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ENVIRONMENTAL SCIENCES DIVISION

GROUNDWATER MONITORING AT THREE OAK RIDGE NATIONAL LABORATORY  
INACTIVE WASTE IMPOUNDMENTS:

Results After One Year

C. W. Francis and R. G. Stansfield

Environmental Sciences Division  
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## ABSTRACT

FRANCIS, C. W., and R. G. STANSFIELD. 1986. Groundwater monitoring at three Oak Ridge National Laboratory inactive waste impoundments: results after one year. ORNL/TM-10193. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 133 pp.

To determine if the migration of potential contaminants from three inactive waste impoundments at Oak Ridge National Laboratory poses a threat to groundwater quality, at least one upgradient groundwater monitoring well and three downgradient monitoring wells were installed at each impoundment in early 1985. These three unlined impoundments (also called waste basins or ponds) were formerly used to collect and, in some instances, treat wastewater. There are (1) the 3513 impoundment, (2) the Old Hydrofracture Facility (OHF) impoundment, and (3) the Homogeneous Reactor Experiment No. 2 (HRE) impoundment.

Groundwater samples were collected quarterly for one year. Analyses were conducted for the groundwater protection parameters promulgated by the Resource Conservation and Recovery Act (RCRA). The groundwater samples were also analyzed for polychlorinated biphenyls; copper; nickel; zinc; and the radioisotopes  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and tritium. The contaminants found most often to affect groundwater quality at all three waste impoundments were radionuclides. For example, mean concentrations of gross beta and gross alpha activity exceeded drinking water limits at all three sites. The gross beta limit (4 mCi/year, assuming a person drinks 2.2 L of water per day for a year) was exceeded at the 3513 and OHF impoundments by either  $^{90}\text{Sr}$  or tritium levels. At the 3513 impoundment, there was substantial evidence that the downgradient groundwater has been contaminated by chromium and lead and possibly by halogenated organic compounds. At the OHF impoundment, the mean level of tritium measured in the upgradient well (about 91,000 Bq/L as compared with 80,000 Bq/L in the downgradient wells) indicated that the groundwater quality has been affected by the radioactive wastes buried in the low-level radioactive waste burial ground solid waste storage area-5 upgradient of the

impoundment. Testing for groundwater contamination, using the indicator parameters outlined in Title 40, CFR (Subpart F, Groundwater Protection, para. 265.92), disclosed statistically significant contamination at all three sites.

## 1. INTRODUCTION

One of the objectives in the operation of a large research facility such as Oak Ridge National Laboratory (ORNL) is to ensure that the treatment and/or disposal of wastes comply fully with federal and state regulations. In response to some recent regulations promulgated under the Resource Conservation and Recovery Act (RCRA), the Laboratory has begun to evaluate more thoroughly the environmental impacts of some of its former waste management practices. One such practice was the use of unlined impoundments (also called waste basins or ponds) to collect and, in some instances, treat the liquid waste. To determine the environmental impact of such a practice on the groundwater quality, a groundwater monitoring program was established at three impoundments that are no longer being used to collect wastewater: (1) the 3513 impoundment, (2) the Old Hydrofracture Facility (OHF) impoundment, and (3) the Homogeneous Reactor Experiment No. 2 (HRE) impoundment. At each impoundment, three downgradient wells and at least one upgradient well were installed. This report contains the groundwater analyses data collected over the first year (four quarterly sample periods) and evaluates the influence of each impoundment on the near-field groundwater quality.

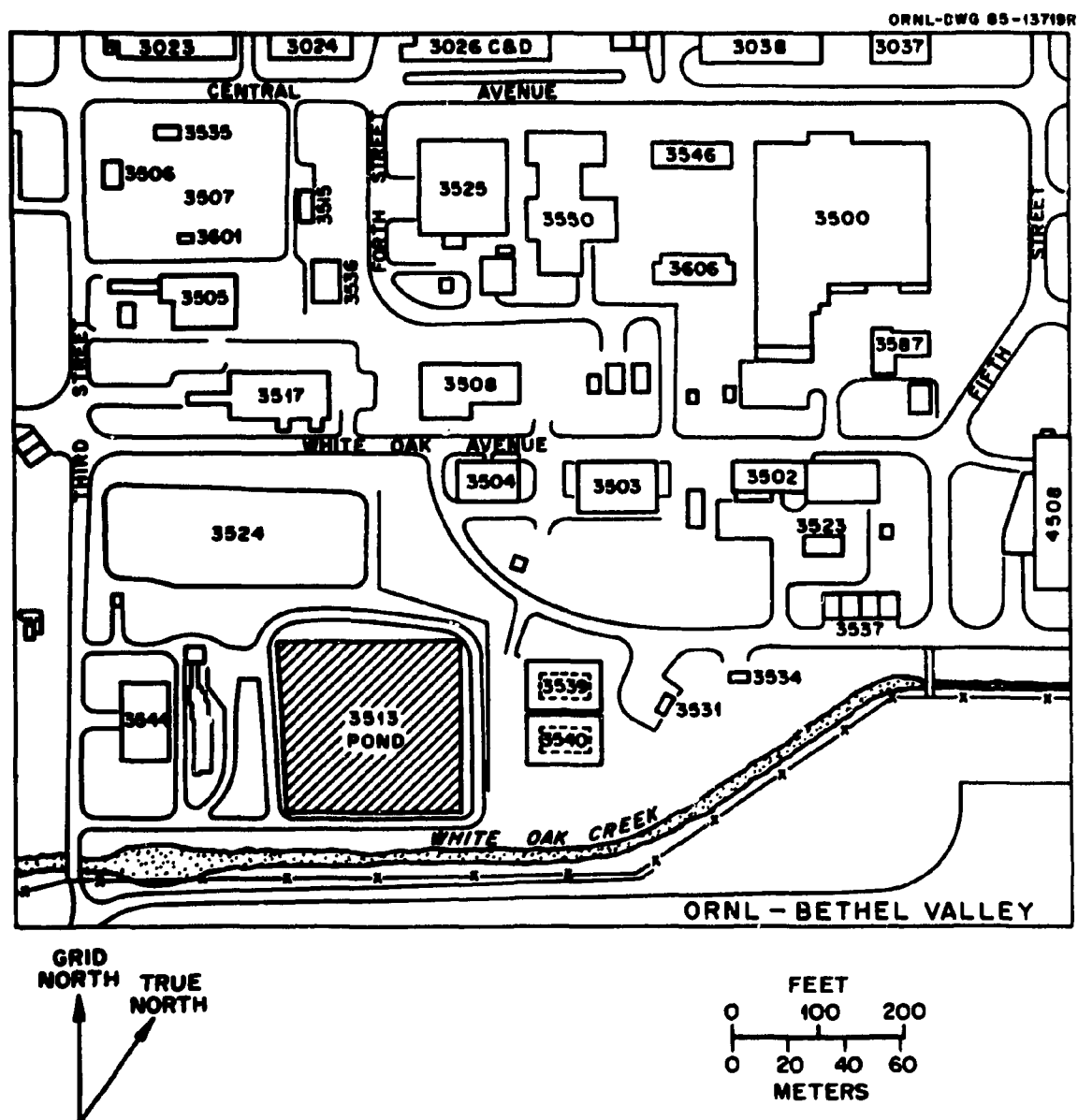
## 2. BACKGROUND AND DESCRIPTION OF SITES

The intent of this section is to introduce, in an abbreviated form, some background material to acquaint the reader with the past history and some general characteristics of each impoundment. A more complete description of the construction and operation of each of the impoundments, as well as the dominant geologic and hydrologic characteristics of each of the sites, is presented in several previous ORNL reports (Stansfield and Francis 1986a, 1986b, 1986c, 1986d; Francis and Stansfield 1986).

Also contained in the above reports are estimated inventories of radionuclides and potentially hazardous chemicals in the standing water phase and sediments of each of the impoundments. Sediments from each of the impoundments have been subjected to leaching by the extraction procedure (EP) leaching test promulgated under the (RCRA). Only the sediment from the 3513 impoundment was found have a toxic characteristic because of elevated levels of mercury in the extract. Thus, sediment from the 3513 impoundment is considered to be a hazardous waste.

### 2.1 3513 IMPOUNDMENT

The 3513 impoundment was constructed in 1944 to serve as a holding basin for wastewaters prior to their discharge into White Oak Creek. This unlined impoundment, which is ~67 by 67 m wide and 1 m deep, received Laboratory liquid wastes until 1976 when a new process waste treatment plant began operating. Its location is illustrated in Fig. 1. On the east and north of the 3513 impoundment are three similar unlined impoundments (a large holding basin, 3524, and two smaller holding ponds, 3539 and 3540), which are presently being used to receive wastewater from ORNL. These holding basins, as well as leaking underground waste lines (F. J. Homan, Operations Division, personal communication, February 1986), represent potential sources of contamination to the groundwater, which is sampled from monitoring wells around 3513.



**Fig. 1. Location of 3513 impoundment within ORNL.**

The estimated capacity of the impoundment is  $7.1 \times 10^6$  L. The net annual precipitation input to the pond is ~56 cm (which corresponds to  $\sim 2.5 \times 10^6$  L). The water level is maintained by pumping the overflow water to the 3524 impoundment where it is processed.

## 2.2 OLD HYDROFRACTURE FACILITY IMPOUNDMENT

The old Hydrofracture Facility (OHF) was used for the permanent disposal of liquid radioactive waste in impermeable shale formations from 1964 to 1979. The facility is located at the confluence of Melton Branch and White Oak Creek, ~1.5 km southwest of the ORNL main complex (see Fig. 2). The impoundment is downslope, ~50 m to the northwest, of building 7852, which contains the control room that was used in injecting liquid radioactive waste, in the form of a grout, into impermeable shale formations at depths ranging from ~230 to 300 m. The impoundment, which is ~30 m long and 6 m wide and 1 to 2 m deep, was constructed in 1963 to serve as an emergency containment basin for possible spillage of grout. The design capacity is  $\sim 3.8 \times 10^5$  L. Stansfield and Francis (1986b) estimated the pond to contain  $\sim 3.0 \times 10^5$  L in August of 1985. Differences between mean annual precipitation (~140 cm) and mean annual evaporation indicate that ~140,000 L is leaking annually from the pond and entering the groundwater.

## 2.3 HOMOGENEOUS REACTOR EXPERIMENT NO. 2 IMPOUNDMENT

The Homogeneous Reactor Experiment No. 2 (HRE) impoundment was built in 1955 to serve as a settling basin for low-level radioactive waste generated by the homogeneous reactor experiments. The HRE facility is located in Melton Valley, ~900 m southeast of the main ORNL complex (see Fig. 3). When constructed, the capacity of the impoundment was  $\sim 1.2 \times 10^6$  L (20 by 20 m and ~3 m deep). The impoundment received liquid wastes intermittently from 1957 through 1962. In 1970 the impoundment was drained and backfilled with soil and partially weathered shale from the surrounding area. The filled impoundment was then capped with crushed limestone and asphaltic concrete.

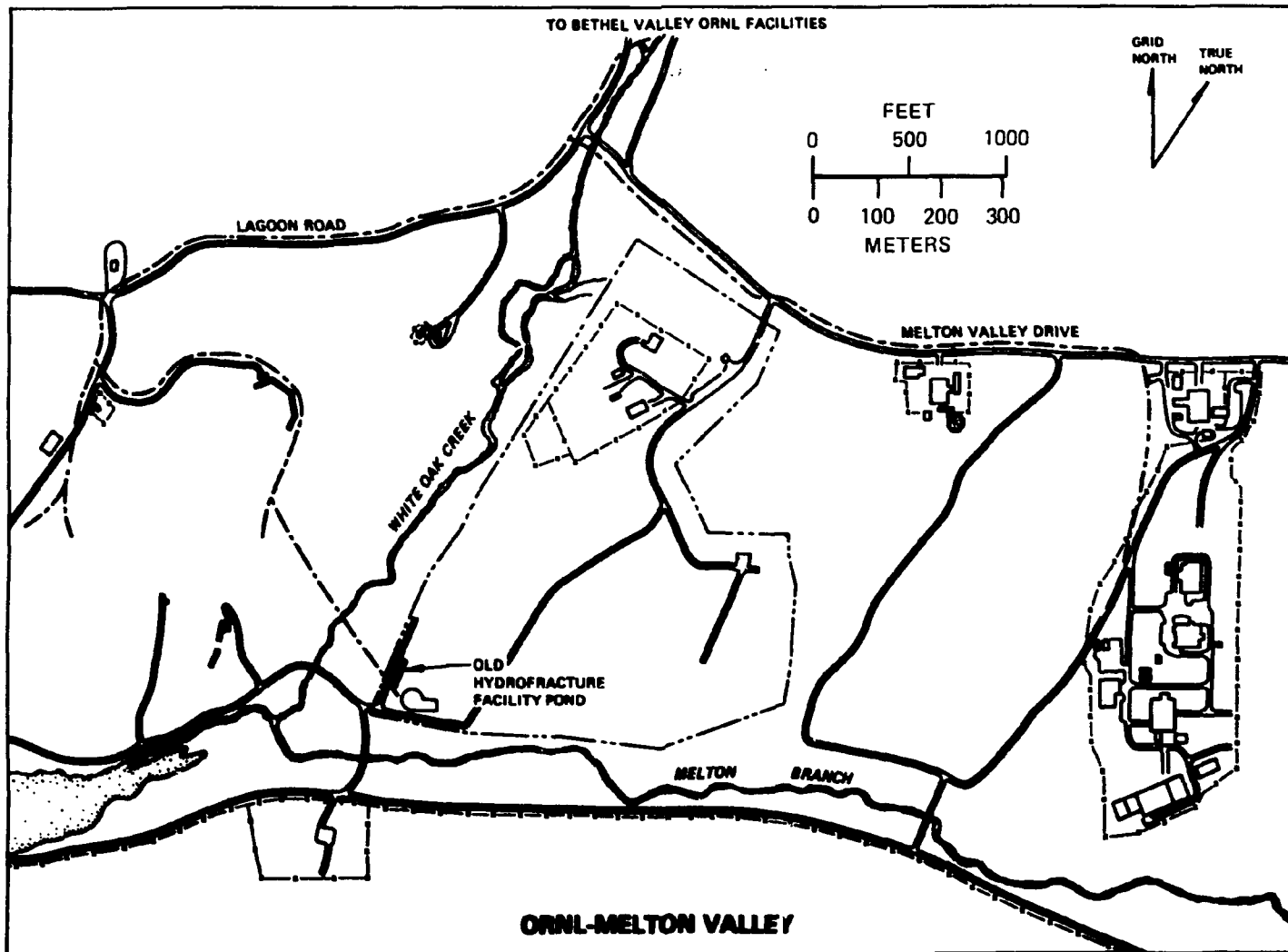


Fig. 2. Location of Old Hydrofracture Facility at ORNL.



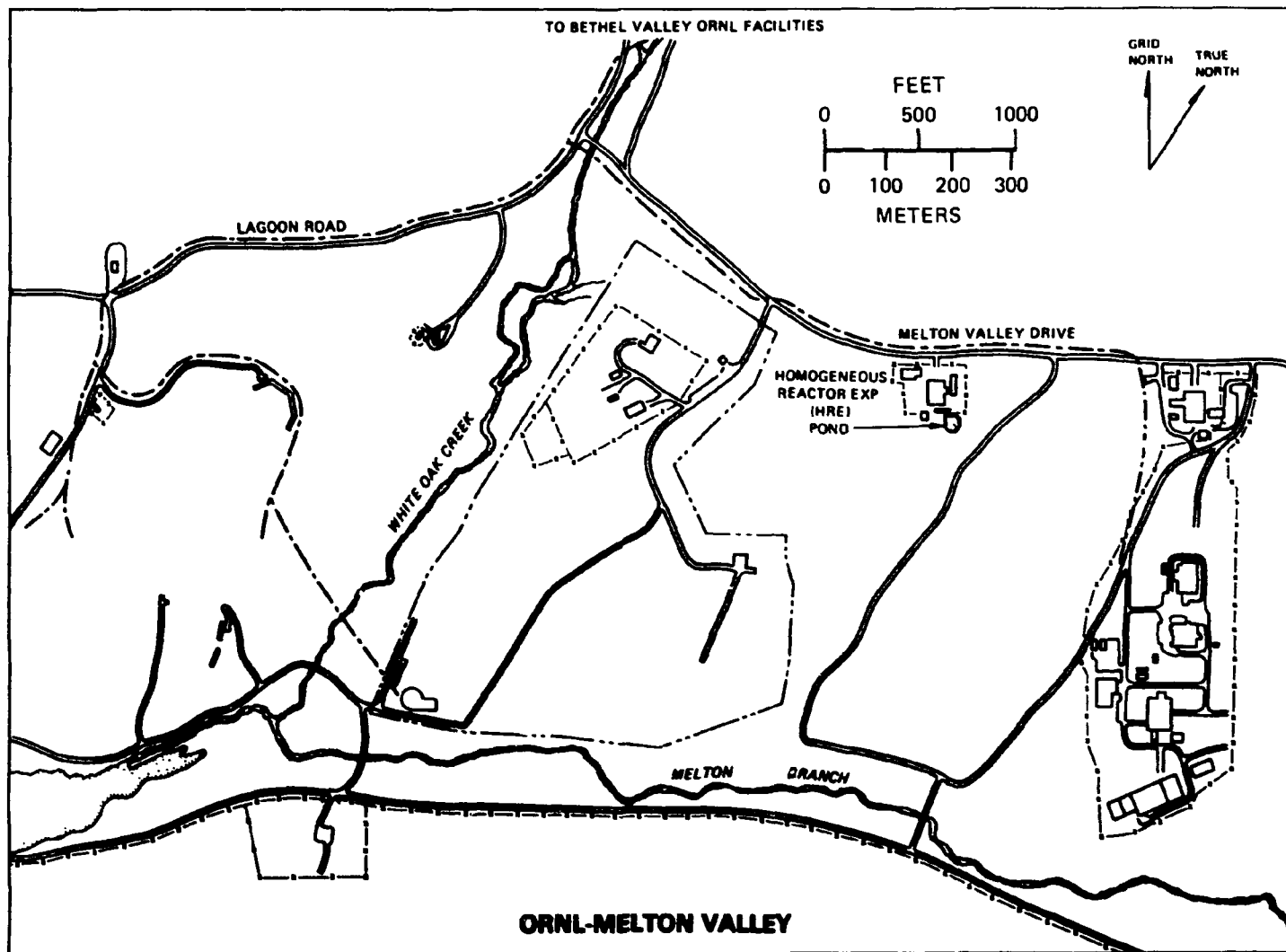


Fig. 3. Location of Homogeneous Reactor Experiment at ORNL.

### 3. METHODS AND MATERIALS

#### 3.1 LOCATION AND CONSTRUCTION OF MONITORING WELLS

##### 3.1.1 3513 Impoundment

Five monitoring wells were installed around the perimeter of the 3513 impoundment in January 1985 (Fig. 4). Monitoring wells 1 and 1A were located to sample groundwater upgradient from the impoundment. "Upgradient" is defined here as the direction of increasing static head of the groundwater table. Monitoring well 1 (the bottom of which is 2.4 m below the ground surface) is not as deep as well 1A (the bottom of which is 7.6 m below the ground surface). The major difference is that well 1 does not penetrate the limestone bedrock underlying the clay soil. Well 1A, on the other hand, penetrates ~1 m into the limestone bedrock. The other three wells (2, 3, and 4) were located with the intent of sampling groundwater downgradient from the impoundment. These wells penetrate ~0.6 m into the limestone bedrock. Thus, approximately one-third of the well screen (which is 2.1 m in length) is located in the limestone bedrock. A geologic cross section of the 3513 impoundment area, illustrating the elevation of the groundwater in relation to the monitoring wells, is presented in Fig. 5. The grid coordinates and pertinent elevations for each of the monitoring wells are presented in Table 1.

Table 1. Grid coordinates and elevations for 3513 monitoring wells

|                          | Monitoring well |        |        |        |        |
|--------------------------|-----------------|--------|--------|--------|--------|
|                          | 1               | 1A     | 2      | 3      | 4      |
| ORNL grid coordinates, m |                 |        |        |        |        |
| North                    | 6542.0          | 6541.7 | 6455.8 | 6455.8 | 6486.7 |
| East                     | 9496.8          | 9496.1 | 9491.9 | 9451.6 | 9439.7 |
| Elevations, m            |                 |        |        |        |        |
| Top of well casing       | 239.8           | 239.7  | 239.6  | 239.3  | 238.7  |
| Ground surface           | 238.8           | 238.8  | 238.7  | 238.4  | 238.0  |
| Top of well screen       | 237.1           | 234.5  | 236.6  | 233.5  | 236.0  |
| Bottom of well screen    | 236.5           | 232.3  | 234.5  | 234.4  | 233.8  |
| Top of sand pack         | 237.3           | 234.6  | 237.1  | 236.9  | 236.5  |
| Bottom of well hole      | 236.4           | 231.2  | 234.5  | 234.4  | 233.8  |

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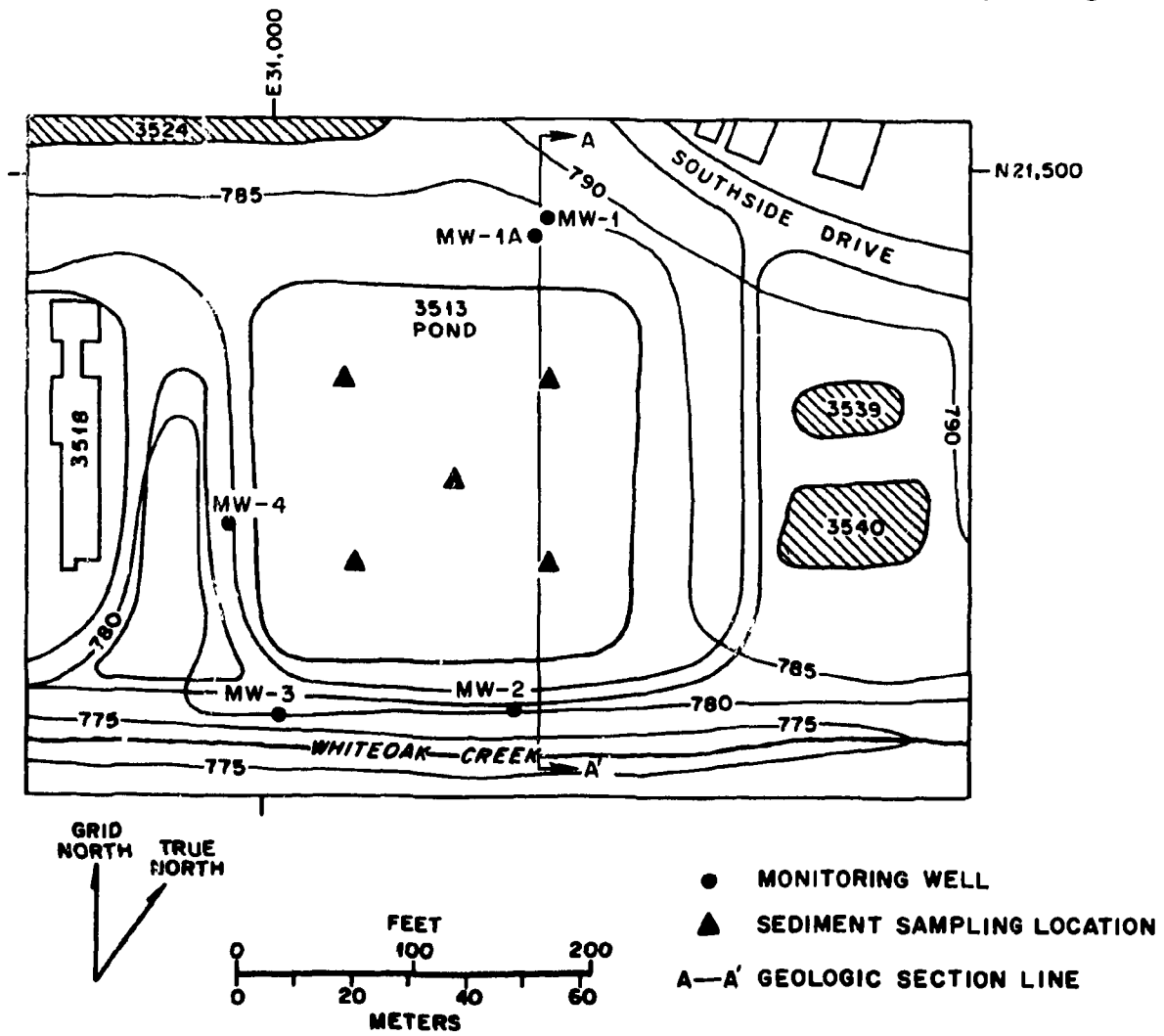


Fig. 4. Locations of groundwater monitoring wells at the 3513 impoundment.

# GEOLOGIC SECTION - 3513 POND

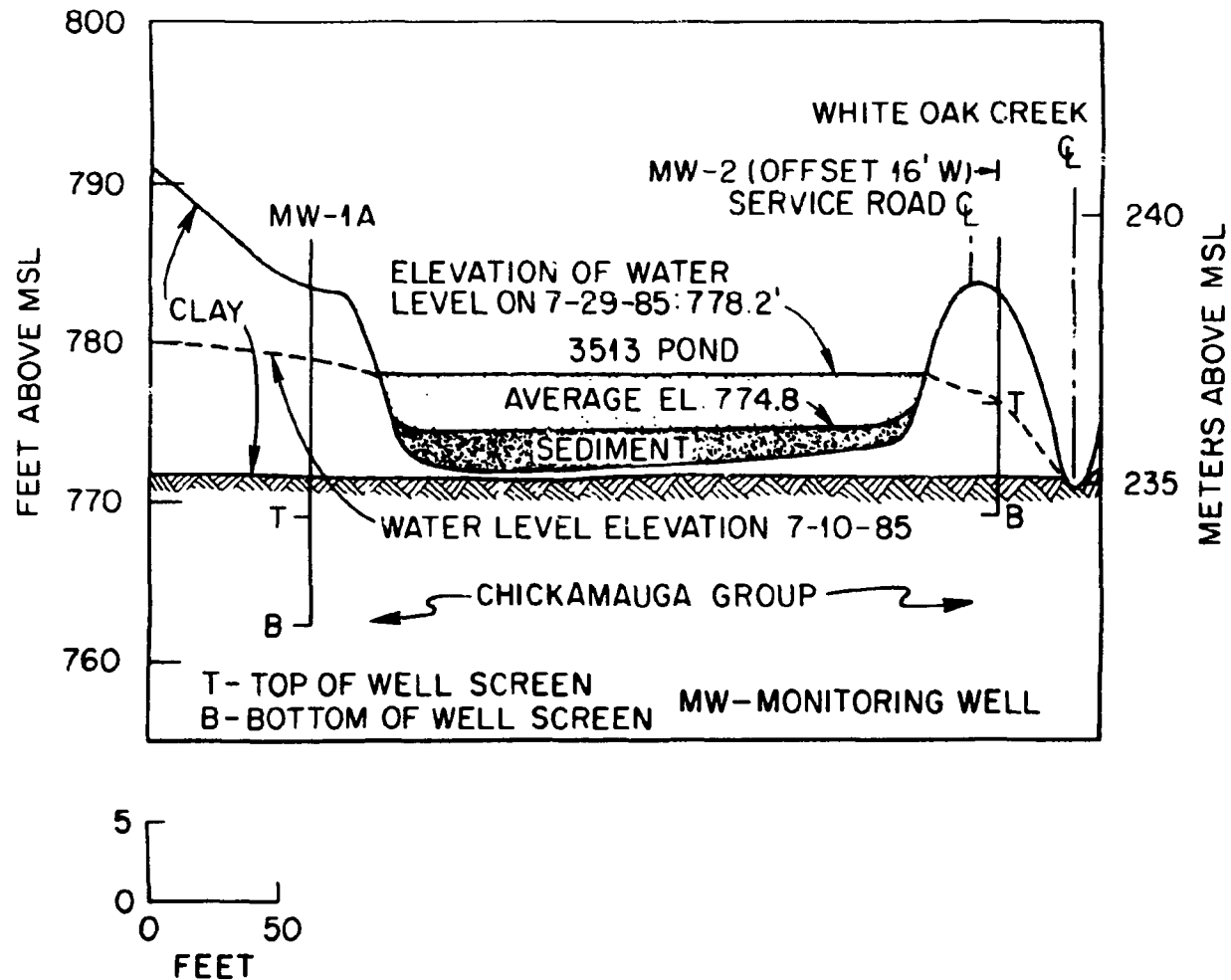


Fig. 5. Geologic section through 3513 impoundment.

The monitoring wells are constructed of 5.1-cm-diam stainless steel well screen and casing. The well screens have a continuous slot, 0.25-mm wide. The length of well screens ranges from 0.6 to 2.1 m, and all are surrounded by a sand pack of medium-grained quartz sand which extends a minimum height of 30 cm above the elevation of the top of the well screen. A detailed description of the coring and construction of the wells is given in Appendices A and B of Stansfield and Francis 1986a.

### 3.1.2 Old Hydrofracture Facility Impoundment

Four monitoring wells were installed in March 1985 around the perimeter of the OHF impoundment (see Fig. 6). Monitoring well 1 was located to sample groundwater upgradient from the impoundment. This well is located at the northeast corner of the impoundment ~15 m from the edge of the standing water contained in the impoundment. However, it is located ~30 m downgradient from a disposal trench in a low-level solid waste storage area (SWSA-5), which is a potential source of contamination. Monitoring wells 2, 3, and 4 were located to collect groundwater downgradient from the impoundment.

The depth from ground surface of monitoring well 1 is ~10 m as compared with ~7 m for monitoring wells 2, 3, and 4. The grid coordinates and elevations to specific parts of each of the monitoring wells are presented in Table 2. A geologic cross section of the

Table 2. Grid coordinates and elevations for  
Old Hydrofracture Facility monitoring wells

|                          | Monitoring well |        |        |        |
|--------------------------|-----------------|--------|--------|--------|
|                          | 1               | 2      | 3      | 4      |
| ORNL grid coordinates, m |                 |        |        |        |
| North                    | 280.7           | 875.6  | 5272.7 | 5285.0 |
| East                     | 8717.4          | 8688.3 | 8685.8 | 8692.6 |
| Elevations, m            |                 |        |        |        |
| Top of well casing       | 238.4           | 236.8  | 235.8  | 235.8  |
| Ground surface           | 237.5           | 236.0  | 234.9  | 234.9  |
| Top of well screen       | 231.7           | 232.0  | 231.8  | 231.8  |
| Bottom of well screen    | 228.6           | 229.2  | 228.7  | 228.8  |
| Top of sand pack         | 234.6           | 234.1  | 233.1  | 232.4  |
| Bottom of well hole      | 226.9           | 228.7  | 227.6  | 227.6  |

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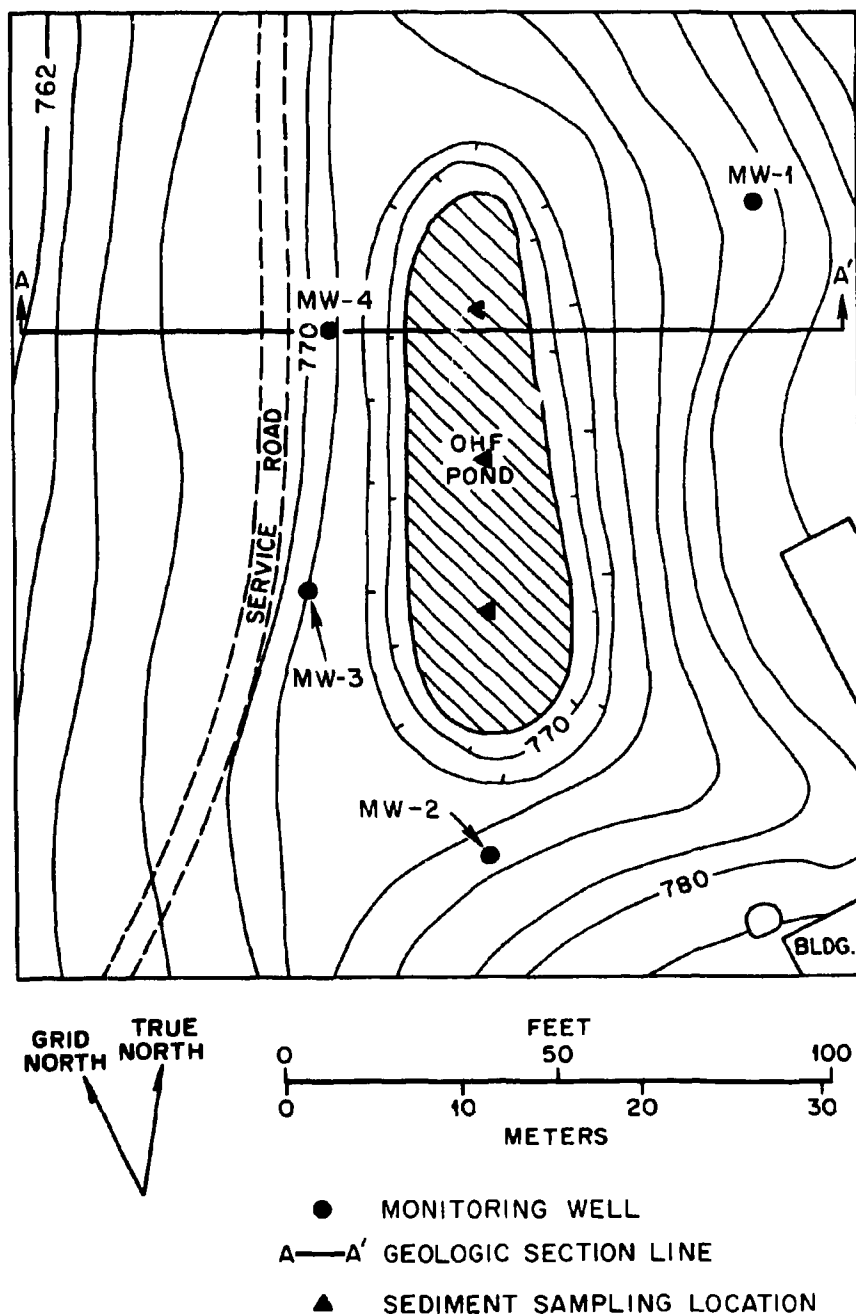


Fig. 6. Locations of groundwater monitoring wells at the Old Hydrofracture Facility impoundment.

impoundment, illustrating the relative position of the water table and the monitoring wells, is presented in Fig. 7. Note that sediments in the bottom of the impoundment were in direct contact with the water table on July 29, 1985.

