Detroit Edison

Golder Associates

50-16

REPORT ON
GROUNDWATER CHARACTERIZATION

ENRICO FERMI 1
LICENSE TERMINATION

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EXECUTIVE SUMMARY

From November 2003 through the most recent sampling event in December 2006, Golder Associates Inc. (Golder) and the Detroit Edison Company have conducted a groundwater characterization and monitoring program at the Enrico Fermi 1 (EF1) Power Plant (Figure 1). The work has been performed in accordance with the Work Plan For Groundwater Characterization, through Revision 2, August 2005. Since the original version in September 2003, the work plan has undergone two revisions to incorporate variations in field procedures that were necessary in order to obtain groundwater samples, given site physical conditions. The objective of this characterization is to test for possible impacts to groundwater due to historical EF1 operations within Areas of Concern (AOCs) where circulating and/or waste fluids are known to have contained radionuclides. These AOCs (Figure 2) are summarized as follows:

- Reactor/Containment Building
- Sodium Tunnel
- Sodium Galleries
- Fission Products Detection (FPD) Building
- Health Physics Building
- Liquid Radioactive Waste Line
- Fuel and Repair Building (FARB)
- Waste Gas Stack

The characterization efforts include the on-going sampling of 15 EF1 monitor wells at a total of 11 locations that are adjacent to and/or downgradient of the various AOCs, measurements of groundwater elevations, followed by the collection and analysis of groundwater samples for possible radionuclides of concern. Five of the 16 wells are installed in the dolomite bedrock; the others are installed in up to 10 feet of clay-rich fill materials that were emplaced on top of the less permeable native clay-rich glacial lake sediments that overlie the bedrock. In addition, EF1 staff also collected groundwater samples from three of the four Enrico Fermi 2 (EF2) Radiological Environmental Monitoring Program (REMP) wells that are utilized by the EF2 power plant (Figure 1).

To date, EF1 has collected and analyzed groundwater samples from the following time intervals:

- April/May 2004
- July/August 2004
- October/November 2004
- February 2005
- September 2005

- February 2006
- June 2006
- December 2006

As of the date of this report, the sample analyses and assessment of the June 2006 and December 2006 data are incomplete.

Not including June 2006, Fermi 2 personnel have conducted its analyses for gross emissions from licensed radionuclides using gamma spectroscopy, and for tritium using liquid scintillation, using Detroit Edison's Fermi 2 laboratory facilities. Fermi 1 submitted the June 2006 sample set to General Engineering Laboratories, LLC, of Charleston, South Carolina for supplemental analyses that include:

- Strontium-90
- Radium-226
- Uranium-233, -234, -236, and -238.

The results of the groundwater monitoring program have led to the following findings and conclusions:

1. For each of the 2004 – 2006 sample sets that have been analyzed to date, all tritium activity was less than the Fermi 2 laboratory's Minimum Detectable Activity. The results of all gamma spectroscopic analyses indicate that no licensed radioactive material was detected.
2. The 2004-2006 internal analytical results are supported by the analysis of the June 2006 sample set by Fermi 1's subcontracted laboratory. This sample set produced no detectable tritium activity and no gamma activity due to licensed material.
3. Some of the June 2006 samples, including those from the Fermi 2 REMP wells, exhibited detectable alpha activity by one or more uranium isotopes. Golder's comparison of the maximum measured alpha activity in any of the Fermi 1 wells to the calculated upper tolerance level for background (at a 95 percent confidence) in the Fermi 2 REMP wells indicates that the reported activity is indicative of naturally occurring radioactive material.
4. None of the calculated total uranium concentrations for the June 2006 samples exceed the USEPA's Maximum Contaminant Level (MCL) of 30 µg/L.
5. Detectable radium activity in the June 2006 samples is higher in the bedrock wells than in the shallow wells. This is consistent with the common substitution of naturally occurring radium for the major cations in carbonate rocks. For the June 2006 samples, total radium activity in the monitor well samples did not exceed that in the Fermi 2 REMP wells. The maximum was observed at bedrock monitor well EFT-1D, where it effectively equaled the USEPA's MCL of 5 pCi/L. Because the highest radium activity occurred at upgradient well EFT-1D, and because that activity was less than the results for the REMP wells, Golder concludes that the radium is naturally-occurring and is not a result of activities at EF1.

Based on these results to date, Golder concludes that historical EF1 operations have not resulted in any radiological impacts to groundwater.

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1.0 INTRODUCTION

From November 2003 through the most recent sampling event in December 2006, Golder Associates Inc. (Golder) and the Detroit Edison Company have conducted a groundwater characterization program to test for possible historical radiological contamination in groundwater within Areas of Concern (AOCs) at the decommissioned Enrico Fermi 1 (EF1) Power Plant (Figure 1). The characterization efforts include the following:

- installation of monitor wells;
- measurement of the hydraulic conductivity of the fill and natural geologic formations in which the monitor wells are set;
- measurements of groundwater elevations, and
- collection and analysis of groundwater samples for possible radionuclides of concern.

The work was performed in accordance with the Work Plan For Groundwater Characterization, through Revision 2, August 2005 (Golder, 2005) that is contained in Appendix A. The work plan specifies the following:

- Areas of Concern (AOCs) with respect to possible historical releases of radioactive fluids and other possible contaminants to the subsurface, based on former EF1 operations and waste routing systems.
- Locations of monitor wells in relation to the AOCs.
- Field methods that include drilling, well installation, hydraulic testing, and groundwater sampling.
- The Quality Assurance and Quality Control methods that will be used to conduct the characterization.
- Schedule.

1.1 Description of EF1 Layout

The EFI layout, Termination Boundary, and associated AOCs are shown in Figure 2. The Termination Boundary to which the NRC and EF1 have agreed to is defined by the asphalt drive (Figure 2) that circumnavigates the EF1 complex. The other facilities that were constructed as a part of EF1 are now considered as components of EF2. Within the Termination Boundary, the building boundaries and fences shown in bold outline constitute the Controlled Area.

1.2 Areas of Concern

During preparation of the work plan, Golder identified several AOCs, shown on Figure 2, where groundwater characterization was warranted, based on the presence of circulating and/or waste fluids that are known to have contained radionuclides. These areas, and the groundwater monitor wells that were installed to test for possible impact from each AOC, are described in Section 1.5 of the work plan. These AOCs are summarized as follows:

- Reactor/Containment Building
- Sodium Tunnel
- Sodium Galleries
- Fission Products Detection (FPD) Building
- Health Physics Building
- Liquid Radioactive Waste Line
- Fuel and Repair Building (FARB)
- Waste Gas Stack

1.3 Geologic Setting

Beginning at the original ground level of around 573.5 feet above mean sea level (MSL) Golder's review of pre-construction boring logs that were obtained from EF1 indicates that inside the Termination Boundary, the unconsolidated native sediments and the bedrock consist of the following typical sequence:

- 0 - 7 feet: Soft black muck and peat.
- 7 - 12 feet: Glaciolacustrine laminated gray clay and silt, with traces of humus.
- 12 - 18 feet: Hard mottled gray to yellowish sandy clay (glacial till).
- > 18 feet: Dolomitic bedrock of the Bass Islands Group.

A pre-construction aerial photograph from 1949 (Appendix A of the Work Plan) and the 1956 license application indicate that EF1 was originally situated near the base of a narrow peninsula that was bordered on the west by a lagoon that was hydraulically connected to Lake Erie. Following the removal of the native glacial deposits and construction of the reactor building in 1956, approximately 27 feet of predominantly clayey fill was added to the top of the bedrock in order to bring the ground

inside much of the current Controlled Area (excluding the Health Physics Building pad) up to elevation of near 590 feet MSL. Outside the Controlled Area, approximately 10 feet of fill was added, bringing the existing ground elevation up to approximately 583.5 feet.

1.4 Objectives

The overall objective of the groundwater characterization is to support the license termination of EF1 by determining whether or not former operations resulted in radiological contamination that exceeds background conditions. In determining whether radiological contamination of groundwater has occurred at EF1, the following project-specific objectives will be met:

- Define the range of background values for potential radiological contaminants.
- Through analysis of groundwater from locations adjacent to and/or downgradient of the AOCs listed above, determine whether radionuclides are present due to EF1 activities.

2.0 SCOPE AND METHODS OF INVESTIGATION

The groundwater characterization was performed in two phases. Golder installed the majority of the monitor wells in November 2003, then initiated periodic groundwater sampling and analyses beginning in April 2004. Due to weather delays, and based on the iterative process of selecting well locations as a function of time-series analyses of the hydraulic gradient (see below), the monitor well network was not completed until July 2005. During this time, one additional well pair (EFT-6S/D), one additional shallow well (EFT-10S), and one shallow replacement well (EFT-8SR) were added to the groundwater monitoring system More detailed descriptions of the sequence, methods, and scope of the characterization activities are described below.

2.1 Monitor Well Locations

Golder installed a total of 16 monitor wells at a total of 11 locations. Figure 2 depicts the actual locations in relation to the planned locations that were included in the work plan. To a large extent, the locations and numbers of monitor wells that were installed agreed with the specification in the work plan, with the following modifications:

- At the EFT-1S/D well pair, Golder and Detroit Edison agreed to install an extra well, EFT-1I. The designation "I" indicates that the screened interval is situated at a hydraulically intermediate level between those of shallow well EFT-1S and deep well EFT-1D. Well EFT-1I was installed after Golder observed no groundwater during or immediately following the installation of EFT-1S, which slowly did yield water. Because groundwater was subsequently encountered in the shallow zone at each of the AOCs, there was no need to install other intermediate zone wells. As such, EF1 staff do not sample EFT-1I.
- The EFT-3S/D well pair was not installed. The decision to eliminate this well pair was made after Golder initially determined that the hydraulic gradient in the bedrock, based on water level measurements in EFT-1D, EFT-2D, and EFT-5D, was to the southeast. This initial assessment of the hydraulic gradient in the bedrock is depicted in Figure 3. During work plan preparation, Golder inferred that the hydraulic gradient in the bedrock would be toward the east-southeast, toward the adjacent Lake Erie shore. Given a gradient more to the southeast, the EFT-3S/D well pair location was determined to be unnecessary for testing groundwater downgradient of the FARB.
- Because of the more southeasterly hydraulic gradient in the bedrock, the location for EFT-6D, which was installed to test for possible impact from the reactor basement, had to be shifted from its original location as shown on Figure 2. The location for EFT-6S was retained in order to test for possible impacts from the east sodium gallery; fission products detector (FPD) building, and reactor. In June/July 2005, EF1 elected to also install one additional well, EFT-10S, at the location shown on Figure 2 in order to test for impacts from the west sodium gallery and reactor.

- Well EFT-8S was originally installed in November 2003 to a depth of 10 feet in clay-rich fill materials near the former waste gas stack. Because the well did not consistently yield water, replacement well EFT-8SR was installed in June 2004 at a location closer to the northeast corner of the FARB, in a borehole that contained saturated granular fill materials near the base of the borehole.

2.2 Drilling and Formation Sampling

Not including EFT-7S and EFT-10S, the monitor well boreholes were initiated by advancing a 12-inch diameter pilot hole to a depth of approximately 9 feet BGL using a truck-mounted vacuum apparatus. The vacuum evacuation work was completed after first using ground penetrating radar (GPR) to locate areas free of shallow (e.g., <3 feet BGL) subsurface conduits. Detroit Edison retained MultiView Locates, Inc. for the GPR and Marine Pollution Control (MPC) for the vacuum services. MPC advanced the pilot hole through the clay fill materials until encountering more resistant native glaciolacustrine clay sediments, below which the native clay could not be readily penetrated by the vacuum apparatus. Well EFT-7S was drilled using augers without a vacuum pilot hole, and EFT-10S was advanced using a combination of manual drilling techniques.

Not including EFT-10S, the other shallow zone monitor wells, including EFT-1I, were then installed using 4.25-inch hollow-stem augers (HSAs) to the desired final depth into the unconsolidated fill and/or native glacial sediments. Because drill rig access was not possible, well EFT-10S was manually installed using a combination of a 3-inch diameter hand auger where clay-rich fill materials were encountered, and using vacuum lift where crushed stone was encountered. A 4-inch diameter conductor casing was used to stabilize the borehole as it was advanced through the crushed stone.

The deep zone (i.e., bedrock) boreholes were drilled by advancing the HSAs through the glacial sediments to the top of the bedrock. While drilling with the HSAs, formation samples were collected by driving 24-inch-long split spoon samplers. Sample intervals are depicted on the borehole logs that are contained in Appendix B of this report.

The bedrock portions of the deep zone wells were first cored using a 4.5-inch diameter barrel. Before installing a deep zone well, the cored hole was reamed with a 5-7/8-inch diameter tri-cone bit, in order to remove possible fine grained particles that may have been smeared against the borehole wall by the core barrel, and to create a larger annulus that could accommodate a sand filter-packed well.

Detroit Edison screened the retrieved bedrock core and split spoon sample materials for possible radionuclide contamination through the use of a frisker.

2.3 Monitor Well Construction and Development

Monitor well construction and well head surface completion details are shown on the borehole logs contained in Appendix B. Each of the 0.01-inch slotted well screens received a No. 7 silica sand filter pack, followed by bentonite seal and/or grout materials in order to isolate the screened interval from overlying strata. The selection of the screened interval at EFT-6D was contingent on the results of packer testing over multiple levels in the bedrock. The results of this testing, and the resulting selection of the screened interval, are presented in Section 3.3.2.

In accordance with the work plan, the monitor wells were developed by means of continuous pumping or intermittent bailing, until field parameters of water quality had stabilized and turbidity had been minimized. The bedrock wells were developed using a 2-inch-submersible pump. Because the shallow wells did not yield groundwater at a high enough rate to use a submersible pump, they were developed using pre-cleaned disposable bailers.

2.4 Surveying

Detroit Edison personnel surveyed the elevations of the top of each monitor well to the nearest 0.01 foot. These elevations are summarized in Table 1, and are displayed on the borehole and well construction logs in Appendix B. Detroit Edison also surveyed the casing elevations for the REMP wells; these data are contained in Appendix G.

2.5 Hydraulic Conductivity Measurements

As specified in the work plan, measurements of hydraulic conductivity were performed in the shallow and deep zones in the following fashions:

- The shallow zone was tested through the use of slug tests in each well, by displacing the static water level in a well and manually recording the rate of recovery using an electronic water level meter. Detroit Edison personnel performed the tests on June 8, 2004. Slug test results are presented in Section 3.2.2.

- At deep zone wells EFT-1D and EFT-6D, Golder conducted constant-rate pumping tests in the open bedrock boreholes. These measurements were performed on November 11, 2003, and June 3, 2004, respectively. During these tests, Golder measured total stabilized drawdown at a constant pumping rate. In accordance with the work plan, at EFT-6D this process was conducted for each of three consecutive 6-foot-long packer testing intervals as a means of selecting that well's screened interval. The results of the pump/packer testing are described in Section 3.3.2.

The slug test-based results were supplemented by means of grain size analyses that were performed on native glacial sediments that were obtained immediately below the vacuum pilot borehole terminus at locations EFT-1D, -5D, 8S, and -9S. These results are also presented in Section 3.2.2.

2.6 Groundwater Sampling

Beginning in April 2004, prior to the installation well of wells EFT-6S and EFT-6D in June 2004, Detroit Edison personnel began conducting quarterly groundwater sampling and analyses on an approximate quarterly basis. Because well EFT-1I is not screened hydraulically equivalent to either the shallow or deep zone at EF1, it is not included in the sampling and analysis plan. To date, Detroit Edison has conducted the following sampling events:

- April 29 – May 17, 2004: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D, EFT-5S/D, and shallow well EFT-7S. Well EFT-8S remained dry during this initial sample event, prompting its replacement by EFT-8SR. During this event, EFT-9S did not yield enough sample volume to provide for a full analysis. One duplicate sample was collected at EFT-2D. Wells EFT-6S and -6D had not been installed.

- July 28 – August 18, 2004: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D through EFT-6S/D, plus shallow wells EFT-7S, EFT-8SR, and EFT-9S. Detroit Edison also sampled REMP wells Nos. 1, 2, and 4. Following this sample round, a field blank was collected on August 18, 2004. One duplicate sample was collected at EFT-6D.

- October 19 – November 1 and November 11 – 25, 2004: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D through EFT-6S/D, plus shallow wells EFT-7S, EFT-8SR, and EFT-9S. REMP wells

Nos. 1, 2, and 4 were also sampled at this time. One duplicate sample was collected at EFT-6D.

- February 1 - 16, 2005: Wells EFT-1S/D, EFT-2D, EFT-4S/D through EFT-6S/D, plus shallow wells EFT-7S, and EFT-8S. REMP wells Nos. 1, 2, and 4, plus a field blank, were sampled/collected. A duplicate sample was collected at EFT-5D. Shallow wells EFT-2S and EFT-9S did not yield enough groundwater for a full analysis.

- September 20 - 30, 2005: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D through EFT-6S/D, plus shallow wells EFT-7S, EFT-8SR, EFT-9S, EFT-10S,, plus REMP wells Nos. 1, 2, and 4, and a field blank, were sampled/collected . A duplicate sample was collected at EFT-6D.

- February 8 - 15, 2006: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D through EFT-6S/D, shallow wells EFT-7S, EFT-8SR, EFT-9S, EFT-10S, plus REMP wells Nos. 1, 2, and 4, and a field blank, were sampled/collected. A duplicate sample was collected at EFT-2D.

- June 6 - 13, 2006: Wells EFT-1S/D, EFT-2S/D, EFT-4S/D through EFT-6S/D, plus shallow wells EFT-7S, EFT-8SR, EFT-9S, EFT-10S, plus REMP wells Nos. 1, 2, and 4, and a field blank, were sampled/collected. A duplicate sample was collected at EFT-4D. During this sample event, EF1 collected double the normal volume, in order to provide samples for supplemental external analyses by an EF1-subcontracted laboratory.

- December 2006: Analytical results are pending. The static groundwater elevations that were measured at the onset of this sample event are contained in Table 1, and the inferred groundwater flow pattern based in part on these measurements is discussed in Section 3.3.

In accordance with the work plan, each of the wells that is capable of yielding a continuous supply of groundwater (e.g., > 50 ml/min) is sampled in accordance with the low-flow protocol specified in the work plan. All samples are filtered to ensure that turbidity does not add potentially sorbed and detectable constituents during the digestion and analysis of samples. Wells that do not yield sufficient groundwater are purged and sampled intermittently. Wells EFT-8S and -9S do not typically yield enough groundwater within a 24-hour period to provide the minimum sample volume to conduct the laboratory analyses. As such, these wells are sampled over a period of weeks until there is sufficient sample volume. For these low-yielding wells, the reported sample date is that when the

sample was initiated, and not the date at which the sample was retained. Fermi 1 personnel indicate that these two wells tend to yield best following rainfall events.

2.7 Groundwater Analyses

Not including June and December 2006, Fermi 1 has completed its own analyses for gross emissions from licensed radionuclides using gamma spectroscopy, and for tritium using liquid scintillation, using Detroit Edison's Fermi 2 laboratory facilities. The June and December 2006 results for liquid scintillation are complete; gamma spectroscopy results are pending. As indicated in Section 4.2.6 of the work plan, Fermi 1 may supplement the sampling and analysis program by submitting samples to one or more outside analytical laboratories for the radionuclides listed in Section 4.2.6. After collecting double the normal sample volume, EF1 submitted a June 2006 sample set to General Engineering Laboratories, LLC, of Charleston, South Carolina (GEL) for supplemental analyses involving:

- Liquid scintillation (tritium and technicium-99)
- Alpha spectroscopic analysis of uranium species (-233/234, -235/236, and -238 isotopes)
- Gamma spectroscopy
- Gas flow proportional counting (radium-228, strontium-89, strontium-90)
- Radon emanation analysis for radium-226

The GEL analyses include all radionuclides that are included in the work plan, including some that are not routinely performed in-house by Detroit Edison. These include:

- Strontium-90
- Radium-226
- Uranium-233, -234, -236, and -238

3.0 RESULTS

As of the date of this report, neither Detroit Edison nor its outside laboratory (GEL) have detected any indication of licensed radioactive material in the groundwater samples that have been collected from the shallow and deep monitor wells that Golder installed in 2003 through 2005. Additionally, Fermi 1's use of its frisker to screen for possible radioactivity in the soil and bedrock materials that were brought to the ground surface during drilling of the boreholes revealed no impacts. The following sections describe in more details the results of the hydrogeologic characterization of the EF1 site, including the occurrence and movement of groundwater in the two different zones in which the monitor wells were installed.

3.1 Geologic Setting

The local geologic profile is depicted in Figures 3 and 4. Descriptions of the fill, glacial, and bedrock formations are found on the boring logs in Appendix B. Golder's observations of site-specific conditions are presented below.

3.1.1 Fill Materials

MPC indicated to Golder during pilot borehole drilling that clay-rich fill materials were penetrated at each of the borehole locations. The use of the vacuum did not permit direct observation of the fill. MPC provided this interpretation to Golder based on the rate of penetration. The fill materials were also observed when retracting the hollow stem augers that were used to install the monitor wells. Other than EFT-7S, the abundance of clay-rich fill is consistent with the low rate of recovery of water levels that have been observed during performance of slug tests for hydraulic conductivity (Section 3.2.2) and during groundwater sampling in the shallow wells. To a lesser extent, Golder observed some sandy fill materials on the hollow stem augers when removing augers following the installation of EFT-4S, -5S, and- 8SR.

3.1.2 Glacial Deposits

Each of the borings encountered native glacial lake clay. In the shallow borings, Golder collected at least one split spoon sample of this formation in an effort to test for possible glacial lake sand interbedded with the clay. No native sand strata were encountered in the shallow zone.

Beneath the lake clay, each of the deep zone borings penetrated hard glacial till consisting of unsorted sandy clay. The lower foot of this unit commonly contains fragments of the dolomite bedrock. The thicknesses of the glacial units agrees with the range that Golder previously observed on EF-1 and EF-2 construction boring logs.

3.1.3 Bedrock

Based on Golder's observations of bedrock cores, the dolomite bedrock is characteristically fine-grained and contains sporadic small vugs, or voids, that are the result of dissolution of the carbonate matrix over long periods of time. Golder also observed occasional stylolites, which are jagged dissolution surfaces that typically occur along contacts of grain size differences. In the bedrock cores that Golder observed, neither feature acts as a source of secondary (i.e., increased) permeability in relation to the fine-grained rock. Golder also observed occasional bedding plane fractures, although these also do not appear to be zones of notable dissolution or secondary permeability.

3.2 Shallow Zone Groundwater Flow

Groundwater elevations in the shallow zone are displayed in green on the geologic cross sections in Figures 3 and 4, and in the series of groundwater elevation maps in Figures 5 through 11. The following sections describe the manner in which groundwater flow in the shallow zone is governed by groundwater elevations and formation permeability (i.e., hydraulic conductivity).

3.2.1 Groundwater Elevations

Groundwater elevations in the shallow zone wells are summarized in Table 1and are posted in green on Figures 3 through 11. On these maps, Golder has not contoured the groundwater elevations for the shallow wells because the site specific observations of saturation (or lack thereof) indicate that a continuous water table flow system does not exist in the shallow zone. Instead, groundwater in the shallow zone appears to be perched on top of the native clay. For this reason, the shallow zone wells were set at the base of the clayey fill and situated on top of the native clay. Within this perched zone, movement of groundwater will be largely controlled by the elevation of the perching clay surface, and may preferentially migrate in permeable fill materials surrounding subsurface features such as building basements (e.g., FARB. Reactor) and tunnels (e.g., sodium galleries). Such perched zones are commonly characterized by only localized areas of horizontal flow. For these reasons, the

shallow wells were situated as close as practicable to the AOCs. In other areas, the tendency will be for the perched water to slowly penetrate downward through the clay into the underlying bedrock, which is the basis for the installation of the bedrock wells.

As shown in Table 1, on each of the dates that full sets of groundwater elevations were recorded, the lake level was lower than the groundwater elevations in the shallow wells, indicating that the potential is consistently for shallow groundwater to either infiltrate vertically to deeper zones or migrate towards Lake Erie, and not potentially from Lake Erie into the fill materials in which the shallow zone wells are set.

3.2.2 Hydraulic Conductivity

Golder used the results of Detroit Edison's slug testing to calculate values for hydraulic conductivity using the Bouwer and Rice method (Bouwer, 1989) within the HydroSOLVE, Inc. Aqtesolv® software package. The reduced slug test results are contained in Appendix C; calculated values are summarized in Table 2.

In accordance with the work plan, Golder also assessed the hydraulic conductivity in the shallow zone by measuring the grain size distribution of native clay-rich sediments that were obtained via split spoon sampling below the terminus of the vacuum pilot holes at locations EFT-8S and -9S, and while drilling the boreholes for EFT-1D and -5D adjacent to their respective shallow wells. It was not possible to collect undisturbed samples from shallower intervals during the vacuum advancement of the pilot holes. The grain size distribution test results are contained in Appendix D.

The results of the grain size analyses indicate that the native sediments in which the shallow wells are screened contain abundant clayey material. The results of the slug tests and grain size distributions both indicate that the shallow zone permeabilities are low, less than 10^{-5} cm/sec, which is indicative of the high clay content that was observed in each of the boreholes. The calculated geometric mean value from Table 1 is 5.4×10^{-6} cm/sec, or approximately 0.015 feet/day. These values indicate that there is a low potential for the migration of radionuclides from the Areas of Concern, should any be detected.

3.2.3 Groundwater Movement

As described in Section 3.2.1, the wide differences of groundwater elevations in the shallow zone indicate that the movement of this water is strongly controlled by infiltration of rainfall and the surface of an underlying and perching clay stratum. Because the perched groundwater does not constitute a uniform flow system, groundwater flow velocity and direction in this zone cannot be accurately estimated. In addition, some of the EF1 buildings and AOCs are constructed entirely or partly below grade, to depths below the piezometric elevations in the shallow zone. These include the FARB, reactor basement, sodium tunnel, and sodium galleries. For these reasons, the shallow zone wells were installed as close as practical to the adjacent AOCs. Nonetheless, Golder has provided below an estimate of horizontal groundwater velocity in the shallow zone, based on the available site hydraulic gradient and conductivity data. The horizontal groundwater flow velocity can be estimated using the following form of Darcy's Law (Freeze and Cherry, 1979):

$V = Ki/n_e$; where:

V = average linear flow velocity (ft/day)
K = hydraulic conductivity (ft/day)
i = hydraulic gradient (ft/ft [i.e., unitless])
n_e = effective porosity (percent [i.e., unitless])

In naturally occurring flow systems in areas of slight topography, such as along Lake Erie, gradients of between 0.1 and 1 percent would be expected. Because of the large differences between the groundwater elevations in the fill, Golder has assumed that local gradients could be as high as 1 percent. Using the geometric mean value of 0.015 ft/day for K from Table 2, assuming an effective porosity of around 5 percent for silty clay (Linsley et al., 1982), and assuming a gradient of up to 1 percent, the estimated maximum of groundwater flow velocity in the fill materials is potentially 0.003 feet/day, or approximately 1 foot/year. This magnitude suggests that the shallow wells are placed close enough to the respective adjacent AOCs to have detected a possible release during the 1960s.

3.3 Deep Zone Groundwater Flow

Groundwater elevations in the deep zone are displayed in blue on the geologic cross sections in Figures 3 and 4, and in the series of groundwater elevation maps in Figures 5 through 11.

3.3.1 Groundwater Potentiometric Elevations

In accordance with the work plan, static groundwater elevations were initially measured in wells EFT-1D, EFT-2D, and EFT-5D in order to determine the direction of the horizontal hydraulic gradient in the bedrock before installing the remaining wells. The sequence of static water level measurements is displayed in Table 1. As determined on November 19, 2003, the gradient was more southeasterly than the easterly (i.e., toward Lake Erie) direction as originally inferred in the work plan. In response, Detroit Edison and Golder agreed that:

- Well EFT-3S/D was not necessary, as location EFT-4S/D was now inferred to be suitably downgradient of the FARB.
- Well EFT-6D must be situated more to the southeast of the reactor, whereas its original location was targeted to be immediately adjacent to the current position of EFT-6S.

Before installing EFT-6D, Golder again measured the static groundwater elevations in all of the deep monitor wells, on February 25, 2004 (Figure 6). These measurements continued to indicate that the gradient in the bedrock was to the southeast, such that the current location of EFT-6D would be downgradient of the reactor. As such, EFT-6D was drilled and installed at its current location in June 2004.

The water levels as shown in Figures 8 through 11 suggest that since 2005, the gradient is more to the south. The reason for the apparent shift in the gradient, which has never been directly toward Lake Erie, is unclear. A plausible explanation would be the presence of a some form of hydraulic sink located south of the EF1 complex, such as a quarry, a high-capacity well, or even a tunnel that may reside in or near the surface of the bedrock. There are no known operating bedrock quarries on the Fermi Power plant site; the closest quarry is located beyond the lagoon located south of EF1 and the adjacent peaking generators. This quarry has been inactive for many years and the water level in it has been allowed to recover to ambient conditions. The lagoon adjacent to the peaking generators drains to Lake Erie, so it does not act as a hydraulic sink.

There are no high capacity wells at EF1 or EF2. There are a number of sumps within the Termination Boundary, including three near the north side of the Steam Generator Building (Figure 2). If one or more of these sumps terminate at or within the bedrock, and if one or more extracts water at a high enough rate, such sumps could potentially alter the hydraulic gradient in the bedrock. EF1 drawing 6P721-1057-1 indicates that the deepest of these sumps, No. 1, which is designed to remove water

from the floor of the annulus outside the reactor building wall, extends to an elevation of 550.5 feet, such that it is situated into the bedrock. Golder's review of other design drawings for the FARB, sodium galleries/tunnel, and the reactor basement indicate that Sump 1 is the only one that reaches into the bedrock. The referenced drawing also indicates that the design capacity of the No. 1 sump pump is 25 gpm at a lift of 30 feet. If the sump was to sustain a flow rate approaching 25 gpm, this could be sufficient to alter the gradient in the bedrock. Fermi 1 personnel have described to Golder, however, that this sump is rarely active. As such, sumps within the EF1 complex are not thought to control the hydraulic gradient in the bedrock.

An examination of potentiometric groundwater elevations in REMP wells W-1 and W-2 (Appendix G), which are both located south of Fermi 1 (shown as GW-1 and GW-2, respectively, on Figure 1), indicates that levels at these location are typically lower than the potentiometric elevations at EFT-6D on approximately the same date (e.g., June 6, 2006 at EFT-6D vs. June 7, 2006), and are also typically lower than Lake Erie. This relationship is consistent with the possible presence of some form of hydraulic sink to the south or southwest of the Fermi site, and suggests that the influence on the hydraulic gradient in the bedrock at Fermi 1 is due to quarrying elsewhere in Monroe County, or possibly a high-capacity irrigation well. This interpretation is also supported by the water levels in REMP well W-3, which is completed approximately 300 feet into the bedrock, and is located southwest of W-1. Water levels at W-3 are consistently lower than any of the REMP wells. Because W-3 is open to the bedrock at a much deeper elevation, its water level would be influenced by quarrying to a greater degree than the other REMP wells, which are completed less than 10 feet into the bedrock surface.

Golder's review of the data base of verified water well locations that is maintained by the Michigan Department of Environmental Quality (MDEQ) indicates the presence of a 105-foot-deep irrigation well, installed in 1990, and located at 5194 Point Aux Peaux Road (State ID No. 58000009748), approximately 500 feet west of REMP well W-3, and approximately 2,000 feet west of REMP well W-2 (Figure 1). Because an irrigation well installed in 1990 does not require registration with the MDEQ, Golder was not able to determine whether the well is in use, or determine its pumping rate. If the rate was high enough (e.g., hundreds of gallons/minute), the pumping stress could lower water levels in the bedrock at a radius of hundreds of feet.

Based on the available data, Golder cannot positively identify what is controlling the hydraulic gradient in the bedrock. Based on EF1's description that Sump No. 1 is only occasionally active, and

because water levels in REMP wells W-1, W-2, and W-3 are lower than both Lake Erie and in EFT-6D, Golder infers that quarry dewatering in Monroe County, and possibly irrigation well use, is responsible for the southerly gradient in the bedrock at EF1.

3.3.2 Hydraulic Conductivity

Hydraulic conductivity in the bedrock has been estimated by measuring drawdown in open boreholes during the drilling, but prior to the installation, of upgradient well EFT-1D, and at downgradient well EFT-6D. At EFT-6D, the pumping tests were performed over consecutive 6-foot-long duel packer intervals, in part as a means of selecting the well's screened interval. During each pumping test, Golder measured the stabilized drawdown at a measured constant pumping rate. From these measurements, the hydraulic conductivity can be estimated using the following empirical relationship:

Transmissivity (gal/day/ft) = 2000 * (Flow Rate in gal/min) / (Total Drawdown in feet)

[Note: transmissivity = hydraulic conductivity (gal/day/ft^2) x thickness of producing zone (ft)]

The measured input parameters and resulting values for K are summarized in Table 3. The values shown for the EFT-6D bedrock borehole, which was drilled to an elevation equivalent to the bottom of the reactor basement, show that the highest transmissivity occurred in the upper several feet of the bedrock, where EFT-6D was correspondingly screened. The resulting calculated average hydraulic conductivity, expressed in units of feet/day, for the screened intervals of wells EFT-1D and EFT-6D is 12 feet/day.

3.3.3 Groundwater Flow Velocity

The approximate horizontal groundwater flow velocity in the bedrock can be estimated using Darcy's Law (Freeze and Cherry, 1979) as above from Section 3.2.3:

$V = Ki/n_e$; where:

V = average linear flow velocity (ft/day)
K = hydraulic conductivity (ft/day)
i = hydraulic gradient (ft/ft [i.e., unitless])
n_e = effective porosity (percent [i.e., unitless])

The hydraulic gradient can be obtained by examining the distance between the equipotential contours in Figure 5; the consistent drop of 0.25 feet over a distance of 108 feet yields a gradient of 0.002, or 0.2 percent. Using the average value of 12 ft/day for K from Table 3, assuming an effective porosity of approximately 3 percent (Linsley et al., 1982) for dense carbonate rock, and a gradient of 0.2 percent, the calculated groundwater flow velocity in the bedrock is 0.8 feet/day, or approximately 290 feet/year. This magnitude suggests that the bedrock wells are placed close enough to the respective adjacent AOCs to have detected a possible release, assuming that contaminated groundwater penetrated through the clay-rich fill and native sediments into the bedrock.

3.4 Groundwater Analytical Results

To date, Fermi 1 personnel have collected eight sets of groundwater samples. Six of these have been completely analyzed (i.e., both gamma and liquid scintillation analyses) internally to date. Fermi's laboratory reports and Golder's validation report for these full sample sets are contained in Appendix E. Each of the complete internally-analyzed sample sets included liquid scintillation and gamma spectroscopy. For all liquid scintillation analyses, each sample's report, as prepared by EF2 Radiation Protection engineer Dr. William Lipton, indicates that either no tritium was detected, or that the sample activity was less that the laboratory's Minimum Detectable Activity (MDA) range of 1.1 to 1.2 x 10^{-6} µCi/ml. The results of all EF2 gamma spectroscopic analyses indicate that no licensed radioactive material was detected. Based on our evaluation, Golder agrees with the EF2 laboratory analysts that these data indicate that there is no evidence of radiological impact to groundwater from historical EF1 operations.

The results and validation of General Engineering Laboratories' analyses are contained in Appendix F and summarized in Table 4, which lists only those radionuclides for which there was reported activity above the lab's Detection and/or Reporting Limits. This includes only uranium and radium. Table 4 also includes the following:

- Calculations of the background Upper Tolerance Limit (UTL) for the 95th percentile (at a confidence level of 95 percent) of these constituents that were detected in all three EF2 REMP wells located at the Nuclear Training Center (NTC), along Pointe Aux Peaux Road (PAP), and the Firing Range (RNG) (Figure 1).
- Summation of uranium-based alpha activity, for comparison with the USEPA's Maximum Contaminant Level (MCL) of 15 pCi/L.
- Summation of radium (226+228) activity, for comparison with the USEPA's MCL of 5 pCi/L.

- Based on total uranium alpha activity, Golder calculated an equivalent total uranium concentration in the groundwater samples using the USEPA's conversion factor of 0.67 pCi/L = 1 µg/L (USEPA, 2001). The USEPA's federal MCL (USEPA, 2006) for total uranium in drinking water is 30 µg/L.

None of the June 2006 sample readings exceeded the calculated background UTL of 21.16 pCi/L. Not including EFT-9S, none of the samples exhibited total alpha activity above the radioactivity-based MCL of 15 pCi/L. At EFT-9S, the measured rate was 16.04 pCi/L. These observations, in conjunction with the lack of positive frisker readings above background during field screening of the soil samples produced during the installation of EFT-9S, indicate that the reported activity did not result from an impact due to historical EF1 operations. This conclusion is supported by the lack of detectable activity in all of the EFT-9S samples for other potential fission products (e.g., Cs-137, Sr-90) that may have been present in the waste water stream that was routed from the laboratories and shower facilities at the Health Physics Building to the FARB. Additionally, none of the calculated total uranium concentrations exceed the total concentration-based (i.e., weight/volume) MCL of 30 µg/L.

The calculated background UTL for total radium (226+228) activity based on samples from the REMP wells is 5.27 pCi/L. This background UTL level is higher than the activity observed for the June 2006 sample from EFT-1D, which effectively equaled the USEPA's MCL of 5 pCi/L. There is no concentration-based MCL for total radium. Golder notes, however, that total radium activity, where detectable, is higher in the bedrock wells than in the shallow wells. This is consistent with the possibility that radium more readily exchanges with cations in carbonate rocks (e.g., substituting for calcium and magnesium) than it does in clay minerals, which are typically more enriched with potassium and sodium. Because the highest radium activity was measured at bedrock well EFT-1D, is less than the background UTL, and because EFT-1D is not downgradient of any of the Fermi 1 AOCs, Golder concludes that is the activity in this June 2006 sample is naturally-occurring radium in the bedrock.

4.0 CONCLUSIONS

Between November 2003 and July 2005, Golder Associates installed a total of 16 monitor wells at a total of 10 locations. Of these 16 wells, 14 are sampled on a quarterly to semi-annual basis to test for possible radiological impacts from historical EF1 operations. On the basis of the hydrogeologic observations and the groundwater analytical data generated during this characterization effort, Golder has drawn the following conclusions as summarized below.

4.1 Hydrogeologic Characteristics

1. The pre-construction geological profile at EF1 consists of the following unconsolidated native sediments and the bedrock sequence:

    - 0 - 7 feet: Soft black muck and peat.
    - 7 - 12 feet: Glaciolacustrine laminated gray clay and silt, with traces of humus.
    - 12 - 18 feet: Hard gray to yellowish sandy clay (glacial till).
    - > 18 feet: Dolomitic bedrock of the Bass Islands Group.

    During construction of the reactor building in 1956, approximately 27 feet of clayey and crushed stone fill was added to the top of the bedrock in order to bring the ground up to elevation of near 590 feet MSL. Outside the Controlled Area, approximately 10 feet of fill was added, bringing the existing ground elevation up to approximately 583.5 feet.

2. Each of the monitor well borings encountered native glacial lake clay beneath fill materials consisting primarily of clay, and to a lesser extend sand and crushed stone. Beneath the native clay, each of the deep zone borings penetrated hard glacial till consisting of unsorted sandy clay. The lower foot of this unit commonly contains fragments of the dolomite bedrock. The thicknesses of the glacial units agrees with the range that Golder previously observed on EF-1 and EF-2 construction boring logs.

3. The dolomite bedrock is characteristically fine-grained and contains sporadic small vugs, stylolites, and occasional bedding plane fractures that do not appear to be zones of notable dissolution or secondary permeability.

4. Groundwater elevations (and conversely, the periodic occurrence of dry wells) in the shallow wells indicate that the groundwater table in the shallow zone is perched on top of the underlying native clay. As such, horizontal movement of the perched groundwater is highly localized and largely controlled by the elevation of the perching surface. Overall, the shallow zone groundwater elevations are higher than Lake Erie's and the site bedrock wells' water levels, indicating that the potential is for shallow groundwater to either infiltrate vertically to deeper zones or eventually migrate towards Lake Erie.

5. The calculated geometric mean value for hydraulic conductivity of the native sediments that underlie the shallow zone wells is 5.4 x 10^{-6} cm/sec, or approximately 0.015 feet/day. The low magnitude is consistent with grain size analyses that indicate an abundance of clay in the native glacial sediments. In areas where horizontal movement of the perched water may occur, the estimated maximum groundwater flow velocity in the shallow zone is 0.003 feet/day, or approximately 1 foot/year. This magnitude suggests that the shallow wells are placed close enough to the respective adjacent AOCs to have detected a possible release during the 1960s.

6. Since 2005, the groundwater flow direction in the bedrock zone has been predominantly to the south, and has never been directly toward Lake Erie, as anticipated prior to the installation of the bedrock wells. Based on the available data, Golder cannot positively identify what is controlling the hydraulic gradient in the bedrock. Based on potentiometric groundwater elevations in REMP wells W-1, W-2, and W-3, which are located south and/or southwest of Fermi 1, and where water elevations are lower than at EFT-6D, Golder infers that quarrying elsewhere in Monroe County, and possibly irrigation well pumping stresses, to the south or southwest of Fermi 1, influences the hydraulic gradient in the bedrock. The calculated groundwater flow velocity in the bedrock at EF1 is 0.8 feet/day, or approximately 290 feet/year. This magnitude suggests that the bedrock wells are placed close enough to the respective adjacent AOCs to have detected a possible release, assuming that impacted groundwater penetrated through the clay-rich fill and native sediments into the bedrock.

4.2 Groundwater Analytical Results

1. For each of the sample sets that have been analyzed to date by Detroit Edison's Fermi 2 on-site laboratory, all tritium activity was less that the laboratory's Minimum Detectable Activity (MDA) of 1.1 to 1.2 x 10^{-6} µCi/ml. As summarized by EF2 Radiation Protection engineer Dr. William

Lipton, the results of all gamma spectroscopic analyses performed to date indicate that no licensed radioactive material was detected. Based on these data, Golder finds that there is no evidence of radiological impact to groundwater from historical EF1 operations.

2. The 2004-2006 EF2 laboratory analytical results are supported by the analysis of the June 2006 sample set by Fermi 1's subcontracted laboratory (GEL). This sample set produced no detectable liquid scintillation activity and no gamma activity.

3. Some of the June 2006 samples, including the Fermi 2 REMP wells, exhibited detectable alpha activity by one or more uranium isotopes. A comparison of the alpha activity in the Fermi 1 wells with the Fermi 2 REMP wells suggests that the reported activity did not result from an impact due to EF1 operations.

4. None of the calculated total uranium concentrations exceed the USEPA's Maximum Contaminant Level (MCL) of 30 µg/L. The highest value, at Fermi 1 shallow zone well EFT-9S, also did not exceed the background Upper Tolerance Limit.

5. Detectable radium activity is higher in the bedrock wells than in the shallow wells. This is consistent with the common substitution of naturally occurring radium for the major cations in carbonate rocks. For the June 2006 samples, the UTL for total radium activity in the Fermi 2 REMP wells was not exceeded by any of the sample results. The highest measurement occurred at bedrock well EFT-1D, which also effectively equaled the USEPA's MCL of 5 pCi/L. Because the highest radium activity occurred at EFT-1D, and did not exceed the background UTL, Golder concludes that its source is naturally occurring radium in the bedrock.

6. Collectively, the groundwater sample results to date have shown neither indications of detectable fission products nor of tritium (i.e., via liquid scintillation) or naturally occurring activity above background. All detectable activity is comparable in magnitude to measurements for samples obtained from the REMP monitor wells. These observations indicate that detectable activity in the EF1 monitor well samples is consistent with the normally occurring radioactive materials in area groundwater. Based on this data, Golder finds that there is no evidence of radiological impact to groundwater from EF1 operations to date.

5.0 REFERENCES

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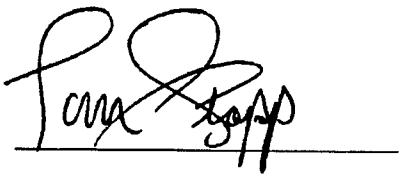
6.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

The undersigned attest that Golder Associates Inc., on behalf of the Detroit Edison Company, have implemented the groundwater characterization at the decommissioned Enrico Fermi 1 power plant in accordance with the most recent version of the groundwater characterization work plan (August 2005).

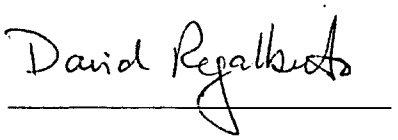
Please contact any of us if there is a need for discussion or additional information.

Sincerely,

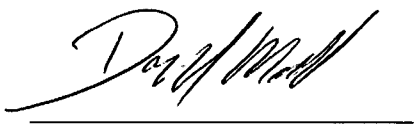
GOLDER ASSOCIATES INC.



Thomas Stapp
Project Scientist



Davis P. Regalbuto, C.P.G.
Senior Hydrogeologist/Project Manger



Douglas Morell, P.E., P.G.
Principal

TABLES

TABLE 1
GROUNDWATER ELEVATIONS
DETROIT EDISON - FERMI I

Well:	1S	1D	2S	2D	4S	4D	5S	5D	6S	6D	7S	8S	8SR	9S	10S	Lake Erie (Note 5)	
Casing Elev 1: (12-03-03)	584.69	584.68	583.15	582.94	586.98	587.16	586.38	586.71				582.68		582.83			
Casing Elev 2: (04-15-05)	584.72	584.72	583.14	582.96	587.07	587.16	586.54	586.74	585.53	585.55	584.82		582.77	582.92	591.38	Time	
Depth to Water (feet below top of well rim)																0800	1700
11/17/03 (08:15)	Dry	11.43	3.75	12.19			2.33	13.65									
11/17/03 (11:24)	Dry	14.00	3.76	12.20			4.68	16.30									
11/17/03 (13:30)	Dry	14.03	3.73	12.17			NM	NM									
11/17/03 (15:30)	Dry	13.92	3.78	12.18			4.70	16.32									
11/17/03 (16:30)	Dry	13.95	3.75	12.15			4.70	16.30									
11/18/03 (08:20)	12.51	13.86	3.78	12.08			4.87	16.36									
11/18/03 (12:20)	12.40	13.84	3.77	12.06			4.94	16.29									
11/19/03	12.22	13.85	3.79	12.04			4.26	16.20									
11/25/03	10.19	13.93	3.76	12.07			4.83	15.95				Dry		8.50			
12/1/03	9.48	13.67	3.84	11.75	4.37	15.98	4.94	15.58			5.25	Dry		7.83			
12/4/03	9.48	13.59	4.72	11.74	6.11	16.00	5.39	15.61			NM	Dry		NM			
12/8/03	9.34	13.61	5.16	11.81	NM	16.76	NM	16.29			NM	NM		8.08			
2/25/04	9.03	13.39	7.43	10.27	6.35	16.20	4.81	15.90			8.66	NM		7.38			
4/29 - 5/13/04	7.82	12.15	5.08	10.06	6.84	15.65	5.76	15.33			6.66	Dry		5.20			
7/28 - 8/05-04	7.02	12.72	4.85	10.49	5.31	14.68	5.22	14.26	7.19	15.39	5.18	Dry	7.84	7.02			
10/19 - 11/23/04	8.12	13.31	5.61	11.53	7.01	15.53	5.45	15.11	7.15	15.84	5.23	Dry	9.76	7.83			
2/1/05	8.80	12.12	Dry	12.40	6.65	14.75	5.81	14.31	7.68	14.90	6.93	Dry	9.77	NM			
4/19/05	7.93	12.22	7.01	10.42	9.05	14.70	7.66	14.32	8.14	14.66	NM	NM	3.24	3.39			
9/22/05	7.79	14.60	4.68	12.02	7.76	17.59	6.35	16.19	7.68	16.83	5.42	NM	6.94	3.85	20.89	Not Analyzed	
2/7/06	7.99	12.17	7.57	10.00	4.31	14.21	4.85	13.83	6.30	14.80	6.71	7.56	8.52	4.66	16.09		
6/6/06	7.08	11.85	4.80	9.95	6.00	14.30	15.10	13.80	6.65	13.95	6.80	6.72	8.85	4.10	16.60		
12/11/06	6.22	12.05	6.39	10.27	6.47	14.52	5.75	14.11	7.37	14.23	6.08	7.32	9.52	4.90	17.32		
Groundwater Elevation																	
11/17/03 (08:15)	Dry	573.25	579.40	570.75			584.05	573.06									
11/17/03 (11:24)	Dry	570.68	579.39	570.74			581.70	570.41									
11/17/03 (13:30)	Dry	570.65	579.42	570.77			NM	NM									
11/17/03 (15:30)	Dry	570.76	579.37	570.76			581.68	570.39									
11/17/03 (16:30)	Dry	570.73	579.40	570.79			581.68	570.41									
11/18/03 (08:20)	572.18	570.82	579.37	570.86			581.51	570.35									
11/18/03 (12:20)	572.29	570.84	579.38	570.88			581.44	570.42									
11/19/03	572.47	570.83	579.36	570.90			582.12	570.51									
11/25/03	574.50	570.75	579.39	570.87			581.55	570.76				Dry		574.42			
12/1/03	575.21	571.01	579.31	571.19	582.61	571.18	581.44	571.13			579.57	Dry		575.09			
12/4/03	575.21	571.09	578.43	571.20	580.87	571.16	580.99	571.10			NM	Dry		NM			
12/8/03	575.35	571.07	577.99	571.13	NM	570.40	NM	570.42			NM	NM		574.84			
2/25/04	575.66	571.29	575.72	572.67	580.63	570.96	581.57	570.81			576.16	NM		575.54			
4/29 - 5/13/04	576.87	572.53	578.07	572.88	580.14	571.51	580.62	571.38			578.16	Dry		577.72			
7/28 - 8/05-04	577.67	571.96	578.30	572.45	581.67	572.48	581.16	572.45	578.34	570.16	579.64	Dry		575.90		572.00	571.80
10/19 - 11/23/04	576.57	571.37	577.54	571.41	579.97	571.63	580.93	571.60	578.38	569.71	579.59	Dry	573.01	575.09		571.45	571.75
2/1/05	575.89	572.56	Dry	570.54	580.33	572.41	580.57	572.40	577.85	570.65	577.89	Dry	573.00	NM		571.70	571.55
4/19/05	576.79	572.50	576.13	572.54	578.02	572.46	578.88	572.42	577.39	570.89	NM	NM	579.53	579.53		572.00	572.10
9/22/05	576.93	570.12	578.46	570.94	579.31	569.57	580.19	570.55	577.85	568.72	579.40	NM	575.83	579.07	570.49	570.90	570.30
2/7/06	576.73	572.55	575.57	572.96	582.76	572.95	581.69	572.91	579.23	570.75	578.11	575.12	574.25	578.26	575.29	570.95	570.90
6/6/06	577.64	572.87	578.34	573.01	581.07	572.86	571.44	572.94	578.88	571.60	578.02	575.96	573.92	578.82	574.78	571.65	571.85
12/11/06	578.50	572.67	576.75	572.69	580.60	572.64	580.79	572.63	578.16	571.32	578.74	575.36	573.25	578.02	574.06	570.75	571.50

NOTES:

1. Well numbers are preceded by the prefix "EFT-"
2. Elevations recorded in feet above mean sea level (MSL). Rim elevations provided by Detroit Edison Company.
3. NM = Not Measured
4. Shaded cell indicates that the well had not yet been installed.
5. Values posted for dates following the installation of EFT-6D. Reference: http://tidesandcurrents.noaa.gov/; NOAA Station ID: 9063090 at Fermi Power Plant.

TABLE 2
SHALLOW ZONE HYDRAULIC CONDUCTIVITY MEASUREMENTS
DETROIT EDISON - FERMI 1

Well	Hydraulic Conductivity (Horizontal)	
	(cm/sec)	(ft/day)
EFT-1S	6.E-06	2E-02
EFT-2S	2.E-06	7E-03
EFT-4S	9.E-06	2E-02
EFT-5S	1.E-06	3E-03
EFT-6S	2.E-06	6E-03
EFT-8S	8.E-05	2E-01
Geometric Mean:	**5.4E-06**	**1.5E-02**

TABLE 3
BEDROCK ZONE HYDRAULIC CONDUCTIVITY MEASUREMENTS
DETROIT EDISON - FERMI 1

Borehole	Interval	Flow Rate		Stable Drawdown (feet)	Transmissivity	Hydraulic Conductivity		
	(ft BGL)	l/min	gal/min		(gal/day/ft)	gal/day/ft^2	cm/sec	ft/day
Bedrock Well Screened Intervals								
EFT-1D	30.5-35.5	1.0	0.3	4.8	109	22	0.0010	2.9
EFT-6D	26 - 32	6.0	1.6	3.4	932	155	0.0073	20.8
					Average:	89	0.0042	12
Other Bedrock Intervals								
EFT-6D	32 - 38	5.5	1.5	5.5	528	88	0.0042	11.8
EFT-6D	38 - 44	5.0	1.3	10.1	262	44	0.0021	5.8

Note: Transmissivity (gal/day/ft) = 2000 * (Flow Rate in gal/min) / (Total Drawdown in feet)

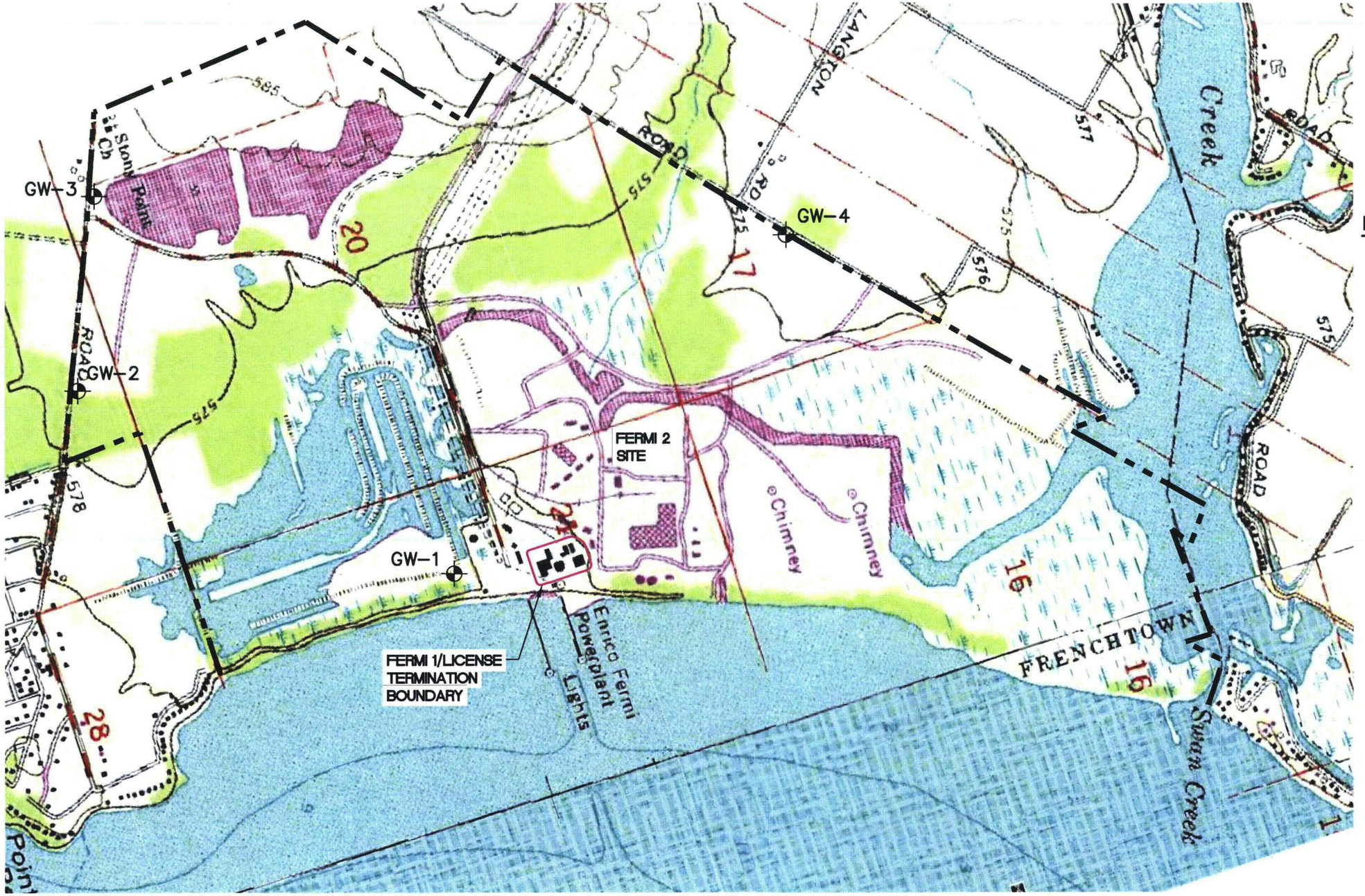
TABLE 4
SUMMARY OF ALPHA AND RADIUM ACTIVITY
DETROIT EDISON COMPANY - FERMI 1
JUNE 2006 SAMPLING EVENT

WELL	Alpha Activity (pCi/L)				Calculated Total U (µg/L) (Note 1)	Radium Activity (pCi/L)		
	U-233/234	U-235/236	U-238	Total		Ra-226	Ra-228	Total
MCL (Note 2):	**Not applicable**			**15**	**30**	**Not applicable**		**5**
1S	1.78	<1	0.62	2.40	3.6	0.62	1.75	2.37
1D	1.67	<1	1.41	3.08	4.6	0.91	4.10	5.01
2S	1.56	<1	1.39	2.95	4.4	<1	<3	<4
2D	0.98	<1	<1	0.98	1.5	1.03	<3	1.03
4S	3.89	<1	2.81	6.70	10.0	<1	<3	<4
4D	<1	<1	<1	<3	<4.5	1.64	1.74	3.38
4D (Dup)	<1	<1	<1	<3	<4.5	0.94	1.03	1.97
5S	3.67	0.49	2.65	6.81	10.2	0.48	<3	0.48
5D	<1	<1	<1	<3	<4.5	2.30	1.26	3.56
6S	<1	3.87	<1	3.87	5.8	0.33	<3	0.33
6D	1.28	<1	<1	1.28	1.9	0.77	<3	0.77
7S	3.33	0.34	2.65	6.32	9.4	0.63	<3	0.63
8S	4.89	0.71	4.02	9.62	14.4	<1	<3	<4
9S	9.71	<1	6.33	16.04	23.9	0.54	<3	0.54
10S	1.02	<1	0.81	1.83	2.7	1.93	<3	1.93
BKG-NTC	1.03	<1	0.30	1.33	2.0	0.57	0.73	1.30
BKG-PAP	2.82	<1	2.99	5.81	8.7	0.41	<3	0.41
BKG-RNG	1.16	<1	1.16	2.32	3.5	1.42	<3	1.42
STDEV	1.00	NA	1.37	2.35	3.5	0.54	NA	0.55
UTL (Note 3)	9.31	NA	11.99	21.16	31.59	4.96	NA	5.27

Notes:

1. Calculated Total Uranium concentrations (ug/L) assume a conversion factor of 0.67 pCi/L = 1 µg/L. Reference: *National Primary Drinking Water Regulations; Final Rule 65 FR 236; December 7, 2000*.
2. Maximum Contaminant Level set by U.S. Envronmental Protection Agency. Reference: *National Primary Drinking Water Regulations; Final Rule 65 FR 236; December 7, 2000.*
3. Upper Tolerance Limit for the 95th percentile; assumes normal distribution of measured values.

FIGURES



LEGEND

GW–2 — FERMI 2 BACKGROUND MONITOR WELL LOCATION

FERMI 2 LAND BOUNDARY

REFERENCES

1.) SITE TOPOGRAPHY FROM USGS 7.5 MINUTE QUAD MAP, STONY POINT, MICHIGAN 1978.

2.) SITE BOUNDARY ADAPTED FROM DECO DRAWING NO. 6A721–2102, REV. L.

