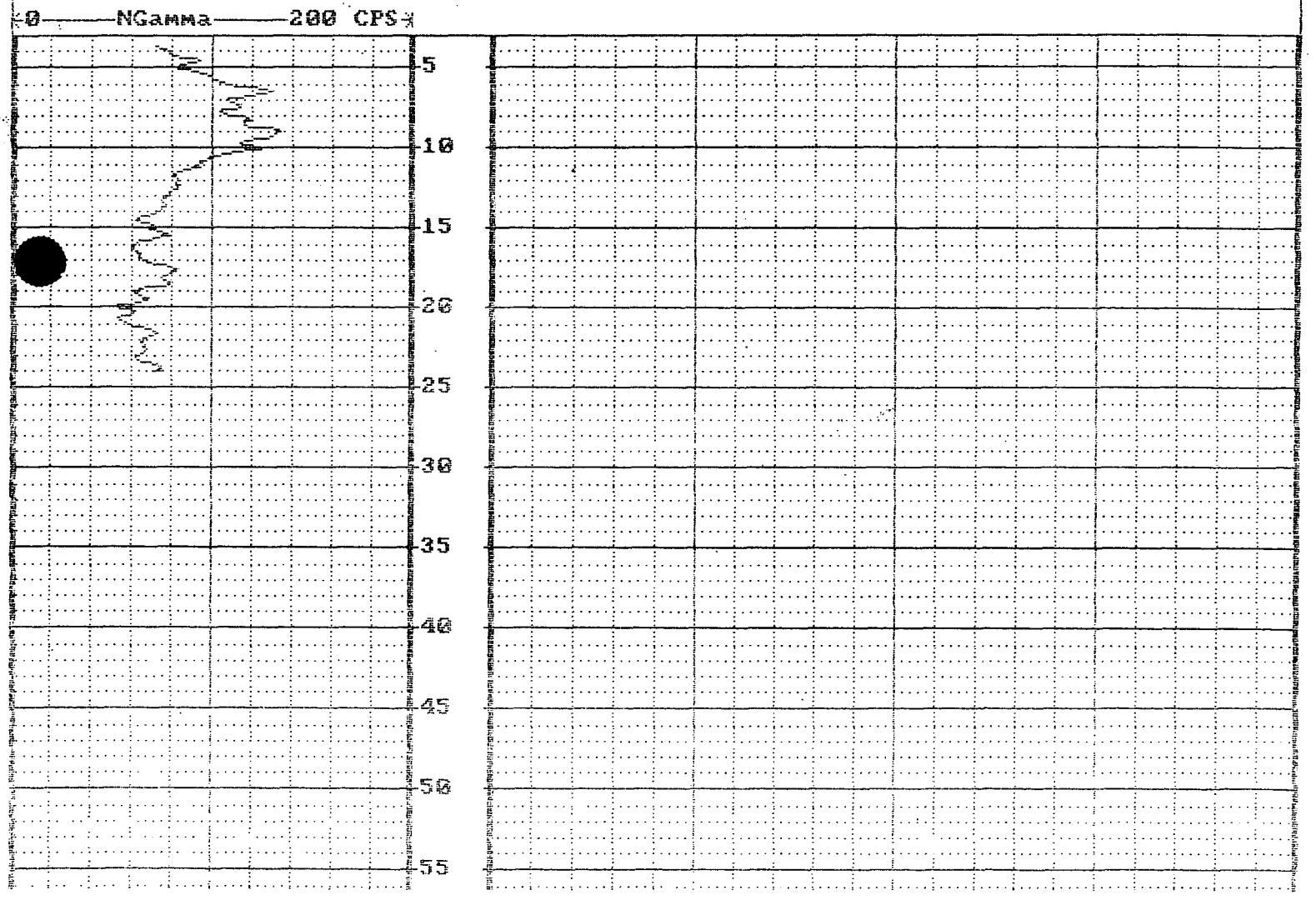
Was there any calibration made to the probe or any other equipment?: Y (N)

Describe calibration: (Calibr in house)

Note any other observations:

hnu Background 2 Reading 2

OUT:0033.GA0 (OFF) RC:220 BY:6389 FR:31396K 7/13/94 08:21
3.5 0.0 67.691



EG&G MOUND OU2 RI/FS

NATURAL GAMMA LOGGING OVERSIGHT FORM

WELL NUMBER: 112 DATE: 7/13/94

Name of Contractor: CSlog

Name of Operator: Mike Willard

Observe logging cable (connected to gamma probe), note any tears, cuts, or wear that could possibly result in a short circuit of the wires: ok

Check cable/rope for excessive wear: ok

Manufacturer of Gamma Probe: Mt. Sopris Inst.

Gamma Probe Model Number: N/A

Gamma Probe Serial Number: 2029

Manufacturer of Logging Instrument: Mt. Sopris

Logging Instrument Model Number: N/A

Logging Instrument Serial Number: N/A

Manufacturer of Data Recorder: Mt. Sopris

Data Recorder Model Number: N/A

Data Recorder Serial Number: N/A

Logging Speed (feet/minute): ± 15 /min

Was Logging Speed continuous over entire borehole?: (Y) N ___ other ___

What is the digital recording interval?: 0.10'

What is reference point for all depth measurements?: TOC 775.20'

Was there any vertical depth error noted?: yes.