The monitoring wells were constructed of 7.60-cm-diam fiberglass well screen and casing. The 3.0-m long well screens contain two rows of slots, each 0.25-mm wide, to allow the movement of groundwater into the wells. A medium-grained quartz sand was packed around the screen extending to ~30 cm above the top of the well screen. A bentonite clay seal of ~30 cm in length was placed on top of the sand pack. The remainder of the boring was backfilled with portland cement concrete. Detailed descriptions of each of the drillings as well as the construction of the monitoring wells are given in Appendices A and B of Stansfield and Francis 1986b.

### 3.1.3 Homogeneous Reactor Experiment No. 2 Impoundment

Four monitoring wells were installed during February and March of 1985 around the perimeter of the HRE impoundment (Fig. 8). Monitoring well 1 was installed at the far northwest corner of the asphaltic cap. The location of monitoring well 1 further upslope and off the asphaltic cap area was restricted by aboveground and belowground structures. This well is considered to be upgradient from the impoundment, based on water level measurements (see Fig. 9). None of the other wells (2, 3, and 4), which were installed to sample groundwater downgradient of the covered impoundment, were located within the area of the enclosed asphaltic cap. Depths from ground level to the bottom of the monitoring wells range from 9 m for monitoring well 1 to ~7.5 m for the downgradient wells. The grid coordinates and elevations for specific parts of the monitoring wells are listed in Table 3.

The construction of the monitoring wells at the HRE impoundment is similar to the construction of the wells at the OHF impoundment; i.e., the well screens and casings are made of 7.6-cm-diam fiberglass rather than stainless steel, which was used for the 3513 impoundment wells. Detailed descriptions of each of the drillings, as well as the construction of the monitoring wells, are given in Appendices B and C of Stansfield and Francis 1986c.

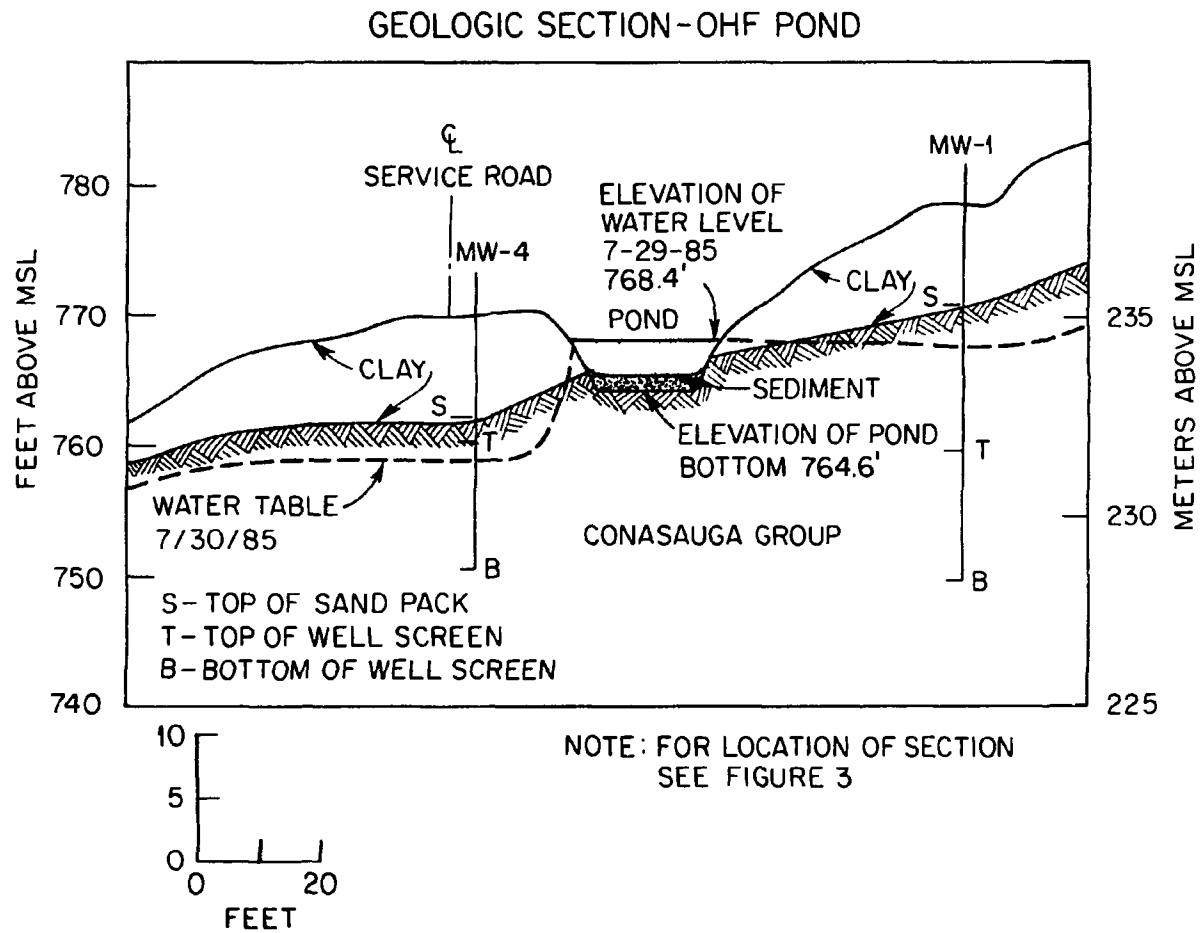


Fig. 7. Geologic section through the Old Hydrofracture Facility impoundment.



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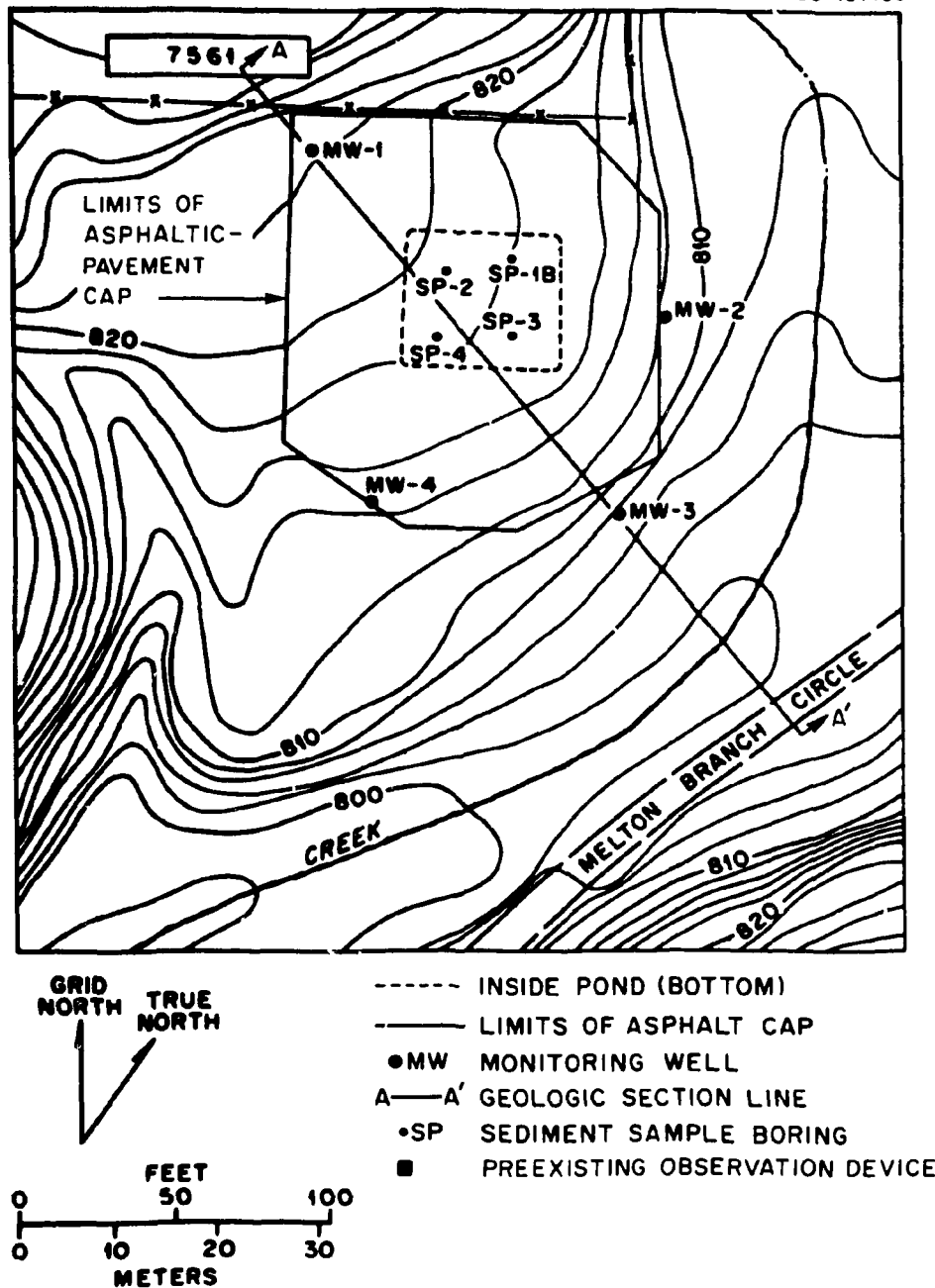


Fig. 8. Locations of groundwater monitoring wells at the Homogeneous Reactor Experiment impoundment.

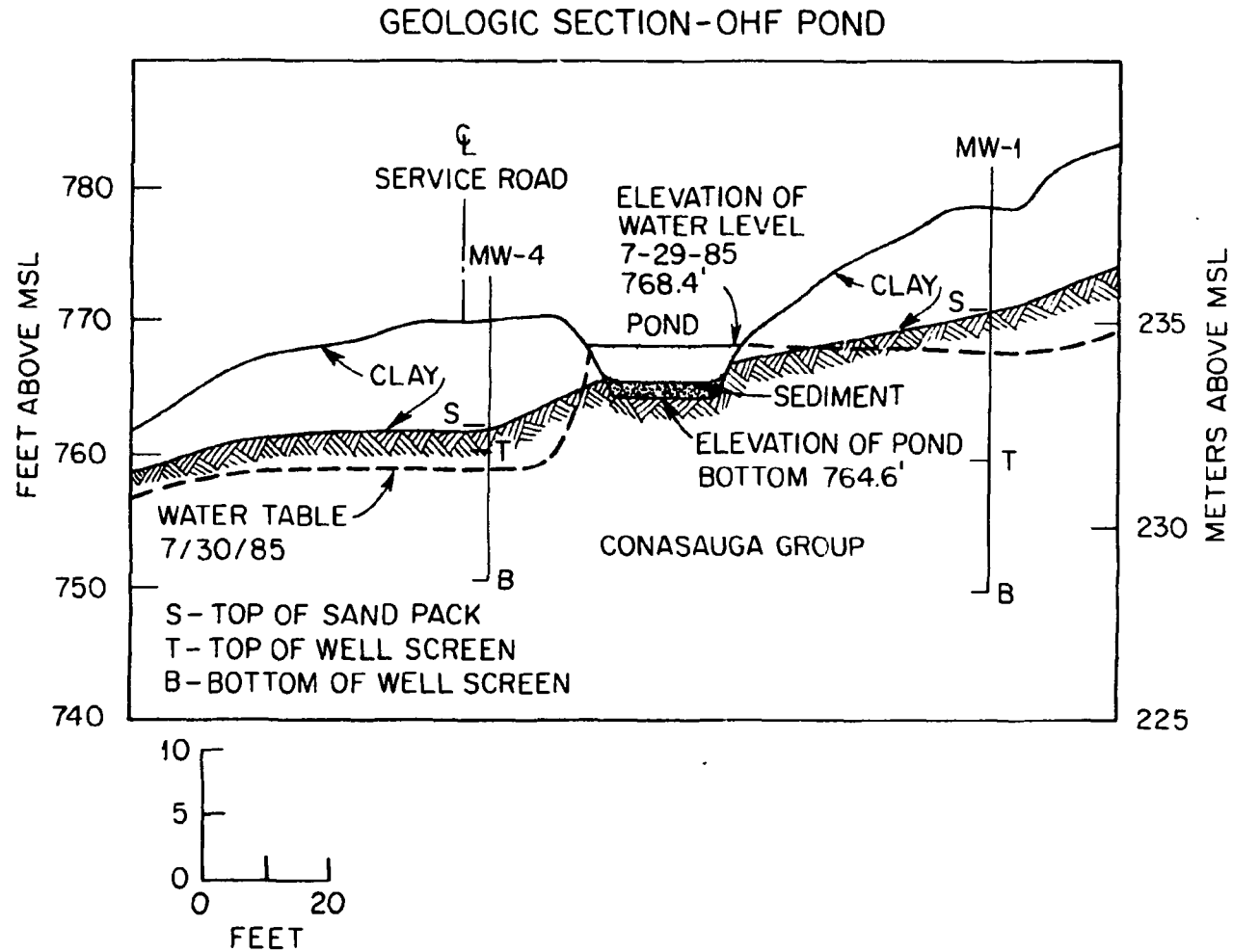


Fig. 9. Geologic section through the Homogeneous Reactor Experiment impoundment.

Table 3. Grid coordinates and elevations for homogeneous Reactor Experiment monitoring wells

|                       | Monitoring well |        |        |        |
|-----------------------|-----------------|--------|--------|--------|
|                       | 1               | 2      | 3      | 4      |
| Grid coordinates, m   |                 |        |        |        |
| North                 | 5679.9          | 5663.6 | 5644.5 | 5643.5 |
| East                  | 9577.7          | 9611.4 | 9609.1 | 9584.3 |
| Elevations, m         |                 |        |        |        |
| Top of well casing    | 252.1           | 248.6  | 247.1  | 248.7  |
| Ground surface        | 250.9           | 247.9  | 246.3  | 247.8  |
| Top of well screen    | 246.0           | 244.1  | 242.6  | 245.2  |
| Bottom of well screen | 242.9           | 241.0  | 239.5  | 242.1  |
| Top of sand pack      | 241.9           | 240.3  | 238.8  | 240.3  |
| Bottom of well hole   | 241.9           | 240.3  | 238.8  | 240.3  |

### 3.2 SAMPLING PROCEDURES

#### 3.2.1 Sample Collection

The monitoring wells at each impoundment were sampled quarterly over a 12-month period (February 1985 to January 1986) (Table 4). Before water samples were taken, the water level of each well was measured with an electric tape. To avoid cross-contamination between wells, the immersed portion of the tape was rinsed with deionized water after samples were taken from each well. The water levels recorded throughout the sampling year are presented in Table 5.

A bottom-loading, stainless steel bailer was used to purge and sample the wells. To ensure a thorough cleaning, the bailer was disassembled and washed with hot water and detergent after each well was sampled. During the first quarter of sampling, the bailer was then rinsed with dilute nitric acid followed by distilled water rinses. In subsequent quarters, the acid rinse was replaced by a methanol rinse followed by distilled water rinses. A new nylon line was attached to the bailer prior to sampling each well. Before a sample was taken, the well was purged by removing a volume of water equal to five times the volume contained within the well screen and casing. The water removed

Table 4. Sampling dates for each waste impoundment

| Impoundment                                   | Quarter           |                   |       |      |
|-----------------------------------------------|-------------------|-------------------|-------|------|
|                                               | 1                 | 2                 | 3     | 4    |
|                                               | Month/year        |                   |       |      |
| 3513                                          | 2/85              | 4/85 <sup>a</sup> | 9/85  |      |
| 1/86                                          |                   |                   |       |      |
| Old Hydrofracture Facility (OHF)              | 3/85 <sup>b</sup> | 5/85              | 9/85  |      |
| 1/86                                          |                   |                   |       |      |
| Homogeneous Reactor Experiment<br>No. 2 (HRE) | 2/85              | 5/85              | 10/85 | 1/86 |

<sup>a</sup>All monitoring wells at the 3513 impoundment were also sampled in June 1985 for total organic carbon.

<sup>b</sup>Well 1 at the OHF impoundment was sampled twice in March 1985 for all groundwater quality parameters.

Table 5. Water levels (m) in monitoring wells

| Date                                                    | Monitoring well |       |       |                 |       |
|---------------------------------------------------------|-----------------|-------|-------|-----------------|-------|
|                                                         | 1A              | 1     | 2     | 3               | 4     |
| <u>3513 impoundment</u>                                 |                 |       |       |                 |       |
| 2/6/85                                                  | 237.6           | 237.8 | 236.7 | 235.9           | 236.8 |
| 4/8/85                                                  | 237.5           | 237.5 | 236.7 | 235.7           | 236.6 |
| 4/16/85                                                 | 237.2           | 237.5 | 236.6 | 235.7           | 236.7 |
| 6/16/85                                                 | 237.4           | 237.5 | 236.8 | 235.7           | 236.5 |
| 7/1/85                                                  | 237.4           | 237.5 | 236.7 | 235.7           | 236.6 |
| 9/10/85                                                 | 237.6           | 237.5 | 236.7 | 235.8           | 236.5 |
| 12/16/85                                                | 236.4           | 237.6 | 236.7 | 235.8           | 236.6 |
| <u>Old Hydrofracture Facility impoundment</u>           |                 |       |       |                 |       |
| 4/8/85                                                  |                 | 235.0 | 230.5 | 230.8           | 231.9 |
| 5/23/85                                                 |                 | 234.5 | 230.3 | 230.7           | 231.6 |
| 6/4/85                                                  |                 | 234.4 | 230.2 | 230.5           | 231.5 |
| 7/1/85                                                  |                 | 234.2 | 230.2 | 230.5           | 231.5 |
| 7/30/85                                                 |                 | 234.1 | 230.3 | 230.6           | 231.5 |
| 9/17/85                                                 |                 | 234.2 | 230.4 | 230.6           | 231.6 |
| 1/06/86                                                 |                 | 234.2 | 230.2 | 230.6           | 231.6 |
| <u>Homogeneous Reactor Experiment No. 2 impoundment</u> |                 |       |       |                 |       |
| 4/8/85                                                  |                 | 248.3 | 246.3 | 245.0           | 245.5 |
| 5/20/85                                                 |                 | 248.0 | 246.1 | 244.9           | 245.5 |
| 6/04/85                                                 |                 | 248.0 | 246.3 | 244.8           | 245.5 |
| 7/01/85                                                 |                 | 248.5 | 246.3 | 245.0           | 245.5 |
| 10/1/85                                                 |                 | 248.2 | 246.3 | NT <sup>a</sup> | 245.5 |
| 1/13/86                                                 |                 | 248.1 | 246.1 | 244.9           | 245.5 |

<sup>a</sup>NT = measurement not taken.

for purging purposes was measured and then discarded into the impoundment. In the case of the wells at the HRE impoundment, the purged water was transported to the process waste system for disposal.

The pH and specific conductivity were measured at the well site, except for the first quarter samples taken at the 3513 impoundment wells. In that instance, samples were taken promptly to the laboratory and measured.

### 3.2.2 Sample Preservation

The groundwater samples that were to be analyzed for RCRA-regulated contaminants were transferred directly from the stainless steel bailer into glass containers with polytetrafluoroethylene-lined caps. These samples were delivered to ORNL's Analytical Chemistry Division for analysis on the day they were collected, or were stored overnight in a refrigerator for delivery the next day. The samples to be analyzed for organic compounds, nitrates, sulfates and chlorides were stored under refrigeration in the Analytical Chemistry Division prior to analysis. Separate aliquots were taken for metal analyses and then acidified with nitric acid to a pH <2. The groundwater samples that were to be analyzed for gamma-emitting radioisotopes were counted directly in the 1-L plastic containers in which they were collected and thus required no refrigeration.

### 3.2.3 Chain of Custody

A record was made for all samples collected in which the following information was recorded: name of collector, identifying list of samples, date and location where collected, inclusive dates when the samples were in the collector's custody, and date when samples were transferred to the laboratory for analyses. A copy of this record accompanied the samples to the analytical laboratory.

## 3.3 GROUNDWATER QUALITY PARAMETERS MEASURED

The principal goal in analyzing the groundwater in the vicinity of former wastewater impoundments was to determine if it had been contaminated. Regulations have been promulgated under RCRA to protect groundwater quality at RCRA-permitted facilities. The wastewater

impoundments discussed here are not RCRA-permitted sites; however, they were included under section 3004(u) of the 1984 Hazardous and Solid Waste Amendments of the reauthorization of RCRA when ORNL applied to the U. S. Environmental Protection Agency (USEPA) for a hazardous waste storage facility at building 7652 (J. H. Scarbrough, Chief of the Residual Management Branch, Region IV, USEPA, personal communication to J. A. Lenhard, Oak Ridge Operations, U. S. Department of Energy, May 1986). Under these regulations, the permittee is required to identify and characterize all solid waste management units currently or previously located within its boundary. The intent of this regulation is to determine whether a prior or continuing release of hazardous waste or hazardous constituents has occurred or is occurring and/or to characterize the nature and extent of the releases. Groundwater protection standards under RCRA are defined in Title 40, Subpart F, of the Code of Federal Regulations (CFR). The only parameters that have regulated limits are those defined by the National Interim Primary Drinking Water Standards (NIPDWS) (see Table 6). Other parameters that require monitoring in groundwater are those establishing groundwater quality and those chosen to be indicators of groundwater contamination (these parameters are also listed in Table 6). The groundwater quality parameters are to be used as the basis for comparison in the event a groundwater quality assessment is required, and the indicator parameters are used to determine if groundwater has been contaminated by the facility. During the first year, the operator or owner, on a quarterly basis, must establish initial background concentrations, or values, of all parameters for all monitoring wells. For each of the indicator parameters, at least four replicate measurements must be obtained for each sample and the initial background arithmetic mean and variance determined by pooling the replicate measurements for the respective parameter concentrations, or values, in samples obtained from the upgradient wells during the first year. These groundwater parameters, as well as PCBs, copper, nickel, zinc, and the radioisotopes  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ , and tritium, were measured in the groundwater samples taken from the monitoring wells. Measurements of temperature and dissolved oxygen were also made.

Table 6. Groundwater parameters measured

| Parameter <sup>a</sup>                                            | Maximum level allowed <sup>a,b</sup> |
|-------------------------------------------------------------------|--------------------------------------|
| <u>National Interim Primary Drinking Water Standards (NIPDWS)</u> |                                      |
| Arsenic                                                           | 0.05                                 |
| Barium                                                            | 1                                    |
| Cadmium                                                           | 0.01                                 |
| Chromium                                                          | 0.05                                 |
| Coliform bacteria, count/100 mL                                   | 1                                    |
| Endrin                                                            | 0.0002                               |
| Fluoride                                                          | 1.4-2.4                              |
| Gross alpha, Bq/L                                                 | 0.556                                |
| Gross beta, mR/year                                               | 4                                    |
| Lead                                                              | 0.05                                 |
| Lindane                                                           | 0.004                                |
| Mercury                                                           | 0.002                                |
| Methoxychlor                                                      | 0.1                                  |
| Nitrate-N                                                         | 10                                   |
| <sup>226</sup> Ra, Bq/L                                           | 0.19                                 |
| Selenium                                                          | 0.01                                 |
| Silver                                                            | 0.05                                 |
| Toxaphene                                                         | 0.005                                |
| 2,4,5-TP Silvex                                                   | 0.01                                 |
| 2,4-D                                                             | 0.1                                  |
| <u>Parameters establishing groundwater quality</u>                |                                      |
| Chloride                                                          | ND                                   |
| Iron                                                              | ND                                   |
| Manganese                                                         | ND                                   |
| Phenols                                                           | ND                                   |
| Sodium                                                            | ND                                   |
| Sulfate                                                           | ND                                   |
| <u>Parameters used as indicators of groundwater contamination</u> |                                      |
| pH                                                                | ND                                   |
| Specific conductance, $\mu$ S/cm                                  | ND                                   |
| Total organic carbon                                              | ND                                   |
| Total organic halides                                             | ND                                   |

<sup>a</sup>Concentrations are in mg/L unless otherwise stated.

<sup>b</sup>ND = maximum level for that parameter not defined.

### 3.4 METHODS OF CHEMICAL ANALYSIS

The methods used to analyze the groundwater are those described in USEPA methods manuals (USEPA 1982, 1983). For elemental concentrations, it was necessary to use atomic absorption spectroscopy to reach the detection levels required by the NIPDWS. The recommended USEPA methods are 7061, 7081, 7131, 7191, 7421, 7470, 7741, and 7761 for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, respectively. Inductively coupled plasma (ICP) spectroscopy (method 200.7 in USEPA 1983) was also used to determine the concentrations of nonregulatory elements, namely copper, nickel, and zinc. The concentrations of pesticides and herbicides as well as the PCBs in the groundwater were determined by method 8080 (USEPA 1982), except the analyses were by liquid chromatography instead of gas chromatography. Coliform bacteria were determined by method 405.1 (USEPA 1983). Concentrations of fluoride, chloride, nitrate, and sulfate were determined using methods 340.2 and 300.0 (USEPA 1983). Phenol concentrations were measured by method 420.1 (USEPA 1983). Total organic carbon (TOC) and total organic halides (TOX) were determined using methods 9060 and 9020, respectively (USEPA 1982).

The radionuclide concentrations were determined using solid state alpha and beta detectors. Aliquots of groundwater were dried on counting planchets, and the levels of gross alpha and gross beta activity were determined using Tennelec LB5100 Series II equipment. This automated system is programmed to convert raw data to activity units as well as utilizing material weights or volumes to produce activity per unit (weight or volume). Analyses of gamma-emitting radionuclides were conducted using high-resolution germanium detectors. The detectors were shielded from extraneous background and were calibrated for the respective sample geometries, using certified mixtures of gamma-emitting radionuclide standard solutions from the National Bureau Standards (NBS). Calibration procedures and assessment have been described by Larsen and Cutshall (1981). Tritium concentrations were measured using established liquid-scintillation



counting procedures. Strontium-90 was separated from other cations in the groundwater by precipitation as the oxalate salt and then counted on a beta proportional counting system.

### 3.5 STATISTICAL PROCEDURES

Two strategies were used to determine statistical differences in the concentrations of parameters measured in groundwater. In the first procedure, all parameters were statistically analyzed for differences in concentrations between monitoring wells across the four quarters of sample collection. In this case, the statistical variability for each well was determined by differences in the concentration of the parameter determined over four quarters of sampling; i.e., the sample quarter was treated as a statistical replicate. Thus, this method of statistical analysis is confounded with respect to time (over the sampling interval of one year). Statistical differences between mean concentrations in individual monitoring wells were determined by Duncan's multiple-range test, as conducted by the GLM procedure of the SAS Institute Inc. statistical software package (SAS 1985). For observations below the analytical detection level, the analytical detection level was used as an estimate for that concentration, a conservative approach.

The second method of statistical analysis that was used is outlined in Subpart F, (Groundwater Monitoring, of Title 40, CFR). In this procedure, for each of the indicator parameters (pH, specific conductance, total organic carbon, and total organic halides), the arithmetic mean and variance must be calculated, based on at least four replicate measurements on each sample for each well monitored, and compared with its initial background arithmetic mean. The initial background arithmetic means for each of the indicator parameters are determined from the measurements made in the upgradient monitoring wells over four quarters of sampling. The comparison must consider individually each of the wells in the monitoring system and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases (and decreases, in the case of pH) over initial background. This method of statistical analysis was

determined using the T TEST procedure as outlined in SAS (1985). Unequal variances were assumed between the background measurements and those determined from a quarterly sample. Measurements for indicator parameters were all above the analytical detection level.

#### 4. RESULTS AND DISCUSSION

Reported in Table A-1 in the Appendix are the concentrations of groundwater quality parameters observed in each of the monitoring wells for each of the four quarters of sampling at the three waste impoundments. (Negative values in these tables indicate the analytical detection level. Data are also reported to five decimal points, but only two digits should be considered significant.) Mean values over four quarters of sampling for each of the monitoring wells are presented in Table A-2 in the Appendix. Comparisons between parameter concentrations sampled from downgradient and upgradient wells are listed in Table A-3. Discussions pertinent to each of the impoundments follow.

##### 4.1 3513 IMPOUNDMENT

###### 4.1.1 Groundwater Measurements That Exceeded RCRA Limits

The mean concentrations of chromium, lead, gross alpha, gross beta, and mean counts of coliform bacteria in the downgradient wells exceeded the maximum allowable levels established by RCRA. The maximum levels were also exceeded for the mean counts of coliform bacteria and mean concentrations of gross alpha and gross beta in the upgradient wells, indicating possible migration of contaminant from one of the adjacent unlined impoundments (impoundments 3524, 3539, or 3940; see Fig. 1) or leakage from a broken transfer line (Stansfield and Francis 1986a).

The high mean values for chromium in the downgradient wells appear to be due to the high chromium values measured in wells 2 and 4 during the first quarter of sampling (see Table 7 and Tables A-1 and A-2 in the Appendix). The high concentrations of lead in the downgradient wells appears to have been caused by the high values observed in monitoring well 3 during the last three quarters of sampling (see Table A-1). For this well, all three samples were in excess of the RCRA limit (0.05 mg/L).