1000 0 1000

APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

FILE No.	023–8793.0004 (1)
PROJECT No.	023–8793 REV. 0

SCALE	AS SHOWN
DATE	03/18/05
DESIGN	DPR
CADD	JJS
CHECK	DJS
REVIEW	DJH

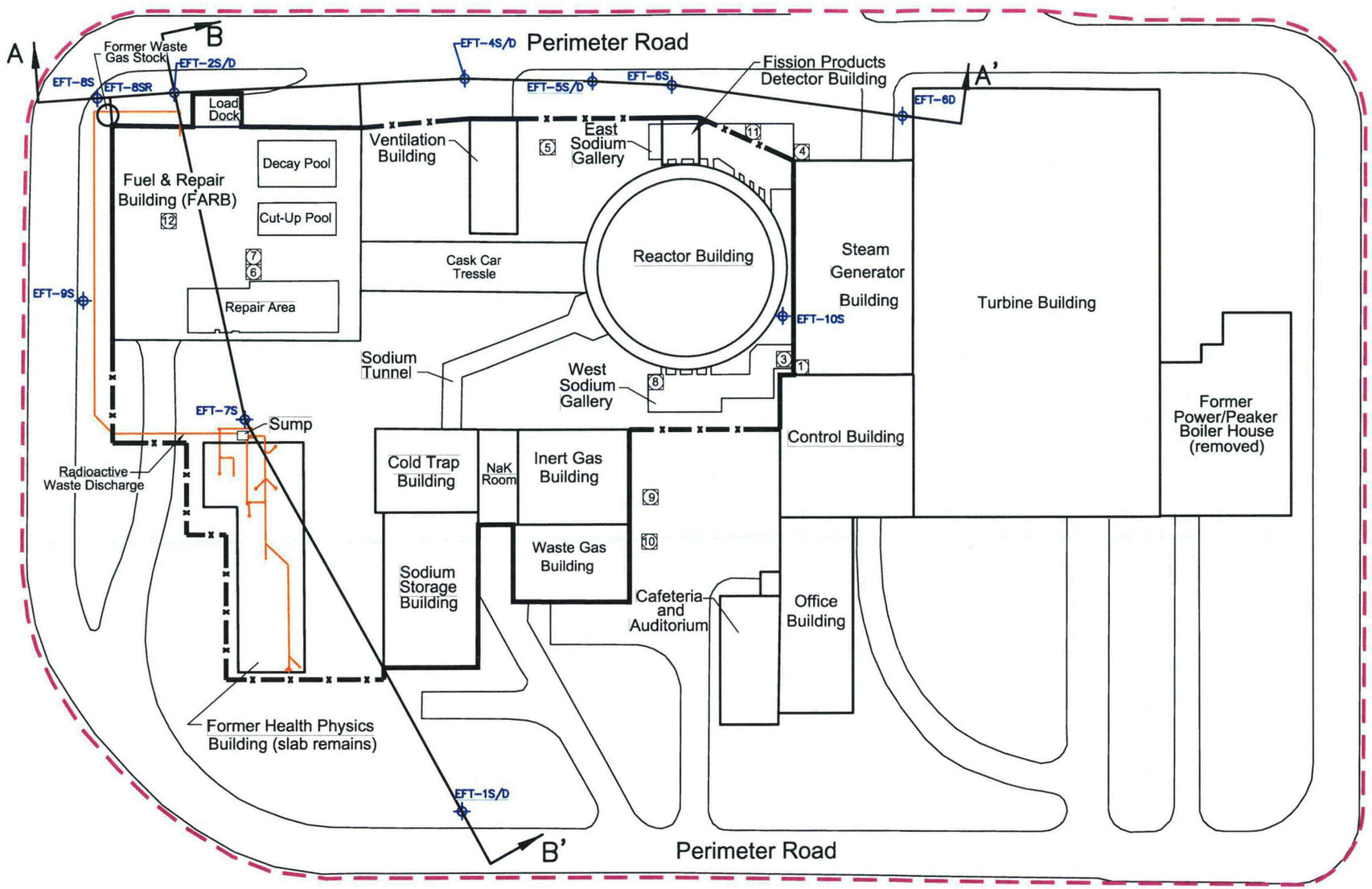
TITLE

SITE LOCATION MAP
DETROIT EDISON
FERMI 1
NEWPORT, MI

DTE\FERMI 1\MI

FIGURE 1

Drawing file: 023B793A001.dwg Jun 20, 2007 - 3:34pm



Legend

- Fence
- Protected Area Boundary
- 5 Sump
- EFT4S/D Proposed Shallow/Deep Monitor Well
- Termination Boundary
- A A' Geologic Cross Section Locations (Figures 3 & 4)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721–56 (Perimeter road and general building layout)
   - 6E721–43–1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721–1074–1 (Sodium tunnel)
   - 6C721–1640–1 (FARB interior)
   - 6E721–57–4 (East sodium gallery)
   - 6E721–57–5 (West sodium gallery)
   - 6P721–1117–1 (Health physics building and drains)
   - 6P721–1118–1 (Radioactive waste discharge line)
   - 6P721–1836–20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

FILE No.	0238793A001 FIG 2
PROJECT No.	023–8793 REV. 0
SCALE	AS SHOWN
DATE	03/18/05
DESIGN	DY
CADD	DY/JJS
CHECK	DBZ
REVIEW	DTH

TITLE
SITE PLAN AND CROSS SECTION LOCATION MAP
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE **2**

Drawing file: 0238793A001.dwg Jun 15, 2007 – 1:04pm

A (NORTH)

A' (SOUTH)

EFT-8S & EFT-8SR

EFT-2S/D

EFT-4S/D

EFT-5S/D

EFT-6S

EFT-6D

585

580

575

570

565

560

555

550

545

540

577.54'

573.01'

579.97'

580.93'

578.38'

569.71'

571.41'

571.63'

571.60'

FILL

FILL

GLACIAL LAKE CLAY

GLACIAL LAKE CLAY

GLACIAL TILL

GLACIAL TILL

BEDROCK: BASS ISLANDS DOLOMITE

Legend

- ASPHALT
- FILL
- SILTY CLAY
- SILTY CLAY W/ TRACE FINE GRAVEL
- SAND
- SANDY CLAY
- SILT
- BED ROCK
- 578.30' PIEZOMETRIC GROUNDWATER ELEVATION (OCT./NOV. 2004)
- 571.60' POTENTIOMETRIC GROUNDWATER ELEVATION (OCT./NOV. 2004)
- MONITORING WELL PROFILE

VERTICAL 6

HORIZONTAL 0' 30

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:04pm

Golder Associates
Lansing, Michigan

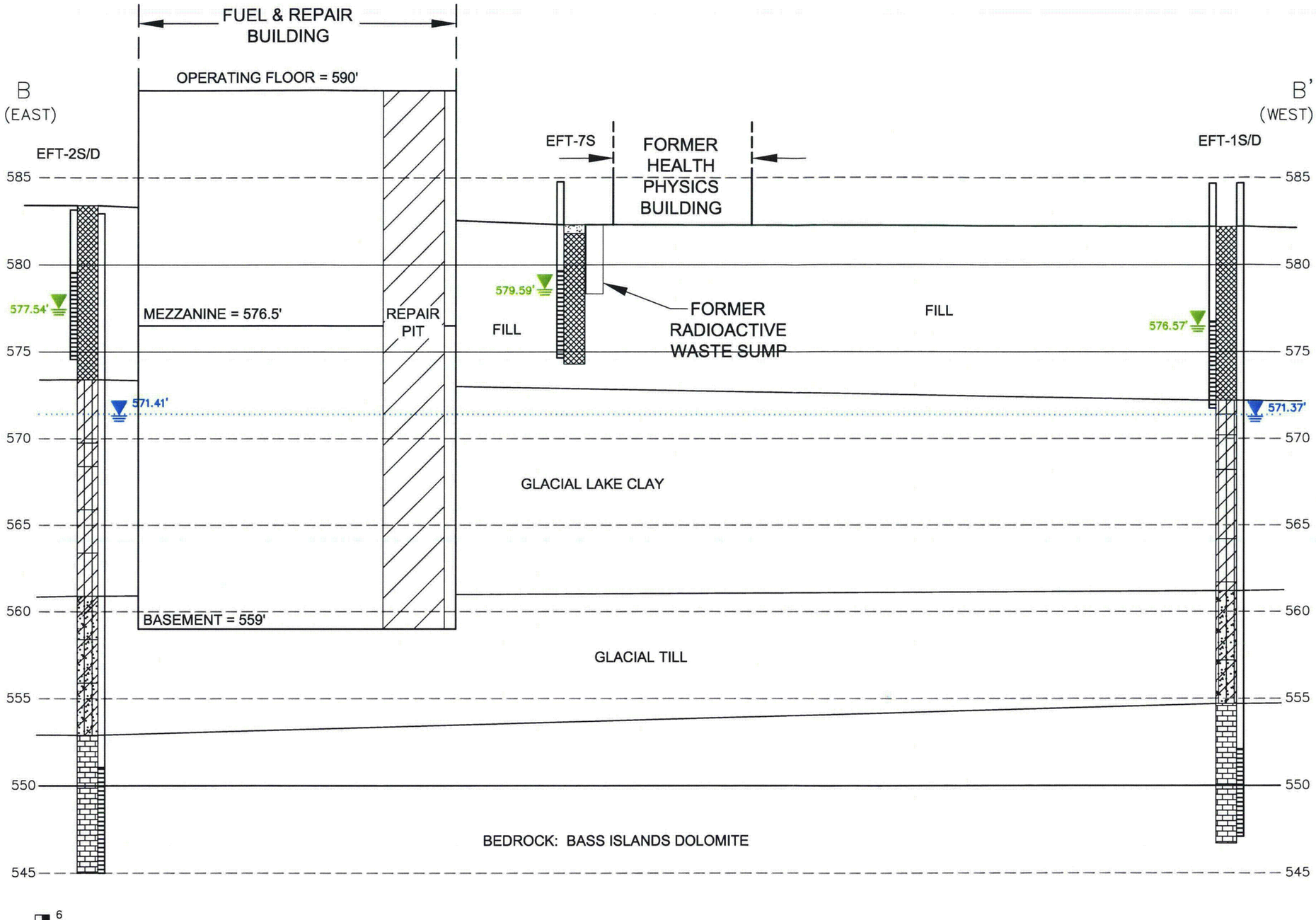
FILE No.	0238793A001 FIG 3		
PROJECT No.	023-8793	REV.	0

SCALE	AS SHOWN
DATE	03/18/05
DESIGN	DY
CADD	DY/JJS
CHECK	DRR
REVIEW	DTH

TITLE: **GEOLOGIC CROSS SECTION A - A'**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 3



Drawing file: 0238793A001.dwg Jun 20, 2007 – 11:57am

Golder Associates
Lansing, Michigan

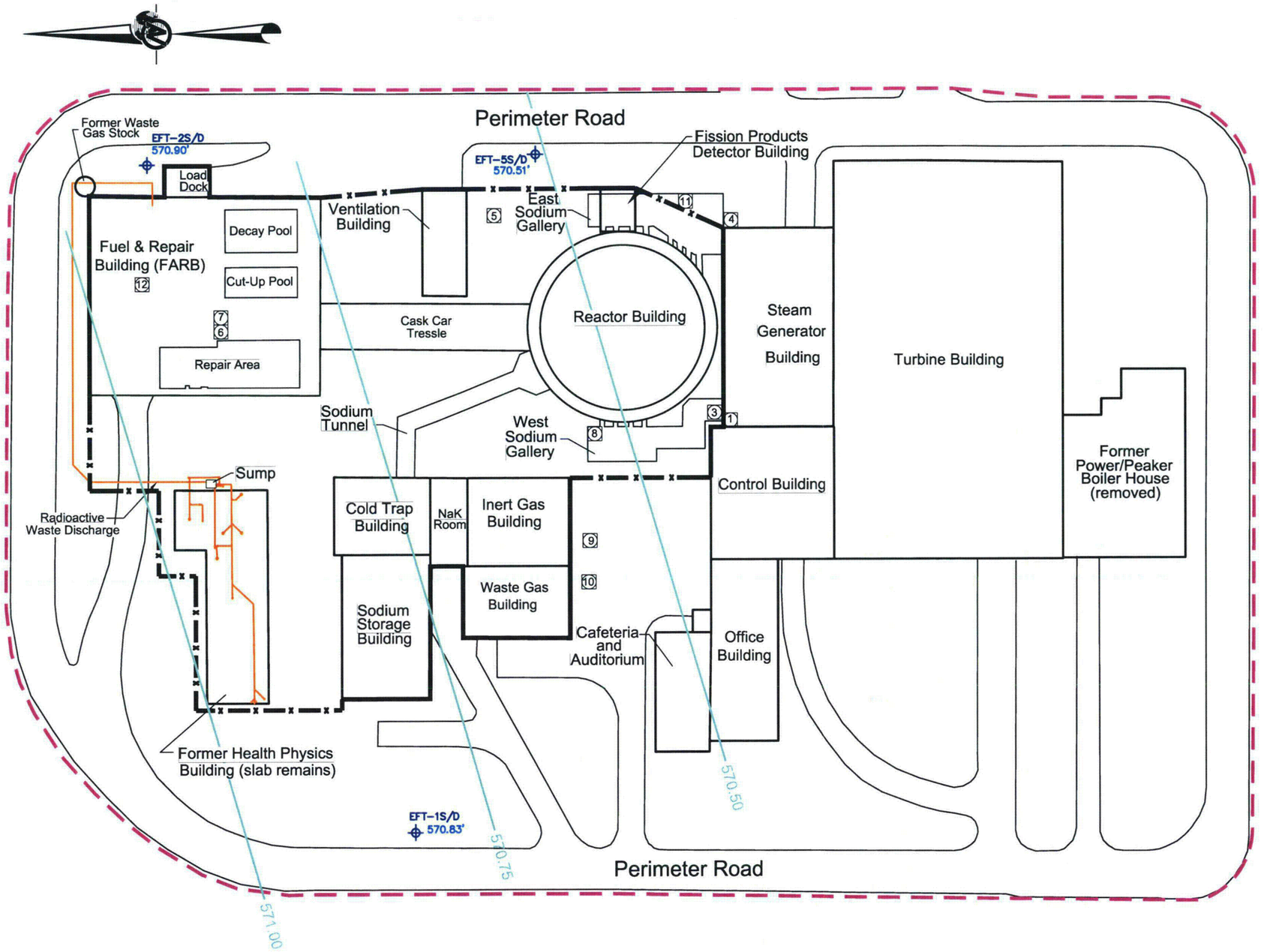
FILE No.	0238793A001 FIG 4		
PROJECT No.	023-8793	REV.	0

SCALE	AS SHOWN
DATE	03/18/05
DESIGN	DY
CADD	DY/JJS
CHECK	BRL
REVIEW	DJH

TITLE: **GEOLOGIC CROSS SECTION B - B'**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 4



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- (5) SUMP
- EFT-1S/D — SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 569.69' — POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721-56 (Perimeter road and general building layout)
   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

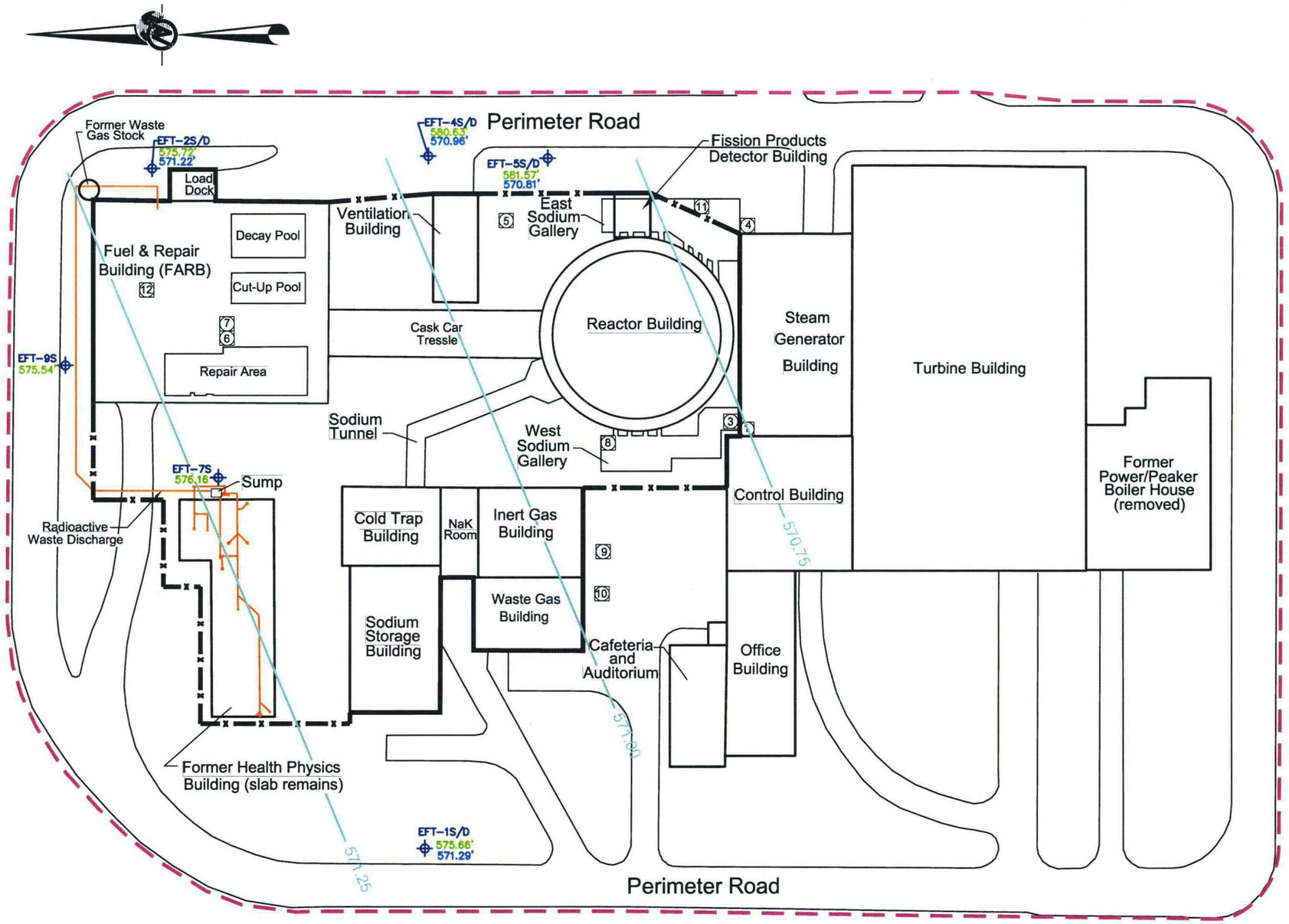
FILE No.	0238793A001
PROJECT No.	023-8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DPR
REVIEW	DJH

TITLE: **GROUNDWATER ELEVATION MAP NOVEMBER 19, 2003**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 5

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:05pm



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- SUMP
- EFT-1S/D — SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' — PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' — POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721-56 (Perimeter road and general building layout)
   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

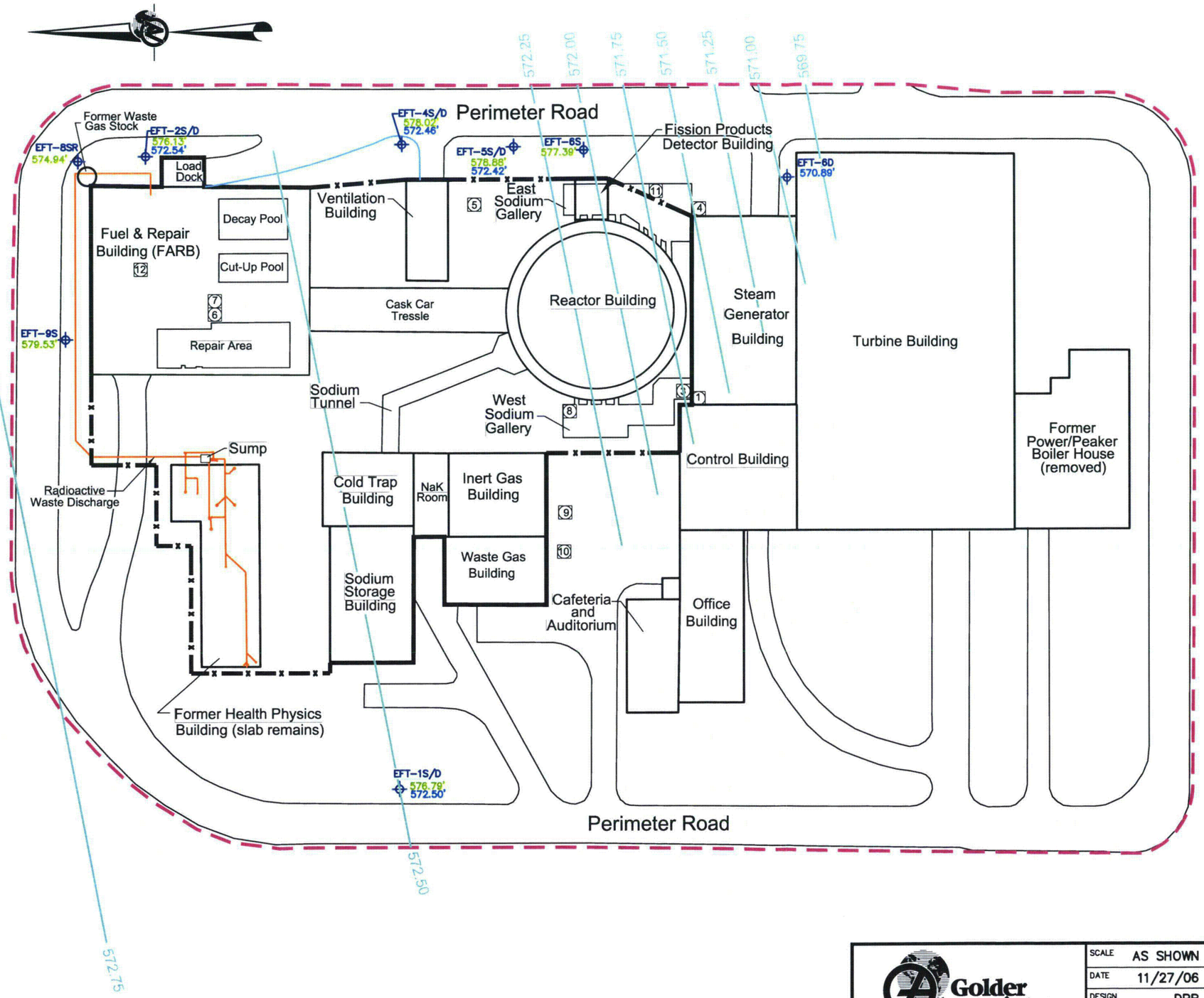
FILE No.	0238793A001
PROJECT No.	023-8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DPR
REVIEW	DTM

TITLE: **GROUNDWATER ELEVATION MAP FEBRUARY 25, 2004**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 6

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:05pm



50 0 50

APPROXIMATE SCALE IN FEET

Legend

- FENCE
- PROTECTED AREA BOUNDARY
- (5) SUMP
- EFT-1S/D SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
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   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)

Golder Associates
Lansing, Michigan

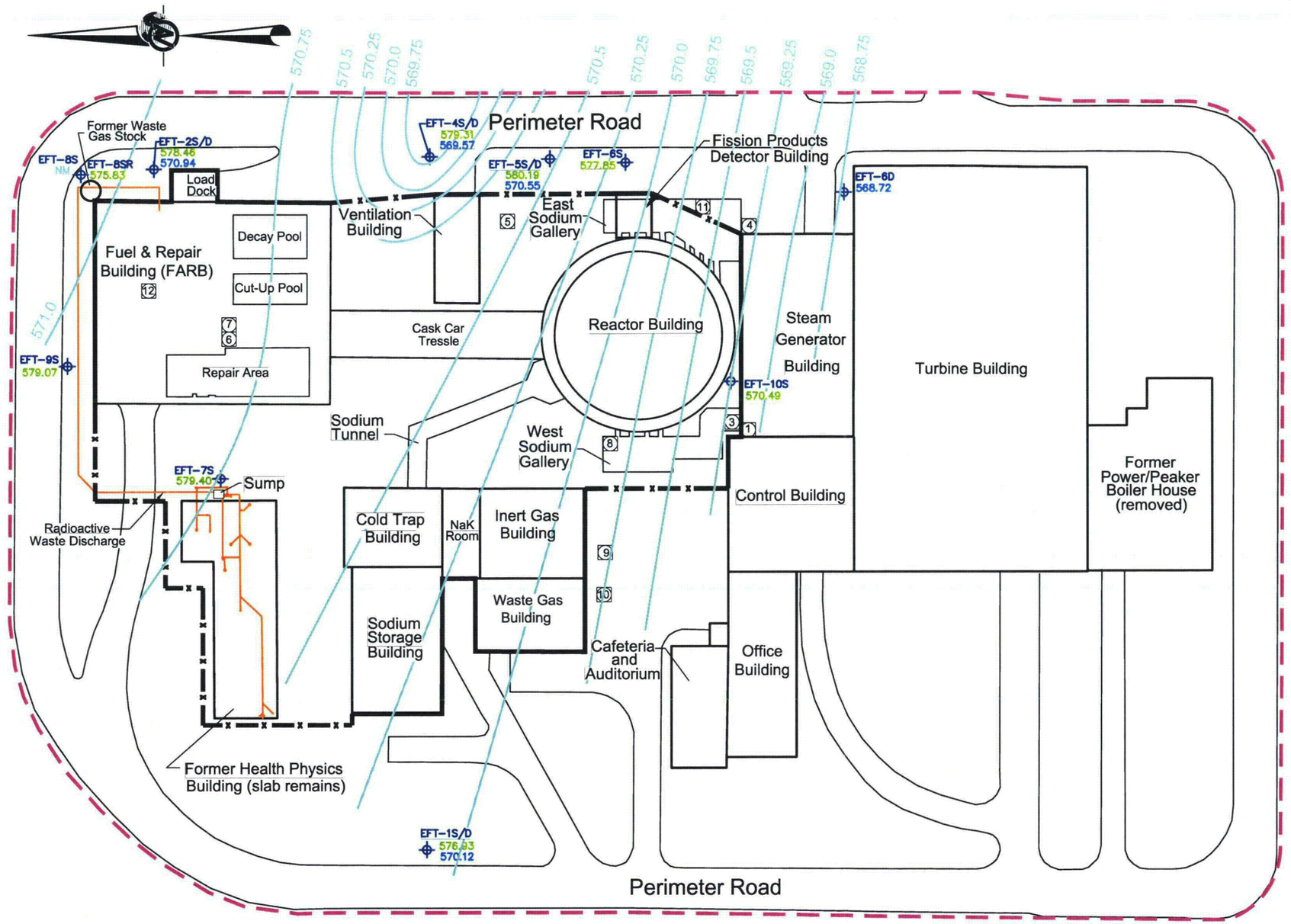
FILE No.	0238793A001
PROJECT No.	023-8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DRC
REVIEW	DTH

TITLE: **GROUNDWATER ELEVATION MAP APRIL 19, 2005** DETROIT EDISON FERMI 1 DETROIT, MI

DTE\FERMI 1\MI

FIGURE 7

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:05pm



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- 5 SUMP
- EFT-1S/D SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721-56 (Perimeter road and general building layout)
   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

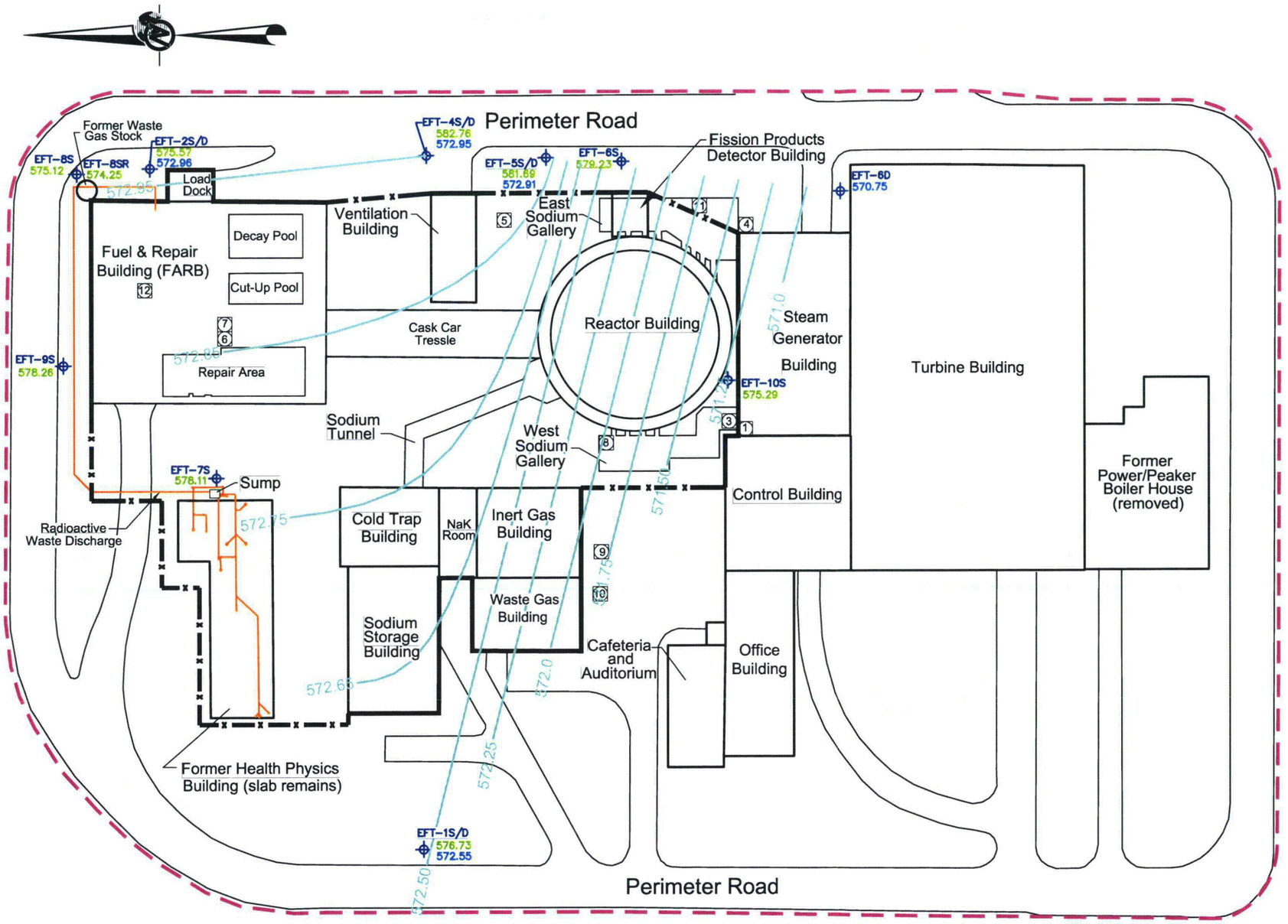
FILE No.	0238793A001
PROJECT No.	023-8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DPR
REVIEW	DTH

TITLE: **GROUNDWATER ELEVATION MAP SEPTEMBER 22, 2005**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 8

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:27pm



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- (5) SUMP
- EFT-1S/D SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721-56 (Perimeter road and general building layout)
   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

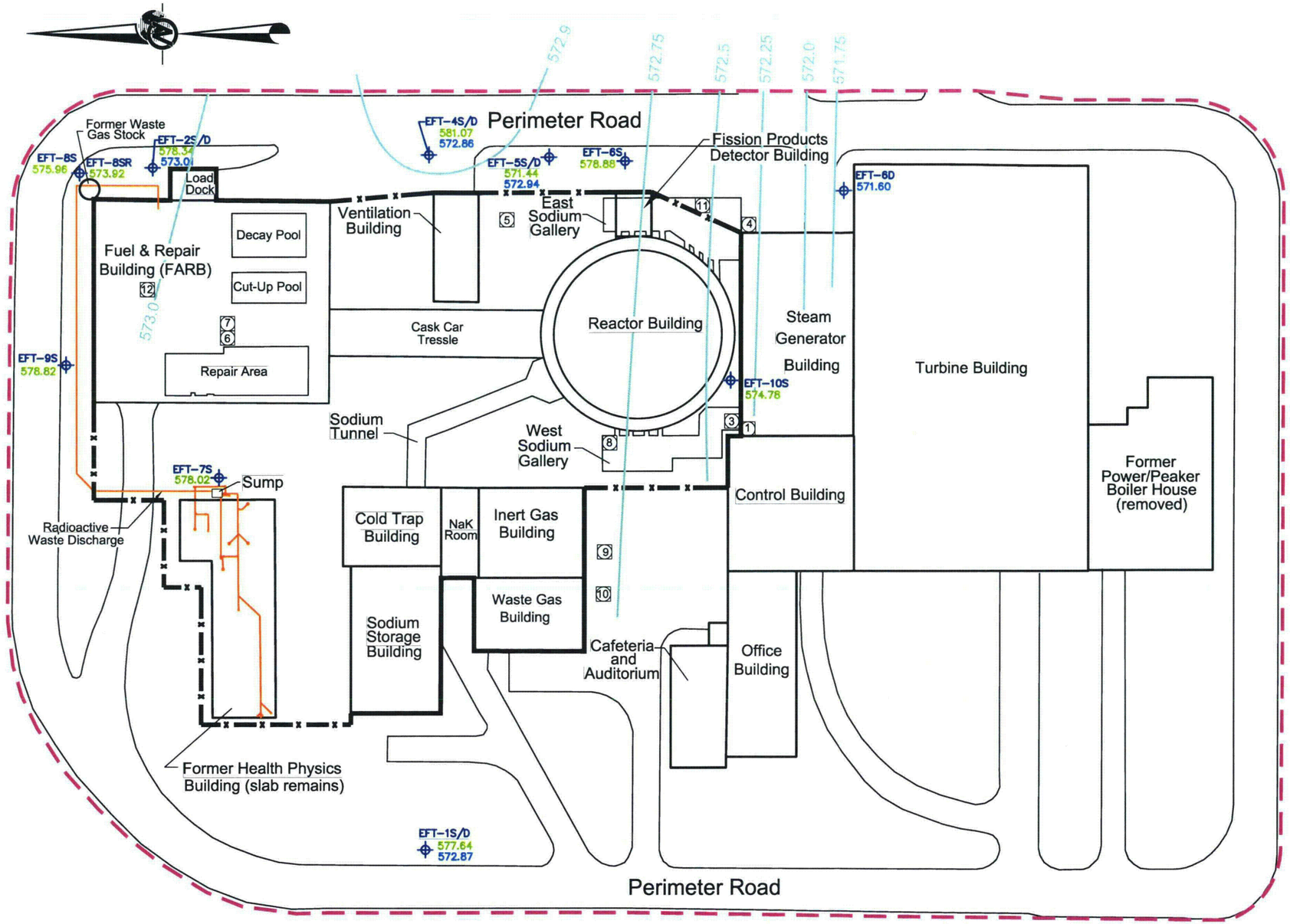
FILE No.	0238793A001
PROJECT No.	023-8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DRC
REVIEW	DJM

TITLE: **GROUNDWATER ELEVATION MAP FEBRUARY 7. 2006**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 9

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:28pm



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- (5) SUMP
- EFT-1S/D — SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' — PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' — POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
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   - 6P721–1074–1 (Sodium tunnel)
   - 6C721–1640–1 (FARB interior)
   - 6E721–57–4 (East sodium gallery)
   - 6E721–57–5 (West sodium gallery)
   - 6P721–1117–1 (Health physics building and drains)
   - 6P721–1118–1 (Radioactive waste discharge line)
   - 6P721–1836–20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

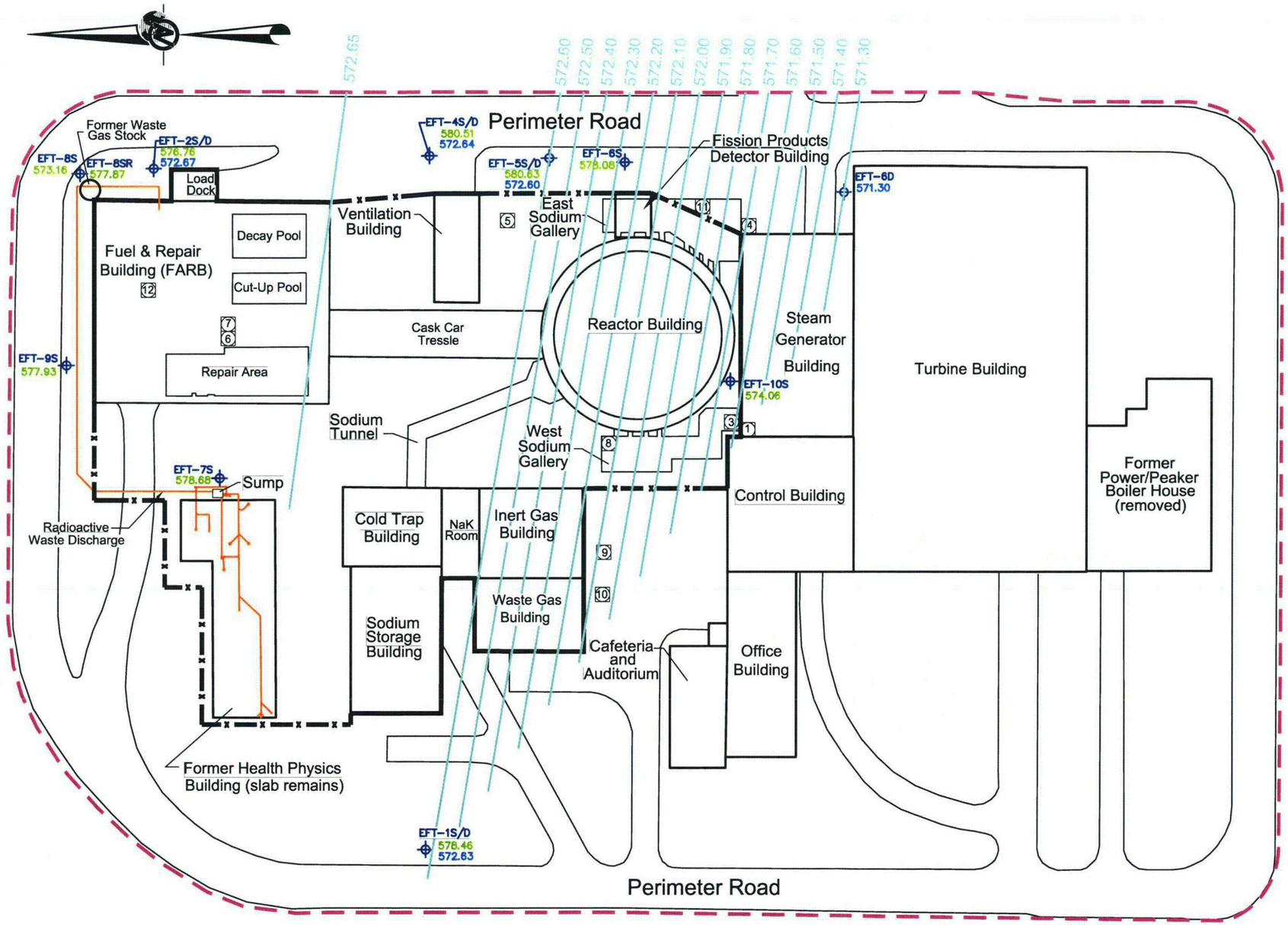
FILE No.	0238793A001
PROJECT No.	023–8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DRR
REVIEW	DTM

TITLE: **GROUNDWATER ELEVATION MAP JUNE 6, 2006**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 10

Drawing file: 0238793A001.dwg Jun 15, 2007 - 1:08pm



Legend

- FENCE
- PROTECTED AREA BOUNDARY
- SUMP
- EFT-1S/D — SHALLOW/DEEP MONITOR WELL
- TERMINATION BOUNDARY
- 577.85' — PIEZOMETRIC GROUNDWATER ELEVATION (SHALLOW ZONE)
- 569.69' — POTENTIOMETRIC GROUNDWATER ELEVATION (BEDROCK)
- GROUNDWATER ELEVATION CONTOUR (BEDROCK)

Notes

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   - 6E721–43–1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721–1074–1 (Sodium tunnel)
   - 6C721–1640–1 (FARB interior)
   - 6E721–57–4 (East sodium gallery)
   - 6E721–57–5 (West sodium gallery)
   - 6P721–1117–1 (Health physics building and drains)
   - 6P721–1118–1 (Radioactive waste discharge line)
   - 6P721–1836–20 (Fission products detector building)

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

FILE No.	0238793A001
PROJECT No.	023–8793 REV. 0
SCALE	AS SHOWN
DATE	11/27/06
DESIGN	DPR
CADD	JJS
CHECK	DPR
REVIEW	DJM

TITLE: **GROUNDWATER ELEVATION MAP DECEMBER 11, 2006**
DETROIT EDISON
FERMI 1
DETROIT, MI

DTE\FERMI 1\MI

FIGURE 11

Drawing file: 0238793A001.dwg Jun 15, 2007 – 1:08pm

APPENDIX A

AUGUST 2005 WORK PLAN

(Aerial Photographs Omitted)

Detroit Edison

Golder Associates

WORK PLAN FOR GROUNDWATER CHARACTERIZATION

ENRICO FERMI 1 LICENSE TERMINATION PLAN

Submitted to:

Detroit Edison Company
Fermi 1 Power Plant
6400 N. Dixie Highway
Newport, MI 48166

Submitted by:

Golder Associates Inc.
15851 S U.S. 27, Suite 50
Lansing, Michigan 48906

Distribution:

1 Copy - Detroit Edison Company/Fermi 1
2 Copy - Golder Associates/Lansing, MI

August 2005

023-8793

TABLE OF CONTENTS

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1.0 INTRODUCTION

On behalf of the Detroit Edison Company, Golder Associates Inc. (Golder) has prepared this work plan to test for historical radiological contamination in groundwater within Areas of Concern (AOCs) at the decommissioned Enrico Fermi 1 (EF1) Power Plant (Figure 1). Golder has prepared this work plan in accordance with an August 2002 request from Detroit Edison, and in accordance with Golder Proposal No. P02-8090. The scope of and methods by which the groundwater is to be characterized are designed to meet guidelines developed by the U.S. Nuclear Regulatory Commission (NRC).

During the preparation of the work plan, Golder conducted multiple site visits and meetings with EF1 personnel, including the following:

- An August 2002 kick-off meeting to understand the objectives of the groundwater characterization pertain of the Termination Plan, and develop a preliminary list of the Areas of Concern (AOCs).
- A March 2003 meeting at EF1 with Lynne Goodman, EF1 Manager, and Jon Couillard, EF1 Radiological Engineer, to define the raw data that Golder would need to conduct a historical site assessment of possible release points or areas for radioactive fluids.
- A May 6, 2003 meeting with Mr. Brian Duke, a contract engineer for EF1, who compiled a list and design drawings of all subsurface conduits at EF1, including all those that conveyed radioactive water and air. The results of this compilation are presented in Section 1.3.2.
- A May 12, 2003 EF1 site walkover with EF1 technician Mr. Richard Janssens. The purpose of the walkover was to visually inspect access target drilling locations within and adjacent to the AOCs and that were identified by the historical site assessment.

1.1 Overview of the Decommissioning Process

This groundwater characterization work plan is one component of the License Termination Plan. The work plan specifies the following:

- Areas of Concern (AOCs) with respect to possible historical releases of radioactive fluids and other possible contaminants to the subsurface, based on former EF1 operations and waste routing systems.
- The Quality Assurance and Quality Control methods that will be used to conduct the characterization.
- A conceptual schedule.

1.2 Description of the EF1 layout

The EFI layout, Termination Boundary, and associated AOCs are shown in Figure 2. When it was constructed in the late 1950s and early 1960s, EF1 included features and buildings other than those strictly associated with the nuclear generation of electricity. Such features included a visitors building, four diesel powered peaking generators ("peakers"), and an aboveground storage tank that supplied the peakers. All these features remain active at Enrico Fermi 2 (EF2). The Termination Boundary to which the NRC and EF1 have agreed is defined by the asphalt drive (Figure 2) that circumnavigates the power generating complex. The other features that were constructed as a part of EF1 are now considered as components of the encompassing EF2 complex. Within the Termination Boundary, the building boundaries and fences shown in bold blue constitute the Controlled Area.

1.3 Physiography and Hydrogeologic Setting

Golder's understanding of the physiologic setting and hydrogeologic conditions at EF1 is based on review of the following documents:

- *Enrico Fermi Atomic Power Plant, Part B Revised License Application, Technical Information and Hazards Summary Report.* Power Reactor Development Corporation, 1956.
- *Fermi 2 Updated Safety Analysis Report.* Detroit Edison Company, May 1972.
- *Applicant's Environmental Report (Operating License Stage), Enrico Fermi Atomic Power Plant Unit 2.* Detroit Edison Company, 1974.
- Detroit Edison Drawings Nos. 6C721-1902-3 (March 1961) and 6C721W-7 (September 1976), which contain transcribed logs of borings that were drilled at EF1 during the late 1950s, the 1960s, and during the early 1970s in conjunction with the construction EF2.
- *Fermi-I : New Age for Nuclear Power : A History of the Enrico Fermi Atomic Power Project.* American Nuclear Society, 1979.

This information indicates that the EF1 site was originally underlain by 16 to 20 feet of glacial deposits that in turn overlie dolomite bedrock. A pre-construction aerial photograph from 1949 (Appendix A) and the 1956 license application indicate that EF1 was originally situated near the base of a narrow peninsula that was bordered on the west by a lagoon that was hydraulically connected to Lake Erie. According to the *Map of Surficial Deposits of the Lower Peninsula of Michigan* (MDNR, 1981) this peninsula and the entire western shore of Lake Erie are underlain by unconsolidated deposits composed up to 10 meters (33 feet) of clay-rich glaciolacustrine sediments and glacial till.

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1.3.1 Site Geologic Conditions

A conceptual diagram showing Golder's interpretation of existing hydrogeologic conditions at EF1 is shown in Figure 3. The location of the transect in Figure 3 is shown in Figure 1. Site-specific geologic information in Figure 3 is taken from borings C-1 and C-3 that were drilled at the perimeter of the reactor during the 1960s, and from boring EF-2 that was drilled immediately east of the FARB in 1972.

Beginning at the original ground level of around 573.5 feet above mean sea level (MSL) Golder's review of pre-construction boring logs that were obtained from EF1 indicates that inside the Termination Boundary, the unconsolidated native sediments and the bedrock consist of the following typical sequence:

- 0 - 7 feet: Soft black muck and peat.
- 7 - 12 feet: Glaciolacustrine laminated gray clay and silt, with traces of humus.
- 12 - 18 feet: Hard mottled gray to yellowish sandy clay (glacial till).
- > 18 feet: Dolomite bedrock of the Bass Islands Group.

The dolomite bedrock is indicated on borings logs at depths typically ranging from 16 to 20 feet below original grade, at corresponding elevations ranging from approximately 557 - 553 feet MSL. The dolomite at EF1 is at least 80 feet thick, and is characteristically tan to light gray, hard, microcrystalline, with occasional thin shale seams and anhydrite lenses. The dolomite is described as containing fracture zones and occasional dissolution zones along bedding plane fractures.

1.3.2 Groundwater Movement

Currently, no monitor well system is present either within or near the Termination Boundary. Because EF1 is situated within several hundred feet of Lake Erie, and because the former lagoon west of EF1 was filled prior to EF2 construction, the inferred horizontal hydraulic gradient in the glacial/fill deposits and in the bedrock at EF1 is predominately to the east. This inferred gradient is consistent with historical descriptions contained in the documents listed in Section 1.3.

Notes on the bedrock boring logs at EF1 indicate that the gradient in the bedrock and between the bedrock and glacial deposits is upward, with flowing artesian conditions commonplace when

drilling in the bedrock below depths of around 75 feet below ground level (BGL). This indicates that there is no reason to anticipate that groundwater, if contaminated by an EF1 source, has migrated appreciably deeper than the release point. The inferred upward hydraulic gradient between the bedrock and the overlying unconsolidated deposits and fill, as well as an easterly groundwater flow direction in both zones, are depicted in the conceptual hydrogeologic cross section in Figure 3. As described in Section 3.2, the proposed EF1 monitor well system will be implemented in a fashion that will permit the overall horizontal and vertical gradient to be confirmed prior to installation of all monitor wells.

1.3.3 Fill Materials and Grade Elevation

EF1 was initially proposed in 1955 and a construction permit was issued by the former Atomic Energy Commission in August 1956. Construction at EF1 began at the reactor building basement in October 1956. As depicted in Figure 3, April 1957 air photos (Appendix A) indicate that fill materials were used during EF1 construction to extend the western shore of the peninsula, partially filling the lagoon. The same lagoon was later completely filled as EF2 was constructed during the 1970s.

Golder's review of borings logs that were drilled within the current Termination Boundary indicate that the pre-construction ground elevation was approximately 573.5 feet MSL. The current Lake Erie stage is approximately 571.5 feet MSL (NOAA, September 2003). According to Richard Janssens, much of the glacial deposits within the area now delineated by the Controlled Area boundary were removed in order to facilitate construction of the basement for the reactor. The removal of such deposits is apparent on the April 1957 photos (Appendix A, Figure A-2). Following the removal of the native glacial deposits and construction of the reactor building in 1956, approximately 17 feet of fill was added to the top of the bedrock in order to bring the ground inside much of the current Controlled Area (excluding the Health Physics Building pad) up to elevation of 590 feet MSL.

The base of the reactor basement was constructed to a depth of 51 feet below the post-filling ground level,, to an elevation of 539 feet MSL, or approximately 17 feet below the top of bedrock. The FARB contained four types of features that were constructed below grade and that contained radioactive waters: a) the repair pit; b) the cut-up and decay pools; c) the hot sump; and d) four waste tanks. These features were constructed to elevations as low as 559 feet MSL, or approximately 3 feet above the top of bedrock. The depths of the structures described above have

been accounted for in designing the total depths of and the target screened intervals for monitor wells that will be installed up- and downgradient of the same structures.

1.3.4 Waste Streams and Outfalls

EF1 maintained three principal waste streams with permitted discharges. These are described briefly as follows:

- The atmospheres inside the reactor building, waste gas building, inert gas building, and the FARB (e.g., evaporation of cut-up and decay pool water) were in contact with low-level radioactive material. In order to minimize airborne radioactivity, these atmospheres were constantly purged and routed to the waste gas stack that was formerly located near the northeast corner of the FARB (Figure 1).
- The radioactive waste water generated from washing spent fuel rods in the FARB was routed to a series of waste tanks in the FARB basement, then was blended with the non-contact cooling water that flowed from the turbine building, through the Overflow Canal, to its permitted surface water outfall northeast of the FARB, into the lagoon. The Overflow Canal was lengthened and the lagoon was backfilled during EF2 construction.
- Non-septic radioactive waste water from the Health Physics Building (e.g., showers, sinks), including its lab, was routed to the sump at the east end of the building, then discharged via the liquid waste conduit along the north side of the FARB (Figure 1), and into the FARB on its east side. These fluids were collected at the Hot Sump and discharged along with other waste waters to the Overflow Canal.

1.3.5 Initial Decommissioning

Between October 1972 and October 1975, EF1 was partially decommissioned to the extent that all radioactive processes ceased and radioactive sodium was drained from the primary system. With respect to the site features, storage areas, and conduits that conveyed radioactive waters and air, the decommissioning process included the following:

- Radioactive sodium was drained from the primary system and stored in drums on-site.
- Non-radioactive sodium was drained from the secondary system and removed from the site.
- The cut-up and decay pool stainless steel surfaces were cleaned with detergent, followed by a nitric acid and demineralized water rinse, then painted.
- The Health Physics Building was demolished in 1980; the slab and entrained plumbing remain.

1.4 Historical Site Assessment

In order to select locations for in the installation of monitor wells to test for possible contaminated groundwater at EF1, Golder and EF1 personnel who are knowledgeable with EF1 construction and operations assembled and analyzed available historical documentation, including aerial photographs, EF1 drawings, and personnel accounts of EF1 operations. The scope and the results of this assessment are described below:

1.4.1 Interviews

In 2002, EF1 managers developed a questionnaire for former EF1 employees regarding historical operations. The purpose of the questionnaire was to identify known or suspected points or areas where releases of radioactive and/or other hazardous fluids may have occurred. In May 2003, EF1 indicated to Golder that the questionnaire produced little new information beyond that which was provided to Golder during the various meetings with EF1 personnel. The former employees who were interviewed had no knowledge of unmonitored releases of radioactive fluids to the environs surrounding EF1.

1.4.2 Pipe Compilation and Analysis

During March and April 2003, EF1 contract engineer Brian Duke assembled drawings of all subsurface conduits at EF1, including electric and electric ground systems, sanitary and radioactive water collection systems, ventilation, waste gas, primary and secondary sodium systems, steam systems, and various other minor conduits. The purpose of this effort was to identify conduits that conveyed radioactive fluids, including sodium, waste water(s), and gases, and points or areas along these conduits where possible releases may have occurred.

For each conduit, the compilation identified the beginning and end points, and whether it conveyed and/or discharged known or possible radioactive fluids. The conduits of interest that were identified by the compilation are summarized in conjunction with the Areas of Concern, as presented below in Section 1.5, and have been taken into account during the selection of proposed groundwater monitor well locations.

1.4.3 Air Photos

During the March 2003 meeting at EF1, Golder requested that EF1 obtain time-series aerial photographs that document site conditions before, during, and following EF1 construction. In response, EF1 provided black-and white and color photographs between 1949 and 2000.

The purpose of the photographs include the following:

- Identify the original shoreline of the peninsula and conversely, where fill materials were placed in the west-adjacent lagoon during EF1 construction.
- Identify the area(s) within the termination boundary where native glacial deposits were removed and fill materials emplaced during construction.
- Identify possible areas within the termination Boundary that may exhibit visual traces of material/waste storage, filling, or altered surface conditions that may suggest a release.

The photographs that Golder analyzed are contained in Appendix A. Golder's examination of these photos indicates the following:

- None of the fill materials that were placed in the lagoon west of the EF1 peninsula are present within the Termination Boundary. The construction photos are consistent with EF1 descriptions in that native glacial materials were removed to the bedrock surface during the construction of the reactor/containment building. The construction of the FARB is not documented on any of the photos.

- There are no readily discernable areas on post-construction photos that suggest the presence of a surficial release or the accumulation of waste materials.

1.5 Summary of Areas Of Concern

On the basis of Golder's EF1 site visits, discussions with EF1 managers and contract engineers, and the analysis of underground conduits, Golder has summarized in Table 1 the following Areas of Concern, and the bases thereof, where groundwater characterization is warranted:

Reactor/Containment Building: In addition to emissions from the core itself, EF1 identified a condensate drainage pipe that potentially discharged radioactive condensate from the aboveground containment structure. Possible contamination derived from theses features will be tested by EFT-6S in the shallow zone and by EFT-6D in the bedrock.

Sodium Tunnel: Although there have been no known releases of primary sodium in the tunnel, the EFT-5S/D well pair will be used to test for possible past leakage from the tunnel. The monitoring location is situated downgradient from the highest concentration of bends in the primary sodium conduits.

Sodium Galleries: Because the secondary sodium system contained small quantities of tritium, monitoring is proposed downgradient from the West and East Sodium Galleries, at EFT-6S and EFT-6D well pairs, depending on the hydraulic gradient(s) in the respective zone. As with the sodium tunnel, there have been no known releases of secondary sodium.

Fission Products Detection (FPD) Building: EF1 identified a drainage pipe on the east side of the FPD Building that potentially discharged radioactive condensate from the building interior. This potential release point will be monitored by well EFT-6S.

Health Physics Building: Drains from several employee wash locations and the lab drained to the sump located at the east end of the building. To test for possible leakage from the sump, EFT-7S will be installed.

Liquid Radioactive Waste Line: Fluids that were collected at the Health Physics Building sump were routed around the north side of the FARB. EF1 personnel have indicated that corrosion was suspected along a previously-abandoned portion of the line. To test for contamination in this area, EFT-9S will be installed.

Fuel and Repair Building: Monitoring is proposed downgradient of the Hot Sump, the Cut-Up and Decay Pools, the repair pit, and the waste tanks. Because installation of wells inside the FARB is not practicable, well pairs EFT-2S/D and EFT-4S/D will be installed along the east (i.e., downgradient) side of the building. A third monitor well pair that was originally intended to be located east of the FARB, EFT-3S/D, will not be installed. The initial round of drilling (i.e., the EFT-1, EFT-2, and EFT-5 locations) revealed that the horizontal hydraulic gradient in the bedrock is to the southeast, as opposed to an original inferred gradient directly toward Lake Erie. Due to this difference, the EFT-3S/D well pair was eliminated, and the location of the EFT-4S/D well pair was relocated to the north, closer to and downgradient of the FARB.

Waste Gas Stack: Monitor well EFT-8S is proposed at the former stack location to test for radioactivity due to possible releases of radioactive condensate that may have precipitated from waste gases.

One well pair, EFT-1S/D, will be installed immediately inside the Termination Boundary in order to test for possible upgradient radioactivity from off-site sources. If no radioactivity above

ambient conditions is observed, radiological test results for groundwater samples from these wells will be used in conjunction with the EF2 background wells (see Section 2.4) to determine background radioactivity for the EF1 site.

Section 3 presents proposed monitor well locations and depths in relation to each AOC, and specific features within the AOC.

2.0 OBJECTIVES AND ACTION LIMITS

The overall objective of the groundwater characterization is to support the license termination of EF1 by determining whether former operations resulted in radiological contamination that exceeds background conditions. The following sections describe the objectives in more detail, and provide specifications for the manner in which analytical results shall be compared to relevant and appropriate regulatory criteria.

2.1 Objectives

In determining whether radiologic contamination of groundwater has occurred at EF1, the following project-specific objectives will be met:

- Define the range of background values for potential radiological contaminants,.
- Through analysis of groundwater from locations adjacent to and/or downgradient of the AOCs described in Section 1.5, determine whether radionuclides are present due to EF1 activities.

2.2 Radionuclides of Concern

Based on discussions with EF1 personnel, a review of the radionuclides contained in the American Nuclear Society's EF1 compilation (1979), and based on Golder's experience at other nuclear sites, groundwater samples will be analyzed at a minimum for the following ROCs:

Tritium (^{3}H), ^{22}Na, ^{60}Co, ^{90}Sr, ^{99}Tc, ^{137}Cs, ^{226}Ra, ^{228}Ra, U Isotopes

As discussed in Section 3.6, other non-radiological contaminants of concern (COCs) may be detected during field screening. During the drilling activities described in Section 3.3, Golder will record evidence of possible hydrocarbon contamination based on discoloration and or odors.

2.3 Regulatory Criteria

Analytical results for groundwater samples will be compared to thresholds defined by the NRC's License Termination Rule for residual radioactivity, in terms of dosage (i.e., millrems/year). Possible radioactivity from individual ROCs will be measured. The total radioactivity will be summed and compared to background levels as described in Section 2.4.

2.4 Definition of Background Levels

In order to determine whether possible radioactive contaminant concentrations in groundwater at EF1 exceed ambient conditions and can therefore be attributable to releases at EF1, analytical results for ROCs in the wells specified in Section 1.5 will be compared to the same types of analyses of groundwater samples that will be collected from four EF-2 background monitoring wells (GW-1 through GW-4) that were installed in July 2003 at locations south and west of EF1, near the EF2 perimeter, at distances of over 1,000 feet from the Controlled Area boundary at EF1. These background well locations are shown in Figure 1.

Upgradient well pair EFT-1S/D, located just inside the Termination Boundary, will be used to determine whether radiological contamination exists upgradient of the Termination Boundary. If no contamination is identified at this location, the results from the EFT-1S/D will also be used to determine background radionuclide concentrations.

Upper confidence limits for emission measurements and analytical results for ROCs will be calculated using values from the upgradient and/or background monitoring wells, provided that potentiometric groundwater elevations indicate that groundwater cannot migrate from the AOCs at EF1 to any of these well locations. Results from the downgradient wells at locations EFT-2S/D through EFT-9S will be compared to the UCLs to determine whether radiologic contamination has occurred, and will be compared to relevant cleanup criteria to determine whether remedial action may be warranted.

3.0 METHODS

In order to meet the Objectives of the groundwater characterization, EF1 will install a total of 13 monitor wells at a total of nine locations within the Termination Boundary, including five well pairs. The wells will be installed in an iterative fashion in order to initially determine the horizontal hydraulic gradient before completing the monitoring system. During drilling, samples of fill, glacial deposits, and bedrock will be screened for radioactivity. An overview of the proposed sequence for the monitor well system is described in Section 3.1, and in detail in the ensuing sections.

3.1 Overview of Technical Approach

The proposed Termination Plan monitoring well system is shown on Figure 2, and summarized in Table 1. From start to finish, the groundwater characterization will consist of the following steps and activities:

- During drilling and following well installation, the primary objective will be to test for radioactivity by vertically screening soil samples, and through subsequent groundwater sample collection from the completed monitor wells. During drilling, soil samples will be screened for radioactivity, as well as other possible environmental contaminants such as petroleum hydrocarbons, solvents, and for possible pre-contaminated fill materials (e.g., foundry sand).
- Before installing the entire monitor well system, three monitor well pairs (i.e., each containing one shallow well and an adjacent deeper well) will be installed, casing elevations surveyed, and groundwater elevations measured, in order to preliminarily resolve the horizontal hydraulic gradient in the fill or glacial deposits and in the bedrock. Assuming that the horizontal gradient in both zones is predominantly to the east, the remaining wells will be installed at the proposed locations as shown in Figure 2. The final locations of any of the wells may be altered slightly to compensate for underground utilities and/or variations from a due easterly groundwater flow direction.
- The groundwater samples will be analyzed by Detroit Edison's own laboratory and/or a contract laboratory for individual radionuclides. A minimum of four quarterly sample sets will be collected. Background groundwater radioactivity levels will be measured by installing an upgradient well pair inside the Termination Boundary and at the four EF2 background locations. The results from the downgradient monitor wells at EF1 will be compared with results from the upgradient and backgrounds wells, and with criteria developed by the NRC under its License Termination rules.
- The results of the characterization study will be contained in a detailed report that will contain text, tables, figures, statistical evaluations of groundwater quality, and interpretations regarding possible sources and migratory pathways of contaminated groundwater. The report will be completed following a minimum of four quarterly sets of sample analyses.

3.2 Sampling Locations

Monitor well locations are summarized and described in Table 1 with respect to the AOCs that are described in Section 1.5. Figure 2 depicts the proposed locations. Final locations may be altered based on underground conduit locations as shown on design drawings, or as encountered during drilling. Well locations may also be adjusted based on initial resolution of the prevailing horizontal hydraulic gradient, as described below. Well pairs with an "S/D" designation indicate that a shallow and a deep well pair will be installed. The other wells are to be installed with a shallow screened interval only.

The upgradient well pair EFT-1S/D and two downgradient well pairs, EFT-2S/D and EFT-5S/D, were installed in November 2003. In order to increase the likelihood the remaining wells are installed downgradient of the respective AOCs, these initial three well pairs will be surveyed and groundwater elevations calculated as specified in Section 3.9 and 3.11. The remaining well locations may be modified based on this initial and subsequent hydraulic gradient analysis.

For example, an additional well, EFT-10S, was installed closer to and more immediately downgradient of the west sodium gallery (Figure 2) beginning in June 2005, after the first few sets of comprehensive water level measurements in late 2004 and early 2005 consistently indicated that the hydraulic gradient exhibited a southeastern component. During this time, it was recognized that shallow well EFT-6S, by itself, may not be sufficient to adequately test for possible impacts from the west sodium gallery.

3.3 Drilling and Formation Sampling

At locations EFT-1S/D, EFT-2S/D, EFT-4S/D, and EFT-5S/D, the deep well will be installed before the paired shallow well. This is so that the greatest amount of geologic and groundwater quality profile information (i.e. radioactivity) can be obtained before selecting the optimal screened intervals for each of the paired shallow wells.

In order to minimize the possibility of damaging nearby underground conduits, EF1 proposes that each borehole be initiated to a depth of approximately 10 feet using vacuum excavation, after first using ground penetrating radar to check for possible underground features. Beyond the vacuum pilot hole, the borehole will be completed depth using roto-sonic methods, in order to maximize the percent recovery and resolution in observing the formations penetrated.

Alternately, the wells may be installed using hollow-stem augers and a variety of rotary methods in the bedrock, including coring and/or air rotary. In this situation, a ground-penetrating radar unit, in conjunction with EF1 design drawings, would be used to check for possible subsurface utilities before beginning a borehole with augers.

One important advantage of using a combination of vacuum and roto-sonic methods is the minimization of waste soil volumes. This is a critical consideration in the event that the soil must be disposed as low-level radioactive waste. Although the proposed drilling methods are typically higher in cost relation to more commonplace methods (e.g., 10 – 50 percent, depending on total job value) such as hollow-stem augers, the protection afforded to subsurface conduits and the minimization of possible low-level radioactive waste soil outweighs the higher drilling cost. Drill cuttings will be contained and staged on-site per site EF1 radiation protection directions.

Shallow well EFT-10S will be installed manually by driving a 4-inch diameter conductor casing into the fill materials that are situated between the West Sodium Gallery and the reactor Building basement. The casing shall be driven using a 140-lb slid hammer that will be operated using pulley system that is mounted on a tripod. The casing will be driven in increments of up to six inches, followed by evacuation of the fill materials using either a hand auger or vacuum.

During drilling, a qualified Golder on-site engineer or geologist (see Section 4.1) will constantly observe samples of the fill and/or native glacial deposits and bedrock and complete an in-field boring log. Unconsolidated soil samples will be described in accordance with the Unified Soil Classification System. The sample color will be described in accordance with a Munsell® soil chart. Initial and stabilized groundwater levels and times will be recorded.

3.4 Bedrock Packer Testing

While drilling at locations EFT-1D and -6D, Golder will direct the completion of pumping test in order to measure the transmissivity of the bedrock, as described in Section 3.10. At EFT-1D, where the borehole will be drilled only eight to 10 feet into the bedrock, the sonic drill casing will be seated into the top of the bedrock in lieu of using a packer to isolate the bedrock from the overlying glacial till. If permeable glacial sediments (e.g., sandy, silty sand, or silt) are present in contact with the top of the bedrock, a single packer will be used at the top of the bedrock.

After reaching the bottom of the EFT-6D borehole at a target elevation of 539 feet MSL, the transmissivity of the bedrock will be measured by means of pump testing over discrete vertical intervals using a dual-packer system. The EFT-6D borehole is anticipated to encounter 17 to 20 feet of bedrock. This interval will be divided into three intervals approximately 6 to 7 feet long. Each interval will be pump-tested as described in Section 3.10.

The results of the pump/packer testing will be used in conjunction with observations of fracturing in the bedrock core that will be retrieved during drilling to: a) select the screened interval for EFT-6D (see Section 3.7); and b) estimate the groundwater flow velocity in the bedrock (Section 3.10).

3.5 Field Screening for Radioactivity

Although the focus of this work is on possible radiological contamination in groundwater, during drilling unconsolidated returns will be screened for radionuclides in unsaturated soil that could leach to groundwater. For each 2-foot interval, a portion of the formation returns will be stored in an appropriate container for possible future laboratory analysis. Each retained sample will then be screened for radioactivity using a hand-held frisker or similar detection device.

Below the water table, formation returns including bedrock core fragments will also be screened for radiological contamination. If detected, elevated readings will provide guidance on the optimal setting for monitor well screened intervals adjacent to or downgradient of the AOCs. Field screening measurements for radioactivity will aid in the selection of the screened interval for bedrock well EFT-6D.

3.6 Field Screening for Non-Radiological Contamination

During drilling, formation returns above the water table will be examined for other possible yet unlikely types of contamination, including:

- Petroleum hydrocarbons.
- Solvents.
- Foundry sand (e.g., heavy metal contamination).

During drilling, Golder will note possible odors and/or discoloration that may be indicative of the above types of contamination.

3.7 Monitor Well Construction and Installation

The design configuration of the shallow and deep monitor well construction is shown in Figure 4. Monitor wells and screens will be constructed of 2-inch diameter Schedule 40 PVC with neoprene O-ringed flush joints. Well screens will be filter-packed to a depth approximately 2 feet above the top of the screen, followed by a 2-foot-long seal formed from bentonite pellets. The remainder of the borehole annulus will be grouted using a low-yield bentonite slurry (deep wells) or bentonite chips (shallow wells). Monitor well heads in trafficked areas will be completed inside aluminum flush-mount covers that will be set inside 2-foot-square cutouts. Well heads will be cut horizontal. A lockable air-tight plug will be set inside the wellhead. Outside of trafficked areas, well heads will be completed inside lockable 4-inch-square aluminum aboveground protective covers. The annulus between the well head and cover will be backfilled with pea gravel and a 1/16-inch weep hole drilled at the base of the cover.

Not including EFT-10S, monitor well screens will nominally be 5 feet long, unless field screening indicates that a narrow vertical interval (e.g., 3 feet or less) of elevated radioactivity is present in the saturated zone. In this event, the screen length will be shortened in an effort to measure maximum ROC concentrations within the interval.

Because well EFT-10S will be manually installed, and may have to be driven to the desired depth with respect to the water table, a 1.25-inch diameter galvanized steel well with stainless steel screen with a drive point will be installed through the borehole conductor casing (Section 3.3). The well annulus will then be completed as described above, and the well will be developed as described in Section 3.8. The well head will be also completed inside a steel 4-inch-square protective cover.

Monitor wells will be set to the desired depth, as summarized below:

- Shallow monitor wells will be set such the top of the screens is approximately one foot below the water table. This screen setting is desirable in order to permit both "slug-in" and "slug-out" measurements for hydraulic conductivity (see Section 3.10). and to avoid incorporating recent meteoric recharge into groundwater samples.
- Deep monitor wells at EFT-1D, -2D, -4D, and -5D will be installed such that the bottom of the screen is set 8 to 10 feet into the bedrock.

- At EFT-6D, the screened interval (i.e. 5-foot-long screen and two feet of filter sand) will coincide with the occurrence of maximum radioactivity and/or fracturing in the bedrock. If measurements of radioactivity are consistent within the entire bedrock borehole, the screened interval will coincide with the highest degree of fracturing, as determined by pump test results and observations of bedrock cores. If a distinct zone of elevated radioactivity is detected, the screened interval will be set accordingly, regardless of fracture frequency. If no fracturing or elevated radioactivity is noted, the bottom of the screened interval will be placed at an elevation equal to the bottom of the reactor basement. If open borehole remains below the bottom of the EFT-6D well screen, it will be backfilled with bentonite pellets, followed by 12 inches of filter sand.

3.8 Monitor Well Development

After installing the well screen filter pack, the screened interval will be developed in order to remove fine-grained materials in the filter pack and surrounding formation that can adsorb ROCs and other possible contaminants (e.g., non-radioactive heavy metals) and thus yield non-representative laboratory analyses, and that can impede sample pump performance. Each well will be developed by means of frequent surging and overpumping, until measurements of field parameters such as pH, specific conductivity have stabilized and turbidity has been minimized. In low yield situations, the well may be developed by manually bailing until the development criteria have been satisfied.

3.9 Groundwater Sampling and Elevation Measurements

Once development is complete, a groundwater sample will be collected from each of the new monitor wells. Before collecting groundwater samples, static groundwater elevations will be measured using an electronic meter to the nearest 0.01-foot. Sampling will be conducted using a peristaltic pump and disposable polyethylene tubing to purge and sample each well, following guidelines for low-flow sampling developed by the MDEQ and USEPA. While purging each well at a maximum rate of 0.5 L/min, Golder or an alternate will perform field measurements of pH, specific conductivity, turbidity, dissolved oxygen (DO), oxidation reduction potential (ORP), and salinity using a Horiba Model U-10 groundwater quality multi-meter or equivalent that will be calibrated a minimum of four times daily. Purging will progress until each of these parameters and the pumping water level have stabilized within prescribed tolerances over three consecutive measurements at 5-minute intervals.

After achieving stabilization, the sample containers will be filled while maintaining the same low-flow purging rate (i.e., < 0.5 L/min). The samples will be filtered using a pre-cleaned in-line

filter with a nominal aperture of 0.45-μ. The sample containers will be preserved in accordance with USEPA protocol, including the use of nitric acid for samples to be analyzed for metal ROCs, in order to achieve a sample pH of less than 2 standard units.