What was total depth of hole?: 35.5'

What was length of gamma log?: 32.15'

Was a repeat section made for this borehole?: (Y) N

What was the length of the repeat section?: entire well

Was there any discrepancy between gamma log and repeat section?: Y (N)

Describe any discrepancy: N/A

Was there any calibration made to the probe or any other equipment?: Y (N)

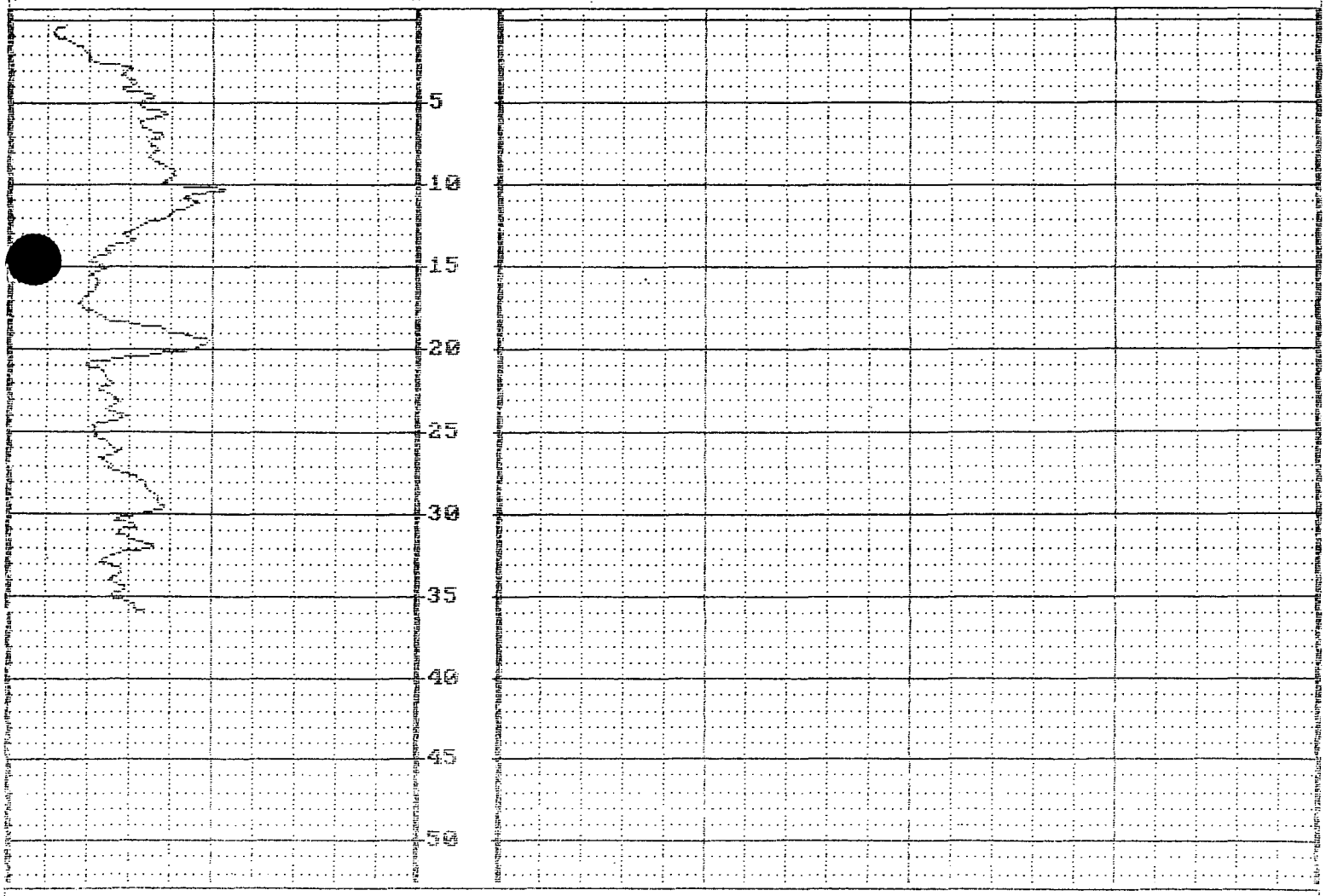
Describe calibration: (calib in house)

Note any other observations: the bottom of the probe had several inches of heavy sediment on it.

hnu Background 2 Reading 2

OUT:0112.GA0 (OFF) RC:374 BY:10853 FR:31416K 7/13/94 07:40
0.0 0.0 33.441

<0——NGamma——200 CPS>



OUT:0112.GA0 (OFF) RC:374 BY:10853 FR:31416K 7/13/94 07:40
0.0 0.0 33.441

<0——NGamma——200 CPS>