The groundwater from downgradient wells 2 and 4 contained considerably more gross alpha and gross beta activity than the

Table 7. Mean groundwater concentrations measured in monitoring wells at the 3513 impoundment

| Parameter <sup>a</sup>                                            | Maximum level<br>allowed <sup>a,b</sup> | Measured <sup>a</sup> |              |
|-------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------|
|                                                                   |                                         | Upgradient            | Downgradient |
| <u>National Interim Primary Drinking Water Standards (NIPDWS)</u> |                                         |                       |              |
| Arsenic                                                           | 0.05                                    | <0.0033               | <0.0040      |
| Barium                                                            | 1                                       | <0.24                 | 0.35         |
| Cadmium                                                           | 0.01                                    | <0.0014               | <10.0        |
| Chromium                                                          | 0.05                                    | <0.029                | 0.18         |
| Coliform bacteria, count/100 mL                                   | 1                                       | 1.3                   | 10.0         |
| Endrin                                                            | 0.0002                                  | <0.0002               | <0.0001      |
| Fluoride                                                          | 1.4-2.4                                 | <1.0000               | <1.0000      |
| Gross alpha, Bq/L                                                 | 0.556                                   | 1.9                   | <5.1         |
| Gross beta, Bq/L                                                  | 0.13 <sup>c</sup>                       | 5.4                   | 23           |
| Lead                                                              | 0.05                                    | <0.010                | 0.15         |
| Lindane                                                           | 0.004                                   | <0.0011               | <0.0011      |
| Mercury                                                           | 0.002                                   | 0.0002                | <0.0002      |
| Methoxychlor                                                      | 0.1                                     | <0.0041               | <0.0041      |
| Nitrate-N                                                         | 10                                      | <5.0                  | <3.5         |
| 226Ra, Bq/L                                                       | 0.19                                    | <0.03                 | <0.0609      |
| Selenium                                                          | 0.01                                    | <0.0050               | <0.0050      |
| Silver                                                            | 0.05                                    | <0.03                 | <0.03        |
| Toxaphene                                                         | 0.005                                   | <0.0035               | <0.0035      |
| 2,4,5-TP Silvex                                                   | 0.01                                    | <0.0075               | <0.0079      |
| 2,4-D                                                             | 0.1                                     | <0.0075               | <0.0078      |
| <u>Parameters establishing groundwater quality</u>                |                                         |                       |              |
| Chloride                                                          | ND                                      | 6.4                   | 18           |
| Iron                                                              | ND                                      | 2.7                   | 24           |
| Manganese                                                         | ND                                      | 1.5                   | 3.9          |
| Phenols                                                           | ND                                      | <0.0010               | <0.0002      |
| Sodium                                                            | ND                                      | 23                    | 31           |
| Sulfate                                                           | ND                                      | 80                    | <13          |
| <u>Parameters used as indicators of groundwater contamination</u> |                                         |                       |              |
| pH                                                                | ND                                      | 6.5                   | 6.4          |
| Specific conductance, $\mu$ S/cm                                  | ND                                      | 820                   | 660          |
| Total organic carbon                                              | ND                                      | 4.8                   | 5.9528       |
| Total organic halides                                             | ND                                      | 0.067                 | 0.14         |
| <u>Nonregulated parameters</u>                                    |                                         |                       |              |
| Copper <sup>d</sup>                                               | ND                                      | <0.025                | <0.028       |
| <sup>137</sup> Cs, Bq/L                                           | ND                                      | 1.3                   | 0.39         |
| Dissolved oxygen                                                  | ND                                      | 5.0                   | 4.5          |
| Nickel <sup>d</sup>                                               | ND                                      | 0.06                  | 0.36         |
| Polychlorinated biphenyls (PCBs)                                  | ND                                      | 0.0001                | 0.0001       |
| <sup>90</sup> Sr, Bq/L                                            | 0.13 <sup>c</sup>                       | 2.4                   | 13           |
| Temperature, $^{\circ}$ C                                         | ND                                      | 15                    | 18           |
| Tritium, Bq/L                                                     | 670 <sup>c</sup>                        | 350                   | 4800         |
| Zinc <sup>d</sup>                                                 | ND                                      | <0.061                | 0.15         |

<sup>a</sup>Concentrations are in mg/L unless otherwise stated.

<sup>b</sup>ND = maximum level for that parameter not defined.

<sup>c</sup>Level of activity necessary to give a total body dose of 4 mR/year to a person drinking 2.2 L of water per day for a year.

<sup>d</sup>Hazardous substance guidelines issued by the State of Tennessee (L. W. Gregory, Division of Solid Waste Management, Department of Health and Environment, State of Tennessee, personal communication, 1985).

groundwater from well 3 (the other downgradient well). Well 2 contained especially high concentrations of gross beta activity (mean value >50 Bq/L). One of the gross alpha measurements involved an analytical detection level greater than the RCRA limit (the measurement of the sample taken the first quarter from well 4; see Table 8). However, its inclusion or omission in the data set had little effect on the mean values of gross alpha in the downgradient wells. For example, the mean value for gross alpha in downgradient wells was <4.7 Bq/L when all measurements were used and 4.8 Bq/L when the measurement involving a detection level greater than the RCRA limit was deleted. In either case, both mean values exceeded the RCRA limit.

The mean levels of tritium and <sup>90</sup>Sr in groundwater from the downgradient wells were considerably greater than the level of activity necessary to give a total body dose of 4 mR/year to a person drinking 2.2 L of water per day for a year (see Table 7). However, only one tritium measurement in the upgradient wells (a measurement of 760 Bq/L taken the third quarter from well 1A) exceeded the calculated limit of 670 Bq/L .

Those concentrations measured in groundwater that exceeded the RCRA maximum limits are listed in Table 9. Measurements in which the analytical detection level exceeded the RCRA limit were not included in Table 9 (e.g., those measurements of gross alpha, <sup>226</sup>Ra, and silver listed in Table 8). Excessive levels of chromium were observed in all three downgradient wells the first quarter of sampling, but measurements from the same wells at later sampling dates were below the RCRA limit. The dominant contaminants appear to be radionuclides; i.e., excessive levels of gross alpha and gross beta were observed in groundwater samples taken from all monitoring wells. There appears to be a trend in elevated levels of lead in groundwater sampled from well 3 as compared with the other downgradient wells.

#### 4.1.2 Statistically Significant Differences Between Monitoring Wells

One method of comparing concentrations of the measured parameters between monitoring wells is to make statistical comparisons between the wells over the four quarters of sampling, i.e., to treat the

Table 8. List of samples whose detection levels exceeded Resource Conservation and Recovery Act (RCRA) limits

| Parameter                                         | Unit | RCRA limit | Well no. | Sampling quarter | Detection level |
|---------------------------------------------------|------|------------|----------|------------------|-----------------|
| <u>3513 impoundment</u>                           |      |            |          |                  |                 |
| Gross alpha                                       | Bq/L | 0.55       | 4        | 1                | 3.0             |
| <sup>226</sup> Ra                                 | Bq/L | 0.18       | 4        | 4                | 0.2             |
| Silver                                            | mg/L | 0.05       | 1        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 1        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 4        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 4        | 2                | 0.07            |
| <u>Old Hydrofracture Facility impoundment</u>     |      |            |          |                  |                 |
| Gross alpha                                       | Bq/L | 0.55       | 2        | 2                | 2.0             |
| Gross alpha                                       | Bq/L | 0.55       | 4        | 2                | 3.0             |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 1        | 3                | 0.40            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 2        | 1                | 0.20            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 3        | 1                | 0.20            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 3        | 3                | 0.60            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 3        | 4                | 0.20            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 4        | 1                | 0.20            |
| <sup>226</sup> Ra                                 | Bq/L | 0.19       | 4        | 3                | 0.60            |
| Silver                                            | mg/L | 0.05       | 1        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 1        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 4        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 4        | 2                | 0.07            |
| <u>Homogeneous Reactor Experiment impoundment</u> |      |            |          |                  |                 |
| Chromium                                          | mg/L | 0.05       | 1        | 2                | 0.20            |
| Silver                                            | mg/L | 0.05       | 1        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 1        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 2        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 1                | 0.07            |
| Silver                                            | mg/L | 0.05       | 3        | 2                | 0.07            |
| Silver                                            | mg/L | 0.05       | 4        | 1                | 0.42            |
| Silver                                            | mg/L | 0.05       | 4        | 2                | 0.07            |

Table 9. Measured concentrations in groundwater at 3513 impoundment that were in excess of Resource Conservation and Recovery Act (RCRA) maximum limits for groundwater

| Parameter         | Unit         | RCRA<br>limit | Sampling quarter <sup>a</sup> |      |       |      |
|-------------------|--------------|---------------|-------------------------------|------|-------|------|
|                   |              |               | 1                             | 2    | 3     | 4    |
| Well 1            |              |               |                               |      |       |      |
| Coliform bacteria | count/100 mL | 1             | 8                             | BL   | BL    | BL   |
| Gross alpha       | Bq/L         | 0.55          | 2                             | 1    | 2     | 2    |
| Gross beta        | Bq/L         | 0.13          | 5                             | 2    | 5     | 3    |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 1    | 2     | 2    |
| Well 1A           |              |               |                               |      |       |      |
| Chromium          | mg/L         | 0.05          | 0.14                          | BL   | BL    | BL   |
| Coliform bacteria | count/100 mL | 1             | 2                             | BL   | BL    | BL   |
| Gross alpha       | Bq/L         | 0.55          | 1                             | 1    | 6     | 4    |
| Gross beta        | Bq/L         | 0.13          | 7                             | 5    | 13    | 8    |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 3    | 3     | 3    |
| Tritium           | Bq/L         | 670           | ND                            | BL   | 760   | BL   |
| Well 2            |              |               |                               |      |       |      |
| Chromium          | mg/L         | 0.05          | 1.20                          | BL   | BL    | BL   |
| Gross alpha       | Bq/L         | 0.55          | 4                             | 1    | 18    | 17   |
| Gross beta        | Bq/L         | 0.13          | 54                            | 45   | 65    | 62   |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 26   | 33    | 32   |
| Tritium           | Bq/L         | 670           | ND                            | 3600 | 3500  | 2900 |
| Well 3            |              |               |                               |      |       |      |
| Chromium          | mg/L         | 0.05          | 0.07                          | BL   | BL    | BL   |
| Coliform bacteria | count/100 mL | 1             | 2                             | BL   | 8     | 120  |
| Gross alpha       | Bq/L         | 0.55          | BL                            | BL   | 2     | 2    |
| Gross beta        | Bq/L         | 0.13          | 4                             | 1    | 4     | 2    |
| Lead              | mg/L         | 0.05          | BL                            | 1.4  | 0.06  | 0.08 |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 0.40 | 0.64  | 1.40 |
| Tritium           | Bq/L         | 670           | ND                            | 2300 | 2800  | 2400 |
| Well 4            |              |               |                               |      |       |      |
| Chromium          | mg/L         | 0.05          | 0.69                          | BL   | BL    | BL   |
| Gross alpha       | Bq/L         | 0.55          | BL                            | BL   | 4     | 5    |
| Iron              | Bq/L         | 0.13          | 9                             | 7    | 15    | 19   |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 5    | 7     | 7    |
| Tritium           | Bq/L         | 670           | ND                            | 2200 | 20000 | 3600 |

<sup>a</sup>BL = below RCRA groundwater limit; ND = not determined.

concentrations taken at the four sampling periods as replicates. Treatment in this manner confounds any analysis with respect to time. For example, there is no assurance that an observation at each of the wells is independent of time or that any response to time, if there is one, is the same for each well. Obviously, such treatment is much less dangerous at inactive sites than it is at active sites (those sites that continue to receive wastes). To make simple comparisons between upgradient and downgradient wells at specific points in time, at least three to four upgradient wells are needed for comparison with the same number of downgradient wells. Regardless of the implications, a statistical comparison was made between monitoring wells for each one of the measured parameters, as described in Sect. 3.5, Statistical Procedures. Those parameters that showed significant differences at the 0.05 level are listed in Table 10.

One evidence of groundwater pollution is a significant difference between upgradient and downgradient wells in the concentration of those parameters defined by RCRA for monitoring groundwater characteristics (see the list of those parameters in Table 6). In a statistical sense, taking into consideration those parameters for which an RCRA limit exists (i.e., NIPDWS), only the gross beta measurements in groundwater from wells 2 and 4 were significantly different ( $P < 0.05$ ) from similar measurements in groundwater taken from upgradient wells (combined measurements from wells 1 and 1A over the four quarters of sampling; see Table 10). There were significant statistical differences in mean concentrations of a number of groundwater parameters between monitoring wells. For example, significantly higher concentrations of chloride, iron, tritium, manganese, <sup>90</sup>Sr, TOC, TOX, and zinc were observed in groundwater sampled from one or more of the downgradient wells as compared with the upgradient wells (Table 10). Interestingly, the concentrations of sulfate were significantly lower in downgradient wells than in upgradient wells. The same was true for measurements of specific conductance; i.e., the groundwater from the downgradient wells measured significantly lower in conductivity than that sampled from the upgradient wells. These measurements strongly indicate that the plume



Table 10. Significant differences in water quality parameters between monitoring wells at the 3513 impoundment

| Parameter                        | Concentrations in monitoring wells 1-4 <sup>a,b</sup> |        |        |        |
|----------------------------------|-------------------------------------------------------|--------|--------|--------|
|                                  | 1                                                     | 2      | 3      | 4      |
| Chloride, mg/L                   | 6.4§                                                  | 36*    | 12†    | 6.6§   |
| Dissolved oxygen, mg/L           | 4.6*                                                  | 3.5†   | 4.6*   | 5.4*   |
| Iron, mg/L                       | 2.7†                                                  | 8.8†   | 51*    | 12†    |
| Gross beta, mR/year              | 5.4§                                                  | 54*    | 2.6§   | 11†    |
| Tritium, Bq/L                    | 35†                                                   | 3300*† | 2500*† | 8600*  |
| Manganese, mg/L                  | 1.5†                                                  | 4.8*   | 3.8*   | 3.2*   |
| pH                               | 6.5†                                                  | 6.7*   | 6.3†§  | 6.3§   |
| Sulfate, mg/L                    | 80*                                                   | 20†    | 6†     | 13†    |
| Specific conductance, $\mu$ S/cm | 820*                                                  | 602*†  | 620†   | 730*†  |
| <sup>90</sup> Sr, Bq/L           | 2.3§                                                  | 30*    | 0.8§   | 6.4†   |
| Total organic carbon, mg/L       | 4.8†                                                  | 3.6†   | 7.1†   | 7.2*   |
| Total organic halides, mg/L      | 0.07†                                                 | 0.07†  | 0.17*  | 0.19*  |
| Zinc, mg/L                       | 0.06†                                                 | 0.07*† | 0.29*  | 0.09*† |

<sup>a</sup>Concentrations are statistically different (0.05 level) between wells if they do not have similar superscripts (\*, †, §). The statistical comparisons were determined using the Duncan's multiple-range test of the GLM procedure, as outlined in SAS 1985.

<sup>b</sup>Concentrations found in monitoring well 1A were combined with those in monitoring well 1 for statistical comparison.

from the 3524 impoundment or leaks in underground waste lines seriously impacted the water quality of the upgradient monitoring wells for the 3513 impoundment. A considerably more valid interpretation can be made regarding the effect of the 3524 impoundment when the analyses for the groundwater sampling program around the 3524 impoundment are completed (data covering four quarters of sampling are expected to be available in late summer to early fall of 1986).

#### 4.1.3 Testing for Groundwater Contamination Using Indicator Parameters

Title 40, CFR (Subpart F, Groundwater Protection, para. 265.92) requires that each of the indicator parameters listed in Table 6 for every sample taken from a monitoring well be compared with background levels in the upgradient wells averaged over the first four quarters of groundwater monitoring. The comparison must consider each of the wells in the monitoring system individually, and must use the Student's t-test at the 0.01 level of significance to determine statistically significant increases (and decreases, in the case of pH) over initial background levels. Means and other statistical information pertaining to the concentrations of the indicator parameters measured in the upgradient wells over the first year of data collection are tabulated in Table A-5 of the Appendix.

Comparisons of indicator parameters in each of the upgradient and downgradient wells with background levels over the four quarters sampled at the 3513 monitoring wells are presented in Table 11. Unfortunately, four replicated measurements were not made on all sampling dates. For example, with respect to the measurements for pH and specific conductance, only in the fourth quarter were four replicated measurements made. Measurements of pH in the fourth quarter showed significantly higher values for groundwater taken from well 2 as compared with the control, whereas samples taken from wells 3 and 4 were significantly lower in pH than the control (mean pH of 6.4). Measurements of groundwater pH from the upgradient wells (wells 1A and 1) in the fourth quarter were not significantly different from the background levels determined over the sampling year (Table 11). The measurements taken in the fourth quarter for specific conductance

Table 11. Student's t-test for indicators of groundwater contamination at the 3513 impoundment

| Well                    | Sampling quarter | pH   |                                | Specific conductance ( $\mu\text{S}/\text{cm}$ ) |                                | Total organic carbon (mg/L) |                                | Total organic halides (mg/L) |                                |
|-------------------------|------------------|------|--------------------------------|--------------------------------------------------|--------------------------------|-----------------------------|--------------------------------|------------------------------|--------------------------------|
|                         |                  | Mean | Signifi-<br>cance <sup>a</sup> | Mean                                             | Signifi-<br>cance <sup>a</sup> | Mean                        | Signifi-<br>cance <sup>a</sup> | Mean                         | Signifi-<br>cance <sup>a</sup> |
| Background <sup>b</sup> |                  | 6.5  |                                | 820                                              |                                | 4.8                         |                                | 0.067                        |                                |
| 1A                      | 1                | 6.4  | SV                             | 590                                              | SV                             | 2.3                         | SV                             | 0.072                        | SV                             |
|                         | 2                | 6.6  | SV                             | 810                                              | SV                             | 8.4                         | **                             | 0.022                        | SV                             |
|                         | 2A <sup>c</sup>  | ND   | ND                             | 4.1                                              | NS                             |                             | ND                             |                              |                                |
|                         | 3                | 6.4  | SV                             | 740                                              | SV                             | 3.1                         | **                             | 0.040                        | *                              |
| 1                       | 4                | 6.4  | NS                             | 790                                              | NS                             | 5.0                         | SV                             | 0.17                         | **                             |
|                         | 1                | 6.7  | SV                             | 570                                              | SV                             | 2.7                         | SV                             | 0.062                        | SV                             |
|                         | 2                | 6.5  | SV                             | 940                                              | SV                             | 8.1                         | **                             | 0.004                        | SV                             |
|                         | 2A <sup>c</sup>  |      | ND                             |                                                  | ND                             | 3.6                         | **                             |                              | ND                             |
| 2                       | 3                | 6.4  | SV                             | 310                                              | SV                             | 3.1                         | **                             | 0.039                        | *                              |
|                         | 4                | 6.5  | NS                             | 1100                                             | **                             | 4.0                         | SV                             | 0.048                        | NS                             |
|                         | 1                | 6.2  | SV                             | 440                                              | SV                             | 1.5                         | SV                             | 0.055                        | SV                             |
|                         | 2                | 7.1  | SV                             | 680                                              | SV                             | 5.7                         | *                              | 0.022                        | SV                             |
| 3                       | 2A <sup>c</sup>  |      | ND                             |                                                  | ND                             | 3.0                         | **                             |                              | ND                             |
|                         | 3                | 6.5  | SV                             | 650                                              | SV                             | 1.6                         | **                             | 0.11                         | **                             |
|                         | 4                | 6.8  | **                             | 680                                              | *                              | 8.0                         | SV                             | 0.046                        | NS                             |
|                         | 1                | 6.4  | SV                             | 460                                              | SV                             | 3.7                         | SV                             | 0.060                        | SV                             |
| 4                       | 2                |      | ND                             |                                                  | ND                             | 9.4                         | **                             | 0.032                        | SV                             |
|                         | 2A <sup>c</sup>  |      | ND                             |                                                  | ND                             | 5.1                         | NS                             |                              | ND                             |
|                         | 3                | 6.3  | SV                             | 370                                              | SV                             | 3.8                         | NS                             | 0.28                         | **                             |
|                         | 4                | 6.2  | **                             | 700                                              | NS                             | 22                          | SV                             | 0.18                         | **                             |
| 4                       | 1                | 6.4  | SV                             | 500                                              | SV                             | 2.9                         | SV                             | 0.08                         | SV                             |
|                         | 2                | ND   | ND                             | 9.7                                              | **                             | 0.042                       | SV                             |                              |                                |
|                         | 2A <sup>c</sup>  |      | ND                             | 5.6                                              | NS                             |                             | ND                             |                              |                                |
|                         | 3                | 6.3  | SV                             | 450                                              | SV                             | 6.7                         | **                             | 0.34                         | **                             |
|                         | 4                | 6.2  | **                             | 830                                              | NS                             | 10.                         | SV                             | 0.053                        | NS                             |

<sup>a</sup>SV = single value; ND = not determined; NS = not significant; \* = significant at the 0.05 level; \*\* = significant at the 0.01 level.

<sup>b</sup>Mean background concentrations determined from upgradient monitoring wells over four quarters of sampling (see Table A-5 of the Appendix).

<sup>c</sup>A replicate sampling taken for total organic carbon in June 1985.

showed no significant difference at the 0.01 level; however, a significantly lower specific conductance, at the 0.05 level, was observed in well 2 in the fourth quarter as compared with the background measurement. The general trend was a lower specific conductance in the groundwater downgradient as compared with the upgradient wells.

An additional sample (designated 2A in Table 11) was taken from the monitoring wells in the second quarter (June 6, 1985) for total organic carbon (TOC) analyses. Samples taken at this date were consistently lower in TOC than the samples collected earlier in the quarter (April 15, 1985) but were closer to the TOC values determined in the third quarter. The early second quarter samples from wells 3 and 4 showed significantly higher levels of TOC (at the 0.01 level) than the background samples. These and the sample taken the third quarter from well 4 were the only samples that showed TOC values significantly ( $P < 0.01$ ) higher than the mean background level (4.8 mg/L). Five samples taken from downgradient wells contained concentrations of TOC that were significantly different ( $P < 0.01$ ) from the background level. Three of these samples contained TOC concentrations greater than background values, and two contained lower concentrations. The high value (a single value of 22 mg/L) measured in the fourth quarter in well 3 appears to be an outlier.

Four replicated measurements of total organic halides (TOX) were made in the third and fourth quarters. The third quarter sampling showed significantly elevated levels in all three downgradient wells. Well 3 also showed significantly higher concentrations of TOX in the fourth quarter. These data indicate that the 3513 impoundment is contaminating the downgradient groundwater with organic halides.

## 4.2 OLD HYDROFRACTURE FACILITY IMPOUNDMENT

### 4.2.1 Groundwater Measurements That Exceeded RCRA Limits

Except for the radioactivity (gross alpha and gross beta measurements) and the counts of coliform bacteria, the mean concentrations of NIPDWS contaminants determined in downgradient wells were below RCRA maximum limits (see Table 12). The major contaminants

Table 12. Mean groundwater concentrations measured in monitoring wells at the Old Hydrofracture Facility impoundment

| Parameter <sup>a</sup>                                            | Maximum level<br>allowed <sup>a,b</sup> | Measured <sup>a</sup> |              |
|-------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------|
|                                                                   |                                         | Upgradient            | Downgradient |
| <u>National Interim Primary Drinking Water Standards (NIPDWS)</u> |                                         |                       |              |
| Arsenic                                                           | 0.05                                    | <0.0028               | <0.0033      |
| Barium                                                            | 1                                       | 0.45                  | 0.57         |
| Cadmium                                                           | 0.01                                    | <0.0011               | <0.0020      |
| Chromium                                                          | 0.05                                    | <0.027                | <0.031       |
| Coliform bacteria, count/100 mL                                   | 1                                       | 5.2                   | <6.4         |
| Endrin                                                            | 0.0002                                  | <0.0001               | <0.0002      |
| Fluoride                                                          | 1.4-2.4                                 | <1.0                  | <1.0         |
| Gross alpha, Bq/L                                                 | 0.556                                   | <1.2                  | <58          |
| Gross beta, Bq/L                                                  | 0.13 <sup>c</sup>                       | 4.8                   | 710          |
| Lead                                                              | 0.05                                    | <0.01                 | <0.0420      |
| Lindane                                                           | 0.004                                   | <0.0009               | <0.0011      |
| Mercury                                                           | 0.002                                   | <0.0001               | <0.0047      |
| Methoxychlor                                                      | 0.1                                     | <0.0033               | <0.0041      |
| Nitrate-N                                                         | 10                                      | 2.7                   | <3.8         |
| <sup>226</sup> Ra, Bq/L                                           | 0.19                                    | <0.11                 | <0.19        |
| Selenium                                                          | 0.01                                    | 0.0033                | <0.0037      |
| Silver                                                            | 0.05                                    | <0.042                | <0.036       |
| Toxaphene                                                         | 0.005                                   | <0.0032               | <0.0035      |
| 2,4,5-TP Silvex                                                   | 0.01                                    | <0.0070               | <0.0075      |
| 2,4-D                                                             | 0.1                                     | <0.0070               | <0.0075      |
| <u>Parameters establishing groundwater quality</u>                |                                         |                       |              |
| Chloride                                                          | ND                                      | 12                    | 19           |
| Iron                                                              | ND                                      | 2.7                   | 17           |
| Manganese                                                         | ND                                      | 0.20                  | 2.9          |
| Phenols                                                           | ND                                      | <0.0012               | <0.0012      |
| Sodium                                                            | ND                                      | 13                    | 24           |
| Sulfate                                                           | ND                                      | 20                    | 16           |
| <u>Parameters used as indicators of groundwater contamination</u> |                                         |                       |              |
| pH                                                                | ND                                      | 6.5                   | 6.3          |
| Specific conductance, $\mu$ S/cm                                  | ND                                      | 710                   | 450          |
| Total organic carbon                                              | ND                                      | 4.5                   | 5.7          |
| Total organic halides                                             | ND                                      | 0.11                  | 0.13         |
| <u>Nonregulated parameters</u>                                    |                                         |                       |              |
| Copper <sup>d</sup>                                               | 1                                       | <0.0200               | <0.0261      |
| <sup>137</sup> Cs, Bq/L                                           | ND                                      | 1.2                   | 1.7          |
| Dissolved oxygen                                                  | ND                                      | 6.9                   | 7.4          |
| Nickel <sup>d</sup>                                               | 5                                       | <0.06                 | <0.06        |
| Polychlorinated biphenyls (PCBs)                                  | ND                                      | 0.0001                | 0.0001       |
| <sup>90</sup> Sr, Bq/L                                            | 0.13 <sup>c</sup>                       | 1.9                   | 460          |
| Temperature, °C                                                   | ND                                      | 16                    | 16           |
| Tritium, Bq/L                                                     | 670 <sup>c</sup>                        | 91000                 | 80000        |
| Zinc <sup>d</sup>                                                 | 5                                       | <0.06                 | <0.1476      |

<sup>a</sup>Concentrations are in mg/L unless otherwise stated.<sup>b</sup>ND = maximum level for that parameter not defined.<sup>c</sup>Level of activity necessary to give a total body dose of 4 mR/year to a person drinking 2.2 L of water per day for a year.<sup>d</sup>Hazardous substance guidelines issued by the State of Tennessee (L. W. Gregory, Division of Solid Waste Management, Department of Health and Environment, State of Tennessee, personal communication, 1985).

in downgradient wells appear to be  $^{90}\text{Sr}$  and tritium (mean concentrations of 460 and 80,000 Bq/L, respectively, over four quarters of sampling). The tritium concentrations appear to be derived from a source other than the impoundment, as the mean concentration of tritium in the upgradient wells over the same four quarters of sampling was slightly higher (91,000 Bq/L) than the mean for the downgradient wells. The most likely source of tritium in these groundwater samples is the low-level radiological waste disposed of in the burial ground (SWSA-5) northeast of the OHF. Tritium has been observed in groundwater sampled immediately below this waste burial ground. For example, in 1974 water samples from seeps at the bottom of the hill on the south side of the burial grounds contained  $10^9$  Bq/L of tritium (Duguid 1976).

Other than the radiological measurements and coliform counts, there were instances where the concentrations of barium, chromium, and lead in the downgradient wells exceeded the RCRA maximum limits (see Table 13). The degree to which these concentrations exceeded the limit was generally very small: for example, the concentration of barium was 1.09 mg/L and the limit was 1; the concentration of chromium was 0.08 mg/L (limit, 0.05); and the concentration of lead was 0.09 mg/L (limit, 0.05). Lead concentrations in monitoring well 3 were 0.08, 0.08, and 0.09 mg/L, respectively, in the last three quarters sampled.

#### 4.2.2 Statistically Significant Differences Between Monitoring Wells

Statistical analysis of the water quality parameters, taken as replicate samples across the four sampling quarters, showed some significant differences ( $P < 0.05$ ) between monitoring wells for the parameters analyzed (Table 14). However, none of these contaminants were those designated as primary drinking water contaminants in the NIPDWS (see Table 6). Well 3, across the four sampling quarters, yielded significantly ( $P < 0.05$ ) higher mean concentrations of chloride, iron, manganese, and sodium than the mean concentrations determined for the upgradient well over the same sampling period. On the other hand, well 4 contained significantly higher ( $P < 0.05$ ) mean concentrations of gross beta and  $^{90}\text{Sr}$  than the upgradient well (1) or

Table 13. Measured concentrations in groundwater at the Old Hydrofracture Facility impoundment that were in excess of Resource Conservation and Recovery Act (RCRA) maximum limits for groundwater

| Parameter         | Unit         | RCRA<br>limit | Sampling quarter <sup>a</sup> |         |        |         |
|-------------------|--------------|---------------|-------------------------------|---------|--------|---------|
|                   |              |               | 1                             | 2       | 3      | 4       |
| Well 1            |              |               |                               |         |        |         |
| Coliform bacteria | count/100 mL | 1             | 5                             | 16      | BL     | BL      |
| Gross alpha       | Bq/L         | 0.55          | BL                            | 2       | 1      | 3       |
| Gross beta        | Bq/L         | 0.13          | 4                             | 5       | 7      |         |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 2       | 2      | 2       |
| Tritium           | Bq/L         | 670           | ND                            | 79,000  | 75,000 | 120,000 |
| Well 2            |              |               |                               |         |        |         |
| Coliform bacteria | count/100 mL | 1             | BL                            | 10      | BL     | BL      |
| Gross alpha       | Bq/L         | 0.55          | BL                            | BL      | 1      | 3       |
| Gross beta        | Bq/L         | 0.13          | 2                             | 2       | 3      | 3       |
| Lead              | mg/L         | 0.05          | BL                            | BL      | 0.10   | BL      |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | BL      | 0.41   | BL      |
| Tritium           | Bq/L         | 670           | ND                            | 190,000 | 58,000 | 140,000 |
| Well 3            |              |               |                               |         |        |         |
| Barium            | mg/L         | 1             | BL                            | 1.09    | BL     | BL      |
| Chromium          | mg/L         | 0.05          | BL                            | 0.08    | BL     | BL      |
| Coliform bacteria | count/100 mL | 1             | 48                            | BL      | BL     | BL      |
| Gross alpha       | Bq/L         | 0.55          | 1                             | 1       | 1      | 52      |
| Gross beta        | Bq/L         | 0.13          | 8                             | 380     | 570    | 220     |
| Lead              | mg/L         | 0.05          | BL                            | 0.08    | 0.08   | 0.09    |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 250     | 240    | 120     |
| Tritium           | Bq/L         | 670           | ND                            | 60,000  | 5,000  | 210,000 |
| Well 4            |              |               |                               |         |        |         |
| Coliform bacteria | count/100 mL | 1             | 18                            | BL      | BL     | BL      |
| Gross alpha       | Bq/L         | 0.55          | 11                            | 3       | 1      | 620     |
| Gross beta        | Bq/L         | 0.13          | 600                           | 1,300   | 2,700  | 2,700   |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 420     | 1,400  | 1,700   |
| Tritium           | Bq/L         | 670           | ND                            | 33,000  | 11,000 | 14,000  |

<sup>a</sup>BL = below RCRA groundwater limit; ND = not determined.

Table 14. Significant differences in water quality parameters between monitoring wells at the Old Hydrofracture Facility impoundment

| Parameter                        | Concentrations in monitoring wells 1-4 <sup>a</sup> |      |      |       |
|----------------------------------|-----------------------------------------------------|------|------|-------|
|                                  | 1                                                   | 2    | 3    | 4     |
| Chloride, mg/L                   | 12†                                                 | 18*† | 25*  | 14†   |
| Iron, mg/L                       | 2.7†                                                | 11*† | 37*  | 2.3†  |
| Gross beta, mR/year              | 5†                                                  | 2†   | 300† | 1800* |
| Manganese, mg/L                  | 0.2†                                                | 1.5† | 6.1* | 1.0†  |
| Sodium, mg/L                     | 13†                                                 | 16†  | 39*  | 17†   |
| pH                               | 6.5*                                                | 6.4* | 6.4* | 6.1†  |
| Sulfate, mg/L                    | 20*                                                 | 12†  | 18*  | 18*   |
| Specific conductance, $\mu$ S/cm | 710*                                                | 630* | 440† | 220§  |
| <sup>90</sup> Sr, Bq/L           | 1.9†                                                | 0.3† | 200† | 1200* |

<sup>a</sup>Concentrations are statistically different (0.05 level) between wells if they do not have similar superscripts (\*, †, §). The statistical comparisons were determined using the Duncan's multiple-range test of the GLM procedure, as outlined in SAS 1985.

the other downgradient wells (2 and 3). Well 4 also yielded groundwater whose mean pH was significantly lower than the mean pH of the groundwater taken from the other wells (Table 14). Interestingly, the mean specific conductivity measurements for wells 3 and 4 were significantly lower than those from upgradient wells 1 and 2.