In the event that a well is extremely low yielding (e.g., <0.1 L/min) such that low-flow sampling is not practical, the well will be purged by periodically bailing three times the volume of water in the well and screen. Upon removing this prescribed volume, a sample will be collected from the well within an estimated maximum 24 hour period using a bailer and following the sample filtration and preservation protocol described above.

In the situation involving EFT-9, which in 24 hours does not yield the minimum required sample volume of 1 liter that is necessary for the analytical program specified in Sections 2.2 and 4.2.6, a composite sample will be generated by periodically removing groundwater from the well over a period of several weeks. At EFT-9, DTE may use low flow techniques (i.e., peristaltic pumping) to obtain the sample in lieu of using a bailer. Because of the extreme low yield from this well, the measurement of field parameters as specified in Section 3.9 will be made using the groundwater that is initially purged from the well. EF-1's observations to date indicate that more than one calendar quarter may be necessary to accumulate as much as 1 liter of sample groundwater.

3.10 Hydraulic Conductivity Testing

In order to estimate groundwater flow velocity in the bedrock and unconsolidated deposits at EF1, the hydraulic conductivity of these formations will be measured at a minimum of three and a maximum of five locations in the shallow zone and three in the bedrock, including EFT-6D. The measurements will consist of the following approaches:

- The hydraulic conductivity of the unconsolidated deposits and/or fill will be measured using single-well slug tests. Tests will be conducted in shallow wells that: a) contain at least two feet of groundwater, and will be run in wells that are installed in variety of materials in order to evaluate the range in flow velocities. The tests will be performed by rapidly displacing the water level in a well, while recording the rate of water level recovery. Values for K will be calculated using the method Bouwer and Rice (1989) within a software program that allows analysis of the data by means of statistical and manual curve matching. Analysis of the slug test plots will take into account that the filter sand may be one or more orders of magnitude greater than the surrounding substrate.

- Slug test-derived values for K in the unconsolidated sediments will be supplemented with grain size distribution analyses of saturated samples from the same locations, using

ASTM Method D-422-63. The analyses will be performed on material to be obtained from the most permeable interval within the monitor well screened intervals. This interval will be selected qualitatively on a visual basis.

- In the bedrock, Golder will direct pump tests of open boreholes. The tests will be performed after purging the borehole to remove fine-grained residues from the rock and fracture surfaces. At EFT-6D, the tests will be performed for each packer test interval (Section 3.4). Golder anticipates that each pumping test will last up to an hour, at a rate up to 5 gallons per minute. For each test, the discharge rate will be maintained constant until the pumping water level stabilizes. Based on the results of the packer tests and fracture frequency observed in bedrock cores, Golder will estimate an effective fracture aperture and whole rock fracture porosity. This value in turn will be combined with the measured transmissivity values and the hydraulic gradient to estimate groundwater flow velocity in the bedrock.

3.11 Surveying

The July 2003 EF1 background and each new EF1 monitor wells will be surveyed by a licensed surveyor. Casing and ground elevations will be surveyed to third-order accuracy (e.g., to the nearest 0.01-foot) in reference to a U.S. Geologic Survey vertical benchmark. Locations will be surveyed to the nearest 0.1-foot in reference to local permanent features, or a local grid system. Casing elevations will be used to: a) calculate groundwater potentiometric elevations from which horizontal and vertical hydraulic gradients will be determined; and b) ascertain that the EF2 background well locations are not located downgradient of any of the EF1 AOCs.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

This section specifies the data management, acquisition, validation, and assessment procedures by which the results of the groundwater characterization will be used to meet project objectives. Data resulting from this investigation will be evaluated to determine whether historical operations at EF1 have resulted in releases of contaminants to groundwater in concentrations that exceed State and/or Federal criteria. The groundwater characterization at EF1 will include radiological surveys, subsurface soil sampling from borings, groundwater monitoring well installations, groundwater sampling, and may include other miscellaneous tasks.

These Quality Assurance and Quality Control (QA/QC) measures have been prepared using NRC Publication NUREG-1575, which is the Multi-Agency Radiation Survey Manual (MARSSIM), as a guidance document with regard to overall content. MARSSIM was developed as a collaborative between the U.S. Environmental Protection Agency, the Departments of Defense and Energy, and the Nuclear Regulatory Commission in order to provide detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance with a dose or risk-based regulation.

4.1 Project Management

4.1.1 Project Organization And Responsibilities

The groundwater characterization will be directed and executed by the following individuals from EF1 and Golder Associates:

Project Managers: EF1: Jon Couillard, Radiological Engineer; Golder: David Regalbuto, C.P.G.

These project managers will serve as the primary point of contact for all activities to be carried out under the work plan, and will be responsible for monitoring adherence to the work plan, for maintaining and controlling the schedule and budget. EF1 will keep the NRC informed as to the status of the activities within the Termination Boundary; Golder will support communications with the NRC. The groundwater characterization Project Manager for EF1 will report on a regular basis to Lynne Goodman, who manages all operations at EF1.

Field Team Leader: Danny Yip, E.I.T., Golder Associates

The Field Team Leader is responsible for documenting and executing the work in accordance with this work plan, for well construction, installation, and development, and for keeping Golder and/or the EF1 project manager informed on a regular basis, including conditions that may warrant deviations from the work plan.

Quality Assurance Lead: Douglas Morell, P.E., Golder Associates.

The Golder Project Manger will maintain approximately daily communication with the Quality Assurance Lead regarding progress, observations, and the possible need to deviate from the work plan during well construction, installation, and development. Golder's Quality Assurance Lead shall have the necessary independence and authority to identify conditions adverse to quality and to systematically seek corrective action. EF1 maintains an internal quality assurance program.

Health and Safety Officer: Jon Couillard, Radiological Engineer

EF1 Project Manger Jon Couillard will also serve as the Health and Safety Officer. He will be responsible for monitoring potential health and safety hazards on-site during field work, including handling potentially radioactive materials. The Health And Safety Officer has the responsibility and authority to halt field activities resulting from unacceptable health and safety hazards, and report such conditions to the Golder Project Manager and EF1 Manager Lynne Goodman.

4.1.2 Analytical Laboratories

All analyses for ROCs shall be coordinated with EF2's Radiation Protection Department and shall be performed in compliance with EF2's QA plans and analytical procedures. Services of alternate qualified laboratories may be procured for radioactive sample analysis.

4.1.3 Data Quality Objectives

As summarized in Section 2, the overall objective of the groundwater characterization is to determine whether former EF1 operation resulted in radiological contamination of groundwater that could pose an adverse health risk for future land use. Therefore, the overall requirement for data quality is that analyses be performed to a degree of precision that meets license termination criteria.

Goals for data representativeness have been addressed qualitatively by the specification of sampling locations, depths, and intervals as previously described in Section 3. Objectives for the completeness of this investigation shall require that contractually or procedurally established requirements for precision and accuracy be met for at least 90% of a selected 10% validated set. Failure to meet this criterion shall be documented and evaluated in the validation process described in Section 4.4.2; corrective action shall be taken as warranted. Any specific data set used to make a decision will be 90% complete.

4.2 Measurements And Data Acquisition

4.2.1 Sample Acquisition

All drilling activities and soil sampling shall be in compliance with the specifications set forth in Section 3.3; all groundwater sampling shall comply with the specifications in Section 3.9. Proposed sample locations are shown in Figure 2; the basis for these locations are described in Section 3.2. The basis for selecting soil sampling depths and target monitor well screened intervals are described in Sections 3.3 and 3.7, respectively.

4.2.2 Sample Container Selection

Sample container types, preparation requirements, special handling requirements, will be in accordance with Detroit Edison's instruction.

4.2.3 Procedure Changes

Should deviations from the drilling and sampling methods contained in Section 3 be required to accommodate unforeseen field situations, they will be initiated and documented in writing by the Field Team Leader or engineer obtaining samples in concert with discussion with the Golder and EF1 Project Manager.

4.2.4 Sample Custody

All samples obtained during the course of the groundwater characterization shall be logged in real-time on a Chain of Custody form from the point of origin to the destination laboratory, in order to ensure the maintenance of sample integrity and identification throughout the analytical process. All analytical results shall be controlled as permanent project quality records.

4.2.5 Calibration Procedures

Calibration of all measuring and test equipment, whether in existing inventory or purchased for this investigation, shall be controlled and documented as required by Detroit Edison's Fermi 1 Quality Assurance Manual. Routine operational checks for field equipment shall be as defined within applicable procedures. All calibration requirements applicable to analytical laboratory equipment shall be as defined by laboratory QA plans and/or applicable standard analytical methods.

4.2.6 Analytical Procedures

Groundwater samples shall be analyzed for the ROCs listed in Section 2.2 per Fermi 2 Radiation Protection Department protocol, not including the hard-to-detect ROCs that require specialized analysis equipment not available at Fermi 2. All analytical procedures shall require the use of the standard units, detection/quantitation levels, and methodology, to facilitate the comparability of data sets in terms of precision and accuracy. All approved procedures shall be retained in the project quality records and shall be available for review on request.

As indicated in Section 4.1.2, Detroit Edison will contract an independent laboratory for analyses for hard-to-detect ROCs. Detroit Edison will determine the frequency the contracted laboratory will be used to perform analysis for hard-to-detect ROCs. In this situation, the contracted laboratory will use the following procedures:

^{3}H	Liquid Scintillation
^{22}Na	Gamma Spectrometry
^{60}Co	Gamma Spectrometry
^{90}Sr	Liquid Scintillation/ Chrenkov Method
^{99}Tc	Liquid Scintillation
^{137}Cs	Gamma Spectrometry
^{226}Ra	Alpha or Gamma Spectrometry
^{228}Ra	Gamma Spectrometry
U (all)	Alpha Spectrometry

4.2.7 Internal Quality Control

All analytical samples shall be subject to in-process Quality Control measures in both the field and laboratory. Unless otherwise specified, the following minimum field QC requirements shall apply.

- Field Duplicate Samples. For each shift of sampling activity under an individual sampling subtask, one duplicate shall be collected for every 20 or fewer samples. Duplicate samples shall be retrieved from the same sampling location using the same equipment and sampling technique, and shall be placed into two identically prepared and preserved containers. All field duplicates shall be analyzed independently to assess the magnitude of field variability and the need for more duplicates.
- Split Samples. Field or field duplicate samples may be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory.
- Field Blanks. Field blanks shall consist of pure deionized distilled water, transferred into a sample container at the site and preserved with the reagent specified for the analytes of interest. Field blanks are used as a check on reagent and environmental contamination, and shall be collected at the same frequency as field duplicate samples.
- Equipment Rinsate Blanks. Equipment blanks shall consist of pure deionized distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples. Equipment blanks are used to verify the adequacy of sampling equipment decontamination procedures, and shall be collected at the same frequency as field duplicate samples where applicable.
- Quality Control Reference Samples. A QC reference sample shall be analyzed daily.

4.2.8 Preventive Maintenance

All measurement and testing equipment used in the field and laboratories that directly affect the quality of the field and analytical data shall be subject to preventive maintenance in accordance with Golder, EF1, EF2, and/or other contractor standard procedures.

4.3 Data Assessment

All analytical data shall be compiled, and reviewed by the laboratory prior to presentation for validation as described in Section 4.4. Depending on the distribution and statistical characteristics of the validated data and other AOC- or ROC-specific considerations, various statistical and/or probabilistic techniques may be selected for use in the process of data comparison or analysis. Methods used shall be documented and retained as project records. All

field QC samples, as defined in Section 4.2.7, such as splits, blanks, and duplicates require evaluation by the reviewer prior to use of the analytical results.

4.4 Data Reduction And Validation

4.4.1 Data Reduction And Data Package Preparation

All analytical laboratories shall be responsible for preparing a detailed data package that includes identifying samples, sampling and analysis dates, raw analytical data, and reduced data. Outside laboratories may also include quality control (QC) check data, equipment calibration data, and documentation of any nonconformances affecting the measurement system in use during the analysis of the particular group of samples.

4.4.2 Validation

Validation of completed data packages being prepared by Golder personnel will be performed under the direction of Golder's Quality Assurance Lead. All such data packages shall be verified and 10% by random selection shall receive full validation. Data packages prepared by EF1 staff shall receive a technical review.

4.4.3 Final Review And Records Management Considerations

All analytical data verification and validation reports and supporting data packages prepared by Golder Associates shall be subject to a final technical review by Golder's Project Manager. Reports prepared by EF1 staff members shall receive a technical review by another staff member or by a member of the EF2 staff. This review shall be performed before submittal of final data packages to regulatory agencies or before inclusion in reports or technical memoranda. All verification and validation reports, data packages, and review comments shall be retained as permanent project quality records.

4.4.4 Requirements For Handling Unacceptable Or Suspect Data

Data errors or procedural discrepancies related to laboratory analytical processes shall prompt data requalification, requests for reanalysis, or other appropriate corrective action by the responsible laboratory. If problems are observed with validated data, either as part of the data assessment process described in Section 4.3, or if separately observed by any of the project team, the data shall be documented as a nonconformance and corrective action initiated.

4.5 Corrective Action

Corrective action requests shall be documented and dispositioned by Golder's Project Manager or other appropriate project personnel. Corrective action reports shall identify the affected requirement, the probable cause of the deviation, data which may have been affected by the deviation, and the corrective action required both to resolve the immediate situation and to reduce or preclude its recurrence. All documentation related to corrective action shall be routed to the project quality records upon completion or closure for retention in compliance with EF1 Quality Assurance protocol, and shall be made available for NRC review.

Calibration errors related to laboratory analytical processes that may be observed in the data validation activities shall prompt requests for reanalysis or other appropriate corrective action by the responsible laboratory. If sample holding time requirements are compromised, insufficient sample material is available for reanalysis, or any other condition prevents compliance with governing analytical methods and data validation protocols, the situation shall be brought to the attention of the EF1 Project Manager and rectified in compliance with the requirements of EF2's internal laboratory QA protocol.

Data sets that fail the completeness criterion shall be documented and controlled as specified in Section 4.1.3. Corrective action may include validation of a separate data set, reanalysis, resampling, or other actions as determined appropriate through the corrective action process.

4.6 Glossary

Accuracy: For the purposes of environmental investigations, accuracy may be interpreted as the measure of the bias in a system. Sampling accuracy is normally assessed through the evaluation of reference samples and split samples.

Comparability: For the purposes of environmental investigations, comparability is an expression of the relative confidence with which one data set may be compared with another.

Completeness: For the purposes of environmental investigations, completeness may be interpreted as a measure of the amount of valid data obtained from a measurement system compared to the total data expected under correct normal conditions.

Deviation: For the purposes of environmental investigations, deviation refers to an approved departure from established criteria that may be required as a result of unforeseen field situations or that may be required to correct ambiguities in procedures that may arise in practical applications.

Equipment Blanks: Equipment blanks consist of pure deionized, distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual

field samples. They are used to verify the adequacy of sampling equipment decontamination procedures, and are normally collected at the same frequency as field duplicate samples.

Field Blanks: Field blanks for water analyses consist of pure deionized, distilled water, transferred to a sample container at the site and preserved with the reagent specified for the analytes of interest. They are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected at the same frequency as field duplicate samples.

Field Duplicate Sample: Field duplicate samples are samples retrieved from the same sampling location using the same equipment and sampling technique, placed in separate, identically prepared and preserved containers, and analyzed independently. Field duplicate samples are generally used to verify the repeatability or reproducibility of analytical data, and are normally analyzed with each analytical batch or every 20 samples, whichever is greater.

Nonconformance: A nonconformance is a deficiency in the characteristic, documentation, or procedure that renders the quality of material equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought into conformance with immediate corrective action, it shall not be categorized as a nonconformance. If the nature of the condition is such that it cannot be immediately and satisfactorily corrected, however, it shall be documented in compliance with approved procedures and brought to the attention of management for disposition and appropriate corrective action.

Precision: Precision is a measure of the repeatability or reproducibility of specific measurements under a given set of conditions. The relative percent difference (RPD) is used to assess the precision of the sampling and analytical method. RPD is a quantitative measure of the variability. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed in terms of standard deviation, but may also be expressed as the coefficient of variation (i.e., relative standard deviation) and range (i.e., maximum value minus minimum value). Precision is assessed by means of duplicate/replicate sample analysis.

Quality Assurance (QA): For the purposes of environmental investigations, QA refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meet all end user requirements and/or the intended end use of the data.

Quality Assurance Project Plan (QAPP): The QAPP is an orderly assembly of management policies, project objectives, methods, and procedures that defines how data of known quality will be produced for a particular project or investigation.

Quality Control (QC): For the purposes of environmental investigations, QC refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Range: Range refers to the difference between the largest and smallest reported values in a sample, and is a statistic for describing the spread in a set of data.

Reference Samples: Reference samples are a type of laboratory quality control sample prepared from an independent traceable standard.

Replicate Sample: Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

Representativeness: For the purposes of environmental investigations, representativeness may be interpreted as the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of a sampling program.

Split Sample: A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples may be routed to separate laboratories for independent analysis, generally for purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method.

Validation: For the purposes of environmental investigations, validation refers to a systematic process of reviewing data against a set of criteria to provide assurance that the data are acceptable for their intended use. Validation methods may include review of verification activities, editing, screening, cross-checking, or technical review.

Verification: For the purposes of environmental investigations, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities may include inspections, audits, surveillance, or technical review.

5.0 HEALTH AND SAFETY PLAN

The field work described in this work plan will be conducted in accordance with a separate Health and Safety Plan and job hazards evaluation that takes into account the physical and potential chemical/radiological hazards associated with drilling, sampling, and the possible presence of radioactivity in the media that will be encountered.

6.0 PROJECT IMPLEMENTATION

Detroit Edison seeks to initiate the activities specified in Section 3 before the end of 2003. The scope of the groundwater characterization will include the following activities:

Activity	Description
1	Install first three well pairs, in order to verify/resolve hydraulic gradient. (1 week)
2	Hydrogeologic data reduction: borehole logs, well construction diagrams; groundwater potentiometric surface maps; discussion between EF1 and Golder Associates Inc. regarding subsequent drilling locations based on hydraulic gradients. (<1 week)
3	Discussion with NRC regarding results of the above data. (1 day)
4	Complete monitor well installation. (2 weeks)
5	Sample wells. (1 week)
6	Groundwater analyses, data reduction and validation. (1 month)
7	Complete report of interim findings to Detroit Edison. (1 month)
8	Quarterly groundwater sampling, analysis, data reduction and validation.
9	Quarterly groundwater sampling, analysis, data reduction and validation.
10	Quarterly groundwater sampling, analysis, data reduction and validation.
11	Prepare summary report of groundwater quality for previous year; including recommendation regarding possible need to extend sampling duration. Complete report approximately 12 months following completion of Activity No. 5.

7.0 REFERENCES

1. Enrico Fermi Atomic Power Plant, Part B Revised License Application, Technical Information and Hazards Summary Report. Power Reactor Development Corporation, 1956.

2. Fermi 2 Updated Final Safety Analysis Report. Detroit Edison Company, May 2002 (Revision 11).

3. Applicant's Environmental Report (Operating License Stage), Enrico Fermi Atomic Power Plant Unit 2. Detroit Edison Company, 1974.

4. Detroit Edison Drawings Nos. 6C721W-7, September 1976; and 6C721-1902-3, March 1961.

5. National Oceanic and Atmospheric Agency: Water Levels for Station No. 9063090 Fermi Power Plant, MI (http://www.glakesonline.nos.noaa.gov/geographic.html).

6. Fermi-I : New Age for Nuclear Power : A History of the Enrico Fermi Atomic Power Project. American Nuclear Society, 1979.

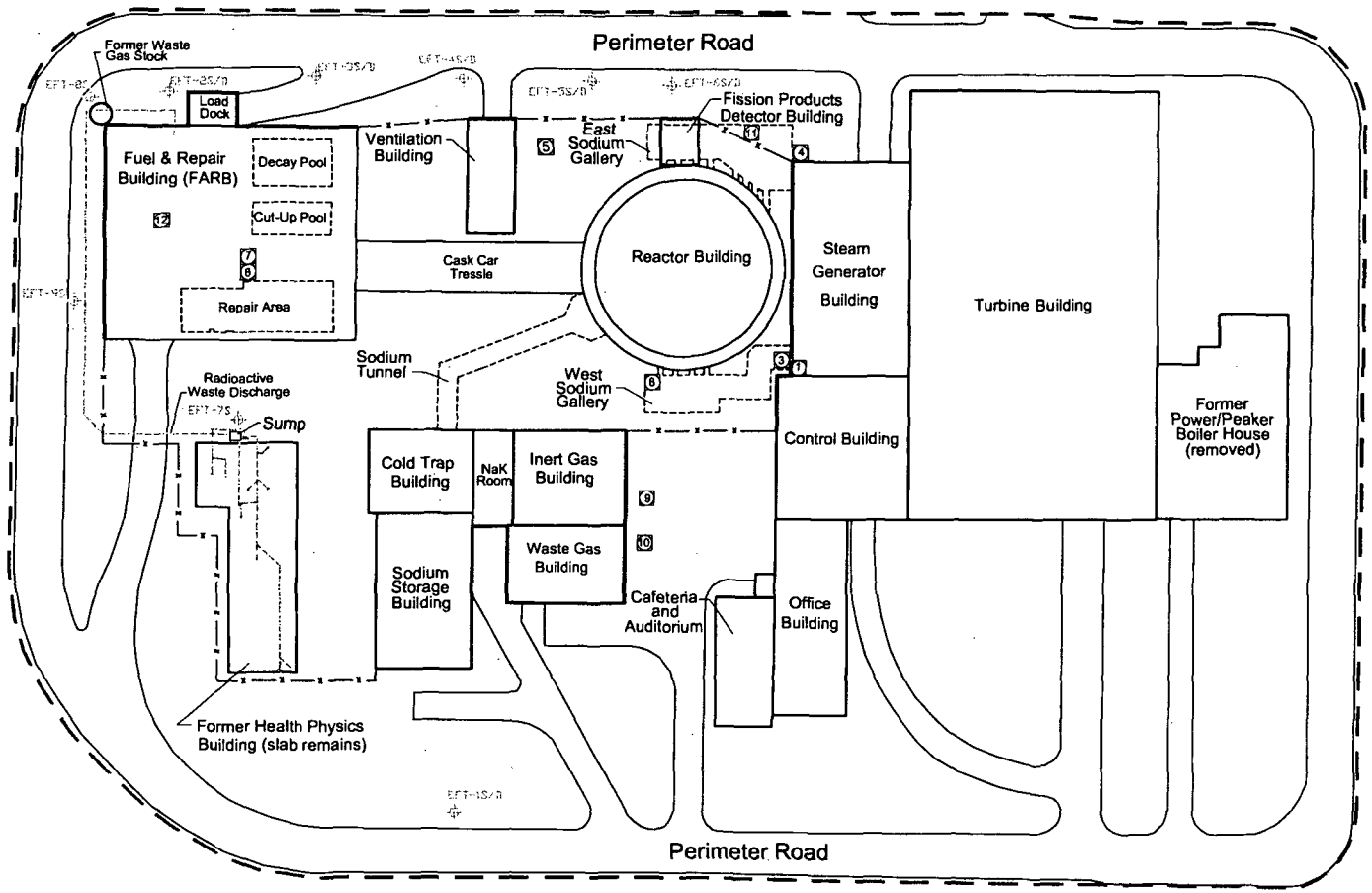
TABLES

TABLE 1
PROPOSED MONITOR WELLS
GROUNDWATER CHARACTERIZATION WORK PLAN
FERMI 1 LICENSE TERMINATION PLAN

Well	Hydraulic Position	Area of Concern	Basis for Monitor Well Installation
1S/D	Upgradient	Controlled Area	Background groundwater quality; detect possible upgradient contamination.
2S/D	Downgradient	Health Physics Building Sump; FARB Hot Sump and Waste Tanks	Radioactive fluids were collected in Health Physics Building drainage system and routed to FARB; Hot Sump and waste tanks inside FARB collected radioactive fluids.
4S/D	Downgradient	FARB Pools and Health Physics Building	Water in FARB cut-up and decay pools was in contact with spent fuel rods; drains in Health Physics received low-level radioactive waste water. Possible leakage of primary (radioactive) sodium to tunnel and other buildings along circulatory route;
5S/D	Downgradient	Sodium Tunnel, Reactor, Sodium and Gas Buildings	
6S/D	Downgradient	East Sodium Gallery; Fission Products Detector (FPD) Building, and Reactor	Secondary (non-radioactive) sodium system contained tritium; radioactive condensate may have discharged to ground near northeast corner of FPD building exterior; radioactive condensate may have discharged to ground along northeast portion of reactor building exterior; possible subsurface/bedrock impacts from reactor core/basement.
7S	Adjacent	Health Physics Building	Possible leakage from sump at east end of building.
8S	Adjacent	Waste Gas Stack	Interior atmospheres in FARB and Inert and Sodium Service Buildings were routed to the waste gas stack, the foundation drain for which is a susceptible location for radioactive condensate accumulation.
9S	Adjacent	Radioactive Liquid Waste Discharge Conduit	Corrosion has been observed on this portion of the 2-inch wrought iron pipe adjacent to the northwest portion of the FARB.
10S	Downgradient	West Sodium Gallery and Reactor	Secondary (non-radioactive) sodium system contained tritium; possible subsurface impacts from reactor core/basement.

Notes: 1. Well numbers are preceded by the designation "EFT-" (i.e., "Enrico Fermi Termination" well)
2. "S" indicates that the well will be installed just below the water table in shallow fill or native glaciolacustrine sediments.
3. "D" indicates that the well will be installed at or below the bedrock surface.

FIGURES



Legend

- Fence
- Protected Area Boundary
- 5 Sump
- Proposed Shallow/Deep Monitor Well
- Termination Boundary

Notes

1. Drawing is adapted from the following Detroit Edison Company drawings:
   - 6E721-56 (Perimeter road and general building layout)
   - 6E721-43-1 (Scaled dimensions of sodium/gas buildings, reactor and FARB)
   - 6P721-1074-1 (Sodium tunnel)
   - 6C721-1640-1 (FARB interior)
   - 6E721-57-4 (East sodium gallery)
   - 6E721-57-5 (West sodium gallery)
   - 6P721-1117-1 (Health physics building and drains)
   - 6P721-1118-1 (Radioactive waste discharge line)
   - 6P721-1836-20 (Fission products detector building)
2. Monitor Well locations subject to change based on surface conduit positions and hydraulic gradient.

50 0 50
APPROXIMATE SCALE IN FEET

Golder Associates
Lansing, Michigan

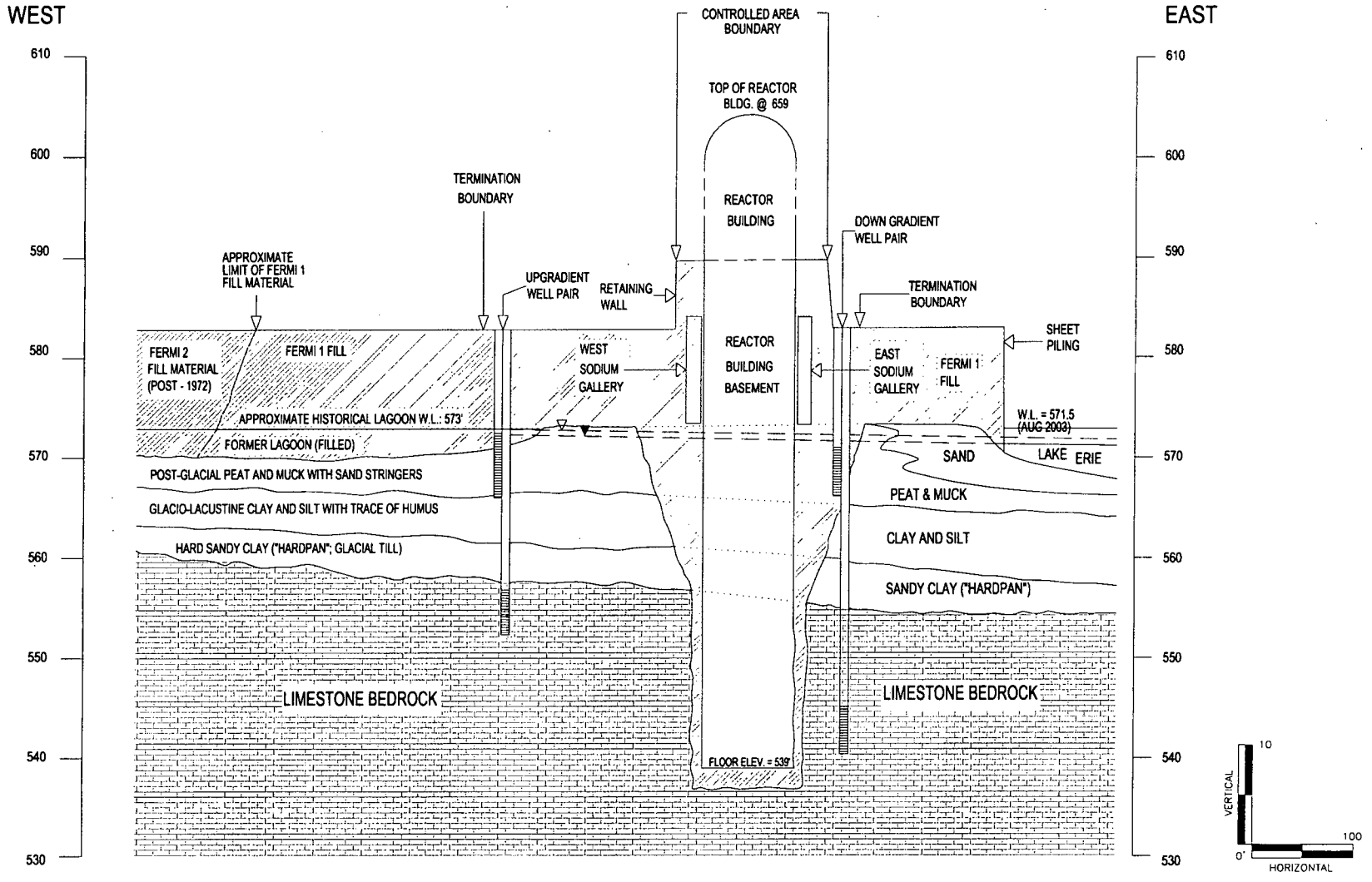
SCALE	AS SHOWN
DATE	5/23/03
DESIGN	DY
CADD	DY/JJS
CHECK	
REVIEW	
FILE No.	8793.0002-001
PROJECT No.	023-8793 REV. 0

TITLE: **SITE PLAN DETROIT EDISON FERMI 1 DETROIT, MI**

DTE\FERM 1\MI

FIGURE 1

Drawing file: 8793.0002-001.dwg Aug 19, 2003 - 11:22am



LEGEND

- CONCEPTUAL POTENTIOMETRIC ELEVATION (BEDROCK)
- CONCEPTUAL WATER TABLE ELEVATION (GLACIAL ZONE)
- MONITORING WELL WITH SCREEN INTERVAL (TYP.)
- FORMER GEOLOGIC CONTACT (PER - EF1 CONSTRUCTION)

Golder Associates
Lansing, Michigan

FILE No.	8793.0001-002
PROJECT No.	023-8793
REV.	0
SCALE	AS SHOWN
DATE	08/18/03
DESIGN	DY/JJS
CADD	DY/MA
CHECK	
REVIEW	

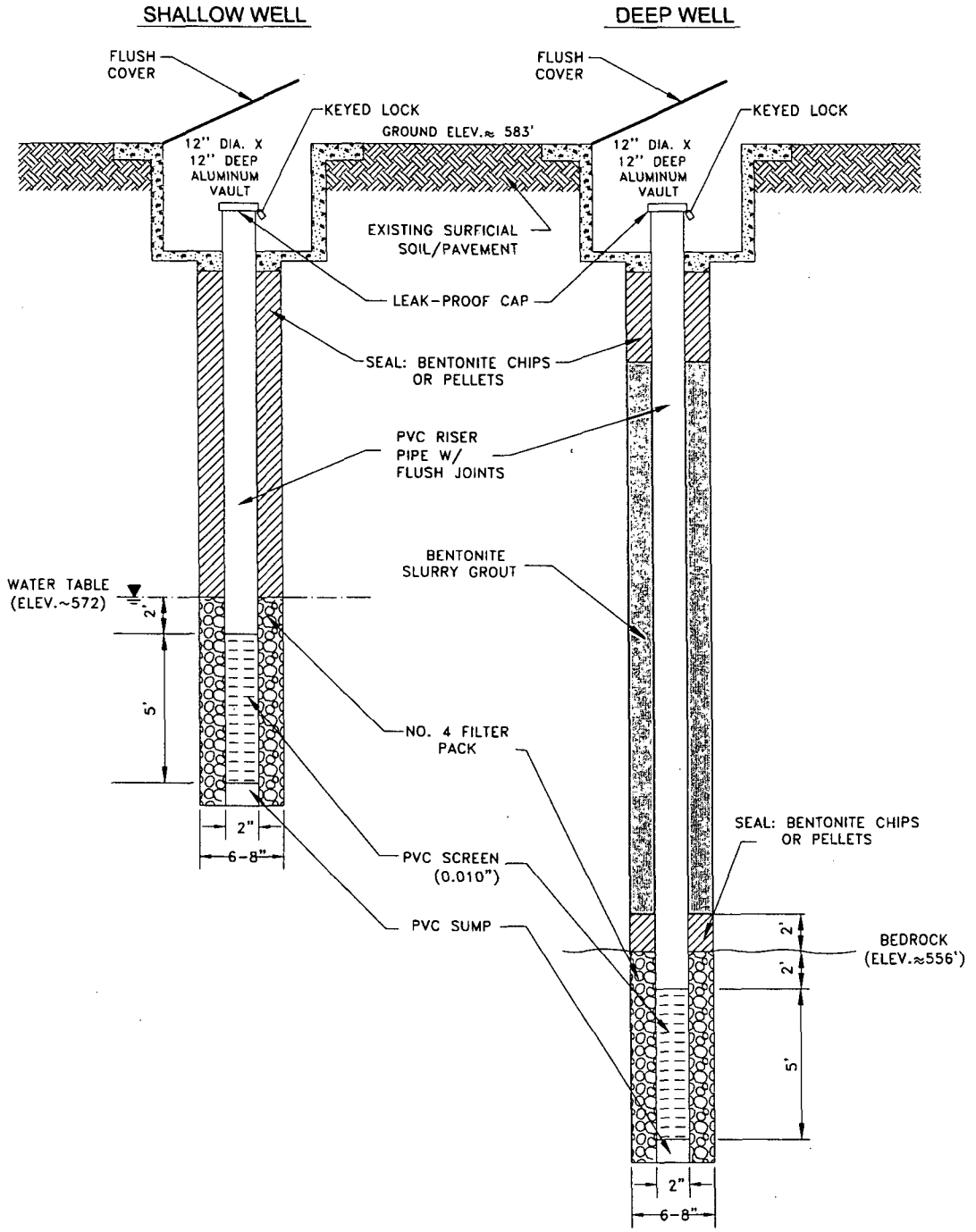
TITLE

CONCEPTUAL HYDROGEOLOGIC MODEL DETROIT EDISON COMPANY FERMI 1 NEWPORT, MI

DTE/EF1/GROUNDWATER WORK PLAN

FIGURE 2

Drawing file: 8793.0001-002.dwg Aug 18, 2003 - 4:02pm



Golder Associates Lansing, Michigan	SCALE AS SHOWN	TITLE **MONITOR WELL CONSTRUCTION DIAGRAM DETROIT EDISON COMPANY FERMI 1 NEWPORT, MI**	
	DATE 8/15/03		
	DESIGN JJS		
	CADD DY		
FILE No. FIGURE 2	CHECK		
PROJECT No. 023-8793 REV. 0	REVIEW	DTE -EF1/GROUNDWATER WORK PLAN	FIGURE 3

Drawing file: 8793-001-3.dwg Aug 18, 2003 - 4:03pm

APPENDIX A

HISTORICAL AIR PHOTOS

APPENDIX B

BOREHOLE AND MONITOR WELL CONSTRUCTION LOGS

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-1S/I/D

BORING DATE: 11/10/03

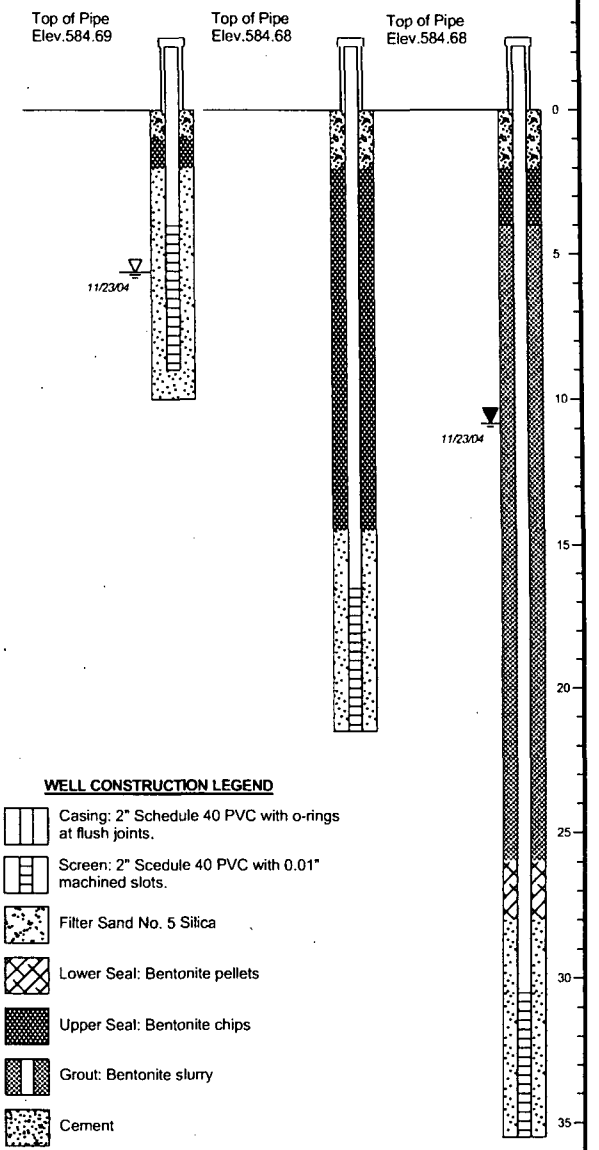
DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY IN.	SAMPLES BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0	Vaccum	GROUND SURFACE (EST.)		582.2 / 0.0							
5	Vaccum	CLAYEY FILL		572.2					580		
10	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, grey/dark gery, LEAN CLAY.		10.0	1	2" DO	18	2 2 3 3	575		
		Moist, mottled light brownish grey/yellowish brown, LEAN CLAY. 10YR (6/2) /(5/8)		10.8 / 570.2							
		Moist, mottled dark grey/dark greyish brown, LEAN CLAY, stratificated, plastic. 2.5YR (4/1)/(4/2)		12.0 / 568.2	2	2" DO	24	1 2 3 4	570		
15		with occasional thin layer of peat.		14.0	3	2" DO	24	1 2 2 4			
		Moist, dark grey, LEAN CLAY, laminated. (Glacial Lacustine) 2.5Y (4/1)		564.2	4	2" DO	24	6 6 7 8	565		
		Moist, mottled dark grey/dark greyish brown, LEAN CLAY, laminated, trace fine gravel. (Glacial Lacustine) 2.5Y (4/1)(4/2)		18.0 / 561.7	5	2" DO	24	2 4 7 8			
20		Wet, LEAN CLAY		20.5	6	2" DO	24	2 1 1 4	560		
		Moist dark grey, SILTY CLAY, non laminated, trace fine gravel. (Glacial Till) 5Y(4/1)		21.0 / 557.2	7	2" DO	18	2 4 6 10			
25		Moist, soft, grey, SILTY CLAY trace fine gravel. (Glacial Till) 2.5Y(5/1)		25.0 / 554.7	8	2" DO	24	2 3 4 5	555		
30	8 ft Core Barrel / Rock Core	Limestone Bed Rock		27.5 / 546.7	9	CORE	96	NA	550		
35		End of EFT-1D Boring @ 35.5 ft bgs		35.5							
40											
45											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Each well installed in separate borehole.
2. Upper portion of each borehole advanced past possible utilities using vacuum.
3. Each well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 6.3 feet

Golder Associates

LOGGED: DY

CHECKED: DR

FERMI1 DEEP BORING.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-2S/D

BORING DATE: 11/12/03

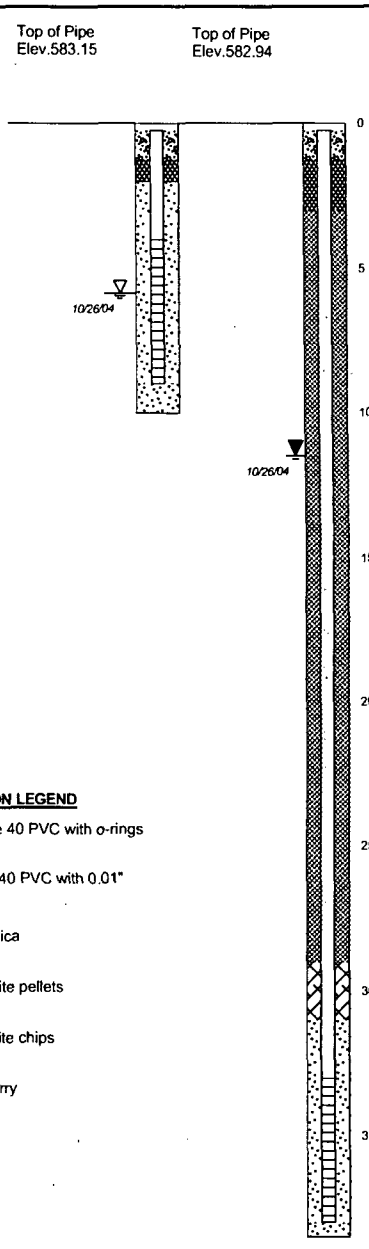
DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	TYPE	RECOVERY IN.	BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0	Vacuum	PAVEMENT SURFACE (EST.)		583.4							
				0.0							
5	Vacuum	Clayey FILL.							580		
									575		
10				573.4							
	24" Split Spoon Sampler; 4 1/4" ID Hollow Stem Auger	Moist, silty clay, trace fine gravel. (FILL)		10.0	1	2" DO	18	2 2 3 4			
				570.9					570		
15		Moist, soft, mottled grey/olive, LEAN CLAY. (Glacial Lacustrine) 5Y (5/1)/(4/3)		12.5	2	2" DO	20	2 2 3 4			
				568.4							
		Moist, soft, mottled dark grey/olive grey, LEAN CLAY, laminated. (Glacial Lacustine) 5Y (4/1)/(4/2) Occ. peat seam (1" thick)		15.0	3	2" DO	18	2 2 2 3			
				565.9							
20		Moist, firm, grey, LEAN CLAY, laminated, occ. reddish brown seam. (Glacial Lacustrine) 2.5Y (6/1)		17.5	4	2" DO	20	2 3 4 5	565		
				563.4							
		Moist, firm, light olive brown, LEAN CLAY, occ. sand seam and pocket, laminated. (Glacial Lacustrine) 2.5Y (5/4)		20.0	5	2" DO	24	3 4 5 8			
				560.9							
		Moist, firm, dark yellowish brown, SILTY CLAY, trace fine gravel. (Glacial Till) 10YR (4/4)		22.5	6	2" DO	24	2 4 6 8	560		
				558.4							
25		Moist, firm, dark grey, SILTY CLAY, trace fine gravel. (Glacial Till) 10YR (4/1)		25.0	7	2" DO	24	3 4 5 8			
				555.9							
		Moist, firm, dark grey, SILTY CLAY, trace fine gravel. (Glacial Till) 10YR (4/1) 2" Rock fragment layer @ 28 ft and 29.2 ft bgs.		27.5	8	2" DO	24	15 18 30 50	555		86
30				552.9	9	2" DO	6	NA			
	8 ft Core Barrel; Rock Core	Dolomite Bedrock.		30.5	10	CORE	96	NA	550		
				544.9							
35		End of Boring @ 38.5 ft bgs		38.5					545		
40											
45											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Each well installed in separate borehole.
2. Upper portion of each borehole advanced past possible utilities using vacuum.
3. Each well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 6.3 feet

Golder Associates

LOGGED: DY

CHECKED: DR

FERMI1 DEEP BORING.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-4S/D

BORING DATE: 11/25/03

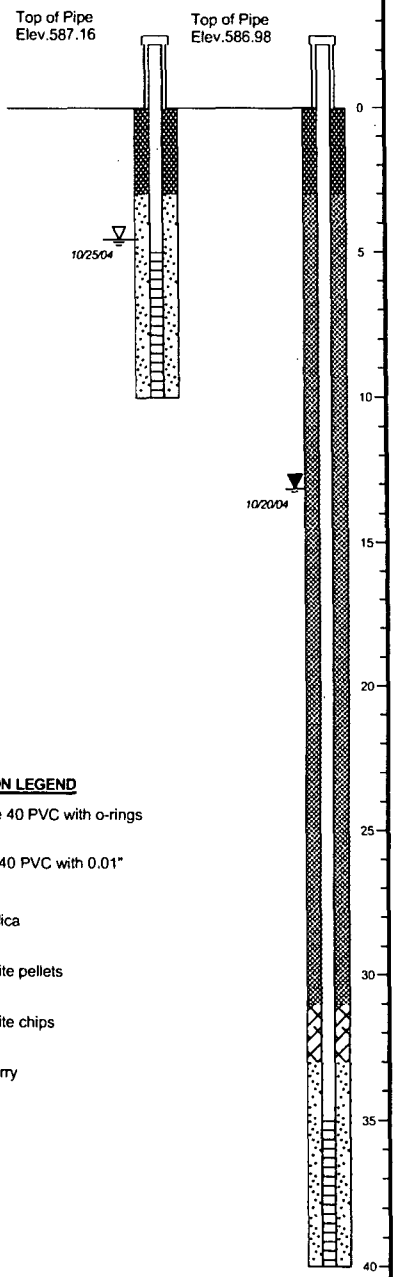
DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY IN.	SAMPLES BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0		GROUND SURFACE (EST.)		584.6 / 0.0							
5	Vacuum / Vacuum	Clayey FILL.							580		
10		Moist, soft, mottled dark grey/very dark grey, LEAN CLAY. (Glacial Lacustine)2.5Y (4/1)/(3/1)		574.6 / 10.0	1	2" DO	18	1 1 2 3	575		
		Moist, soft, mottled very dark grey/black, LEAN CLAY, laminated. (Glacial Lacustrine) 2.5Y (3/1)/(2/1)		572.1 / 12.5	2	2" DO	18	1 2 3 3			
15		1" Peat seam Moist, soft, mottled grey/olive brown, LEANCLAY, laminated. (Glacial Lacustrine) 2.5Y (5/1)/(4/3) Interbed 2" thick dark grey SILTY CLAY layer from 16 to 17ft bgs.		569.6 / 15.0	3	2" DO	22	1 2 2 3	570		
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, dark grey, medium to fine SAND.		567.1 / 17.5	4	2" DO	20	1 1 2 2			
20		Moist, firm, light olive brown, LEAN CLAY, occ. sand seam and pocket, laminated. (Glacial Lacustrine) 2.5Y (5/4)		565.6 / 19.0	5	2" DO	20	3 3 3 4	565		
		Moist, firm, dark yellowish brown, LEAN CLAY, some sand seam and pocket. (Glacial Lacustrine) 10YR (4/4)		562.1 / 22.5	6	2" DO	18	2 4 5 9			
25		Moist, firm, olive brown, SILTY CLAY, trace fine gravel. (Glacial Till) 2.5YR (4/4)		559.6 / 25.0	7	2" DO	24	4 5 6 10	560		
		Moist, soft/firm, dark grey, SILTY CLAY, trace fine gravel. (Glacial Till) 2.5Y (4/1)		557.1 / 27.5	8	2" DO	24	3 4 4 5			
30		Moist/wet, grey, SILTY CLAY, some rock fragments. (Glacial Till) 2.5Y (4/1)		554.6 / 30.0	9	2" DO	8	7 10 11 15	555		1
	8 ft Core Barrel / Rock Core	Dolomite Bedrock.		552.6 / 32.0	10	CORE	96	NA	550		
40		End of Boring @ 40 ft bgs		544.6 / 40.0					545		
45											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Each well installed in separate borehole.
2. Upper portion of each borehole advanced past possible utilities using vacuum.
3. Each well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 6.3 feet

Golder Associates

LOGGED: DY

CHECKED: DR

FERMI1 DEEP BORING.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-5S/D

BORING DATE: 11/14/03

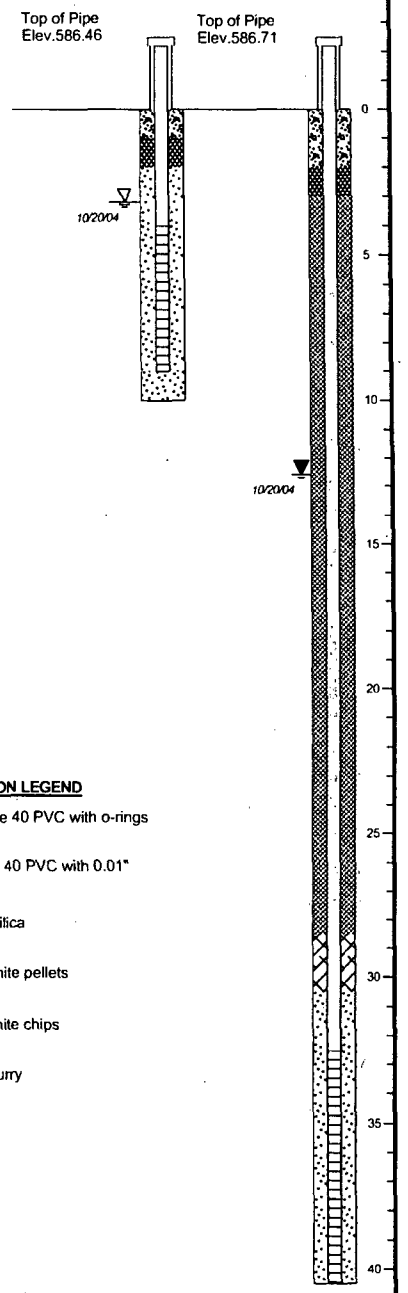
DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	TYPE	RECOVERY IN.	BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0	Vaccum / 24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	GROUND SURFACE (EST.)		584.2 / 0.0							
5	Vaccum / 24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Clayey FILL.		574.2					580		
10	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, olive grey mottled with black, SILTY CLAY. (FILL)		10.0 / 571.7	1	2" DO	12	1 2 2 2	575	□	
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, soft, mottled greyish brown/olive brown, LEAN CLAY. (Glacial Lacustrine) 2.5Y (4/4)/(5/3)		12.5 / 569.2	2	2" DO	24	2 3 3 4		□	
15	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, soft, mottled olive brown/dark greyish brown, LEAN CLAY, laminated. (Glacial Lacustrine) 2.5Y (4/2)/(4/4) 2" Peat layer		15.0 / 566.7	3	2" DO	20	3 3 4 5	570	□	
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	2" Peat layer Moist, soft, mottled grey/olive brown, LEAN CLAY, laminated. (Glacial Lacustrine) 2.5Y (5/1)/(4/3)		17.5 / 564.2	4	2" DO	24	2 3 4 4		□	
20	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, firm,mottled grey/olive brown, LEAN CLAY, laminated, trace fine gravel. (Glacial Lacustrine) 2.5Y (5/1)/(4/3)		20.0 / 561.7	5	2" DO	20	3 4 4 7	565	□	
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, firm,mottled brown/olive brown, SILTY CLAY, laminated, occ. sand pocket. (Glacial Lacustrine) 10Y (4/3)/2.5Y(4/4)		22.5 / 559.2	6	2" DO	24	3 3 5 6		□	
25	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, firm, olive brown, SILTY CLAY, trace fine gravel. (Glacial Till) 2.5Y (4/3)		25.0 / 556.7	7	2" DO	24	5 7 11 12	560	□	
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, firm, dark grey, SILTY CLAY, laminated, trace coarse to fine gravel. (Glacial Till) 2.5Y (4/1)		27.5 / 553.7	8	2" DO	24	6 8 10 14		□	
30	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Moist, hard, grey, SANDY CLAY, little coarse to fine gravel. (Glacial Till) 2.5Y (6/1)		30.5 / 552.7	9	2" DO	18	12 20 50	555	□	2
	24" Split Spoon Sampler / 4 1/4" ID Hollow Stem Auger	Weathered Bedrock.		31.5 / 551.7	10	2" DO	12	NA			
35	8 ft Core Barrel / Rock Core	Dolomite Bedrock.		32.5	11	CORE	96	NA	550		
40	8 ft Core Barrel / Rock Core			543.7 / 40.5					545		
45											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Each well installed in separate borehole.
2. Upper portion of each borehole advanced past possible utilities using vacuum.
3. Each well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 6.3 feet

Golder Associates

LOGGED: DY

CHECKED: DR

FERMI1 DEEP BORING.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-6S

BORING DATE: 6/01/04

DRILLING CONTRACTOR: MPC/TTL

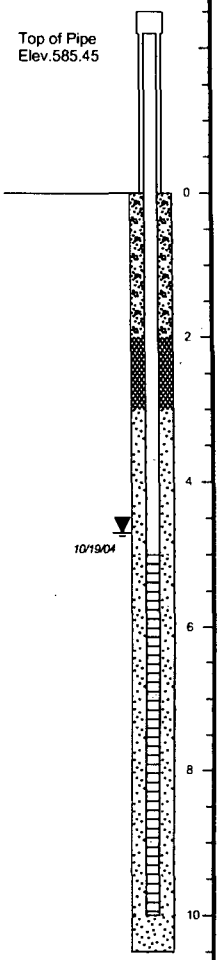
SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY IN.	SAMPLES BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0	Vaccum	PAVEMENT SURFACE (EST.)		583.0							
		FILL: Crushed stone.		0.0 582.5					582		
				0.5							
2											
4	Vaccum	SANDY FILL.							580		
6									578		
8				574.5					576		
	24" Split Spoon Sampler 4 1/4" ID Hollow Stem Auger			8.5							
		FILL: wet greyish brown clay.		573.5	1	2" DO	16	1	574		
10				9.5							
		LEAN CLAY (CL): mottled greyish brown to brownish grey (10 yr 4/2/ - 10 yr 6/2), few percent fine to coarse sand. (Glacial Lacustrine)			2	2" DO	12	7	572		
12		LEAN CLAY as above.		570.5							
		End of Boring @ 12.5 ft bgs		12.5							
14											
16											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EFT-6S



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 2.5 feet

Golder Associates

LOGGED: DR

CHECKED: DR

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-6D

BORING DATE: 6/01/04

DRILLING CONTRACTOR: MPC/TTL

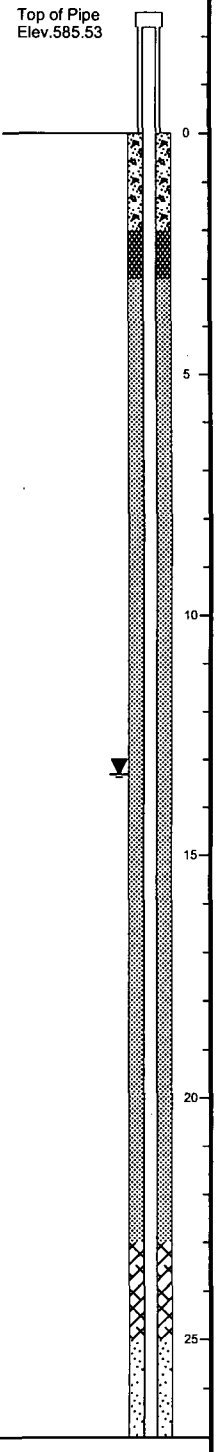
SHEET 1 OF 2

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	Penetration Resistance (N) 5 10 15	ELEVATION	ADDITIONAL LAB. TESTING
0	Vacuum	GROUND SURFACE (EST.)		583.0					
				0.0					
		FILL: Crushed stone.							
				581.0					
				2.0				580	
5	Vacuum	SANDY FILL.							
				573.5				575	
				9.5	1	2" DO	14		
10	24" Split Spoon Sampler 4 1/4" ID Hollow Stem Auger	LEAN CLAY (CL): variagated brown, greyish brown, grey, yellowish brown, plastic, moist, stiff to very stiff, few percent fine to coarse ang. sand (Glacial lacustrine).			2	2" DO	22 7		
		LEAN CLAY (CL): as above, but becomes pinkish from 14.6 to 14.9', occasional trace plant material, only trace fine to coarse sand.			3	2" DO	24 9	570	
15		LEAN CLAY as above, but color is mostly dark greyish brown (10 yr 4/2) with increasing plant material, laminated.			4	2" DO	24 12		
		LEAN CLAY as above, becoming mostly grey with occasional varigation, stiff to mostly stiff.			5	2" DO	24 6	565	
20		LEAN CLAY as above, variagated brown, greyish brown, reddish brown, stiff to very stiff.			6	2" DO	24 8		
				561.8					
		SILTY CLAY (CL): approximately 30-40% fine to coarse sand, trace fine gravel, mostly brown (10 yr 4/3) with some reddish brown areas (2.5 yr 5/4), moist slight plastic, very stiff, non-stratified with occasional laminated silt partings (Glacial Till).		21.2	7	2" DO	24 13		
				560.1				560	
		SILTY CLAY (ML): pale red, laminated.		23.0	8	2" DO	24 11		
25		SILTY CLAY as above, becoming dark grey (10 yr 4/1) below 23.5 ft., no silt partings.		558.2					
				24.8					
		DOLOMITE: pale brown, sucrosic.		557.0					
		DOLOMITE: sucrosic , slight vuggy, massive, pale brown.		26.0	9	CORE	50/50 NA		
				556.4					
				26.6					
		--- CONTINUED NEXT PAGE ---							

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EFT-6D



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 3.8 feet

Golder Associates

LOGGED: DR

CHECKED: *DR*

FERMI1 6D BORING.GPJ GLDR_LDN.GDT 5/2/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-6D

BORING DATE: 6/01/04

DRILLING CONTRACTOR: MPC/TTL

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES	SAMPLES	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING	WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS
		--- CONTINUED FROM PREVIOUS PAGE ---										
30	8 ft Core Barrel Rock Core	DOLOMITE: pale greyish brown, microcrystalline, laminated with occasional black to dark grey shale partings, occasional vertical to high-angle fractures, occasional bioturbation.		554.6 28.4 28.9	9	CORE	50/50	NA	555			Top of Pipe Elev.585.53
		DOLOMITE: as above, but more pale grey, abundant stylolites.										
		DOLOMITE as above from 26.6-28.4 ft.										
		DOLOMITE as above.							550			
		DOLOMITE as above.		548.0								
35		DOLOMITE: micritic, massive, pale brown, occasional black shale streaks, abundant stylolites at intervals of about 1/4 to 1 inch. Rock appears unfractured, occasional small vugs (< 1 mm).		35.0	10	CORE	117/120	NA				
		DOLOMITE as above, with increasing frequency and size of vugs (<1 mm to 4 mm) below 38.5 ft., faint stratification.							545			
40		DOLOMITE as above, with occasional high-angle fracture 4-6" long below 42.5 feet.										
		DOLOMITE as above, with increasing density of fractures, increasing length of vugs, oriented similar to fractures.			11	CORE	57/60	NA	540			
45				537.0								
		End of Boring @ 46 ft. bgs		46.0								
50												
55												

WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

EFT-6D

FERMI1 6D BORING.GPJ GLDR_LDN.GDT 5/2/07 DATA INPUT: DY

DEPTH SCALE

1 inch to 3.8 feet

Golder Associates

LOGGED: DR

CHECKED: *DR*

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-7S

BORING DATE: 11/25/03

DRILLING CONTRACTOR: MPC/TTL

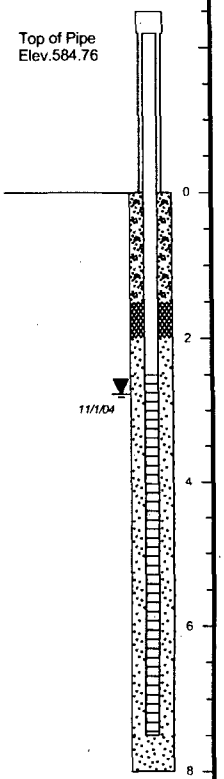
SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	ELEVATION	ADDITIONAL LAB. TESTING
0	2.4" Split Spoon Sampler; 4 1/4" ID Hollow Stem Auger	PAVEMENT SURFACE (EST.)		582.3				
		CONCRETE.		0.0 581.8			582	
		FILL: fine to medium reddish brown sand, very moist, no odor.		0.5	1	2" DO		
2							580	
4		FILL as above, but saturated at approximately 1.5 ft.			2 3	2" DO 2" DO	578	
6		FILL as above.					576	
8		End of Boring @ 8 ft. bgs		574.3 8.0	4	2" DO		
10								
12								
14								
16								

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EFT-7S



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminium cover.

DEPTH SCALE

1 inch to 2.5 feet

Golder Associates

LOGGED: DY

CHECKED: *DR*

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-8S

BORING DATE: 11/25/03

DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

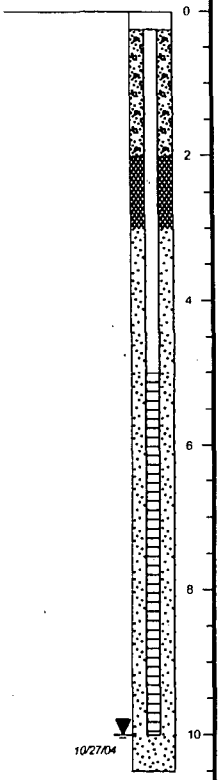
DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES: NUMBER	SAMPLES: TYPE	ELEVATION	ADDITIONAL LAB. TESTING
0	24" Split Spoon Sampler; 4 1/4" ID Hollow Stem Auger	PAVEMENT SURFACE (EST.)		583.0				
		ASPHALT.		0.0 582.5				
				0.5			582	
2								
							580	
4								
		CLAYEY FILL.					578	
6								
							576	
8					1	2" DO		
							574	
				573.5				
10		Moist, stiff LEAN CLAY, mottled dark grey/olive grey (5 y 5/1-4/3), laminated (Glacial lacustine).		9.5 573.0				
		End of Boring @ 10 ft. bgs		10.0				
12								
14								
16								

ADDITIONAL LAB. TESTING

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EFT-8S

Top of Pipe Elev.582.68



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 2.5 feet

Golder Associates

LOGGED: DY

CHECKED: *DR*

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 8/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-8SR

BORING DATE: 6/01/04

DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

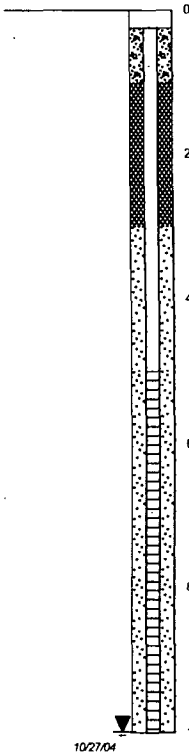
DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY IN.	SAMPLES BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0		PAVEMENT SURFACE (EST.)		583.0							
		ASPHALT.		0.0							
				0.3							
		FILL: Mixture of sand, gravel and clay.							582		
2				581.0							
				2.0					580		
4		Note: Upper ~9.5' of borehole were vacuum advanced on May 10, 2004 by MPC.							578		
6									576		
8	24" Split Spoon Sampler 4 1/4" ID Hollow Stem Auger	FILL: Wet yellowish brown fine silty sand with trace clay; some bits of brown sandy clay (collapse from vacuum pilot hole).			1	2" DO	18/24	2	574		
				573.5							
10		LEAN CLAY (CL): brownish grey (10 yr 4/2), stiff moist, plastic.		9.5							
				573.0							
		End of Boring @ 10 ft. bgs		10.0							
12											
14											
16											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EFT-8SR

Top of Pipe Elev.582.77



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 2.5 feet

Golder Associates

LOGGED: DR

CHECKED: *DR*

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-9S

BORING DATE: 11/25/03

DRILLING CONTRACTOR: MPC/TTL

SHEET 1 OF 1

DATUM: USGS

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY IN.	SAMPLES BLOW, N	ELEVATION	Penetration Resistance (N) 5 10 15	ADDITIONAL LAB. TESTING
0		PAVEMENT SURFACE (EST.)		583.1							
		ASPHALT.		0.0 / 582.6							
				0.5					582		
2											
									580		
4											
		CLAYEY FILL.							578		
6											
									576		
8	24" Split Spoon Sampler, 4 1/4" ID Hollow Stem Auger				1	2" OD	0	6			
				573.6 / 9.5					574		
10		Moist, stiff LEAN CLAY, mottled dark grey/olive grey (5 y 5/1-4/3), laminated (Glacial lacustine).			2	2" OD	24/24	5			
				571.1					572		
12		End of Boring @ 12 ft. bgs		12.0							
14											
16											

WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

EPT-9S

Top of Pipe Elev.582.83

10/28/04

WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filter Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 2.5 feet

Golder Associates

LOGGED: DY

CHECKED: DR

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 6/14/07 DATA INPUT: DY

PROJECT: License Termination DTE-Fermi 1

LOCATION: Newport, Michigan

PROJECT NUMBER: 023-8793

RECORD OF BOREHOLE EFT-10S

BORING DATE: 6/29/05

DRILLING CONTRACTOR: Golder assoc

SHEET 1 OF 1

DATUM: USGS

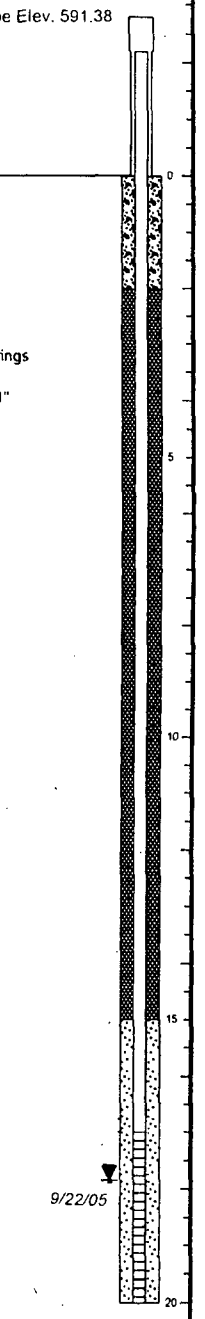
DEPTH SCALE FEET	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	ELEVATION	ADDITIONAL LAB. TESTING
0	Hand Auger w/ tripod	PAVEMENT SURFACE		588.5 / 0.0			588	
		FILL: washed 1/2" to 1" round stone with abund. agate, granite, some limestone		587.0 / 1.5				
2		FILL: lean clay (CL); mottled brown, gray, yell. brown, stiff, moist					586	
4							584	
				583.0 / 5.5				
6		FILL: crushed 1/2"-2" gray limestone, moist					582	
8							580	
10							578	
12				576.0 / 12.5			576	
14		FILL: lean clay (CL), brownish gray, m. stiff-stiff, moist (inc. w. depth), plastic					574	
16							572	
18				570.0 / 18.5			570	
		FILL: lean clay (CL), brownish gray, m. stiff-stiff, very moist (inc. w. depth), plastic, pocket of wet sand and gravel (native?)		568.5				
20		End of boring at 20 ft bgs		20.0				

SOIL PROFILE | SAMPLES | ADDITIONAL LAB. TESTING | WELL CONSTRUCTION DETAILS AND GROUNDWATER OBSERVATIONS

Hand Auger w/ tripod

Hand Auger w/ tripod

Top of Pipe Elev. 591.38



WELL CONSTRUCTION LEGEND

- Casing: 2" Schedule 40 PVC with o-rings at flush joints.
- Screen: 2" Scedule 40 PVC with 0.01" machined slots.
- Filler Sand No. 5 Silica
- Lower Seal: Bentonite pellets
- Upper Seal: Bentonite chips
- Grout: Bentonite slurry
- Cement

NOTES:

1. Upper portion of borehole advanced past possible utilities using vacuum.
2. Well head set inside 4-inch-square aluminum cover.

DEPTH SCALE

1 inch to 3 feet

Golder Associates

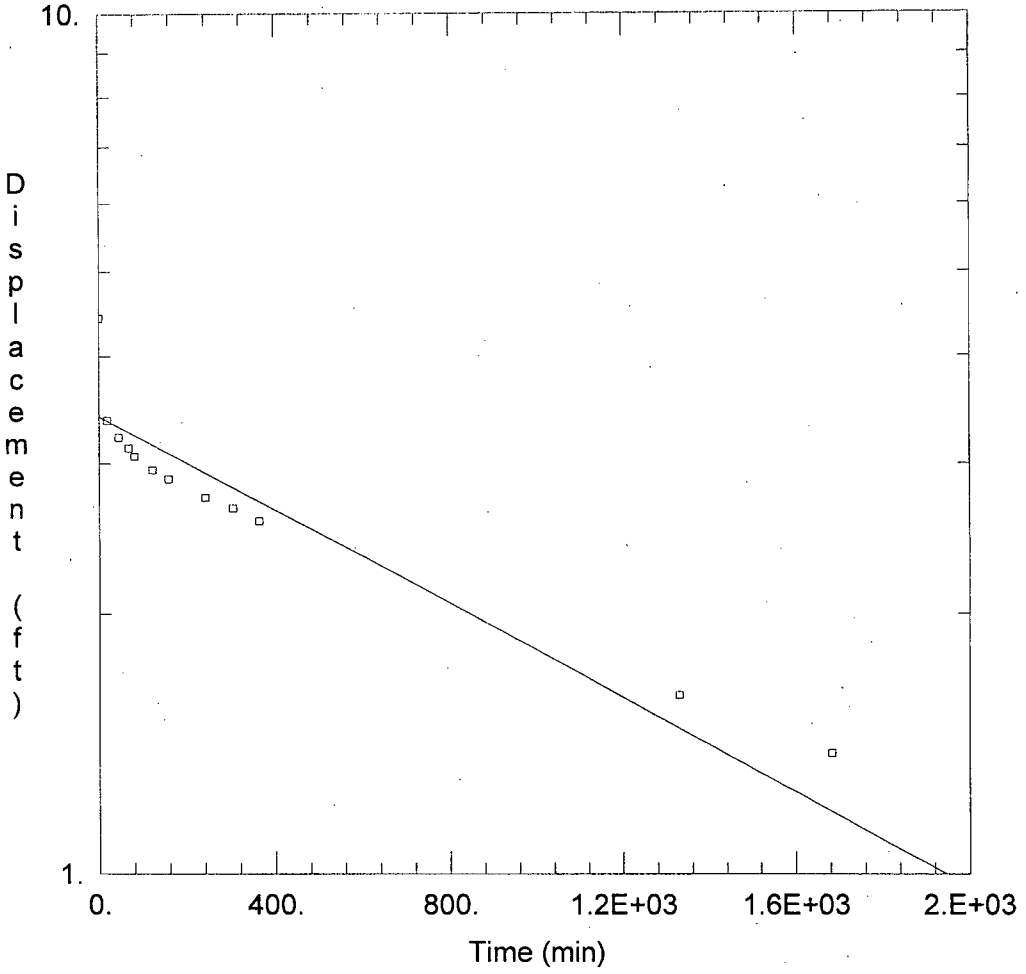
LOGGED: DR

CHECKED: DR

FERMI1 SHALLOW BORINGS.GPJ GLDR_LDN.GDT 4/10/07 DATA INPUT: DY

APPENDIX C

SLUG TEST RESULTS FOR HYDRAULIC CONDUCTIVITY



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\1S.aqt
Date: 09/07/04 Time: 15:04:37

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 1S
Test Date: 6/8/04

AQUIFER DATA

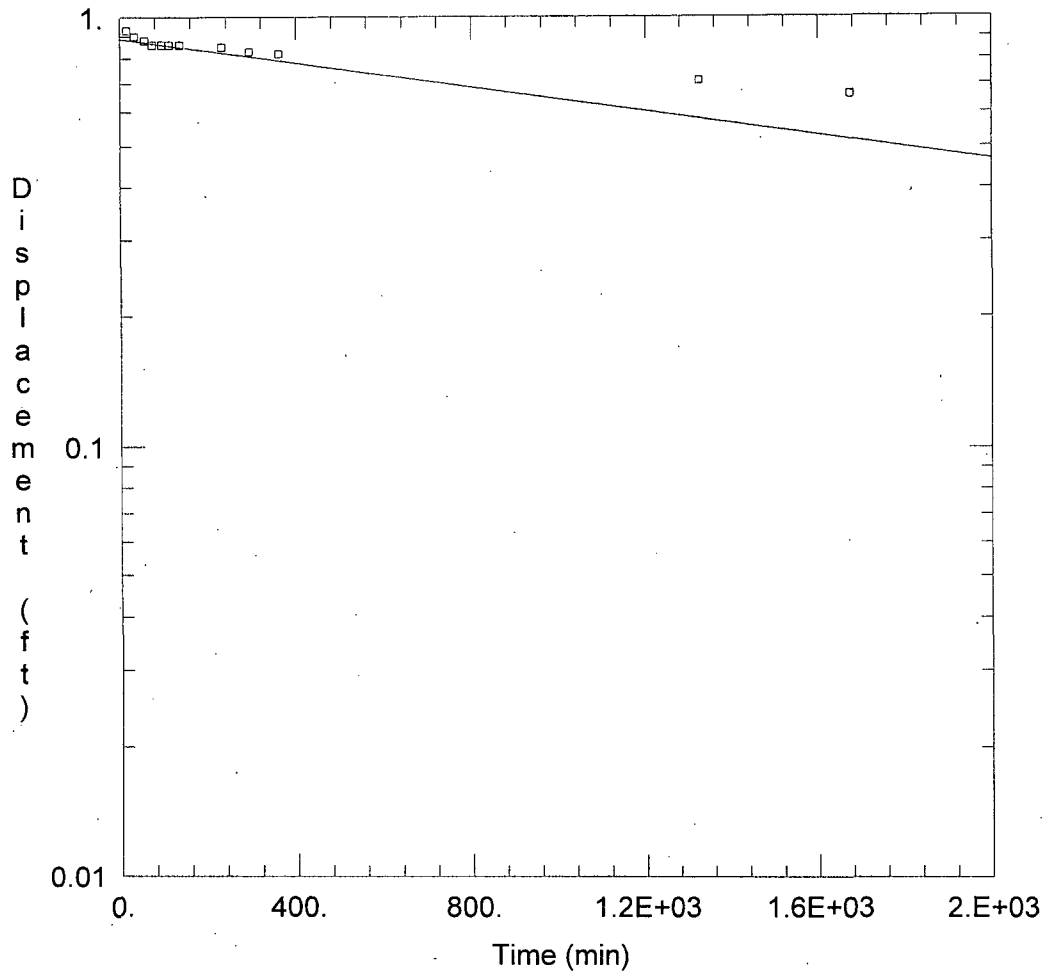
Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (1S)

Initial Displacement: 4.42 ft
Water Column Height: 4.5 ft
Casing Radius: 0.1667 ft
Wellbore Radius: 0.8333 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.313E-06 cm/sec
y0 = 3.405 ft



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\2S.aqt
Date: 09/07/04 Time: 15:03:44

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 2S
Test Date: 6/8/04

AQUIFER DATA

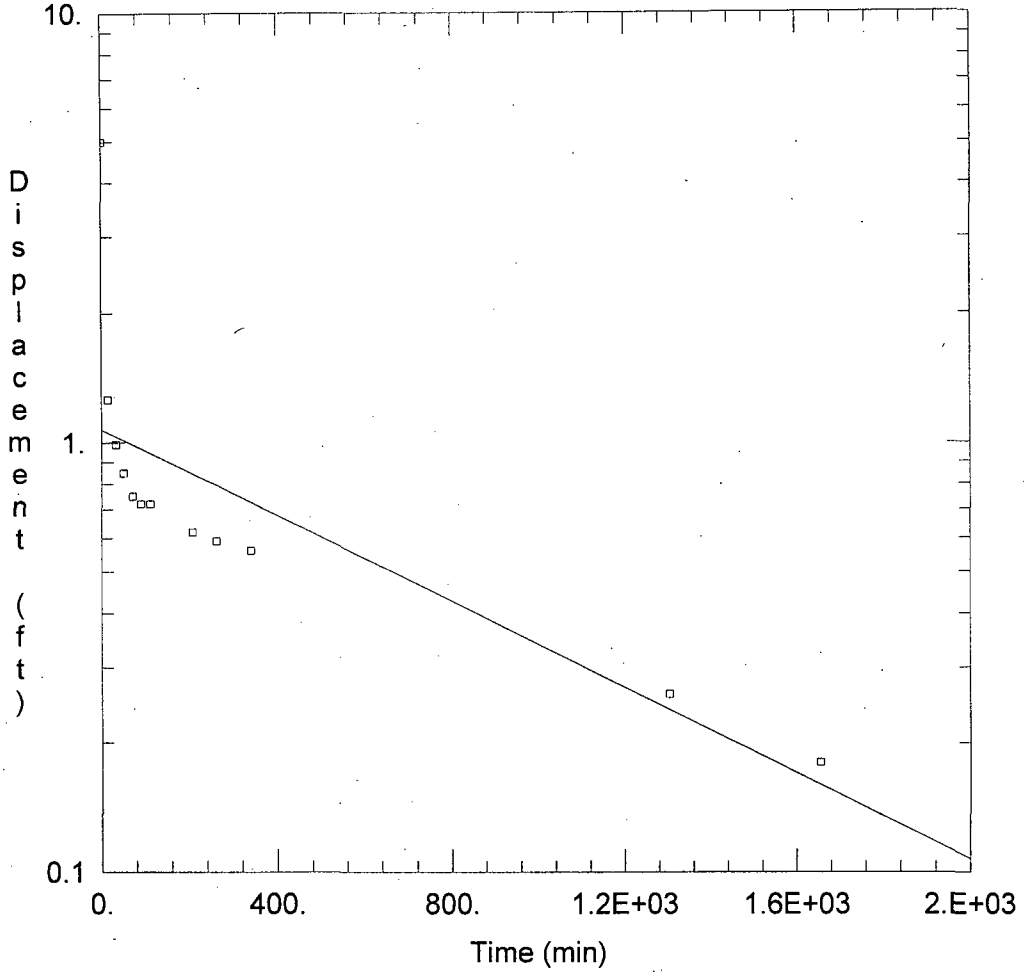
Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (2S)

Initial Displacement: 1.09 ft
Water Column Height: 3.5 ft
Casing Radius: 0.1667 ft
Wellbore Radius: 0.833 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.463E-06 cm/sec
y0 = 0.8872 ft



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\4S.aqt
Date: 09/07/04 Time: 15:27:51

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 4S
Test Date: 6/8/04

AQUIFER DATA

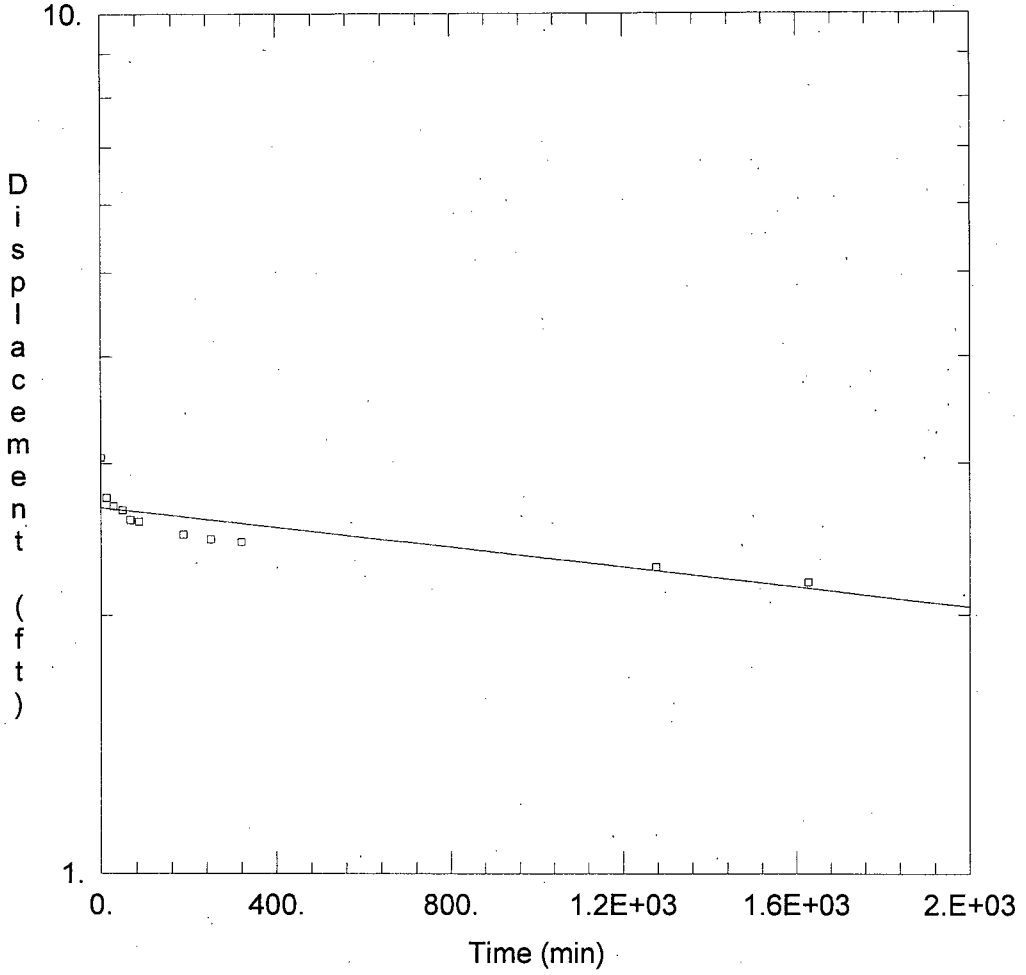
Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (4S)

Initial Displacement: 5. ft
Casing Radius: 0.1667 ft
Screen Length: 5. ft
Water Column Height: 3.5 ft
Wellbore Radius: 0.8333 ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.807E-06 cm/sec
y0 = 1.072 ft



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\5S.aqt
Date: 09/07/04 Time: 15:09:41

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 5S
Test Date: 6/8/04

AQUIFER DATA

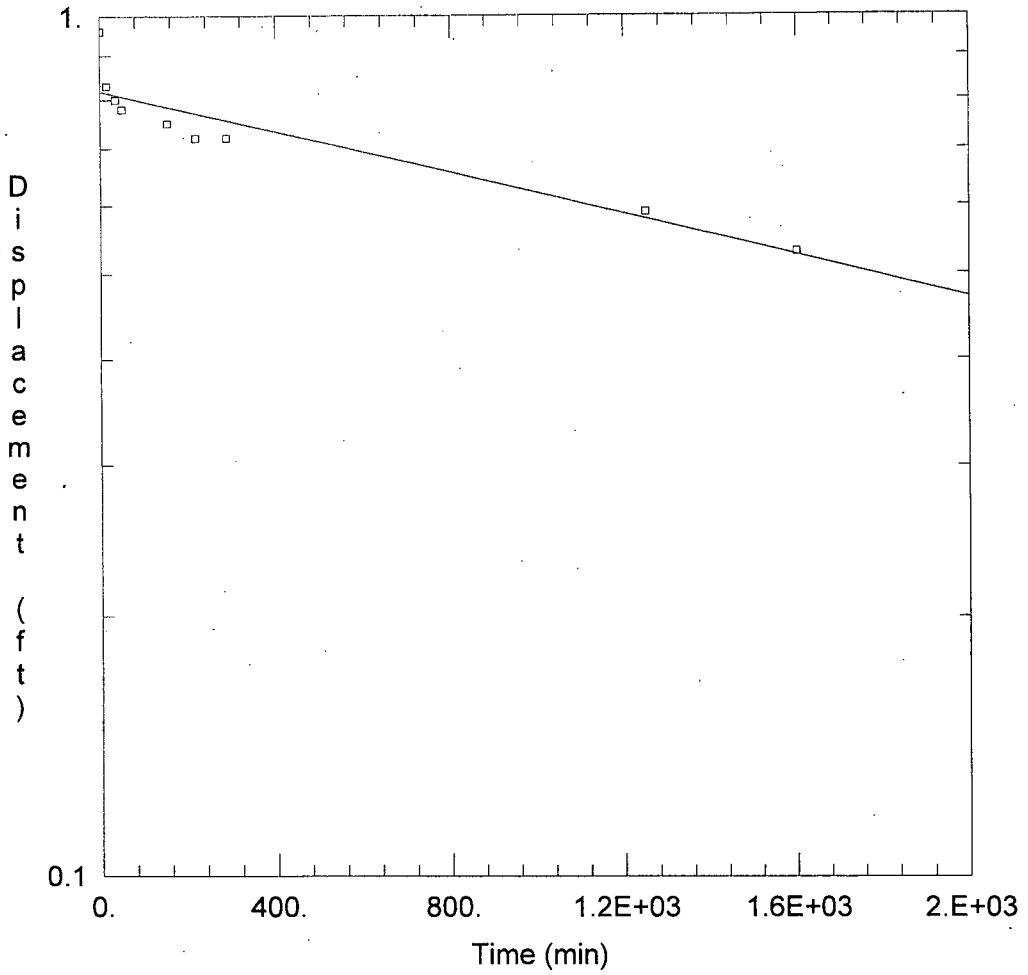
Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (5S)

Initial Displacement: 3.05 ft
Water Column Height: 3.5 ft
Casing Radius: 0.1667 ft
Wellbore Radius: 0.8333 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.028E-06 cm/sec
y0 = 2.667 ft



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\6S.aqt
Date: 09/07/04 Time: 15:17:56

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 6S
Test Date: 6/8/04

AQUIFER DATA

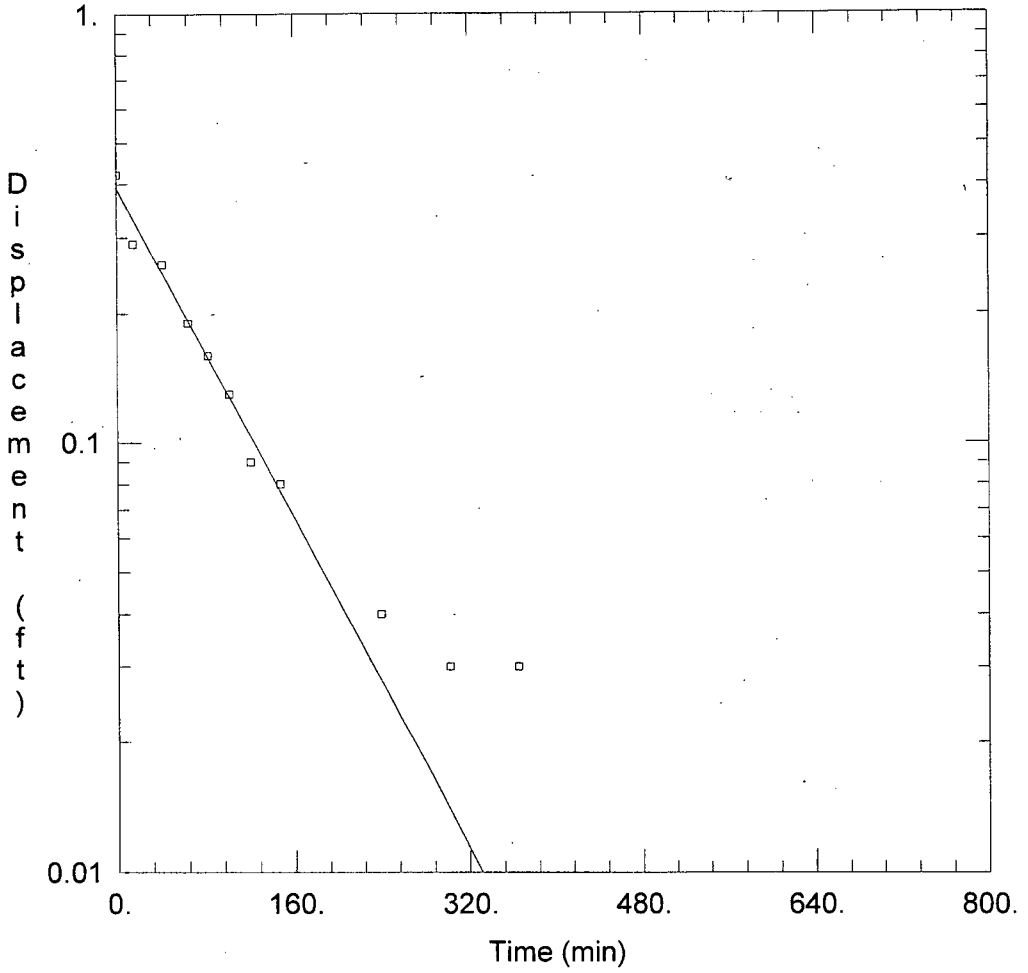
Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (6S)

Initial Displacement: 0.96 ft
Water Column Height: 3.5 ft
Casing Radius: 0.1667 ft
Wellbore Radius: 0.8333 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.114E-06 cm/sec
y0 = 0.818 ft



WELL TEST ANALYSIS

Data Set: P:\Major Clients\Detroit Edison\Fermi 1\hydraulic conductivity data\8S.aqt
Date: 09/07/04 Time: 15:31:47

PROJECT INFORMATION

Company: Golder Associates
Client: DTE Fermi 1
Project: 023-8793.0004
Test Location: Fermi 1
Test Well: 8S
Test Date: 6/8/04

AQUIFER DATA

Saturated Thickness: 4.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (8S)

Initial Displacement: 0.42 ft
Water Column Height: 3.5 ft
Casing Radius: 0.1667 ft
Wellbore Radius: 0.8333 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.459E-05 cm/sec
y0 = 0.3912 ft

APPENDIX D

SOIL GRAIN SIZE DISTRIBUTION ANALYTICAL REPORTS

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	Detroit Edison Fermi 1	SAMPLE ID	EFT 1D 111403
PROJECT NO.	023-8793.0004	SAMPLE TYPE	Bag
		SAMPLE DEPTH	10-12'

AS RECEIVED WATER CONTENT

Wt. Wet Soil & Tare (gm)	(W1)	74.31
Wt. Dry Soil & Tare (gm)	(W2)	66.04
Weight of Tare (gm)	(W3)	30.25
Weight of Water (gm)	(W4=W1-W2)	8.27
Weight of Dry Soil (gm)	(W5=W2-W3)	35.79
Moisture Content (%)	(W4/W5)*100	23.11%

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	74.31
Dry Soil & Tare (gm)	66.04
Tare Weight (gm)	30.25
Moisture Content (%)	23.11

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	311.40	
Tare Weight (gm)	0.00	
Total Weight (gm)	252.95	(W6)

Plus #4 Material Sieve

TARE WEIGHT: 81.63

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"	81.63	0.0	100.0	12.0"	cobbles
3.0"	81.63	0.0	100.0	3.0"	coarse gravel
2.5"	81.63	0.0	100.0	2.5"	coarse gravel
2.0"	81.63	0.0	100.0	2.0"	coarse gravel
1.5"	81.63	0.0	100.0	1.5"	coarse gravel
1.0"	81.63	0.0	100.0	1.0"	coarse gravel
0.75"	81.63	0.0	100.0	0.75"	fine gravel
0.50"	81.63	0.0	100.0	0.50"	fine gravel
0.375"	81.63	0.0	100.0	0.375"	fine gravel
#4	83.45	0.7	99.3	#4	coarse sand

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.65
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	66.47
Calculated Dry Wt. used in test (gm)	53.99
Hydrometer Bulb Number	624378
% Pass #4 Sieve For Whole Sample	99.28

TARE WEIGHT: 30.81

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	30.92	0.11	99.1	#10	medium sand
#20	31.45	0.64	98.1	#20	medium sand
#40	31.96	1.15	97.2	#40	fine sand
#60	32.58	1.77	96.0	#60	fine sand
#100	33.55	2.74	94.2	#100	fine sand
#200	35.60	4.79	90.5	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
6/14/2004	10:26	(min)	R	T	K	Cc	C	LENGTH	A
6/14/2004	10:28	2.00	50.0	22.00	0.013	5.51	44.49	9.1	1.00
6/14/2004	10:31	5.00	47.5	22.00	0.013	5.51	41.99	9.6	1.00
6/14/2004	10:41	15.00	44.0	22.00	0.013	5.51	38.49	10.1	1.00
6/14/2004	10:56	30.00	41.0	22.00	0.013	5.51	35.49	10.6	1.00
6/14/2004	11:26	60.00	39.0	22.00	0.013	5.51	33.49	10.9	1.00
6/14/2004	14:36	250.00	34.0	22.00	0.013	5.51	28.49	11.7	1.00
6/15/2004	10:26	1440.00	27.0	22.00	0.013	5.51	21.49	12.9	1.00

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING				
0.0284	81.8	% COBBLES	0.00		
0.0184	77.2	% COARSE GRAVEL	0.00		
0.0109	70.8	% FINE GRAVEL	0.72	0.72	
0.0079	65.3	% COARSE SAND	0.20		
0.0057	61.6	% MEDIUM SAND	1.91		
0.0029	52.4	% FINE SAND	6.69	8.81	
0.0013	39.5	% FINES	90.47		
		% TOTAL SAMPLE	100.00		

Description: Dark Brown, LEAN CLAY, with little sand and trace fine gravel

USCS: CL

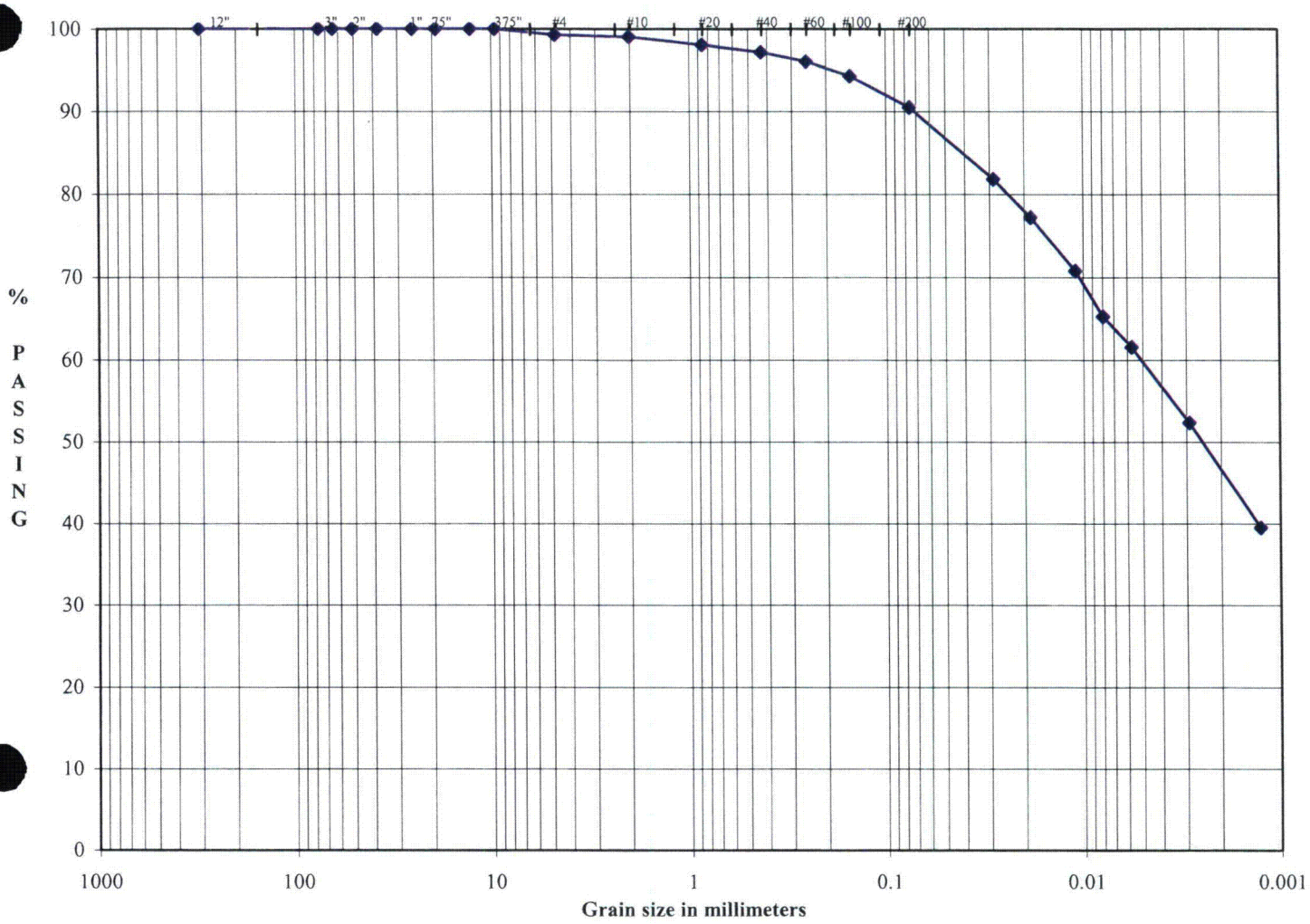
LL:

PL:

PI:

TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
		0.72		8.81			90.47

SAMPLE ID	EFT 1D 111403
SAMPLE TYPE	Bag
SAMPLE DEPTH	10-12'

LL	
PL	
PI	

DESCRIPTION	Dark Brown, LEAN CLAY, with little sand and trace fine gravel
USCS	CL

Detroit Edison Fermi 1
023-8793.0004

TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	Detroit Edison Fermi 1	SAMPLE ID	EFT 5D 111403
PROJECT NO.	023-8793.0004	SAMPLE TYPE	Bag
		SAMPLE DEPTH	12.5 - 14.5'

AS RECEIVED WATER CONTENT

Wt. Wet Soil & Tare (gm)	(W1)	65.72
Wt. Dry Soil & Tare (gm)	(W2)	59.18
Weight of Tare (gm)	(W3)	30.91
Weight of Water (gm)	(W4=W1-W2)	6.54
Weight of Dry Soil (gm)	(W5=W2-W3)	28.27
Moisture Content (%)	(W4/W5)*100	23.13%

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	65.72
Dry Soil & Tare (gm)	59.18
Tare Weight (gm)	30.91
Moisture Content (%)	23.13

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	260.49	
Tare Weight (gm)	0.00	
Total Weight (gm)	211.55	(W6)

Plus #4 Material Sieve

TARE WEIGHT: 82.34

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"	82.34	0.0	100.0	12.0"	cobbles
3.0"	82.34	0.0	100.0	3.0"	coarse gravel
2.5"	82.34	0.0	100.0	2.5"	coarse gravel
2.0"	82.34	0.0	100.0	2.0"	coarse gravel
1.5"	82.34	0.0	100.0	1.5"	coarse gravel
1.0"	82.34	0.0	100.0	1.0"	coarse gravel
0.75"	82.34	0.0	100.0	0.75"	fine gravel
0.50"	82.34	0.0	100.0	0.50"	fine gravel
0.375"	85.15	1.3	98.7	0.375"	fine gravel
#4	86.47	2.0	98.0	#4	coarse sand

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.65
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	68.58
Calculated Dry Wt. used in test (gm)	55.70
Hydrometer Bulb Number	624378
% Pass #4 Sieve For Whole Sample	98.05

TARE WEIGHT: 30.91

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	31.14	0.23	97.6	#10	medium sand
#20	31.96	1.05	96.2	#20	medium sand
#40	32.95	2.04	94.5	#40	fine sand
#60	34.26	3.35	92.2	#60	fine sand
#100	36.10	5.19	88.9	#100	fine sand
#200	38.83	7.92	84.1	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
6/14/2004	10:20	(min)	R	T	K	Cc	C	LENGTH	A
6/14/2004	10:22	2.00	48.5	22.00	0.013	5.51	42.99	9.4	1.00
6/14/2004	10:25	5.00	45.0	22.00	0.013	5.51	39.49	9.9	1.00
6/14/2004	10:35	15.00	41.5	22.00	0.013	5.51	35.99	10.6	1.00
6/14/2004	10:50	30.00	39.0	22.00	0.013	5.51	33.49	10.9	1.00
6/14/2004	11:20	60.00	36.0	22.00	0.013	5.51	30.49	11.4	1.00
6/14/2004	14:30	250.00	31.0	22.00	0.013	5.51	25.49	12.2	1.00
6/15/2004	10:20	1440.00	25.0	22.00	0.013	5.51	19.49	13.2	1.00

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING				
0.0288	75.7	% COBBLES	0.00		
0.0187	69.5	% COARSE GRAVEL	0.00		
0.0112	63.4	% FINE GRAVEL	1.95	1.95	
0.0080	59.0	% COARSE SAND	0.40		
0.0058	53.7	% MEDIUM SAND	3.19		
0.0029	44.9	% FINE SAND	10.35	13.94	
0.0013	34.3	% FINES	84.11		
		% TOTAL SAMPLE	100.00		

Description: Dark Brown, LEAN CLAY, with some sand and trace fine gravel.

USCS: CL

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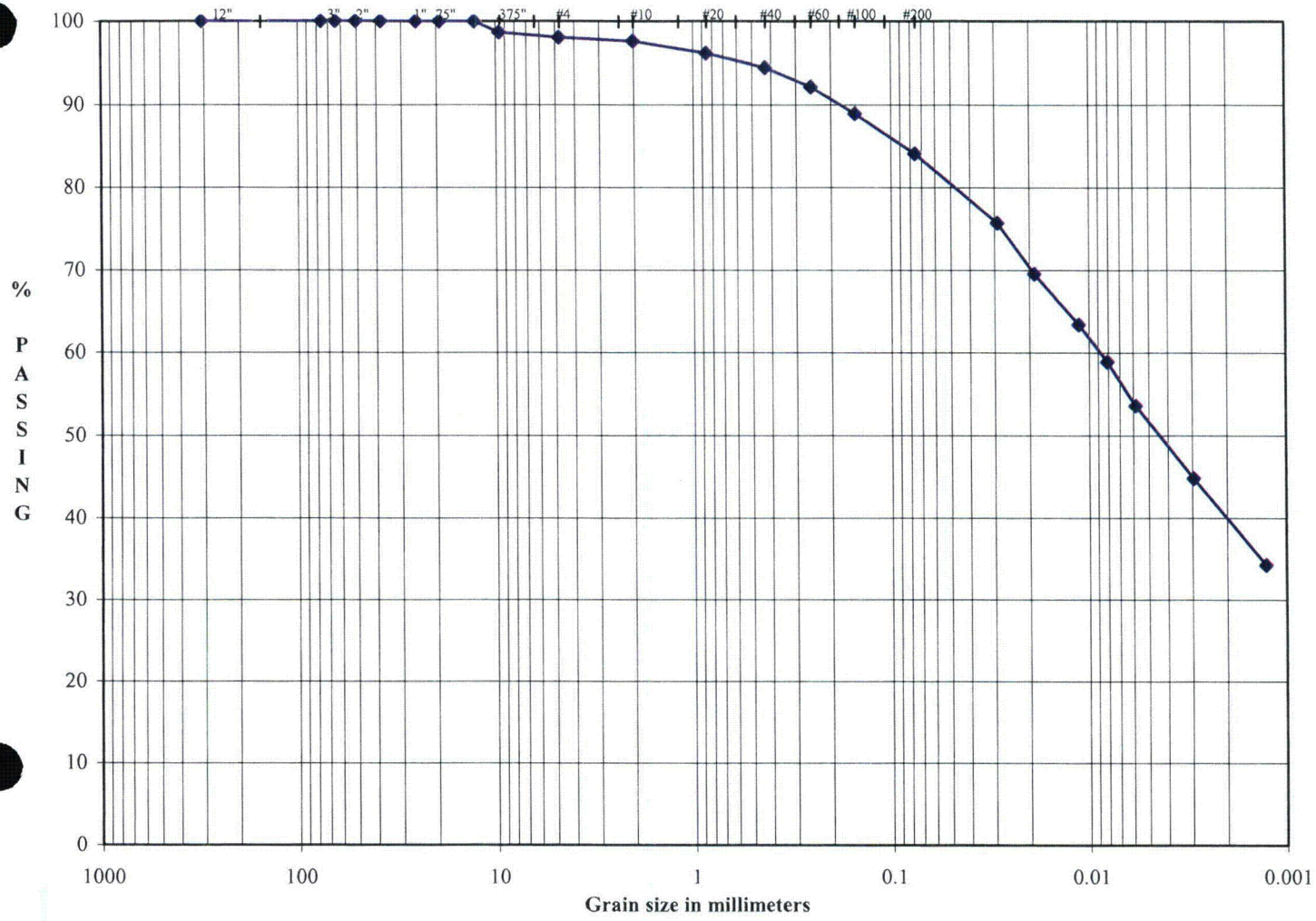
TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
		1.95		13.94			84.11

SAMPLE ID	EFT 5D 111403
SAMPLE TYPE	Bag
SAMPLE DEPTH	12.5 - 14.5'

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DESCRIPTION	Dark Brown, LEAN CLAY, with some sand and trace fine gravel.
USCS	CL

Detroit Edison Fermi 1
023-8793.0004

TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	Detroit Edison Fermi 1	SAMPLE ID	EFT 8S 112503
PROJECT NO.	023-8793.0004	SAMPLE TYPE	Bag
		SAMPLE DEPTH	9 - 10'

AS RECEIVED WATER CONTENT

Wt. Wet Soil & Tare (gm)	(W1)	67.83
Wt. Dry Soil & Tare (gm)	(W2)	62.66
Weight of Tare (gm)	(W3)	31.10
Weight of Water (gm)	(W4=W1-W2)	5.17
Weight of Dry Soil (gm)	(W5=W2-W3)	31.56
Moisture Content (%)	(W4/W5)*100	16.38%

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	67.83
Dry Soil & Tare (gm)	62.66
Tare Weight (gm)	31.10
Moisture Content (%)	16.38

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	217.05	
Tare Weight (gm)	0.00	
Total Weight (gm)	186.50	(W6)

Plus #4 Material Sieve

TARE WEIGHT: 81.29

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"	81.29	0.0	100.0	12.0"	cobbles
3.0"	81.29	0.0	100.0	3.0"	coarse gravel
2.5"	81.29	0.0	100.0	2.5"	coarse gravel
2.0"	81.29	0.0	100.0	2.0"	coarse gravel
1.5"	81.29	0.0	100.0	1.5"	coarse gravel
1.0"	81.29	0.0	100.0	1.0"	coarse gravel
0.75"	105.15	12.8	87.2	0.75"	fine gravel
0.50"	105.15	12.8	87.2	0.50"	fine gravel
0.375"	105.15	12.8	87.2	0.375"	fine gravel
#4	105.78	13.1	86.9	#4	coarse sand

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.65
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	67.22
Calculated Dry Wt. used in test (gm)	57.76
Hydrometer Bulb Number	624378
% Pass #4 Sieve For Whole Sample	86.87

TARE WEIGHT: 30.26

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	30.64	0.38	86.3	#10	medium sand
#20	31.31	1.05	85.3	#20	medium sand
#40	32.15	1.89	84.0	#40	fine sand
#60	33.31	3.05	82.3	#60	fine sand
#100	35.05	4.79	79.7	#100	fine sand
#200	37.67	7.41	75.7	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
6/14/2004	10:22	(min)	R	T	K	Cc	C	LENGTH	A
6/14/2004	10:24	2.00	50.2	22.00	0.013	5.51	44.69	9.1	1.00
6/14/2004	10:27	5.00	47.5	22.00	0.013	5.51	41.99	9.6	1.00
6/14/2004	10:37	15.00	43.5	22.00	0.013	5.51	37.99	10.2	1.00
6/14/2004	10:52	30.00	40.5	22.00	0.013	5.51	34.99	10.7	1.00
6/14/2004	11:22	60.00	36.5	22.00	0.013	5.51	30.99	11.4	1.00
6/14/2004	14:32	250.00	33.0	22.00	0.013	5.51	27.49	11.9	1.00
6/15/2004	10:22	1440.00	27.0	22.00	0.013	5.51	21.49	12.9	1.00

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING		
0.0284	67.2	% COBBLES	0.00
0.0184	63.2	% COARSE GRAVEL	12.79
0.0110	57.1	% FINE GRAVEL	0.34
0.0079	52.6	% COARSE SAND	0.57
0.0058	46.6	% MEDIUM SAND	2.27
0.0029	41.4	% FINE SAND	8.30
0.0013	32.3	% FINES	75.72
		% TOTAL SAMPLE	100.00

13.13

11.14

Description: Dark Brown, LEAN CLAY, with some sand and little fine gravel

USCS: CL

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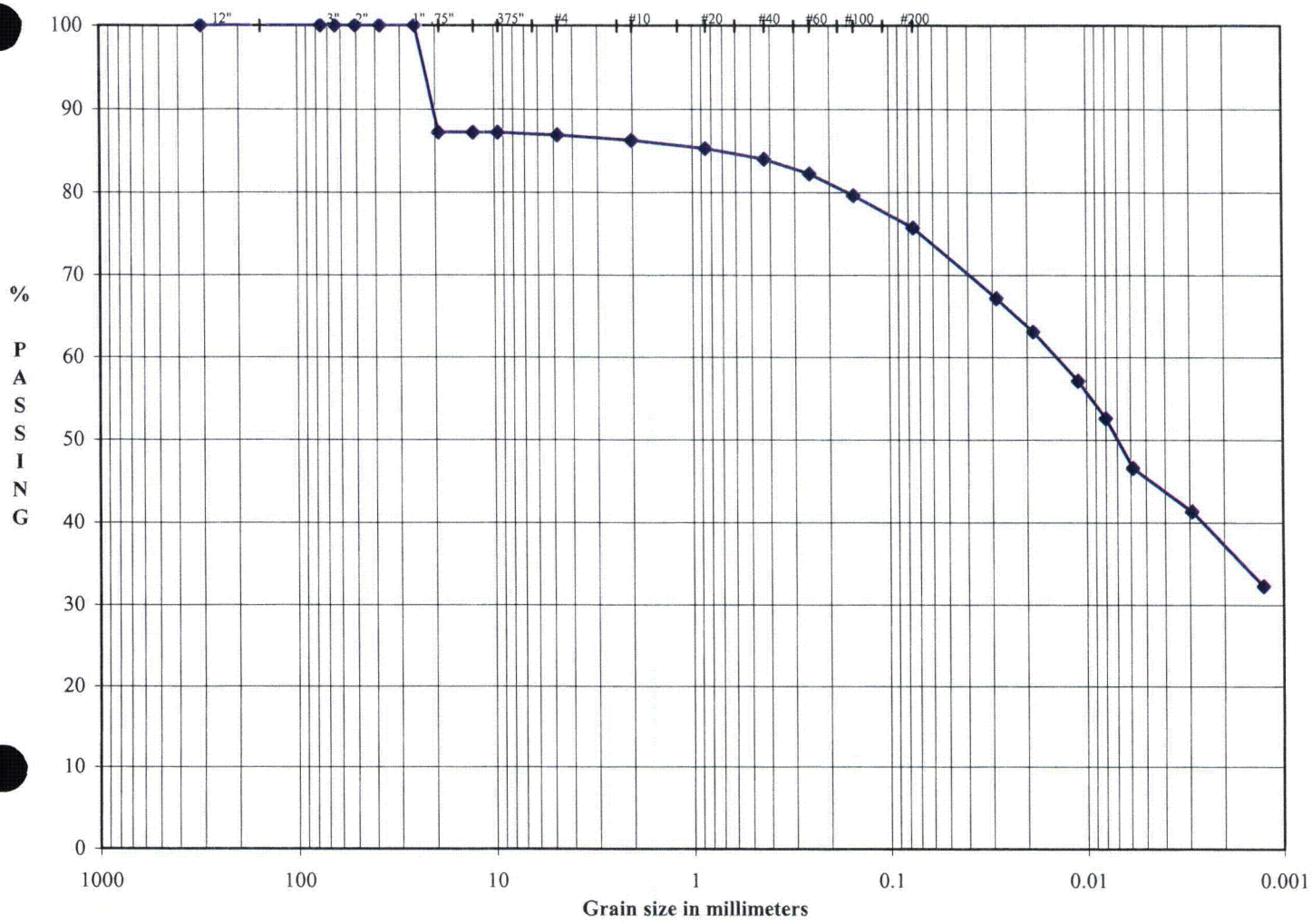
TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
		13.13		11.14			75.72

SAMPLE ID	EFT 8S 112503
SAMPLE TYPE	Bag
SAMPLE DEPTH	9 - 10'

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DESCRIPTION	Dark Brown, LEAN CLAY, with some sand and little fine gravel
USCS	CL

Detroit Edison Fermi 1
023-8793.0004

TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

ASTM GRAIN SIZE ANALYSIS
ASTM C117, C136, D421, D422, D1140 and D2217

PROJECT TITLE	Detroit Edison Fermi 1	SAMPLE ID	EFT 9S 112503
PROJECT NO.	023-8793.0004	SAMPLE TYPE	Bag
		SAMPLE DEPTH	10 - 12'

AS RECEIVED WATER CONTENT

Wt. Wet Soil & Tare (gm)	(W1)	59.76
Wt. Dry Soil & Tare (gm)	(W2)	55.64
Weight of Tare (gm)	(W3)	30.83
Weight of Water (gm)	(W4=W1-W2)	4.12
Weight of Dry Soil (gm)	(W5=W2-W3)	24.81
Moisture Content (%)	(W4/W5)*100	16.61%

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	59.26
Dry Soil & Tare (gm)	55.64
Tare Weight (gm)	30.83
Moisture Content (%)	14.59

Total Weight of Sample Used For Sieve Analysis Corrected For Hygroscopic Moisture

Weight + Tare, Before Separating On The #4 Sieve (gm)	121.15	
Tare Weight (gm)	0.00	
Total Weight (gm)	105.72	(W6)

Plus #4 Material Sieve

TARE WEIGHT: 82.16

	(Wt+Tare)	(((Wt-Tare)/W6)*100)	%PASSING		
12.0"	82.16	0.0	100.0	12.0"	cobbles
3.0"	82.16	0.0	100.0	3.0"	coarse gravel
2.5"	82.16	0.0	100.0	2.5"	coarse gravel
2.0"	82.16	0.0	100.0	2.0"	coarse gravel
1.5"	82.16	0.0	100.0	1.5"	coarse gravel
1.0"	82.16	0.0	100.0	1.0"	coarse gravel
0.75"	82.16	0.0	100.0	0.75"	fine gravel
0.50"	82.16	0.0	100.0	0.50"	fine gravel
0.375"	82.16	0.0	100.0	0.375"	fine gravel
#4	82.75	0.6	99.4	#4	coarse sand

HYDROMETER ANALYSIS

Specific Gravity	(assumed)	2.65
Specific Gravity	(tested)	
Amount Dispersing Agent (ml)		125.00
Type Dispersion Device		Mechanical
Length of Dispersion Period		1 Minute

Weight of Sample Used For Hydrometer Test

Weight of Sample Wet or Dry (gm)	68.22
Calculated Dry Wt. used in test (gm)	59.53
Hydrometer Bulb Number	624378
% Pass #4 Sieve For Whole Sample	99.44

TARE WEIGHT: 30.47

HYDROMETER BACKSIEVE (Percent Passing #10 - #200 Sieves)

	(Wt+Tare)	Cumul Wt. Retained	% PASSING		
#10	31.34	0.87	98.0	#10	medium sand
#20	32.74	2.27	95.7	#20	medium sand
#40	34.12	3.65	93.3	#40	fine sand
#60	35.67	5.20	90.8	#60	fine sand
#100	37.78	7.31	87.2	#100	fine sand
#200	40.58	10.11	82.6	#200	fines

HYDROMETER CALCULATIONS

DATE	TIME	ET	READING	TEMP	TEMP.COR.	HYD.COR.	READING	EFFECTIVE	
6/14/2004	10:24	(min)	R	T	K	Cc	C	LENGTH	A
6/14/2004	10:26	2.00	48.5	22.00	0.013	5.51	42.99	9.4	1.00
6/14/2004	10:29	5.00	45.5	22.00	0.013	5.51	39.99	9.9	1.00
6/14/2004	10:39	15.00	41.5	22.00	0.013	5.51	35.99	10.6	1.00
6/14/2004	10:54	30.00	39.0	22.00	0.013	5.51	33.49	10.9	1.00
6/14/2004	11:24	60.00	36.5	22.00	0.013	5.51	30.99	11.4	1.00
6/14/2004	14:34	250.00	31.5	22.00	0.013	5.51	25.99	12.2	1.00
6/15/2004	10:24	1440.00	25.5	22.00	0.013	5.51	19.99	13.2	1.00

GRAIN SIZE PERCENTAGES

Particle Diameter	% PASSING				
0.0288	71.8	% COBBLES	0.00		
0.0187	66.8	% COARSE GRAVEL	0.00		
0.0112	60.1	% FINE GRAVEL	0.56	0.56	
0.0080	55.9	% COARSE SAND	1.45		
0.0058	51.8	% MEDIUM SAND	4.64		
0.0029	43.4	% FINE SAND	10.79	16.89	
0.0013	33.4	% FINES	82.55		
		% TOTAL SAMPLE	100.00		

Description: Dark Brown, LEAN CLAY, with some sand and trace fine gravel

USCS: CL

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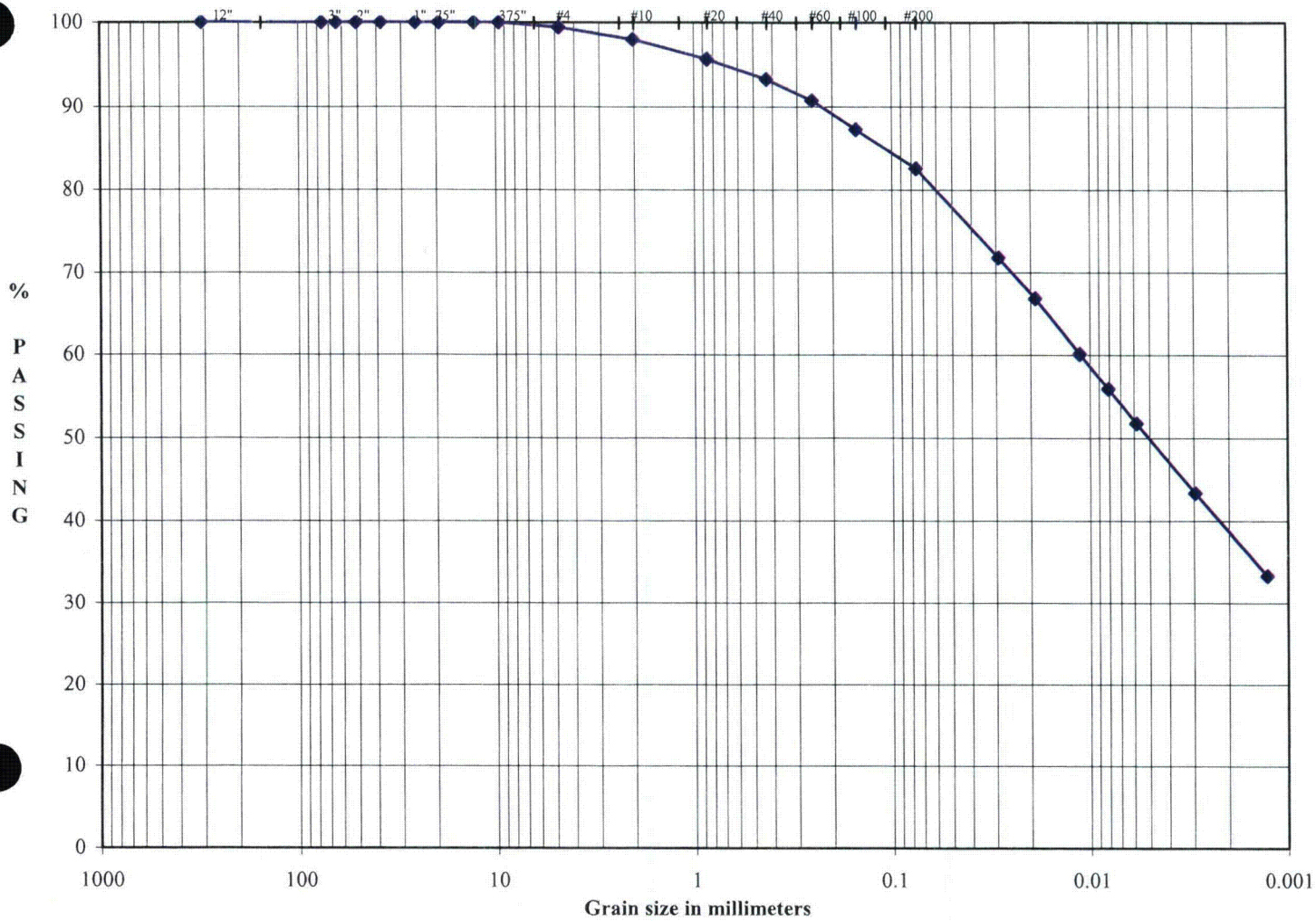
TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
		0.56		16.89			82.55

SAMPLE ID	EFT 9S 112503
SAMPLE TYPE	Bag
SAMPLE DEPTH	10 - 12'

LL	
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DESCRIPTION	Dark Brown, LEAN CLAY, with some sand and trace fine gravel
USCS	CL

Detroit Edison Fermi 1
023-8793.0004

TECH	ARM
DATE	6/14/2004
CHECK	
REVIEW	

APPENDIX E

GROUNDWATER LABORATORY ANALYTICAL

AND DATA VALIDATION REPORT

2004 - 2006

April/May 2004

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT- 1505170 4

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 05/17/04 / 1445

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cauilland / Cauilland Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipka / William V. Lipka Date: July 13, 2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-1S0S1704	
2 . Date Sampled	05/17/2004	
3 . Time Sampled	14:45	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:26	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.8	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}}} = 1.20\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-1S051704

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 05/17/04 / 1445

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cavillard / [signature] Date: 7-8-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. May / [signature] Date: 7-9-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-1505704

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. May L. May Date: 7-9-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected
William V. Lipton 7/13/2004

DETROIT EDISON FERMI-2 POWER PLANT 6-JUL-2004 15:58:43.59

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-1S051704

Sample End Time: 17-MAY-2004 14:45:00.00

REMARKS SAVED UNDER File # 01-EN1495

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:28:39

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-1S051704
Sample collection start date: 17-MAY-2004 14:45:00.00
Sample collection end date : 17-MAY-2004 14:45:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 15:28:39.99
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.13 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	198.35	43	78	1.04	396.50	391	12	2.39E-02	43.8	Ac228
2	0	511.23	120	59	2.55	1022.17	1014	18	6.66E-02	17.9	annihilation
3	0	558.60	50	25	1.41	1116.91	1110	11	2.77E-02	24.0	Hg-Hg Ulmon
4	0	1460.81	71	13	2.28	2922.48	2913	21	3.94E-02	18.2	K-40

Post-NID Peak Search Report

	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	198.35	43	78	1.04	396.50	391	12	43.8		
0	511.23	120	59	2.55	1022.17	1014	18	17.9		
0	558.60	50	25	1.41	1116.91	1110	11	24.0		
0	1460.81	71	13	2.28	2922.40	2913	21	18.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	71	10.67*	2.389E+00	4.176E-07	4.176E-07	18.21

Flag: "*" = Keyline

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:28:39

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.176E-07	4.176E-07	0.760E-07	18.21	
Total Activity :			4.176E-07	4.176E-07			
Grand Total Activity :			4.176E-07	4.176E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:20:39

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	682.87	511.00*	193.46	1.000E+35	17.94	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.43	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	9.464E-07	43.82	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
AS-76	26.32H	47.45	559.10*	44.70	7.110E+06	23.95	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			

Flag: "*" = Keyline

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:20:39

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	198.35	43	78	1.04	396.50	391	12	2.39E-02	43.8	6.36E+00	T
	511.23	120	59	2.55	1022.17	1014	18	6.66E-02	17.9	4.74E+00	T
0	558.60	50	25	1.41	1116.91	1110	11	2.77E-02	24.0	4.55E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 15:58:48.59

Sample ID : EFT-1S051704

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	21.	477.59	1.3937E-07
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0086E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	11.	889.25	1.3418E-08
CR-51	50.	320.08	3.4980E-07
MN-54	13.	834.83	9.8441E-09
CO-56	8.	1238.25	2.1451E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	65.	158.38	3.5645E-06
CO-57	54.	122.06	1.3721E-08
CO-58	15.	810.76	1.5093E-08
FE-59	11.	1099.22	3.7834E-08
CO-60	11.	1332.49	1.1063E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	10.	1115.52	2.1029E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	33.	136.00	1.7065E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	36.	513.99	2.2780E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	36.	513.99	1.7054E-08
RB-86	14.	1076.63	8.4896E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	8.	1836.01	1.5518E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	15.	1204.90	7.1300E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:26:39

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	16.	702.63	8.1202E-09
NB-95	12.	765.79	2.2139E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	11.	756.72	2.3734E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	27.	497.08	2.3546E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	17.	621.84	8.4601E-08
CD-109	35.	88.03	3.8823E-07
AG-110M	16.	937.48	3.6193E-08
SN-113	28.	391.69	1.6305E-08
SN-117M	67.	158.56	1.5851E-07
SB-122	0.	563.93	Half-Life too short
SB-124	10.	602.71	1.1007E-08
SB-125	26.	427.89	2.7229E-08
TE-125M	36.	109.28	6.3083E-06
TE-127	0.	417.90	Half-Life too short
[redacted]-127M	18.	57.60	3.1730E-05
[redacted]-127	45.	202.84	3.1745E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	19.	695.88	7.6590E-07
XE-129M	49.	196.56	1.0098E-05
I-130	0.	536.09	Half-Life too short
BA-131	41.	123.80	6.5092E-07
I-131	21.	364.48	7.2141E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	47.	163.93	8.7190E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	41.	302.84	4.7552E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	27.	81.00	3.8220E-05
XE-133M	0.	233.22	Half-Life too short
CS-134	18.	604.70	8.3063E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-1S051704 Acquisition date : 8-JUL-2004 15:20:39

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	15.	818.50	1.4125E-07
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.7608E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	53.	165.85	1.3703E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	23.	537.32	5.4221E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	42.	145.44	5.0496E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	48.	133.54	9.4180E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	39.	91.10	1.2438E-06
PM-148M	18.	550.27	1.8530E-08
EU-152	40.	344.27	3.2941E-08
EU-154	10.	1004.76	5.1047E-08
EU-156	20.	646.29	1.2591E-06
HF-181	28.	482.03	2.3865E-08
TA-182	14.	1221.42	5.6778E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	57.	279.19	2.6629E-08
BI-207	14.	569.67	6.8900E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	47.	186.21	2.4711E-07
AC-228	41.	338.32	7.7721E-08
TH-228	29.	84.37	1.1561E-06
PA-234	0.	131.20	Half-Life too short
TH-234	32.	63.29	4.9973E-06
U-235	52.	143.76	8.5179E-08
NP-239	0.	106.13	Half-Life too short
AM-241	24.	59.54	1.7687E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-1DOS1104

Sample Location (Well Number): 1 Deep

1. Representative sample collected. Date/Time 05/11/04 / 1100

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 07/08/2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Courtland / [signature] Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yorek Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William H Lipton William H Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-1D0S1104	
2 . Date Sampled	05/11/2004	
3 . Time Sampled	11:00	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:06	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	6.0	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.20\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT- 1DOS1104

Sample Location (Well Number): 1 Deep

1. Representative sample collected. Date/Time 05/11/04 / 1100

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07/09/2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 7-8-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / [signature] Date: 8-Jul-2004
Fermi 2 RP Printed Name Signature

Sample number: EFT-1D05H04

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / L. McCoy Date: 7/8/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks NO Increased radioactive material detected
William V. Lipton 48457 7/13/2004

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 13:31:08.88

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-1D051104

Sample End Time: 11-MAY-2004 11:00:00.00

REMARKS SAVED AS File # 01-EN1491

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-1D051104 Acquisition date : 8-JUL-2004 13:01:04

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

Sample Parameters

Sample ID Number: EFT-1D051104
Sample collection start date: 11-MAY-2004 11:00:00.00
Sample collection end date : 11-MAY-2004 11:00:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

Acquisition Parameters

Detector number : DET 4 Acquire date : 8-JUL-2004 13:01:04.60
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.18 Percent dead time : 0.05 %

Calibration Parameters

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

Peak Search Parameters

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

Nuclide Identification Parameters

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	66.30	75	79	1.87	132.51	127	10	4.16E-02	25.1	
2	0	351.91	84	68	1.67	703.54	697	13	4.65E-02	23.1	
3	0	511.40	201	55	2.53	1022.67	1012	25	1.11E-01	12.3	
4	0	558.56	57	34	1.81	1116.83	1109	12	3.14E-02	24.4	
5	0	609.70	58	24	1.37	1219.12	1214	12	3.22E-02	21.4	
6	0	1378.28	13	6	0.90	2757.23	2750	11	7.40E-03	43.9	
7	1	1459.81	24	8	2.56	2920.47	2912	22	1.31E-02	46.3	1.24E+00
8	1	1461.57	59	7	2.33	2924.00	2912	22	3.29E-02	18.1	
9	0	1764.44	51	0	1.17	3530.57	3521	16	2.83E-02	14.0	

Post-NID Peak Search Report

IC	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	66.30	75	79	1.87	132.51	127	10	25.1		
0	351.91	84	68	1.67	703.54	697	13	23.1		
0	511.48	201	55	2.53	1022.67	1012	25	12.3		
0	558.56	57	34	1.81	1116.83	1109	12	24.4		
0	609.70	58	24	1.37	1219.12	1214	12	21.4		
0	1378.28	13	6	0.96	2757.23	2750	11	43.9		
1	1459.01	24	6	2.56	2920.47	2912	22	46.3	1.24E+00	
1	1461.57	59	7	2.33	2924.00	2912	22	18.1		K-40
0	1764.44	51	0	1.17	3530.57	3521	16	14.0		

Sample ID : EFT-1D051104 Acquisition date : 0-JUL-2004 13:01:04

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	59	10.67*	2.300E+00	3.409E-07	3.409E-07	16.15

Flag: "*" = Keyline

Sample ID : EFT-1D051104 Acquisition date : 8-JUL-2004 13:01:04

Total number of lines in spectrum	9	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	8	88.89%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.489E-07	3.489E-07	0.633E-07	18.15	
	Total Activity :		3.489E-07	3.489E-07			
	Grand Total Activity :		3.489E-07	3.489E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	762.31	511.00*	193.46	1.000E+35	12.29	Decay
	% Abundances Found =			100.00			
SE-75	119.78D	0.49	66.05	1.02	1.140E-05	25.14	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
	% Abundances Found =			0.57			
AS-76	26.32H	52.97	559.10*	44.70	3.697E+08	24.36	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
RU-103	39.35D	1.48	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	9.869E-07	21.40	
	% Abundances Found =			5.92			
CS-136	13.16D	4.41	66.91	12.50	1.417E-05	25.14	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	40.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
	% Abundances Found =			4.10			
BI-214	19.90M	4203.82	609.31*	46.30	1.000E+35	21.40	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
-214	19.90M	4203.82	1377.67	4.11	1.000E+35	43.87	Decay
			1764.49	15.80	1.000E+35	14.00	
		% Abundances Found =		69.33	(Abn. Limit =	48.48%)	
PB-214	26.80M	3121.50	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	23.11	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit =	37.20%)	

Flag: "*" = Keyline

Sample ID : EFT-1D051104 Acquisition date : 8-JUL-2004 13:01:04

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	66.30	75	79	1.87	132.51	127	10	4.16E-02	25.1	1.35E+00	T
0	351.91	84	60	1.67	703.54	697	13	4.65E-02	23.1	5.53E+00	T
0	511.48	201	55	2.53	1022.67	1012	25	1.11E-01	12.3	4.73E+00	T
0	558.56	57	34	1.81	1116.83	1109	12	3.14E-02	24.4	4.55E+00	T
0	609.70	56	24	1.37	1219.12	1214	12	3.22E-02	21.4	4.30E+00	T
0	1378.28	13	6	0.96	2757.23	2750	11	7.40E-03	43.9	2.46E+00	T
1	1459.81	24	9	2.56	2920.47	2912	22	1.31E-02	46.3	2.39E+00	
0	1764.44	51	0	1.17	3530.57	3521	16	2.83E-02	14.0	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 13:31:14.18