#### 4.2.3 Testing for Groundwater Contamination Using Indicator Parameters

As described in Sect. 4.1.3, for every sample taken from a monitoring well, each of the indicator parameters listed in Table 6 must be compared with background levels averaged from the upgradient wells over the first four quarters of groundwater monitoring. As was



the case for the 3513 data, there were a number of sampling quarters where four replicate measurements were not taken. In cases where only single values were determined (denoted by "SV" in Table 15), statistical analysis could not be performed.

Compared to the background pH (the mean of these pH measurements taken from the upgradient well over the first year), significantly lower ( $P < 0.01$ ) mean pH measurements were observed in well 2 (fourth quarter sampling) and well 4 (second and fourth sample quarters). During the second quarter, the pH measurements in wells 1 and 2 were significantly higher than the background level (Table 15).

As indicated in Sect. 4.2.2, measurements of specific conductance in groundwater taken from wells 3 and 4 were significantly lower than those in groundwater from the upgradient well (see Table 15). For example, measurements taken in the second quarter (243 and 161  $\mu\text{S}/\text{cm}$  for groundwater from wells 3 and 4) were significantly lower ( $P < 0.01$ ) than the background level (709  $\mu\text{S}/\text{cm}$ ). These measurements, like those of tritium concentrations, indicate potential contamination from the low-level radioactive waste burial ground (SWSA-5) upgradient and northeast of the OHF impoundment.

Measurements of total organic carbon (TOC) varied erratically from one sample period to another; for example, in wells 1 and 4 values significantly higher as well as significantly lower than the background levels were observed (Table 15). A similar trend was observed in TOC measurements at the 3513 impoundment, indicating either a sampling and/or an analytical analysis error.

Four samples, from four different monitoring wells, showed significantly higher concentrations of total organic halides than were found in samples taken from the upgradient background monitoring wells (Table 15). All four samples were collected in the third quarter. These high values on this one sampling date (if not a result of either contamination of the samples or a procedural error in their analysis) might indicate general contamination of the groundwater with organic halides.

Table 15. Student's t-test for indicators of groundwater contamination at the Old Hydrofracture Facility impoundment

| Well                    | Quarter | pH   |                                | Specific conductance (μS/cm) |                                | Total organic carbon (mg/L) |                                | Total organic halides (mg/L) |                                |
|-------------------------|---------|------|--------------------------------|------------------------------|--------------------------------|-----------------------------|--------------------------------|------------------------------|--------------------------------|
|                         |         | Mean | Signifi-<br>cance <sup>a</sup> | Mean                         | Signifi-<br>cance <sup>a</sup> | Mean                        | Signifi-<br>cance <sup>a</sup> | Mean                         | Signifi-<br>cance <sup>a</sup> |
| Background <sup>b</sup> |         | 6.4  |                                | 820                          |                                | 4.8                         |                                | 0.067                        |                                |
| 1                       | 1       | 6.2  | SV                             | 820                          | SV                             | 3.4                         | NS                             | 0.020                        | NS                             |
|                         | 2       | 6.8  | **                             | 610                          | NS                             | 7.0                         | **                             | 0.010                        | SV                             |
|                         | 3       | 6.4  | NS                             | 670                          | NS                             | 5.2                         | NS                             | 0.223                        | **                             |
|                         | 4       | 6.4  | *                              | 820                          | *                              | 1.9                         | **                             | 0.073                        | NS                             |
| 2                       | 1       | 6.3  | SV                             | 760                          | SV                             | 6.3                         | SV                             | 0.013                        | SV                             |
|                         | 2       | 6.9  | **                             | 580                          | *                              | 8.3                         | **                             | 0.009                        | SV                             |
|                         | 3       | 6.4  | NS                             | 640                          | NS                             | 3.2                         | *                              | 0.23                         | **                             |
|                         | 4       | 6.1  | **                             | 650                          | NS                             | 3.3                         | NS                             | 0.044                        | *                              |
| 3                       | 1       | 6.5  | SV                             | 710                          | SV                             | 3.2                         | SV                             | 0.033                        | SV                             |
|                         | 2       | 6.5  | NS                             | 240                          | **                             | 7.0                         | **                             | 0.029                        | SV                             |
|                         | 3       | 6.5  | NS                             | 310                          | **                             | 8.9                         | **                             | 0.27                         | **                             |
|                         | 4       | 6.3  | *                              | 680                          | NS                             | 3.9                         | NS                             | 0.061                        | NS                             |
| 4                       | 1       | 6.2  | SV                             | 260                          | SV                             | 2.2                         | SV                             | 0.049                        | SV                             |
|                         | 2       | 6.2  | **                             | 160                          | **                             | 5.7                         | *                              | 0.037                        | SV                             |
|                         | 3       | 5.5  | SV                             | 200                          | SV                             | 9.0                         | **                             | 0.26                         | **                             |
|                         | 4       | 6.1  | **                             | 280                          | **                             | 2.4                         | **                             | 0.069                        | NS                             |

<sup>a</sup>SV = single value; ND = not determined; NS = not significant; \* = significant at the 0.05 level; \*\* = significant at the 0.01 level.

<sup>b</sup>Mean background concentrations determined from upgradient monitoring wells over four quarters of sampling (see Table A-5 in the Appendix).

### 4.3 HOMOGENEOUS REACTOR EXPERIMENT IMPOUNDMENT

#### 4.3.1 Groundwater Measurements That Exceeded RCRA Limits

Mean values for the RCRA groundwater-protection parameters in upgradient and downgradient monitoring wells over the four quarters of sample collection are presented in Table 16. As in the case of the 3513 and OHF impoundments, the major contaminants in groundwater downgradient of the HRE impoundment appear to be alpha and beta radionuclides. Mean counts of coliform bacteria in downgradient as well as in upgradient wells are also in excess of drinking water standards. It is not clear why excessive counts of coliform bacteria are present in upgradient wells. Similar high counts were observed in the 3513 and OHF impoundments (see Tables 7 and 12). Waterfowl, as well as muskrat and woodchucks, are known to inhabit the ponds and adjoining areas and most likely contribute to the bacteria counts in downgradient wells, but their presence should not have a major impact on upgradient wells.

The mean concentration of chromium in the upgradient wells was found to exceed the drinking water standard ( $<0.065$  as compared with the limit of  $0.05$  mg/L); however, this is an artifact resulting from the analytical detection levels being in excess of the drinking water limit. For example, Table 8 shows that the detection limit for the second quarter sample from monitoring well 1 was  $0.2$  mg/L. If this value is deleted from the data set, the mean chromium concentration in the upgradient wells is  $0.0203$  mg/L (see Table A-4 in the Appendix). A similar relationship exists for silver. For example, the mean concentration for silver in the downgradient wells was  $<0.0645$  mg/L if all measured values were used and the analytical detection level was used as an estimate for that value. The analytical detection level for silver for many samples was  $0.07$  mg/L, and in one case the detection level was as high as  $0.42$  (Table 8). When those detection levels in excess of the RCRA drinking water limit are deleted from the data set, the mean value for silver in the downgradient wells over the four quarters of sampling is  $<0.007$  mg/L (see Table A-4 in the Appendix).

Table 16. Mean groundwater concentrations measured in monitoring wells at the Homogeneous Reactor Experiment No. 2 impoundment

| Parameter <sup>a</sup>                                            | Maximum level<br>allowed <sup>a,b</sup> | Measured <sup>a</sup> |              |
|-------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------|
|                                                                   |                                         | Upgradient            | Downgradient |
| <u>National Interim Primary Drinking Water Standards (NIPDWS)</u> |                                         |                       |              |
| Arsenic                                                           | 0.05                                    | <0.0028               | <0.0044      |
| Barium                                                            | 1                                       | <0.30                 | <0.74        |
| Cadmium                                                           | 0.01                                    | <0.0006               | <0.0010      |
| Chromium                                                          | 0.05                                    | <0.065                | <0.031       |
| Coliform bacteria, count/100 mL                                   | 1                                       | 3.0                   | 3.3          |
| Endrin                                                            | 0.0002                                  | <0.0002               | <0.0002      |
| Fluoride                                                          | 1.4-2.4                                 | <1.0                  | <1.0         |
| Gross alpha, Bq/L                                                 | 0.556                                   | 4.0                   | <22          |
| Gross beta, Bq/L                                                  | 0.13 <sup>c</sup>                       | 3.9                   | 380          |
| Lead                                                              | 0.05                                    | <0.022                | <0.020       |
| Lindane                                                           | 0.004                                   | <0.0014               | <0.0014      |
| Mercury                                                           | 0.002                                   | <0.0001               | <0.0001      |
| Methoxychlor                                                      | 0.1                                     | <0.0043               | <2.5         |
| <sup>226</sup> Ra, Bq/L                                           | 0.19                                    | <0.0063               | <0.053       |
| Selenium                                                          | 0.01                                    | <0.0033               | <0.0033      |
| Silver                                                            | 0.05                                    | <0.035                | <0.06        |
| Toxaphene                                                         | 0.005                                   | <0.0035               | <0.0039      |
| 2,4,5-TP Silvex                                                   | 0.01                                    | <0.0075               | <0.0075      |
| 2,4-D                                                             | 0.1                                     | <0.0075               | <0.0075      |
| <u>Parameters establishing groundwater quality</u>                |                                         |                       |              |
| Chloride                                                          | ND                                      | 8.5                   | 5.5          |
| Iron                                                              | ND                                      | 1.9                   | 24           |
| Manganese                                                         | ND                                      | 0.13                  | 4.5          |
| Phenols                                                           | ND                                      | <0.0018               | 0.0012       |
| Sodium                                                            | ND                                      | 6.3                   | 14.          |
| Sulfate                                                           | ND                                      | 46.                   | 44.          |
| <u>Parameters used as indicators of groundwater contamination</u> |                                         |                       |              |
| pH                                                                | ND                                      | 6.8                   | 6.7          |
| Specific conductance, $\mu$ S/cm                                  | ND                                      | 500                   | 590          |
| Total organic carbon                                              | ND                                      | 5.0                   | 3.7          |
| Total organic halides                                             | ND                                      | 0.10                  | 0.06         |
| <u>Nonregulated parameters</u>                                    |                                         |                       |              |
| Copper <sup>d</sup>                                               | 1                                       | <0.02                 | <0.04        |
| <sup>137</sup> Cs, Bq/L                                           | ND                                      | 0.13                  | 0.48         |
| Dissolved oxygen                                                  | ND                                      | 4.2                   | 4.5          |
| Nickel <sup>d</sup>                                               | 5                                       | <0.06                 | <0.11        |
| Polychlorinated biphenyls (PCBs)                                  | ND                                      | 0.0001                | 0.0001       |
| <sup>90</sup> Sr, Bq/L                                            | 0.13 <sup>c</sup>                       | 0.17                  | 130          |
| Temperature, °C                                                   | ND                                      | 18                    | 17           |
| Tritium, Bq/L                                                     | 670 <sup>c</sup>                        | 12                    | 190          |
| Zinc <sup>d</sup>                                                 | 5                                       | <0.02                 | 0.08         |

<sup>a</sup>Concentrations are in mg/L unless otherwise stated.

<sup>b</sup>ND = maximum level for that parameter not defined.

<sup>c</sup>Level of activity necessary to give a total body dose of 4 mR/year to a person drinking 2.2 L of water per day for a year.

<sup>d</sup>Hazardous substance guidelines issued by the State of Tennessee (L. W. Gregory, Division of Solid Waste Management, Department of Health and Environment, State of Tennessee, personal communication, 1985).

Those measurements in groundwater sampled from the HRE monitoring wells that were found to be in excess of the RCRA maximum limits for groundwater are listed in Table 17. As mentioned above, the principal parameters in excess of the limits are radionuclides and counts for coliform bacteria. There were a few instances where concentrations of barium, lead, chromium, and nitrate exceeded the limits; however, those instances were few and the degree of excess was generally quite small.

#### 4.3.2 Statistically Significant Differences Between Monitoring Wells

Comparisons of RCRA groundwater parameters between monitoring wells revealed some significant differences ( $P < 0.05$ ) between wells (Table 18). Well 2 appears to be in the path of  $^{90}\text{Sr}$  leaching from the impoundment (e.g., the mean concentration over the four quarters of sample collection was 370 Bq/L as compared with 28 Bq/L for well 4 and 0.2 for the upgradient well). The mean concentrations of tritium measured in groundwater from wells 2 and 3 were significantly higher ( $P < 0.05$ ) than those measured in wells 1 and 3. The mean tritium concentration measured in groundwater from well 3 (390 Bq/L) was also significantly higher ( $P < 0.05$ ) than that measured from well 2 (170 Bq/L). Well 3 also showed the highest concentration of sodium (Table 18). The mean chloride level measured in groundwater from well 1 (the upgradient well) was significantly higher ( $P < 0.05$ ) than those measured in groundwater from wells 3 or 4, but similar to that measured in well 2 groundwater.

#### 4.3.3 Testing for Groundwater Contamination Using Indicator Parameters

As described in Sect. 4.1.3, for every sample taken from a monitoring well, each of the indicator parameters listed in Table 6 had to be compared with background levels of these parameters in groundwater from the upgradient wells, averaged over the first four quarters of groundwater monitoring. As was the case for the 3513 and OHF groundwater monitoring data, four replicate measurements were not taken in a number of sampling quarters. Where only single values were determined (denoted by "SV" in Table 19), statistical analysis could not be performed.

Four groundwater samples were significantly lower ( $P < 0.05$ ) in pH than the background samples (Table 19). Two of the samples were from

Table 17. Measured concentrations in groundwater at the Homogeneous Reactor Experiment No. 2 impoundment that were in excess of Resource Conservation and Recovery Act (RCRA) maximum limits for groundwater

| Parameter         | Unit         | RCRA<br>limit | Sampling quarter <sup>a</sup> |      |                 |     |
|-------------------|--------------|---------------|-------------------------------|------|-----------------|-----|
|                   |              |               | 1                             | 2    | 3               | 4   |
| Well 1            |              |               |                               |      |                 |     |
| Coliform bacteria | count/100 mL | 1             | 8                             | 4    | BL <sup>a</sup> | BL  |
| Gross alpha       | Bq/L         | 0.55          | 1                             | 1    | BL              | 9   |
| Gross beta        | Bq/L         | 0.13          | 10                            | 4    | 1               | 1   |
| Lead              | mg/L         | 0.05          | 0.07                          | BL   | BL              | BL  |
| Nitrate-N         | mg/L         | 10            | 24                            | BL   | BL              | BL  |
| Well 2            |              |               |                               |      |                 |     |
| Coliform bacteria | count/100 mL | 1             | 30                            | BL   | BL              | 2   |
| Endrin            | mg/L         | 0.0002        | 0.0008                        | BL   | BL              | BL  |
| Gross alpha       | Bq/L         | 0.55          | 6                             | 6    | BL              | 200 |
| Gross beta        | Bq/L         | 0.13          | 720                           | 950  | 810             | 840 |
| <sup>226</sup> Ra | Bq/L         | 0.185         | 0.33                          | BL   | BL              | BL  |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND <sup>b</sup>               | 540  | 140             | 430 |
| Well 3            |              |               |                               |      |                 |     |
| Barium            | mg/L         | 1             | 2                             | BL   | BL              | BL  |
| Coliform bacteria | count/100 mL | 1             | BL                            | 2    | BL              | BL  |
| Gross alpha       | Bq/L         | 0.55          | 1                             | BL   | BL              | 2   |
| Gross beta        | Bq/L         | 0.13          | 24                            | 4    | 2               | 1   |
| Lead              | Bq/L         | 0.05          | 0.09                          | BL   | BL              | BL  |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 1.3  | BL              | BL  |
| Toxaphene         | mg/L         | 0.005         | 0.005                         | BL   | BL              | BL  |
| Well 4            |              |               |                               |      |                 |     |
| Barium            | mg/L         | 1             | 2.7                           | BL   | BL              | BL  |
| Chromium          | mg/L         | 0.05          | BL                            | 0.06 | BL              | BL  |
| Coliform bacteria | count/100 mL | 1             | BL                            | 6    | BL              | BL  |
| Gross alpha       | Bq/L         | 0.55          | 24                            | BL   | BL              | BL  |
| Gross beta        | Bq/L         | 0.13          | 900                           | 210  | 65              | 61  |
| <sup>90</sup> Sr  | Bq/L         | 0.13          | ND                            | 1    | 50              | 32  |

<sup>a</sup>BL = below RCRA groundwater limit; ND = not determined.

Table 18. Significant differences in water quality parameters between monitoring wells at the Homogeneous Reactor Experiment No. 2 impoundment

| Parameter              | Concentrations in monitoring wells 1-4 <sup>a</sup> |       |       |      |
|------------------------|-----------------------------------------------------|-------|-------|------|
|                        | 1                                                   | 2     | 3     | 4    |
| Chloride, mg/L         | 8.5*                                                | 7.2*† | 4.6†  | 4.6† |
| Tritium, Bq/L          | 12§                                                 | 170†  | 390*  | 24§  |
| Sodium, mg/L           | 6.3†                                                | 12†   | 25*   | 5.8† |
| pH                     | 6.8*†                                               | 6.6†  | 6.7*† | 6.9* |
| Sulfate, mg/L          | 46*†                                                | 57*   | 41†   | 35†  |
| <sup>90</sup> Sr, Bq/L | 0.2†                                                | 370*  | 0.5†  | 28†  |
| Temperature, °C        | 18*                                                 | 17*†  | 16†   | 17*† |

<sup>a</sup>Concentrations are statistically different (0.05 level) between wells if they do not have similar superscripts (\*, †, §). The statistical comparisons were determined using the Duncan's multiple-range test of the GLM procedure as outlined in SAS 1985.

well 2 (third and fourth quarters), and the remaining two samples were taken from wells 3 and 4 in the fourth quarter of sampling. There seemed to be considerable variation in specific conductance measurements. For example, significantly smaller as well as significantly larger values were observed in samples from the same well over the four quarters of sample collection. There does not seem to be a pattern with respect to time. For example, well 2 showed lower specific conductance measurements in the fourth quarter relative to those measured during the second and third quarter. Well 3, on the other hand, revealed significantly lower measurements than the background in the second quarter of sampling, and in the third and fourth quarter had measurements that were significantly higher than the background measurements (Table 19).

The total organic carbon (TOC) in downgradient wells appeared to be generally lower than the background measurements. For example, three of the four significant differences observed between the measurements in groundwater downgradient from the impoundment contained lower rather than higher TOC levels. In one instance, in well 3 (where the sample was taken the second quarter) there was an increase in TOC in groundwater downgradient from the impoundment.

Only one groundwater sample showed a total organic halide (TOX) content that was significantly higher ( $P < 0.01$ ) than that measured in the background samples. This sample was taken from well 2 during the first quarter of sampling (Table 19). Samples taken from the same well at later dates showed a mean concentration of TOX less than one-fourth of that measured the first quarter.



Table 19. Student's t-test for indicators of groundwater contamination at the Homogeneous Reactor Experiment No. 2 impoundment

| Well                    | Quarter | pH   |                                | Specific conductance (µS/cm) |                                | Total organic carbon (mg/L) |                                | Total organic halides (mg/L) |                                |
|-------------------------|---------|------|--------------------------------|------------------------------|--------------------------------|-----------------------------|--------------------------------|------------------------------|--------------------------------|
|                         |         | Mean | Signifi-<br>cance <sup>a</sup> | Mean                         | Signifi-<br>cance <sup>a</sup> | Mean                        | Signifi-<br>cance <sup>a</sup> | Mean                         | Signifi-<br>cance <sup>a</sup> |
| Background <sup>b</sup> |         | 6.8  |                                | 500                          |                                | 5.0                         |                                | 0.10                         |                                |
| 1                       | 1       | 6.8  | SV                             | 640                          | SV                             | 2.9                         | SV                             | 0.540                        | SV                             |
|                         | 2       | 6.9  | NS                             | 520                          | NS                             | 6.5                         | NS                             | 0.014                        | SV                             |
|                         | 3       | 6.7  | NS                             | 440                          | NS                             | 8.3                         | **                             | 0.086                        | NS                             |
|                         | 4       | 6.7  | NS                             | 520                          | NS                             | 0.71                        | **                             | 0.023                        | NS                             |
| 2                       | 1       | 6.7  | SV                             | 720                          | SV                             | 2.3                         | SV                             | 0.410                        | **                             |
|                         | 2       | 6.7  | NS                             | 720                          | **                             | 5.9                         | NS                             | 0.015                        | SV                             |
|                         | 3       | 6.5  | **                             | 720                          | **                             | 4.5                         | NS                             | 0.075                        | NS                             |
|                         | 4       | 6.5  | **                             | 240                          | **                             | 0.95                        | **                             | 0.029                        | NS                             |
| 3                       | 1       | 6.9  | SV                             | 730                          | SV                             | 2.1                         | SV                             | 0.36                         | SV                             |
|                         | 2       | 6.6  | NS                             | 290                          | **                             | 8.2                         | **                             | 0.013                        | SV                             |
|                         | 3       | 6.9  | NS                             | 750                          | **                             | 3.4                         | NS                             | 0.029                        | NS                             |
|                         | 4       | 6.5  | **                             | 730                          | **                             | 0.83                        | **                             | 0.024                        | NS                             |
| 4                       | 1       | 6.7  | SV                             | 630                          | SV                             | 0.24                        | SV                             |                              |                                |
|                         | 2       | 6.6  | *                              | 560                          | NS                             | 6.1                         | NS                             | 0.006                        | SV                             |
|                         | 3       | 7.5  | NS                             | 610                          | **                             | 2.7                         | *                              | 0.023                        | NS                             |
|                         | 4       | 6.6  | **                             | 580                          | *                              | 1.0                         | **                             | 0.016                        | NS                             |

<sup>a</sup>SV = single value; ND = not determined; NS = not significant; \* = significant at the 0.05 level; \*\* = significant at the 0.01 level.

<sup>b</sup>Mean background concentrations determined from upgradient monitoring wells over four quarters of sampling, see Table A5 of Appendix A.

## 5. SUMMARY AND CONCLUSIONS

As one would expect, the contaminants that most often were found to impact groundwater quality at all three waste impoundments were radionuclides. The mean concentrations of gross beta activity in the groundwater from downgradient wells exceeded the drinking water limits of 4 mR/year at all three sites. At the 3513 and OHF impoundments, this limit (4 mR/year, assuming a person drinks 2.2 L of water per day for a year) was exceeded by concentrations of either  $^{90}\text{Sr}$  or tritium. At the HRE impoundment, the limit was exceeded only by the level of  $^{90}\text{Sr}$  in the groundwater. The mean concentrations of alpha activity in the downgradient groundwater also exceeded drinking water standards at all three impoundments. The mean counts of coliform bacteria in downgradient and upgradient monitoring wells at all impoundments were in excess of the RCRA drinking water standards. The source of the bacteria in the groundwater has not been identified but is assumed to be the excrement of waterfowl and animals such as woodchuck and muskrat that inhabit the areas.

At the 3513 impoundment, there is substantial evidence that the downgradient groundwater has been contaminated by chromium and lead and possibly by halogenated organic compounds. Groundwater quality upgradient of the 3513 impoundment is believed to be strongly impacted by the leaching of constituents from leaking underground waste lines or the 3524 waste holding basin located ~25 m to the northwest of the 3513 impoundment. The 3524 basin is presently being used to store laboratory wastewater effluent before treatment at the process waste treatment plant. Indications of impact by the 3524 basin are higher measurements of specific conductivity and sulfate in groundwater from upgradient wells than from downgradient wells at 3513.

At the OHF impoundment, lead concentrations of 0.08, 0.08, and 0.09 mg/L were observed in groundwater samples (taken the second, third, and fourth quarter, respectively) from one of the downgradient monitoring wells. These values are slightly in excess of the RCRA limit for groundwater (0.05 mg/L). A lead concentration of 0.10 mg/L was also observed in a groundwater sample taken from one of the other downgradient monitoring wells, indicating possible contamination by lead. The high

mean concentration of tritium measured in the upgradient well (~91,000 as compared with the 80,000 Bq/L in the downgradient wells) indicates that groundwater quality has been affected by radioactive wastes buried in the low-level radioactive waste burial ground (SWSA-5) upgradient of the impoundment. Another indication that this burial site is affecting water quality at the OHF impoundment is the significantly ( $P < 0.01$ ) higher readings for specific conductance in the upgradient well as compared with the downgradient wells.

Two groundwater samples at the HRE site contained levels of herbicides in excess of the RCRA limit. For example, in the first quarter of sample collection, Endrin was measured in groundwater from well 2 at a concentration of 0.0008 mg/L (slightly higher than the 0.0002 mg/L limit). Toxaphene was also found during the first quarter in well 3 to be at the RCRA limit of 0.005 mg/L. This is the first instance of detection of herbicides or pesticides in groundwater at any of the three impoundments in concentrations in excess of the RCRA limits. There is a record of sodium borate being added to kill weeds during backfilling of the HRE impoundment (Stansfield and Francis 1986c), but there is no record of the use of Endrin or Toxaphene. These compounds were not detected in any of the groundwater samples taken at later dates.

There were also instances at all three sites where lead, barium, and chromium were detected at levels in excess of the RCRA maximum limit. However, none of these metals were in excess of the limit more than twice over the four quarters of sampling (4 wells x 4 sample periods), and in no case was an excess observed twice in the same well. Statistical analyses, in which sample quarters were used as replicate analyses, revealed no statistical differences between monitoring wells for the RCRA parameters for which limits have been set (the primary drinking water standards). The exception was gross beta measurements at both the 3513 and OHF impoundments.

Testing for groundwater contamination, using the indicator parameters outlined in Title 40, CFR (Subpart F, Groundwater Protection, para. 265.92), disclosed statistically significant contamination at all three sites. This testing procedure is the one prescribed by USEPA to determine

if there is an indication of groundwater contamination at RCRA-permitted sites. The procedure involves a comparison of pH, specific conductance, total organic carbon, and total organic halides concentrations at each of the wells at a specific sample time with the initial background levels taken from the upgradient well over four quarters of sample collection. The Student's t-test at the 0.01 level of significance is used to determine statistically significant increases (and decreases, in the case of pH) over initial background levels.

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**APPENDIX**  
**CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS**

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=1

|                   |         |         | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-------------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |         |         | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER         | UNITS   | LIMIT   |                                |    |                                |    |                                |    |                                |    |
| ARSENIC           | MG/L    | 10.05   | -0.00200                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00300                       | 1  |
| BARIUM            | MG/L    | 1       | 0.09300                        | 1  | 0.12000                        | 1  | -0.50000                       | 1  | -0.50000                       | 1  |
| CADMIUM           | MG/L    | 10.01   | -0.00100                       | 1  | -0.00100                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| CESIUM-<br>137    | BQ/L    | IND     | 0.26277                        | 1  | 0.00000                        | 1  |                                |    |                                |    |
| CHLORIDE          | MG/L    | IND     | 12.00000                       | 1  | 7.00000                        | 1  | 7.00000                        | 1  | 7.90000                        | 1  |
| CHROMIUM          | MG/L    | 10.05   | -0.05000                       | 1  | -0.20000                       | 1  | 0.00200                        | 1  | 0.00900                        | 1  |
| COLIFORM          | COL/100 | 1       | 8.00000                        | 1  | 4.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER            | MG/L    | 1       | -0.02000                       | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS.<br>OXYGEN   | MG/L    | IND     |                                |    |                                |    | 4.45000                        | 4  | 3.95000                        | 4  |
| ENDRIN            | MG/L    | 10.0002 | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE          | MG/L    | 1.4-2.4 | -1.00100                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA           | BQ/L    | 10.555  | 1.00000                        | 1  | 0.90000                        | 1  | 0.00000                        | 1  | 8.90000                        | 2  |
| G-BETA            | BQ/L    | 10.29   | 10.00000                       | 1  | 3.50000                        | 1  | 0.80000                        | 1  | 1.30000                        | 1  |
| IRON              | MG/L    | IND     | 0.48000                        | 1  | 4.59000                        | 1  |                                |    | 0.68000                        | 1  |
| LEAD              | MG/L    | 10.05   | 0.07000                        | 1  | -0.00100                       | 1  | 0.01000                        | 1  | 0.00500                        | 1  |
| LINDANE           | MG/L    | 10.004  |                                |    | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE         | MG/L    | IND     | 0.15000                        | 1  | 0.19800                        | 1  |                                |    | 0.04800                        | 1  |
| MERCURY           | MG/L    | 10.002  | 0.00005                        | 1  | -0.00005                       | 1  | 0.00020                        | 1  | -0.00010                       | 1  |
| METHOXY-<br>CHLOR | MG/L    | 10.1    | 0.00000                        | 1  | -0.00020                       | 1  | -0.00600                       | 1  | -0.00600                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=MRE WELL NUMBER=1

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | -0.06000                       | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | 24.00000                       | 1  | -1.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00009                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 6.80000                        | 1  | 6.90000                        | 4  | 6.65000                        | 4  | 6.67500                        | 4  |
| PHENOLS         | MG/L     | IND    | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | 0.00400                        | 1  |
| RADIUM-226      | BQ/L     | 10,195 | 0.01000                        | 1  | -0.00200                       | 1  | -0.00300                       | 1  | -0.01000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00200                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00100                       | 1  |
| SODIUM          | MG/L     | IND    | .1                             | .1 | 6.80000                        | 1  | .1                             | .1 | 5.80000                        | 1  |
| SP.COND.        | UMHQS/CM | IND    | 635.00000                      | 1  | 522.25000                      | 4  | 438.75000                      | 4  | 519.00000                      | 4  |
| STRONTIUM-90    | BQ/L     | 10.3   | .1                             | .1 | 0.26000                        | 1  | 0.12000                        | 1  | 0.14000                        | 1  |
| SULFATE         | MG/L     | IND    | 54.00000                       | 1  | 42.00000                       | 1  | 44.00000                       | 1  | 44.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 2.85000                        | 1  | 6.47500                        | 4  | 8.27500                        | 4  | 0.70750                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.54000                        | 1  | 0.01400                        | 1  | 0.08575                        | 4  | 0.02300                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 18.55000                       | 4  | 17.07500                       | 4  |
| TOXAPHENE       | MG/L     | 10,095 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 20.00000                       | 1  | 3.00000                        | 1  | 13.00000                       | 1  |
| ZINC            | MG/L     | 15     | -0.02000                       | 1  | -0.02000                       | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)



TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=1

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 13,4-D    | MG/L  | 10.1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |
| 12,4-5 T  | MG/L  | 10.01 | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=2

|                   |          |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-------------------|----------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |          |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |          |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |          |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER         | UNITS    | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC           | MG/L     | 10.35    | -0.00600                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00300                       | 1  |
| BARIUM            | MG/L     | 11       | 0.95000                        | 1  | 0.16300                        | 1  | -0.50000                       | 1  | -0.50000                       | 1  |
| CADMIUM           | MG/L     | 10.01    | -0.00100                       | 1  | -0.00100                       | 1  | 0.00020                        | 1  | -0.00020                       | 1  |
| CESIUM-<br>137    | BQ/L     | IND      | 2.07994                        | 1  | 0.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| CHLORIDE          | MG/L     | IND      | 13.00000                       | 1  | 5.00000                        | 1  | 6.00000                        | 1  | 4.00000                        | 1  |
| CHROMIUM          | MG/L     | 10.05    | -0.00000                       | 1  | -0.00000                       | 1  | 0.00250                        | 1  | 0.01000                        | 1  |
| COLIFORM          | ICOL/100 | 11       | 30.00000                       | 1  | 0.00000                        | 1  | 0.00000                        | 1  | 2.00000                        | 1  |
| COPPER            | MG/L     | 11       | -0.00000                       | 1  | -0.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| DISS.<br>OXYGEN   | MG/L     | IND      | .1                             | .1 | .1                             | .1 | 3.57500                        | 4  | 3.55000                        | 4  |
| DENDRIN           | MG/L     | 10.0000  | 0.00080                        | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE          | MG/L     | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA           | BQ/L     | 10.555   | 5.00000                        | 1  | 5.60000                        | 1  | -0.10000                       | 1  | 200.00000                      | 1  |
| G-BETA            | BQ/L     | 10.29    | 170.00000                      | 1  | 350.00000                      | 1  | 10.00000                       | 1  | 840.00000                      | 1  |
| IRON              | MG/L     | IND      | 24.00000                       | 1  | 2.83000                        | 1  | .1                             | .1 | 1.50000                        | 1  |
| LEAD              | MG/L     | 10.05    | 0.03000                        | 1  | -0.00100                       | 1  | 0.03000                        | 1  | 0.00800                        | 1  |
| LINDANE           | MG/L     | 10.004   | .1                             | .1 | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| MANGANESE         | MG/L     | IND      | 6.30000                        | 1  | 0.78900                        | 1  | .1                             | .1 | 0.71000                        | 1  |
| MERCURY           | MG/L     | 10.002   | 0.00005                        | 1  | -0.00005                       | 1  | 0.00020                        | 1  | -0.00010                       | 1  |
| METHOXY-<br>CHLOR | MG/L     | 10.1     | 0.00230                        | 1  | -0.00020                       | 1  | -0.00800                       | 1  | -0.00300                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=2

|                 |          |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15    | -0.06000                       | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 10    | 5.00000                        | 1  | -1.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND   | .1                             | .1 | 0.00015                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND   | 6.70000                        | 1  | 6.72500                        | 4  | 6.50000                        | 4  | 6.47500                        | 4  |
| PHENOLS         | MG/L     | IND   | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | 0.00100                        | 1  |
| RADIUM-226      | BQ/L     | 0.185 | 0.33000                        | 1  | -0.02000                       | 1  | -0.03000                       | 1  | -0.01000                       | 1  |
| SELENIUM        | MG/L     | 0.01  | -0.00500                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00200                       | 1  |
| SILVER          | MG/L     | 0.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00100                       | 1  |
| SODIUM          | MG/L     | IND   | .1                             | .1 | 12.70000                       | 1  | .1                             | .1 | 11.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND   | 1721.00000                     | 1  | 1715.50000                     | 4  | 1724.00000                     | 4  | 1741.25000                     | 4  |
| STRONTIUM-90    | BQ/L     | 0.3   | .1                             | .1 | 1540.00000                     | 1  | 140.00000                      | 1  | 430.00000                      | 1  |
| SULFATE         | MG/L     | IND   | 75.00000                       | 1  | 55.00000                       | 1  | 51.00000                       | 1  | 46.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND   | 2.29000                        | 1  | 5.87500                        | 4  | 4.50000                        | 4  | 0.94750                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND   | 0.41000                        | 1  | 0.01500                        | 1  | 0.07475                        | 4  | 0.02925                        | 4  |
| TEMPERATURE     | DEG. C   | IND   | .1                             | .1 | .1                             | .1 | 18.42500                       | 4  | 16.10000                       | 4  |
| TOXAPHENE       | MG/L     | 0.005 | 0.00300                        | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740  | .1                             | .1 | 1230.00000                     | 1  | 96.00000                       | 1  | 190.00000                      | 1  |
| ZINC            | MG/L     | 15    | 0.05200                        | 1  | -0.02000                       | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=2

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=3

|               |         |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05    | 0.01500                        | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00300                       | 1  |
| BARIUM        | MG/L    | 1        | 1.50000                        | 1  | 0.10500                        | 1  | -0.50000                       | 1  | -0.50000                       | 1  |
| CADMIUM       | MG/L    | 10.01    | -0.00100                       | 1  | 0.00350                        | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| CESIUM-137    | BQ/L    | IND      | 0.35899                        | 1  | 0.00000                        | 1  |                                |    |                                |    |
| CHLORIDE      | MG/L    | IND      | 6.00000                        | 1  | 4.00000                        | 1  | 5.00000                        | 1  | 3.40000                        | 1  |
| CHROMIUM      | MG/L    | 10.05    | -0.05000                       | 1  | 0.02120                        | 1  | 0.00400                        | 1  | 0.02700                        | 1  |
| COLIFORM      | COL/100 | 1        | 0.00000                        | 1  | 2.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L    | 1        | -0.02000                       | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN  | MG/L    | IND      |                                |    |                                |    | 6.92500                        | 4  | 4.25000                        | 4  |
| ENDRIN        | MG/L    | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L    | 10.555   | 1.00000                        | 1  | 0.10000                        | 1  | -0.10000                       | 1  | 1.50000                        | 1  |
| G-BETA        | BQ/L    | 10.29    | 24.00000                       | 1  | 3.60000                        | 1  | 1.50000                        | 1  | 0.70000                        | 1  |
| IRON          | MG/L    | IND      | 83.00000                       | 1  | 4.14000                        | 1  |                                |    | 4.90000                        | 1  |
| LEAD          | MG/L    | 10.05    | 0.00000                        | 1  | -0.00100                       | 1  | 0.00500                        | 1  | 0.01200                        | 1  |
| LINDANE       | MG/L    | 10.004   |                                |    | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | IND      | 7.80000                        | 1  | 0.18000                        | 1  |                                |    | 0.24000                        | 1  |
| MERCURY       | MG/L    | 10.002   | -0.00005                       | 1  | -0.00005                       | 1  | 0.00020                        | 1  | -0.00010                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1     | 0.00030                        | 1  | -0.00020                       | 1  | -0.00800                       | 1  | -0.00800                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=3

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | 0.06800                        | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | -5.00000                       | 1  | -1.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCE             | MG/L     | IND    | .1                             | .1 | 0.00011                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 6.90000                        | 1  | 6.60000                        | 4  | 6.87500                        | 4  | 6.47500                        | 4  |
| PHENOLS         | MG/L     | IND    | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | 0.00100                        | 1  |
| RADIUM-226      | BQ/L     | 0.195  | -0.00100                       | 1  | -0.01000                       | 1  | -0.00500                       | 1  | -0.07000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00200                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00100                       | 1  |
| SODIUM          | MG/L     | IND    | .1                             | .1 | 21.70000                       | 1  | .1                             | .1 | 28.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND    | 1725.00000                     | 1  | 1294.75000                     | 4  | 1744.75000                     | 4  | 1725.00000                     | 4  |
| STRONTIUM-90    | BQ/L     | 0.3    | .1                             | .1 | 1.30000                        | 1  | 0.12000                        | 1  | 0.18000                        | 1  |
| SULFATE         | MG/L     | IND    | 39.00000                       | 1  | 43.00000                       | 1  | 42.00000                       | 1  | 42.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 2.08000                        | 1  | 8.22500                        | 4  | 3.42500                        | 4  | 0.82750                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.36000                        | 1  | 0.01300                        | 1  | 0.02875                        | 4  | 0.02425                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 17.02500                       | 4  | 15.00000                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | 0.00520                        | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 370.00000                      | 1  | 430.00000                      | 1  | 360.00000                      | 1  |
| UINC            | MG/L     | 15     | 0.13000                        | 1  | -0.02000                       | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=3

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 12,4-D    | MG/L  | 10.1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |
| 12,4-5 T  | MG/L  | 10.01 | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=4

|                   |         |         | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-------------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |         |         | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER         | UNITS   | LIMIT   |                                |    |                                |    |                                |    |                                |    |
| ARSENIC           | MG/L    | 10.05   | 0.00400                        | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00300                       | 1  |
| BARIUM            | MG/L    | 1       | 2.70000                        | 1  | 0.49400                        | 1  | -0.50000                       | 1  | -0.50000                       | 1  |
| CADMIUM           | MG/L    | 10.01   | -0.00100                       | 1  | 0.00350                        | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| CESIUM-<br>137    | BQ/L    | IND     | 0.30348                        | 1  | 0.15174                        | 1  |                                |    |                                |    |
| CHLORIDE          | MG/L    | IND     | 6.00000                        | 1  | 4.00000                        | 1  | 4.00000                        | 1  | 4.00000                        | 1  |
| CHROMIUM          | MG/L    | 10.05   | -0.05000                       | 1  | 0.05910                        | 1  | 0.02500                        | 1  | 0.03200                        | 1  |
| COLIFORM          | COL/100 | 1       | 0.00000                        | 1  | 6.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER            | MG/L    | 1       | -0.12000                       | 1  | 0.03200                        | 1  |                                |    |                                |    |
| DISS.<br>OXYGEN   | MG/L    | IND     |                                |    |                                |    | 4.22500                        | 4  | 4.20000                        | 4  |
| DENDRIN           | MG/L    | 10.0002 | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE          | MG/L    | 1.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA           | BQ/L    | 10.555  | 24.00000                       | 1  | 0.10000                        | 1  | -0.10000                       | 1  |                                |    |
| G-BETA            | BQ/L    | 10.29   | 1900.00000                     | 1  | 210.00000                      | 1  | 65.00000                       | 1  | 61.00000                       | 1  |
| IRON              | MG/L    | IND     | 51.00000                       | 1  | 29.00000                       | 1  |                                |    | 13.00000                       | 1  |
| LEAD              | MG/L    | 10.05   | 0.03500                        | 1  | -0.00100                       | 1  | 0.02000                        | 1  | 0.01200                        | 1  |
| LINDANE           | MG/L    | 10.004  |                                |    | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE         | MG/L    | IND     | 22.00000                       | 1  | 1.75000                        | 1  |                                |    | 0.78000                        | 1  |
| MERCURY           | MG/L    | 10.002  | -0.00005                       | 1  | -0.00005                       | 1  | -0.00010                       | 1  | -0.00010                       | 1  |
| METHOXY-<br>CHLOR | MG/L    | 10.1    | 0.00320                        | 1  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00800                       | 1  |

(CONTINUED)



TABLE 3-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=4

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | .1                             | .1 | -0.21000                       | 2  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | 2.00000                        | 1  | -1.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 6.70000                        | 1  | 6.62500                        | 4  | 7.47500                        | 4  | 5.55000                        | 4  |
| PHENOLS         | MG/L     | IND    | 0.00200                        | 1  | -0.00100                       | 1  | -0.00100                       | 1  | 0.00200                        | 1  |
| RADIUM-226      | BQ/L     | 10.195 | 0.05000                        | 1  | -0.01000                       | 1  | -0.00600                       | 1  | -0.09000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00200                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.42000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00100                       | 1  |
| SODIUM          | MG/L     | IND    | .1                             | .1 | 5.65000                        | 1  | .1                             | .1 | 6.00000                        | 1  |
| SP. COND.       | UMHDS/CM | IND    | 1632.00000                     | 1  | 562.25000                      | 4  | 1610.25000                     | 4  | 583.50000                      | 4  |
| STRONTIUM       | BQ/L     | 10.3   | .1                             | .1 | 0.58000                        | 1  | 50.00000                       | 1  | 32.00000                       | 1  |
| SULFATE         | MG/L     | IND    | 42.00000                       | 1  | 34.00000                       | 1  | 32.00000                       | 1  | 31.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 5.32000                        | 1  | 6.07500                        | 4  | 2.65000                        | 4  | 1.02250                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.23500                        | 1  | 0.00600                        | 1  | 0.02275                        | 4  | 0.01600                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 18.50000                       | 4  | 15.30000                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 37.00000                       | 1  | 10.00000                       | 1  | 25.00000                       | 1  |
| ZINC            | MG/L     | 15     | 0.14000                        | 1  | 0.06310                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=HRE WELL NUMBER=4

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| B,4-D     | MG/L  | 10.1  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| L,4-5 T   | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=DHF WELL NUMBER=1

|              |         |         | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|--------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|              |         |         | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|              |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|              |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER    | UNITS   | LIMIT   |                                |    |                                |    |                                |    |                                |    |
| ARSENIC      | MG/L    | 10.05   | -0.00150                       | 2  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM       | MG/L    | 1       | 0.25200                        | 2  | 0.25700                        | 1  | -0.50000                       | 1  | -1.00000                       | 1  |
| CADMIUM      | MG/L    | 10.01   | -0.00100                       | 2  | 0.00300                        | 1  | -0.00020                       | 1  | -0.00050                       | 1  |
| CESIUM-137   | BQ/L    | IND     | 1.00000                        | 2  | 1.77000                        | 1  |                                |    |                                |    |
| CHLORIDE     | MG/L    | IND     | 12.00000                       | 2  | 12.00000                       | 1  | 12.00000                       | 1  | 13.00000                       | 1  |
| CHROMIUM     | MG/L    | 10.75   | -0.00000                       | 2  | -0.02000                       | 1  | 0.00700                        | 1  | 0.00600                        | 1  |
| COLIFORM     | COL/100 | 1       | 5.00000                        | 2  | 16.00000                       | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER       | MG/L    | 1       | -0.02000                       | 2  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN | MG/L    | IND     |                                |    |                                |    | 6.17500                        | 4  | 7.57500                        | 4  |
| ENDRIK       | MG/L    | 10.0002 | -0.00010                       | 2  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE     | MG/L    | 1.4-2.4 | -1.00000                       | 2  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA      | BQ/L    | 10.555  | 0.03000                        | 2  | 1.80000                        | 1  | 0.60000                        | 1  | 2.90000                        | 1  |
| G-BETA       | BQ/L    | 10.29   | 3.35000                        | 2  | 4.50000                        | 1  | 6.60000                        | 1  | 5.20000                        | 1  |
| IRON         | MG/L    | IND     | 0.89000                        | 2  | 0.58700                        | 1  |                                |    | 8.60000                        | 1  |
| LEAD         | MG/L    | 10.05   | 0.00050                        | 2  | 0.00000                        | 1  | 0.03000                        | 1  | 0.01300                        | 1  |
| LIADANE      | MG/L    | 10.004  | -0.00010                       | 2  | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE    | MG/L    | IND     | 0.24500                        | 2  | 0.03340                        | 1  |                                |    | 0.27000                        | 1  |
| MERCURY      | MG/L    | 10.002  | -0.00005                       | 2  | -0.00005                       | 1  | -0.00010                       | 1  | -0.00010                       | 1  |
| METHOXY-     | MG/L    | 10.1    |                                |    |                                |    |                                |    |                                |    |
| CHLOR        |         |         | -0.00020                       | 2  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=DHF WELL NUMBER=1

|                 |          |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15    | -0.06000                       | 2  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE         | MG/L     | 10    | 1.00000                        | 2  | 6.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND   | .1                             | .1 | 0.00012                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND   | 6.20000                        | 1  | 6.84000                        | 4  | 6.35000                        | 4  | 6.30000                        | 4  |
| PHENOLS         | MG/L     | IND   | -0.00100                       | 2  | 0.00200                        | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226      | BQ/L     | 0.185 | -0.02500                       | 2  | -0.00500                       | 1  | -0.40000                       | 1  | -0.10000                       | 1  |
| SELENIUM        | MG/L     | 0.01  | -0.00400                       | 2  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 0.05  | -0.07000                       | 2  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00200                       | 1  |
| SODIUM          | MG/L     | IND   | 14.00000                       | 2  | .1                             | .1 | .1                             | .1 | 10.00000                       | 1  |
| SP. COND.       | UMHOS/CM | IND   | 1317.00000                     | 1  | 1639.75000                     | 4  | 1672.75000                     | 4  | 1816.75000                     | 4  |
| STRONTIUM-90    | BQ/L     | 0.3   | .1                             | .1 | 1.80000                        | 1  | 2.20000                        | 1  | 1.90000                        | 1  |
| SULFATE         | MG/L     | IND   | 19.00000                       | 2  | 20.00000                       | 1  | 22.00000                       | 1  | 22.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND   | 3.35000                        | 2  | 6.97500                        | 4  | 5.17500                        | 4  | 1.85000                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND   | 0.02000                        | 2  | 0.01100                        | 1  | 0.22625                        | 4  | 0.07350                        | 4  |
| TEMPERATURE     | DEG. C   | IND   | .1                             | .1 | .1                             | .1 | 17.65000                       | 4  | 14.70000                       | 4  |
| TOXAPHENE       | MG/L     | 0.005 | -0.00200                       | 2  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 740   | .1                             | .1 | 79000                          | 1  | 75000                          | 1  | 120000                         | 1  |
| ZINC            | MG/L     | 15    | 0.08405                        | 2  | -0.02000                       | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=OHF WELL NUMBER=1

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 21 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 21 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=0HF WELL NUMBER=2

| PARAMETER    | UNITS   | LIMIT   | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|--------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|              |         |         | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|              |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|              |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| ARSENIC      | MG/L    | 10.35   | -0.00200                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM       | MG/L    | 11      | 0.42000                        | 1  | 0.25300                        | 1  | -0.50000                       | 1  | -1.00000                       | 1  |
| CADMIUM      | MG/L    | 10.01   | -0.00100                       | 1  | -0.00200                       | 1  | -0.00020                       | 1  | -0.00050                       | 1  |
| CESIUM-137   | BQ/L    | IND     |                                |    | 0.99926                        | 1  |                                |    |                                |    |
| CHLORIDE     | MG/L    | IND     | 19.00000                       | 1  | 20.00000                       | 1  | 17.00000                       | 1  | 19.00000                       | 1  |
| CHROMIUM     | MG/L    | 10.05   | -0.05000                       | 1  | 0.02420                        | 1  | 0.03000                        | 1  | 0.01500                        | 1  |
| COLIFORM     | COL/100 | 11      | 0.00000                        | 1  | 10.00000                       | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER       | MG/L    | 11      | -0.02000                       | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN | MG/L    | IND     |                                |    |                                |    | 9.40000                        | 3  | 5.32500                        | 4  |
| DENDRIN      | MG/L    | 10.0002 | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE     | MG/L    | 1.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA      | BQ/L    | 10.555  | 0.31000                        | 1  | -2.00000                       | 1  | 0.70000                        | 1  | 2.60000                        | 1  |
| G-BETA       | BQ/L    | 10.23   | 2.10000                        | 1  | 1.70000                        | 1  | 2.50000                        | 1  | 3.20000                        | 1  |
| IRON         | MG/L    | IND     | 3.80000                        | 1  | 4.00000                        | 1  |                                |    | 24.00000                       | 1  |
| LEAD         | MG/L    | 10.05   | 0.02000                        | 1  | 0.01500                        | 1  | 0.10000                        | 1  | 0.04200                        | 1  |
| LINDANE      | MG/L    | 10.004  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANAGANESE   | MG/L    | IND     | 1.30000                        | 1  | 0.56300                        | 1  |                                |    | 2.60000                        | 1  |
| MERCURY      | MG/L    | 10.002  | -0.00005                       | 1  | -0.00005                       | 1  | -0.00010                       | 1  | -0.00010                       | 1  |
| METHOXY-     | MG/L    | 10.1    |                                |    |                                |    |                                |    |                                |    |
| CHLOR        |         |         | -0.00020                       | 1  | -0.00020                       | 1  | -0.00800                       | 1  | -0.00800                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=JHF WELL NUMBER=2

| PARAMETER       | UNITS    | LIMIT | SAMPLING QUARTER       |    |                        |    |                        |    |                        |    |
|-----------------|----------|-------|------------------------|----|------------------------|----|------------------------|----|------------------------|----|
|                 |          |       | 1                      |    | 2                      |    | 3                      |    | 4                      |    |
|                 |          |       | MEASURED CONCENTRATION |    | MEASURED CONCENTRATION |    | MEASURED CONCENTRATION |    | MEASURED CONCENTRATION |    |
|                 |          |       | MEAN                   | IN | MEAN                   | IN | MEAN                   | IN | MEAN                   | IN |
| NICKEL          | MG/L     | 15    | -0.06000               | 1  | -0.06000               | 1  | .1                     | .1 | .1                     | .1 |
| NITRATE-N       | MG/L     | 10    | 2.00000                | 1  | 8.00000                | 1  | .1                     | .1 | .1                     | .1 |
| PCB             | MG/L     | IND   | .1                     | .1 | 0.00011                | 1  | .1                     | .1 | .1                     | .1 |
| PH              | PH       | IND   | 5.30000                | 1  | 6.90000                | 4  | 6.37500                | 4  | 6.12500                | 4  |
| PHENOLS         | MG/L     | IND   | -0.00100               | 1  | -0.00100               | 1  | -0.00100               | 1  | 0.00200                | 1  |
| RADIUM-226      | BQ/L     | 0.185 | -0.20000               | 1  | -0.00800               | 1  | -0.10000               | 1  | -0.05000               | 1  |
| SELENIUM        | MG/L     | 0.01  | 0.00500                | 1  | -0.00100               | 1  | -0.00500               | 1  | -0.00500               | 1  |
| SILVER          | MG/L     | 0.05  | -0.07000               | 1  | -0.07000               | 1  | -0.00050               | 1  | -0.00200               | 1  |
| SODIUM          | MG/L     | IND   | 17.00000               | 1  | 13.80000               | 1  | .1                     | .1 | 17.00000               | 1  |
| SP. COND.       | UMHOS/CM | IND   | 1755.00000             | 1  | 576.75000              | 4  | 1644.25000             | 4  | 1648.50000             | 4  |
| STRONTIUM       | BQ/L     | 0.3   | .1                     | .1 | 0.21000                | 1  | 0.41000                | 1  | 0.26000                | 1  |
| SULFATE         | MG/L     | IND   | 13.00000               | 1  | 12.00000               | 1  | 12.00000               | 1  | 12.00000               | 1  |
| T. ORG. CARBON  | MG/L     | IND   | 5.33000                | 1  | 8.25000                | 4  | 3.15000                | 4  | 3.30000                | 4  |
| T. ORG. HALOGEN | MG/L     | IND   | 0.02300                | 1  | 0.00900                | 1  | 0.23050                | 4  | 0.04475                | 4  |
| TEMPERATURE     | DEG. C   | IND   | .1                     | .1 | .1                     | .1 | 17.10000               | 4  | 13.75000               | 4  |
| TOXAPHENE       | MG/L     | 0.005 | -0.00200               | 1  | -0.00200               | 1  | -0.00500               | 1  | -0.00500               | 1  |
| TRITIUM         | BQ/L     | 1740  | .1                     | .1 | 190000                 | 1  | 50000                  | 1  | 140000                 | 1  |
| ZINC            | MG/L     | 15    | 0.21000                | 1  | -0.02000               | 1  | .1                     | .1 | .1                     | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=JHF WELL NUMBER=2

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |



TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=JHF WELL NUMBER=3

|               |          |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|----------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |          |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |          |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |          |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS    | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L     | 10.05    | -0.00200                       | 1  | 0.00200                        | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM        | MG/L     | 1        | 0.39000                        | 1  | 1.09000                        | 1  | -0.50000                       | 1  | -1.00000                       | 1  |
| CADMIUM       | MG/L     | 10.01    | 0.00600                        | 1  | 0.01000                        | 1  | -0.00020                       | 1  | -0.00050                       | 1  |
| CESIUM-137    | BQ/L     | IND      | 0.71793                        | 1  | 0.92524                        | 1  |                                |    |                                |    |
| CHLORIDE      | MG/L     | IND      | 17.00000                       | 1  | 40.00000                       | 1  | 22.00000                       | 1  | 21.00000                       | 1  |
| CHROMIUM      | MG/L     | 10.05    | -0.05000                       | 1  | 0.07970                        | 1  | 0.01200                        | 1  | 0.03300                        | 1  |
| COLIFORM      | ICOL/100 | 1        | 49.00000                       | 1  | -0.10000                       | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L     | 1        | -0.02000                       | 1  | 0.05670                        | 1  |                                |    |                                |    |
| DISS. OXYGEN  | MG/L     | IND      |                                |    |                                |    | 7.15000                        | 4  | 8.35000                        | 4  |
| DENDRIN       | MG/L     | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L     | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L     | 10.555   | 0.06000                        | 1  | 1.20000                        | 1  | 1.10000                        | 1  | 52.00000                       | 1  |
| G-BETA        | BQ/L     | 10.29    | 8.00000                        | 1  | 380.00000                      | 1  | 570.00000                      | 1  | 220.00000                      | 1  |
| IRON          | MG/L     | IND      | 3.20000                        | 1  | 57.90000                       | 1  |                                |    | 50.00000                       | 1  |
| LEAD          | MG/L     | 10.05    | 0.02500                        | 1  | 0.08000                        | 1  | 0.08000                        | 1  | 0.09300                        | 1  |
| LINDANE       | MG/L     | 10.004   | -0.00010                       | 1  | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L     | IND      | 1.50000                        | 1  | 8.85000                        | 1  |                                |    | 8.00000                        | 1  |
| MERCURY       | MG/L     | 10.002   | -0.00006                       | 1  | -0.00005                       | 1  | -0.00010                       | 1  | -0.00010                       | 1  |
| METHOXY-CHLOR | MG/L     | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00600                       | 1  | -0.00800                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=OHF WELL NUMBER=3

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | -0.06000                       | 1  | 0.07350                        | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | 2.00000                        | 1  | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00010                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 5.50000                        | 1  | 5.51250                        | 4  | 6.50000                        | 4  | 6.27500                        | 4  |
| PHENOLS         | MG/L     | IND    | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | 0.00200                        | 1  |
| RADIUM-226      | BQ/L     | 10,185 | -0.20000                       | 1  | -0.00700                       | 1  | -0.60000                       | 1  | -0.20000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00300                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00200                       | 1  |
| SODIUM          | MG/L     | IND    | 37.00000                       | 1  | 37.30000                       | 1  | .1                             | .1 | 44.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND    | 1711.00000                     | 1  | 242.75000                      | 4  | 311.50000                      | 4  | 683.50000                      | 4  |
| STRONTIUM       | BQ/L     | 10.3   | .1                             | .1 | 1250.00000                     | 1  | 240.00000                      | 1  | 120.00000                      | 1  |
| SULFATE         | MG/L     | IND    | 24.00000                       | 1  | 13.00000                       | 1  | 12.00000                       | 1  | 23.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 3.21000                        | 1  | 7.00000                        | 4  | 8.87500                        | 4  | 3.87500                        | 4  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.03300                        | 1  | 0.02900                        | 1  | 0.27275                        | 4  | 0.06075                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 17.60000                       | 4  | 15.65000                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 60000                          | 1  | 5000                           | 1  | 210000                         | 1  |
| ZINC            | MG/L     | 15     | 0.12000                        | 1  | 0.19300                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=DHF WELL NUMBER=3

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=04F WELL NUMBER=4

|               |         |         | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |         | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT   |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05   | -0.00200                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM        | MG/L    | 1       | 0.06500                        | 1  | 0.12500                        | 1  | -0.50000                       | 1  | -1.00000                       | 1  |
| CADMIUM       | MG/L    | 10.01   | -0.00100                       | 1  | -0.00200                       | 1  | -0.00020                       | 1  | -0.00050                       | 1  |
| CESIUM-137    | BQ/L    | ND      | 2.27609                        | 1  | 3.62594                        | 1  |                                |    |                                |    |
| CHLORIDE      | MG/L    | ND      | 8.00000                        | 1  | 17.00000                       | 1  | 15.00000                       | 1  | 15.00000                       | 1  |
| CHROMIUM      | MG/L    | 10.05   | -0.05000                       | 1  | -0.02000                       | 1  | 0.00300                        | 1  | -0.00500                       | 1  |
| COLIFORM      | COL/100 | 1       | 18.00000                       | 1  | -0.10000                       | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L    | 1       | -0.02000                       | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN  | MG/L    | ND      |                                |    |                                |    | 7.30000                        | 1  | 7.35000                        | 4  |
| DENDRIN       | MG/L    | 10.0002 |                                |    | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 1.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L    | 10.555  | 11.00000                       | 1  | -3.00000                       | 1  | 0.60000                        | 1  | 1620.00000                     | 1  |
| G-BETA        | BQ/L    | 10.29   | 1500.00000                     | 1  | 1300                           | 1  | 2700                           | 1  | 2700                           | 1  |
| IRON          | MG/L    | ND      | 0.29000                        | 1  | 3.46000                        | 1  |                                |    | 3.30000                        | 1  |
| LEAD          | MG/L    | 10.05   | 0.00200                        | 1  | 0.01800                        | 1  | 0.02000                        | 1  | 0.00900                        | 1  |
| LINDANE       | MG/L    | 10.004  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | ND      | 1.10000                        | 1  | 0.94000                        | 1  |                                |    | 1.10000                        | 1  |
| MERCURY       | MG/L    | 10.002  | -0.00005                       | 1  | -0.00005                       | 1  | -0.00010                       | 1  | -0.00010                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1    | -0.00020                       | 1  | -0.00020                       | 1  | -0.00800                       | 1  | -0.00800                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=OHF WELL NUMBER=4

|                |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER      | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL         | MG/L     | 15     | -0.06000                       | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N      | MG/L     | 110    | -1.00000                       | 1  | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB            | MG/L     | IND    | .1                             | .1 | 0.00016                        | 1  | .1                             | .1 | .1                             | .1 |
| PH             | PH       | IND    | 6.20000                        | 1  | 6.1875                         | 4  | 5.50000                        | 1  | 6.12500                        | 4  |
| PHENOLS        | MG/L     | IND    | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226     | BQ/L     | 10,135 | -0.20000                       | 1  | 0.01000                        | 1  | -0.60000                       | 1  | -0.07000                       | 1  |
| SELENIUM       | MG/L     | 10.01  | -0.00300                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER         | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.00200                       | 1  |
| SODIUM         | MG/L     | IND    | 17.00000                       | 1  | 15.10000                       | 1  | .1                             | .1 | 19.00000                       | 1  |
| SP.COND.       | UMHDS/CM | IND    | 1259.00000                     | 1  | 161.00000                      | 4  | 201.00000                      | 1  | 275.25000                      | 4  |
| STRONTIUM-90   | BQ/L     | 10.3   | .1                             | .1 | 420.00000                      | 1  | 1400                           | 1  | 1700                           | 1  |
| SULFATE        | MG/L     | IND    | 21.00000                       | 1  | 19.00000                       | 1  | 15.00000                       | 1  | 17.00000                       | 1  |
| T.ORG. CARBON  | MG/L     | IND    | 2.18000                        | 1  | 5.72500                        | 4  | 6.95000                        | 4  | 2.42500                        | 4  |
| T.ORG. HALOGEN | MG/L     | IND    | 0.04900                        | 1  | 0.03700                        | 1  | 0.26050                        | 4  | 0.06925                        | 4  |
| TEMPERATURE    | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 19.40000                       | 1  | 15.37500                       | 4  |
| TOXAPHENE      | MG/L     | 10.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM        | BQ/L     | 1740   | .1                             | .1 | 33000                          | 1  | 11000                          | 1  | 14000                          | 1  |
| ZINC           | MG/L     | 15     | 0.32000                        | 1  | 0.02280                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=DHF WELL NUMBER=4

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.2  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=1

|               |         |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05    | -0.00200                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM        | MG/L    | 11       | -0.08300                       | 1  | 0.11000                        | 1  | -0.50000                       | 1  | 0.21000                        | 1  |
| CADMIUM       | MG/L    | 10.01    | 0.00200                        | 1  | -0.00200                       | 1  | 0.00020                        | 1  | -0.00200                       | 1  |
| CESIUM-137    | BQ/L    | IND      | 4.88527                        | 1  | 0.16505                        | 1  |                                |    |                                |    |
| CHLORIDE      | MG/L    | IND      | 6.00000                        | 1  | 6.30000                        | 1  | 5.00000                        | 1  | 5.80000                        | 1  |
| CHROMIUM      | MG/L    | 10.05    | 0.02100                        | 1  | -0.00800                       | 1  | 0.00200                        | 1  | 0.01000                        | 1  |
| COLIFORM      | COL/100 | 11       | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L    | 11       | 0.03900                        | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN  | MG/L    | IND      |                                |    |                                |    | 4.20000                        | 1  | 4.60000                        | 4  |
| DNDIN         | MG/L    | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L    | 10.555   | 2.20000                        | 1  | 0.79000                        | 1  | 1.60000                        | 1  | 1.60000                        | 1  |
| G-BETA        | BQ/L    | 10.29    | 4.70000                        | 1  | 1.80000                        | 1  | 5.40000                        | 1  | 3.10000                        | 1  |
| IRON          | MG/L    | IND      | 0.42000                        | 1  | 1.40000                        | 1  |                                |    | 1.80000                        | 1  |
| LEAD          | MG/L    | 10.05    | 0.01100                        | 1  | 0.01500                        | 1  | 0.01000                        | 1  | 0.00700                        | 1  |
| LINDANE       | MG/L    | 10.004   |                                |    | -0.00055                       | 2  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | IND      | 1.40000                        | 1  | 2.70000                        | 1  |                                |    | 3.50000                        | 1  |
| MERCURY       | MG/L    | 10.002   | 0.00040                        | 1  | 0.00020                        | 1  | 0.00020                        | 1  | -0.00020                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00800                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=351C WELL NUMBER=1

| PARAMETER       | UNITS    | LIMIT  | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| NICKEL          | MG/L     | 15     | -0.06000                       | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | .1                             | .1 | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 6.70000                        | 1  | 6.50000                        | 1  | 6.40000                        | 1  | 6.45000                        | 4  |
| PHENOLS         | MG/L     | IND    | .1                             | .1 | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226      | BQ/L     | 10,165 | -0.01000                       | 1  | -0.01000                       | 1  | -0.05000                       | 1  | -0.02000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.00000                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |
| SODIUM          | MG/L     | IND    | 15.00000                       | 1  | 25.00000                       | 1  | .1                             | .1 | 56.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND    | 570.00000                      | 1  | 941.00000                      | 1  | 305.00000                      | 1  | 1090.25                        | 4  |
| STRONTIUM-90    | BQ/L     | 10.3   | .1                             | .1 | 1.30000                        | 1  | 2.10000                        | 1  | 1.90000                        | 1  |
| SULFATE         | MG/L     | IND    | 97.00000                       | 1  | 135.00000                      | 1  | 65.00000                       | 1  | 170.00000                      | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 2.70000                        | 1  | 5.86250                        | 8  | 3.12500                        | 4  | 4.00000                        | 1  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.06200                        | 1  | 0.00390                        | 1  | 0.03941                        | 4  | 0.04775                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 21.30000                       | 1  | 15.62500                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | -0.00000                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |
| TRIETHYL LEAD   | BQ/L     | 1740   | .1                             | .1 | 9.00000                        | 1  | 340.00000                      | 1  | 340.00000                      | 1  |
| ZINC            | MG/L     | 15     | 0.11000                        | 1  | -0.02000                       | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)



TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=1

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | ILI   |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | 0.00                           | 11 |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | 0.00                           | 11 |

TABLE 4-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=1A

|               |         |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05    | -0.70200                       | 1  | -0.00100                       | 1  | -0.70500                       | 1  | -0.00500                       | 1  |
| BARIUM        | MG/L    | 1        | 0.06300                        | 1  | 0.14000                        | 1  | -0.50000                       | 1  | 0.30000                        | 1  |
| CADMIUM       | MG/L    | 10.01    | 0.00100                        | 1  | -0.00200                       | 1  | 0.00020                        | 1  | -0.00200                       | 1  |
| CESIUM-137    | BQ/L    | IND      | 7.32563                        | 1  | 0.00000                        | 1  |                                | 1  |                                | 1  |
| CHLORIDE      | MG/L    | IND      | 7.00000                        | 1  | 7.00000                        | 1  | 7.00000                        | 1  | 5.30000                        | 1  |
| CHROMIUM      | MG/L    | 10.05    | 0.14000                        | 1  | 0.02900                        | 1  | 0.00500                        | 1  | 0.02000                        | 1  |
| COLIFORM      | COL/100 | 1        | 2.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L    | 1        | -0.02000                       | 1  | -0.02000                       | 1  |                                | 1  |                                | 1  |
| DISS. OXYGEN  | MG/L    | IND      |                                | 1  |                                | 1  | 5.50000                        | 1  | 5.50000                        | 4  |
| ENDRIN        | MG/L    | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| B-ALPHA       | BQ/L    | 10.555   | 1.00000                        | 1  | 1.10000                        | 1  | 5.70000                        | 1  | 4.00000                        | 1  |
| B-BETA        | BQ/L    | 10.29    | 5.60000                        | 1  | 4.80000                        | 1  | 13.00000                       | 1  | 7.50000                        | 1  |
| IRON          | MG/L    | IND      | 1.20000                        | 1  | 3.50000                        | 1  |                                | 1  | 7.90000                        | 1  |
| LEAD          | MG/L    | 10.05    | -0.00100                       | 1  | 0.00700                        | 1  | 0.02000                        | 1  | 0.01000                        | 1  |
| LINDANE       | MG/L    | 10.004   |                                | 1  | 0.00002                        | 2  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | IND      | 0.25000                        | 1  | 0.54000                        | 1  |                                | 1  | 0.43000                        | 1  |
| MERCURY       | MG/L    | 10.002   | 0.00030                        | 1  | 0.00010                        | 1  | 0.00010                        | 1  | -0.00020                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=1A

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | -0.05000                       | 1  | -0.05000                       | 1  | .1                             | .1 |                                | .1 |
| NITRATE-N       | MG/L     | 10     | -5.00000                       | 1  | -5.00000                       | 1  | .1                             | .1 |                                | .1 |
| PCB             | MG/L     | IND    |                                | .1 | 0.00007                        | 1  | .1                             | .1 |                                | .1 |
| PH              | PH       | IND    | 5.40000                        | 1  | 6.50000                        | 1  | 6.40000                        | 1  | 6.37500                        | 4  |
| PHENOLS         | MG/L     | IND    |                                | .1 | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226      | BQ/L     | 10,135 | -0.00200                       | 1  | -0.10000                       | 1  | -0.03000                       | 1  | -0.02000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.01000                       | 1  |
| SODIUM          | MG/L     | IND    | 13.00000                       | 1  | 13.00000                       | 1  |                                | .1 | 12.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND    | 1590.00000                     | 1  | 1305.00000                     | 1  | 11741.00000                    | 1  | 11786.00000                    | 4  |
| STRONTIUM-90    | BQ/L     | 10.5   |                                | .1 | 2.60000                        | 1  | 2.90000                        | 1  | 3.30000                        | 1  |
| SULFATE         | MG/L     | IND    | 35.00000                       | 1  | 36.00000                       | 1  | 42.00000                       | 1  | 41.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 2.25000                        | 1  | 5.22500                        | 8  | 3.10000                        | 4  | 5.00000                        | 1  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.07200                        | 1  | 0.02200                        | 1  | 0.04019                        | 4  | 0.17000                        | 4  |
| TEMPERATURE     | DEG. C   | IND    |                                | .1 |                                | .1 | 18.40000                       | 1  | 13.05000                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   |                                | .1 | 1200.00000                     | 1  | 1750.00000                     | 1  | 1450.00000                     | 1  |
| ZINC            | MG/L     | 15     | 0.05000                        | 1  | -0.02000                       | 1  |                                | .1 |                                | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=1A

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| 2,4-5     | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=2

|                   |         |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-------------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER         | UNITS   | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC           | MG/L    | 10.05    | -0.00200                       | 1  | -0.00100                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| BARIUM            | MG/L    | 11       | 0.24000                        | 1  | 0.43000                        | 1  | -0.50000                       | 1  | 0.53000                        | 1  |
| CADMIUM           | MG/L    | 10.01    | 0.00200                        | 1  | -0.00200                       | 1  | -0.00020                       | 1  | -0.00200                       | 1  |
| CESIUM-<br>137    | BQ/L    | IND      | 0.25167                        | 1  | 0.00000                        | 1  |                                |    |                                |    |
| CHLORIDE          | MG/L    | IND      | 33.00000                       | 1  | 35.00000                       | 1  | 34.00000                       | 1  | 40.00000                       | 1  |
| CHROMIUM          | MG/L    | 10.05    | 1.20000                        | 1  | 0.01500                        | 1  | 0.00600                        | 1  | 0.02000                        | 1  |
| COLIFORM          | COL/100 | 11       | 1.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER            | MG/L    | 11       | 0.02500                        | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS.<br>OXYGEN   | MG/L    | IND      |                                |    |                                |    | 2.50000                        | 1  | 3.80000                        | 4  |
| ENDRIN            | MG/L    | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE          | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA           | BQ/L    | 10.555   | 3.90000                        | 1  | 1.40000                        | 1  | 18.00000                       | 1  | 17.00000                       | 1  |
| G-BETA            | BQ/L    | 10.29    | 54.00000                       | 1  | 45.00000                       | 1  | 65.00000                       | 1  | 62.00000                       | 1  |
| IRON              | MG/L    | IND      | 7.20000                        | 1  | 9.30000                        | 1  |                                |    | 10.00000                       | 1  |
| LEAD              | MG/L    | 10.05    | 0.00400                        | 1  | 0.02200                        | 1  | 0.05000                        | 1  | 0.02400                        | 1  |
| LINDANE           | MG/L    | 10.004   |                                |    | -0.00055                       | 21 | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE         | MG/L    | IND      | 4.50000                        | 1  | 5.00000                        | 1  |                                |    | 5.00000                        | 1  |
| MERCURY           | MG/L    | 10.002   | 0.00030                        | 1  | -0.00010                       | 1  | 0.00020                        | 1  | 0.00030                        | 1  |
| METHOXY-<br>CHLOR | MG/L    | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=2

|                   |          |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-------------------|----------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |          |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |          |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |          |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER         | UNITS    | LIMIT |                                |    |                                |    |                                |    |                                |    |
| NICKEL            | MG/L     | 15    | 1.00000                        | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N         | MG/L     | 110   | -2.00000                       | 1  | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB               | MG/L     | IND   | .1                             | .1 | 0.00010                        | 1  | .1                             | .1 | .1                             | .1 |
| PH                | PH       | IND   | 6.20000                        | 1  | 7.10000                        | 1  | 6.50000                        | 1  | 6.80000                        | 4  |
| PHEOLS            | MG/L     | IND   | -0.00200                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226        | BQ/L     | 0.185 | -0.02000                       | 1  | -0.07000                       | 1  | -0.01300                       | 1  | -0.05000                       | 1  |
| SELENIUM          | MG/L     | 0.01  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER            | MG/L     | 0.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.01000                       | 1  |
| SODIUM            | MG/L     | IND   | 37.00000                       | 1  | 35.00000                       | 1  | .1                             | .1 | 38.00000                       | 1  |
| SP.COND.          | UMHDS/CM | IND   | 1442.00000                     | 1  | 1678.00000                     | 1  | 1554.00000                     | 1  | 1679.50000                     | 4  |
| STRONTIUM         | BQ/L     | 0.3   | .1                             | .1 | 26.00000                       | 1  | 33.00000                       | 1  | 32.00000                       | 1  |
| SULFATE           | MG/L     | IND   | 21.00000                       | 1  | 22.00000                       | 1  | 18.00000                       | 1  | 20.00000                       | 1  |
| T.ORG.<br>CARBON  | MG/L     | IND   | 1.46000                        | 1  | 4.33750                        | 8  | 1.50000                        | 4  | 8.00000                        | 1  |
| T.ORG.<br>HALOGEN | MG/L     | IND   | 0.05500                        | 1  | 0.02200                        | 1  | 0.10380                        | 4  | 0.04550                        | 4  |
| TEMPERA-<br>TURE  | DEG. C   | IND   | .1                             | .1 | .1                             | .1 | 21.70000                       | 1  | 15.87500                       | 4  |
| TOXAPHEN          | MG/L     | 0.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRIETH            | BQ/L     | 140   | .1                             | .1 | 3600                           | 1  | 3500                           | 1  | 2900                           | 1  |
| UICV              | MG/L     | 15    | 0.11000                        | 1  | 0.03700                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE 4-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=5513 WELL NUMBER=2

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | 1N | MEAN                           | 1N | MEAN                           | 1N | MEAN                           | 1N |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |
| 2,4-5 T   | MG/L  | 10.01 | -0.00500                       | 1  | -0.00500                       | 1  | -0.01000                       | 1  | -0.01000                       | 1  |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=3

| PARAMETER     | UNITS   | LIMIT    | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| ARSENIC       | MG/L    | 10.15    | 0.00400                        | 1  | -0.00100                       | 1  | 0.00500                        | 1  | 0.01100                        | 1  |
| BARIUM        | MG/L    | 11       | 0.14000                        | 1  | 0.52000                        | 1  | -0.50000                       | 1  | 0.35000                        | 1  |
| CADMIUM       | MG/L    | 10.01    | 0.00100                        | 1  | -0.00200                       | 1  | 0.00040                        | 1  | -0.00200                       | 1  |
| CESIUM-137    | BQ/L    | IND      | 0.50988                        | 2  | 0.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| CHLORIDE      | MG/L    | IND      | 10.00000                       | 1  | 13.00000                       | 1  | 13.00000                       | 1  | 13.00000                       | 1  |
| CHROMIUM      | MG/L    | 10.95    | 0.07300                        | 1  | 0.03400                        | 1  | 0.01800                        | 1  | 0.01900                        | 1  |
| COLIFORM      | COL/100 | 11       | 2.00000                        | 1  | 0.00000                        | 1  | 4.00000                        | 2  | 120.00000                      | 1  |
| COPPER        | MG/L    | 11       | 0.02200                        | 1  | 0.05900                        | 1  | .1                             | .1 | .1                             | .1 |
| DISS. OXYGEN  | MG/L    | IND      | .1                             | .1 | .1                             | .1 | 3.80000                        | 1  | 4.82500                        | 4  |
| ENDRIN        | MG/L    | 10.0002  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L    | 10.555   | 0.20000                        | 1  | 0.30000                        | 1  | 1.90000                        | 1  | 1.50000                        | 1  |
| G-BETA        | BQ/L    | 10.29    | 3.60000                        | 1  | 1.40000                        | 1  | 3.70000                        | 1  | 2.10000                        | 1  |
| IRON          | MG/L    | IND      | 15.00000                       | 1  | 72.00000                       | 1  | .1                             | .1 | 65.00000                       | 1  |
| LEAD          | MG/L    | 10.05    | 0.01100                        | 1  | 1.40000                        | 1  | 0.05000                        | 1  | 0.08300                        | 1  |
| LINDANE       | MG/L    | 10.004   | .1                             | .1 | 0.00000                        | 2  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | IND      | 3.10000                        | 1  | 4.10000                        | 1  | .1                             | .1 | 4.10000                        | 1  |
| MERCURY       | MG/L    | 10.002   | 0.00010                        | 1  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00800                       | 1  | -0.00800                       | 1  |

(CONTINUED)



TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=3

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | 0.27000                        | 1  | -0.06000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | -7.00000                       | 1  | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00000                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 5.40000                        | 1  | .1                             | .1 | 6.30000                        | 1  | 6.22500                        | 4  |
| PHENOLS         | MG/L     | IND    | -0.00200                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226      | BQ/L     | 10,195 | -0.00000                       | 1  | 0.14000                        | 1  | -0.00000                       | 1  | -0.10000                       | 1  |
| SELENIUM        | MG/L     | 10.01  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 10.05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.01000                       | 1  |
| SODIUM          | MG/L     | IND    | 25.00000                       | 1  | 27.00000                       | 1  | .1                             | .1 | 29.00000                       | 1  |
| SP. COND.       | UMHDS/CM | IND    | 1460.00000                     | 1  | .1                             | .1 | 365.00000                      | 1  | 1702.75000                     | 4  |
| STRONTIUM       | BQ/L     | 10.3   | .1                             | .1 | 0.40000                        | 1  | 0.64000                        | 1  | 1.40000                        | 1  |
| SULFATE         | MG/L     | IND    | -5.00000                       | 1  | -5.00000                       | 1  | -5.00000                       | 1  | 8.50000                        | 1  |
| T. DSS. CARBON  | MG/L     | IND    | 3.71000                        | 1  | 7.25000                        | 8  | 3.82500                        | 4  | 22.00000                       | 1  |
| T. DSS. HALOGEN | MG/L     | IND    | 0.06000                        | 1  | 0.03200                        | 1  | 0.27925                        | 4  | 0.17750                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 21.10000                       | 1  | 16.92500                       | 4  |
| TOXAPHENE       | MG/L     | 10.005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 2300                           | 1  | 2500                           | 1  | 2400                           | 1  |
| UENIC           | MG/L     | 15     | 0.15000                        | 1  | 0.43000                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=1513 WELL NUMBER=3

|           |       |       | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |
| 2,4-D T   | MG/L  | 10.01 | -0.00500                       | 11 | -0.00500                       | 11 | -0.01000                       | 11 | -0.01000                       | 11 |

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=4

|               |         |          | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|---------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05    | -0.00200                       | 1  | 0.00100                        | 1  | -0.00500                       | 1  | 0.00600                        | 1  |
| BARIUM        | MG/L    | 1        | 0.05900                        | 1  | 0.09400                        | 1  | -0.50000                       | 1  | 0.36000                        | 1  |
| CADMIUM       | MG/L    | 10.01    | 0.00200                        | 1  | -0.00200                       | 1  | 0.00200                        | 1  | -0.00200                       | 1  |
| CESIUM-137    | BQ/L    | IND      | 0.52184                        | 2  | 0.00000                        | 1  | 0.79201                        | 2  |                                |    |
| CHLORIDE      | MG/L    | IND      | 9.00000                        | 1  | 6.00000                        | 1  | 6.00000                        | 1  | 5.00000                        | 1  |
| CHROMIUM      | MG/L    | 10.05    | 0.69000                        | 1  | 0.02000                        | 1  | 0.00700                        | 1  | 0.03000                        | 1  |
| COLIFORM      | COL/100 | 1        | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  | 0.00000                        | 1  |
| COPPER        | MG/L    | 1        | -0.02000                       | 1  | -0.02000                       | 1  |                                |    |                                |    |
| DISS. OXYGEN  | MG/L    | IND      |                                |    |                                |    | 4.70000                        | 1  | 5.55000                        | 4  |
| ENDRIN        | MG/L    | 10.0012  | -0.00010                       | 1  | -0.00010                       | 1  | -0.00020                       | 1  | -0.00020                       | 1  |
| FLUORIDE      | MG/L    | 11.4-2.4 | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  | -1.00000                       | 1  |
| G-ALPHA       | BQ/L    | 10.555   | -3.00000                       | 1  | 0.03000                        | 1  | 4.10000                        | 1  | 4.50000                        | 1  |
| G-BETA        | BQ/L    | 10.29    | 3.50000                        | 1  | 7.00000                        | 1  | 15.00000                       | 1  | 19.00000                       | 1  |
| IRON          | MG/L    | IND      | 5.60000                        | 1  | 9.60000                        | 1  |                                |    | 20.00000                       | 1  |
| LEAD          | MG/L    | 10.05    | 0.00300                        | 1  | 0.02400                        | 1  | 0.04000                        | 1  | 0.02400                        | 1  |
| LINDANE       | MG/L    | 10.004   |                                |    | 0.00000                        | 2  | -0.00200                       | 1  | -0.00200                       | 1  |
| MANGANESE     | MG/L    | IND      | 3.00000                        | 1  | 2.70000                        | 1  |                                |    | 3.80000                        | 1  |
| MERCURY       | MG/L    | 10.002   | 0.00050                        | 1  | -0.00010                       | 1  | 0.00010                        | 1  | -0.00020                       | 1  |
| METHOXY-CHLOR | MG/L    | 10.1     | -0.00020                       | 1  | -0.00020                       | 1  | -0.00000                       | 1  | -0.00000                       | 1  |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=4

|                 |          |        | SAMPLING QUARTER               |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | 0.59000                        | 1  | -0.05000                       | 1  | .1                             | .1 | .1                             | .1 |
| NITRATE-N       | MG/L     | 110    | -2.00000                       | 1  | -5.00000                       | 1  | .1                             | .1 | .1                             | .1 |
| PCB             | MG/L     | IND    | .1                             | .1 | 0.00009                        | 1  | .1                             | .1 | .1                             | .1 |
| PH              | PH       | IND    | 6.40000                        | 1  | .1                             | .1 | 6.30000                        | 1  | 6.20000                        | 4  |
| PHENOLS         | MG/L     | IND    | -0.00200                       | 1  | 0.00700                        | 1  | -0.00100                       | 1  | -0.00100                       | 1  |
| RADIUM-226      | BQ/L     | 10,155 | 0.00300                        | 1  | -0.02000                       | 1  | -0.01000                       | 1  | -0.20000                       | 1  |
| SELENIUM        | MG/L     | 10,01  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| SILVER          | MG/L     | 10,05  | -0.07000                       | 1  | -0.07000                       | 1  | -0.00050                       | 1  | -0.01000                       | 1  |
| SODIUM          | MG/L     | IND    | 31.00000                       | 1  | 26.00000                       | 1  | .1                             | .1 | 30.00000                       | 1  |
| SP. COND.       | UMMOS/CM | IND    | 1500.00000                     | 1  | .1                             | .1 | 1454.00000                     | 1  | 1331.00000                     | 4  |
| STRONTIUM       | BQ/L     | 10,5   | .1                             | .1 | 5.40000                        | 1  | 7.30000                        | 1  | 6.50000                        | 1  |
| SULFATE         | MG/L     | IND    | 11.00000                       | 1  | 13.00000                       | 1  | 13.00000                       | 1  | 14.00000                       | 1  |
| T. ORG. CARBON  | MG/L     | IND    | 2.85000                        | 1  | 7.61250                        | 8  | 6.67500                        | 4  | 10.00000                       | 1  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.09000                        | 1  | 0.04200                        | 1  | 0.33500                        | 4  | 0.05350                        | 4  |
| TEMPERATURE     | DEG. C   | IND    | .1                             | .1 | .1                             | .1 | 20.80000                       | 1  | 16.10000                       | 4  |
| TOXAPHENE       | MG/L     | 10,005 | -0.00200                       | 1  | -0.00200                       | 1  | -0.00500                       | 1  | -0.00500                       | 1  |
| TRITIUM         | BQ/L     | 1740   | .1                             | .1 | 2200                           | 1  | 2000                           | 1  | 3500                           | 1  |
| ZINC            | MG/L     | 15     | 0.15000                        | 1  | 0.03700                        | 1  | .1                             | .1 | .1                             | .1 |

(CONTINUED)

TABLE A-1. CONCENTRATIONS OF GROUNDWATER QUALITY PARAMETERS  
OVER FOUR QUARTERS OF SAMPLING  
SITE=3513 WELL NUMBER=4

|           |       |       | SAMPLING QUARTER |    |            |    |            |    |            |    |
|-----------|-------|-------|------------------|----|------------|----|------------|----|------------|----|
|           |       |       | 1                |    | 2          |    | 3          |    | 4          |    |
|           |       |       | MEASURED         |    | MEASURED   |    | MEASURED   |    | MEASURED   |    |
|           |       |       | CONCENTRA-       |    | CONCENTRA- |    | CONCENTRA- |    | CONCENTRA- |    |
|           |       |       | TION             |    | TION       |    | TION       |    | TION       |    |
|           |       |       | MEAN             | IN | MEAN       | IN | MEAN       | IN | MEAN       | IN |
| PARAMETER | UNITS | LIMIT |                  |    |            |    |            |    |            |    |
| 2,4-D     | MG/L  | 10.1  | -0.00900         | 11 | -0.00500   | 11 | -0.01000   | 11 | -0.01000   | 11 |
| 2,4-5 T   | MG/L  | 10.01 | -0.01000         | 11 | -0.00500   | 11 | -0.01000   | 11 | -0.01000   | 11 |

TABLE 4-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=HRE

| PARAMETER         | UNITS   | LIMIT    | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|-------------------|---------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                   |         |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                   |         |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                   |         |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| ARSENIC           | MG/L    | 10.75    | 0.00275                        | 4  | 0.00375                        | 4  | 0.00525                        | 4  | 0.00325                        | 4  |
| BARIUM            | MG/L    | 1        | 0.30075                        | 4  | 0.52825                        | 4  | 0.55125                        | 4  | 1.04850                        | 4  |
| CADMIUM           | MG/L    | 0.01     | 0.00050                        | 4  | 0.00050                        | 4  | 0.00122                        | 4  | 0.00122                        | 4  |
| CESIUM-<br>137    | BQ/L    | IND      | 0.13138                        | 2  | 1.03997                        | 2  | 0.17950                        | 2  | 0.22761                        | 2  |
| CHLORIDE          | MG/L    | IND      | 5.47500                        | 4  | 7.20000                        | 4  | 4.50000                        | 4  | 4.50000                        | 4  |
| CHROMIUM          | MG/L    | 10.75    | 0.05525                        | 4  | 0.02525                        | 4  | 0.02555                        | 4  | 0.04152                        | 4  |
| COLIFORM          | COL/100 | 11       | 3.00000                        | 4  | 8.00000                        | 4  | 0.50000                        | 4  | 1.50000                        | 4  |
| COPPER            | MG/L    | 1        | 0.02000                        | 2  | 0.02000                        | 2  | 0.02000                        | 2  | 0.07600                        | 2  |
| DISS.<br>OXYGEN   | MG/L    | IND      | 4.20000                        | 8  | 3.56250                        | 8  | 5.58750                        | 8  | 4.21250                        | 8  |
| ENDRIN            | MG/L    | 0.0002   | 0.00015                        | 4  | 0.00032                        | 4  | 0.00015                        | 4  | 0.00015                        | 4  |
| FLUORIDE          | MG/L    | 11.4-2.4 | 1.00025                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  |
| G-ALPHA           | BQ/L    | 10.555   | 3.95200                        | 5  | 52.32500                       | 4  | 0.57500                        | 4  | 8.06667                        | 3  |
| G-BETA            | BQ/L    | 12.29    | 3.90000                        | 4  | 830.00000                      | 4  | 7.45000                        | 4  | 309.00000                      | 4  |
| IRON              | MG/L    | IND      | 1.91657                        | 2  | 2.46000                        | 3  | 30.68000                       | 3  | 31.00000                       | 3  |
| LEAD              | MG/L    | 10.75    | 0.02150                        | 4  | 0.01725                        | 4  | 0.02700                        | 4  | 0.01700                        | 4  |
| LINDANE           | MG/L    | 10.004   | 0.00137                        | 3  | 0.00137                        | 3  | 0.00137                        | 3  | 0.00137                        | 3  |
| MANGANESE         | MG/L    | IND      | 0.13200                        | 3  | 2.50967                        | 3  | 2.74000                        | 3  | 8.17667                        | 3  |
| MERCURY           | MG/L    | 10.002   | 0.00010                        | 4  | 0.00010                        | 4  | 0.00010                        | 4  | 0.00007                        | 4  |
| METHOXY-<br>CHLOR | MG/L    | 10.1     | 0.00425                        | 4  | 0.00475                        | 4  | 0.00412                        | 4  | 0.00485                        | 4  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=HRE

|                 |          |        | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|-----------------|----------|--------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |        | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |        | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |        | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT  |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15     | 0.05000                        | 2  | 0.06000                        | 2  | 0.06400                        | 2  | 0.21000                        | 2  |
| NITRATE-N       | MG/L     | 110    | 12.50000                       | 2  | 3.00000                        | 2  | 3.00000                        | 2  | 1.50000                        | 2  |
| PCB             | MG/L     | IND    | 0.00009                        | 1  | 0.00015                        | 1  | 0.00011                        | 1  | 0.00009                        | 1  |
| PH              | PH       | IND    | 5.74515                        | 13 | 6.57692                        | 13 | 6.56923                        | 13 | 5.86923                        | 13 |
| PHENOLS         | MG/L     | IND    | 0.00175                        | 4  | 0.00100                        | 4  | 0.00100                        | 4  | 0.00150                        | 4  |
| RADIUM-226      | BQ/L     | 10,185 | 0.00625                        | 4  | 0.09750                        | 4  | 0.02150                        | 4  | 0.03900                        | 4  |
| SELENIUM        | MG/L     | 10.01  | 0.00325                        | 4  | 0.00325                        | 4  | 0.00325                        | 4  | 0.00325                        | 4  |
| SILVER          | MG/L     | 10.35  | 0.03537                        | 4  | 0.03537                        | 4  | 0.03537                        | 4  | 0.12297                        | 4  |
| SODIUM          | MG/L     | IND    | 6.30000                        | 2  | 11.85000                       | 2  | 24.85000                       | 2  | 5.82500                        | 2  |
| SP. COND.       | UMHDS/CM | IND    | 1504.30769                     | 13 | 572.61538                      | 13 | 595.92308                      | 13 | 588.92308                      | 13 |
| STRONTIUM-90    | BQ/L     | 10.3   | 0.17333                        | 3  | 170.00000                      | 3  | 0.53333                        | 3  | 27.52667                       | 3  |
| SULFATE         | MG/L     | IND    | 46.00000                       | 4  | 56.75000                       | 4  | 41.50000                       | 4  | 34.75000                       | 4  |
| T. ORG. CARBON  | MG/L     | IND    | 4.07538                        | 13 | 3.66000                        | 13 | 3.99923                        | 13 | 3.40846                        | 13 |
| T. ORG. HALOGEN | MG/L     | IND    | 0.03890                        | 10 | 0.03410                        | 10 | 0.05850                        | 10 | 0.03960                        | 10 |
| TEMPERATURE     | DEG. C   | IND    | 17.31250                       | 8  | 17.26250                       | 8  | 16.01250                       | 8  | 16.90000                       | 8  |
| TOXAPHENE       | MG/L     | 10.005 | 0.00350                        | 4  | 0.00375                        | 4  | 0.00430                        | 4  | 0.00350                        | 4  |
| TRITIUM         | BQ/L     | 1740   | 12.00000                       | 3  | 172.00000                      | 3  | 36.66667                       | 3  | 24.00000                       | 3  |
| ZINC            | MG/L     | 15     | 0.02000                        | 2  | 0.03600                        | 2  | 0.07500                        | 2  | 0.11155                        | 2  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=HRE

|           |       |       | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2.4-D     | MG/L  | 10.1  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  |
| 2.4-D T   | MG/L  | 10.01 | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  |



TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=CHF

|               |          |          | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|---------------|----------|----------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |          |          | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|               |          |          | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |          |          | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS    | LIMIT    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L     | 10.05    | 0.00390                        | 5  | 0.00325                        | 4  | 0.00350                        | 4  | 0.00325                        | 4  |
| BARIUM        | MG/L     | 11       | 0.45220                        | 5  | 0.54325                        | 4  | 0.74500                        | 4  | 0.42275                        | 4  |
| CADMIUM       | MG/L     | 10.01    | 0.00114                        | 5  | 0.00092                        | 4  | 0.00417                        | 4  | 0.00092                        | 4  |
| CESIUM-137    | BQ/L     | IND      | 1,18924                        | 3  | 0.99925                        | 1  | 0.92161                        | 2  | 2.95152                        | 2  |
| CHLORIDE      | MG/L     | IND      | 12,20000                       | 5  | 13,75000                       | 4  | 25,00000                       | 4  | 13,75000                       | 4  |
| CHROMIUM      | MG/L     | 10.05    | 0.02560                        | 5  | 0.02960                        | 4  | 0.04367                        | 4  | 0.01950                        | 4  |
| COLIFORM      | ICOL/100 | 11       | 5,20000                        | 5  | 2,50000                        | 4  | 12,02500                       | 4  | 4,52500                        | 4  |
| COPPER        | MG/L     | 11       | 0.02000                        | 3  | 0.02000                        | 2  | 0.03835                        | 2  | 0.02000                        | 2  |
| DISS. OXYGEN  | MG/L     | IND      | 5.87500                        | 8  | 7.07143                        | 7  | 7.75000                        | 8  | 7.34000                        | 5  |
| DENDRIN       | MG/L     | 10.0032  | 0.00014                        | 5  | 0.00015                        | 4  | 0.00015                        | 4  | 0.00017                        | 3  |
| FLUORIDE      | MG/L     | 11.4-2.4 | 1.00000                        | 5  | 1.00000                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  |
| IG-ALPHA      | BQ/L     | 10.555   | 1,23200                        | 5  | 1,40250                        | 4  | 13,81500                       | 4  | 153,65000                      | 4  |
| IG-BETA       | BQ/L     | 10.29    | 4,82000                        | 5  | 2,37500                        | 4  | 294,50000                      | 4  | 1825                           | 4  |
| IRON          | MG/L     | IND      | 2,74175                        | 4  | 10,60000                       | 3  | 37,03333                       | 3  | 2,35667                        | 3  |
| LEAD          | MG/L     | 10.05    | 0.01080                        | 5  | 0.04425                        | 4  | 0.06950                        | 4  | 0.01225                        | 4  |
| LINDANE       | MG/L     | 10.004   | 0.00086                        | 5  | 0.00105                        | 4  | 0.00105                        | 4  | 0.00105                        | 4  |
| MANGANESE     | MG/L     | IND      | 0.19310                        | 4  | 1.48767                        | 3  | 5.11667                        | 3  | 1.04667                        | 3  |
| MERCURY       | MG/L     | 10.002   | 0.00007                        | 5  | 0.00007                        | 4  | 0.00008                        | 4  | 0.00007                        | 4  |
| METHOXY-CHLOR | MG/L     | 10.1     | 0.00332                        | 5  | 0.00410                        | 4  | 0.00410                        | 4  | 0.00410                        | 4  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=JHF

|                 |          |       | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|-----------------|----------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|                 |          |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|                 |          |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|                 |          |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER       | UNITS    | LIMIT |                                |    |                                |    |                                |    |                                |    |
| NICKEL          | MG/L     | 15    | 0.06000                        | 3  | 0.06000                        | 2  | 0.06675                        | 2  | 0.06000                        | 2  |
| NITRATE-N       | MG/L     | 10    | 2.66667                        | 2  | 5.00000                        | 2  | 3.50000                        | 2  | 3.00000                        | 2  |
| PCB             | MG/L     | IND   | 0.00012                        | 1  | 0.00011                        | 1  | 0.00010                        | 1  | 0.00016                        | 1  |
| PH              | PH       | IND   | 6.47385                        | 13 | 6.45385                        | 13 | 6.43462                        | 13 | 6.09500                        | 10 |
| PHENOLS         | MG/L     | IND   | 0.00120                        | 5  | 0.00125                        | 4  | 0.00125                        | 4  | 0.00100                        | 4  |
| RADIUM-226      | BS/L     | 0.185 | 0.11100                        | 5  | 0.08950                        | 4  | 0.25175                        | 4  | 0.22000                        | 4  |
| SELENIUM        | MG/L     | 0.01  | 0.00380                        | 5  | 0.00400                        | 4  | 0.00350                        | 4  | 0.00350                        | 4  |
| SILVER          | MG/L     | 0.05  | 0.04250                        | 5  | 0.03562                        | 4  | 0.03562                        | 4  | 0.03562                        | 4  |
| SODIUM          | MG/L     | IND   | 12.56667                       | 3  | 15.93333                       | 3  | 39.43333                       | 3  | 17.03333                       | 3  |
| SP. COND.       | UMHDS/CM | IND   | 1708.76923                     | 13 | 633.30769                      | 13 | 435.53846                      | 13 | 220.50000                      | 10 |
| STRONTIUM-90    | BS/L     | 0.3   | 1.93333                        | 3  | 0.29333                        | 3  | 203.33333                      | 3  | 1173.33                        | 3  |
| SULFATE         | MG/L     | IND   | 20.40000                       | 5  | 12.25000                       | 4  | 18.00000                       | 4  | 18.00000                       | 4  |
| T. ORG. CARBON  | MG/L     | IND   | 4.47357                        | 14 | 5.01000                        | 13 | 6.32385                        | 13 | 5.42923                        | 13 |
| T. ORG. HALOGEN | MG/L     | IND   | 0.11364                        | 11 | 0.11380                        | 10 | 0.13960                        | 10 | 0.14050                        | 10 |
| TEMPERATURE     | DEG. C   | IND   | 16.17500                       | 8  | 15.42500                       | 8  | 16.62500                       | 8  | 16.18000                       | 5  |
| TOXAPHENE       | MG/L     | 0.005 | 0.00320                        | 5  | 0.00350                        | 4  | 0.00350                        | 4  | 0.00350                        | 4  |
| TRITIUM         | BS/L     | 740   | 01373.3                        | 3  | 129333                         | 3  | 91565.7                        | 3  | 19333.3                        | 3  |
| ZINC            | MG/L     | 15    | 0.06270                        | 3  | 0.11500                        | 2  | 0.15650                        | 2  | 0.17140                        | 2  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=OHF

|           |       |       | WELL NUMBER                    |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | 0.00700                        | 5  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  |
| 2,4-5 T   | MG/L  | 10.01 | 0.00700                        | 5  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  |