Sample ID : EFT-1D051104

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	1.6186E-07
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0320E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	10.	889.25	1.3543E-08
CR-51	48.	320.08	3.9834E-07
MN-54	12.	834.83	9.5845E-09
CO-56	18.	1238.25	3.1756E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	59.	158.38	6.7565E-06
CO-57	45.	122.06	1.2800E-08
CO-58	17.	810.76	1.6824E-08
FE-59	9.	1099.22	3.8945E-08
CO-60	16.	1332.49	1.3046E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	13.	1115.52	2.4030E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	44.	136.00	2.0275E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	58.	513.99	2.8426E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	58.	513.99	2.2678E-08
RB-86	16.	1076.63	1.1249E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	2.	1836.01	1.0392E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	13.	1204.90	7.3677E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]-92	0.	1383.94	Half-Life too short
[redacted]92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	19.	702.63	8.6090E-09
NB-95	17.	765.79	2.8971E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	13.	756.72	2.6719E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	24.	497.08	2.5140E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	20.	621.84	9.2340E-08
CD-109	30.	88.03	3.6063E-07
AG-110M	15.	937.48	3.5501E-08
SN-113	26.	391.69	1.6331E-08
SN-117M	62.	158.56	2.0789E-07
SB-122	0.	563.93	Half-Life too short
SB-124	25.	602.71	1.7584E-08
SB-125	28.	427.89	2.8118E-08
TE-125M	38.	109.28	7.0076E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	23.	57.60	3.7323E-05
XE-127	62.	202.84	4.1496E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	21.	695.88	8.9792E-07
XE-129M	62.	196.56	1.8153E-05
I-130	0.	536.09	Half-Life too short
BA-131	44.	123.80	9.5905E-07
I-131	30.	364.48	1.5794E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	64.	163.93	1.4321E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	31.	302.84	4.2026E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	18.	604.70	8.3775E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	17.	818.50	2.0804E-07
I-136	0.	1313.02	Half-Life too short
CS-137	19.	661.65	9.5493E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	52.	165.85	1.4147E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	28.	537.32	8.2122E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	45.	145.44	5.8889E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	43.	133.54	9.1364E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	43.	91.10	1.9069E-06
PM-148M	20.	550.27	2.1364E-08
EU-152	32.	344.27	2.9737E-08
EU-154	7.	1004.76	4.3772E-08
EU-156	16.	646.29	1.5017E-06
[redacted]-181	30.	482.03	2.7022E-08
[redacted]-182	13.	1221.42	5.8357E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	46.	279.19	2.6422E-08
BI-207	29.	569.67	9.4732E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	57.	186.21	2.6877E-07
AC-228	37.	338.32	7.4441E-08
TH-228	28.	84.37	1.1609E-06
PA-234	0.	131.20	Half-Life too short
TH-234	47.	63.29	7.0686E-06
U-235	47.	143.76	8.1315E-08
NP-239	0.	106.13	Half-Life too short
AM-241	29.	59.54	1.9265E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2S051304

Sample Location (Well Number): 2 Shallow

1. Representative sample collected. Date/Time 5-13-04 / 1150

Sample collected by: Jay Marie Slabach / Jay Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Courtland / Courtland Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 10/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2S0S1304	
2 . Date Sampled	05/13/2004	
3 . Time Sampled	11:50	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:46	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.5	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.20\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2S0S1304

Sample Location (Well Number): 2 Shallow

1. Representative sample collected. Date/Time 5-13-04 / 1150

Sample collected by: JayMarie Slaback / JayMarie Slaback Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 7-8-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / [signature] Date: 7-9-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-2505 1304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy J. McCoy Date: 7-8-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V Lipton William V Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No identified radioactive material detected.
William V Lipton 7/13/2004

****

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 14:06:02.38

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RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2S051304

Sample End Time: 13-MAY-2004 11:50:00.00

REMARKS SAVED As File # 01-EN1492

PERFORMED BY:

[signature] SIGNATURE

REVIEWED BY:

William N. [signature] 78461 / 7/13/2004 SIGNATURE/DATE

PAGE ____ of ____

Sample ID : EFT-2S051304 Acquisition date : 8-JUL-2004 13:35:58

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-2S051304
Sample collection start date: 13-MAY-2004 11:50:00.00
Sample collection end date : 13-MAY-2004 11:50:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 13:35:58.17
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:02.47 Percent dead time : 0.11 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	198.89	35	49	1.42	397.57	394	7	1.92E-02	38.0	Ac228
2	3	510.09	58	37	2.26	1019.88	1013	18	3.22E-02	29.5	8.29E-01 annihilation
3	3	511.68	45	35	1.96	1023.06	1013	18	2.53E-02	34.7	
4	0	558.94	57	23	1.40	1117.60	1112	12	3.16E-02	21.7	Bi214
5	0	608.83	35	33	1.45	1217.39	1209	15	1.94E-02	40.0	Bi214
6	0	1238.04	34	0	0.78	2476.47	2467	20	1.89E-02	17.1	Bi214
7	0	1461.18	68	15	1.58	2923.22	2915	15	3.77E-02	17.4	K40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	198.09	35	49	1.42	397.57	394	7	30.0		
3	510.09	58	37	2.26	1019.88	1013	10	29.5	8.28E-01	
3	511.60	45	35	1.96	1023.06	1013	10	34.7		
0	558.94	57	23	1.40	1117.60	1112	12	21.7		
0	608.83	35	33	1.45	1217.39	1209	15	40.0		
0	1238.04	34	0	0.78	2476.47	2467	20	17.1		
0	1461.10	68	15	1.58	2923.22	2915	15	17.4		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	68	10.67*	2.389E+00	3.998E-07	3.998E-07	17.39

Flag: "*" = Keyline

Sample ID : EFT-2S051304 Acquisition date : 8-JUL-2004 13:35:58

Total number of lines in spectrum	7	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	6	85.71%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.998E-07	3.998E-07	0.695E-07	17.39	
	Total Activity :		3.998E-07	3.998E-07			
	Grand Total Activity :		3.998E-07	3.998E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	735.93	511.00*	193.46	1.000E+35	34.69	Decay
		% Abundances Found =		100.00			
CO-56	78.76D	0.71	846.75	99.96	--- Not Found ---		Abun.
			1037.82	14.03	--- Not Found ---		
			1238.25*	67.00	4.751E-08	17.15	
			1360.21	4.29	--- Not Found ---		
			1771.40	15.51	--- Not Found ---		
			2015.35	3.03	--- Not Found ---		
			2034.91	7.78	--- Not Found ---		
		% Abundances Found =		31.66			
SE-75	119.78D	0.47	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	7.005E-07	37.97	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
AS-76	26.32H	51.14	559.10*	44.70	1.042E+08	21.70	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
XE-135	9.11H	147.75	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	1.000E+35	40.00	
		% Abundances Found =		3.11			
BI-214	19.90M	4058.34	609.31*	46.30	1.000E+35	40.00	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	1.000E+35	17.15	
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		54.70	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

Sample ID : EFT-2S051304 Acquisition date : 8-JUL-2004 13:35:50

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	198.89	35	49	1.42	397.57	394	7	1.92E-02	38.0	6.35E+00	T
0	510.09	50	37	2.26	1019.88	1013	10	3.22E-02	29.5	4.74E+00	
3	511.60	45	35	1.96	1023.06	1013	10	2.53E-02	34.7	4.73E+00	T
0	558.94	57	23	1.40	1117.60	1112	12	3.16E-02	21.7	4.55E+00	T
0	608.83	35	33	1.45	1217.39	1209	15	1.94E-02	40.0	4.39E+00	T
0	1238.04	34	0	0.78	2476.47	2467	20	1.89E-02	17.1	2.63E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 14:06:07.64

Sample ID : EFT-2S051304

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	1.5785E-07
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0497E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	15.	889.25	1.5804E-08
CR-51	40.	320.08	3.5084E-07
MN-54	21.	834.83	1.2411E-08
CO-56	25.	1238.25	3.6143E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	49.	158.38	4.9346E-06
CO-57	51.	122.06	1.3466E-08
CO-58	12.	810.76	1.4609E-08
FE-59	12.	1099.22	4.2553E-08
CO-60	18.	1332.49	1.3569E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	2.0307E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	55.	136.00	2.2205E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	32.	513.99	2.1692E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	32.	513.99	1.6944E-08
RB-86	14.	1076.63	9.7629E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	8.	1836.01	1.6653E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	17.	1204.90	7.9523E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-2S051304 Acquisition date : 8-JUL-2004 13:35:50

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	23.	702.63	9.5124E-09
NB-95	12.	765.79	2.3398E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	16.	756.72	2.8660E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	24.	497.08	2.4198E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	16.	621.84	8.3005E-08
CD-109	59.	88.03	4.9511E-07
AG-110M	15.	937.48	3.4936E-08
SN-113	32.	391.69	1.7509E-08
SN-117M	50.	158.56	1.6927E-07
SB-122	0.	563.93	Half-Life too short
SB-124	22.	602.71	1.6136E-08
SB-125	21.	427.89	2.4948E-08
TE-125M	52.	109.28	7.8773E-06
TE-127	0.	417.90	Half-Life too short
[redacted]-127M	113.	57.60	7.6170E-05
[redacted]-127	58.	202.84	3.8553E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	24.	695.88	9.1041E-07
XE-129M	52.	196.56	1.4220E-05
I-130	0.	536.09	Half-Life too short
BA-131	64.	123.80	1.0138E-06
I-131	33.	364.48	1.2599E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	62.	163.93	1.2567E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	41.	302.84	4.7577E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	20.	604.70	8.6300E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

[redacted]

Sample ID : EFT-2S051304 Acquisition date : 8-JUL-2004 13:35:58

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	9.	818.50	1.4481E-07
I-136	0.	1313.02	Half-Life too short
CS-137	15.	661.65	8.6460E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	47.	165.85	1.3306E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	24.	537.32	6.9194E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	53.	145.44	6.1239E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	45.	133.54	9.2471E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	41.	91.10	1.6335E-06
PM-148M	22.	550.27	2.1730E-08
EU-152	38.	344.27	3.2356E-08
EU-154	12.	1004.76	5.4964E-08
EU-156	22.	646.29	1.5759E-06
HF-181	25.	482.03	2.4231E-08
TA-182	6.	1221.42	4.0742E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	51.	279.19	2.6827E-08
BI-207	19.	569.67	7.8620E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	69.	186.21	2.9441E-07
AC-228	40.	338.32	7.7248E-08
TH-228	54.	84.37	1.5534E-06
PA-234	0.	131.20	Half-Life too short
TH-234	93.	63.29	9.2207E-06
U-235	54.	143.76	8.6646E-08
NP-239	0.	106.13	Half-Life too short
AM-241	104.	59.54	3.4603E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2DOS1304

Sample Location (Well Number): 2Deep

1. Representative sample collected. Date/Time 05/13/04 / 1115

Sample collected by: Jay Marie Slaback / Jay Marie Slaback Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulliard / [signature] Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN A. GORDON [signature] Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 10/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2D0S1304	
2 . Date Sampled	05/13/2004	
3 . Time Sampled	11:15	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:36	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.20\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2DOS1304D (Duplicate)

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 5-13-04 / 1130

Sample collected by: Jon Marie Slabeck / Jon Marie Slabeck Date: 07-05-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cowillard / [signature] Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR"

Performed by: John M. Yokoma / [signature] Date: 7-9-4
Fermi 2 Chemistry Printed Name / Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 10/9/2007
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks Resolve inconsistency in sample location - this form revises tritium activity calculation of 7/13/04

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2DOS1304D (Duplicate)

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 5-13-04 / 1130

Sample collected by: Jay Marie Slabach / Jay Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cawillard / Jon Cawillard Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yancey / Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: _____ / _____ Date: _____
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks Resolve inconsistency in sample location - this form uses tritium activity calculation on 7/13/04

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2D081304D	
2 . Date Sampled	05/13/2004	
3 . Time Sampled	11:30	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:56	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.20\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2DOS1304

Sample Location (Well Number): 2Deep

1. Representative sample collected. Date/Time 05/13/04 / 1115

Sample collected by: Jay Marc Slaback / Jay Marc Slaback Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caulfield / [signature] Date: 7.8.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / [signature] Date: 7-8-04
Fermi 2 RP Printed Name / Signature

Sample number: EFT-2D051304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 7-8-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected 7/13/2004
detected. William V Lipton 48651 7/13/2004

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 14:48:33.04

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2D051304 (7/6/04)

Sample End Time: 13-MAY-2004 11:15:00.00

REMARKS SAVED AS File # 01-EN1493

PERFORMED BY:

J. McCoy
SIGNATURE

REVIEWED BY:

William N. Lytton 4869 / 7/13/2004
SIGNATURE/DATE

PAGE _____ of _____

Sample ID : EFT-2D0[illegible]1304 Acquisition date : 8-JUL-2004 14:18:29

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-2D0[illegible]1304
Sample collection start date: 13-MAY-2004 11:15:00.00
Sample collection end date : 13-MAY-2004 11:15:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 8-JUL-2004 14:18:29.49
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.17 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	510.78	166	33	2.91	1021.27	1011	19	9.20E-02	11.4	annihilation
2	0	558.88	45	31	1.39	1117.47	1110	11	2.52E-02	27.9	Hg-203 Cs-134
3	0	608.93	46	32	0.68	1217.58	1209	18	2.58E-02	31.9	Bi-214
4	0	1460.16	70	6	1.62	2921.18	2915	14	3.89E-02	14.3	K-40

Sample Title : EFT-2D0~~3~~5 1304 — Page : 1

Decay Time = 56 03:03:29.49 — Acquisition Time = 8-JUL-2004 14:18:29.49

Post-NID Peak Search Report

	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	510.78	166	33	2.91	1021.27	1011	19	11.4		
0	558.88	45	31	1.39	1117.47	1110	11	27.9		
0	608.93	46	32	0.68	1217.58	1209	18	31.9		
0	1460.16	70	6	1.62	2921.18	2915	14	14.3		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	70	10.67*	2.390E+00	4.127E-07	4.127E-07	14.31

Flag: "*" = Keyline

Sample ID : EFT-2D0[illegible]1304 Acquisition date : 8-JUL-2004 14:18:29

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.127E-07	4.127E-07	0.590E-07	14.31	
Total Activity :			4.127E-07	4.127E-07			
Grand Total Activity :			4.127E-07	4.127E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-2D0[illegible]1304 Acquisition date : 8-JUL-2004 14:18:29

5 4/7/2009

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	15.	702.63	7.8345E-09
NB-95	13.	765.79	2.4760E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	7.	756.72	1.9827E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	27.	497.08	2.5202E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	10.	621.84	6.9108E-08
CD-109	26.	88.03	3.3752E-07
AG-110M	14.	937.48	3.4008E-08
SN-113	32.	391.69	1.7626E-08
SN-117M	37.	158.56	1.4838E-07
SB-122	0.	563.93	Half-Life too short
SB-124	17.	602.71	1.4421E-08
SB-125	28.	427.89	2.8466E-08
TE-125M	37.	109.28	6.7692E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	36.	57.60	4.4621E-05
XE-127	49.	202.84	3.5779E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	8.3944E-07
XE-129M	60.	196.56	1.5359E-05
I-130	0.	536.09	Half-Life too short
BA-131	45.	123.80	8.6464E-07
I-131	29.	364.48	1.1781E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	40.	163.93	1.0310E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	37.	302.84	4.5073E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	17.	604.70	8.1605E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-2D0[illegible]1304 Acquisition date : 8-JUL-2004 14:18:29

5 in 11304

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[illegible]-136	10.	818.50	1.5064E-07
I-136	0.	1313.02	Half-Life too short
CS-137	10.	661.65	9.3513E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	39.	165.85	1.2239E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	34.	537.32	8.0935E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	35.	145.44	5.0592E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	39.	133.54	8.6850E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	33.	91.10	1.4861E-06
PM-148M	19.	550.27	2.0543E-08
EU-152	29.	344.27	2.8564E-08
EU-154	8.	1004.76	4.6837E-08
EU-156	22.	646.29	1.5601E-06
HF-181	23.	482.03	2.3539E-08
[illegible]-182	8.	1221.42	4.6749E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	37.	279.19	2.3215E-08
BI-207	21.	569.67	8.1798E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	50.	186.21	2.5271E-07
AC-228	40.	338.32	7.6833E-08
TH-228	38.	84.37	1.3201E-06
PA-234	0.	131.20	Half-Life too short
TH-234	37.	63.29	5.9750E-06
U-235	44.	143.76	7.8491E-08
NP-239	0.	106.13	Half-Life too short
AM-241	34.	59.54	2.0671E-07

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2DOS1304D (Duplicate)

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 5/13/04 / 1130

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cawthorn / Jon Cawthorn Date: 7-8-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / L. McCoy Date: 7-8-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-2D051304DUP

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy J. McCoy Date: 7-8-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William V Lipton 4606 7/13 7/13/2004

****

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 15:27:35.04

****

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2D051304DUP

Sample End Time: 13-MAY-2004 11:30:00.00

REMARKS SAVED AS G/R # 01-EN1494

PERFORMED BY:

[signature]
SIGNATURE

REVIEWED BY:

[signature] 48651 / 7/13/2004
SIGNATURE/DATE

PAGE ______ of ______

Sample ID : EFT-2D051304DUP Acquisition date : 8-JUL-2004 14:57:31

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-2D051304DUP
Sample collection start date: 13-MAY-2004 11:30:00.00
Sample collection end date : 13-MAY-2004 11:30:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 14:57:31.00
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.18 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00206E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	199.46	64	117	2.06	398.73	392	18	3.56E-02	41.6	Ac228
2	0	510.57	139	49	1.62	1020.05	1012	18	7.70E-02	14.6	annihilation
3	0	559.37	41	39	2.27	1118.45	1110	16	2.28E-02	37.8	Bi214
4	0	1459.63	68	9	2.17	2920.12	2910	17	3.75E-02	15.7	K40

Decay Time = 56 03:27:31.00 Acquisition Time = 8-JUL-2004 14:57:31.00

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	199.46	64	117	2.06	398.73	392	18	41.6		
0	510.57	139	49	1.62	1020.85	1012	18	14.6		
0	559.37	41	39	2.27	1118.45	1110	16	37.8		
0	1459.63	68	9	2.17	2920.12	2910	17	15.7		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	68	10.67*	2.390E+00	3.974E-07	3.974E-07	15.69

Flag: "*" = Keyline

Sample ID : EFT-2D051304DUP Acquisition date : 8-JUL-2004 14:57:31

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.974E-07	3.974E-07	0.623E-07	15.69	
	Total Activity :		3.974E-07	3.974E-07			
	Grand Total Activity :		3.974E-07	3.974E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-2D051304DUP Acquisition date : 8-JUL-2004 14:57:31

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]18	109.74M	736.86	511.00*	193.46	1.000E+35	14.62	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.47	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	1.445E-06	41.56	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
AS-76	26.32H	51.20	559.10*	44.70	7.858E+07	37.82	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
TE-131M	30.00H	44.92	102.06	7.90	--- Not Found ---		Decay,Abun.
			149.72	5.10	--- Not Found ---		
			200.63	7.56	6.680E+06	41.56	
			240.93	7.59	--- Not Found ---		
			334.27	9.60	--- Not Found ---		
			773.67*	38.20	--- Not Found ---		
			782.49	7.79	--- Not Found ---		
			793.75	13.90	--- Not Found ---		
			822.78	6.12	--- Not Found ---		
			852.21	20.70	--- Not Found ---		
			1125.46	11.40	--- Not Found ---		
			1206.60	9.80	--- Not Found ---		
		% Abundances Found =		5.19			

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	199.46	64	117	2.06	398.73	392	18	3.56E-02	41.6	6.35E+00	T
0	510.57	139	49	1.62	1020.85	1012	18	7.70E-02	14.6	4.74E+00	T
0	559.37	41	39	2.27	1118.45	1110	16	2.28E-02	37.8	4.54E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 15:27:40.11 *
****
* Sample ID : EFT-2D051304DUP *
****

[redacted]imum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	21.	477.59	1.4728E-07
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0458E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	11.	889.25	1.3984E-08
CR-51	32.	320.08	3.1656E-07
MN-54	15.	834.83	1.0550E-08
CO-56	11.	1238.25	2.5344E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	49.	158.38	4.9668E-06
CO-57	42.	122.06	1.2277E-08
CO-58	13.	810.76	1.5121E-08
FE-59	12.	1099.22	4.2909E-08
CO-60	9.	1332.49	1.0397E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	10.	1115.52	2.1700E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	39.	136.00	1.8937E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	42.	513.99	2.4419E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	42.	513.99	1.9089E-08
RB-86	13.	1076.63	9.3741E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	1.1131E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	14.	1204.90	7.2569E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]-92	0.	1383.94	Half-Life too short
[redacted]92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	12.	702.63	7.2246E-09
NB-95	12.	765.79	2.3692E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	11.	756.72	2.4701E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	21.	497.08	2.2492E-08
TC-104	0.	357.95	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	21.	621.84	9.4203E-08
CD-109	46.	88.03	4.3767E-07
AG-110M	10.	937.48	2.9593E-08
SN-113	36.	391.69	1.8482E-08
SN-117M	49.	158.56	1.6810E-07
SB-122	0.	563.93	Half-Life too short
SB-124	22.	602.71	1.6233E-08
SB-125	17.	427.89	2.2800E-08
TE-125M	38.	109.28	6.8514E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	30.	57.60	4.1214E-05
XE-127	48.	202.84	3.5497E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	23.	695.88	8.9671E-07
XE-129M	58.	196.56	1.5133E-05
I-130	0.	536.09	Half-Life too short
BA-131	25.	123.80	6.6614E-07
I-131	30.	364.48	1.2115E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	43.	163.93	1.0591E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	35.	302.84	4.4135E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	15.	604.70	7.5725E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[illegible]-136	19.	818.50	1.9700E-07
I-136	0.	1313.02	Half-Life too short
CS-137	0.	661.65	6.7600E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	43.	165.85	1.2750E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	12.	537.32	5.2073E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	50.	145.44	5.9759E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	41.	133.54	8.8802E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	32.	91.10	1.4709E-06
PM-148M	10.	550.27	1.5464E-08
EU-152	50.	344.27	3.6431E-08
EU-154	14.	1004.76	5.8683E-08
EU-156	17.	646.29	1.3856E-06
HF-181	20.	482.03	2.5371E-08
[illegible]-182	7.	1221.42	4.4278E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	34.	279.19	2.2277E-08
BI-207	21.	569.67	8.1988E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	47.	186.21	2.4492E-07
AC-228	35.	338.32	7.2572E-08
TH-228	33.	84.37	1.2424E-06
PA-234	0.	131.20	Half-Life too short
TH-234	33.	63.29	5.7031E-06
U-235	46.	143.76	7.9914E-08
NP-239	0.	106.13	Half-Life too short
AM-241	33.	59.54	2.0419E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EF1-4S050704

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 050704 / 0948

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Gerard / [signature] Date: 7-7-04
Printed Name / Signature

3. Sample counted in accordance with 76,000,70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / [signature] Date: 7-9-04
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: July 13, 2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-4SOS0704	
2 . Date Sampled	05/07/2004	
3 . Time Sampled	09:48	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

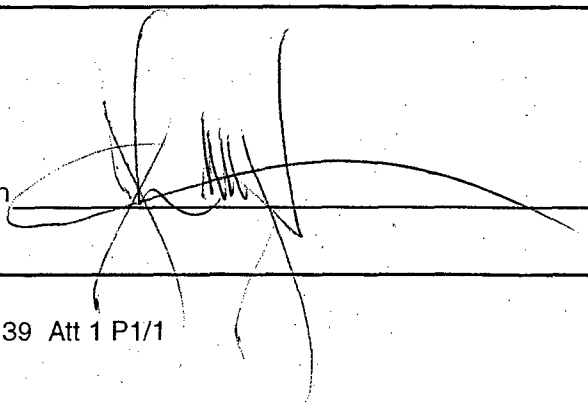
1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	15:56	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.0	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.20\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician  Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-4S050704

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 05/07/04 / 0948

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cawillard / [signature] Date: 7.7.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET4

Performed by: L. McCoy [signature] Date: 7/8/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-4S050704

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 7/8/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William Wright / [signature] Date: 7/13/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected
William Wright 48451 / 7/13/04

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 12:08:38.62

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4S050704

Sample End Time: 7-MAY-2004 09:48:00.00

REMARKS SAVED AS File # 01-EN1490

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-4S050704 Acquisition date : 8-JUL-2004 11:38:33

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-4S050704
Sample collection start date: 7-MAY-2004 09:40:00.00
Sample collection end date : 7-MAY-2004 09:48:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 11:38:33.72
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.15 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	64.55	26	41	1.11	129.00	126	12	1.47E-02	50.1	5.14E-00
2	1	67.05	46	52	1.12	134.00	126	12	2.55E-02	29.6	
3	0	199.24	30	82	1.05	398.28	394	10	1.67E-02	59.3	
4	0	511.52	114	52	1.45	1022.75	1017	14	6.34E-02	16.7	
5	0	558.48	70	28	1.49	1116.66	1109	14	3.88E-02	20.0	
6	0	609.51	42	16	1.14	1218.75	1214	9	2.35E-02	22.9	
7	0	1121.31	14	12	0.79	2242.82	2234	11	7.99E-03	52.1	
8	0	1460.79	80	11	2.87	2922.44	2914	15	4.45E-02	14.4	

Th-232 daughter
Th-232
Ac-228
annihilation
Bi-214
Pb-214
K-40

Decay Time = 62 01:50:33.72 Acquisition Time = 8-JUL-2004 11:36:33.72

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	64.55	26	41	1.11	129.00	126	12	50.1	8.14E+00	
1	67.05	46	52	1.12	134.00	126	12	29.6		
0	199.24	30	82	1.05	398.28	394	10	59.3		
0	511.52	114	52	1.45	1022.75	1017	14	16.7		
0	558.48	70	28	1.49	1116.66	1109	14	20.0		
0	609.51	42	16	1.14	1218.75	1214	9	22.9	- Bi-214	
0	1121.31	14	12	0.79	2242.82	2234	11	52.1	- Bi-214	
0	1460.79	80	11	2.87	2922.44	2914	15	14.4		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	80	10.67*	2.389E+00	4.720E-07	4.720E-07	14.40

Flag: "*" = Keyline

Sample ID : EFT-48050704 Acquisition date : 8-JUL-2004 11:38:33

Total number of lines in spectrum	8	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	7	87.50%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.720E-07	4.720E-07	0.680E-07	14.40	
Total Activity :			4.720E-07	4.720E-07			
Grand Total Activity :			4.720E-07	4.720E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-4S050704 Acquisition date : 8-JUL-2004 11:38:33

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]10	109.74M	814.70	511.00*	193.46	1.000E+35	16.66	Decay
		% Abundances Found =		100.00			
SC-46	83.83D	0.74	142.53	62.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	1.300E-00	52.14	
		% Abundances Found =		38.07			
SE-75	119.78D	0.52	66.05	1.02	6.762E-06	29.59	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	7.020E-07	59.34	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		1.38			
AS-76	26.32H	56.61	559.10*	44.70	5.696E+09	20.03	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.58	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	7.710E-07	22.08	
		% Abundances Found =		5.92			
CS-136	13.16D	4.72	66.91	12.50	1.014E-05	29.59	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
TA-182	114.74D	0.54	67.75	42.30	1.656E-07	29.59	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			
BI-214	19.90M	4492.74	609.31*	46.30	1.000E+35	22.88	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	52.14	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		64.29	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

Sample ID : EFT-4S050704 Acquisition date : 8-JUL-2004 11:38:33

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	64.55	26	41	1.11	129.00	126	12	1.47E-02	50.1	1.16E+00	
0	67.05	46	52	1.12	134.00	126	12	2.55E-02	29.6	1.43E+00	T
0	199.24	30	82	1.05	398.20	394	10	1.67E-02	59.3	6.35E+00	T
0	511.52	114	52	1.45	1022.75	1017	14	6.34E-02	16.7	4.73E+00	T
0	558.48	70	28	1.49	1116.66	1109	14	3.88E-02	20.0	4.55E+00	T
0	609.51	42	16	1.14	1218.75	1214	9	2.35E-02	22.9	4.38E+00	T
0	1121.31	14	12	0.79	2242.62	2234	11	7.99E-03	52.1	2.70E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 12:08:43.91 *
****
* Sample ID : EFT-4S050704 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	24.	477.59	1.6861E-07
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0841E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	12.	889.25	1.5322E-08
CR-51	30.	320.08	3.5781E-07
MN-54	15.	834.83	1.0899E-08
CO-56	14.	1238.25	2.9439E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	33.	122.06	1.1112E-08
CO-58	9.	810.76	1.3784E-08
FE-59	16.	1099.22	5.2711E-08
CO-60	15.	1332.49	1.2678E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.5907E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	40.	136.00	1.9795E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	47.	513.99	2.5921E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	47.	513.99	2.1566E-08
RB-86	15.	1076.63	1.2492E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	6.7394E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	16.	1204.90	8.3224E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-4S050704 Acquisition date : 8-JUL-2004 11:38:33

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	26.	702.63	1.0034E-08
NB-95	16.	765.79	3.0168E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	9.	756.72	2.4545E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	30.	497.08	2.9624E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	18.	621.84	8.9803E-08
CD-109	37.	88.03	4.0077E-07
AG-110M	13.	937.48	3.3858E-08
SN-113	31.	391.69	1.7903E-08
SN-117M	45.	158.56	2.2007E-07
SB-122	0.	563.93	Half-Life too short
SB-124	16.	602.71	1.5272E-08
SB-125	34.	427.89	3.1157E-08
TE-125M	41.	109.28	7.5835E-06
TE-127	0.	417.90	Half-Life too short
[redacted]-127M	30.	57.60	4.2716E-05
XE-127	39.	202.84	3.6120E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	26.	695.88	1.0715E-06
XE-129M	47.	196.56	2.1836E-05
I-130	0.	536.09	Half-Life too short
BA-131	40.	123.80	1.1622E-06
I-131	23.	364.48	1.8028E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	53.	163.93	1.6487E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	40.	302.84	4.6722E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	20.	604.70	8.7040E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
[redacted]-135M	0.	526.56	Half-Life too short

Sample ID : EFT-4S050704 Acquisition date : 8-JUL-2004 11:38:33

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	12.	818.50	2.1800E-07
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.8021E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	64.	165.85	1.5847E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	10.	537.32	8.3760E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	45.	145.44	6.4354E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	39.	133.54	8.7875E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	30.	91.10	2.0871E-06
PM-148M	15.	550.27	2.0018E-08
EU-152	30.	344.27	2.9057E-08
EU-154	8.	1004.76	4.7081E-08
EU-156	13.	646.29	1.6295E-06
HF-181	29.	482.03	2.8477E-08
TA-182	9.	1221.42	4.9905E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	43.	279.19	2.7358E-08
BI-207	17.	569.67	7.4897E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	48.	186.21	2.4764E-07
AC-228	30.	338.32	6.7379E-08
TH-228	34.	84.37	1.2664E-06
PA-234	0.	131.20	Half-Life too short
TH-234	33.	63.29	6.7636E-06
U-235	47.	143.76	8.0969E-08
NP-239	0.	106.13	Half-Life too short
AM-241	30.	59.54	1.9318E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-4D043004

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 043004 / 1200

Sample collected by: Joy Marie Stabach / Joy Marie Stabach Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cowillard / Cowillard Date: 7-7-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. [illegible] / [signature] Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: July 13, 2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks ______________________________

____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-4D043004	
2 . Date Sampled	04/30/2004	
3 . Time Sampled	12:00	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	17:06	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.0	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.20\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT- 4D043004

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 043004 / 1200

Sample collected by: Joy Marie Stoback / Joy Marie Stoback Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: JCouillard / Date: 7.7.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L.McCoy / J.mcg Date: 7/7/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-4D043004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy L. McCoy Date: 7/7/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 7/13/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V Lipton 48451

DETROIT EDISON FERMI-2 POWER PLANT 7-JUL-2004 16:23:34.92

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4D043004

Sample End Time: 30-APR-2004 12:00:00.00

REMARKS SAVED AS 01-EN1487

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************
Sample ID Number: EFT-4D043004
Sample collection start date: 30-APR-2004 12:00:00.00
Sample collection end date : 30-APR-2004 12:00:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

*************************** Acquisition Parameters ***************************
Detector number : DET 4 Acquire date : 7-JUL-2004 15:53:30.95
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.18 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00338E-01 Zero offset: -1.40739E-02
Daily cal date : 7-JUL-2004 12:22:10.06

*************************** Peak Search Parameters ***************************
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 0 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

*********************** Nuclide Identification Parameters **********************
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	352.49	45	27	1.14	704.67	701	10	2.53E-02	25.5	Pb 214
2	5	510.99	118	36	2.73	1021.63	1012	20	6.57E-02	15.7	2.13E+00 annihilation
3	5	511.84	35	24	1.87	1023.34	~~1012~~	20	1.96E-02	44.0	
4	0	558.61	73	10	1.69	1116.86	1112	10	4.05E-02	14.3	Hb / Ni-?
5	0	584.77	18	28	0.58	1169.20	1163	10	1.00E-02	60.0	K 40
6	0	1461.09	89	3	2.30	2922.78	2916	15	4.93E-02	11.6	K40

Post-NID Peak Search Report

ID	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	352.49	45	27	1.14	704.67	701	10	25.5		
5	510.99	110	36	2.73	1021.63	1012	20	15.7	2.13E+00	
5	511.84	35	24	1.87	1023.34	1012	20	44.0		
0	558.61	73	10	1.69	1116.86	1112	10	14.3		
0	584.77	18	28	0.58	1169.20	1163	10	60.8		
0	1461.09	89	3	2.30	2922.78	2916	15	11.6		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	89	10.67*	2.389E+00	5.224E-07	5.224E-07	11.61

Flag: "*" = Keyline

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

Total number of lines in spectrum	6	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	5	83.33%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.224E-07	5.224E-07	0.607E-07	11.61	
	Total Activity :		5.224E-07	5.224E-07			
	Grand Total Activity :		5.224E-07	5.224E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	894.56	511.00*	193.46	1.000E+35	15.72	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	62.16	559.10*	44.70	2.781E+11	14.26	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
KR-89	3.16M	31065.99	220.90*	20.00	--- Not Found ---		Decay,Abun.
			497.50	6.60	--- Not Found ---		
			576.96	5.60	--- Not Found ---		
			585.80	16.60	1.000E+35	60.82	
			867.08	5.90	--- Not Found ---		
			904.27	7.20	--- Not Found ---		
			1472.76	6.90	--- Not Found ---		
			1533.68	5.10	--- Not Found ---		
	% Abundances Found =			22.46			
BA-131	11.80D	5.78	78.76	0.73	--- Not Found ---		Abun.
			92.29	0.64	--- Not Found ---		
			123.80*	29.00	--- Not Found ---		
			133.61	2.16	--- Not Found ---		
			216.07	19.70	--- Not Found ---		
			239.62	2.40	--- Not Found ---		
			249.43	2.82	--- Not Found ---		
			373.24	14.00	--- Not Found ---		
			404.04	1.31	--- Not Found ---		
			480.40	0.32	--- Not Found ---		
			486.51	2.07	--- Not Found ---		
			496.31	46.80	--- Not Found ---		
			572.67	0.16	--- Not Found ---		
			585.03	1.22	2.741E-05	60.82	
			620.10	1.36	--- Not Found ---		
			923.85	0.73	--- Not Found ---		
			1047.57	1.17	--- Not Found ---		
	% Abundances Found =			0.96			
PB-214	26.80M	3663.00	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
-214	26.80M	3663.00	351.92*	37.20	1.000E+35	25.50	Decay
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit =	37.20%)	

Flag: "*" = Keyline

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	352.49	45	27	1.14	704.67	701	10	2.53E-02	25.5	5.52E+00	T
5	510.99	110	36	2.73	1021.63	1012	20	6.57E-02	15.7	4.74E+00	T
5	511.84	35	24	1.87	1023.34	1012	20	1.96E-02	44.0	4.73E+00	
0	558.61	73	10	1.69	1116.86	1112	10	4.05E-02	14.3	4.55E+00	T
0	584.77	18	20	0.58	1169.20	1163	10	1.00E-02	60.8	4.45E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 7-JUL-2004 16:23:40.16 *
****
* Sample ID : EFT-4D043004 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	1.8538E-07
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0169E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.6746E-08
CR-51	34.	320.08	4.3964E-07
MN-54	16.	834.83	1.1145E-08
CO-56	15.	1238.25	3.2044E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	38.	122.06	1.2117E-08
CO-58	11.	810.76	1.5426E-08
FE-59	15.	1099.22	5.6429E-08
CO-60	13.	1332.49	1.1981E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
[illegible]-65	13.	1115.52	2.5190E-08
[illegible]-69M	0.	438.63	Half-Life too short
SE-75	38.	136.00	2.0100E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	51.	513.99	2.6948E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	51.	513.99	2.3902E-08
RB-86	13.	1076.63	1.4954E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	1.1941E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	20.	1204.90	9.7561E-06
Y-91M	0.	555.60	Half-Life too short
[illegible]-92	0.	1383.94	Half-Life too short
[illegible]-92	0.	934.46	Half-Life too short

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	15.	702.63	7.9160E-09
NB-95	12.	765.79	2.9854E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	14.	756.72	3.1028E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	25.	497.08	3.0569E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	16.	621.84	8.6353E-08
CD-109	33.	88.03	3.8520E-07
AG-110M	10.	937.48	3.1218E-08
SN-113	25.	391.69	1.6950E-08
SN-117M	51.	158.56	3.1770E-07
SB-122	0.	563.93	Half-Life too short
SB-124	24.	602.71	1.9301E-08
SB-125	22.	427.89	2.5621E-08
TE-125M	34.	109.28	7.4842E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	33.	57.60	4.6237E-05
XE-127	40.	202.84	4.1233E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	18.	695.88	1.0469E-06
XE-129M	53.	196.56	3.6922E-05
I-130	0.	536.09	Half-Life too short
BA-131	38.	123.80	1.6310E-06
I-131	29.	364.48	3.3396E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	57.	163.93	2.4504E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	53.	302.84	5.3554E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	34.	604.70	1.1032E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-4D043004 Acquisition date : 7-JUL-2004 15:53:30

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	12.	818.50	3.0287E-07
I-136	0.	1313.02	Half-Life too short
CS-137	15.	661.65	8.6459E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	37.	165.85	1.2677E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	28.	537.32	1.4276E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	39.	145.44	6.8417E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	46.	133.54	9.6451E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	34.	91.10	3.2203E-06
PM-148M	19.	550.27	2.5188E-08
EU-152	37.	344.27	3.1748E-08
EU-154	7.	1004.76	4.3666E-08
EU-156	16.	646.29	2.3742E-06
[illegible]-181	21.	482.03	2.7060E-08
[illegible]-182	13.	1221.42	6.1014E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	46.	279.19	3.0668E-08
BI-207	25.	569.67	8.8650E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	43.	186.21	2.3489E-07
AC-228	31.	338.32	6.8922E-08
TH-228	40.	84.37	1.3757E-06
PA-234	0.	131.20	Half-Life too short
TH-234	32.	63.29	7.9031E-06
U-235	41.	143.76	7.6326E-08
NP-239	0.	106.13	Half-Life too short
AM-241	26.	59.54	1.8218E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-SS042904

Sample Location (Well Number): S Shallow

1. Representative sample collected. Date/Time 4-29-04 / 1630

Sample collected by: JoyMarie Slaback / JoyMarie Slaback Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caillard / Jon Caillard Date: 7-7-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: July 8, 2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks Regular inconsistency in sample location - this form versus tritium activity calculation, JMS 7/13/04

Tritium Activity Calculation

Sample Information

1 .	Sample Location	EFT-~~SS042904~~ SS042904	
2 .	Date Sampled	04/29/2004	
3 .	Time Sampled	16:30	
4 .	Sample Volume, (ml)	4	ml

Instrument Count Data

1 .	Date Sample Counted	07/09/2004	
2 .	Time Sample Counted	15:46	
3 .	Background Inf.:		
	Minutes Counted	10	min.
	Background Count Rate (cpm)	9.2	cpm
4 .	Efficiency Inf.: (Daily Spike Source ID # 111)		
	Gross Spike Count Rate (cpm)	4068.6	cpm
	Net Spike Count Rate (cpm)	4059.4	cpm
	H3 Spike Activity (dpm on count date)	9642.0	dpm
	Counter Efficiency	0.4210	cpm/dpm
5 .	Sample Info:		
	Sample Gross Count Rate (cpm)	6.6	cpm
	Sample Count Time (min.)	10.0	min.
	Net Sample Count Rate (cpm)	0.0	cpm
6 .	Critical Level:		
	Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.20\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-5S042904

Sample Location (Well Number): 5 shallow

1. Representative sample collected. Date/Time 4-29-04 / 1630

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 7-7-04
Printed Name Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L.McCoy / L.McCoy Date: 7/8/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-5S042904

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / D. McCoy Date: 7/8/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V Lipton Jr. William V Lipton Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks 1097.15 KeV peak unidentified. High FWHM and error %. Does not match any expected peaks from licensed material. Here I can ignore.
No licensed radioactive material detected.
Julian Upton 48651 / 7/13/04

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 10:53:45.56

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-SS042904

Sample End Time: 29-APR-2004 16:30:00.00

REMARKS SAVED AS 01-EN1488

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-5S042904 Acquisition date : 8-JUL-2004 10:23:42

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-5S042904
Sample collection start date: 29-APR-2004 16:30:00.00
Sample collection end date : 29-APR-2004 16:30:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 10:23:42.19
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.17 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00206E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	295.53	40	41	1.39	590.80	587	8	2.23E-02	32.4	Pb214
2	0	352.18	74	38	0.80	704.09	699	11	4.12E-02	19.9	Pb214 amplitude
3	0	511.13	123	64	2.44	1021.96	1015	16	6.83E-02	17.1	Pb-Hg other
4	0	558.64	71	45	1.02	1116.99	1109	18	3.94E-02	25.1	Ba214
5	0	609.66	53	23	2.15	1219.05	1213	12	2.96E-02	22.8	
6	0	1097.15	16	7	3.84	2194.46	2185	15	8.72E-03	45.6	
7	0	1461.21	82	29	2.37	2923.28	2910	19	4.53E-02	19.2	K40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	295.53	40	41	1.39	590.80	587	8	32.4		
0	352.18	74	38	0.00	704.09	699	11	19.9		
0	511.13	123	64	2.44	1021.96	1015	16	17.1		
0	558.64	71	45	1.02	1116.99	1109	10	25.1		
0	609.66	53	23	2.15	1219.05	1213	12	22.8		
0	1097.15	16	7	3.04	2194.46	2185	15	45.6		
0	1461.21	82	29	2.37	2923.28	2910	19	19.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	82	10.67*	2.389E+00	4.801E-07	4.801E-07	19.22

Flag: "*" = Keyline

Sample ID : EFT-SS042904 Acquisition date : 8-JUL-2004 10:23:42

Total number of lines in spectrum	7	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	6	85.71%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.801E-07	4.801E-07	0.923E-07	19.22	
	Total Activity :		4.801E-07	4.801E-07			
	Grand Total Activity :		4.801E-07	4.801E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]18	109.74M	915.33	511.00*	193.46	1.000E+35	17.11	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	63.61	559.10*	44.70	7.371E+11	25.14	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.77	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	1.114E-06	22.82	
		% Abundances Found =		5.92			
BI-214	19.90M	5047.67	609.31*	46.30	1.000E+35	22.82	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		
PB-214	26.80M	3748.09	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	1.000E+35	32.37	
			351.92*	37.20	1.000E+35	19.90	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		80.96	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Sample ID : EFT-5S042904 Acquisition date : 8-JUL-2004 10:23:42

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	295.53	40	41	1.39	590.80	587	8	2.23E-02	32.4	5.88E+00	T
0	352.10	74	38	0.80	704.09	699	11	4.12E-02	19.9	5.52E+00	T
0	511.13	123	64	2.44	1021.96	1015	16	6.83E-02	17.1	4.74E+00	T
0	558.64	71	45	1.02	1116.99	1109	18	3.94E-02	25.1	4.55E+00	T
0	609.66	53	23	2.15	1219.05	1213	12	2.96E-02	22.8	4.38E+00	T
0	1097.15	16	7	3.84	2194.46	2185	15	8.72E-03	45.6	2.80E+00	

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 10:53:50.57

Sample ID : EFT-5S042904

[redacted]Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	1.9093E-07
F-18	0.	511.00	Half-Life too short
NA-22	14.	1274.54	1.2267E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	16.	889.25	1.8359E-08
CR-51	27.	320.08	4.0787E-07
MN-54	17.	834.83	1.1435E-08
CO-56	12.	1238.25	2.9241E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	32.	122.06	1.1218E-08
CO-58	13.	810.76	1.7156E-08
FE-59	14.	1099.22	5.6097E-08
CO-60	11.	1332.49	1.0968E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	2.1110E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	45.	136.00	2.1810E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	48.	513.99	2.6088E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	48.	513.99	2.3528E-08
RB-86	18.	1076.63	1.8057E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	1.4694E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	7.7564E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]-92	0.	1383.94	Half-Life too short
[redacted]92	0.	934.46	Half-Life too short

Sample ID : EFT-5S042904 Acquisition date : 8-JUL-2004 10:23:42

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	16.	702.63	8.0679E-09
NB-95	9.	765.79	2.7447E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	13.	756.72	3.0791E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	28.	497.08	3.2835E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	14.	621.84	8.1557E-08
CD-109	39.	88.03	4.1370E-07
AG-110M	17.	937.48	3.8465E-08
SN-113	32.	391.69	1.9063E-08
SN-117M	44.	158.56	3.1950E-07
SB-122	0.	563.93	Half-Life too short
SB-124	23.	602.71	1.9477E-08
SB-125	22.	427.89	2.5467E-08
TE-125M	59.	109.28	9.8258E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	39.	57.60	5.0596E-05
XE-127	43.	202.84	4.3911E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	13.	695.88	9.2676E-07
XE-129M	51.	196.56	4.1172E-05
I-130	0.	536.09	Half-Life too short
BA-131	29.	123.80	1.5751E-06
I-131	30.	364.48	3.8790E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	39.	163.93	2.2375E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	38.	302.84	4.5882E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	28.	604.70	1.0217E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-SS042904 Acquisition date : 8-JUL-2004 10:23:42

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	15.	818.50	3.6096E-07
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.9056E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	48.	165.85	1.4358E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	21.	537.32	1.3739E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	47.	145.44	7.7529E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	34.	133.54	8.4195E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	38.	91.10	3.7596E-06
PM-148M	24.	550.27	2.8235E-08
EU-152	33.	344.27	3.0235E-08
EU-154	18.	1004.76	6.5422E-08
EU-156	21.	646.29	2.8324E-06
[illegible]-181	16.	482.03	2.4571E-08
[illegible]-182	9.	1221.42	5.2521E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	47.	279.19	3.1924E-08
BI-207	24.	569.67	8.7181E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	59.	186.21	2.7342E-07
AC-228	41.	338.32	7.7809E-08
TH-228	32.	84.37	1.2366E-06
PA-234	0.	131.20	Half-Life too short
TH-234	35.	63.29	8.6580E-06
U-235	47.	143.76	8.0670E-08
NP-239	0.	106.13	Half-Life too short
AM-241	24.	59.54	1.7726E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 5D043004

Sample Location (Well Number): 5 Deep

1. Representative sample collected. Date/Time 043004 / 0927

Sample collected by: JayMarie Slaback / JayMarie Slaback Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Gouillard / Jon Gouillard Date: 7.7.04
Printed Name / Signature

3. Sample counted in accordance with 76,000,70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YORK / Date: 7-9-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: July 13, 2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-5D043004	
2 . Date Sampled	04/30/2004	
3 . Time Sampled	09:27	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	17:16	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	6.9	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.20\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-5D043004

Sample Location (Well Number): 5D deep

1. Representative sample collected. Date/Time 043004 / 0927

Sample collected by: Joy Marie Staback / Joy Marie Staback Date: 07-07-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulliard / [signature] Date: 7.7.04
Printed Name Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / [signature] Date: 7/8/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-5D043004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 7/8/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Upton / William V. Upton Date: 7/11/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William Upton 4869 / 7/13/04

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 11:30:09.05

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-5D043004

Sample End Time: 30-APR-2004 09:27:00.00

REMARKS SAVED AS GL # 01-EN1489

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-5D043004 Acquisition date : 8-JUL-2004 11:00:05

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-5D043004
Sample collection start date: 30-APR-2004 09:27:00.00
Sample collection end date : 30-APR-2004 09:27:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 11:00:05.71
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.18 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00286E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	351.86	72	41	5.06	703.45	695	15	3.98E-02	22.8	Pb 214
2	2	510.81	70	28	2.06	1021.33	1013	18	3.91E-02	22.6	1.80E+00
3	2	512.00	43	24	2.06	1023.71	1013	18	2.37E-02	36.9	Annihilation
4	0	558.84	81	24	1.89	1117.40	1111	16	4.50E-02	17.5	Hg-203 Bi 214
5	0	609.31	43	24	4.38	1218.35	1211	12	2.39E-02	27.4	Bi 214
6	0	1460.86	65	9	2.04	2922.58	2916	12	3.60E-02	15.5	K40
7	0	1764.30	38	4	2.92	3530.28	3521	17	2.12E-02	20.3	Bi 214

Sample Title : EFT-SD043004 Page : 1
Decay Time = 69 01:33:05.71 Acquisition Time = 8-JUL-2004 11:00:05.71

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	351.86	72	41	5.06	703.45	695	15	22.8		
2	510.81	70	28	2.06	1021.33	1013	10	22.6	1.00E+00	
2	512.00	43	24	2.06	1023.71	1013	10	36.9		
0	558.84	81	24	1.89	1117.40	1111	16	17.5		
0	609.31	43	24	4.38	1218.35	1211	12	27.4	- BI-214	
0	1460.86	65	9	2.04	2922.50	2916	12	15.5		K-40
0	1764.30	38	4	2.92	3530.28	3521	17	20.3	- BI-214	

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	65	10.67*	2.389E+00	3.822E-07	3.822E-07	15.49

Flag: "*" = Keyline

Sample ID : EFT-SD043004 Acquisition date : 6-JUL-2004 11:00:05

Total number of lines in spectrum	7	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	6	85.71%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.822E-07	3.822E-07	0.592E-07	15.49	
	Total Activity :		3.822E-07	3.822E-07			
	Grand Total Activity :		3.822E-07	3.822E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-5D043004 Acquisition date : 8-JUL-2004 11:00:05

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
I-10	109.74M	906.40	511.00*	193.46	1.000E+35	22.63	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	62.99	559.10*	44.70	5.469E+11	17.50	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.76	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	8.870E-07	27.44	
		% Abundances Found =		5.92			
XE-135	9.11H	181.98	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	1.000E+35	27.44	
		% Abundances Found =		3.11			
BI-214	19.90M	4998.40	609.31*	46.30	1.000E+35	27.44	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.00	1.000E+35	20.31	
		% Abundances Found =		65.03	(Abn. Limit =	48.40%)	
PB-214	26.80M	3711.50	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	22.82	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit =	37.20%)	

Flag: "*" = Keyline

Sample ID : EFT-SD043004 Acquisition date : 8-JUL-2004 11:00:05

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	351.06	72	41	5.06	703.45	695	15	3.98E-02	22.8	5.53E+00	T
2	510.01	70	28	2.06	1021.33	1013	18	3.91E-02	22.6	4.74E+00	T
2	512.00	43	24	2.06	1023.71	1013	18	2.37E-02	36.9	4.73E+00	
0	558.04	61	24	1.89	1117.40	1111	16	4.50E-02	17.5	4.55E+00	T
0	609.31	43	24	4.38	1218.35	1211	12	2.39E-02	27.4	4.39E+00	T
0	1764.30	38	4	2.92	3530.28	3521	17	2.12E-02	20.3	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 11:30:14.20

Sample ID : EFT-5D043004

[redacted]nimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	21.	477.59	1.7250E-07
F-18	0.	511.00	Half-Life too short
NA-22	5.	1274.54	7.9230E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	19.	889.25	1.9683E-08
CR-51	36.	320.08	4.6013E-07
MN-54	13.	834.83	1.0223E-08
CO-56	21.	1238.25	3.7839E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	35.	122.06	1.1637E-08
CO-58	17.	810.76	1.9205E-08
FE-59	8.	1099.22	4.4318E-08
CO-60	12.	1332.49	1.1440E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	13.	1115.52	2.4932E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	50.	136.00	2.2897E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	40.	513.99	2.4038E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	40.	513.99	2.1525E-08
RB-86	12.	1076.63	1.4569E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	1.2012E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	9.	1204.90	6.9849E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]-92	0.	1383.94	Half-Life too short
[redacted]92	0.	934.46	Half-Life too short

Sample ID : EFT-5D043004 Acquisition date : 8-JUL-2004 11:00:05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	14.	702.63	7.6272E-09
NB-95	8.	765.79	2.6285E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	16.	756.72	3.3049E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	28.	497.08	3.2443E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	19.	621.84	9.1468E-08
CD-109	26.	88.03	3.4429E-07
AG-110M	14.	937.48	3.5451E-08
SN-113	37.	391.69	2.0243E-08
SN-117M	46.	158.56	3.1704E-07
SB-122	0.	563.93	Half-Life too short
SB-124	24.	602.71	1.9580E-08
SB-125	31.	427.89	2.9819E-08
TE-125M	44.	109.28	8.5602E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	23.	57.60	3.9930E-05
XE-127	45.	202.84	4.4202E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	21.	695.88	1.1325E-06
XE-129M	59.	196.56	4.1761E-05
I-130	0.	536.09	Half-Life too short
BA-131	36.	123.80	1.6716E-06
I-131	31.	364.48	3.7192E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	59.	163.93	2.6251E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	34.	302.84	4.3765E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	33.	604.70	1.0908E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-5D043004 Acquisition date : 8-JUL-2004 11:00:05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[illegible]-136	14.	818.50	3.4267E-07
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.9193E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	55.	165.85	1.5260E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	20.	537.32	1.2046E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	52.	145.44	7.9504E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	45.	133.54	9.6047E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	38.	91.10	3.6172E-06
PM-148M	28.	550.27	3.0177E-08
EU-152	44.	344.27	3.4458E-08
EU-154	12.	1004.76	5.3896E-08
EU-156	19.	646.29	2.6292E-06
HF-181	19.	482.03	2.6408E-08
[illegible]-182	8.	1221.42	5.0806E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	26.	279.19	2.4158E-08
BI-207	18.	569.67	7.7115E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	58.	186.21	2.7042E-07
AC-228	38.	338.32	7.4986E-08
TH-228	36.	84.37	1.3118E-06
PA-234	0.	131.20	Half-Life too short
TH-234	44.	63.29	9.3828E-06
U-235	48.	143.76	8.2104E-08
NP-239	0.	106.13	Half-Life too short
AM-241	37.	59.54	2.1386E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 7S051704

Sample Location (Well Number): 7 Shallow

1. Representative sample collected. Date/Time 051704 / 1350

Sample collected by: Jay Marie Slabach / Jay Marie Slabach Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 7-8-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yorks / Date: 7-9-4
Fermi 2 Chemistry Printed Name / Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: _____ / _____ Date: _____
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks Resolve inconsistency sample location this form versus tritium activity calculation.

Tritium Activity Calculation

Sample Information

5/a 7-16-04

1 . Sample Location	EFT-7S0S1704	
2 . Date Sampled	05/17/2004	
3 . Time Sampled	13:50	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	07/09/2004	
2 . Time Sample Counted	16:16	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	9.2	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	4068.6	cpm
Net Spike Count Rate (cpm)	4059.4	cpm
H3 Spike Activity (dpm on count date)	9642.0	dpm
Counter Efficiency	0.4210	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	5.8	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.2	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.20\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date JUL 09 2004

Form 76.000.39 Att 1 P:1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-7S0S1704

Sample Location (Well Number): 7 Shallow

1. Representative sample collected. Date/Time 5-17-04 / 1350

Sample collected by: Jay Marie Slabock / Jay Marie Slabock Date: 07-08-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cailliod / Jon Cailliod Date: 1350 7-8-04
Printed Name / Signature 7-8-04

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: L. McCoy / L. McCoy Date: 7-8-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-7S051704

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy [signature] Date: 7/8/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipten [signature] Date: 7/13/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William V. Lipten 7/13/2004

DETROIT EDISON FERMI-2 POWER PLANT 8-JUL-2004 16:32:31.16

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-7S051704

Sample End Time: 17-MAY-2004 13:50:00.00

REMARKS SAVED UNDER FILE # 01-EN1496

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE 7/13/2004

Sample ID : EFT-7S051704 Acquisition date : 8-JUL-2004 16:02:28

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-7S051704
Sample collection start date: 17-MAY-2004 13:50:00.00
Sample collection end date : 17-MAY-2004 13:50:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 8-JUL-2004 16:02:28.55
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.13 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.002086E-01 Zero offset: 1.06715E-02
Daily cal date : 8-JUL-2004 09:58:17.14

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.36	166	59	2.61	1022.42	1012	23	9.25E-02	14.2	annihilation
2	0	559.10	39	41	1.53	1117.91	1110	12	2.17E-02	36.8	Hf-182
3	0	609.08	34	13	3.19	1217.88	1213	12	1.90E-02	28.0	Bi-214
4	0	1460.19	87	0	2.45	2921.24	2914	13	4.83E-02	10.7	K-40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.36	166	59	2.61	1022.42	1012	23	14.2		
0	559.10	39	41	1.53	1117.91	1110	12	36.8		
0	609.08	34	13	3.19	1217.88	1213	12	28.0		
0	1460.19	87	0	2.45	2921.24	2914	13	10.7		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	87	10.67*	2.390E+00	5.124E-07	5.124E-07	10.72

Flag: "*" = Keyline

Sample ID : EFT-7S051704 Acquisition date : 8-JUL-2004 16:02:20

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.124E-07	5.124E-07	0.549E-07	10.72	
Total Activity :			5.124E-07	5.124E-07			
Grand Total Activity :			5.124E-07	5.124E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	683.68	511.00*	193.46	1.000E+35	14.16	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	47.51	559.10*	44.70	5.778E+06	36.79	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
XE-135	9.11H	137.26	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	8.480E+34	27.99	
		% Abundances Found =		3.11			
BI-214	19.90M	3770.23	609.31*	46.30	1.000E+35	27.99	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		40.40	(Abn. Limit = 40.40%)		

Flag: "*" = Keyline

Sample ID : EFT-7S051704 Acquisition date : 8-JUL-2004 16:02:20

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.36	166	59	2.61	1022.42	1012	23	9.25E-02	14.2	4.74E+00	T
0	559.10	39	41	1.53	1117.91	1110	12	2.17E-02	36.6	4.54E+00	T
0	609.00	34	13	3.19	1217.80	1213	12	1.90E-02	28.0	4.39E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 8-JUL-2004 16:32:36.42

Sample ID : EFT-7S051704

[redacted]imum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	23.	477.59	1.4533E-07
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0688E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	15.	889.25	1.5292E-08
CR-51	26.	320.08	2.5998E-07
MN-54	12.	834.83	9.4360E-09
CO-56	17.	1238.25	2.9580E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	45.	158.38	3.0199E-06
CO-57	37.	122.06	1.1429E-08
CO-58	13.	810.76	1.4390E-08
FE-59	9.	1099.22	3.6066E-08
CO-60	18.	1332.49	1.3601E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	13.	1115.52	2.3693E-08
[redacted]69M	0.	438.63	Half-Life too short
[redacted]75	34.	136.00	1.7380E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	47.	513.99	2.5725E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	47.	513.99	1.9271E-08
RB-86	6.	1076.63	5.7264E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	1.0206E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	6.2295E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
[redacted]2	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	20.	702.63	8.8473E-09
NB-95	14.	765.79	2.3536E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	15.	756.72	2.7091E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	19.	497.08	2.0349E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	17.	621.84	8.5699E-08
CD-109	33.	88.03	3.7816E-07
AG-110M	14.	937.48	3.3530E-08
SN-113	30.	391.69	1.6654E-08
SN-117M	47.	158.56	1.3403E-07
SB-122	0.	563.93	Half-Life too short
SB-124	21.	602.71	1.5312E-08
SB-125	32.	427.89	3.0116E-08
TE-125M	36.	109.28	6.3790E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	28.	57.60	3.9025E-05
XE-127	42.	202.84	3.0935E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	17.	695.88	7.2902E-07
XE-129M	42.	196.56	9.5322E-06
I-130	0.	536.09	Half-Life too short
BA-131	43.	123.80	6.6896E-07
I-131	27.	364.48	8.1007E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	43.	163.93	8.3311E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	29.	302.84	4.0338E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	27.	81.00	3.8253E-05
XE-133M	0.	233.22	Half-Life too short
CS-134	28.	604.70	1.0033E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-7S051704 Acquisition date : 8-JUL-2004 16:02:20

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]-136	16.	818.50	1.4620E-07
I-136	0.	1313.02	Half-Life too short
CS-137	11.	661.65	7.7272E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	44.	165.85	1.2627E-08
CS-139	0.	1203.23	Half-Life too short
BA-140	20.	537.32	5.1099E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	41.	145.44	4.9963E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	38.	133.54	8.5313E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	35.	91.10	1.1839E-06
PM-148M	15.	550.27	1.7100E-08
EU-152	36.	344.27	3.1504E-08
EU-154	10.	1004.76	5.0295E-08
EU-156	13.	646.29	1.0479E-06
HF-181	20.	482.03	2.0770E-08
[redacted]-182	16.	1221.42	6.1644E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	40.	279.19	2.4796E-08
BI-207	13.	569.67	6.6727E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	55.	186.21	2.6496E-07
AC-228	28.	338.32	6.5639E-08
TH-228	48.	84.37	1.4688E-06
PA-234	0.	131.20	Half-Life too short
TH-234	42.	63.29	5.6751E-06
U-235	45.	143.76	7.9714E-08
NP-239	0.	106.13	Half-Life too short
AM-241	27.	59.54	1.8635E-07

July/August 2004

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-1S072804

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 7-28-04 / 1418

Sample collected by: Joy Slabark / Joy Marie Slabark Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cuillard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YAVORSKY / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No Tritium detected. William V Lipton 48657 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-1S072804	
2 . Date Sampled	07/28/2004	
3 . Time Sampled	14:18	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.9	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-04

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-1S072804

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 7/28/04 / 1418

Sample collected by: Jay Slaback / Jay Slaback Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caillard / Jon Caillard Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / L. McCoy Date: 8-18-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-15072604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William V. Lipton 48651 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 17-AUG-2004 15:52:49.95

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-1S072804

Sample End Time: 28-JUL-2004 14:10:00.00

REMARKS 01-EN1508

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-1S072804 Acquisition date : 17-AUG-2004 15:22:45

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-1S072804
Sample collection start date: 28-JUL-2004 14:10:00.00
Sample collection end date : 28-JUL-2004 14:10:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 17-AUG-2004 15:22:45.29
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.00 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00274E-01 Zero offset: -1.19017E-01
Daily cal date : 17-AUG-2004 14:15:41.22

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	67.73	62	83	1.53	135.63	130	14	3.45E-02	34.2	TH228
2	0	511.82	102	50	2.48	1023.64	1015	19	5.66E-02	19.7	annihilation
3	0	558.93	27	18	1.05	1117.88	1111	14	1.51E-02	37.8	Bi-214
4	0	1460.92	83	7	2.21	2923.16	2916	13	4.50E-02	12.7	K40

Decay Time = 20 01:04:45.29 Acquisition Time = 17-AUG-2004 15:22:45.2

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	67.73	62	83	1.53	135.63	130	14	34.2		
0	511.82	102	50	2.48	1023.64	1015	19	19.7		
0	550.93	27	18	1.85	1117.88	1111	14	37.8		
0	1460.92	83	7	2.21	2923.16	2916	13	12.7		K-40

Sample ID : EFT-1S072804 Acquisition date : 17-AUG-2004 15:22:45

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	83	10.67*	2.389E+00	4.860E-07	4.860E-07	12.72

Flag: "*" = Keyline

Sample ID : EFT-15072804 Acquisition date : 17-AUG-2004 15:22:45

Total number of lines in spectrum 4
Number of unidentified lines 0
Number of lines tentatively identified by NID 4 100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.860E-07	4.860E-07	0.618E-07	12.72	
	Total Activity :		4.860E-07	4.860E-07			
	Grand Total Activity :		4.860E-07	4.860E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-1S072804 Acquisition date : 17-AUG-2004 15:22:45

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	263.17	511.00*	193.46	1.000E+35	19.65	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	18.29	559.10*	44.70	6.445E-03	37.82	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
CS-136	13.16D	1.52	66.91	12.50	1.424E-06	34.24	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
	% Abundances Found =			4.10			
TA-182	114.74D	0.17	67.75	42.30	1.652E-07	34.24	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
	% Abundances Found =			38.01			

Flag: "*" = Keyline

Sample ID : EFT-1S072804 Acquisition date : 17-AUG-2004 15:22:45

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	67.73	62	83	1.53	135.63	130	14	3.45E-02	34.2	1.50E+00	T
0	511.02	102	50	2.40	1023.64	1015	19	5.66E-02	19.7	4.73E+00	T
0	558.93	27	10	1.05	1117.88	1111	14	1.51E-02	37.6	4.55E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 17-AUG-2004 15:52:55.10

Sample ID : EFT-1S072804

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	20.	477.59	8.9778E-08
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	8.4390E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	18.	889.25	1.2823E-08
CR-51	36.	320.08	1.3536E-07
MN-54	12.	834.83	8.8232E-09
CO-56	15.	1238.25	2.1079E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	46.	158.38	7.9727E-08
CO-57	25.	122.06	8.8416E-09
CO-58	15.	810.76	1.0981E-08
FE-59	14.	1099.22	2.5831E-08
CO-60	15.	1332.49	1.2497E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	7.	1115.52	1.7196E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	40.	136.00	1.5527E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	44.	513.99	2.4000E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	44.	513.99	1.3264E-08
RB-86	7.	1076.63	1.9115E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	9.7447E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	4.2190E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-13072804 Acquisition date : 17-AUG-2004 15:22:45

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	12.	702.63	7.1789E-09
NB-95	6.	765.79	8.9179E-09
NB-95M	35.	235.69	1.4099E-06
ZR-95	13.	756.72	1.7611E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	15.	739.50	1.0148E-05
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	23.	497.08	1.2547E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	17.	621.84	7.9541E-08
CD-109	25.	88.03	3.1804E-07
AG-110M	10.	937.48	2.6858E-08
SN-113	27.	391.69	1.3033E-08
[redacted]-117M	44.	158.56	2.5533E-08
[redacted]122	16.	563.93	1.7159E-06
SB-124	25.	602.71	1.1424E-08
SB-125	16.	427.89	2.1687E-08
TE-125M	32.	109.28	4.1207E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	26.	57.60	3.0895E-05
XE-127	41.	202.84	1.6573E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	12.	695.88	3.2114E-07
XE-129M	31.	196.56	6.8290E-07
I-130	0.	536.09	Half-Life too short
BA-131	28.	123.80	8.3684E-08
I-131	23.	364.48	4.7473E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	34.	163.93	1.1523E-06
I-132	0.	667.69	Half-Life too short
TE-132	27.	228.16	5.3641E-07
BA-133	33.	302.84	4.2880E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	25.	81.00	5.4106E-07
XE-133M	27.	233.22	3.6781E-05
CS-134	22.	604.70	8.6828E-09
[redacted]34	0.	884.09	Half-Life too short
[redacted]-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-1S072804 Acquisition date : 17-AUG-2004 15:22:45

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	14.	818.50	2.5670E-08
I-136	0.	1313.02	Half-Life too short
CS-137	17.	661.65	9.1448E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	39.	165.85	1.0153E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	16.	537.32	8.1408E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	38.	145.44	2.4344E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	42.	133.54	8.2760E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	25.	91.10	1.3490E-07
PM-148M	21.	550.27	1.1705E-08
EU-152	26.	344.27	2.7075E-08
EU-154	12.	1004.76	5.3898E-08
EU-156	12.	646.29	2.3450E-07
HF-181	13.	482.03	1.0030E-08
TA-182	7.	1221.42	3.6037E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	38.	279.19	1.3840E-08
BI-207	16.	569.67	7.3340E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	43.	240.98	9.6556E-06
RA-226	55.	186.21	2.6493E-07
AC-228	31.	338.32	6.7817E-08
TH-228	37.	84.37	1.2633E-06
PA-234	0.	131.20	Half-Life too short
TH-234	24.	63.29	1.7441E-06
U-235	35.	143.76	7.1024E-08
NP-239	43.	106.13	1.7382E-05
AM-241	27.	59.54	1.8467E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-1D072804

Sample Location (Well Number): 1 Deep

1. Representative sample collected. Date/Time 7-28-04 / 1105

Sample collected by: Joy Slabach / Joy Marie Slabach Date: 08-15-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yoder / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V Lipton 4865 / 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-1D072804	
2 . Date Sampled	07/28/2004	
3 . Time Sampled	11:05	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:00	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.0	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.6	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 R1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-1D072904

Sample Location (Well Number): 1 Deep

1. Representative sample collected. Date/Time 07/29/04 / 11:05

Sample collected by: Joy Marie Slobak / Joy Marie Slobak Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Courtland / Jon Courtland Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / L. McCoy Date: 8-18-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-1D072804

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / L. McCoy Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks NU licensed radioactive material detected
William V. Lipton 4869 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 17-AUG-2004 15:19:43.21

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-1D072804

Sample End Time: 28-JUL-2004 11:05:00.00

REMARKS 01-EN1507

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-1D072804 Acquisition date : 17-AUG-2004 14:49:4

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-1D072804
Sample collection start date: 28-JUL-2004 11:05:00.00
Sample collection end date : 28-JUL-2004 11:05:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : MELL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 17-AUG-2004 14:49:43.64
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:00.97 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00274E-01 Zero offset: -1.19017E-01
Daily cal date : 17-AUG-2004 14:15:41.22

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	512.21	79	55	2.17	1024.44	1014	17	4.38E-02	24.3	
2	0	1461.16	72	4	1.51	2923.64	2916	14	4.02E-02	13.0	

Sample Title : EFT-1D072004
Decay Time = 20 03:44:43.64 Acquisition Time = 17-AUG-2004 14:49:43.6

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	512.21	79	55	2.17	1024.44	1014	17	24.3		
0	1461.16	72	4	1.51	2923.64	2916	14	13.0		K-40

Nuclide Line Activity Report
Sample ID : EFT-1D072004

Page :
Acquisition date : 17-AUG-2004 14:49:43

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	72	10.67*	2.389E+00	4.259E-07	4.259E-07	13.00

Flag: "*" = Keyline

Sample ID : SFT-1D072004 Acquisition date : 17-AUG-2004 14:49:43

Total number of lines in spectrum	2	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	2	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.259E-07	4.259E-07	0.553E-07	13.00	
	Total Activity :		4.259E-07	4.259E-07			
Grand Total Activity :			4.259E-07	4.259E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-1D072004 Acquisition date : 17-AUG-2004 14:49:43

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	264.62	511.00*	193.46	1.000E+35	24.35	Decay

% Abundances Found = 100.00

Flag: "*" = Keyline

Sample ID : EFT-1D072804 Acquisition date : 17-AUG-2004 14:49:43

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	512.21	79	55	2.17	1024.44	1014	17	4.30E-02	24.3	4.73E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 17-AUG-2004 15:19:53.24 *
****
* Sample ID : EFT-1D072804 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	14.	477.59	7.7491E-08
F-18	0.	511.00	Half-Life too short
NA-22	5.	1274.54	7.8619E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	10.	889.25	1.0100E-08
CR-51	32.	320.08	1.2780E-07
MN-54	16.	834.83	1.0107E-08
CO-56	14.	1238.25	2.0728E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	31.	158.38	6.7567E-08
CO-57	27.	122.06	9.2050E-09
CO-58	21.	810.76	1.2790E-08
FE-59	14.	1099.22	2.5886E-08
CO-60	16.	1332.49	1.2810E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	11.	1115.52	2.0403E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	26.	136.00	1.3270E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	41.	513.99	2.3992E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	41.	513.99	1.2847E-08
RB-86	16.	1076.63	2.6996E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	5.9739E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	4.2396E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	18.	702.53	8.4498E-09
NB-95	10.	765.79	1.0617E-08
NB-95M	45.	235.69	1.6052E-06
ZR-95	7.	756.72	1.3529E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	13.	739.56	9.8123E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	24.	497.08	1.2699E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	310.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	20.	621.84	8.5131E-08
CD-109	33.	88.03	3.5602E-07
AG-110M	14.	937.48	3.1212E-08
SN-113	27.	391.69	1.3097E-08
SN-117M	33.	158.56	2.2406E-08
[illegible]-122	16.	563.93	1.7675E-06
[illegible]-124	25.	602.71	1.1309E-08
SB-125	23.	427.89	2.5033E-08
TE-125M	24.	109.28	3.6246E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	17.	57.60	2.5585E-05
XE-127	28.	202.84	1.3899E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	12.	695.88	3.1986E-07
XE-129M	41.	196.56	7.7603E-07
I-130	0.	536.09	Half-Life too short
BA-131	31.	123.80	8.8351E-08
I-131	32.	364.48	5.6048E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	47.	163.93	1.3305E-06
I-132	0.	667.69	Half-Life too short
TE-132	28.	228.16	5.5819E-07
BA-133	24.	302.84	3.7237E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	28.	81.00	5.7054E-07
XE-133M	30.	233.22	4.0096E-05
CS-134	24.	604.70	9.0850E-09
I-134	0.	884.09	Half-Life too short
[illegible]-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	14.	818.50	2.5046E-08
I-136	0.	1313.02	Half-Life too short
CS-137	10.	661.65	9.4406E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1436.06	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1428.50	Half-Life too short
CE-139	33.	165.85	9.4855E-09
CS-139	0.	1283.23	Half-Life too short
BA-140	15.	537.32	8.1060E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	31.	145.44	2.2261E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	28.	133.54	6.8733E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	25.	91.10	1.3535E-07
PM-148M	17.	550.27	1.0701E-08
EU-152	10.	344.27	2.3001E-08
EU-154	9.	1004.76	4.7312E-08
EU-156	10.	646.29	2.7916E-07
HF-181	15.	482.03	1.0627E-08
TA-182	4.	1221.42	2.8332E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	39.	279.19	1.4016E-08
BI-207	22.	569.67	8.2984E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	44.	240.98	9.9782E-06
RA-226	30.	186.21	2.0009E-07
AC-228	32.	338.32	6.8273E-08
TH-228	26.	84.37	1.0725E-06
PA-234	0.	131.20	Half-Life too short
TH-234	35.	63.29	2.0771E-06
U-235	29.	143.76	6.4690E-08
NP-239	33.	106.13	1.5802E-05
AM-241	20.	59.54	1.6095E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2S080404

Sample Location (Well Number): 2 shallow

1. Representative sample collected. Date/Time 8-4-04 / 0922

Sample collected by: Jay Slabach / Jay Mark Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: Jon M. Yokom / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/30/2004
Fermi 2 Radiation Protection Supervision/Delegate Printed Name Signature

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V Lipton 4865
8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2S080404	
2 . Date Sampled	08/04/2004	
3 . Time Sampled	09:22	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:40	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.4	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E}6 \text{ dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E}6 \text{ uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2S080404

Sample Location (Well Number): 2 Shallow

1. Representative sample collected. Date/Time 8/4/04 / 0922

Sample collected by: Joy Slaback / Joy Marie Slaback Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caulland / [signature] Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-2S080404

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / [signature] Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William V. Lipton 4869 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 10-AUG-2004 12:23:30.02

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-25000404

Sample End Time: 4-AUG-2004 09:22:00.00

REMARKS 01-EN1509

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

******************************* Sample Parameters *******************************

Sample ID Number: EFT-2S080404
Sample collection start date: 4-AUG-2004 09:22:00.00
Sample collection end date : 4-AUG-2004 09:22:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

*************************** Acquisition Parameters ***************************

Detector number : DET 4 Acquire date : 18-AUG-2004 11:53:33.15
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:00.98 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 18-AUG-2004 11:45:05.57

*************************** Peak Search Parameters ***************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********************** Nuclide Identification Parameters **********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	66.57	44	88	1.60	133.15	128	11	2.42E-02	44.4	Th231
2	0	511.36	89	49	1.62	1022.81	1015	14	4.94E-02	19.8	annihilation
3	0	609.87	28	30	1.63	1219.91	1210	15	1.56E-02	46.6	Bi214
4	0	1460.74	102	0	1.12	2923.22	2914	17	5.67E-02	9.9	K40

Sample Title : EFT-2S080404 Page : 1
Decay Time = 14 02:31:33.15 Acquisition Time = 10-AUG-2004 11:53:33.1

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	66.57	44	68	1.60	133.15	128	11	44.4		
0	511.36	89	49	1.62	1022.81	1015	14	19.8		
0	609.87	28	30	1.63	1219.91	1210	15	46.6		
0	1460.74	102	0	1.12	2923.22	2914	17	9.9		K-40

Nuclide Line Activity Report
Sample ID : EFT-20000404

Page :
Acquisition date : 10-AUG-2004 11:53:35

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	102	10.67*	2.389E+00	6.000E-07	6.006E-07	9.90

Flag: "*" = Keyline

Sample ID : EFT-2S000404 Acquisition date : 10-AUG-2004 11:53:33

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	6.000E-07	6.000E-07	0.595E-07	9.90	
	Total Activity :		6.000E-07	6.000E-07			
	Grand Total Activity :		6.000E-07	6.000E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-2S000404 Acquisition date : 18-AUG-2004 11:53:33

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	185.22	511.00*	193.46	1.000E+35	19.77	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.12	66.05	1.02	5.034E-06	44.41	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
RU-103	39.35D	0.36	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	2.196E-07	46.63	
		% Abundances Found =		5.92			
CS-136	13.16D	1.07	66.91	12.50	7.962E-07	44.41	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
TA-182	114.74D	0.12	67.75	42.30	1.218E-07	44.41	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			
BI-214	19.90M	1021.44	609.31*	46.30	1.000E+35	46.63	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

Sample ID : EFT-2S080404 Acquisition date : 18-AUG-2004 11:53:33

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	66.57	44	88	1.60	133.15	128	11	2.42E-02	44.4	1.38E+00	T
0	511.36	89	49	1.62	1022.81	1015	14	4.94E-02	19.8	4.74E+00	T
0	609.87	28	30	1.83	1219.91	1210	15	1.56E-02	46.6	4.38E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 12:23:43.25 *
****
* Sample ID : EFT-2S080404 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	18.	477.59	8.0201E-08
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0170E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	9.	889.25	9.0026E-09
CR-51	33.	320.08	1.1162E-07
MN-54	17.	834.83	1.0108E-08
CO-56	11.	1238.25	1.7361E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	48.	158.38	4.1321E-08
CO-57	24.	122.06	8.5412E-09
CO-58	12.	810.76	9.4721E-09
FE-59	11.	1099.22	2.1611E-08
CO-60	12.	1332.49	1.1138E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.2924E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	27.	136.00	1.2553E-08
AS-76	0.	559.10	Half-Life too short
BR-82	10.	776.49	6.7308E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	34.	513.99	2.2199E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	34.	513.99	1.1154E-08
RB-86	0.	1076.63	1.6022E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	9.1684E-09
KR-89	0.	220.98	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	4.0309E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	12.	702.63	7.1818E-09
NB-95	17.	765.79	1.1978E-08
NB-95M	45.	235.69	5.0118E-07
ZR-95	11.	756.72	1.5358E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	12.	739.50	2.0504E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	24.	497.08	1.1580E-08
TC-104	0.	357.99	Half-Life too short
RH-105	26.	318.90	2.7724E-05
RU-105	0.	724.50	Half-Life too short
RU-106	17.	621.84	7.9405E-08
CD-109	27.	88.03	3.2452E-07
AG-110M	14.	937.48	3.0972E-08
SN-113	32.	391.69	1.3748E-08
SN-117M	48.	158.56	1.9575E-08
[illegible]-122	20.	563.93	4.1733E-07
SB-124	19.	602.71	9.4995E-09
SB-125	29.	427.89	2.7717E-08
TE-125M	40.	109.28	4.2411E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	18.	57.60	2.5367E-05
XE-127	36.	202.84	1.3901E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	23.	695.88	3.7858E-07
XE-129M	37.	196.56	4.6516E-07
I-130	0.	536.09	Half-Life too short
BA-131	31.	123.80	6.1978E-08
I-131	30.	364.48	3.2217E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	49.	163.93	9.5898E-07
I-132	0.	667.69	Half-Life too short
TE-132	43.	228.16	1.8541E-07
BA-133	30.	302.84	4.0773E-08
BA-133M	31.	276.09	1.6733E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	29.	81.00	2.6359E-07
XE-133M	38.	233.22	6.5420E-06
CS-134	10.	604.70	7.8826E-09
[illegible]-134	0.	884.09	Half-Life too short
[illegible]-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	12.	818.50	1.7551E-08
I-136	0.	1313.02	Half-Life too short
CS-137	13.	661.65	8.1003E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	51.	165.85	1.1176E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	10.	537.32	4.9181E-08
LA-140	4.	1596.49	2.7463E-06
BA-141	0.	190.22	Half-Life too short
CE-141	43.	145.44	2.2648E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	39.	133.54	7.8055E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	21.	91.10	8.5458E-08
PM-148M	21.	550.27	1.0620E-08
EU-152	31.	344.27	2.9183E-08
EU-154	13.	1004.76	5.5253E-08
EU-156	10.	646.29	1.6716E-07
HF-181	27.	482.03	1.2544E-08
TA-182	10.	1221.42	3.9726E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	36.	279.19	1.2376E-08
BI-207	29.	569.67	9.5192E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	42.	240.98	3.0752E-06
RA-226	35.	186.21	2.1408E-07
AC-228	40.	338.32	7.5692E-08
TH-228	18.	84.37	9.0296E-07
PA-234	0.	131.20	Half-Life too short
TH-234	36.	63.29	1.7664E-06
U-235	41.	143.76	7.6010E-08
NP-239	38.	106.13	2.8537E-06
AM-241	32.	59.54	1.9958E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2D080404

Sample Location (Well Number): 2D deep

1. Representative sample collected. Date/Time 08/04/04 / 1110

Sample collected by: Jay Slabach / Jay Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coolland / Jon Coolland Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / John M. Yokom Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/27/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V Lipton / 48457/ [illegible]

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2D080404	
2 . Date Sampled	08/04/2004	
3 . Time Sampled	11:10	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:40	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	6.8	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E}6 \text{ dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E}6 \text{ uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2D080404

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 08/04/04 / 11:10

Sample collected by: Jay Slaback / Jay Slaback Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cawillard / Jon Cawillard Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McCoy Date: 8-17-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-2D080404

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton [signature] Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V Lipton 48451 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 10-AUG-2004 13:52:09.79

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2D000404

Sample End Time: 4-AUG-2004 11:10:00.00

REMARKS 01-EN1510

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-2D080404 Acquisition date : 18-AUG-2004 13:22:06

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-2D080404
Sample collection start date: 4-AUG-2004 11:10:00.00
Sample collection end date : 4-AUG-2004 11:10:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E-03 cc
Sample geometry : M2LL Operator. LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 18-AUG-2004 13:22:06.06
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:00.97 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 18-AUG-2004 11:45:05.57

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.03	106	33	2.60	1022.15	1016	13	5.98E-02	14.7	Gaussian
2	1	1460.63	34	0	2.44	2923.00	2915	19	1.89E-02	25.8	1.45E+00
3	1	1461.63	20	0	2.44	2925.00	2915	19	1.11E-02	44.3	Keq

Sample Title : EFT-2D080404 Page : 1
Decay Time = 14 02:12:06.06 Acquisition Time = 10-AUG-2004 13:22:06.0
6

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.03	106	33	2.60	1022.15	1016	13	14.7		
1	1460.63	34	0	2.44	2923.00	2915	19	25.8	1.45E+00	K-40
1	1461.63	20	0	2.44	2925.00	2915	19	44.3		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	34	10.67*	2.389E+00	2.003E-07	2.003E-07	25.81

Flag: "*" = Keyline

Sample ID : EFT-2D080404 Acquisition date : 18-AUG-2004 13:22:06

Total number of lines in spectrum	3	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	2	66.67%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	2.003E-07	2.003E-07	0.517E-07	25.8i	
	Total Activity :		2.003E-07	2.003E-07			
	Grand Total Activity :		2.003E-07	2.003E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-2D080404 Acquisition date : 10-AUG-2004 13:22:06

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	185.05	511.00*	193.46	1.000E+35	14.73	Decay

% Abundances Found = 100.00

Flag: "*" = Keyline

Sample ID : EFT-2D080404
Acquisition date : 10-AUG-2004 13:22:06

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.03	106	33	2.60	1022.15	1016	13	5.90E-02	14.7	4.74E+00	T
1	1461.63	20	0	2.44	2925.00	2915	19	1.11E-02	44.3	2.39E+00	

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 13:52:14.86

Sample ID : EFT-2D080404

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	9.2302E-08
F-18	0.	511.00	Half-Life too short
NA-22	8.	1274.54	9.4942E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	7.	889.25	8.2809E-09
CR-51	31.	320.08	1.0948E-07
MN-54	12.	834.83	8.7550E-09
CO-56	17.	1238.25	2.1134E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	38.	158.38	3.7096E-08
CO-57	31.	122.06	9.5907E-09
CO-58	10.	810.76	8.8627E-09
FE-59	12.	1099.22	2.2594E-08
CO-60	20.	1332.49	1.4079E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	13.	1115.52	2.1331E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	45.	136.00	1.5835E-08
AS-76	0.	559.10	Half-Life too short
BR-82	14.	776.49	7.7335E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	35.	513.99	2.2481E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	35.	513.99	1.1294E-08
RB-86	10.	1076.63	1.8101E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	5.7429E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	12.	1204.90	4.1762E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short

Sample ID : EFT-2D080404 Acquisition date : 18-AUG-2004 13:22:06

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	17.	702.63	8.3268E-09
NB-95	14.	765.79	1.1062E-08
NB-95M	55.	235.69	5.5836E-07
ZR-95	18.	756.72	1.9425E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	12.	739.58	2.0480E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	20.	497.08	1.0709E-08
TC-104	0.	357.99	Half-Life too short
RH-105	30.	318.90	2.9137E-05
RU-105	0.	724.50	Half-Life too short
RU-106	23.	621.84	8.9979E-08
CD-109	34.	88.03	3.5953E-07
AG-110M	11.	937.48	2.7395E-08
[redacted]-113	23.	391.69	1.1779E-08
[redacted]-117M	37.	158.56	1.7370E-08
SB-122	21.	563.93	4.2410E-07
SB-124	28.	602.71	1.1139E-08
SB-125	20.	427.89	2.3496E-08
TE-125M	32.	109.28	3.8368E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	15.	57.60	2.3297E-05
XE-127	30.	202.84	1.2798E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	16.	695.88	3.2258E-07
XE-129M	33.	196.56	4.3994E-07
I-130	0.	536.09	Half-Life too short
BA-131	31.	123.80	6.1859E-08
I-131	23.	364.48	2.8744E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	34.	163.93	8.1666E-07
I-132	0.	667.69	Half-Life too short
TE-132	32.	228.16	1.6132E-07
BA-133	38.	302.84	4.5633E-08
BA-133M	31.	276.09	1.6568E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	30.	81.00	2.6504E-07
XE-133M	50.	233.22	7.3850E-06
[redacted]-134	23.	604.70	8.8786E-09
[redacted]-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-2D080404 Acquisition date : 18-AUG-2004 13:22:06

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	11.	818.50	1.6866E-08
I-136	0.	1313.02	Half-Life too short
CS-137	24.	661.65	1.0681E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	41.	165.85	1.0094E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	14.	537.32	5.6001E-08
LA-140	5.	1596.49	3.0635E-06
BA-141	0.	190.22	Half-Life too short
CE-141	30.	145.44	1.9149E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	38.	133.54	7.7524E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	27.	91.10	9.5996E-08
PM-148M	15.	550.27	9.1974E-09
EU-152	25.	344.27	2.6462E-08
EU-154	11.	1004.76	5.2482E-08
EU-156	20.	646.29	2.2299E-07
HF-181	19.	482.03	1.0747E-08
TA-182	9.	1221.42	3.8012E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	37.	279.19	1.2455E-08
BI-207	21.	569.67	8.2096E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	34.	240.98	2.7774E-06
RA-226	42.	186.21	2.3430E-07
AC-228	28.	338.32	6.4708E-08
TH-228	26.	84.37	1.0720E-06
PA-234	0.	131.20	Half-Life too short
TH-234	34.	63.29	1.7170E-06
U-235	42.	143.76	7.6671E-08
NP-239	32.	106.13	2.6336E-06
AM-241	18.	59.54	1.5398E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-45080304

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 8/3/04 / 1423

Sample collected by: Jay Slabach / Jay Mark Slabach Date: ~~08-18-04~~ 8-18-04 AMS
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Don Coviliard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/30/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No Tritium detected, William V Lipton 4868
8/30/04

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-4S080304	
2 . Date Sampled	08/03/2004	
3 . Time Sampled	14:23	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.7	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-4S080304

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 8/3/04 / 1423

Sample collected by: Jay Slaback / Jay Slaback Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coullard / Coullard Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-17-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-4 8080304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton [signature] Date: 8/18/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V. Lipton 48651 / 8/18/2004

DETROIT EDISON FERMI-2 POWER PLANT 18-AUG-2004 14:23:19.13

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4S000304

Sample End Time: 3-AUG-2004 14:23:00.00

REMARKS 01-EN1511

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

**************************** Sample Parameters ****************************

Sample ID Number: EFT-4S080304
Sample collection start date: 3-AUG-2004 14:23:00.00
Sample collection end date : 3-AUG-2004 14:23:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

*************************** Acquisition Parameters ***************************

Detector number : DET 4 Acquire date : 18-AUG-2004 13:53:15.04
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.00 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 18-AUG-2004 11:45:05.57

*************************** Peak Search Parameters ***************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

*********************** Nuclide Identification Parameters ***********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m2ll Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.20	107	56	2.76	1022.48	1013	21	5.97E-02	20.1	annihilation
2	0	559.25	36	17	0.97	1118.61	1114	13	2.01E-02	28.5	Hb-Hb Crhem
3	1	1460.87	22	7	2.69	2923.49	2916	14	1.23E-02	45.5	2.19E+00
4	1	1461.63	41	6	2.44	2925.00	2916	14	2.29E-02	21.3	K40

Sample Title : EFT-4S080304 Page : 1
Decay Time = 14 23:30:15.04 Acquisition Time = 18-AUG-2004 13:53:15.0
4

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.20	107	56	2.76	1022.40	1013	21	20.1		
0	559.25	36	17	0.97	1118.61	1114	13	28.5		
1	1460.87	22	7	2.69	2923.49	2916	14	45.5	2.19E+00	K-40
1	1461.63	41	6	2.44	2925.00	2916	14	21.3		

Sample ID : EFT-4S080304 Acquisition date : 10-AUG-2004 13:53:15

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.01	22	10.67*	2.389E+00	1.304E-07	1.304E-07	45.50

Flag: "*" = Keyline

Sample ID : EFT-4S000304 Acquisition date : 18-AUG-2004 13:53:15

Total number of lines in spectrum	4	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	3	75.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	1.304E-07	1.304E-07	0.593E-07	45.50	
	Total Activity :		1.304E-07	1.304E-07			
	Grand Total Activity :		1.304E-07	1.304E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-45080304 Acquisition date : 18-AUG-2004 13:53:15

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	196.69	511.00*	193.46	1.000E+35	20.09	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	13.67	559.10*	44.70	3.475E-04	28.49	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			

Flag: "*" = Keyline

Sample ID : EFT-4S050304 Acquisition date : 18-AUG-2004 13:53:15

Ib	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.20	107	56	2.76	1022.48	1013	21	5.97E-02	20.1	4.74E+00	T
0	559.25	36	17	0.77	1118.61	1114	13	2.01E-02	28.5	4.54E+00	T
1	1461.63	41	6	2.44	2925.00	2916	14	2.29E-02	21.3	2.39E+00	

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 14:23:24.32 *
****
* Sample ID : EFT-46000304 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	26.	477.59	9.4709E-08
F-18	0.	511.00	Half-Life too short
NA-22	5.	1274.54	7.8101E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.0747E-08
CR-51	40.	320.08	1.2473E-07
MN-54	14.	834.83	9.4251E-09
CO-56	17.	1238.25	2.1354E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	41.	158.38	4.2649E-08
CO-57	42.	122.06	1.1016E-08
CO-58	8.	810.76	7.9287E-09
FE-59	16.	1099.22	2.5837E-08
CO-60	18.	1332.49	1.3461E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	14.	1115.52	2.2018E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.4358E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	34.	513.99	2.1959E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	34.	513.99	1.1135E-08
RB-86	11.	1076.63	1.9097E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	9.9604E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	17.	1204.90	4.9025E-06
Y-91M	0.	555.60	Half-Life too short

Sample ID : EFT-4S080304 Acquisition date : 18-AUG-2004 13:53:15

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	13.	702.63	7.2351E-09
NB-95	12.	765.79	1.0341E-08
NB-95M	44.	235.69	5.8993E-07
ZR-95	14.	756.72	1.7234E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	17.	739.58	2.9533E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	22.	497.08	1.1107E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	10.	621.84	8.0766E-08
CD-109	28.	88.03	3.2909E-07
AG-110M	10.	937.48	2.7032E-08
[illegible]-113	26.	391.69	1.2438E-08
SN-117M	42.	158.56	1.9162E-08
SB-122	19.	563.93	5.1036E-07
SB-124	13.	602.71	8.0068E-09
SB-125	16.	427.89	2.1572E-08
TE-125M	35.	109.28	4.0443E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	25.	57.60	2.9293E-05
XE-127	41.	202.84	1.5137E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	17.	695.88	3.3978E-07
XE-129M	45.	196.56	5.4063E-07
I-130	0.	536.09	Half-Life too short
BA-131	34.	123.80	6.8117E-08
I-131	35.	364.48	3.7116E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	56.	163.93	1.0739E-06
I-132	0.	667.69	Half-Life too short
TE-132	30.	228.16	1.9132E-07
BA-133	34.	302.84	4.3196E-08
BA-133M	32.	276.09	2.4774E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	25.	81.00	2.7330E-07
[illegible]-133M	36.	233.22	8.4241E-06
[illegible]-134	16.	604.70	7.5664E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
[illegible]	[illegible]	[illegible]	[illegible]

Sample ID : EFT-4S000304 Acquisition date : 18-AUG-2004 13:53:15

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	7.	818.50	1.4757E-08
I-136	0.	1313.02	Half-Life too short
CS-137	13.	661.65	8.1678E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	42.	165.85	1.0320E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	20.	537.32	6.9171E-08
LA-140	3.	1596.49	3.8389E-06
BA-141	0.	190.22	Half-Life too short
CE-141	40.	145.44	2.2303E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	36.	133.54	7.5892E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	27.	91.10	1.0178E-07
PM-148M	20.	550.27	1.0391E-08
EU-152	24.	344.27	2.5988E-08
EU-154	11.	1004.76	5.2142E-08
EU-156	13.	646.29	1.8771E-07
HF-181	20.	482.03	1.1282E-08
TA-182	12.	1221.42	4.3701E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	1.2370E-08
BI-207	24.	569.67	8.7547E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	41.	240.98	3.6069E-06
RA-226	40.	186.21	2.2957E-07
AC-228	34.	338.32	7.0279E-08
TH-228	29.	84.37	1.1271E-06
PA-234	0.	131.20	Half-Life too short
TH-234	28.	63.29	1.6260E-06
U-235	33.	143.76	6.8509E-08
NP-239	36.	106.13	3.5949E-06
AM-241	26.	59.54	1.8249E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-4D080304

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 8/3/04 / 1056

Sample collected by: Joy Slaback / Joy Marie Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coillard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. TOKOM / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Litton / William V. Litton Date: 8/30/2004
Fermi 2 Radiation Protection Supervision/Delegate Printed Name Signature

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected. William V Litton 8609 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-4D080304	
2 . Date Sampled	08/03/2004	
3 . Time Sampled	10:56	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3267.5	cpm
Net Spike Count Rate (cpm)	3259.6	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3405	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.4	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.5	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.37\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT- 4D080304

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 8/3/04 / 1056

Sample collected by: Jay Slaback / Jay Slaback Date: 08-17-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coolland / Jon Coolland Date: 8-13-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-4D080304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V Lipton 4805 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 18-AUG-2004 15:57:16.77

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4D000304

Sample End Time: 3-AUG-2004 10:56:00.00

REMARKS 01-EN154

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-4D000304 Acquisition date : 18-AUG-2004 15:27:11

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-4D000304
Sample collection start date: 3-AUG-2004 10:56:00.00
Sample collection end date : 3-AUG-2004 10:56:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 18-AUG-2004 15:27:11.50
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.02 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 18-AUG-2004 11:45:05.57

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	510.57	101	42	1.04	1021.22	1012	19	5.58E-02	18.5	annihilation
2	0	609.74	95	17	2.57	1219.65	1210	22	5.27E-02	15.0	Bi-214
3	0	1460.64	79	5	2.55	2923.01	2915	18	4.39E-02	12.9	K-40

Decay Time = 15 04:31:11.50 Acquisition Time = 18-AUG-2004 15:27:11.5
0

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	510.57	101	42	1.64	1021.22	1012	19	18.5		
0	609.74	95	17	2.57	1219.65	1210	22	15.0		
0	1460.64	79	5	2.55	2923.01	2915	18	12.9		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	79	10.67*	2.389E+00	4.658E-07	4.658E-07	12.91

Flag: "*" = Keyline

Sample ID : EFT-4D080304 Acquisition date : 15-AUG-2004 15:27:11

Total number of lines in spectrum	3	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	3	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.658E-07	4.658E-07	0.601E-07	12.91	
	Total Activity :		4.658E-07	4.658E-07			
	Grand Total Activity :		4.658E-07	4.658E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-4D080304 Acquisition date : 10-AUG-2004 15:27:11

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	199.44	511.00*	193.46	1.000E+35	18.51	Decay
	% Abundances Found =			100.00			
RU-103	39.35D	0.39	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	7.585E-07	15.00	
	% Abundances Found =			5.92			
BI-214	19.90M	1099.61	609.31*	46.30	1.000E+35	15.00	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1230.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.00	--- Not Found ---		
	% Abundances Found =			48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	510.57	101	42	1.84	1021.22	1012	19	5.50E-02	10.5	4.74E+00	T
0	609.74	95	17	2.57	1219.65	1210	22	5.27E-02	15.0	4.38E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 15:57:21.92 *
****
* Sample ID : EFT-4D080304
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	20.	477.59	8.5894E-08
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	8.3089E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	19.	889.25	1.2535E-08
CR-51	28.	320.08	1.0727E-07
MN-54	12.	834.83	8.7763E-09
CO-56	21.	1238.25	2.3202E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	39.	158.38	4.2428E-08
CO-57	28.	122.06	9.2511E-09
CO-58	11.	810.76	9.2066E-09
FE-59	13.	1099.22	2.3281E-08
CO-60	13.	1332.49	1.1611E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	10.	1115.52	2.4896E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	34.	136.00	1.4016E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	33.	513.99	2.1652E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	33.	513.99	1.1004E-08
RB-86	14.	1076.63	2.1647E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	2.	1836.01	7.2991E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life&too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	4.1152E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-4D060304 Acquisition date : 18-AUG-2004 15:27:11

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	11.	818.50	1.7850E-08
I-136	0.	1313.02	Half-Life too short
CS-137	10.	661.65	7.3827E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	37.	165.85	9.7639E-09
CS-139	0.	1283.23	Half-Life too short
BA-140	16.	537.32	6.3069E-08
LA-140	2.	1596.49	3.6795E-06
BA-141	0.	190.22	Half-Life too short
CE-141	46.	145.44	2.3882E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	39.	133.54	7.8794E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	31.	91.10	1.1008E-07
PM-148M	17.	550.27	9.7055E-09
EU-152	23.	344.27	2.5284E-08
EU-154	13.	1004.76	5.6388E-08
EU-156	16.	646.29	2.1297E-07
HF-181	22.	482.03	1.1765E-08
TA-182	9.	1221.42	3.8474E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	39.	279.19	1.2954E-08
BI-207	19.	569.67	7.8150E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	47.	240.98	3.9767E-06
RA-226	51.	186.21	2.5614E-07
AC-228	36.	338.32	7.1949E-08
TH-228	28.	84.37	1.0975E-06
PA-234	0.	131.20	Half-Life too short
TH-234	35.	63.29	1.8015E-06
U-235	40.	143.76	7.4944E-08
NP-239	16.	106.13	2.6882E-06
AM-241	20.	59.54	1.6196E-07

DETROIT EDISON FERMI-2 POWER PLANT 18-AUG-2004 14:54:17.83

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4D000304

Sample End Time: 3-AUG-2004 10:56:00.00

REMARKS 01-EN1512 Co-60 ID

Co-60 on August 18, 2004 1925 count 19 counts, Critical level for Co-60 = 23 counts. Therefore, this peak is due to statistical background variation and does not represent the presence of Co-60

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

PAGE ____ of ____

Sample ID : EFT-4D080304 Acquisition date : 18-AUG-2004 14:24:12

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-4D080304
Sample collection start date: 3-AUG-2004 10:56:00.00
Sample collection end date : 3-AUG-2004 10:56:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 18-AUG-2004 14:24:12.37
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.00 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 18-AUG-2004 11:45:05.57

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

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Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	296.55	30	53	2.72	593.09	587	10	1.67E-02	49.5	Pb214
2	0	352.24	45	57	1.03	704.49	698	11	2.49E-02	36.1	Pb214
3	0	510.83	139	20	2.46	1021.75	1014	16	7.71E-02	11.1	annihilation
4	0	558.37	42	13	2.13	1116.87	1110	13	2.35E-02	23.3	Ho-166 ? rhe
5	0	609.63	49	30	1.73	1219.43	1215	11	2.74E-02	25.8	Bi214
6	0	1238.73	13	6	0.67	2478.63	2474	9	6.94E-03	46.1	Bi214
7	0	1332.02	19	4	1.23	2665.43	2657	13	1.07E-02	30.1	Co-60
8	0	1461.05	67	6	2.79	2923.04	2918	14	3.74E-02	14.7	K-40

Decay Time = 15 03:28:12.37 Acquisition Time = 18-AUG-2004 14:24:12.3
7

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	296.55	30	53	2.72	593.09	587	10	49.5		
0	352.24	45	57	1.03	704.49	698	11	36.1		
0	510.83	139	20	2.46	1021.75	1014	16	11.1		
0	558.37	42	13	2.13	1116.87	1110	13	23.3		
0	609.63	49	30	1.73	1219.43	1215	11	25.8		
0	1238.73	13	6	0.67	2478.63	2474	9	46.1		
0	1332.02	19	4	1.23	2665.43	2657	13	30.1		CO-60
0	1461.05	67	6	2.79	2923.84	2918	14	14.7		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	67	10.67*	2.389E+00	3.970E-07	3.970E-07	14.65

Nuclide Type: activation

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
CO-60	1173.22	-------	100.00	2.717E+00	------- Line Not Found		-------
	1332.49	19	100.00*	2.507E+00	1.154E-08	1.160E-08	30.08

Flag: "*" = Keyline

Total number of lines in spectrum	8	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	7	87.50%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	3.970E-07	3.970E-07	0.582E-07	14.65	
	Total Activity :		3.970E-07	3.970E-07			

Nuclide Type : activation

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
CO-60	5.27Y	1.01	1.154E-08	1.160E-08	0.349E-08	30.08	A
	Total Activity :		1.154E-08	1.160E-08			
Grand Total Activity :			4.086E-07	4.086E-07			

Flags: "K" = Keyline not found
"E" = Manually edited
"M" = Manually accepted
"A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[illegible]18	109.74M	190.86	511.00*	193.46	1.000E+35	11.14	Decay
		% Abundances Found =		100.00			
CO-56	78.76D	0.19	846.75	99.96	--- Not Found ---		Abun.
			1037.82	14.03	--- Not Found ---		
			1238.25*	67.00	1.219E-08	46.09	
			1360.21	4.29	--- Not Found ---		
			1771.40	15.51	--- Not Found ---		
			2015.35	3.03	--- Not Found ---		
			2034.91	7.78	--- Not Found ---		
		% Abundances Found =		31.66			
AS-76	26.32H	13.82	559.10*	44.70	4.512E-04	23.33	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.39	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	3.946E-07	25.78	
		% Abundances Found =		5.92			
BI-214	19.90M	1096.64	609.31*	46.30	1.000E+35	25.78	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	1.000E+35	46.09	
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		54.70	(Abn. Limit = 48.48%)		
PB-214	26.80M	814.30	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	36.07	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.48	(Abn. Limit = 37.20%)		

Flags: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	296.55	30	53	2.72	593.09	587	10	1.67E-02	49.5	5.87E+00	
0	352.24	45	57	1.03	704.49	698	11	2.49E-02	36.1	5.52E+00	T
0	510.83	139	20	2.46	1021.75	1014	16	7.71E-02	11.1	4.74E+00	T
0	558.37	42	13	2.13	1116.87	1110	13	2.35E-02	23.3	4.55E+00	T
0	609.63	49	30	1.73	1219.43	1215	11	2.74E-02	25.8	4.38E+00	T
0	1238.73	13	6	0.67	2478.63	2474	9	6.94E-03	46.1	2.63E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 14:54:23.02

Sample ID : EFT-4D080304

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	22.	477.59	8.8618E-08
F-18	0.	511.00	Half-Life too short
NA-22	13.	1274.54	1.1599E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	8.	889.25	8.4728E-09
CR-51	24.	320.08	9.9261E-08
MN-54	17.	834.83	1.0132E-08
CO-56	19.	1238.25	2.2331E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	51.	158.38	4.7821E-08
CO-57	41.	122.06	1.0908E-08
CO-58	9.	810.76	8.6935E-09
FE-59	10.	1099.22	2.1205E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	14.	1115.52	2.2175E-08
ZN-69M	0.	438.63	Half-Life too short
[illegible]75	40.	136.00	1.5079E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	25.	513.99	1.9175E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	25.	513.99	9.7406E-09
RB-86	6.	1076.63	1.4775E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	9.9260E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	3.	1204.90	2.4605E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
[illegible]92	0.	934.46	Half-Life too short
[illegible]93	0.	590.28	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
Y-93	0.	266.90	Half-Life too short
NB-94	22.	702.63	9.2599E-09
NB-95	22.	765.79	1.3608E-08
NB-95M	34.	235.69	5.3860E-07
ZR-95	7.	756.72	1.2826E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	12.	739.58	2.6504E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	15.	497.08	9.6073E-09
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.98	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	14.	621.84	7.2906E-08
CD-109	35.	88.03	3.6596E-07
AG-110M	19.	937.48	3.5357E-08
SN-113	20.	391.69	1.1268E-08
SN-117M	53.	158.56	2.1558E-08
SB-122	20.	563.93	5.4239E-07
SB-124	26.	602.71	1.0972E-08
SB-125	28.	427.89	2.7243E-08
TE-125M	31.	109.28	3.8129E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	18.	57.60	2.5306E-05
XE-127	36.	202.84	1.4222E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	17.	695.88	3.3511E-07
XE-129M	49.	196.56	5.6908E-07
I-130	0.	536.09	Half-Life too short
BA-131	27.	123.80	6.2025E-08
I-131	39.	364.48	3.9777E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	34.	163.93	8.6426E-07
I-132	0.	667.69	Half-Life too short
TE-132	43.	228.16	2.3129E-07
BA-133	26.	302.84	3.8306E-08
BA-133M	33.	276.09	2.6742E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	29.	81.00	3.0241E-07
XE-133M	23.	233.22	7.3006E-06
CS-134	25.	604.70	9.2202E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short
CS-136	20.	818.50	2.3293E-08

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]136	0.	1313.02	Half-Life too short
CS-137	11.	661.65	7.6067E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	30.	165.85	8.6772E-09
CS-139	0.	1283.23	Half-Life too short
BA-140	13.	537.32	5.6911E-08
LA-140	0.	1596.49	5.6659E-06
BA-141	0.	190.22	Half-Life too short
CE-141	44.	145.44	2.3332E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	41.	133.54	8.0240E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	30.	91.10	1.0748E-07
PM-148M	23.	550.27	1.1068E-08
EU-152	27.	344.27	2.7358E-08
EU-154	12.	1004.76	5.4146E-08
EU-156	16.	646.29	2.0938E-07
HF-181	25.	482.03	1.2486E-08
TA-182	7.	1221.42	3.4364E-08
[redacted]87	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	34.	279.19	1.2221E-08
BI-207	21.	569.67	8.2226E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	50.	240.98	4.0548E-06
RA-226	30.	186.21	2.2420E-07
AC-228	34.	338.32	7.0141E-08
TH-228	38.	84.37	1.2688E-06
PA-234	0.	131.20	Half-Life too short
TH-234	30.	63.29	1.6769E-06
U-235	47.	143.76	8.1291E-08
NP-239	33.	106.13	3.6367E-06
AM-241	32.	59.54	2.0020E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT. 55080204

Sample Location (Well Number): S Shallow

1. Representative sample collected. Date/Time 8/2/04 / 1115

Sample collected by: Jay Slabach / Jay Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cowland / Date: 8.18.04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YOKOM Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V Lipton / William V Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V Lipton 48651 / 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-5S080204	
2 . Date Sampled	08/02/2004	
3 . Time Sampled	11:15	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.9	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-5S080204

Sample Location (Well Number): 5Shallow

1. Representative sample collected. Date/Time 8/2/04 / 1115

Sample collected by: Joy Slabach / Joy Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 8.18.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-SS080204

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Upton / [signature] Date: 8/25/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks 544.28 keV peak unidentified. Low FW HM (0.70), hi % error (±57.1), does not match any peak from expected contamination. 1180.98 keV peak unidentified. Hi % error (55.8). Does not match any peak from expected contamination. Can ignore both unidentified peaks. No licensed radioactive material detected.
[signature] 48651 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 09:58:25.12

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-SS080204

Sample End Time: 2-AUG-2004 11:15:00.00

REMARKS 01-EN1515

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

mple ID : EFT-5S080204 Acquisition date : 19-AUG-2004 09:28:21

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-5S080204
Sample collection start date: 2-AUG-2004 11:15:00.00
Sample collection end date : 2-AUG-2004 11:15:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 19-AUG-2004 09:28:21.07
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.11 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 00:51:58.73

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Weight sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	65.56	63	47	1.17	131.21	126	32	3.53E-02	22.1	3.57E+00
2	1	66.87	37	42	1.10	133.64	126	32	2.04E-02	39.1	
3	1	75.06	32	23	1.20	150.22	126	32	1.76E-02	35.0	
4	0	511.10	129	72	2.26	1022.20	1014	17	7.14E-02	17.5	
5	0	544.28	13	14	0.72	1088.66	1085	8	7.47E-03	57.1	
6	0	609.32	32	36	1.75	1219.28	1214	11	1.78E-02	40.3	
7	0	911.02	24	10	1.53	1824.11	1817	13	1.35E-02	33.2	
8	0	1180.98	12	7	2.95	2362.88	2356	11	6.43E-03	55.8	
9	0	1460.93	66	16	2.77	2923.49	2916	16	3.65E-02	18.4	
10	0	1764.82	26	4	0.92	3532.18	3523	15	1.43E-02	25.7	

Unidentified

Decay Time = 16 22:13:21.87 Acquisition Time = 19-AUG-2004 09:20:21
7

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
1	65.56	63	47	1.17	131.21	126	32	22.1	2.57E+00	
1	66.87	37	42	1.10	133.84	126	32	39.1		
1	75.00	32	23	1.20	150.22	126	32	35.0		
0	511.10	129	72	2.26	1022.20	1014	17	17.5		
0	544.28	13	14	0.72	1088.66	1085	0	57.1		
0	609.57	32	36	1.75	1219.20	1214	11	40.3		
0	911.82	24	10	1.53	1824.11	1817	13	33.3		
0	1180.98	12	7	2.95	2362.00	2356	11	55.0		
0	1460.95	66	16	2.77	2923.49	2916	16	18.4		K-40
0	1764.82	26	4	0.92	3532.10	3523	15	25.7		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	66	10.67*	2.389E+00	3.073E-07	3.073E-07	10.30

Flag: "*" = Keyline

Summary of Nuclide Activity Page :
Sample ID : EFT-SS080204 Acquisition date : 19-AUG-2004 09:20:21

Total number of lines in spectrum 10
Number of unidentified lines 1
Number of lines tentatively identified by NID 9 90.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	3.073E-07	3.073E-07	0.712E-07	18.38	
	Total Activity :		3.073E-07	3.073E-07			
	Grand Total Activity :		3.073E-07	3.073E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	222.24	511.00*	193.46	1.000E+35	17.53	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.14	66.05	1.02	8.097E-06	22.14	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
TC-101	14.20M	1717.49	127.24	2.82	--- Not Found ---		Decay,Abun.
			184.11	1.62	--- Not Found ---		
			306.81*	88.00	--- Not Found ---		
			531.49	1.02	--- Not Found ---		
			545.14	6.00	1.000E+35	57.13	
			649.70	1.10	--- Not Found ---		
		% Abundances Found =		5.97			
RU-103	39.35D	0.43	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	2.636E-07	40.32	
		% Abundances Found =		5.92			
TE-133M	55.40M	440.22	168.87	11.50	--- Not Found ---		Decay,Abun.
			261.55	15.70	--- Not Found ---		
			334.14	5.40	--- Not Found ---		
			647.40	29.30	--- Not Found ---		
			863.91	19.50	--- Not Found ---		
			912.58*	87.00	1.000E+35	33.32	
			914.72	16.50	--- Not Found ---		
			978.19	9.50	--- Not Found ---		
		% Abundances Found =		44.75			
CS-136	13.16D	1.29	66.91	12.50	7.612E-07	39.13	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
TA-182	114.74D	0.15	67.75	42.30	1.021E-07	39.13	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		

Sample ID : EFT-55080204 Acquisition date : 19-AUG-2004 09:28:21

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
TA-182	114.74D	0.15	1230.97	11.50	--- Not Found ---		Abun.
	% Abundances		Found =	30.01			
PB-212	10.64H	38.19	74.81	10.70	6.181E+04	34.97	Decay,Abun.
			77.11	18.00	--- Not Found ---		
			87.30	8.00	--- Not Found ---		
			115.19	0.60	--- Not Found ---		
			238.63*	44.60	--- Not Found ---		
			300.09	3.41	--- Not Found ---		
	% Abundances		Found =	12.54	(Abn. Limit = 44.60%)		
BI-214	19.90M	1225.55	609.31*	46.30	1.000E+35	40.32	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	25.71	
	% Abundances		Found =	65.03	(Abn. Limit = 48.48%)		
AC-228	6.13Y	0.01	129.08	2.00	--- Not Found ---		Abun.
			209.28	4.40	--- Not Found ---		
			270.23	3.60	--- Not Found ---		
			327.64	3.20	--- Not Found ---		
			338.32*	11.40	--- Not Found ---		
			409.51	2.13	--- Not Found ---		
			463.00	4.40	--- Not Found ---		
			794.70	4.60	--- Not Found ---		
			911.07	27.70	4.340E-00	33.32	
			964.60	5.20	--- Not Found ---		
			969.11	16.60	--- Not Found ---		
			1588.00	3.50	--- Not Found ---		
	% Abundances		Found =	30.94			

Flag: "*" = Keyline

Sample ID : EFT-SS000204 Acquisition date : 19-AUG-2004 09:28:21

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	65.56	63	47	1.17	131.21	126	32	3.53E-02	22.1	1.27E+00	T
1	66.87	37	42	1.18	133.84	126	32	2.04E-02	39.1	1.41E+00	T
1	75.06	32	23	1.20	150.22	126	32	1.76E-02	35.0	2.25E+00	T
0	511.10	129	72	2.26	1022.20	1014	17	7.14E-02	17.5	4.74E+00	T
0	544.20	13	14	0.72	1088.66	1085	8	7.47E-03	57.1	4.60E+00	T
0	609.57	32	36	1.75	1219.28	1214	11	1.78E-02	40.3	4.38E+00	T
0	911.82	24	10	1.53	1824.11	1817	13	1.35E-02	33.3	3.05E+00	T
0	1100.90	12	7	2.95	2362.88	2356	11	6.43E-03	55.8	2.71E+00	
0	1764.82	26	4	0.92	3532.18	3523	15	1.43E-02	25.7	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 09:50:30.46

Sample ID : EFT-55080204

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	9.6233E-08
F-18	0.	511.00	Half-Life too short
NA-22	11.	1274.54	1.0527E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	12.	889.25	1.0295E-08
CR-51	36.	320.08	1.2543E-07
MN-54	10.	834.83	8.2528E-09
CO-56	9.	1238.25	1.6643E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	52.	158.38	5.9078E-08
CO-57	35.	122.06	1.0171E-08
CO-58	12.	810.76	9.6443E-09
FE-59	16.	1099.22	2.6609E-08
CO-60	12.	1332.49	1.1448E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	11.	1115.52	2.0274E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.4478E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	55.	513.99	2.7463E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	55.	513.99	1.4214E-08
RB-86	13.	1076.63	2.2074E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	9.5491E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	16.	1204.90	4.8584E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-SS080204 Acquisition date : 19-AUG-2004 09:28:21

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	17.	702.63	8.2435E-09
NB-95	14.	765.79	1.1763E-08
NB-95M	45.	235.69	6.6847E-07
ZR-95	19.	756.72	2.0262E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	13.	739.58	4.3064E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	17.	497.08	1.0242E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	19.	621.84	8.3997E-08
CD-109	41.	88.03	3.9151E-07
AG-110M	16.	937.48	3.2172E-08
SN-113	27.	391.69	1.2819E-08
[illegible]-117M	49.	158.56	2.2876E-08
[illegible]-122	23.	563.93	9.0926E-07
SB-124	28.	602.71	1.1557E-08
SB-125	27.	427.89	2.7196E-08
TE-125M	37.	109.28	4.2236E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	25.	57.60	2.9603E-05
XE-127	35.	202.84	1.4556E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	28.	695.88	4.4076E-07
XE-129M	51.	196.56	6.6956E-07
I-130	0.	536.09	Half-Life too short
BA-131	29.	123.80	7.1256E-08
I-131	30.	364.48	4.0891E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	46.	163.93	1.0987E-06
I-132	0.	667.69	Half-Life too short
TE-132	54.	228.16	3.7806E-07
BA-133	42.	302.84	4.7381E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	27.	81.00	3.6894E-07
XE-133M	39.	233.22	1.6140E-05
CS-134	26.	604.70	9.4291E-09
[illegible]-134	0.	884.09	Half-Life too short
[illegible]E-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-550800204 Acquisition date : 19-AUG-2004 09:28:21

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	10.	818.50	1.8464E-08
I-136	0.	1313.02	Half-Life too short
CS-137	0.	661.65	7.0427E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	50.	165.85	1.1284E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	20.	537.32	7.6489E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	36.	145.44	2.2849E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	44.	133.54	8.3311E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	38.	91.10	1.3362E-07
PM-148M	32.	550.27	1.3286E-08
EU-152	32.	344.27	2.9602E-08
EU-154	15.	1004.76	5.8784E-08
EU-156	14.	646.29	2.1646E-07
HF-181	21.	482.03	1.1772E-08
TA-182	16.	1221.42	4.9313E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	1.2736E-08
BI-207	21.	569.67	8.1782E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	44.	240.98	5.4073E-06
RA-226	51.	186.21	2.5525E-07
AC-228	33.	338.32	6.9094E-08
TH-228	33.	84.37	1.1929E-06
PA-234	0.	131.20	Half-Life too short
TH-234	31.	63.29	1.8032E-06
U-235	46.	143.76	8.1571E-08
NP-239	35.	106.13	6.3016E-06
AM-241	28.	59.54	1.8847E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - SD080204

Sample Location (Well Number): S Deep

1. Representative sample collected. Date/Time 8/2/04 / 1545

Sample collected by: Joy Sieback / Joy Marie Sieback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Willard / Jon Willard Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yokom / John M. Yokom Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected. William V. Lipton 48691 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-5D080204	
2 . Date Sampled	08/02/2004	
3 . Time Sampled	15:45	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	11:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-SD080204

Sample Location (Well Number): 5 Deep

1. Representative sample collected. Date/Time 8/2/04 / 1545

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / Jon Coulland Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McCoy Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-5D080204

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L.McCoy J.McS Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 8/25/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected
William V. Lipton 8/25/04

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 10:29:44.18

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-SD080204

Sample End Time: 2-AUG-2004 15:45:00.00

REMARKS 01-EN1516

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-5D080204 Acquisition date : 19-AUG-2004 09:59:39

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-5D080204
Sample collection start date: 2-AUG-2004 15:45:00.00
Sample collection end date : 2-AUG-2004 15:45:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : MELL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 19-AUG-2004 09:59:39.10
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.12 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00100E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 00:51:50.73

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	199.31	48	109	5.32	398.66	392	16	2.65E-02	50.9	
2	0	298.96	51	106	0.69	597.95	584	25	2.83E-02	56.6	
3	0	511.27	137	62	2.74	1022.62	1015	10	7.64E-02	16.0	
4	0	558.56	52	36	2.02	1117.23	1113	12	2.89E-02	26.9	
5	0	1460.69	98	0	2.53	2922.97	2913	19	5.44E-02	10.1	

Decay Time = 16 10:14:39.10 Acquisition Time = 19-AUG-2004 09:59:39.1
0

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	199.31	48	100	5.32	398.66	392	16	50.9		
0	298.96	51	106	8.68	597.95	584	25	56.2		
0	511.27	137	62	2.74	1022.62	1015	18	16.0		
0	556.56	52	36	2.02	1117.23	1113	12	26.9		
0	1460.69	98	0	2.53	2922.97	2913	19	10.1		K-40

Sample ID : EFT-SD080204 Acquisition date : 19-AUG-2004 09:59:39

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	98	10.67*	2.389E+00	5.772E-07	5.772E-07	10.10

Flag: "*" = Keyline

Sample ID : EFT-5D080204 Acquisition date : 19-AUG-2004 09:59:39

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.772E-07	5.772E-07	0.583E-07	10.10	
Total Activity :			5.772E-07	5.772E-07			
Grand Total Activity :			5.772E-07	5.772E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-SD060204 Acquisition date : 19-AUG-2004 09:59:39

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	220.06	511.00*	193.46	1.000E+35	15.98	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.14	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	8.561E-07	50.94	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
AS-76	26.32H	15.29	559.10*	44.70	1.542E-03	26.92	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
PB-212	10.64H	37.02	74.81	10.70	--- Not Found ---		Decay,Abun.
			77.11	10.00	--- Not Found ---		
			87.30	0.00	--- Not Found ---		
			115.19	0.60	--- Not Found ---		
			238.63*	44.60	--- Not Found ---		
			300.09	3.41	9.281E+04	56.23	
		% Abundances Found =		4.00	(Abn. Limit = 44.60%)		

Flag: "*" = Keyline

Sample ID : EFT-50080204 Acquisition date : 19-AUG-2004 09:59:39

It	Energy	ΔArea	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	199.31	48	109	5.32	398.66	392	16	2.65E-02	50.9	6.35E+00	T
0	298.96	51	106	8.68	597.95	584	25	2.83E-02	56.2	5.86E+00	T
0	511.27	137	62	2.74	1022.62	1015	10	7.64E-02	16.0	4.74E+00	T
0	558.56	52	36	2.02	1117.23	1113	12	2.89E-02	26.9	4.55E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 10:29:49.32 *
****
* Sample ID : EFT-5D080204 *
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Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	28.	477.59	9.9878E-08
F-18	0.	511.00	Half-Life too short
NA-22	11.	1274.54	1.0075E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	11.	889.25	1.0141E-08
CR-51	44.	320.08	1.3610E-07
MN-54	16.	834.83	1.0007E-08
CO-56	14.	1238.25	2.0079E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	44.	158.38	5.3989E-08
CO-57	50.	122.06	1.2021E-08
CO-58	10.	810.76	8.9451E-09
FE-59	16.	1099.22	2.6290E-08
CO-60	11.	1332.49	1.0748E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	1.8646E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	37.	136.00	1.4643E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	41.	513.99	2.4017E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	41.	513.99	1.2409E-08
RB-86	7.	1076.63	1.6911E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.1200E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	12.	1204.90	4.2934E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short

Sample ID : EFT-5D080204 Acquisition date : 19-AUG-2004 09:59:39

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	22.	702.63	9.1002E-05
NB-95	17.	765.79	1.2646E-08
NB-95M	47.	235.69	8.5880E-07
ZR-95	7.	756.72	1.2981E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	10.	739.58	4.7632E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	21.	497.08	1.1265E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	21.	621.84	8.7152E-08
CD-109	33.	88.03	3.5617E-07
AG-110M	14.	937.48	3.1079E-08
[illegible]-113	22.	391.69	1.1751E-08
[illegible]-117M	44.	158.56	2.1551E-08
SB-122	19.	563.93	8.0782E-07
SB-124	26.	602.71	1.1081E-08
SB-125	34.	427.89	3.0166E-08
TE-125M	33.	109.28	3.9635E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	21.	57.60	2.7414E-05
XE-127	50.	202.84	1.7077E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	26.	695.88	4.2155E-07
XE-129M	30.	196.56	5.7927E-07
I-130	0.	536.09	Half-Life too short
BA-131	40.	123.80	8.0967E-08
I-131	32.	364.48	4.1733E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	32.	163.93	9.1836E-07
I-132	0.	667.69	Half-Life too short
TE-132	42.	228.16	3.2292E-07
BA-133	36.	302.84	4.4315E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	25.	81.00	3.4906E-07
XE-133M	43.	233.22	1.6103E-05
[illegible]-134	22.	604.70	8.6793E-09
[illegible]-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-5D000204 Acquisition date : 19-AUG-2004 09:59:39

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	12.	818.50	2.0412E-08
I-136	0.	1313.02	Half-Life too short
CS-137	14.	661.65	8.4313E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	43.	165.85	1.0534E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	23.	537.32	7.9797E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	44.	145.44	2.4308E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	43.	133.54	8.2748E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	26.	91.10	1.1092E-07
PM-148M	20.	550.27	1.0678E-08
EU-152	32.	344.27	2.9770E-08
EU-154	4.	1004.76	3.3760E-08
EU-156	15.	646.29	2.1766E-07
HF-181	28.	482.03	1.3453E-08
TA-182	18.	1221.42	5.1073E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	40.	279.19	1.3375E-08
BI-207	25.	569.67	8.8529E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	30.	240.98	4.9009E-06
RA-226	50.	186.21	2.5337E-07
AC-228	34.	338.32	7.0319E-08
TH-228	20.	84.37	9.4545E-07
PA-234	0.	131.20	Half-Life too short
TH-234	30.	63.29	1.7533E-06
U-235	39.	143.76	7.4356E-08
NP-239	34.	106.13	5.8889E-06
AM-241	33.	59.54	2.0311E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-6S073004

Sample Location (Well Number): 6 Shallow

1. Representative sample collected. Date/Time 7-30-04 / 1420

Sample collected by: Joy Slaback / Joy Marie Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Couillard Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YOUNG / Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected. William V. Lipton 48657 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6S073004	
2 . Date Sampled	07/30/2004	
3 . Time Sampled	14:20	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.8	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.4	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}} \Big/ \text{Efficiency x 2.22E6 dpm/uCi x Sample Volume} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-1B073004

Sample Location (Well Number): 6 Shallow

1. Representative sample collected. Date/Time 7-30-04 / 1420

Sample collected by: Jay Slaback / Jay Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: J Gaillard / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-6S073004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 11:00:37.53

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-65073004

Sample End Time: 30-JUL-2004 14:20:00.00

REMARKS 01-ENi5i7

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-6S073004 Acquisition date : 19-AUG-2004 10:30:33

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************

Sample ID Number: EFT-6S073004
Sample collection start date: 30-JUL-2004 14:20:00.00
Sample collection end date : 30-JUL-2004 14:20:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

**************************** Acquisition Parameters ****************************

Detector number : DET 4 Acquire date : 19-AUG-2004 10:30:33.53
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.14 Percent dead time : 0.05 %

**************************** Calibration Parameters ****************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

**************************** Peak Search Parameters ****************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

************************ Nuclide Identification Parameters ************************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	352.73	23	49	1.03	705.50	700	8	1.27E-02	57.4	Pb 214
2	0	511.51	139	74	2.62	1023.10	1011	23	7.70E-02	18.3	Annihilation
3	0	559.15	42	38	1.41	1118.41	1113	11	2.35E-02	~~32.3~~	[illegible]
4	0	609.54	34	38	1.14	1219.21	1215	11	1.90E-02	38.1	Bi 214
5	0	1153.48	20	9	5.82	2307.83	2299	18	1.11E-02	41.8	Ac 228
6	0	1378.95	32	0	5.73	2759.28	2752	16	1.78E-02	17.7	Ac 228
7	0	1461.16	90	4	1.40	2923.92	2916	14	5.01E-02	11.4	K 40
8	0	1764.17	23	3	1.95	3530.87	3522	15	1.27E-02	27.6	Bi 214

Sample Title : EFT-6S073004 Page : 1
Decay Time = 19 20:10:33.53 Acquisition Time = 19-AUG-2004 10:30:33.5
3

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	352.73	23	49	1.03	705.50	700	8	57.4		
0	511.51	139	74	2.62	1023.10	1011	23	18.3		
0	559.15	42	38	1.41	1118.41	1113	11	32.3		
0	609.54	34	38	1.14	1219.21	1215	11	38.1		
0	1153.48	20	9	5.83	2307.83	2299	18	41.8		
0	1378.95	32	0	5.73	2759.28	2752	16	17.7		
0	1461.16	90	4	1.40	2923.92	2916	14	11.4		K-40
0	1764.17	23	3	1.95	3530.87	3522	15	27.6		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	90	10.67*	2.389E+00	5.310E-07	5.310E-07	11.44

Flag: "*" = Keyline

Sample ID : EFT-6S073004 Acquisition date : 19-AUG-2004 10:30:33

Total number of lines in spectrum	8	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	7	87.50%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.310E-07	5.310E-07	0.607E-07	11.44	
	Total Activity :		5.310E-07	5.310E-07			
	Grand Total Activity :		5.310E-07	5.310E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	260.40	511.00*	193.46	1.000E+35	18.29	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	18.10	559.10*	44.70	8.774E-03	32.30	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
RU-103	39.35D	0.50	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	2.970E-07	30.12	
	% Abundances Found =			5.92			
EU-156	15.19D	1.31	88.96	9.00	--- Not Found ---		Abun.
			646.29*	7.10	--- Not Found ---		
			723.47	6.00	--- Not Found ---		
			811.77	10.40	--- Not Found ---		
			1065.14	5.20	--- Not Found ---		
			1153.47	7.20	3.752E-07	41.83	
			1154.09	5.30	5.097E-07	41.83	
			1230.71	8.90	--- Not Found ---		
			1242.42	6.80	--- Not Found ---		
	% Abundances Found =			10.97			
BI-214	19.90M	1436.46	609.31*	46.30	1.000E+35	38.12	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	27.61	
	% Abundances Found =			65.03	(Abn. Limit = 48.48%)		
PB-214	26.80M	1066.63	87.30	4.67	--- Not Found ---		Decay
			241.90	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	57.39	
			785.91	1.10	--- Not Found ---		
	% Abundances Found =			53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Sample ID : EFT-6S073004 Acquisition date : 19-AUG-2004 10:30:33