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=3513

|               |         |         | WELL NUMBER                    |    |                                |    |                                |    |                                |    |                                |    |
|---------------|---------|---------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|               |         |         | 1                              |    | 1A                             |    | 2                              |    | 3                              |    | 4                              |    |
|               |         |         | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|               |         |         | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER     | UNITS   | LIMIT   |                                |    |                                |    |                                |    |                                |    |                                |    |
| ARSENIC       | MG/L    | 10.05   | 0.00325                        | 4  | 0.00325                        | 4  | 0.00325                        | 4  | 0.00525                        | 4  | 0.00350                        | 4  |
| BARIUM        | MG/L    | 1       | 0.22700                        | 4  | 0.25575                        | 4  | 0.42500                        | 4  | 0.37750                        | 4  | 0.25325                        | 4  |
| CADMIUM       | MG/L    | 10.01   | 0.00155                        | 4  | 0.00130                        | 4  | 0.00155                        | 4  | 0.00135                        | 4  | 0.00155                        | 4  |
| CESIUM-137    | BQ/L    | IND     | 2.53516                        | 2  | 0.16284                        | 2  | 0.12583                        | 2  | 0.33925                        | 3  | 0.52554                        | 5  |
| CHLORIDE      | MG/L    | IND     | 5.90000                        | 4  | 5.82500                        | 4  | 35.50000                       | 4  | 12.25000                       | 4  | 6.57500                        | 4  |
| CHROMIUM      | MG/L    | 10.05   | 0.01025                        | 4  | 0.04850                        | 4  | 0.31050                        | 4  | 0.03600                        | 4  | 0.18675                        | 4  |
| COLIFORM      | COL/100 | 1       | 2.00000                        | 4  | 0.50000                        | 4  | 0.25000                        | 4  | 26.00000                       | 5  | 0.00000                        | 4  |
| COPPER        | MG/L    | 1       | 0.02950                        | 2  | 0.02000                        | 2  | 0.02250                        | 2  | 0.04950                        | 2  | 0.02000                        | 2  |
| DISS. OXYGEN  | MG/L    | IND     | 4.52000                        | 5  | 5.50000                        | 5  | 3.54000                        | 5  | 4.62000                        | 5  | 5.38000                        | 5  |
| DENDRIN       | MG/L    | 10.0002 | 0.00015                        | 4  | 0.00015                        | 4  | 0.00015                        | 4  | 0.00015                        | 4  | 0.00015                        | 4  |
| FLUORIDE      | MG/L    | 1.4-2.4 | 1.00000                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  | 1.00000                        | 4  |
| G-ALPHA       | BQ/L    | 10.555  | 1.59750                        | 4  | 2.95000                        | 4  | 10.07500                       | 4  | 0.97500                        | 4  | 2.90750                        | 4  |
| G-BETA        | BQ/L    | 10.29   | 3.75000                        | 4  | 7.37500                        | 4  | 55.50000                       | 4  | 2.70000                        | 4  | 12.37500                       | 4  |
| IRON          | MG/L    | IND     | 1.20667                        | 3  | 4.20000                        | 3  | 8.93333                        | 3  | 50.66667                       | 3  | 11.73333                       | 3  |
| LEAD          | MG/L    | 10.05   | 0.01075                        | 4  | 0.00950                        | 4  | 0.02500                        | 4  | 0.38850                        | 4  | 0.02275                        | 4  |
| LINDANE       | MG/L    | 10.004  | 0.00127                        | 4  | 0.00106                        | 4  | 0.00127                        | 4  | 0.00105                        | 4  | 0.00105                        | 4  |
| MANGANESE     | MG/L    | IND     | 2.53333                        | 3  | 0.40667                        | 3  | 4.93333                        | 3  | 3.76667                        | 3  | 3.16667                        | 3  |
| MERCURY       | MG/L    | 10.002  | 0.00025                        | 4  | 0.00017                        | 4  | 0.00022                        | 4  | 0.00012                        | 4  | 0.00022                        | 4  |
| METHOXY-CHLOR | MG/L    | 10.1    | 0.00410                        | 4  | 0.00410                        | 4  | 0.00410                        | 4  | 0.00410                        | 4  | 0.00410                        | 4  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=3513

|                 |          |       | WELL NUMBER                    |    |                                |    |                                |    |                                |    |                                |    |  |  |
|-----------------|----------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|--|--|
|                 |          |       | 1                              |    | 1A                             |    | 2                              |    | 3                              |    | 4                              |    |  |  |
|                 |          |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |  |  |
|                 |          |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |  |  |
| PARAMETER       | UNITS    | LIMIT |                                |    |                                |    |                                |    |                                |    |                                |    |  |  |
| NICKEL          | MG/L     | 15    | 0.06000                        | 2  | 0.06000                        | 2  | 0.53000                        | 2  | 0.16500                        | 2  | 0.37500                        | 2  |  |  |
| NITRATE-N       | MG/L     | 110   | 5.00000                        | 1  | 5.00000                        | 2  | 3.50000                        | 2  | 3.50000                        | 2  | 3.50000                        | 2  |  |  |
| PCB             | MG/L     | IND   | 0.00007                        | 1  | 0.00007                        | 1  | 0.00010                        | 1  | 0.00009                        | 1  | 0.00009                        | 1  |  |  |
| PH              | PH       | IND   | 6.48571                        | 7  | 6.41429                        | 7  | 6.71429                        | 7  | 6.26667                        | 6  | 6.25000                        | 6  |  |  |
| PHENOLS         | MG/L     | IND   | 0.00100                        | 3  | 0.00100                        | 3  | 0.00125                        | 4  | 0.00125                        | 4  | 0.00275                        | 4  |  |  |
| RADIUM-226      | DO/L     | 0.165 | 0.02250                        | 4  | 0.03800                        | 4  | 0.03825                        | 4  | 0.08500                        | 4  | 0.05950                        | 4  |  |  |
| SELENIUM        | MG/L     | 0.01  | 0.00500                        | 4  | 0.00500                        | 4  | 0.00500                        | 4  | 0.00500                        | 4  | 0.00500                        | 4  |  |  |
| SILVER          | MG/L     | 0.05  | 0.03762                        | 4  | 0.03762                        | 4  | 0.03762                        | 4  | 0.03762                        | 4  | 0.03762                        | 4  |  |  |
| SODIUM          | MG/L     | IND   | 33.00000                       | 3  | 12.66667                       | 3  | 35.66667                       | 3  | 26.66667                       | 3  | 29.00000                       | 3  |  |  |
| SP. COND.       | UMHDS/CM | IND   | 1882.42657                     | 7  | 1754.28571                     | 7  | 1641.71429                     | 7  | 1605.00000                     | 6  | 1713.00000                     | 6  |  |  |
| STRONTIUM       | DO/L     | 0.3   | 1.76667                        | 3  | 2.93333                        | 3  | 30.33333                       | 3  | 0.81333                        | 3  | 6.40000                        | 3  |  |  |
| SULFATE         | MG/L     | IND   | 121.75000                      | 4  | 38.50000                       | 4  | 20.25000                       | 4  | 5.37500                        | 4  | 12.75000                       | 4  |  |  |
| T. ORG. CARBON  | MG/L     | IND   | 4.72143                        | 14 | 4.96071                        | 14 | 3.61143                        | 14 | 7.07214                        | 14 | 7.17500                        | 14 |  |  |
| T. ORG. HALOGEN | MG/L     | IND   | 0.04145                        | 10 | 0.09347                        | 10 | 0.06742                        | 10 | 0.19190                        | 10 | 0.16760                        | 10 |  |  |
| TEMPERATURE     | DEG. C   | IND   | 16.76000                       | 5  | 14.12000                       | 5  | 17.04000                       | 5  | 17.75000                       | 5  | 18.64000                       | 5  |  |  |
| TOXAPHENE       | MG/L     | 0.005 | 0.00350                        | 4  | 0.00350                        | 4  | 0.00350                        | 4  | 0.00350                        | 4  | 0.00350                        | 4  |  |  |
| TRITIUM         | DO/L     | 1740  | 229.66667                      | 3  | 173.33333                      | 3  | 3333.33                        | 3  | 2500                           | 3  | 8600                           | 3  |  |  |
| ZINC            | MG/L     | 15    | 0.06500                        | 2  | 0.05900                        | 2  | 0.07350                        | 2  | 0.29500                        | 2  | 0.09350                        | 2  |  |  |

(CONTINUED)

TABLE A-2. COMPARISON BETWEEN MONITORING WELLS  
OF CONCENTRATIONS OF WATER QUALITY PARAMETERS  
SITE=3513

|           |       |       | WELL NUMBER                    |    |                                |    |                                |    |                                |    |                                |    |
|-----------|-------|-------|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|--------------------------------|----|
|           |       |       | 1                              |    | 1A                             |    | 2                              |    | 3                              |    | 4                              |    |
|           |       |       | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    | MEASURED<br>CONCENTRA-<br>TION |    |
|           |       |       | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN | MEAN                           | IN |
| PARAMETER | UNITS | LIMIT |                                |    |                                |    |                                |    |                                |    |                                |    |
| 2,4-D     | MG/L  | 10.1  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00850                        | 4  |
| 2,4-5 T   | MG/L  | 10.0  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00750                        | 4  | 0.00875                        | 4  |

TABLE A-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIDENT AND UPGRAIDENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=HRE

| PARAMETER     | UNITS   | LIMIT   | WELL LOCATION          |         |           |    |                        |         |          |   |
|---------------|---------|---------|------------------------|---------|-----------|----|------------------------|---------|----------|---|
|               |         |         | DOWN-GRADIENT          |         |           |    | UP-GRADIENT            |         |          |   |
|               |         |         | MEASURED CONCENTRATION |         |           |    | MEASURED CONCENTRATION |         |          |   |
|               |         |         | MEAN                   | MIN     | MAX       | N  | MEAN                   | MIN     | MAX      | N |
| ARSENIC       | MG/L    | 10.05   | 0.00442                | 0.00100 | 0.01600   | 12 | 0.00275                | 0.00100 | 0.00500  | 4 |
| BARIUM        | MG/L    | 1       | 0.74267                | 0.10500 | 2.75000   | 12 | 0.30075                | 0.09300 | 0.50000  | 4 |
| CADMIUM       | MG/L    | 10.01   | 0.00102                | 0.00020 | 0.00350   | 12 | 0.00060                | 0.00020 | 0.00100  | 4 |
| CESIUM-137    | BQ/L    | ND      | 0.48235                | 0.00000 | 2.07994   | 6  | 0.13138                | 0.00000 | 0.26277  | 2 |
| CHLORIDE      | MG/L    | ND      | 5.46667                | 3.40000 | 13.00000  | 12 | 8.47500                | 7.00000 | 12.00000 | 4 |
| CHROMIUM      | MG/L    | 10.05   | 0.03111                | 0.00400 | 0.05910   | 12 | 0.06525                | 0.00200 | 0.20000  | 4 |
| COLIFORM      | COL/100 | 1       | 3.33333                | 0.00000 | 30.00000  | 12 | 3.00000                | 0.00000 | 8.00000  | 4 |
| COPPER        | MG/L    | 1       | 0.03867                | 0.02000 | 0.12000   | 6  | 0.02000                | 0.02000 | 0.02000  | 2 |
| DISS. OXYGEN  | MG/L    | ND      | 4.45417                | 2.70000 | 9.40000   | 12 | 4.20000                | 3.50000 | 6.20000  | 8 |
| DENDRIN       | MG/L    | 0.0002  | 0.00021                | 0.00010 | 0.00080   | 12 | 0.00015                | 0.00010 | 0.00020  | 4 |
| FLUORIDE      | MG/L    | 1.4-2.4 | 1.00000                | 1.00000 | 1.00000   | 12 | 1.00025                | 1.00000 | 1.00100  | 4 |
| G-ALPHA       | BQ/L    | 10.555  | 21.69091               | 0.10000 | 200.00000 | 11 | 3.95200                | 0.06000 | 16.00000 | 5 |
| G-BETA        | BQ/L    | 10.25   | 382.15000              | 0.70000 | 150.00000 | 12 | 3.90000                | 0.80000 | 10.00000 | 4 |
| IRON          | MG/L    | ND      | 23.71333               | 1.50000 | 93.00000  | 3  | 1.91667                | 0.48000 | 4.59000  | 3 |
| LEAD          | MG/L    | 10.05   | 0.02042                | 0.00100 | 0.03000   | 12 | 0.02150                | 0.00100 | 0.07000  | 4 |
| LINDANE       | MG/L    | 10.004  | 0.00137                | 0.00010 | 0.00200   | 9  | 0.00137                | 0.00010 | 0.00200  | 3 |
| MANGANESE     | MG/L    | ND      | 4.50544                | 0.10000 | 22.00000  | 3  | 0.13200                | 0.04000 | 0.19800  | 3 |
| MERCURY       | MG/L    | 10.002  | 0.00009                | 0.00005 | 0.00020   | 12 | 0.00010                | 0.00005 | 0.00020  | 4 |
| METHOXY-CHLOR | MG/L    | 10.1    | 0.00457                | 0.00020 | 0.00800   | 12 | 0.00425                | 0.00020 | 0.00800  | 4 |

(CONTINUED)

TABLE A-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRAIDENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=HRE

| PARAMETER       | UNITS    | LIMIT | WELL LOCATION           |           |            |     |                         |           |            |     |
|-----------------|----------|-------|-------------------------|-----------|------------|-----|-------------------------|-----------|------------|-----|
|                 |          |       | DOWN-GRADIENT           |           |            |     | UP-GRADIENT             |           |            |     |
|                 |          |       | MEASURED CONCENTRA-TION |           |            |     | MEASURED CONCENTRA-TION |           |            |     |
|                 |          |       | MEAN                    | MIN       | MAX        | IN  | MEAN                    | MIN       | MAX        | IN  |
| NICKEL          | MG/L     | 15    | 0.11133                 | 0.06000   | 0.36000    | 6   | 0.05000                 | 0.05000   | 0.06000    | 2   |
| NITRATE-N       | MG/L     | 10    | 2.50000                 | 1.00000   | 5.00000    | 6   | 12.50000                | 1.00000   | 24.00000   | 2   |
| PCB             | MG/L     | ND    | 0.00012                 | 0.00009   | 0.00015    | 3   | 0.00009                 | 0.00009   | 0.00009    | 1   |
| PH              | PH       | ND    | 6.70513                 | 6.40000   | 8.10000    | 139 | 6.74615                 | 6.50000   | 7.00000    | 113 |
| PHENOLS         | MG/L     | ND    | 0.00117                 | 0.00100   | 0.00200    | 12  | 0.00175                 | 0.00100   | 0.00400    | 4   |
| RADIUM-226      | BQ/L     | 0.135 | 0.05267                 | 0.00100   | 0.33000    | 12  | 0.00625                 | 0.00200   | 0.01000    | 4   |
| SELENIUM        | MG/L     | 0.01  | 0.00325                 | 0.00100   | 0.00500    | 12  | 0.00325                 | 0.00100   | 0.00500    | 4   |
| SILVER          | MG/L     | 10.05 | 0.06454                 | 0.00050   | 0.42000    | 12  | 0.03537                 | 0.00050   | 0.07000    | 4   |
| SODIUM          | MG/L     | ND    | 14.17500                | 5.65000   | 28.00000   | 6   | 6.30000                 | 5.80000   | 6.80000    | 2   |
| SP. COND.       | UMHDS/CM | ND    | 1585.82051              | 241.00000 | 1747.00000 | 139 | 1504.30769              | 185.00000 | 1636.00000 | 113 |
| STRONTIUM-90    | BQ/L     | 0.3   | 132.68667               | 0.12000   | 540.00000  | 9   | 0.17333                 | 0.12000   | 0.26000    | 3   |
| SULFATE         | MG/L     | ND    | 44.33333                | 31.00000  | 75.00000   | 12  | 46.00000                | 42.00000  | 54.00000   | 4   |
| T. ORG. CARBON  | MG/L     | ND    | 3.68923                 | 0.76000   | 8.40000    | 139 | 4.97538                 | 0.63000   | 8.40000    | 113 |
| T. ORG. HALOGEN | MG/L     | ND    | 0.06073                 | 0.00600   | 0.41000    | 130 | 0.09890                 | 0.01400   | 0.54000    | 10  |
| TEMPERATURE     | DEG. C   | ND    | 16.72500                | 15.00000  | 18.60000   | 124 | 17.81250                | 17.00000  | 18.80000   | 8   |
| TOXAPHENE       | MG/L     | 0.005 | 0.00385                 | 0.00200   | 0.00520    | 12  | 0.00350                 | 0.00200   | 0.00500    | 4   |
| TRITIUM         | BQ/L     | 1740  | 194.22222               | 10.00000  | 1430.00000 | 9   | 12.00000                | 3.00000   | 20.00000   | 3   |
| ZINC            | MG/L     | 15    | 0.07418                 | 0.02000   | 0.14000    | 6   | 0.02000                 | 0.02000   | 0.02000    | 2   |

(CONTINUED)



TABLE 4-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRAIDENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=HRE

|           |       |       | WELL LOCATION           |         |         |    |                         |         |         |    |
|-----------|-------|-------|-------------------------|---------|---------|----|-------------------------|---------|---------|----|
|           |       |       | DOWN-GRADIENT           |         |         |    | UP-GRADIENT             |         |         |    |
|           |       |       | MEASURED CONCENTRA-TION |         |         |    | MEASURED CONCENTRA-TION |         |         |    |
|           |       |       | MEAN                    | MIN     | MAX     | IN | MEAN                    | MIN     | MAX     | IN |
| PARAMETER | UNITS | LIMIT |                         |         |         |    |                         |         |         |    |
| 2,4-D     | MG/L  | 0.1   | 0.00750                 | 0.00500 | 0.01000 | 12 | 0.00750                 | 0.00500 | 0.01000 | 4  |
| 2,4-5 T   | MG/L  | 0.01  | 0.00750                 | 0.00500 | 0.01000 | 12 | 0.00750                 | 0.00500 | 0.01000 | 4  |

TABLE A-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADE AND UPGRADE MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=DHF

|              |         |         | WELL LOCATION          |         |            |    |                        |          |          |    |
|--------------|---------|---------|------------------------|---------|------------|----|------------------------|----------|----------|----|
|              |         |         | DOWN-GRADIENT          |         |            |    | UP-GRADIENT            |          |          |    |
|              |         |         | MEASURED CONCENTRATION |         |            |    | MEASURED CONCENTRATION |          |          |    |
| PARAMETER    | UNITS   | LIMIT   | MEAN                   | MIN     | MAX        | IN | MEAN                   | MIN      | MAX      | IN |
| ARSENIC      | MG/L    | 10.05   | 0.00333                | 0.00100 | 0.00500    | 12 | 0.00280                | 0.00100  | 0.00500  | 5  |
| BARII        | MG/L    | 1       | 0.57033                | 0.00600 | 1.00000    | 12 | 0.45220                | 0.25000  | 1.00000  | 5  |
| CADMIUM      | MG/L    | 10.01   | 0.00201                | 0.00020 | 0.01000    | 12 | 0.00114                | 0.00020  | 0.00300  | 5  |
| CESIUM-      | MG/L    | ND      |                        |         |            |    |                        |          |          |    |
| 137          |         |         | 1.70910                | 0.71739 | 3.62694    | 5  | 1.18924                | 0.72169  | 2.06884  | 3  |
| CHLORIDE     | MG/L    | ND      | 19.16667               | 8.00000 | 40.00000   | 12 | 12.20000               | 12.00000 | 13.00000 | 5  |
| CHROMIUM     | MG/L    | 10.05   | 0.03099                | 0.00300 | 0.07970    | 12 | 0.02660                | 0.00600  | 0.05000  | 5  |
| COLIFORM     | COL/100 | 11      | 6.35000                | 0.00000 | 49.00000   | 12 | 5.20000                | 0.00000  | 16.00000 | 5  |
| COPPER       | MG/L    | 1       | 0.02612                | 0.02000 | 0.05570    | 6  | 0.02000                | 0.02000  | 0.02000  | 3  |
| DISS. OXYGEN | MG/L    | ND      | 7.41000                | 4.30000 | 12.00000   | 20 | 6.87500                | 5.20000  | 10.30000 | 8  |
| ENDRIN       | MG/L    | 10.0002 | 0.00015                | 0.00010 | 0.00020    | 11 | 0.00014                | 0.00010  | 0.00020  | 5  |
| FLUORIDE     | MG/L    | 1.4-2.4 | 1.00000                | 1.00000 | 1.00000    | 12 | 1.00000                | 1.00000  | 1.00000  | 5  |
| G-ALPHA      | MG/L    | 10.555  | 57.95583               | 0.31000 | 1629.00000 | 12 | 1.23200                | 0.40000  | 2.90000  | 5  |
| G-BETA       | MG/L    | 10.20   | 1737.29157             | 1.70000 | 2700       | 12 | 4.62000                | 3.50000  | 6.60000  | 5  |
| IRON         | MG/L    | ND      | 16.65333               | 0.23000 | 57.90000   | 9  | 2.74175                | 0.58700  | 8.60000  | 4  |
| LEAD         | MG/L    | 10.05   | 0.04200                | 0.00200 | 0.10000    | 12 | 0.01080                | 0.00100  | 0.03000  | 5  |
| LINDANE      | MG/L    | 10.004  | 0.00105                | 0.00010 | 0.00200    | 12 | 0.00085                | 0.00010  | 0.00200  | 5  |
| MANGANESE    | MG/L    | ND      | 2.89367                | 0.56300 | 8.85000    | 9  | 0.13910                | 0.03340  | 0.29300  | 4  |
| MERCURY      | MG/L    | 10.002  | 0.00003                | 0.00005 | 0.00010    | 12 | 0.00007                | 0.00005  | 0.00010  | 5  |
| METHOXY-     | MG/L    | 10.1    |                        |         |            |    |                        |          |          |    |
| CHLOR        |         |         | 0.00410                | 0.00020 | 0.00800    | 12 | 0.00332                | 0.00020  | 0.00800  | 5  |

(CONTINUED)

TABLE A-7. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRADIENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=CHF

|                 |          |        | WELL LOCATION          |           |            |     |                        |           |            |     |
|-----------------|----------|--------|------------------------|-----------|------------|-----|------------------------|-----------|------------|-----|
|                 |          |        | DOWN-GRADIENT          |           |            |     | UP-GRADIENT            |           |            |     |
|                 |          |        | MEASURED CONCENTRATION |           |            |     | MEASURED CONCENTRATION |           |            |     |
|                 |          |        | MEAN                   | MIN       | MAX        | IN  | MEAN                   | MIN       | MAX        | IN  |
| PARAMETER       | UNITS    | LIMIT  |                        |           |            |     |                        |           |            |     |
| NICKEL          | MG/L     | 15     | 0.06225                | 0.06000   | 0.07350    | 6   | 0.06000                | 0.06000   | 0.06000    | 3   |
| NITRATE-N       | MG/L     | 110    | 3.93333                | 1.00000   | 8.00000    | 6   | 2.66567                | 1.00000   | 6.00000    | 3   |
| PCE             | MG/L     | IND    | 0.00012                | 0.00010   | 0.00016    | 3   | 0.00012                | 0.00012   | 0.00012    | 1   |
| PH              | PH       | IND    | 6.34722                | 5.50000   | 7.70000    | 36  | 6.47335                | 6.20000   | 6.95000    | 113 |
| PHENOLS         | MG/L     | IND    | 0.00117                | 0.00100   | 0.00200    | 12  | 0.00120                | 0.00100   | 0.00200    | 5   |
| RADIUM-226      | PI/L     | 10.185 | 0.18703                | 0.00700   | 0.50000    | 12  | 0.11100                | 0.00500   | 0.40000    | 5   |
| SELENIUM        | MG/L     | 10.01  | 0.00367                | 0.00100   | 0.00500    | 12  | 0.00380                | 0.00100   | 0.00500    | 5   |
| SILVER          | MG/L     | 10.03  | 0.03552                | 0.00050   | 0.07000    | 12  | 0.04250                | 0.00050   | 0.07000    | 5   |
| SODIUM          | MG/L     | IND    | 24.13333               | 13.80000  | 44.00000   | 3   | 12.66667               | 10.00000  | 17.00000   | 3   |
| SP. COND.       | UMHDS/CM | IND    | 1447.22222             | 158.00000 | 1766.00000 | 135 | 1708.76923             | 251.00000 | 1818.00000 | 113 |
| STRONTIUM-90    | PI/L     | 10.3   | 158.38567              | 0.21000   | 1700       | 9   | 1.93333                | 1.60000   | 2.20000    | 3   |
| SULFATE         | MG/L     | IND    | 16.08333               | 12.00000  | 24.00000   | 12  | 20.40000               | 19.00000  | 22.00000   | 5   |
| T. ORG. CARBON  | MG/L     | IND    | 5.58759                | 2.18000   | 9.00000    | 139 | 4.47857                | 1.80000   | 7.10000    | 14  |
| T. ORG. HALOGEN | MG/L     | IND    | 0.13130                | 0.00900   | 0.28400    | 130 | 0.11364                | 0.01100   | 0.25200    | 11  |
| TEMPERATURE     | DEG. C   | IND    | 16.06130               | 13.50000  | 19.40000   | 121 | 16.17500               | 14.50000  | 18.70000   | 8   |
| TOXAPHENE       | MG/L     | 10.003 | 0.00350                | 0.00200   | 0.00500    | 12  | 0.00320                | 0.00200   | 0.00500    | 5   |
| TRITIUM         | PI/L     | 1740   | 90111.1                | 5000      | 210000     | 9   | 91333.3                | 75000     | 120000     | 3   |
| UENO            | MG/L     | 15     | 0.14753                | 0.02000   | 0.32000    | 6   | 0.06270                | 0.02000   | 0.09000    | 3   |

(CONTINUED)

TABLE A-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRADIENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=CHF

|           |       |       | WELL LOCATION           |         |         |    |                         |         |         |    |
|-----------|-------|-------|-------------------------|---------|---------|----|-------------------------|---------|---------|----|
|           |       |       | DOWN-GRADIENT           |         |         |    | UP-GRADIENT             |         |         |    |
|           |       |       | MEASURED CONCENTRA-TION |         |         |    | MEASURED CONCENTRA-TION |         |         |    |
|           |       |       | MEAN                    | MIN     | MAX     | IN | MEAN                    | MIN     | MAX     | IN |
| PARAMETER | UNITS | LIMIT |                         |         |         |    |                         |         |         |    |
| 2,4-D     | MG/L  | 10.1  | 0.00750                 | 0.00500 | 0.01000 | 12 | 0.00700                 | 0.00500 | 0.01000 | 5  |
| 2,4-5 T   | MG/L  | 10.01 | 0.00750                 | 0.00500 | 0.01000 | 12 | 0.00700                 | 0.00500 | 0.01000 | 5  |

TABLE 4-2. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRADIENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=3513

|               |         |         | WELL LOCATION          |         |           |    |                        |         |          |    |
|---------------|---------|---------|------------------------|---------|-----------|----|------------------------|---------|----------|----|
|               |         |         | DOWN-GRADIENT          |         |           |    | UP-GRADIENT            |         |          |    |
|               |         |         | MEASURED CONCENTRATION |         |           |    | MEASURED CONCENTRATION |         |          |    |
| PARAMETER     | UNITS   | LIMIT   | MEAN                   | MIN     | MAX       | IN | MEAN                   | MIN     | MAX      | IN |
| ARSENIC       | MG/L    | 10.05   | 0.00400                | 0.00100 | 0.01100   | 12 | 0.00325                | 0.00100 | 0.00400  | 8  |
| BARIUM        | MG/L    | 1       | 0.25102                | 0.05900 | 0.53000   | 12 | 0.24137                | 0.08300 | 0.50     | 8  |
| CADMIUM       | MG/L    | 10.01   | 0.00149                | 0.00020 | 0.00200   | 12 | 0.00142                | 0.00020 | 0.00200  | 8  |
| CESIUM-137    | BQ/L    | IND     | 0.33371                | 0.00000 | 1.04367   | 10 | 1.34900                | 0.00000 | 4.88527  | 4  |
| CHLORIDE      | MG/L    | IND     | 18.10333               | 5.30000 | 40.00000  | 12 | 5.36250                | 5.00000 | 7.00000  | 9  |
| CHROMIUM      | MG/L    | 10.03   | 0.17775                | 0.00600 | 1.20000   | 12 | 0.02937                | 0.00200 | 0.14000  | 8  |
| COLIFORM      | COL/100 | 1       | 10.07692               | 0.00000 | 120.00000 | 13 | 1.25000                | 0.00000 | 6.00000  | 8  |
| COPPER        | MG/L    | 1       | 0.02767                | 0.02000 | 0.05900   | 6  | 0.02475                | 0.02000 | 0.03900  | 4  |
| DISS. OXYGEN  | MG/L    | IND     | 4.51333                | 2.50000 | 7.00000   | 15 | 5.01000                | 4.00000 | 6.10000  | 10 |
| DENDRYN       | MG/L    | 10.0002 | 0.00015                | 0.00010 | 0.00020   | 12 | 0.00015                | 0.00010 | 0.00020  | 8  |
| FLUORIDE      | MG/L    | 1.4-3.4 | 1.00000                | 1.00000 | 1.00000   | 12 | 1.00000                | 1.00000 | 1.00000  | 8  |
| G-ALPHA       | BQ/L    | 10.555  | 4.65250                | 0.03000 | 15.00000  | 12 | 2.27375                | 0.79000 | 5.70000  | 8  |
| G-BETA        | BQ/L    | 10.29   | 23.85833               | 1.40000 | 65.00000  | 12 | 5.86250                | 1.80000 | 13.00000 | 8  |
| IRON          | MG/L    | IND     | 23.74444               | 5.60000 | 72.00000  | 9  | 2.70333                | 0.42000 | 7.90000  | 6  |
| LEAD          | MG/L    | 10.05   | 0.14542                | 0.00300 | 1.40000   | 12 | 0.01012                | 0.00100 | 0.02000  | 8  |
| LINDANE       | MG/L    | 10.004  | 0.00112                | 0.00010 | 0.00200   | 12 | 0.00117                | 0.00010 | 0.00200  | 8  |
| MANGANESE     | MG/L    | IND     | 3.92222                | 2.70000 | 5.00000   | 9  | 1.47000                | 0.25000 | 3.50000  | 6  |
| MERCURY       | MG/L    | 10.002  | 0.00019                | 0.00010 | 0.00050   | 12 | 0.00021                | 0.00010 | 0.00040  | 8  |
| METHOXY-CHLOR | MG/L    | 10.1    | 0.00410                | 0.00020 | 0.00900   | 12 | 0.00410                | 0.00020 | 0.00900  | 8  |

(CONTINUED)

TABLE 4-3. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRAIDENT MONITORING WELLS  
(ALL MEASUREMENTS)  
SITE=3513

|                 |          |        | WELL LOCATION          |           |           |     |                        |           |           |    |
|-----------------|----------|--------|------------------------|-----------|-----------|-----|------------------------|-----------|-----------|----|
|                 |          |        | DOWN-GRADIENT          |           |           |     | UP-GRADIENT            |           |           |    |
|                 |          |        | MEASURED CONCENTRATION |           |           |     | MEASURED CONCENTRATION |           |           |    |
| PARAMETER       | UNITS    | LIMIT  | MEAN                   | MIN       | MAX       | IN  | MEAN                   | MIN       | MAX       | IN |
| NICKEL          | MG/L     | 15     | 0.35657                | 0.00000   | 1.00000   | 6   | 0.76000                | 0.00000   | 0.06000   | 4  |
| NITRATE-N       | MG/L     | 110    | 3.50000                | 2.00000   | 5.00000   | 6   | 5.00000                | 5.00000   | 5.00000   | 3  |
| PCB             | MG/L     | IND    | 0.00009                | 0.00009   | 0.00010   | 3   | 0.00007                | 0.00007   | 0.00007   | 2  |
| PH              | PH       | IND    | 6.42632                | 6.10000   | 7.10000   | 19  | 6.45000                | 6.30000   | 6.70000   | 14 |
| PHENOLS         | MG/L     | IND    | 0.00175                | 0.00100   | 0.00700   | 12  | 0.00150                | 0.00100   | 0.00100   | 6  |
| RADIUM-226      | BQ/L     | 10,165 | 0.06092                | 0.00800   | 0.20000   | 12  | 0.03025                | 0.00200   | 0.10000   | 8  |
| SELENIUM        | MG/L     | 10.01  | 0.00500                | 0.00500   | 0.00500   | 12  | 0.00500                | 0.00500   | 0.00500   | 8  |
| SILVER          | MG/L     | 10.05  | 0.03762                | 0.00050   | 0.07000   | 12  | 0.03762                | 0.00050   | 0.07000   | 8  |
| SODIUM          | MG/L     | IND    | 30.77778               | 25.00000  | 36.00000  | 9   | 22.83333               | 12.00000  | 56.00000  | 6  |
| SP. COND.       | UMHDS/CM | IND    | 552.94737              | 355.00000 | 833.00000 | 19  | 18.35714               | 305.00000 | 1095      | 14 |
| STRONTIUM       | BQ/L     | 10.3   | 12.51556               | 0.40000   | 33.00000  | 9   | 2.35000                | 1.30000   | 3.30000   | 6  |
| SULFATE         | MG/L     | IND    | 12.95833               | 5.00000   | 22.00000  | 12  | 80.12500               | 35.00000  | 170.00000 | 8  |
| T. ORG. CARBON  | MG/L     | IND    | 5.95286                | 1.46000   | 22.00000  | 142 | 4.84107                | 2.25000   | 8.70000   | 28 |
| T. ORG. HALOGEN | MG/L     | IND    | 0.14231                | 0.02200   | 0.35000   | 30  | 0.06746                | 0.00390   | 0.17300   | 20 |
| TEMPERATURE     | DEG. C   | IND    | 17.51333               | 15.80000  | 21.70000  | 15  | 15.44000               | 5.50000   | 21.30000  | 10 |
| TOXAPHENE       | MG/L     | 10.005 | 0.00350                | 0.00200   | 0.00500   | 12  | 0.00350                | 0.00200   | 0.00500   | 8  |
| TRITIUM         | BQ/L     | 1740   | 4511.11                | 2200      | 2200      | 9   | 351.50000              | 9.00000   | 760.00000 | 6  |
| ZINC            | MG/L     | 15     | 0.15400                | 0.03700   | 0.43000   | 6   | 0.06150                | 0.02000   | 0.11000   | 4  |

(CONTINUED)

TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRAIDENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=HRE

|               |         |         | WELL LOCATION          |         |           |    |                        |         |          |    |
|---------------|---------|---------|------------------------|---------|-----------|----|------------------------|---------|----------|----|
|               |         |         | DOWN-GRADIENT          |         |           |    | UP-GRADIENT            |         |          |    |
|               |         |         | MEASURED CONCENTRATION |         |           |    | MEASURED CONCENTRATION |         |          |    |
| PARAMETER     | UNITS   | LIMIT   | MEAN                   | MIN     | MAX       | IN | MEAN                   | MIN     | MAX      | IN |
| ARSENIC       | MG/L    | 10.05   | 0.00442                | 0.00100 | 0.01600   | 12 | 0.00275                | 0.00100 | 0.00500  | 4  |
| BARIUM        | MG/L    | 1       | 0.74267                | 0.10500 | 2.70000   | 12 | 0.30075                | 0.09300 | 0.50000  | 4  |
| CADMIUM       | MG/L    | 10.01   | 0.00102                | 0.00020 | 0.00350   | 12 | 0.00060                | 0.00020 | 0.00100  | 4  |
| CESIUM-137    | BQ/L    | IND     | 0.48236                | 0.00000 | 2.07994   | 6  | 0.13138                | 0.00000 | 0.26277  | 2  |
| CHLORIDE      | MG/L    | IND     | 5.45667                | 3.40000 | 13.00000  | 12 | 8.47500                | 7.00000 | 12.00000 | 4  |
| CHROMIUM      | MG/L    | 10.05   | 0.03111                | 0.00400 | 0.05910   | 12 | 0.02033                | 0.00200 | 0.05000  | 3  |
| CILIFOR4      | COL/100 | 1       | 3.33333                | 0.00000 | 30.00000  | 12 | 3.00000                | 0.00000 | 6.00000  | 4  |
| COPPER        | MG/L    | 1       | 0.03967                | 0.02000 | 0.12000   | 6  | 0.02000                | 0.02000 | 0.02000  | 2  |
| DISS. OXYGEN  | MG/L    | IND     | 4.45417                | 2.70000 | 3.40000   | 24 | 4.20000                | 3.50000 | 6.20000  | 8  |
| DNR IN        | MG/L    | 10.0002 | 0.00021                | 0.00010 | 0.00080   | 12 | 0.00015                | 0.00010 | 0.00020  | 4  |
| FLUORIDE      | MG/L    | 1.4-2.4 | 1.00000                | 1.00000 | 1.00000   | 12 | 1.00025                | 1.00000 | 1.00100  | 4  |
| G-ALPHA       | BQ/L    | 10.555  | 21.69091               | 0.10000 | 200.00000 | 11 | 3.95200                | 0.06000 | 16.00000 | 5  |
| G-BETA        | BQ/L    | 10.29   | 352.15000              | 0.70000 | 350.00000 | 12 | 3.90000                | 0.30000 | 10.00000 | 4  |
| IRON          | MG/L    | IND     | 23.71333               | 1.50000 | 33.00000  | 9  | 1.91667                | 0.48000 | 4.59000  | 3  |
| LEAD          | MG/L    | 10.05   | 0.02042                | 0.00100 | 0.09000   | 12 | 0.02150                | 0.00100 | 0.07000  | 4  |
| LINDANE       | MG/L    | 10.004  | 0.00137                | 0.00010 | 0.00200   | 9  | 0.00137                | 0.00010 | 0.00200  | 3  |
| MANGANESE     | MG/L    | IND     | 4.50544                | 0.19000 | 22.00000  | 9  | 0.13200                | 0.04300 | 0.19800  | 3  |
| MERCURY       | MG/L    | 10.002  | 0.00009                | 0.00005 | 0.00020   | 12 | 0.00010                | 0.00005 | 0.00020  | 4  |
| METHOXY-CHLOR | MG/L    | 10.1    | 0.00457                | 0.00020 | 0.00800   | 12 | 0.00425                | 0.00020 | 0.00800  | 4  |

(CONTINUED)

TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRAIDENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=HRE

| PARAMETER       | UNITS    | LIMIT  | WELL LOCATION          |             |             |      |                        |            |             |      |
|-----------------|----------|--------|------------------------|-------------|-------------|------|------------------------|------------|-------------|------|
|                 |          |        | DOWN-GRADIENT          |             |             |      | UP-GRADIENT            |            |             |      |
|                 |          |        | MEASURED CONCENTRATION |             |             |      | MEASURED CONCENTRATION |            |             |      |
|                 |          |        | MEAN                   | MIN         | MAX         | IN   | MEAN                   | MIN        | MAX         | IN   |
| NICKEL          | MG/L     | 15     | 0.111331               | 0.050001    | 0.362001    | 61   | 0.060001               | 0.050001   | 0.060001    | 21   |
| NITRATE-N       | MG/L     | 11     | 2.500001               | 1.000001    | 5.000001    | 61   | 12.500001              | 1.000001   | 24.000001   | 21   |
| PCB             | MG/L     | IND    | 0.000121               | 0.000091    | 0.000151    | 31   | 0.000091               | 0.000091   | 0.000091    | 11   |
| PH              | PH       | IND    | 6.705131               | 6.400001    | 8.100001    | 1391 | 6.746151               | 6.500001   | 7.000001    | 1131 |
| PHENOLS         | MG/L     | IND    | 0.001171               | 0.001001    | 0.002011    | 121  | 0.001751               | 0.001001   | 0.004001    | 41   |
| RADIUM-226      | BQ/L     | 10,135 | 0.052671               | 0.001001    | 0.330001    | 121  | 0.006251               | 0.002001   | 0.010001    | 41   |
| SELENIUM        | MG/L     | 10.01  | 0.003251               | 0.001001    | 0.005001    | 121  | 0.003251               | 0.001001   | 0.005001    | 41   |
| SILVER          | MG/L     | 10.05  | 0.000751               | 0.000501    | 0.001001    | 61   | 0.000751               | 0.000501   | 0.001001    | 21   |
| SODIUM          | MG/L     | IND    | 14.175001              | 5.550001    | 28.000001   | 61   | 6.300001               | 5.900001   | 6.800001    | 21   |
| SP.COND.        | UMHDS/CM | IND    | 1585.820511            | 1241.000011 | 1747.000001 | 1591 | 504.307591             | 185.000011 | 1636.000001 | 1131 |
| STRONTIUM       | BQ/L     | 10.3   | 132.686671             | 0.120001    | 540.000001  | 91   | 0.173331               | 0.120001   | 0.260001    | 31   |
| SULFATE         | MG/L     | IND    | 44.333331              | 31.000001   | 75.000001   | 121  | 46.000001              | 42.000001  | 54.000001   | 41   |
| T. ORG. CARBON  | MG/L     | IND    | 3.689231               | 0.750001    | 8.400001    | 1391 | 4.975361               | 0.630001   | 8.400001    | 1131 |
| T. ORG. HALOGEN | MG/L     | IND    | 0.050731               | 0.005001    | 0.410001    | 1301 | 0.098901               | 0.014001   | 0.540001    | 1101 |
| TEMPERATURE     | DEG. C   | IND    | 16.725001              | 15.000001   | 18.600001   | 241  | 17.812501              | 17.000001  | 18.800001   | 81   |
| TOXAPHENE       | MG/L     | 10.005 | 0.003951               | 0.002001    | 0.005201    | 121  | 0.003501               | 0.002001   | 0.005001    | 41   |
| TRITIUM         | BQ/L     | 1740   | 194.222221             | 10.000001   | 1430.000001 | 91   | 12.000001              | 3.000001   | 20.000001   | 31   |
| ZINC            | MG/L     | 15     | 0.074191               | 0.020001    | 0.140001    | 61   | 0.020001               | 0.020001   | 0.020001    | 21   |

(CONTINUED)



TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIENT AND UPGRADIENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=HRE

|           |       |       | WELL LOCATION          |         |         |    |                        |         |         |    |
|-----------|-------|-------|------------------------|---------|---------|----|------------------------|---------|---------|----|
|           |       |       | DOWNGRAIENT            |         |         |    | UP-GRADIENT            |         |         |    |
|           |       |       | MEASURED CONCENTRATION |         |         |    | MEASURED CONCENTRATION |         |         |    |
|           |       |       | MEAN                   | MIN     | MAX     | IN | MEAN                   | MIN     | MAX     | IN |
| PARAMETER | UNITS | LIMIT |                        |         |         |    |                        |         |         |    |
| 2,4-D     | MG/L  | 10.1  | 0.00750                | 0.00500 | 0.01000 | 12 | 0.00750                | 0.00500 | 0.01000 | 4  |
| 2,4-5 T   | MG/L  | 10.01 | 0.00750                | 0.00500 | 0.01000 | 12 | 0.00750                | 0.00500 | 0.01000 | 4  |

TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIDENT AND UPGRAIDENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=CHF

| PARAMETER     | UNITS   | LIMIT   | WELL LOCATION          |         |           |    |                        |          |          |    |
|---------------|---------|---------|------------------------|---------|-----------|----|------------------------|----------|----------|----|
|               |         |         | DOWN-GRADIENT          |         |           |    | UP-GRADIENT            |          |          |    |
|               |         |         | MEASURED CONCENTRATION |         |           |    | MEASURED CONCENTRATION |          |          |    |
|               |         |         | MEAN                   | MIN     | MAX       | IN | MEAN                   | MIN      | MAX      | IN |
| ARSENIC       | MG/L    | 10.05   | 0.00333                | 0.00100 | 0.00500   | 12 | 0.00100                | 0.00100  | 0.00500  | 5  |
| BARIUM        | MG/L    | 1       | 0.57033                | 0.05600 | 1.00000   | 12 | 0.45220                | 0.25000  | 1.00000  | 5  |
| CADMIUM       | MG/L    | 10.01   | 0.00201                | 0.00020 | 0.01000   | 12 | 0.00114                | 0.00020  | 0.00300  | 5  |
| CESIUM-137    | BQ/L    | IND     | 1.70910                | 0.71799 | 3.62694   | 5  | 1.18924                | 0.72169  | 2.06884  | 3  |
| CHLORIDE      | MG/L    | IND     | 19.16667               | 8.00000 | 40.00000  | 12 | 12.20000               | 12.00000 | 13.00000 | 5  |
| CHROMIUM      | MG/L    | 10.05   | 0.03039                | 0.00300 | 0.07970   | 12 | 0.02660                | 0.00600  | 0.05000  | 5  |
| COLIFORM      | COL/100 | 1       | 6.35000                | 0.00000 | 49.00000  | 12 | 5.20000                | 0.00000  | 16.00000 | 5  |
| COPPER        | MG/L    | 1       | 0.02612                | 0.00000 | 0.05670   | 6  | 0.02000                | 0.02000  | 0.02000  | 3  |
| DISS. OXYGEN  | MG/L    | IND     | 7.41000                | 4.30000 | 12.00000  | 20 | 6.37500                | 5.20000  | 10.30000 | 8  |
| DNDIN         | MG/L    | 10.0002 | 0.00015                | 0.00010 | 0.00020   | 11 | 0.00014                | 0.00010  | 0.00020  | 5  |
| FLUORIDE      | MG/L    | 1.4-2.4 | 1.00000                | 1.00000 | 1.00000   | 12 | 1.00000                | 1.00000  | 1.00000  | 5  |
| G-ALPHA       | BQ/L    | 10.555  | 59.04700               | 0.31000 | 520.00000 | 10 | 1.23200                | 0.40000  | 2.90000  | 5  |
| G-BETA        | BQ/L    | 10.29   | 1707.29167             | 1.70000 | 3700      | 12 | 4.82000                | 3.50000  | 6.60000  | 5  |
| IRON          | MG/L    | IND     | 16.66333               | 0.20000 | 57.90000  | 9  | 2.74175                | 0.58700  | 6.60000  | 4  |
| LEAD          | MG/L    | 10.05   | 0.04200                | 0.00200 | 0.10000   | 12 | 0.01080                | 0.00100  | 0.03000  | 5  |
| LINDAIE       | MG/L    | 10.004  | 0.00105                | 0.00010 | 0.00200   | 12 | 0.00086                | 0.00010  | 0.00200  | 5  |
| MANGANESE     | MG/L    | IND     | 0.66367                | 0.55300 | 8.95000   | 9  | 0.19910                | 0.03340  | 0.29300  | 4  |
| MERCURY       | MG/L    | 10.002  | 0.00005                | 0.00005 | 0.00010   | 12 | 0.00007                | 0.00005  | 0.00010  | 5  |
| METHOXY-CHLOR | MG/L    | 10.1    | 0.00410                | 0.00020 | 0.00800   | 12 | 0.00332                | 0.00020  | 0.00800  | 5  |

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TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIENT AND UPGRAIENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=OHF

| PARAMETER      | UNITS    | LIMIT | WELL LOCATION          |           |            |     |                        |            |            |     |
|----------------|----------|-------|------------------------|-----------|------------|-----|------------------------|------------|------------|-----|
|                |          |       | DOWN-GRADIENT          |           |            |     | UP-GRADIENT            |            |            |     |
|                |          |       | MEASURED CONCENTRATION |           |            |     | MEASURED CONCENTRATION |            |            |     |
|                |          |       | MEAN                   | MIN       | MAX        | IN  | MEAN                   | MIN        | MAX        | IN  |
| NICKEL         | MG/L     | 5     | 0.06225                | 0.06000   | 0.07350    | 6   | 0.06000                | 0.05000    | 0.06000    | 3   |
| NITRATE-N      | MG/L     | 10    | 3.93333                | 1.00000   | 9.00000    | 6   | 2.66667                | 1.00000    | 6.00000    | 3   |
| PCB            | MG/L     | IND   | 0.00013                | 0.00010   | 0.00016    | 3   | 0.00012                | 0.00012    | 0.00012    | 1   |
| PH             | PH       | IND   | 6.34722                | 5.50000   | 7.70000    | 136 | 6.47385                | 5.20000    | 6.95000    | 113 |
| PHENOLS        | MG/L     | IND   | 0.00117                | 0.00100   | 0.00200    | 112 | 0.00120                | 0.00100    | 0.00200    | 5   |
| RADIUM-226     | DD/L     | 0.185 | 0.04083                | 0.00700   | 0.10000    | 6   | 0.03875                | 0.00500    | 0.10000    | 4   |
| SELENIUM       | MG/L     | 0.01  | 0.00367                | 0.00100   | 0.00500    | 112 | 0.00380                | 0.00100    | 0.00500    | 5   |
| SILVER         | MG/L     | 0.05  | 0.00125                | 0.00050   | 0.00200    | 6   | 0.00125                | 0.00050    | 0.00200    | 2   |
| SODIUM         | MG/L     | IND   | 24.13333               | 13.80000  | 44.00000   | 9   | 12.66667               | 10.00000   | 17.00000   | 3   |
| SP.COND.       | UMHDS/CM | IND   | 1447.22222             | 158.00000 | 1766.00000 | 136 | 1706.76923             | 1251.00000 | 1816.00000 | 113 |
| STRONTIUM      | DD/L     | 0.3   | 1458.98667             | 0.21000   | 1700       | 9   | 1.93333                | 1.80000    | 2.20000    | 3   |
| SULFATE        | MG/L     | IND   | 16.08333               | 12.00000  | 24.00000   | 112 | 20.40000               | 19.00000   | 22.00000   | 5   |
| T.ORG. CARBON  | MG/L     | IND   | 5.58759                | 2.16000   | 9.00000    | 39  | 4.47357                | 1.80000    | 7.10000    | 14  |
| T.ORG. HALOGEN | MG/L     | IND   | 0.13130                | 0.00000   | 0.28400    | 130 | 0.11364                | 0.01100    | 0.25200    | 11  |
| TEMPERATURE    | DEG. C   | IND   | 16.05190               | 13.60000  | 19.40000   | 21  | 16.17500               | 14.50000   | 16.70000   | 8   |
| TOXAPHENE      | MG/L     | 0.005 | 0.00350                | 0.00200   | 0.00500    | 112 | 0.00320                | 0.00200    | 0.00500    | 5   |
| TRITIUM        | DD/L     | 1740  | 20111.1                | 5000      | 21000      | 9   | 9133.3                 | 7500       | 12000      | 3   |
| ZINC           | MG/L     | 5     | 0.14753                | 0.02000   | 0.32000    | 6   | 0.06270                | 0.02000    | 0.09000    | 3   |

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TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRADIENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=CHF

|           |       | WELL LOCATION           |         |         |         |    |                         |         |         |    |  |
|-----------|-------|-------------------------|---------|---------|---------|----|-------------------------|---------|---------|----|--|
|           |       | DOWN-GRADIENT           |         |         |         |    | UP-GRADIENT             |         |         |    |  |
|           |       | MEASURED CONCENTRA-TION |         |         |         |    | MEASURED CONCENTRA-TION |         |         |    |  |
|           |       | MEAN                    | MIN     | MAX     | IN      |    | MEAN                    | MIN     | MAX     | IN |  |
|           |       |                         |         |         |         |    |                         |         |         |    |  |
| PARAMETER | UNITS | LIMIT                   |         |         |         |    |                         |         |         |    |  |
| 2,4-D     | MG/L  | 10.1                    | 0.00750 | 0.00500 | 0.01000 | 12 | 0.00700                 | 0.00500 | 0.01000 | 5  |  |
| 2,4-5 T   | MG/L  | 10.1                    | 0.00750 | 0.00500 | 0.01000 | 12 | 0.00700                 | 0.00500 | 0.01000 | 5  |  |

TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIDENT AND UPGRAIDENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=3513

|              |         |         | WELL LOCATION           |         |           |    |                         |         |          |    |
|--------------|---------|---------|-------------------------|---------|-----------|----|-------------------------|---------|----------|----|
|              |         |         | DOWN-GRADIENT           |         |           |    | UP-GRADIENT             |         |          |    |
|              |         |         | MEASURED CONCENTRA-TION |         |           |    | MEASURED CONCENTRA-TION |         |          |    |
| PARAMETER    | UNITS   | LIMIT   | MEAN                    | MIN     | MAX       | IN | MEAN                    | MIN     | MAX      | IN |
| ARSENIC      | MG/L    | 10.35   | 0.00400                 | 0.00100 | 0.01100   | 12 | 0.00325                 | 0.00100 | 0.00500  | 8  |
| BARIUM       | MG/L    | 1       | 0.35192                 | 0.05000 | 0.53000   | 12 | 0.24137                 | 0.08300 | 0.50000  | 8  |
| CADMIUM      | MG/L    | 10.31   | 0.00148                 | 0.00020 | 0.00200   | 12 | 0.00142                 | 0.00020 | 0.00200  | 8  |
| CESIUM-137   | BQ/L    | ND      | 0.38971                 | 0.00000 | 1.04367   | 10 | 1.34900                 | 0.00000 | 4.68527  | 4  |
| CHLORIDE     | MG/L    | ND      | 18.10833                | 5.30000 | 40.00000  | 12 | 6.36250                 | 5.00000 | 7.00000  | 8  |
| CHROMIUM     | MG/L    | 10.05   | 0.17775                 | 0.00600 | 1.20000   | 12 | 0.02937                 | 0.00200 | 0.14000  | 8  |
| COLIFORM     | COL/100 | 1       | 10.07692                | 0.00000 | 120.00000 | 13 | 1.25000                 | 0.00000 | 8.00000  | 8  |
| COPPER       | MG/L    | 1       | 0.02767                 | 0.02000 | 0.05900   | 6  | 0.02475                 | 0.02000 | 0.03900  | 4  |
| DISS. OXYGEN | MG/L    | ND      | 4.51333                 | 2.50000 | 7.00000   | 15 | 5.01000                 | 4.00000 | 6.10000  | 10 |
| ENDRIN       | MG/L    | 10.0002 | 0.00015                 | 0.00010 | 0.00020   | 12 | 0.00015                 | 0.00010 | 0.00020  | 8  |
| FLUORIDE     | MG/L    | 1.4-2.4 | 1.00000                 | 1.00000 | 1.00000   | 12 | 1.00000                 | 1.00000 | 1.00000  | 8  |
| 3-ALPHA      | BQ/L    | 10.555  | 4.80273                 | 0.03000 | 13.00000  | 11 | 2.27375                 | 0.79000 | 5.70000  | 8  |
| 3-BETA       | BQ/L    | 10.29   | 23.85833                | 1.40000 | 65.00000  | 12 | 5.86250                 | 1.60000 | 13.00000 | 8  |
| IRON         | MG/L    | ND      | 23.74444                | 5.60000 | 72.00000  | 9  | 2.70333                 | 0.42000 | 7.90000  | 6  |
| LEAD         | MG/L    | 10.05   | 0.14542                 | 0.00300 | 1.40000   | 12 | 0.01012                 | 0.00100 | 0.02000  | 8  |
| LINDANE      | MG/L    | 10.004  | 0.00112                 | 0.00010 | 0.00200   | 12 | 0.00117                 | 0.00010 | 0.00200  | 8  |
| MANGANESE    | MG/L    | ND      | 3.92222                 | 2.70000 | 5.00000   | 9  | 1.47000                 | 0.25000 | 3.50000  | 6  |
| MERCURY      | MG/L    | 10.002  | 0.00019                 | 0.00010 | 0.00050   | 12 | 0.00021                 | 0.00010 | 0.00040  | 8  |
| METHOXY-     | MG/L    | 10.1    | 0.00410                 | 0.00020 | 0.00600   | 12 | 0.00410                 | 0.00020 | 0.00600  | 8  |
| CHLOR        |         |         |                         |         |           |    |                         |         |          |    |

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TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRADIENT AND UPGRADIENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=3513

|                 |          |       | WELL LOCATION          |           |            |     |                        |           |            |      |
|-----------------|----------|-------|------------------------|-----------|------------|-----|------------------------|-----------|------------|------|
|                 |          |       | DOWN-GRADIENT          |           |            |     | UP-GRADIENT            |           |            |      |
|                 |          |       | MEASURED CONCENTRATION |           |            |     | MEASURED CONCENTRATION |           |            |      |
| PARAMETER       | UNITS    | LIMIT | MEAN                   | MIN       | MAX        | IN  | MEAN                   | MIN       | MAX        | IN   |
| NICKEL          | MG/L     | 15    | 0.35667                | 0.06000   | 1.00000    | 6   | 0.06000                | 0.06000   | 0.06000    | 4    |
| NITRATE-N       | MG/L     | 10    | 3.50000                | 2.00000   | 5.00000    | 6   | 5.00000                | 5.00000   | 5.00000    | 3    |
| PCB             | MG/L     | IND   | 0.00009                | 0.00009   | 0.00010    | 3   | 0.00007                | 0.00007   | 0.00007    | 2    |
| PH              | PH       | IND   | 5.42632                | 5.10000   | 7.10000    | 19  | 6.45000                | 5.30000   | 6.70000    | 14   |
| PHENOLS         | MG/L     | IND   | 0.00175                | 0.00100   | 0.00700    | 12  | 0.00100                | 0.00100   | 0.00100    | 6    |
| RADIUM-226      | BQ/L     | 0.155 | 0.04827                | 0.00800   | 0.14000    | 11  | 0.03025                | 0.00200   | 0.10000    | 8    |
| SELENIUM        | MG/L     | 0.01  | 0.00500                | 0.00500   | 0.00500    | 12  | 0.00500                | 0.00500   | 0.00500    | 8    |
| SILVER          | MG/L     | 0.05  | 0.00525                | 0.00050   | 0.01000    | 6   | 0.00525                | 0.00050   | 0.01000    | 4    |
| SODIUM          | MG/L     | IND   | 30.77778               | 25.00000  | 39.00000   | 9   | 22.83333               | 12.00000  | 56.00000   | 6    |
| SP. COND.       | UMHJS/CM | IND   | 1652.94737             | 365.00000 | 1833.00000 | 19  | 1818.35714             | 305.00000 |            | 1095 |
| STRONTIUM-90    | BQ/L     | 0.3   | 12.51556               | 0.40000   | 33.00000   | 9   | 2.35000                | 1.30000   | 3.30000    | 6    |
| SULFATE         | MG/L     | IND   | 12.95833               | 5.00000   | 22.00000   | 12  | 80.12500               | 35.00000  | 170.00000  | 8    |
| T. ORG. CARBON  | MG/L     | IND   | 5.95236                | 1.46000   | 22.00000   | 12  | 4.84107                | 2.25000   | 8.70000    | 128  |
| T. ORG. HALOGEN | MG/L     | IND   | 0.14231                | 0.02200   | 0.36000    | 130 | 0.06746                | 0.00390   | 0.17300    | 120  |
| TEMPERATURE     | DEG. C   | IND   | 17.81333               | 15.80000  | 21.70000   | 15  | 15.44000               | 5.50000   | 21.30000   | 10   |
| TOXAPHENE       | MG/L     | 0.005 | 0.00350                | 0.00200   | 0.00500    | 12  | 0.00350                | 0.00200   | 0.00500    | 8    |
| TRITIUM         | BQ/L     | 1740  | 4811.11                | 2200      | 20000      | 9   | 351.50000              | 9.00000   | 1760.00000 | 6    |
| ZINC            | MG/L     | 15    | 0.15400                | 0.03700   | 0.43000    | 6   | 0.06150                | 0.02000   | 0.11000    | 4    |

(CONTINUED)

TABLE A-4. COMPARISON IN WATER QUALITY PARAMETER CONCENTRATIONS  
IN DOWNGRAIDENT AND UPGRADIENT MONITORING WELLS  
(DETECTION LEVELS GREATER THAN RCRA LIMITS DELETED)  
SITE=2513

|           |       |       | WELL LOCATION           |         |         |    |                         |         |         |    |
|-----------|-------|-------|-------------------------|---------|---------|----|-------------------------|---------|---------|----|
|           |       |       | DOWA-GRADIENT           |         |         |    | UP-GRADIENT             |         |         |    |
|           |       |       | MEASURED CONCENTRA-TION |         |         |    | MEASURED CONCENTRA-TION |         |         |    |
|           |       |       | MEAN                    | MIN     | MAX     | IN | MEAN                    | MIN     | MAX     | IN |
| PARAMETER | UNITS | LIMIT |                         |         |         |    |                         |         |         |    |
| 2,4-D     | MG/L  | 10.1  | 0.00783                 | 0.00500 | 0.01000 | 12 | 0.00750                 | 0.00500 | 0.01000 | 8  |
| 2,4-D T   | MG/L  | 10.01 | 0.00792                 | 0.00500 | 0.01000 | 12 | 0.00750                 | 0.00500 | 0.01000 | 6  |

TABLE A-5. STATISTICAL SUMMARY OF BACKGROUND CONCENTRATIONS  
FOR INDICATORS OF GROUNDWATER CONTAMINATION

| SITE | PARAMETER | MEASURED CONCENTRATION |         |          |     |    |
|------|-----------|------------------------|---------|----------|-----|----|
|      |           | MEAN                   | MIN     | MAX      | CV  | N  |
| HRE  | PH        | 6.746                  | 6.500   | 7.000    | 2   | 13 |
|      | SP.COND.  | 504.308                | 185.000 | 636.000  | 20  | 13 |
|      | TOC       | 4.975                  | 0.630   | 9.400    | 66  | 13 |
|      | TOX       | 0.099                  | 0.014   | 0.540    | 150 | 10 |
| CHF  | PH        | 6.474                  | 6.200   | 6.950    | 4   | 13 |
|      | SP.COND.  | 708.769                | 251.000 | 818.000  | 24  | 13 |
|      | TOC       | 4.479                  | 1.300   | 7.100    | 47  | 14 |
|      | TOX       | 0.114                  | 0.011   | 0.252    | 82  | 11 |
| 3515 | PH        | 6.450                  | 6.300   | 6.700    | 2   | 14 |
|      | SP.COND.  | 818.357                | 305.000 | 1095.000 | 28  | 14 |
|      | TOC       | 4.841                  | 2.250   | 8.700    | 47  | 28 |
|      | TOX       | 0.067                  | 0.004   | 0.173    | 30  | 20 |



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