Ib	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	352.73	23	49	1.03	705.50	700	8	1.27E-02	57.4	5.52E+00	T
0	511.51	139	74	2.62	1023.10	1011	23	7.70E-02	15.3	4.73E+00	T
0	559.15	42	38	1.41	1119.41	1113	11	2.35E-02	32.3	4.54E+00	T
0	609.54	34	38	1.14	1219.21	1215	11	1.90E-02	38.1	4.38E+00	T
0	1153.40	20	9	5.63	2307.63	2299	18	1.11E-02	41.8	2.74E+00	T
0	1370.95	32	0	5.73	2759.28	2752	16	1.78E-02	17.7	2.46E+00	
0	1764.17	23	3	1.95	3530.87	3522	15	1.27E-02	27.6	2.16E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 11:00:42.75 *
****
* Sample ID : EFT-6S073004 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	27.	477.59	1.0344E-07
F-18	0.	511.00	Half-Life too short
NA-22	15.	1274.54	1.2405E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.1109E-08
CR-51	37.	320.08	1.3538E-07
MN-54	13.	834.83	9.2704E-09
CO-56	15.	1238.25	2.1304E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	54.	158.38	8.4278E-08
CO-57	43.	122.06	1.1365E-08
CO-58	14.	810.76	1.0626E-08
FE-59	15.	1099.22	2.6781E-08
CO-60	18.	1332.49	1.3624E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.3216E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.4715E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	54.	513.99	2.7283E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	54.	513.99	1.4561E-08
RB-86	14.	1076.63	2.5395E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	9.7318E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
[illegible]90	0.	1118.69	Half-Life too short
[illegible]90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	8.	1204.90	3.7337E-06
Y-91M	0.	555.60	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	22.	702.63	9.3364E-09
NB-95	15.	765.79	1.2620E-08
NB-95M	29.	235.69	1.2338E-06
ZR-95	15.	756.72	1.6769E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	14.	739.50	9.3130E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	19.	497.08	1.1376E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	22.	621.84	8.9731E-08
CD-109	39.	88.03	3.8730E-07
AG-110M	15.	937.48	3.1835E-08
SN-113	32.	391.69	1.4165E-08
SN-117M	53.	158.56	2.7477E-08
SB-122	12.	563.93	1.4353E-06
SB-124	27.	602.71	1.1812E-08
SB-125	32.	427.89	2.9430E-08
TE-125M	44.	109.28	4.7138E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	22.	57.60	2.8756E-05
XE-127	52.	202.84	1.8512E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	3.9994E-07
XE-129M	50.	196.56	8.3001E-07
I-130	0.	536.09	Half-Life too short
BA-131	45.	123.80	1.0327E-07
I-131	35.	364.48	5.6247E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	34.	163.93	1.1383E-06
I-132	0.	667.69	Half-Life too short
TE-132	40.	228.16	6.1201E-07
BA-133	37.	302.84	4.4910E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	26.	81.00	5.3168E-07
XE-133M	49.	233.22	4.4963E-05
CS-134	25.	604.70	9.3231E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short

Sample ID : EFT-6S073004 Acquisition date : 19-AUG-2004 10:30:33

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	2.4189E-08
I-136	0.	1313.02	Half-Life too short
CS-137	19.	661.65	9.5382E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	50.	165.85	1.2223E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	17.	537.32	8.3163E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	50.	145.44	2.7430E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	40.	133.54	8.0730E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	30.	91.10	1.4386E-07
PM-148M	24.	550.27	1.2180E-08
EU-152	30.	344.27	2.8936E-08
EU-154	13.	1004.76	5.5686E-08
EU-156	22.	646.29	2.9797E-07
HF-181	26.	482.03	1.3747E-08
TA-182	11.	1221.42	4.2703E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	49.	279.19	1.5417E-08
BI-207	28.	569.67	9.3073E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	51.	240.98	1.0051E-05
RA-226	55.	186.21	2.6532E-07
AC-228	41.	338.32	7.7239E-08
TH-228	29.	84.37	1.1207E-06
PA-234	0.	131.20	Half-Life too short
TH-234	36.	63.29	2.0753E-06
U-235	42.	143.76	7.7338E-08
NP-239	42.	106.13	1.6178E-05
AM-241	35.	59.54	2.0779E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-6D073004

Sample Location (Well Number): 6 Deep

1. Representative sample collected. Date/Time 7-30-04 / 1042

Sample collected by: Jay Slabach / Jay Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yocom / John M. Yocom Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/26/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected above MDA (800) 8/26/04

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6D073004	
2 . Date Sampled	07/30/2004	
3 . Time Sampled	10:42	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	11:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.7	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-04

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-6D073004

Sample Location (Well Number): 6 Deep

1. Representative sample collected. Date/Time 7-30-04 / 1042

Sample collected by: Joy Slabaugh / Joy Marie Slabaugh Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caillard / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-6D073004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William N Lipton [signature] Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William N Lipton 48651 / 8/24/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 11:34:02.52

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6D073004

Sample End Time: 30-JUL-2004 10:42:00.00

REMARKS 01-EN1518

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-6D073004 Acquisition date : 19-AUG-2004 11:03:56

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-6D073004
Sample collection start date: 30-JUL-2004 10:42:00.00
Sample collection end date : 30-JUL-2004 10:42:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 19-AUG-2004 11:03:56.24
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.15 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.001006E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 00:51:58.73

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	65.45	33	39	1.07	131.00	126	12	1.81E-02	36.2	1.[illegible]+00
2	3	66.89	40	50	1.43	133.66	128	12	2.20E-02	35.4	
3	0	352.39	49	55	0.75	704.81	698	13	2.72E-02	34.4	
4	0	510.95	146	23	1.85	1021.98	1016	13	8.11E-02	10.7	
5	0	558.80	63	40	1.56	1117.70	1112	15	3.51E-02	24.7	
6	0	1461.02	87	7	3.23	2923.63	2917	14	4.83E-02	12.5	

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
3	65.45	33	39	1.07	131.00	126	12	36.2	1.70E+00	
3	66.89	40	50	1.43	133.88	126	12	35.4		
0	352.39	49	55	0.75	704.81	698	13	34.4		
0	510.95	146	23	1.85	1021.98	1016	13	10.7		
0	558.80	63	40	1.56	1117.70	1112	15	24.7		
0	1461.02	87	7	3.23	2923.63	2917	14	12.5		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	87	10.67*	2.389E+00	5.125E-07	5.125E-07	12.51

Flag: "*" = Keyline

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	6	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.125E-07	5.125E-07	0.641E-07	12.51	
	Total Activity :		5.125E-07	5.125E-07			
	Grand Total Activity :		5.125E-07	5.125E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]	109.74M	262.78	511.00*	193.46	1.000E+35	10.67	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.17	66.05	1.02	4.268E-06	36.19	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
AS-76	26.32H	18.26	559.10*	44.70	1.466E-02	24.70	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
CS-136	13.16D	1.52	66.91	12.50	9.651E-07	35.41	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
TA-182	114.74D	0.17	67.75	42.30	1.121E-07	35.41	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			
PB-214	26.80M	1076.01	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
PB-214	26.80M	1076.01	295.21	19.20	--- Not Found ---		Decay
			351.92*	37.20	1.000E+35	34.36	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit =	37.20%)	

Flag: "*" = Keyline

Sample ID : EFT-6D073004 Acquisition date : 19-AUG-2004 11:03:56

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
	65.45	33	39	1.07	131.00	126	12	1.01E-02	36.2	1.26E+00	T
	66.09	40	50	1.43	133.68	126	12	2.20E-02	35.4	1.42E+00	T
0	352.39	49	55	0.75	704.81	698	13	2.72E-02	34.4	5.52E+00	T
0	510.95	146	23	1.85	1021.98	1016	13	8.11E-02	10.7	4.74E+00	T
0	558.80	63	40	1.56	1117.70	1112	15	3.51E-02	24.7	4.55E+00	T

Flags: "T" = Tentatively associated

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* Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 11:34:07.55 *
****
* Sample ID : EFT-6D073004 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	23.	477.59	9.6371E-08
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0323E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	23.	889.25	1.4332E-08
CR-51	37.	320.08	1.3702E-07
MN-54	14.	834.83	9.5225E-09
CO-56	14.	1238.25	2.0240E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	49.	158.38	8.1926E-08
CO-57	41.	122.06	1.1123E-08
CO-58	18.	810.76	1.1957E-08
FE-59	15.	1099.22	2.6529E-08
CO-60	22.	1332.49	1.4667E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	20.	1115.52	2.6361E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	46.	136.00	1.6455E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	33.	513.99	2.1765E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	33.	513.99	1.1637E-08
RB-86	13.	1076.63	2.4762E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	2.	1836.01	7.5318E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	13.	1204.90	4.5779E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-6D073004 Acquisition date : 19-AUG-2004 11:03:56

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	19.	702.63	8.6888E-09
NB-95	16.	765.79	1.3133E-08
NB-95M	51.	235.69	1.6613E-06
ZR-95	14.	756.72	1.8572E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	16.	739.58	1.0328E-05
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	24.	497.08	1.2743E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	316.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	21.	621.84	8.8002E-08
CD-109	26.	88.03	3.2090E-07
AG-110M	10.	937.48	2.6355E-08
SN-113	28.	391.69	1.3277E-08
SN-117M	48.	158.56	2.6596E-08
SB-122	24.	563.93	2.0466E-06
SB-124	35.	602.71	1.3314E-08
SB-125	32.	427.89	2.9410E-08
TE-125M	37.	109.28	4.3942E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	21.	57.60	2.7724E-05
XE-127	44.	202.84	1.7060E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	18.	695.88	3.7920E-07
XE-129M	45.	196.56	8.0540E-07
I-130	0.	536.09	Half-Life too short
BA-131	47.	123.80	1.0623E-07
I-131	36.	364.48	5.8542E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	47.	163.93	1.3295E-06
I-132	0.	667.69	Half-Life too short
TE-132	38.	228.16	6.2035E-07
BA-133	34.	302.84	4.3317E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	38.	81.00	6.4328E-07
XE-133M	37.	233.22	4.2124E-05
CS-134	35.	604.70	1.0758E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	15.	818.50	2.6730E-08
I-136	0.	1313.02	Half-Life too short
CS-137	11.	661.65	7.7276E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.85	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	41.	165.85	1.0443E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	18.	537.32	0.5471E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	45.	145.44	2.6217E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	59.	133.54	9.6100E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	34.	91.10	1.5397E-07
PM-148M	14.	550.27	9.7660E-09
EU-152	29.	344.27	2.8379E-08
EU-154	9.	1004.76	4.7426E-08
EU-156	25.	646.29	3.2047E-07
HF-181	30.	482.03	1.4542E-08
TA-182	11.	1221.42	4.2459E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	50.	279.19	1.5577E-08
BI-207	21.	569.67	8.1681E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	39.	240.98	9.2104E-06
RA-226	60.	186.21	2.7435E-07
AC-228	39.	338.32	7.4790E-08
TH-228	43.	84.37	1.3453E-06
PA-234	0.	131.20	Half-Life too short
TH-234	27.	63.29	1.8383E-06
U-235	42.	143.76	7.6858E-08
NP-239	31.	106.13	1.4761E-05
AM-241	19.	59.54	1.5997E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-6D073004D

Sample Location (Well Number): 6 Deep (Duplicate)

1. Representative sample collected. Date/Time 7.30.04 / 1059

Sample collected by: Jay Slabach / Jay Mark Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cavilland / Cavilland Date: 8.18.04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YOKOM / Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/31/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6D073004D	
2 . Date Sampled	07/30/2004	
3 . Time Sampled	10:59	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	11:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.2	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.8	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-6D073004D

Sample Location (Well Number): 6 Deep (Duplicate)

1. Representative sample collected. Date/Time 7-30-04 / 1059

Sample collected by: Joy Slabach / Joy Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 6-19-04
Fermi 2 RP Printed Name Signature

Sample number: EF1-6D0730040

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCay [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William Upston / William Upston Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks 67.91 keV peak sample location 01-EN1577 ~~unidentified~~ TKD 8/24/04 potentially Ta-182, but ruled out since: (1) short T½ (114 days), expected 1121.42 keV peak not present. 66.02 keV peak from sample location 01-EN1579 also unidentified and potentially Ta-182 - ruled out for same reasons - no licensed radioactive material detected.

William Upston 48451
8/24/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 14:43:11.83

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6D073004D

Sample End Time: 30-JUL-2004 10:59:00.00

REMARKS 01-EN1521

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE 48651 / 8/24/2004

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 14:13:07

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-6D073004D
Sample collection start date: 30-JUL-2004 10:59:00.00
Sample collection end date : 30-JUL-2004 10:59:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 19-AUG-2004 14:13:07.76
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.15 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 00:51:58.73

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m2ll Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	67.91	73	124	3.94	135.92	129	15	4.05E-02	35.3	Th230 ~~Th234~~
2	0	511.44	135	60	2.49	1022.96	1014	18	7.51E-02	16.6	annihilation
3	0	558.97	42	53	0.96	1118.05	1111	14	2.34E-02	39.6	Bi-214
4	0	608.92	56	24	1.45	1217.97	1211	12	3.10E-02	22.1	Bi214
5	0	1461.18	82	0	2.67	2923.96	2916	13	4.58E-02	12.0	K40

Sample Title : EFT-60073004D
Decay Time = 20 03:14:07.76

Acquisition Time = 19-AUG-2004 14:13:07.7
6

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	67.91	73	124	3.94	135.92	129	15	35.3		
0	511.44	135	60	2.49	1022.96	1014	10	16.6		
0	558.97	42	53	0.96	1118.03	1111	14	39.6		
0	608.92	56	24	1.45	1217.97	1211	12	22.1		
0	1461.10	82	6	2.67	2923.96	2916	13	12.8		K-40

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 14:13:

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	82	10.67*	2.389E+00	4.058E-07	4.858E-07	12.79

Flag: "*" = Keyline

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 14:13:07

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.058E-07	4.058E-07	0.621E-07	12.70	
	Total Activity :		4.058E-07	4.058E-07			
	Grand Total Activity :		4.058E-07	4.058E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	264.34	511.00*	193.46	1.000E+35	16.65	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	18.37	559.10*	44.70	1.055E-02	39.60	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
XE-135	9.11H	53.07	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	6.254E+09	22.10	
	% Abundances Found =			3.11			
CS-136	13.16D	1.53	66.91	12.50	1.660E-06	35.20	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
	% Abundances Found =			4.10			
TA-182	114.74D	0.10	67.75	42.30	1.917E-07	35.20	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
	% Abundances Found =			38.01			
BI-214	19.90M	1457.75	609.31*	46.30	1.000E+35	22.10	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.30	--- Not Found ---		
	% Abundances Found =			48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	67.91	73	124	3.94	135.92	129	15	4.05E-02	35.3	1.52E+00	T
0	511.44	135	68	2.49	1022.96	1014	10	7.51E-02	16.6	4.73E+00	T
0	558.97	42	53	0.96	1118.05	1111	14	2.34E-02	39.6	4.55E+00	T
0	608.92	56	24	1.45	1217.97	1211	12	3.10E-02	22.1	4.39E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 14:43:17.13

Sample ID : EFT-6D073004D

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.59	1.0700E-07
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	8.3389E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	16.	889.25	1.2045E-08
CR-51	33.	320.08	1.3044E-07
MN-54	17.	834.83	1.0405E-08
CO-56	19.	1238.25	2.3452E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	57.	158.38	8.9174E-08
CO-57	41.	122.06	1.1121E-08
CO-58	16.	810.76	1.1311E-08
FE-59	12.	1099.22	2.4078E-08
CO-60	19.	1332.49	1.3759E-08
[redacted]54	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	14.	1115.52	2.2611E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	42.	136.00	1.5846E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	63.	513.99	2.9389E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	63.	513.99	1.5733E-08
RB-86	7.	1076.63	1.9153E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	9.	1836.01	1.3302E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
[redacted]91	0.	1024.30	Half-Life too short
[redacted]1	11.	1204.90	4.2532E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 14:13:0

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	22.	702.63	9.3310E-09
NB-95	18.	765.79	1.3741E-08
NB-95M	50.	235.69	1.6861E-06
ZR-95	13.	756.72	1.8017E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	17.	739.58	1.1060E-05
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	25.	497.08	1.2960E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	26.	621.84	9.6430E-08
CD-109	30.	88.03	3.4529E-07
AG-110M	18.	937.48	3.4798E-08
SN-113	27.	391.69	1.3033E-08
SN-117M	58.	158.56	2.9050E-08
SB-122	26.	563.93	2.1813E-06
SB-124	26.	602.71	1.1553E-08
SB-125	26.	427.89	2.6510E-08
TE-125M	34.	109.28	4.2115E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	24.	57.60	2.9454E-05
XE-127	42.	202.84	1.6805E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	4.0701E-07
XE-129M	51.	196.56	8.5886E-07
I-130	0.	536.09	Half-Life too short
BA-131	36.	123.80	9.4367E-08
I-131	27.	364.48	5.1754E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	46.	163.93	1.3547E-06
I-132	0.	667.69	Half-Life too short
TE-132	42.	228.16	6.6435E-07
BA-133	30.	302.84	4.1000E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	28.	81.00	5.7282E-07
XE-133M	45.	233.22	4.7635E-05
CS-134	31.	604.70	1.0154E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 14:13:07

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	16.	818.50	2.7547E-08
I-136	0.	1313.02	Half-Life too short
CS-137	18.	661.65	9.3965E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	31.	165.85	9.1655E-09
CS-139	0.	1283.23	Half-Life too short
BA-140	16.	537.32	8.3318E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	35.	145.44	2.3323E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	52.	133.54	9.0499E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	32.	91.10	1.5229E-07
PM-148M	13.	550.27	9.5763E-09
EU-152	27.	344.27	2.7341E-08
EU-154	15.	1004.76	5.9651E-08
EU-156	12.	646.29	2.3047E-07
HF-181	27.	482.03	1.4028E-08
TA-182	8.	1221.42	3.8258E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	36.	279.19	1.3419E-08
BI-207	22.	569.67	8.3230E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	45.	240.98	1.0096E-05
RA-226	48.	186.21	2.4745E-07
AC-228	39.	338.32	7.5077E-08
TH-228	33.	84.37	1.2046E-06
PA-234	0.	131.20	Half-Life too short
TH-234	39.	63.29	2.1926E-06
U-235	45.	143.76	7.9664E-08
NP-239	41.	106.13	1.7452E-05
AM-241	30.	59.54	1.9530E-07

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 12:04:55.09

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6D073004D

Sample End Time: 30-JUL-2004 10:59:00.00

REMARKS 01-EN1519 ~~KR-85/SR-85~~ 4/8/04

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

PAGE ____ of ____

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 11:34:50

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-6D073004D
Sample collection start date: 30-JUL-2004 10:59:00.00
Sample collection end date : 30-JUL-2004 10:59:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 19-AUG-2004 11:34:50.02
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.15 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit	
1	0	66.02	42	103	1.91	132.13	127	10	2.34E-02	47.6		unidentified Th-234?
2	0	140.07	39	81	1.47	280.20	275	10	2.15E-02	46.6		Th-234?
3	2	510.33	67	23	2.13	1020.74	1014	16	4.83E-02	18.0	1.17E+00	annihilation
4	2	511.96	31	18	1.76	1024.00	1014	16	1.70E-02	47.2		
5	2	512.76	32	14	1.43	1025.60	1014	16	1.76E-02	39.6		
6	0	609.81	44	27	1.87	1219.76	1214	10	2.47E-02	26.6		Bi-214
7	0	1119.74	25	7	1.13	2240.29	2233	13	1.36E-02	29.5		Bi-214
8	0	1460.96	95	0	2.16	2923.53	2915	10	5.28E-02	10.3		K-40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	66.02	42	103	1.91	132.13	127.	10	47.6		
0	140.07	39	81	1.47	280.20	275	10	46.6		
2	510.33	87	23	2.13	1020.74	1014	16	18.0	1.17E+00	
2	511.96	31	18	1.76	1024.00	1014	16	47.2		
2	512.76	32	14	1.43	1025.60	1014	16	39.6		SR-85 KR-85
0	609.01	44	27	1.67	1219.76	1214	10	26.6		
0	1119.74	25	7	1.13	2240.29	2233	13	29.5		
0	1460.96	95	0	2.16	2923.53	2915	18	10.3		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	95	10.67*	2.389E+00	5.596E-07	5.596E-07	10.26

Nuclide Type: fission gas

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
KR-85	513.99	32	0.43*	4.729E+00	2.337E-06	2.345E-06	39.64

Nuclide Type: activation

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
SR-85	513.99	32	99.27*	4.729E+00	1.012E-08	1.254E-08	39.64

Flag: "*" = Keyline

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 11:34:50

Total number of lines in spectrum 8
Number of unidentified lines 1
Number of lines tentatively identified by NID 7 87.50%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	5.596E-07	5.596E-07	0.574E-07	10.26	
	Total Activity :		5.596E-07	5.596E-07			

Nuclide Type : fission gas

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
KR-85	10.72Y	1.00	2.337E-06	2.345E-06	0.930E-06	39.64	
	Total Activity :		2.337E-06	2.345E-06			

Nuclide Type : activation

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
SR-85	64.84D	1.24	1.012E-08	1.254E-08	0.497E-08	39.64	
	Total Activity :		1.012E-08	1.254E-08			

Grand Total Activity : 2.907E-06 2.917E-06

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]10	109.74M	262.90	511.00*	193.46	1.000E+35	17.97	Decay
	% Abundances Found =			100.00			
SC-46	83.83D	0.24	142.53	62.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	1.563E-08	29.47	
	% Abundances Found =			38.07			
SE-75	119.78D	0.17	66.05	1.02	5.266E-06	47.56	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			196.60	1.45	--- Not Found ---		
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
	% Abundances Found =			0.57			
KR-90	32.32S	53559.73	121.82	32.00	--- Not Found ---		Decay,Abun.
			539.49	29.00	--- Not Found ---		
			1118.69*	37.00	1.000E+35	29.47	
	% Abundances Found =			37.76			
MO-99	66.02H	7.28	140.51	3.60	3.966E-05	46.64	Abun.
			181.06	6.20	--- Not Found ---		
			366.43	1.37	--- Not Found ---		
			739.50*	12.80	--- Not Found ---		
			778.00	4.50	--- Not Found ---		
	% Abundances Found =			13.25			
TC-99M	6.02H	79.87	140.50*	89.07	1.204E+16	46.64	Decay
	% Abundances Found =			100.00			
RU-103	39.35D	0.51	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	3.866E-07	26.62	
	% Abundances Found =			5.92			
CS-136	13.16D	1.52	66.91	12.50	1.099E-06	47.56	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.69	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
	% Abundances Found =			4.10			
[redacted]214	19.90M	1449.79	609.31*	46.30	1.000E+35	26.62	Decay
			768.36	5.04	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
BI-214	19.90M	1449.79	934.06	3.21	--- Not Found ---		Decay
			1120.29	15.10	1.000E+35	29.47	
			1230.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		64.29	(Abn. Limit = 40.40%)		

Flag: "*" = Keyline

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 11:34:50

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	66.02	42	103	1.91	132.13	127	10	2.34E-02	47.6	1.32E+00	T
0	140.07	39	81	1.47	280.20	275	10	2.15E-02	46.6	6.01E+00	T
2	510.33	87	23	2.13	1020.74	1014	16	4.83E-02	18.0	4.74E+00	T
2	511.96	31	10	1.76	1024.00	1014	16	1.70E-02	47.2	4.73E+00	
0	609.81	44	27	1.07	1219.76	1214	10	2.47E-02	26.6	4.38E+00	T
0	1119.74	25	7	1.13	2240.29	2233	13	1.36E-02	29.5	2.73E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 12:05:00.29 *
****
* Sample ID : EFT-6D073004D
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	27.	477.59	1.0310E-07
F-18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0509E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	10.	889.25	1.0104E-08
CR-51	32.	320.08	1.2741E-07
MN-54	17.	834.83	1.0243E-08
CO-56	27.	1238.25	2.7229E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	52.	158.38	8.4105E-08
CO-57	33.	122.06	1.0069E-08
CO-58	15.	810.76	1.1225E-08
FE-59	10.	1099.22	2.2587E-08
CO-60	14.	1332.49	1.2200E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	17.	1115.52	2.4615E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	43.	136.00	1.5996E-08
AS-76	0.	559.10	Half-Life too short
SR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85M	0.	151.18	Half-Life too short
RB-86	8.	1076.63	2.0102E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	8.	1836.01	1.2702E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	14.	1204.90	4.7809E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
NB-94	14.	702.63	7.4805E-09
NB-95	14.	765.79	1.2232E-08
NB-95M	46.	235.69	1.5887E-06
ZR-95	23.	756.72	2.3145E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	21.	739.58	1.1598E-05
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	29.	497.08	1.3995E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	316.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	25.	621.84	9.5603E-08
CD-109	31.	88.03	3.4872E-07
AG-110M	10.	937.48	3.4641E-08
SN-113	22.	391.69	1.2065E-08
SN-117M	49.	158.56	2.6043E-08
SB-122	10.	563.93	1.7990E-06
SB-124	21.	602.71	1.0432E-08
SB-125	36.	427.89	3.1030E-08
TE-125M	41.	109.28	4.6106E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	31.	57.60	3.3081E-05
XE-127	39.	202.84	1.6158E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	15.	695.88	3.5550E-07
XE-129M	48.	196.56	8.3029E-07
I-130	0.	536.09	Half-Life too short
BA-131	36.	123.80	9.4104E-08
I-131	31.	364.48	5.4523E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	36.	163.93	1.1811E-06
I-132	0.	667.69	Half-Life too short
TE-132	46.	228.16	6.7907E-07
BA-133	36.	302.84	4.4547E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	25.	81.00	5.3344E-07
XE-133M	26.	233.22	3.6739E-05
CS-134	27.	604.70	9.6230E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short
CS-136	20.	818.50	2.9998E-08
I-136	0.	1313.02	Half-Life too short

Sample ID : EFT-6D073004D Acquisition date : 19-AUG-2004 11:34:50

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-137	24.	661.65	1.0604E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	53.	165.85	1.1004E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	19.	537.32	8.7562E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	46.	145.44	2.6556E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	42.	133.54	8.2358E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	29.	91.10	1.4364E-07
PM-148M	22.	550.27	1.1961E-08
EU-152	36.	344.27	3.1275E-08
EU-154	15.	1004.76	5.9261E-08
EU-156	23.	646.29	3.0619E-07
HF-181	23.	482.03	1.2901E-08
TA-182	7.	1221.42	3.6188E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	47.	279.19	1.5178E-08
BI-207	28.	569.67	9.3642E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	57.	240.98	1.0990E-05
RA-226	60.	186.21	2.7597E-07
AC-228	43.	338.32	7.8275E-08
TH-228	32.	84.37	1.1851E-06
PA-234	0.	131.20	Half-Life too short
TH-234	31.	63.29	1.9519E-06
U-235	42.	143.76	7.6811E-08
NP-239	37.	106.13	1.6125E-05
AM-241	36.	59.54	2.1198E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 7S080504

Sample Location (Well Number): T Shallow

1. Representative sample collected. Date/Time 8-5-04 / 1055

Sample collected by: Joy Slabach / Joy Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Gaillard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yoxon / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/31/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-7S080504	
2 . Date Sampled	08/05/2004	
3 . Time Sampled	10:55	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	11:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.7	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-7S080504

Sample Location (Well Number): 7 Shallow

1. Representative sample collected. Date/Time 8.5.04 / 10:55

Sample collected by: Jay Slaback / Jay Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caillard / [signature] Date: 8.18.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / D. McG Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-7S080504

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected.
William V Lipton 4810 / 8/24/04

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 14:10:57.78

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-7S060504

Sample End Time: 5-AUG-2004 10:55:00.00

REMARKS vm 8/16/04 ~~EFT~~ 01-EN1520

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-7S080504 Acquisition date : 19-AUG-2004 13:40:52

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-7S080504
Sample collection start date: 5-AUG-2004 10:55:00.00
Sample collection end date : 5-AUG-2004 10:55:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 19-AUG-2004 13:40:52.37
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.15 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00100E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	65.23	22	64	1.29	130.55	127	16	1.20E-02	72.1	2.53E+00
2	4	66.86	54	51	1.11	133.82	127	16	2.90E-02	27.1	
3	0	511.11	140	51	2.13	1022.30	1014	17	7.78E-02	14.4	
4	0	558.70	69	21	1.62	1117.51	1111	16	4.91E-02	15.6	
5	0	609.49	54	23	1.45	1219.11	1212	15	2.97E-02	23.7	
6	0	1460.77	70	0	1.61	2923.13	2914	16	3.89E-02	12.0	

Sample Title : EFT-7S000504 Page : 1
Decay Time = 14 02:45:52.37 Acquisition Time = 19-AUG-2004 13:40:52.37

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
4	65.23	82	64	1.29	130.55	127	16	72.1	2.53E+00	
4	66.86	54	51	1.11	133.82	127	16	27.1		
0	511.11	140	51	2.13	1022.30	1014	17	14.4		
0	558.70	88	21	1.62	1117.51	1111	16	15.6		
0	609.49	54	23	1.45	1219.11	1212	15	23.7		
0	1460.77	70	0	1.61	2923.13	2914	16	12.0		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	70	10.67*	2.389E+00	4.123E-07	4.123E-07	11.95

Flag: "*" = Keyline

Sample ID : EFT-75080504 Acquisition date : 19-AUG-2004 13:40:52

Total number of lines in spectrum 6
Number of unidentified lines 1
Number of lines tentatively identified by NID 5 83.33%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.123E-07	4.123E-07	0.493E-07	11.95	
	Total Activity :		4.123E-07	4.123E-07			
	Grand Total Activity :		4.123E-07	4.123E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT-7S080504 Acquisition date : 19-AUG-2004 13:40:52

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	185.36	511.00*	193.46	1.000E+35	14.42	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.12	66.05	1.02	6.074E-06	27.10	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
AS-76	26.32H	12.88	559.10*	44.70	4.924E-04	15.56	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.36	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	4.195E-07	23.67	
		% Abundances Found =		5.92			
CS-136	13.16D	1.07	66.91	12.50	9.611E-07	27.10	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
TA-182	114.74D	0.12	67.75	42.30	1.470E-07	27.10	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			

Nuclide	Half-Life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
BI-214	19.90M	1022.15	609.31*	46.30	1.000E+35	23.67	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		46.45	(Abn. Limit = 40.45%)		

Flag: "*" = Keyline

Sample ID : EFT-7S000504 Acquisition date : 19-AUG-2004 13:40:52

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flag
4	65.23	22	64	1.29	130.55	127	16	1.20E-02	72.1	1.24E+00	
4	66.86	54	51	1.11	133.82	127	16	2.98E-02	27.1	1.41E+00	T
0	511.11	140	51	2.13	1022.30	1014	17	7.78E-02	14.4	4.74E+00	T
0	558.70	80	21	1.62	1117.51	1111	16	4.91E-02	15.6	4.55E+00	T
0	609.49	54	23	1.45	1219.11	1212	15	2.97E-02	23.7	4.39E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 14:11:03.12

Sample ID : EFT-7S080504

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.59	9.8513E-08
F-18	0.	511.00	Half-Life too short
NA-22	3.	1274.54	6.3803E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	16.	889.25	1.1566E-08
CR-51	31.	320.08	1.0918E-07
MN-54	14.	834.83	9.4085E-09
CO-56	19.	1238.25	2.2412E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	36.	158.38	3.6639E-08
CO-57	42.	122.06	1.1021E-08
CO-58	12.	810.76	9.5790E-09
FE-59	10.	1099.22	2.0445E-08
CO-60	14.	1332.49	1.2139E-08
CU-64	0.	1345.90	Half-Life too short
[redacted]65	0.	1481.84	Half-Life too short
ZN-65	19.	1115.52	2.5474E-08
ZN-69M	0.	438.62	Half-Life too short
SE-75	49.	136.00	1.6405E-08
AS-76	0.	559.10	Half-Life too short
BR-82	17.	776.49	8.5005E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	43.	513.99	2.4597E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	43.	513.99	1.2360E-08
RB-86	9.	1076.63	1.7023E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	8.5529E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
[redacted]91	10.	1204.90	3.8718E-06
[redacted]91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	16.	702.63	8.1491E-09
NB-95	14.	765.79	1.1150E-08
NB-95M	47.	235.69	5.1487E-07
ZR-95	19.	756.72	1.9592E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	24.	739.58	2.7899E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	31.	497.08	1.2992E-08
TC-104	0.	357.99	Half-Life too short
RH-105	31.	318.90	3.0126E-05
RU-105	0.	724.50	Half-Life too short
RU-106	13.	621.84	7.0586E-08
CD-109	37.	88.03	3.7331E-07
AG-110M	16.	937.48	3.2366E-08
SN-113	30.	391.69	1.3258E-08
SN-117M	35.	158.56	1.6958E-08
SB-122	20.	563.93	4.1559E-07
SB-124	26.	602.71	1.0752E-08
SB-125	25.	427.89	2.5935E-08
TE-125M	33.	109.28	3.8781E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	27.	57.60	2.9910E-05
XE-127	55.	202.84	1.6971E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	14.	695.88	3.0869E-07
XE-129M	50.	196.56	5.3235E-07
I-130	0.	536.09	Half-Life too short
BA-131	33.	123.80	6.3319E-08
I-131	37.	364.48	3.5369E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	44.	163.93	9.1632E-07
I-132	0.	667.69	Half-Life too short
TE-132	41.	228.16	1.0321E-07
BA-133	39.	302.84	4.5824E-08
BA-133M	47.	276.09	2.0373E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	30.	81.00	2.6451E-07
XE-133M	36.	233.22	6.3887E-06
CS-134	20.	604.70	8.3570E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-7S000504 Acquisition date : 19-AUG-2004 13:40:52

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	1.8365E-08
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.8698E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1429.50	Half-Life too short
CE-139	56.	165.85	1.1674E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	28.	537.32	6.4936E-08
LA-140	6.	1596.49	3.8211E-06
BA-141	0.	190.22	Half-Life too short
CE-141	43.	145.44	2.2701E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	45.	133.54	8.3521E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	21.	91.10	8.5582E-08
PM-148M	22.	550.27	1.0752E-08
EU-152	26.	344.27	2.6900E-08
EU-154	17.	1004.76	6.2544E-08
EU-156	20.	646.29	2.2178E-07
HF-181	22.	482.03	1.1635E-08
TA-182	9.	1221.42	3.8110E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	45.	279.19	1.3615E-08
BI-207	18.	569.67	7.6692E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	35.	240.98	2.0460E-06
RA-226	45.	186.21	2.4101E-07
AC-228	44.	338.32	7.9279E-08
TH-228	31.	84.37	1.1615E-06
PA-234	0.	131.20	Half-Life too short
TH-234	36.	63.29	1.7670E-06
U-235	46.	143.76	8.0342E-08
NP-239	42.	106.13	2.9883E-06
AM-241	29.	59.54	1.9869E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EF1-8,S080504

Sample Location (Well Number): 8 Shallow

1. Representative sample collected. Date/Time 8-5-04 / 1625

Sample collected by: Jay Slabach / Jay Mark Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yoxon / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected/William V. Lipton 8665 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-8S080504	
2 . Date Sampled	08/05/2004	
3 . Time Sampled	16:25	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	10:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.4	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-85080504

Sample Location (Well Number): 8 Shallow

1. Representative sample collected. Date/Time 8-5-04 / 1625

Sample collected by: Jay Slabach / Jay Mark Slabach Date: 08-18-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cauillard / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L M'Coy / [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-85080504

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy [signature] Date: 8-18-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William L. Lipton, III [signature] Date: 8/19/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William L. Lipton 4865 / 8/19/2004

DETROIT EDISON FERMI-2 POWER PLANT 10-AUG-2004 15:25:10.00

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6S080504

Sample End Time: 5-AUG-2004 16:25:00.00

REMARKS 01-EN1513

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-8S0800504 Acquisition date : 10-AUG-2004 14:55:05

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-8S0800504
Sample collection start date: 5-AUG-2004 16:25:00.00
Sample collection end date : 5-AUG-2004 16:25:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 10-AUG-2004 14:55:05.50
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:00.99 Percent dead time : 0.03 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00115E-01 Zero offset: -1.44471E-02
Daily cal date : 10-AUG-2004 11:45:05.57

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	65.64	27	58	1.46	131.28	126	12	1.48E-02	61.3	1.47E+00
2	3	66.89	26	58	1.21	133.78	126	12	1.43E-02	55.0	
3	0	74.66	45	40	1.00	149.31	144	10	2.50E-02	36.2	
4	0	352.37	22	32	1.21	704.74	699	9	1.24E-02	49.9	
5	0	510.78	95	40	3.07	1021.65	1013	16	5.28E-02	18.1	
6	0	609.76	43	22	1.26	1219.68	1213	12	2.38E-02	27.3	
7	0	767.76	16	6	0.99	1535.85	1531	11	9.12E-03	37.1	
8	0	1460.86	65	6	1.22	2923.46	2915	14	3.63E-02	14.9	
9	0	1765.00	27	5	2.43	3532.71	3522	21	1.50E-02	28.6	

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
3	65.64	27	50	1.46	131.20	126	12	61.3	1.47E+00	
3	66.09	26	50	1.21	133.70	126	12	55.0		
0	74.66	45	40	1.00	149.31	144	10	30.2		
0	352.37	22	32	1.21	704.74	699	9	49.9		
0	510.70	95	40	3.07	1021.65	1013	16	18.1		
0	609.76	43	22	1.26	1219.60	1213	12	27.3		
0	767.76	16	6	0.99	1535.85	1531	11	37.1		
0	1460.86	65	6	1.22	2923.46	2915	14	14.9		K-40
0	1765.00	27	5	2.43	3532.71	3522	21	28.6		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	65	10.67*	2.309E+00	3.854E-07	3.854E-07	14.94

Flag: "*" = Keyline

Sample ID : EFT-650805S4 Acquisition date : 18-AUG-2004 14:55:05

Total number of lines in spectrum	9	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	9	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	3.854E-07	3.854E-07	0.576E-07	14.94	
	Total Activity :		3.854E-07	3.854E-07			
	Grand Total Activity :		3.854E-07	3.854E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-Life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	169.90	511.00*	193.46	1.000E+35	18.08	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.11	66.05	1.02	3.290E-06	61.27	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
RU-103	39.35D	0.33	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	3.295E-07	27.29	
		% Abundances Found =		5.92			
I-134	52.60M	354.47	135.40	3.76	--- Not Found ---		Decay,Abun.
			235.47	1.90	--- Not Found ---		
			405.45	7.30	--- Not Found ---		
			540.83	7.80	--- Not Found ---		
			595.36	11.40	--- Not Found ---		
			621.79	10.60	--- Not Found ---		
			677.34	8.50	--- Not Found ---		
			766.68	4.10	1.000E+35	37.13	
			847.03	95.41	--- Not Found ---		
			857.29	6.96	--- Not Found ---		
			884.09*	65.30	--- Not Found ---		
			947.86	4.04	--- Not Found ---		
			1072.55	15.30	--- Not Found ---		
			1136.16	9.70	--- Not Found ---		
			1613.80	4.36	--- Not Found ---		
			1806.84	5.70	--- Not Found ---		
		% Abundances Found =		1.56			
TE-134	41.80M	446.06	79.45	21.00	--- Not Found ---		Decay,Abun.
			180.89	18.00	--- Not Found ---		
			201.24	8.70	--- Not Found ---		
			210.47*	21.90	--- Not Found ---		
			277.95	21.30	--- Not Found ---		
			435.06	18.60	--- Not Found ---		
			461.00	10.00	--- Not Found ---		
			464.64	5.10	--- Not Found ---		
			565.99	18.90	--- Not Found ---		
			742.59	14.70	--- Not Found ---		
			767.20	30.00	1.000E+35	37.13	
		% Abundances Found =		15.87			
CS-136	13.16D	0.98	66.91	12.50	4.300E-07	54.95	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
CS-136	13.16D	0.98	163.89	4.61	--- Not Found ---		Abun.
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances	Found =	4.10			
TA-182	114.74D	0.11	67.75	42.30	6.960E-08	54.95	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances	Found =	30.01			
PB-212	10.64H	29.20	74.81	10.70	1.756E+02	30.23	Decay,Abun.
			77.11	18.00	--- Not Found ---		
			87.30	8.00	--- Not Found ---		
			115.19	0.60	--- Not Found ---		
			238.63*	44.60	--- Not Found ---		
			300.09	3.41	--- Not Found ---		
		% Abundances	Found =	12.54	(Abn. Limit = 44.60%)		
BI-214	19.90M	936.94	609.31*	46.30	1.000E+35	27.29	Decay
			768.36	5.04	1.000E+35	37.13	
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.00	1.000E+35	28.60	
		% Abundances	Found =	70.30	(Abn. Limit = 48.40%)		
PB-214	26.80M	695.71	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	49.87	
			785.91	1.10	--- Not Found ---		
		% Abundances	Found =	53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Sample ID : EFT-0S000504 Acquisition date : 10-AUG-2004 14:55:05

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
	65.64	27	58	1.46	131.28	126	12	1.40E-02	61.3	1.20E+00	T
3	66.89	26	58	1.21	133.78	126	12	1.43E-02	55.0	1.42E+00	T
0	74.66	45	40	1.00	149.31	144	10	2.50E-02	30.2	2.21E+00	T
0	352.37	22	32	1.21	704.74	699	9	1.24E-02	49.9	5.52E+00	T
0	510.78	95	40	3.07	1021.65	1013	16	5.28E-02	18.1	4.74E+00	T
0	609.76	43	22	1.26	1219.68	1213	12	2.38E-02	27.3	4.38E+00	T
0	767.76	16	6	0.99	1535.85	1531	11	9.12E-03	37.1	3.62E+00	T
0	1765.00	27	5	2.43	3532.71	3522	21	1.50E-02	28.6	2.16E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 18-AUG-2004 15:25:15.52 *
****
* Sample ID : EFT-BS000504 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.59	9.6140E-08
F-18	0.	511.00	Half-Life too short
NA-22	5.	1274.54	7.6018E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	14.	889.25	1.0906E-08
CR-51	28.	320.08	1.0105E-07
MN-54	22.	834.83	1.1314E-08
CO-56	18.	1238.25	2.1571E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	35.	158.38	3.1253E-08
CO-57	37.	122.06	1.0434E-08
CO-58	7.	810.76	7.7052E-09
FE-59	14.	1099.22	2.3667E-08
CO-60	8.	1332.49	9.3478E-09
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	11.	1115.52	1.9996E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	25.	136.00	1.2039E-08
AS-76	0.	559.10	Half-Life too short
BR-82	11.	776.49	4.1084E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	36.	513.99	2.2786E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	36.	513.99	1.1309E-08
RB-86	15.	1076.63	2.0512E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	8.9376E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	18.	1204.90	4.8892E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-BS080504 Acquisition date : 18-AUG-2004 14:55:05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	15.	702.63	7.8250E-09
NB-95	10.	765.79	9.4637E-09
NB-95M	41.	235.69	3.8432E-07
ZR-95	13.	756.72	1.6495E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	5.	739.50	1.0564E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	22.	497.08	1.0822E-08
TC-104	0.	357.99	Half-Life too short
RH-105	33.	318.90	1.7826E-05
RU-105	0.	724.50	Half-Life too short
RU-106	20.	621.84	8.5561E-08
CD-109	33.	88.03	3.5200E-07
AG-110M	6.	937.48	2.1897E-08
SN-113	17.	391.69	1.0370E-08
SN-117M	35.	158.56	1.5981E-08
SB-122	14.	563.93	2.6594E-07
SB-124	16.	602.71	8.7076E-09
SB-125	32.	427.89	2.9030E-08
TE-125M	30.	109.28	3.6630E-06
[redacted]-127	0.	417.90	Half-Life too short
[redacted]-127M	23.	57.60	2.8016E-05
XE-127	41.	202.84	1.4439E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	19.	695.88	3.3702E-07
XE-129M	39.	196.56	4.3158E-07
I-130	0.	536.09	Half-Life too short
BA-131	39.	123.80	6.4299E-08
I-131	29.	364.48	2.8548E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	39.	163.93	8.1109E-07
I-132	0.	667.69	Half-Life too short
TE-132	38.	228.16	1.3754E-07
BA-133	29.	302.84	4.0023E-08
BA-133M	32.	276.09	1.0246E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	20.	81.00	2.2075E-07
XE-133M	44.	233.22	4.8119E-06
CS-134	22.	604.70	8.6960E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
[redacted]-135	0.	249.79	Half-Life too short
[redacted]-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	1.6822E-08
I-136	0.	1313.02	Half-Life too short
CS-137	10.	661.65	7.1684E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	256.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	49.	165.85	1.0983E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	11.	537.32	4.7298E-08
LA-140	4.	1596.49	1.7524E-06
BA-141	0.	190.22	Half-Life too short
CE-141	37.	145.44	2.0571E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	41.	293.26	1.3452E-05
CE-144	42.	133.54	8.0527E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	24.	91.10	8.4214E-08
PM-148M	11.	550.27	7.6410E-09
EU-152	31.	344.27	2.9222E-08
EU-154	6.	1004.76	4.0525E-08
EU-156	14.	646.29	1.8161E-07
HF-181	22.	482.03	1.1340E-08
TA-182	16.	1221.42	4.8451E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	34.	0 279.19	1.1767E-08
BI-207	26.	569.67	8.9498E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	39.	240.98	2.3621E-06
RA-226	40.	186.21	2.2929E-07
AC-228	31.	338.32	6.7335E-08
TH-228	20.	84.37	9.4697E-07
PA-234	0.	131.20	Half-Life too short
TH-234	21.	63.29	1.3495E-06
U-235	46.	143.76	7.9998E-08
NP-239	36.	106.13	1.9584E-06
AM-241	36.	59.54	2.1109E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT- 95080604

Sample Location (Well Number): 9 Shallow

1. Representative sample collected. Date/Time 08/06/04 / 1100

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: [signature] / J. May Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected.

Performed by: William V. Lipka James Lipka 1-26- William V. Lipka Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-9S080604	
2 . Date Sampled	08/06/2004	
3 . Time Sampled	11:00	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	10:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-95080604

Sample Location (Well Number): 9 Shallow

1. Representative sample collected. Date/Time 08/06/04 / 11:00

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McCoy Date: 12/29/04
Fermi 2 RP Printed Name Signature

Sample number: EFT. 95080604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 12/29/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V. Lipton 48651 / 1/13/2005

THE DETROIT EDISON COMPANY

ENRICO FERMI II

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

Sample Identification EFT-9$080604

PERFORMED BY: [signature] 12/29/04
SIGNATURE/DATE

REVIEWED BY: William J. Linton 48651 1/13/2005
SIGNATURE/DATE

Detroit Edison Fermi-2 Power Plant 29-DEC-2004 11:20:09.14

Radiation Protection Gamma Spectroscopy Report

Sample Parameters

Sample ID Number: EFT9S0000604
Sample collection start date: 6-AUG-2004 11:00:00.00
Sample collection end date : 6-AUG-2004 11:00:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03
Sample geometry : MELL Operator. LKM

Acquisition Parameters

Detector number : DET 4 Acquire date : 29-DEC-2004 10:52:46.76
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.11 Percent dead time : 0.05 %

Calibration Parameters

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14550E-01
Daily cal date : 29-DEC-2004 08:39:38.08

Peak Search Parameters

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

Nuclide Identification Parameters

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

PK	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	352.63	47	38	1.22	705.19	699	10	2.63E-02	20.3	Pb214
2	0	511.55	154	48	2.43	1022.91	1014	18	8.57E-02	13.4	annihilation
3	0	556.51	43	38	1.75	1116.79	1112	15	2.40E-02	33.4	Th228
4	0	609.25	64	21	1.39	1218.25	1212	12	3.56E-02	19.0	Bi214
5	0	1461.24	76	13	2.39	2922.78	2916	14	4.20E-02	15.5	K40

Detroit Edison Fermi 2 Peak Report, Generated 29-DEC-2004 11:20:11.62

Sample ID : EFT96060604 Page_____of_____

Decay Time = 144 23:53:46.76 Deposition Time = 00:00:00.00

Fast-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	352.63	47	30	1.22	705.10	699	10	20.3		
0	511.55	154	48	2.43	1022.91	1014	18	13.4		
0	558.51	43	30	1.75	1116.79	1112	15	33.4		
0	589.25	64	21	1.39	1218.25	1212	12	19.0		
0	1401.24	76	13	2.39	2922.78	2916	14	15.5		K 40

Sample ID : EFT03002604 Acquisition date : 29-DEC-2004 10:53:46

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected (uCi)	Decay Corr (uCi)	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.453E-07	4.453E-07	0.692E-07	15.54	
	Total Activity :		4.453E-07	4.453E-07			
	Grand Total Activity :		4.453E-07	4.453E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : EFT9S080604 Acquisition date : 29-DEC-2004 10:53:45

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi)	1-Sigma %Error	Rejected by
F-18	109.74M	1902.76	511.00*	193.46	1.000E+35	13.37	Decay
	% Abundances Found =		100.00				
AS-76	26.32H	132.22	559.10*	44.70	2.027E+32	33.40	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1189.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.94	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
	% Abundances Found =		73.70				
RU-103	39.35D	3.69	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	5.034E-06	19.01	
	% Abundances Found =		5.92				
XE-135	9.11H	382.01	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	1.000E+35	19.01	
	% Abundances Found =		3.11				
BI-214	19.90M	10492.90	609.31*	46.30	1.000E+35	19.01	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
	% Abundances Found =		48.48	(Abn. Limit = 48.48%)			
PB-214	26.80M	7791.37	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	28.29	
			785.91	1.10	--- Not Found ---		
	% Abundances Found =		53.40	(Abn. Limit = 37.20%)			

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	352.63	47	30	1.22	705.19	699	10	2.63E-02	20.3	5.52E+00	T
0	511.55	154	48	2.43	1022.91	1014	16	8.57E-02	13.4	4.73E+00	T
0	558.51	43	38	1.75	1116.79	1110	15	2.40E-02	33.4	4.55E+00	T
0	609.25	64	21	1.37	1218.25	1212	12	3.56E-02	19.8	4.39E+00	T

Flags: "T" = Tentatively associated

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi)
[redacted]7	28.	477.59	5.2692E-07
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	9.1340E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	12.	889.25	2.9946E-08
CR-51	33.	320.08	2.9472E-06
MN-54	17.	834.83	1.3798E-08
CO-56	22.	1238.25	7.4256E-08
MN-56	9.	1810.69	Half Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	38.	122.06	1.4732E-06
CO-58	7.	810.76	2.7548E-08
FE-59	13.	1099.22	1.7453E-07
CO-60	15.	1332.49	1.3087E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	3.3592E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	50.	136.00	3.5263E-06
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
RB-84	0.	881.50	Half-Life too short
[redacted]-85	0.	802.41	Half-Life too short
KR-85	51.	513.99	2.7168E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	51.	513.99	5.4048E-08
RB-86	11.	1076.63	2.3586E-05
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	1.9680E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	0.	1204.90	1.6532E-05
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	20.	702.63	8.8356E-09
NB-95	19.	765.79	1.6593E-07
[redacted]-95M	0.	235.69	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi)
ZR-95	12.	756.72	6.6824E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	82.	497.08	1.3985E-07
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	20.	621.84	1.0835E-07
CD-109	27.	88.03	3.9470E-07
AG-110M	15.	937.48	4.5895E-08
SN-113	23.	391.69	2.6176E-08
SN-117M	0.	156.56	Half-Life too short
SB-122	0.	563.93	Half-Life too short
SB-124	23.	602.71	4.6389E-08
SB-125	28.	427.89	3.0123E-08
TE-125M	24.	109.28	1.6850E-05
TE-127	0.	417.90	Half-Life too short
TE-127M	26.	57.60	6.8412E-05
XE-127	47.	202.84	1.9016E-07
TE-129	0.	459.60	Half-Life too short
TE-129M	15.	695.86	4.6039E-06
XE-129M	0.	196.56	Half-Life too short
I-130	0.	536.09	Half-Life too short
BA-131	0.	123.80	Half-Life too short
I-131	0.	364.48	Half-Life too short
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	0.	163.93	Half-Life too short
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	39.	302.84	4.7012E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	9.5290E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short
CS-136	0.	818.50	Half-Life too short
I-136	0.	1313.02	Half-Life too short
CS-137	27.	661.65	1.1375E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short

Sample ID : EFT9S0006604 Acquisition date : 29-DEC-2004 10:53:46

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi)
[redacted]-138	0.	258.31	Half-Life too short
[redacted]-139	0.	1420.50	Half-Life too short
CE-139	33.	165.85	1.7750E-08
CS-139	0.	1203.23	Half-Life too short
BA-140	0.	537.32	Half-Life too short
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	47.	145.44	3.6650E-07
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	37.	133.54	1.0561E-07
PR-144	0.	1489.15	Half-Life too short
ND-147	0.	91.10	Half-Life too short
PM-148M	19.	550.27	8.9757E-08
EU-152	31.	344.27	2.9780E-08
EU-154	12.	1004.76	5.6440E-08
EU-156	28.	646.29	1.0090E-04
HF-181	22.	482.03	9.7395E-08
TA-182	13.	1221.42	9.8235E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	8.5371E-08
BI-207	28.	569.67	9.3995E-09
TL-208	0.	583.14	Half-Life too short
[redacted]-212	0.	238.63	Half-Life too short
[redacted]-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	50.	186.21	2.5270E-07
AC-228	35.	338.32	7.4709E-08
TH-228	43.	84.37	1.5289E-06
PA-234	0.	131.20	Half-Life too short
TH-234	31.	63.29	7.1000E-05
U-235	46.	143.76	6.0537E-08
NP-239	0.	106.13	Half-Life too short
AM-241	30.	59.54	1.9336E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BKG-RANGE080604

Sample Location (Well Number): Firing Range Ramp WG11

1. Representative sample collected. Date/Time 8/6/04 / 1237

Sample collected by: Jay Slaback / Jay Marie Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon C Caulland / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M. Yoken / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / [signature] Date: 8/26/04
Fermi 2 Radiation Protection Supervision/Delegate Printed Name Signature

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected. William V. Lipton 48051 8/26/04

Tritium Activity Calculation

Sample Information

1 . Sample Location	BKG-RANGE080604	
2 . Date Sampled	08/06/2004	
3 . Time Sampled	12:37	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.9	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.5	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BICG RANGE080604

Sample Location (Well Number): Firing RANGE Remp Well

1. Representative sample collected. Date/Time 8/6/04 / 1237

Sample collected by: Jay Slaback / Jay Mark Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 8·18·04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample number: BLG-RANGE080604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / L. McCoy Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V Lipton 48651 / 8/24/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 15:46:08.24

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-RANGE080604

Sample End Time: 6-AUG-2004 12:37:00.00

REMARKS 01-EN1523

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

ple ID : BKG-RANGE080604 Acquisition date : 19-AUG-2004 15:16:04

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************

Sample ID Number: BKG-RANGE080604
Sample collection start date: 6-AUG-2004 12:37:00.00
Sample collection end date : 6-AUG-2004 12:37:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

*************************** Acquisition Parameters ***************************

Detector number : DET 4 Acquire date : 19-AUG-2004 15:16:04.74
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.14 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

*************************** Peak Search Parameters ***************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********************** Nuclide Identification Parameters **********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	352.22	55	39	1.56	704.48	699	11	3.06E-02	26.1	Pb214
2	0	511.07	152	63	2.02	1022.22	1014	19	8.43E-02	14.9	annihilation
3	0	559.07	47	56	2.38	1118.24	1110	16	2.61E-02	38.5	[illegible]
4	0	609.92	51	31	1.22	1219.98	1215	12	2.82E-02	25.8	Bi214
5	0	1237.55	13	7	1.54	2476.14	2472	9	7.19E-03	45.8	Bi214
6	0	1460.88	73	9	2.67	2923.36	2911	18	4.06E-02	15.2	K40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	352.22	55	39	1.56	704.48	699	11	26.1		
0	511.07	152	63	2.02	1022.22	1014	19	14.9		
0	559.07	47	56	2.30	1118.24	1110	16	38.5		
0	609.92	51	31	1.22	1219.90	1215	12	25.0		
0	1237.55	13	7	1.54	2476.14	2472	9	45.8		
0	1460.88	73	9	2.67	2923.36	2911	18	15.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	73	10.67*	2.389E+00	4.300E-07	4.300E-07	15.16

Flag: "*" = Keyline

Summary of Nuclide Activity Page :
Sample ID : BKG-RANGE080604 Acquisition date : 19-AUG-2004 15:16:04

Total number of lines in spectrum 6
Number of unidentified lines 0
Number of lines tentatively identified by NID 6 100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.300E-07	4.300E-07	0.652E-07	15.16	
Total Activity :			4.300E-07	4.300E-07			
Grand Total Activity :			4.300E-07	4.300E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	172.17	511.00*	193.46	1.000E+35	14.86	Decay
	% Abundances Found =			100.00			
CO-56	78.76D	0.17	846.78	99.96	--- Not Found ---		Abun.
			1037.82	14.03	--- Not Found ---		
			1238.25*	67.00	1.239E-08	45.81	
			1360.21	4.29	--- Not Found ---		
			1771.40	15.51	--- Not Found ---		
			2015.35	3.03	--- Not Found ---		
			2034.91	7.78	--- Not Found ---		
	% Abundances Found =			31.66			
AS-76	26.32H	11.96	559.10*	44.70	1.380E-04	38.47	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
RU-103	39.35D	0.33	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	3.913E-07	25.83	
	% Abundances Found =			5.92			
I-133	20.80H	15.14	529.87*	86.30	--- Not Found ---		Decay,Abun.
			706.58	1.49	--- Not Found ---		
			856.28	1.23	--- Not Found ---		
			875.33	4.47	--- Not Found ---		
			1236.41	1.49	1.792E-02	45.81	
			1298.22	2.33	--- Not Found ---		
	% Abundances Found =			1.53			
BI-214	19.90M	949.45	609.31*	46.30	1.000E+35	25.83	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	1.000E+35	45.81	
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
	% Abundances Found =			54.70	(Abn. Limit =	48.48%)	
PB-214	26.80M	705.00	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		

Sample ID : BKG-RANGE000604 Acquisition date : 19-AUG-2004 13:16:04

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
PB-214	26.80M	705.00	295.21	19.20	--- Not Found ---		Decay
			351.92*	37.20	1.000E+35	26.12	
			705.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit =	37.20%)	

Flag: "*" = Keyline

Sample ID : BKG-RANGE080604 Acquisition date : 19-AUG-2004 15:16:04

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	352.22	55	39	1.56	704.40	699	11	3.06E-02	26.1	5.52E+00	T
0	511.07	152	63	2.02	1022.22	1014	19	8.43E-02	14.9	4.74E+00	T
0	559.07	47	56	2.38	1118.24	1110	16	2.61E-02	38.5	4.55E+00	T
0	609.02	51	31	1.22	1219.98	1215	12	2.82E-02	25.0	4.38E+00	T
0	1237.55	13	7	1.54	2476.14	2472	9	7.19E-03	45.8	2.63E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 15:46:13.45

Sample ID : BKG-RANGE080604

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	27.	477.59	9.3919E-08
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	9.8033E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.0415E-08
CR-51	47.	320.08	1.2888E-07
MN-54	11.	834.83	8.5028E-09
CO-56	24.	1238.25	2.4279E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	53.	158.38	3.8855E-08
CO-57	44.	122.06	1.1242E-08
CO-58	20.	810.76	1.1816E-08
FE-59	14.	1099.22	2.3388E-08
CO-60	12.	1332.49	1.1228E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	17.	1115.52	2.4382E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	34.	136.00	1.3778E-08
AS-76	0.	559.10	Half-Life too short
BR-82	12.	776.49	4.5303E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	57.	513.99	2.7930E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	57.	513.99	1.3888E-08
RB-86	9.	1076.63	1.6396E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	8.3482E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	14.	1204.90	4.3666E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	15.	702.63	7.7406E-09
NB-95	11.	765.79	9.8825E-09
NB-95M	54.	235.69	4.5276E-07
ZR-95	10.	756.72	1.9264E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	14.	739.50	1.7082E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	26.	497.08	1.1692E-08
TC-104	0.	357.99	Half-Life too short
RH-105	35.	318.90	1.9904E-05
RU-105	0.	724.50	Half-Life too short
RU-106	16.	621.84	7.7774E-08
CD-109	20.	88.03	2.0611E-07
AG-110M	8.	937.48	2.3858E-08
SN-113	29.	391.69	1.3044E-08
SN-117M	53.	158.56	1.9508E-08
SB-122	19.	563.93	3.0973E-07
SB-124	21.	602.71	9.6337E-09
SB-125	19.	427.89	2.3259E-08
TE-125M	31.	109.28	3.7286E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	22.	57.60	2.7253E-05
XE-127	47.	202.84	1.5432E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	21.	695.88	3.5423E-07
XE-129M	52.	196.56	5.0119E-07
I-130	0.	536.09	Half-Life too short
BA-131	32.	123.80	5.9101E-08
I-131	27.	364.48	2.8094E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	42.	163.93	8.4103E-07
I-132	0.	667.69	Half-Life too short
TE-132	44.	228.16	1.5285E-07
BA-133	37.	302.84	4.4752E-08
BA-133M	47.	276.09	1.3227E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	33.	81.00	2.4368E-07
XE-133M	50.	233.22	5.3969E-06
CS-134	23.	604.70	8.7681E-09
CS-134	0.	884.09	Half-Life too short
BA-134	0.	218.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : BKG-RANGE080604 Acquisition date : 19-AUG-2004 15:16:04

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	20.	818.50	2.0724E-08
I-136	0.	1313.02	Half-Life too short
CS-137	24.	661.65	1.0670E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	45.	165.85	1.0559E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	10.	537.32	5.9177E-08
LA-140	7.	1596.49	2.3686E-06
BA-141	0.	190.22	Half-Life too short
CE-141	51.	145.44	2.4070E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	46.	293.26	1.5477E-05
CE-144	38.	133.54	7.7359E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	30.	91.10	9.4710E-08
PM-148M	20.	550.27	1.0209E-08
EU-152	37.	344.27	3.1727E-08
EU-154	14.	1004.76	5.6962E-08
EU-156	16.	646.29	1.9201E-07
HF-181	21.	482.03	1.1042E-08
TA-182	15.	1221.42	4.6485E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	45.	279.19	1.3448E-08
BI-207	38.	569.67	1.0678E-08
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	54.	240.98	2.8370E-06
RA-226	46.	186.21	2.4390E-07
AC-228	33.	338.32	6.9422E-08
TH-228	45.	84.37	1.3688E-06
PA-234	0.	131.20	Half-Life too short
TH-234	49.	63.29	1.9764E-06
U-235	50.	143.76	8.3092E-08
NP-239	39.	106.13	2.1376E-06
AM-241	35.	59.54	2.0864E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BKG-PAP080604

Sample Location (Well Number): Point Aux Peaux Remp well

1. Representative sample collected. Date/Time 08/6/04 / 1523

Sample collected by: Joy Slabach / Joy Marie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couilland / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YOKOM / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 8/30/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V Lipton 4845 8/30/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	BKG-PAP080604	
2 . Date Sampled	08/06/2004	
3 . Time Sampled	15:23	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	08:59	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.41\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BKG-PAPOB0604

Sample Location (Well Number): Point Aux Peaux Ramp Well

1. Representative sample collected. Date/Time 8/6/04 / 1523

Sample collected by: Jay Slabeck / Jay Mac Slabeck Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Courtland / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 8/19/04
Fermi 2 RP Printed Name Signature

Sample number: BKG-PAP000604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L.McCoy [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton [signature] Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed radioactive material detected,
William V. Lipton 48651 8/24/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 15:15:45.23

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-PAP080604

Sample End Time: 6-AUG-2004 15:23:00.00

REMARKS 01-EN1520

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE 8/24/2004

Sample ID : BKG-PAP080604 Acquisition date : 19-AUG-2004 14:45:3

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: BKG-PAP080604
Sample collection start date: 6-AUG-2004 15:23:00.00
Sample collection end date : 6-AUG-2004 15:23:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 19-AUG-2004 14:45:39.94
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.16 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00100E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	352.70	30	51	1.05	705.43	699	9	1.66E-02	47.0	
2	0	511.16	135	56	1.31	1022.39	1014	15	7.48E-02	14.9	
3	0	556.57	65	37	1.39	1117.25	1110	15	3.62E-02	23.9	
4	1	606.43	24	8	1.86	1217.00	1212	30	1.36E-02	37.0	2.90E+00
5	1	609.25	30	10	2.04	1218.63	1212	30	1.69E-02	34.9	
6	0	1120.56	48	0	2.77	2241.94	2234	16	2.67E-02	14.4	
7	0	1460.91	70	7	2.88	2923.42	2916	13	3.86E-02	14.2	

Sample Title : BKG-PAP000604 Page : 1
Decay Time = 12 23:22:39.94 Acquisition Time = 19-AUG-2004 14:45:39.9

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	352.70	30	51	1.05	705.43	699	9	47.0		
0	511.16	135	56	1.31	1022.39	1014	15	14.9		
0	558.57	65	37	1.39	1117.25	1110	15	23.9		
1	606.43	24	8	1.06	1217.00	1212	30	37.0	8.98E+00	
1	609.25	30	10	2.04	1218.63	1212	30	34.9		
0	1120.56	48	0	2.77	2241.94	2234	18	14.4		
0	1460.91	70	7	2.28	2923.42	2916	13	14.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	70	10.67*	2.389E+00	4.094E-07	4.094E-07	14.18

Flag: "*" = Keyline

Sample ID : BKG-PAP000604 Acquisition date : 19-AUG-2004 14:45:39

Total number of lines in spectrum	7	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	7	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.094E-07	4.094E-07	0.581E-07	14.10	
Total Activity :			4.094E-07	4.094E-07			
Grand Total Activity :			4.094E-07	4.094E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : BKG-PAP980604 Acquisition date : 19-AUG-2004 14:45:3

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	170.38	511.00*	193.46	1.000E+35	14.90	Decay
		% Abundances Found =		100.00			
SC-46	83.83D	0.15	142.53	62.70	--- Not Found ---		Abun.
			889.25*	99.96	--- Not Found ---		
			1120.51	99.99	2.889E-08	14.43	
		% Abundances Found =		38.07			
AS-76	26.32H	11.84	559.10*	44.70	1.767E-04	23.89	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.33	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	2.343E-07	34.87	
		% Abundances Found =		5.92			
XE-135	9.11H	34.21	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	5.748E+03	37.04	
		% Abundances Found =		3.11			
BI-214	19.90M	939.58	609.31*	46.30	1.000E+35	34.87	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	14.43	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		64.29	(Abn. Limit = 48.48%)		
PB-214	26.80M	697.67	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	47.02	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Sample ID : BKG-PAP050604 Acquisition date : 19-AUG-2004 14:45:39

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	352.70	30	51	1.05	705.43	699	9	1.66E-02	47.0	5.52E+00	T
0	511.16	135	56	1.31	1022.39	1014	15	7.48E-02	14.9	4.74E+00	T
0	556.57	65	37	1.39	1117.25	1110	15	3.62E-02	23.9	4.55E+00	T
1	608.43	24	0	1.56	1217.00	1212	30	1.36E-02	37.0	4.39E+00	T
1	609.25	30	10	2.04	1218.63	1212	30	1.69E-02	34.9	4.39E+00	T
0	1120.56	48	0	2.77	2241.94	2234	18	2.67E-02	14.4	2.78E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 15:15:50.69

Sample ID : BKG-PAP000604

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	23.	477.59	8.7500E-08
F-18	0.	511.00	Half-Life too short
NA-22	12.	1274.54	1.1094E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	15.	889.25	1.1020E-08
CR-51	37.	320.08	1.1401E-07
MN-54	19.	834.83	1.0702E-08
CO-56	14.	1238.25	1.9223E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	41.	158.38	3.3804E-08
CO-57	44.	122.06	1.1230E-08
CO-58	14.	810.76	1.0126E-08
FE-59	9.	1099.22	1.9535E-08
CO-60	14.	1332.49	1.2236E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	11.	1115.52	1.9975E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	40.	136.00	1.4876E-08
AS-76	0.	559.10	Half-Life too short
BR-82	19.	776.49	5.2615E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	46.	513.99	2.5332E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	46.	513.99	1.2578E-08
RB-86	17.	1076.63	2.1404E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.0928E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	9.	1204.90	3.5527E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : BKG-PAP080604 Acquisition date : 19-AUG-2004 14:45:39

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	16.	702.63	7.9479E-09
NB-95	17.	765.79	1.1647E-08
NB-95M	43.	235.69	3.9590E-07
ZR-95	23.	756.72	2.1110E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	17.	739.58	1.7988E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	26.	497.08	1.1658E-08
TC-104	0.	357.99	Half-Life too short
RH-105	29.	318.90	1.7153E-05
RU-105	0.	724.50	Half-Life too short
RU-106	16.	621.84	7.7185E-08
CD-109	38.	88.03	3.7841E-07
AG-110M	12.	937.48	2.8676E-08
SN-113	24.	391.69	1.1866E-08
SN-117M	40.	158.56	1.7031E-08
SB-122	16.	563.93	2.7730E-07
[redacted]-124	33.	602.71	1.1832E-08
SB-125	26.	427.89	2.6683E-08
TE-125M	43.	109.28	4.3195E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	24.	57.60	2.8431E-05
XE-127	50.	202.84	1.5937E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	19.	695.88	3.4203E-07
XE-129M	63.	196.56	5.4167E-07
I-130	0.	536.09	Half-Life too short
BA-131	38.	123.80	6.3227E-08
I-131	28.	364.48	2.8361E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	36.	163.93	7.8177E-07
I-132	0.	667.69	Half-Life too short
TE-132	50.	228.16	1.5741E-07
BA-133	38.	302.84	4.5240E-08
BA-133M	33.	276.09	1.0531E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	33.	81.00	2.3820E-07
XE-133M	43.	233.22	4.8250E-06
CS-134	24.	604.70	8.9426E-09
I-134	0.	884.09	Half-Life too short
[redacted]-134	0.	210.47	Half-Life too short
[redacted]-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : BKG-PAP080604 Acquisition date : 19-AUG-2004 14:45:3

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	1.7089E-08
I-136	0.	1313.82	Half-Life too short
CS-137	10.	661.65	9.4135E-09
XE-137	0.	455.49	Half-Life too short
CS-139	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	35.	165.85	9.4354E-09
CS-139	0.	1203.23	Half-Life too short
BA-140	22.	537.32	6.4425E-08
LA-140	9.	1596.49	2.4263E-06
BA-141	0.	190.22	Half-Life too short
CE-141	46.	145.44	2.2855E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	28.	293.26	1.1579E-05
CE-144	34.	133.54	7.3583E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	34.	91.10	9.8990E-08
PM-148M	14.	550.27	8.6696E-09
EU-152	36.	344.27	3.1045E-08
EU-154	7.	1004.76	4.3166E-08
EU-156	20.	646.29	2.1042E-07
HF-181	17.	482.03	1.0218E-08
TA-182	16.	1221.42	4.7858E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	1.2002E-08
BI-207	25.	569.67	8.8773E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	46.	240.98	2.5829E-06
RA-226	52.	186.21	2.5869E-07
AC-228	30.	338.32	6.6585E-08
TH-228	36.	84.37	1.2410E-06
PA-234	0.	131.20	Half-Life too short
TH-234	31.	63.29	1.6092E-06
U-235	47.	143.76	8.0684E-08
NP-239	37.	106.13	2.0042E-06
AM-241	20.	59.54	1.6135E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BKG-NTC080604

Sample Location (Well Number): Nuclear Training Center (Ramp Well)

1. Representative sample collected. Date/Time 8/6/04 / 0957

Sample collected by: Jay Slaback / Jay Marie Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cailliard / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000 70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: JOHN M. YORK / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 8/26/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected, William V. Lipton 4866
8/26/2004

Tritium Activity Calculation

Sample Information

1 . Sample Location	BKG-NTC080604	
2 . Date Sampled	08/06/2004	
3 . Time Sampled	09:57	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.4	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.41\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 uCi/ml} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

Sample number: BKG - NTC080604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L McCoy / J.McC Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 8/25/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks 353.46 KeV peak unidentified. Low FWHM (0.62), Hi σ error (55.4), does not match any peak from expected contamination, can ignore, No licensed radioactive material detected.
William V Lipton 4865 / 8/25/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 09:26:00.79

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-NTC080604

Sample End Time: 6-AUG-2004 09:57:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY:

William V. Lister 4869 / 8/25/2004

SIGNATURE/DATE

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BKG-NTC080604

Sample Location (Well Number): Nuclear Training Center (Ramp well)

1. Representative sample collected. Date/Time 08/06/04 / 0957

Sample collected by: JayMarie Slabach / JayMarie Slabach Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: J Gaillard / [signature] Date: 8.18.04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: C. McCoy D. McCoy Date: 8-19-04
Fermi 2 RP Printed Name Signature

Sample ID : BKG-NTC000604 Acquisition date : 19-AUG-2004 08:56:05

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: BKG-NTC000604
Sample collection start date: 6-AUG-2004 09:57:00.00
Sample collection end date : 6-AUG-2004 09:57:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 19-AUG-2004 08:56:05.27
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.10 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00100E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Rw	Cts/Sec	%Err	Fit
1	0	353.45	37	74	0.62	706.93	703	16	2.04E-02	55.4	
2	2	510.33	51	26	2.13	1020.74	1016	16	2.85E-02	24.9	
3	2	512.05	71	22	2.13	1024.17	1016	16	3.94E-02	21.9	
4	0	558.79	47	27	0.90	1117.69	1111	12	2.62E-02	26.4	
5	0	609.72	67	23	1.97	1219.58	1213	13	3.75E-02	19.0	
6	0	1461.32	59	20	1.55	2924.25	2916	17	3.30E-02	21.9	

Decay Time = 12 22:59:05.27 Acquisition Time = 19-AUG-2004 08:56:05.2
7

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	353.45	37	74	0.62	706.93	700	15	55.4		
2	510.33	51	26	2.13	1020.74	1016	16	24.9	9.94E-01	
2	512.05	71	22	2.13	1024.17	1016	16	21.9		
0	558.79	47	27	0.98	1117.69	1111	12	26.4		
0	609.72	67	23	1.97	1219.58	1213	13	19.0		
0	1461.32	59	20	1.55	2924.25	2916	17	21.9		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	59	10.67*	2.389E+00	3.504E-07	3.504E-07	21.88

Flag: "*" = Keyline

Sample ID : BKG-NTC080604 Acquisition date : 19-AUG-2004 08:56:0

Total number of lines in spectrum	6	
Number of unidentified lines	2	
Number of lines tentatively identified by NID	4	66.67%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	3.504E-07	3.504E-07	0.767E-07	21.88	
Total Activity :			3.504E-07	3.504E-07			
Grand Total Activity :			3.504E-07	3.504E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : BKG-NTC000604 Acquisition date : 19-AUG-2004 00:56:05

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	170.17	511.00*	193.46	1.000E+35	24.91	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	11.83	559.10*	44.70	1.265E-04	26.38	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1123.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.33	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	5.183E-07	18.99	
		% Abundances Found =		5.92			
BI-214	19.90M	938.40	609.31*	46.30	1.000E+35	18.99	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.00	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

Sample ID : BKG-NTC000604 Acquisition date : 19-AUG-2004 08:56:0

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	353.45	37	74	0.62	706.93	700	16	2.04E-02	55.4	5.52E+00	
2	510.33	51	26	2.13	1020.74	1016	16	2.85E-02	24.9	4.74E+00	T
2	512.05	71	22	2.13	1024.17	1016	16	3.94E-02	21.9	4.73E+00	
0	558.79	47	27	0.98	1117.69	1111	12	2.62E-02	26.4	4.55E+00	T
0	609.72	67	23	1.97	1219.58	1213	13	3.75E-02	19.0	4.38E+00	T

Flags: "T" = Tentatively associated

****
* [redacted] Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 09:26:14.11 *
****
* Sample ID : BKG-NTC080604 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.59	8.8191E-08
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	8.3260E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	20.	889.25	1.2558E-08
CR-51	42.	320.08	1.2149E-07
MN-54	15.	834.83	9.6675E-09
CO-56	13.	1238.25	1.8409E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	35.	158.38	3.1680E-08
CO-57	29.	122.06	9.3211E-09
CO-58	11.	810.76	9.1839E-09
FE-59	13.	1099.22	2.2661E-08
[redacted]60	16.	1332.49	1.2821E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	16.	1115.52	2.3555E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	41.	136.00	1.5124E-08
AS-76	0.	559.10	Half-Life too short
BR-82	10.	776.49	5.0759E-06
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	37.	513.99	2.2823E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	37.	513.99	1.1330E-08
RB-86	11.	1076.63	1.7732E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	1.0273E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.68	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
[redacted]90M	5.	202.51	Half-Life too short
[redacted]-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	3.9143E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	21.	702.63	8.9994E-09
NB-95	12.	765.79	9.9531E-09
NB-95M	39.	235.69	3.7883E-07
ZR-95	17.	756.72	1.8602E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	16.	739.58	1.7459E-06
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	25.	497.08	1.1561E-08
TC-104	0.	357.99	Half-Life too short
RH-105	46.	318.90	2.0775E-05
RU-105	0.	724.50	Half-Life too short
RU-106	26.	621.84	9.4449E-08
CD-109	30.	88.03	3.4849E-07
AG-110M	12.	937.48	2.8786E-08
SN-113	25.	391.69	1.2195E-08
SN-117M	36.	158.56	1.6264E-08
SB-122	18.	563.93	2.9082E-07
SB-124	22.	602.71	9.8803E-09
SB-125	18.	427.89	2.2537E-08
TE-125M	40.	109.28	4.1504E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	34.	57.60	3.3399E-05
XE-127	40.	202.84	1.4407E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	14.	695.88	2.9406E-07
XE-129M	51.	196.56	4.9077E-07
I-130	0.	536.09	Half-Life too short
BA-131	32.	123.60	5.8709E-08
I-131	37.	364.48	3.1875E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	49.	163.93	8.9945E-07
I-132	0.	667.69	Half-Life too short
TE-132	42.	228.16	1.4493E-07
BA-133	35.	302.84	4.3559E-08
BA-133M	51.	276.09	1.2890E-05
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	29.	81.00	2.2592E-07
XE-133M	45.	233.22	4.8933E-06
CS-134	25.	604.70	9.1496E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : BKG-NTC080604 Acquisition date : 19-AUG-2004 00:56:05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	16.	818.50	1.8020E-08
I-136	0.	1313.02	Half-Life too short
CS-137	16.	661.65	5.9032E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	46.	165.85	1.0867E-08
LS-139	0.	1203.23	Half-Life too short
BA-140	27.	537.32	7.0259E-08
LA-140	3.	1596.49	1.5237E-06
BA-141	0.	190.22	Half-Life too short
CE-141	62.	145.44	2.6176E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	28.	293.26	1.1506E-05
CE-144	46.	133.54	8.4772E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	32.	91.10	9.6213E-08
PM-148M	15.	550.27	8.8809E-09
EU-152	38.	344.27	3.2143E-08
EU-154	12.	1004.76	5.3631E-08
EU-156	18.	646.29	1.9851E-07
HF-181	21.	482.03	1.0993E-08
TA-182	3.	1221.42	2.5316E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	44.	279.19	1.3238E-08
BI-207	27.	569.67	9.0941E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	42.	240.98	2.4592E-06
RA-226	48.	186.21	2.4826E-07
AC-228	36.	338.32	7.2130E-08
TH-228	26.	84.37	1.0589E-06
PA-234	0.	131.20	Half-Life too short
TH-234	43.	63.29	1.8574E-06
U-235	44.	143.76	7.8611E-08
NP-239	39.	106.13	2.0506E-06
AM-241	33.	59.54	2.0186E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-FB081804

Sample Location (Well Number): Field Blank

1. Representative sample collected. Date/Time 8/18/04 / 1440

Sample collected by: Jay Slaback / Jay Marie Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 8-18-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: John M Yoder / [signature] Date: 8-26-4
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 8/30/04
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No Tritium detected. William V. Lipton 48651 8/30/04

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-FB081804

Sample Location (Well Number): Field Blank

1. Representative sample collected. Date/Time 8/18/04 / 1440

Sample collected by: Jay Slaback / Jay Mark Slaback Date: 08-18-04
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coullard / [signature] Date: 8-18-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # DET 4

Performed by: C. McCoy / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-FB081804	
2 . Date Sampled	08/18/2004	
3 . Time Sampled	14:40	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	08/25/2004	
2 . Time Sample Counted	09:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.4	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3078.7	cpm
Net Spike Count Rate (cpm)	3071.3	cpm
H3 Spike Activity (dpm on count date)	9572.3	dpm
Counter Efficiency	0.3209	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.9	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.41E\text{-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 uCi/ml x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 8-26-4

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

Sample number: EFT- FB081804

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCay / [signature] Date: 8-19-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / [signature] Date: 8/24/2004
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks 1658.91 keV peak unidentified; does not match peak of any expected contaminant, can ignore.
No licensed radioactive material detected.
[signature] 4865 / 8/24/2004

DETROIT EDISON FERMI-2 POWER PLANT 19-AUG-2004 16:16:43.75

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-FB041804

Sample End Time: 18-AUG-2004 14:40:00.00

REMARKS 01-EN1584

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-FB081004 Acquisition date : 19-AUG-2004 15:46:38

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************
Sample ID Number: EFT-FB081004
Sample collection start date: 18-AUG-2004 14:40:00.00
Sample collection end date : 18-AUG-2004 14:40:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

**************************** Acquisition Parameters ****************************
Detector number : DET 4 Acquire date : 19-AUG-2004 15:46:38.70
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.20 Percent dead time : 0.05 %

**************************** Calibration Parameters ****************************
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00180E-01 Zero offset: -6.94196E-02
Daily cal date : 19-AUG-2004 08:51:58.73

**************************** Peak Search Parameters ****************************
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

************************ Nuclide Identification Parameters ************************
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	77.99	38	86	1.42	156.07	151	9	2.09E-02	48.8	Pb-212
2	0	295.35	77	62	1.18	590.73	584	12	4.27E-02	23.6	Pb214
3	0	352.42	114	95	1.60	704.87	696	18	6.34E-02	22.1	Pb214
4	0	510.96	111	74	1.45	1022.00	1014	16	6.14E-02	20.0	annihilation
5	0	558.55	64	33	1.60	1117.21	1113	13	3.53E-02	21.8	[illegible]
6	0	609.48	117	33	2.01	1219.09	1213	12	6.49E-02	13.5	Bi214
7	0	1460.95	85	0	2.32	2923.51	2912	20	4.72E-02	10.8	K40
8	0	1658.91	11	0	1.20	3320.00	3316	8	6.11E-03	30.2	unidentified

Sample Title : EFT-FB081804 Page : 1
Decay Time = 1 01:06:38.70 Acquisition Time = 19-AUG-2004 15:46:36.7
0

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	XErr	Fit	Nuclides
0	77.99	38	86	1.42	156.07	151	9	48.0		
0	295.35	77	62	1.18	590.73	584	12	23.6		
0	352.42	114	95	1.60	704.87	696	18	22.1		
0	510.96	111	74	1.45	1022.00	1014	16	20.0		
0	558.55	64	33	1.60	1117.21	1113	13	21.8		
0	609.40	117	33	2.01	1219.09	1213	12	13.5		
0	1460.95	65	0	2.32	2923.51	2912	20	10.8		K-40
0	1659.91	11	0	1.20	3320.00	3316	0	30.2		

Sample ID : EFT-FB081604 Acquisition date : 19-AUG-2004 15:46:38

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	85	10.67*	2.389E+00	5.007E-07	5.007E-07	10.85

Flag: "*" = Keyline

Sample ID : EFT-FB081804 Acquisition date : 19-AUG-2004 15:46:38

Total number of lines in spectrum	8	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	7	87.50%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	5.007E-07	5.007E-07	0.543E-07	10.85	
Total Activity :			5.007E-07	5.007E-07			
Grand Total Activity :			5.007E-07	5.007E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	13.47	511.00*	193.46	2.699E-04	20.01	Decay
	% Abundances Found =			100.00			
AS-76	26.32H	0.96	559.10*	44.70	9.164E-08	21.79	Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =			73.70			
R[redacted]103	39.35D	0.03	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	7.282E-07	13.50	
	% Abundances Found =			5.92			
BA-131	11.80D	0.09	78.76	0.73	3.252E-06	47.96	Abun.
			92.29	0.64	--- Not Found ---		
			123.80*	29.00	--- Not Found ---		
			133.61	2.16	--- Not Found ---		
			216.07	19.70	--- Not Found ---		
			239.62	2.40	--- Not Found ---		
			249.43	2.02	--- Not Found ---		
			373.24	14.00	--- Not Found ---		
			404.04	1.31	--- Not Found ---		
			480.40	0.32	--- Not Found ---		
			486.51	2.07	--- Not Found ---		
			496.31	46.80	--- Not Found ---		
			572.67	0.16	--- Not Found ---		
			585.03	1.22	--- Not Found ---		
			620.10	1.36	--- Not Found ---		
			923.85	0.73	--- Not Found ---		
			1047.57	1.17	--- Not Found ---		
	% Abundances Found =			0.58			
BA-142	10.70M	142.21	77.60	9.60	1.000E+35	47.96	Decay,Abun.
			231.52	10.10	--- Not Found ---		
			255.12*	16.00	--- Not Found ---		
			425.03	5.00	--- Not Found ---		
			894.90	11.00	--- Not Found ---		
			948.75	8.90	--- Not Found ---		
			1000.86	7.80	--- Not Found ---		
			1078.48	9.30	--- Not Found ---		
			1202.20	5.30	--- Not Found ---		

Sample ID : EFT-FS001004 Acquisition date : 19-AUG-2004 15:46:30

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
BA-142	10.70M	142.21	1204.06	14.00	--- Not Found ---		Decay,Abun.
	% Abundances		Found =	9.70			
PB-212	10.64H	2.30	74.81	10.70	--- Not Found ---		Abun.
			77.11	18.00	6.465E-07	47.96	
			87.30	0.00	--- Not Found ---		
			115.19	0.60	--- Not Found ---		
			238.63*	44.60	--- Not Found ---		
			300.09	3.41	--- Not Found ---		
	% Abundances		Found =	21.10	(Abn. Limit = 44.60%)		
BI-214	19.90M	76.47	609.31*	46.30	8.619E+15	13.50	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
	% Abundances		Found =	48.48	(Abn. Limit = 48.48%)		
PB-214	26.80M	56.78	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	1.232E+10	23.57	
			351.92*	37.20	1.005E+10	22.07	
			785.91	1.10	--- Not Found ---		
	% Abundances		Found =	80.96	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Sample ID : EFT-FB081804 Acquisition date : 19-AUG-2004 15:46:38

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Fw	Cts/Sec	%Err	%Eff	Flags
0	77.99	38	35	1.42	156.07	151	9	2.09E-02	40.0	2.54E+00	T
0	295.35	77	62	1.18	590.73	584	12	4.27E-02	23.6	5.88E+00	T
0	352.42	114	95	1.69	704.67	696	10	6.34E-02	22.1	5.52E+00	T
0	510.96	111	74	1.45	1022.00	1014	16	6.14E-02	20.0	4.74E+00	T
0	558.55	64	33	1.60	1117.21	1113	13	3.53E-02	21.8	4.55E+00	T
0	609.48	117	33	2.01	1219.09	1213	12	6.49E-02	13.5	4.39E+00	T
0	1650.91	11	0	1.20	3300.00	3316	0	6.11E-03	30.2	2.24E+00	

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 19-AUG-2004 16:16:49.29 *
****
* Sample ID : EFT-FD0081804 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.59	6.2450E-08
F-18	0.	511.00	Half-Life too short
NA-22	11.	1274.54	1.0599E-08
NA-24	6.	1368.53	2.7548E-08
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	16.	889.25	1.0457E-08
CR-51	52.	320.08	9.9214E-08
MN-54	14.	834.83	9.1765E-09
CO-56	18.	1238.25	1.9203E-08
MN-56	3.	1810.69	2.5321E-05
NI-56	51.	158.38	9.6769E-09
CO-57	33.	122.06	9.5204E-09
CO-58	17.	810.76	9.7960E-09
FE-59	11.	1099.22	1.7479E-08
CO-60	19.	1332.49	1.3665E-08
CU-64	9.	1345.90	1.3022E-05
NI-65	10.	1481.84	4.9308E-05
ZN-65	16.	1115.52	2.2843E-08
ZN-69M	30.	438.63	3.1374E-08
SE-75	42.	136.00	1.4203E-08
AS-76	82.	559.10	6.4725E-08
BR-82	17.	776.49	1.8175E-08
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	60.	513.99	2.8681E-06
KR-85M	50.	151.18	5.7641E-07
SR-85	60.	513.99	1.2562E-08
RB-86	7.	1076.63	9.4306E-08
KR-87	0.	402.58	Half-Life too short
SR-87M	37.	388.40	5.5895E-06
KR-88	49.	196.32	1.5496E-05
RB-88	0.	1382.39	Half-Life too short
Y-88	7.	1836.01	1.0767E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	46.	202.51	2.0791E-06
SR-91	12.	1024.30	1.0967E-07
Y-91	15.	1204.90	3.9187E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	13.	1383.94	8.7471E-06
Y-92	19.	934.46	1.1726E-05

Sample ID : EFT-FB081004 Acquisition date : 19-AUG-2004 15:46:30

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	530.28	Half-Life too short
Y-93	53.	266.90	7.5708E-07
NB-94	23.	702.63	9.3617E-09
NB-95	16.	765.79	9.1130E-09
NB-95M	36.	235.69	3.6810E-08
ZR-95	23.	756.72	1.0036E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	19.	743.36	2.6532E-08
MO-99	23.	739.58	1.0166E-07
TC-99M	69.	140.50	2.1499E-07
TC-101	0.	306.81	Half-Life too short
RU-103	23.	497.08	8.9476E-09
TC-104	0.	357.99	Half-Life too short
RH-105	51.	318.90	8.0643E-08
RU-105	24.	724.50	1.0722E-06
RU-106	11.	621.84	6.3403E-08
CD-109	38.	88.03	3.7301E-07
AG-110M	9.	937.48	2.4518E-08
SN-113	27.	391.69	1.1683E-08
SN-117M	50.	158.56	1.0274E-08
SB-122	21.	563.93	1.4642E-08
SB-124	30.	602.71	9.8725E-09
SB-125	28.	427.89	2.7204E-08
TE-125M	39.	109.28	3.5781E-06
TE-127	39.	417.90	6.0702E-06
TE-127M	26.	57.60	2.7319E-05
XE-127	42.	202.84	1.1650E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	26.	695.88	3.0612E-07
XE-129M	49.	196.56	1.9054E-07
I-130	27.	536.09	3.6218E-08
BA-131	38.	123.80	3.1674E-08
I-131	41.	364.48	1.1984E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	13.	773.67	3.8659E-08
XE-131M	51.	163.93	4.5780E-07
I-132	0.	667.69	Half-Life too short
TE-132	56.	228.16	1.3120E-08
BA-133	38.	302.84	4.5374E-08
BA-133M	43.	276.09	7.2686E-08
I-133	28.	529.87	2.3664E-08
TE-133M	0.	912.58	Half-Life too short
XE-133	32.	81.00	4.8443E-08
XE-133M	58.	233.22	1.2748E-07
CS-134	21.	604.70	8.4362E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	54.	268.24	1.0686E-07
I-135	6.	1260.41	4.1144E-07
XE-135	49.	249.79	6.7368E-08
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-FB081004 Acquisition date : 19-AUG-2004 15:46:38

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	20.	818.50	1.1137E-08
I-136	9.	1313.02	Half-Life too short
CS-137	21.	661.65	1.0090E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	58.	165.85	1.1157E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	24.	537.32	3.5271E-08
LA-140	10.	1596.49	1.8346E-08
BA-141	0.	190.22	Half-Life too short
CE-141	52.	145.44	1.8673E-08
LA-141	4.	1354.52	2.3979E-05
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	53.	293.26	3.7826E-08
CE-144	60.	133.54	9.2913E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	28.	91.10	4.2976E-08
PM-148M	19.	550.27	8.0533E-09
EU-152	41.	344.27	3.3189E-08
EU-154	15.	1004.76	5.9923E-08
EU-156	20.	646.29	1.2193E-07
HF-181	25.	482.03	9.9079E-09
TA-182	16.	1221.42	4.7452E-08
W-187	21.	685.81	6.3334E-08
RE-188	51.	155.03	1.6027E-07
HG-203	55.	279.19	1.2269E-08
BI-207	19.	569.67	7.8779E-09
TL-208	0.	583.14	Half-Life too short
PB-212	43.	238.63	9.6238E-08
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	73.	240.98	3.2505E-07
RA-226	68.	186.21	2.9122E-07
AC-228	28.	338.32	6.4309E-08
TH-228	48.	84.37	1.2807E-06
PA-234	45.	131.20	6.0033E-07
TH-234	47.	63.29	1.3796E-06
U-235	50.	143.76	8.3340E-08
NP-239	45.	106.13	6.5700E-08
AM-241	34.	59.54	2.0689E-07

October/November 2004

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-1S112304

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 11/25/04 / 0918

Sample collected by: JayMarie Slaback / JayMarie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coullard / [signature] Date: 12/27/04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected,

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Radiation Protection Supervision/Delegate Printed Name Signature

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-1S112304	
2 . Date Sampled	11/25/2004	
3 . Time Sampled	09:18	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:00	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.8	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-1S112304

Sample Location (Well Number): 1 Shallow

1. Representative sample collected. Date/Time 11/25/04 / 0918

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cavilland / [signature] Date: 11-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L McCoy / [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-1S112304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L.McCoy / J.McCoy Date: 12/28/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V Lipton William V Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks NO 1/13/2005 ~~positive~~ license material detected.
William V Lipton 48651 1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 10:34:46.94

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-1S112304

Sample End Time: 23-NOV-2004 09:10:00.00

REMARKS 198.87 keV peak cannot be identified; does not match any expected licensed material - can ignore.
William V. Lytton 48651 1/13/2005

PERFORMED BY:

[signature]
SIGNATURE

REVIEWED BY:

William V. Lytton 48651 / 1/13/2005
SIGNATURE/DATE

8

PAGE ____ of ____

Sample ID : EFT-1S112304 Acquisition date : 28-DEC-2004 10:04:42

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-1S112304
Sample collection start date: 23-NOV-2004 09:18:00.00
Sample collection end date : 23-NOV-2004 09:18:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 28-DEC-2004 10:04:42.25
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.00 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55789E-01
Daily cal date : 28-DEC-2004 10:02:01.27

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

	Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
	1	0	198.87	46	33	1.60	397.76	394	8	2.54E-02	27.2	unidentified
	2	0	511.49	103	61	2.06	1022.71	1016	15	5.71E-02	19.5	annihilation
>	3	0	558.35	44	24	1.34	1116.41	1110	12	2.44E-02	26.9	Bi-214
	4	0	1121.65	22	17	1.04	2243.54	2233	10	1.21E-02	50.4	K-40
	5	0	1461.24	65	9	2.30	2922.77	2913	17	3.61E-02	16.2	
	6	0	1763.92	13	7	1.35	3528.74	3523	10	7.06E-03	49.0	Bi-214

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	198.67	46	33	1.60	397.76	394	8	27.2		
0	511.49	103	61	2.06	1022.71	1016	15	19.5		
0	558.35	44	24	1.34	1116.41	1110	12	26.9		
0	1121.85	22	17	1.04	2243.54	2233	18	50.4		
0	1461.24	65	9	2.30	2922.77	2913	17	16.2		K-40
0	1763.92	13	7	1.35	3528.74	3523	10	49.0		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	65	10.67*	2.389E+00	3.820E-07	3.820E-07	16.15

Flag: "*" = Keyline

Sample ID : EFT-1S112304 Acquisition date : 28-DEC-2004 10:04:42

Total number of lines in spectrum	6	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	5	83.33%

Nuclide Type : natural

Nuclide	Hlife	0 Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.020E-07	3.020E-07	0.618E-07	16.15	
Total Activity :			3.020E-07	3.020E-07			
Grand Total Activity :			3.020E-07	3.020E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific ybn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18 <	109.74M	459.83	511.00*	193.46	1.000E+35	19.52	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.29	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	9.129E-07	27.22	
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.01			
AS-76	26.32H	31.95	559.10*	44.70	1.352E+02	26.89	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
		0	665.31	0.39	--- Not Found ---		
		0	740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
止			<1470.160	0.33	--- Not Found ---		
		0	1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
BI-214 0	19.90M	2535.76	609.31*	46.30	--- Not Found ---		Decay,Abun.
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	49.02	
		% Abundances Found =		16.54	(Abn. Limit = 48.48%)		

Flags: "*" = Keyline

Sample ID : EFT-1S112304 Acquisition date : 28-DEC-2004 10:04:42

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Fw	Cts/Sec	%Err	%Eff	Flags
	190.87	46	33	1.60	397.76	394	8	2.54E-02	27.2	6.35E+00	T
	511.49	103	61	2.06	1022.71	1016	15	5.71E-02	19.5	4.73E+00	T
0	558.35	44	24	1.34	1116.41	1110	12	2.44E-02	26.9	4.55E+00	T
0	1121.05	22	17	1.04	2243.54	2233	18	1.21E-02	50.4	2.78E+00	
0	1763.92	13	7	1.35	3528.74	3523	10	7.06E-03	49.0	2.16E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 10:34:51.99 *
****
* Sample ID : EFT-1S112304 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	15.	477.59	9.7207E-08
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	9.9837E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	17.	889.25	1.4266E-08
CR-51	22.	320.08	1.5795E-07
MN-54	19.	834.83	1.1106E-08
CO-56	15.	1238.25	2.4372E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	33.	158.38	3.7915E-07
CO-57	39.	122.06	1.1281E-08
CO-58	13.	810.76	1.2002E-08
FE-59	13.	1099.22	3.1319E-08
CO-60	11.	1332.49	1.1037E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	14.	1115.52	2.3462E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	22.	136.00	1.3016E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	43.	513.99	2.4725E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	43.	513.99	1.5480E-08
RB-86	12.	1076.63	4.2011E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	1.0375E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	8.	1204.90	4.5311E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-1S112304 Acquisition date : 28-DEC-2004 10:04:42

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	20.	702.63	8.9325E-09
NB-95	18.	765.79	1.0724E-08
NB-95M	42.	235.69	2.7023E-05
ZR-95	16.	756.72	2.2927E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	18.	497.08	1.4305E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	316.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	13.	621.84	7.2293E-08
CD-109	32.	88.03	3.5802E-07
AG-110M	11.	937.48	2.9132E-08
SN-113	27.	391.69	1.4409E-08
SN-117M	36.	158.56	4.9630E-08
SB-122	0.	563.93	Half-Life too short
SB-124	21.	602.71	1.2571E-08
SB-125	23.	427.89	2.5430E-08
TE-125M	28.	109.28	4.6224E-06
TE-127	0.	417.90	Half-Life too short
[redacted]127M	25.	57.60	3.3494E-05
[redacted]127	52.	202.84	2.4630E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	19.	695.88	5.3644E-07
XE-129M	47.	196.56	2.6460E-06
I-130	0.	536.09	Half-Life too short
BA-131	35.	123.80	2.2285E-07
I-131	18.	364.48	1.5748E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	35.	163.93	2.8034E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	35.	302.84	4.3746E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.67	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	22.	81.00	3.6989E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	8.6916E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide		Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136		12.	818.50	5.3022E-08
I-136		0.	1313.02	Half-Life too short
CS-137		14.	661.65	8.4271E-09
XE-137		0.	455.49	Half-Life too short
CS-138		0.	1435.86	Half-Life too short
XE-138		0.	258.31	Half-Life too short
BA-139		0.	1420.50	Half-Life too short
CE-139		39.	165.85	1.0950E-08
CS-139		0.	1283.23	Half-Life too short
BA-140		20.	537.32	2.0203E-07
LA-140		0.	1596.49	Half-Life too short
BA-141		0.	190.22	Half-Life too short
CE-141	S	33.	145.44	3.1584E-08
LA-141		0.	1354.52	Half-Life too short
BA-142		0.	255.12	Half-Life too short
LA-142		0.	641.17	Half-Life too short
CE-143		0.	293.26	Half-Life too short
CE-144		47.	133.54	8.9529E-08
PR-144		0.	1489.15	Half-Life too short
ND-147		33.	91.10	3.9392E-07
PM-148M		21.	550.27	1.4908E-08
EU-152		24.	344.27	2.5969E-08
EU-154		11.	1004.76	5.2937E-08
EU-156		10.	646.29	4.2383E-07
HF-181		21.	482.03	1.5899E-08
TA-182		10.	1221.42	4.4953E-08
W-187		0.	685.81	Half-Life too short
RE-188		0.	155.03	Half-Life too short
HG-203		37.	279.19	1.7024E-06
BI-207		10.	569.67	5.9402E-09
TL-208		0.	583.14	Half-Life too short
PB-212		0.	238.63	Half-Life too short
BI-214		0.	609.31	Half-Life too short
PB-214		0.	351.92	Half-Life too short
RA-224		39.	240.98	1.6291E-04
RA-226		40.	186.21	2.2927E-07
AC-228		34.	338.32	7.0600E-08
TH-228		30.	84.37	1.1599E-06
PA-234		0.	131.20	Half-Life too short
TH-234		25.	63.29	2.7490E-06
U-235		30.	143.76	6.5717E-08
NP-239		0.	106.13	Half-Life too short
AM-241		30.	59.54	1.9312E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-2S102604

Sample Location (Well Number): 2 Shallow

1. Representative sample collected. Date/Time 10/26/04 / 1020

Sample collected by: JoyMarieSlabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jcouillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected.

Performed by: William V. Lipton William V Lipton Date: 1/19/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2S102604	
2 . Date Sampled	1/26/2004	
3 . Time Sampled	10:20	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.5	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-2S102604

Sample Location (Well Number): 2 Shallow

1. Representative sample collected. Date/Time 10/26/04 / 1020

Sample collected by: Jay Marie Slaback / Jay Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Caulbard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-2S102604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. Jones Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected
William V. Lipton 4804 / 1/13/2005

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2S102604

Sample End Time: 26-OCT-2004 10:20:00.00

REMARKS _____

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-2S102604 Acquisition date : 28-DEC-2004 10:35:37

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-2S102604
Sample collection start date: 26-OCT-2004 10:20:00.00
Sample collection end date : 26-OCT-2004 10:20:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 28-DEC-2004 10:35:37.55
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.01 Percent dead time : 0.03 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55789E-01
Daily cal date : 28-DEC-2004 10:02:01.27

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.60	95	56	1.72	1022.92	1015	10	5.25E-02	21.5	annihilation
2	0	558.80	46	22	1.47	1117.32	1110	13	2.53E-02	26.1	Bi-214
3	0	1461.13	74	4	2.41	2922.54	2914	17	4.10E-02	13.3	K-40

Decay Time = 63 00:15:37.55 Acquisition Time = 28-DEC-2004 10:35:37.5
5

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.60	95	56	1.72	1022.92	1015	18	21.5		
0	558.80	46	22	1.47	1117.32	1110	13	26.1		
0	1461.13	74	4	2.41	2922.54	2914	17	13.3		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	74	10.67*	2.389E+00	4.351E-07	4.351E-07	13.27

Flag: "*" = Keyline

Sample ID : EFT-2S102604 Acquisition date : 28-DEC-2004 10:35:37

Total number of lines in spectrum 3
Number of unidentified lines 0
Number of lines tentatively identified by NID 3 100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.351E-07	4.351E-07	0.577E-07	13.27	
	Total Activity :		4.351E-07	4.351E-07			
	Grand Total Activity :		4.351E-07	4.351E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	826.96	511.00*	193.46	1.000E+35	21.53	Decay
	% Abundances Found = 100.00						
AS-76	26.32H	57.47	559.10*	44.70	6.709E+09	26.12	Decay,Abun.
	0		563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	Not Found		
			1216.02	3.04	--- Not Found ---		
	0		1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
	>		1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
	% Abundances Found = 73.70						

Flags: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
	511.60	95	56	1.72	1022.92	1015	18	5.25E-02	21.5	4.73E+00	T
0	558.00	46	22	1.47	1117.32	1110	13	2.53E-02	26.1	4.55E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 11:05:45.92

Sample ID : EFT-2S102604

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	17.	477.59	1.4790E-07
F-18	0.	511.00	Half-Life too short
NA-22	7.	1274.54	9.1869E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	12.	889.25	1.5302E-08
CR-51	28.	320.08	3.5082E-07
MN-54	13.	834.83	1.0115E-08
CO-56	26.	1238.25	3.9348E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	35.	122.06	1.1558E-08
CO-58	19.	810.76	1.8813E-08
FE-59	11.	1099.22	4.5759E-08
CO-60	6.	1332.49	8.6360E-09
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	10.	1115.52	2.2330E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.8838E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	36.	513.99	2.2970E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	36.	513.99	1.9300E-08
RB-86	11.	1076.63	1.1326E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	8.9182E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	7.2450E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-2S102604 Acquisition date : 28-DEC-2004 10:35:37

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	14.	702.63	7.4925E-09
NB-95	11.	765.79	2.6013E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	11.	756.72	2.6316E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	13.	497.08	2.0472E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	22.	621.84	9.6940E-08
CD-109	35.	88.03	3.9156E-07
AG-110M	12.	937.48	3.2530E-08
SN-113	20.	391.69	1.5026E-08
SN-117M	53.	158.56	2.4870E-07
SB-122	0.	563.93	Half-Life too short
SB-124	10.	602.71	1.6216E-08
SB-125	22.	427.89	2.5635E-08
TE-125M	31.	109.28	6.7812E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	26.	57.60	4.0305E-05
XE-127	42.	202.84	3.7835E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	9.7921E-07
XE-129M	47.	196.56	2.3325E-05
I-130	0.	536.09	Half-Life too short
BA-131	43.	123.80	1.2706E-06
I-131	28.	364.48	2.0978E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	36.	163.93	1.4672E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	36.	302.84	4.4574E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0 0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	11.	604.70	6.8203E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
CS-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	16.	818.50	2.6493E-07
I-136	0.	1313.02	Half-Life too short
CS-137	17.	661.65	9.2891E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	41.	165.85	1.2956E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	22.	537.32	9.7312E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	46.	145.44	6.6038E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	41.	133.54	9.0639E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	22.	91.10	1.9283E-06
PM-148M	19.	550.27	2.2760E-08
EU-152	24.	344.27	2.5961E-08
EU-154	11.	1004.76	5.3085E-08
EU-156	18.	646.29	1.9447E-06
HF-181	20.	482.03	2.4604E-08
TA-182	5.	1221.42	4.1061E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	31.	279.19	2.3752E-08
BI-207	20.	569.67	8.0582E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	49.	186.21	2.5056E-07
AC-228	26.	338.32	6.3876E-08
TH-228	33.	84.37	1.2561E-06
PA-234	0.	131.20	Half-Life too short
TH-234	25.	63.29	6.0931E-06
U-235	48.	143.76	8.1974E-08
NP-239	0.	106.13	Half-Life too short
AM-241	23.	59.54	1.7288E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 2D102604

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 10/26/04 / 1418

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR". No Tritium detected JWG 1/14/2005

Performed by: James May / Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected

Performed by: William V. Lipton, III / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2D102604	
2 . Date Sampled	10/26/2004	
3 . Time Sampled	14:18	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.5	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT 2D102604

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 10/26/04 / 1418

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-20102604

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / J. McCoy Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48451 / 1/13/2005

****

DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 11:44:19.68

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RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-2D102604

Sample End Time: 26-OCT-2004 14:18:00.00

REMARKS 66.63 keV peak unidentified - high error (57.99%) can ignore. William V Lipton 48651 1/13/2005

PERFORMED BY:

[signature] SIGNATURE

REVIEWED BY:

William V Lipton 48651 / 1/13/2005
SIGNATURE/DATE

PAGE ____ of ____

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************
Sample ID Number: EFT-2D102604
Sample collection start date: 26-OCT-2004 14:16:00.00
Sample collection end date : 26-OCT-2004 14:16:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

**************************** Acquisition Parameters ****************************
Detector number : DET 4 Acquire date : 28-DEC-2004 11:14:15.09
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.04 Percent dead time : 0.05 %

**************************** Calibration Parameters ****************************
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55789E-01
Daily cal date : 28-DEC-2004 10:02:01.27

**************************** Peak Search Parameters ****************************
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

************************ Nuclide Identification Parameters ************************
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m2ll Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	66.63	28	68	1.70	133.46	129	10	1.56E-02	57.9	unidentified
2	0	511.67	107	66	2.31	1023.07	1015	20	5.96E-02	21.3	annihilation
3	0	556.61	36	30	0.62	1116.92	1111	11	1.99E-02	34.0	BKG from Bi 214
4	0	610.60	23	41	1.24	1220.90	1214	14	1.29E-02	62.4	Bi 214
5	0	1461.49	63	8	2.56	2923.25	2915	14	3.52E-02	15.4	K40
6	0	1764.85	18	6	0.89	3530.61	3524	12	1.00E-02	36.0	Bi 214

Decay Time = 52 20:56:15.09 Acquisition Time = 28-DEC-2004 11:14:15.0
9

Gamt-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	66.63	20	60	1.70	133.46	129	10	57.9		
0	511.67	107	66	2.31	1023.07	1015	20	21.3		
0	550.61	36	30	0.66	1116.92	1111	11	34.0		
0	610.60	23	41	1.24	1220.90	1214	14	62.4		
0	1461.49	63	0	2.56	2923.25	2915	14	15.4		K-40
0	1764.95	10	6	0.89	3530.61	3524	12	36.0		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	63	10.67*	2.388E+00	3.733E-07	3.733E-07	15.43

Flags: "*" = Keyline

Sample ID : EFT-2D102604 Acquisition date : 28-DEC-2004 11:14:15

Total number of lines in spectrum 6
Number of unidentified lines 0
Number of lines tentatively identified by NID 6 100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	3.733E-07	3.733E-07	0.576E-07	15.43	
	Total Activity :		3.733E-07	3.733E-07			
	Grand Total Activity :		3.733E-07	3.733E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	825.14	511.00*	193.46	1.000E+35	21.30	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.52	66.05	1.02	4.290E-06	57.90	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			190.60	1.45	--- Not Found ---		
			264.65	59.00	--- Not Found ---		
			279.53	25.21	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.57			
AS-76	26.32H	57.34	559.10*	44.70	4.839E+09	34.01	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.60	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	4.309E-07	62.43	
		% Abundances Found =		5.92			
CS-136	13.16D	4.78	66.91	12.50	6.677E-06	57.90	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
PM-148M	41.30D	1.52	288.11	12.56	--- Not Found ---		Abun.
			414.07	18.66	--- Not Found ---		
			432.78	5.35	--- Not Found ---		
			501.26	6.75	--- Not Found ---		
			550.27*	94.90	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
PM-148M	41.30D	1.52	599.74	12.54	--- Not Found ---		Abun.
			611.26	5.46	4.179E-07	62.43	
			629.97	09.00	--- Not Found ---		
			725.70	32.80	--- Not Found ---		
			915.33	17.17	--- Not Found ---		
			1013.81	20.30	--- Not Found ---		
		% Abundances Found =		1.74			
TA-182	114.74D	0.55	67.75	42.30	1.051E-07	57.90	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			
BI-214	19.90M	4550.31	609.31*	46.30	--- Not Found ---		Decay,Abun.
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	36.00	
		% Abundances Found =		16.54	(Abn. Limit = 48.48%)		

Flags: "*" = Keyline

Sample ID : EFT-2D102604 Acquisition date : 28-DEC-2004 11:14:15

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flag
0	66.63	28	60	1.70	133.46	129	10	1.56E-02	57.9	1.39E+00	T
0	511.67	107	66	2.31	1023.07	1015	20	5.96E-02	21.3	4.73E+00	T
0	559.61	36	30	0.66	1116.92	1111	11	1.99E-02	34.0	4.55E+00	T
0	610.60	23	41	1.24	1220.90	1214	14	1.29E-02	62.4	4.38E+00	T
0	1764.85	10	6	0.89	3530.61	3524	12	1.00E-02	36.0	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 11:44:25.03

Sample ID : EFT-2D102604

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	24.	477.59	1.6877E-07
F-18	0.	511.00	Half-Life too short
NA-22	13.	1274.54	1.1906E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	10.	889.25	1.4142E-08
CR-51	30.	320.08	3.6357E-07
MN-54	10.	834.83	9.1335E-09
CO-56	15.	1238.25	3.1139E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	37.	122.06	1.1855E-08
CO-58	17.	810.76	1.7525E-08
FE-59	17.	1099.22	5.4423E-08
CO-60	22.	1332.49	1.5042E-08
CU-64	0.	1345.90	Half-Life too short
[illegible]65	0.	1481.84	Half-Life too short
[illegible]65	15.	1115.52	2.6096E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	31.	136.00	1.7620E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	43.	513.99	2.4888E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	43.	513.99	2.0381E-08
RB-86	7.	1076.63	9.3430E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	7.8865E-09
KR-89	0.	220.50	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	13.	1204.90	7.6159E-06
[illegible]1M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-2D102604 Acquisition date : 28-DEC-2004 11:14:15

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	10.	702.63	8.4132E-09
NB-95	12.	765.79	2.6809E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	12.	756.72	2.7509E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	23.	497.08	2.6709E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	15.	621.84	8.1176E-08
CD-109	20.	88.03	3.5261E-07
AG-110M	12.	937.48	3.2685E-08
SN-113	23.	391.69	1.5676E-08
SN-117M	37.	158.56	2.0919E-07
SB-122	0.	563.93	Half-Life too short
SB-124	20.	602.71	1.6974E-08
SB-125	24.	427.89	2.6676E-08
TE-125M	30.	109.28	6.6731E-06
TE-127	0.	<417.90	Half-Life too short
TE-127M	27.	57.60	4.1128E-05
XE-127	36.	202.84	3.5420E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	16.	695.88	8.9033E-07
XE-129M	51.	196.56	2.4137E-05
I-130	0.	536.09	Half-Life too short
BA-131	40.	123.80	1.2228E-06
I-131	30.	364.48	2.1507E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	43.	163.93	1.5662E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	35.	302.84	4.4231E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	8.9333E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : EFT-2D102604 Acquisition date : 28-DEC-2004 11:14:15

Nuclide	Bckgnd Sum		Energy (keV)		MDA (uCi/cc)
CS-136	12.		818.50		2.3883E-07
I-136	0.		1313.02		Half-Life too short
CS-137	16.		661.65		8.8931E-09
XE-137	0.		455.49		Half-Life too short
CS-138	0.		1435.86		Half-Life too short
XE-138	0.		258.31		Half-Life too short
BA-139	0.		1420.50	@	Half-Life too short
CE-139	53.		165.85		1.4533E-08
CS-139	0.		1283.23	@	Half-Life too short
BA-140	21.	>	537.32		9.4093E-07
LA-140	0.		1596.49		Half-Life too short
BA-141	0.		190.22	>	Half-Life too short
CE-141	35.		145.44		5.8568E-08
LA-141	0.		1354.52		Half-Life too short
BA-142	0.		255.12		Half-Life too short
LA-142	0.		641.17		Half-Life too short
CE-143	0.		293.26		Half-Life too short
CE-144	40.		133.54		8.9446E-08
PR-144	0.		1489.15		Half-Life too short
ND-147	32.		91.10		2.2442E-06
PM-148M	14.		550.27		2.0137E-08
EU-152	30.		344.27		2.8953E-08
EU-154	9.		1004.76		4.9224E-08
EU-156	17.		646.29		1.8982E-06
W-181	22.		482.03		2.5642E-08
TA-182	10.		1221.42		5.3465E-08
W-187	0.		685.81		Half-Life too short
RE-188	0.		155.03		Half-Life too short
HG-203	41.		279.19		2.7062E-08
BI-207	19.		569.67		7.8373E-09
TL-208	0.		583.14		Half-Life too short
PB-212	0.		238.63		Half-Life too short
BI-214	0.		609.31		Half-Life too short
PB-214	0.		351.92		Half-Life too short
RA-224	0.		240.98		Half-Life too short
RA-226	41.		186.21		2.3076E-07
AC-228	33.		338.32		7.0150E-08
TH-228	23.		84.37		1.0610E-06
PA-234	0.		131.20		Half-Life too short
TH-234	31.		63.29		6.6822E-06
U-235	38.		143.76		6.6172E-08
NP-239	0.		106.13		Half-Life too short
AM-241	25.		59.54		1.7887E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 2D112304

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 11/23/04 / 1030

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: Jane May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2D112304	
2 . Date Sampled	11/23/2004	
3 . Time Sampled	10:30	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.5	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.6	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT- 2D112304

Sample Location (Well Number): 2 Deep

1. Representative sample collected. Date/Time 11/23/04 / 1030

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-20112304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy J. James Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V. Lipton 4809 / 1/13/2005

THE DETROIT EDISON COMPANY

ENRICO FERMI II

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

Sample Identification EFT-2D112304

PERFORMED BY:

12/28/04

SIGNATURE/DATE

REVIEWED BY:

SIGNATURE/DATE

Detroit Edison Fermi-2 Power Plant 28-DEC-2004 12:49:38.05

Radiation Protection Gamma Spectroscopy Report

Sample Parameters

Sample ID Number: EFT-2D112304
Sample collection start date: 23-NOV-2004 10:30:00.00
Sample collection end date : 23-NOV-2004 10:30:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03
Sample geometry : M2LL Operator:

Acquisition Parameters

Detector number : DET 4 Acquire date : 28-DEC-2004 11:44:49.43
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.03 Percent dead time : 0.05 %

Calibration Parameters

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55709E-01
Daily cal date : 28-DEC-2004 10:02:01.27

Peak Search Parameters

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

Nuclide Identification Parameters

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	351.96	40	22	1.44	703.77	699	8	2.22E-02	25.0	
2	0	511.66	102	81	1.93	1023.06	1013	19	5.67E-02	23.3	
3	0	558.97	26	42	1.32	1117.65	1111	12	1.45E-02	53.2	
4	0	609.78	41	39	2.15	1219.25	1213	15	2.27E-02	34.0	
5	0	1461.25	75	5	1.77	2922.78	2914	19	4.16E-02	13.5	

Detroit Edison Fermi 2 Peak Report, Generated 20-DEC-2004 12:49:40.40

Sample ID : EFT-2D112304 Page_____of_____

Decay Time = 35 01:14:49.43 Deposition Time = 00:00:00.00

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	351.96	40	22	1.44	703.77	699	8	25.8		
0	511.66	102	81	1.93	1023.06	1013	19	23.3		
0	558.97	26	42	1.32	1117.65	1111	12	53.2		
0	609.78	41	39	2.15	1219.25	1213	15	34.0		
0	1461.25	75	5	1.77	2922.78	2914	19	13.5		K-40

Sample ID : EFT-2D112304 Acquisition date : 28-DEC-2004 11:44:49

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected (uCi)	Decay Corr (uCi)	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	4.417E-07	4.417E-07	0.597E-07	13.51	
	Total Activity :		4.417E-07	4.417E-07			
	Grand Total Activity :		4.417E-07	4.417E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi)	1-Sigma %Error	Rejected by
F-18	109.74M	460.09	511.00*	193.46	1.000E+35	23.31	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	31.97	559.10*	44.70	8.147E+01	53.21	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1707.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.89	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	4.625E-07	34.03	
		% Abundances Found =		5.92			
BI-214	19.90M	2537.18	609.31*	46.30	1.000E+35	34.03	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		
PB-214	26.80M	1883.95	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	25.81	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	351.96	40	22	1.44	703.77	699	8	2.22E-02	25.8	5.53E+00	T
0	511.66	102	81	1.93	1023.06	1013	19	5.67E-02	23.3	4.73E+00	T
0	558.97	26	42	1.32	1117.65	1111	12	1.45E-02	53.2	4.55E+00	T
0	609.78	41	39	2.15	1219.25	1213	15	2.27E-02	34.0	4.38E+00	T

Flags: "T" = Tentatively associated

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi)
BE-7	23.	477.59	1.1728E-07
F-18	0.	511.00	Half-Life too short
NA-22	8.	1274.54	9.4260E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.2689E-08
CR-51	32.	320.08	1.8707E-07
MN-54	13.	834.83	9.4026E-09
CO-56	9.	1238.25	1.9753E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	39.	158.38	4.0734E-07
CO-57	30.	122.06	1.0018E-08
CO-58	16.	810.76	1.3414E-08
FE-59	9.	1099.22	2.7263E-08
CO-60	11.	1332.49	1.1037E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	12.	1115.52	2.2451E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	38.	136.00	1.6467E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	47.	513.99	2.5792E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	47.	513.99	1.6152E-08
RB-86	8.	1076.63	3.5269E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	9.2009E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	10.	1204.90	4.9006E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	17.	702.63	8.3276E-09
NB-95	8.	765.79	1.3490E-08
NB-95M	40.	235.69	2.6584E-05

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi)
[redacted]95	21.	756.72	2.6160E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	10.	497.08	1.4535E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	15.	621.84	7.7468E-08
CD-109	33.	88.03	3.6703E-07
AG-110M	7.	937.48	2.3960E-08
SN-113	23.	391.69	1.3458E-08
SN-117M	37.	158.56	5.0773E-08
SB-122	0.	563.93	Half-Life too short
SB-124	17.	602.71	1.1530E-08
SB-125	20.	427.89	2.3892E-08
TE-125M	39.	109.28	5.3737E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	24.	57.60	3.2546E-05
XE-127	48.	202.84	2.3726E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	25.	695.88	6.0814E-07
XE-129M	46.	196.56	2.6314E-06
[redacted]30	0.	536.09	Half-Life too short
[redacted]-131	40.	123.80	2.3679E-07
I-131	28.	364.48	1.8881E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	35.	163.93	2.8238E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	31.	302.84	4.1367E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	25.	81.00	3.9115E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	8.7195E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short
CS-136	11.	818.50	5.0844E-08
I-136	0.	1313.02	Half-Life too short
CS-137	19.	661.65	9.6981E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-4 $ 102504

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 10/25/04 / 1122

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Gaillard / [signature] Date: 12.27.04
Printed Name Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

No tritium detected.

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V Lipton Date: 1/19/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-2S102504	
2 . Date Sampled	10/25/2004	
3 . Time Sampled	11:22	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:40	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.2	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.3	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-4S102504

Sample Location (Well Number): 4 Shallow

1. Representative sample collected. Date/Time 10/25/04 / 1122

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-45102504

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William Vilpton [signature] Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48651 / 1/13/2005

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DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 12:47:32.87

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RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4S102504

Sample End Time: 25-OCT-2004 11:22:00.00

REMARKS: 67.47 KeV peak unidentified. ~~High~~ Low FWHM (0.96) - can ignore
William V Lipton 48651 / 1/13/2005

PERFORMED BY:

SIGNATURE

REVIEWED BY:

William V Lipton 48651 / 1/13/2005

SIGNATURE/DATE

PAGE ______ of ______

Sample ID : EFT-4S102504 Acquisition date : 28-DEC-2004 12:17:28

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: EFT-4S102504
Sample collection start date: 25-OCT-2004 11:22:00.00
Sample collection end date : 25-OCT-2004 11:22:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 28-DEC-2004 12:17:30.74
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.05 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55709E-01
Daily cal date : 28-DEC-2004 10:02:01.27

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	67.47	45	57	0.96	135.15	129	12	2.50E-02	37.4	unidentified
2	0	196.16	70	67	1.20	396.33	391	12	3.89E-02	26.2	Ac-228
3	0	511.86	80	54	1.59	1023.44	1016	14	4.43E-02	22.8	annihilation
4	0	609.82	41	25	1.57	1219.32	1213	13	2.26E-02	30.2	Bi-214
5	0	1460.80	74	7	2.66	2921.88	2913	16	4.10E-02	14.4	K-40
6	0	1765.11	32	0	3.75	3531.13	3524	13	1.78E-02	17.7	Bi-214

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	67.47	45	57	0.96	135.15	129	12	37.4		
0	196.16	70	67	1.30	396.33	391	12	26.2		
0	511.86	80	54	1.50	1023.44	1016	14	22.6		
0	609.82	41	25	1.57	1219.32	1213	13	30.2		
0	1460.80	74	7	2.66	2921.68	2913	16	14.4		K-40
0	1765.11	32	0	3.75	3531.13	3524	13	17.7		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	74	10.67*	2.389E+00	4.345E-07	4.345E-07	14.41

Flags: "*" = Keyline

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	6	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.02	4.345E-07	4.345E-07	0.626E-07	14.41	
Total Activity :			4.345E-07	4.345E-07			
Grand Total Activity :			4.345E-07	4.345E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
N-13	109.74M	840.45	511.00*	193.46	1.000E+35	22.80	8Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.53	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			170.68	1.45	1.651E-06	26.16	
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
RU-103	39.35D	1.63	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	7.688E-07	30.16	
		% Abundances Found =		5.92			
CS-136	13.16D	4.87	66.91	12.50	1.065E-05	37.39	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		8% Abundances Found =		4.10			
TA-182	114.74D	0.56	67.75	42.30	1.589E-07	37.39	Abun.
			100.10	14.10	--- Not Found ---		
			1189.05	16.30	--- Not Found ---		
			1221.42*	27.10	--- Not Found ---		
			1230.97	11.50	--- Not Found ---		
		% Abundances Found =		38.01			
BI-214	19.90M	4634.70	609.31*	46.30	1.000E+35	30.16	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	17.68	
		% Abundances Found =		65.03	(Abn. Limit = 40.48%)		

Flags: "*" = Keyline

Sample ID : EFT-4S102504 Acquisition date : 28-DEC-2004 12:17:28

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	67.47	45	57	0.96	135.15	129	12	2.50E-02	37.4	1.48E+00	T
0	198.16	70	67	1.30	396.33	391	12	3.89E-02	26.2	6.36E+00	T
0	511.86	80	54	1.59	1023.44	1016	14	4.43E-02	22.8	4.73E+00	T
0	609.82	41	25	1.57	1219.32	1213	13	2.26E-02	30.2	4.38E+00	T
0	1765.11	32	0	3.75	3531.13	3524	13	1.78E-02	17.7	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 12:47:38.27

Sample ID : EFT-451025504

Minimum Detectable Activity Report

Nuclide	Bckgnd. Sum	Energy (keV)	MDA (uCi/cc)
ZE-7	27.	477.59	1.8265E-07
F-18	6.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0145E-08
NA-24	8.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	8.	889.25	1.3056E-08
CR-51	27.	320.08	3.5420E-07
MN-54	13.	834.83	1.0256E-08
CO-56	20.	1238.25	3.5410E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	42.	122.06	1.2517E-08
CO-58	15.	810.76	1.6856E-08
FE-59	13.	1099.22	4.9142E-08
CO-60	9.	1332.49	1.0208E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
[redacted]65	7.	1115.52	1.9130E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	40.	136.00	1.9986E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	41.	513.99	2.4212E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	41.	513.99	2.0564E-08
RB-86	11.	1076.63	1.1560E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.5133E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	10.	1204.90	6.8718E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	21.	702.63	9.0452E-09
NB-95	13.	765.79	2.9714E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	13.	756.72	2.0790E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	22.	497.08	2.6748E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	14.	621.84	8.0494E-08
CD-109	24.	88.03	3.3070E-07
AG-110M	14.	937.48	3.4906E-08
SN-113	32.	391.69	1.8303E-08
SN-117M	45.	158.56	2.4171E-07
SB-122	0.	563.93	Half-Life too short
SB-124	27.	602.71	1.9681E-08
SB-125	33.	427.89	3.0485E-08
TE-125M	30.	109.28	6.7443E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	22.	57.60	3.7891E-05
XE-127	41.	202.84	3.8303E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	12.	695.88	8.0109E-07
XE-129M	51.	196.56	2.6221E-05
I-130	0.	536.09	Half-Life too short
BA-131	45.	123.80	1.3831E-06
I-131	28.	364.48	2.3200E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	47.	163.93	1.7605E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	31.	302.84	4.1676E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	24.	604.70	9.5135E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	BckgndSum	Energy (keV)	MDA (uCi/cc)
CS-136	17.	818.50	2.8585E-07
I-136	0.	1313.02	Half-Life too short
CS-137	17.	661.65	9.1254E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	22.	1402.50	Half-Life too short
CE-139	40.	165.85	1.2990E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	21.	537.32	1.0076E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	40.	145.44	6.8989E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	36.	133.54	8.4991E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	26.	91.10	2.2158E-06
PM-148M	17.	550.27	2.2025E-08
EU-152	34.	344.27	3.0823E-08
EU-154	7.	1004.76	4.3409E-08
EU-156	20.	646.29	2.1452E-06
[redacted]181	23.	482.03	2.6779E-08
TH-182	13.	1221.42	6.0395E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	37.	279.19	2.6087E-08
BI-207	24.	569.67	8.7070E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	44.	186.21	2.3842E-07
AC-228	31.	338.32	6.9086E-08
TH-228	38.	84.37	1.3270E-06
PA-234	0.	131.20	Half-Life too short
TH-234	29.	63.29	6.7052E-06
U-235	37.	143.76	7.2896E-08
NP-239	0.	106.13	Half-Life too short
AM-241	33.	59.54	2.0365E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT. 4D102004

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 10/20/04 / 1443

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-4D102004	
2 . Date Sampled	10/20/2004	
3 . Time Sampled	14:43	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	08:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.2	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.3	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-4D102004

Sample Location (Well Number): 4 Deep

1. Representative sample collected. Date/Time 10/20/04 / 1443

Sample collected by: Jay Marie Slabach / Jay Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L.McCoy / [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

Sample number: EFT - 4D1020 04

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L McCoy L McCoy Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipten William V Lipten Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipten 46451 1/14/2005

****

DETROIT EDISON FERMI-2 POWER PLANT   28-DEC-2004 14:09:20.25

****

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-4D102004

Sample End Time: 20-OCT-2004 14:43:00.00

REMARKS 199.30 KeV peak unidentified, High error (63.2%) low FWHM (0.65) can ignore. [signature] 48651 1/13/05

PERFORMED BY:

[signature] SIGNATURE

REVIEWED BY:

[signature] 48651 / 1/13/2005
SIGNATURE/DATE

PAGE_____of_____

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

****************************** Sample Parameters ******************************

Sample ID Number: EFT-4D102004
Sample collection start date: 20-OCT-2004 14:43:00.00
Sample collection end date : 20-OCT-2004 14:43:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

************************** Acquisition Parameters **************************

Detector number : DET 4 Acquire date : 28-DEC-2004 13:05:46.09
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.04 Percent dead time : 0.05 %

************************** Calibration Parameters **************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55789E-01
Daily cal date : 28-DEC-2004 10:02:01.27

************************** Peak Search Parameters **************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********************** Nuclide Identification Parameters **********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	199.30	23	60	0.65	398.61	394	8	1.25E-02	63.9	Unidentified
2	0	351.99	21	22	1.97	703.82	700	7	1.16E-02	40.3	Pb 214
3	0	512.03	135	44	2.65	1023.78	1015	23	7.49E-02	16.2	annihilation
4	0	558.82	52	30	0.99	1117.35	1107	15	2.89E-02	26.8	[illegible]
5	0	1460.93	77	4	1.45	2922.15	2914	15	4.28E-02	12.7	K-40
6	0	1764.61	32	0	2.60	3530.13	3522	16	1.78E-02	17.7	Bi 214

Post-NID Peak Search Report

Ib	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	199.30	23	60	0.65	398.61	394	8	63.2		
0	351.99	21	22	1.97	703.02	700	7	40.3		
0	516.03	135	44	2.65	1023.76	1015	03	16.2		
0	550.62	58	38	3.09	1117.35	1107	15	26.6		
0	1460.91	77	4	1.45	2922.15	2914	15	12.7		K-40
0	1764.61	32	0	2.50	3530.13	3522	16	17.7		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	77	10.67*	2.389E+00	4.538E-07	4.530E-07	12.66

Flag: "*" = Keyline

Sample ID : EFT-4D10E004 Acquisition date : 25-DEC-2004 13:35:46

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	6	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.538E-07	4.538E-07	0.574E-07	12.66	
	Total Activity :		4.538E-07	4.538E-07			
	Grand Total Activity :		4.538E-07	4.538E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[illegible]8	109.74M	904.94	511.00*	193.46	1.000E+35	16.19	Decay
		% Abundances Found =		193.46			
SE-75	119.78D	0.50	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	5.478E-07	63.21	
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	Not Found		
			400.65	11.43	--- Not Found ---		
		% Abundances Found =		0.01			
AG-76	26.32H	62.00	559.10*	44.70	3.272E+11	26.82	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	9.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.67	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
BI-214	19.90M	4990.34	609.31*	46.30	--- Not Found ---		Decay,Abun.
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	17.60	
		% Abundances Found =		16.54	(Abn. Limit = 40.48%)		
PB-214	26.80M	3705.51	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	40.27	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cps/Sec	%Err	%Eff	Flags
0	199.30	23	60	0.65	398.61	394	8	1.25E-02	63.2	5.35E+00	T
0	351.99	21	52	1.97	703.82	700	7	1.16E-02	40.3	5.53E+00	T
0	512.03	135	44	2.65	1023.78	1015	23	7.49E-02	16.2	4.73E+00	T
0	556.82	52	30	0.99	1117.35	1107	15	2.89E-02	26.8	4.55E+00	T
0	1764.61	32	0	2.60	3530.13	3522	16	1.78E-02	17.7	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 14:09:25.44

Sample ID : EFT-4D102004

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	37.	477.59	1.9401E-07
F-18	0.	511.00	Half-Life too short
MO-99	13.	1274.54	1.1935E-06
NA-24	0.	1368.53	Half-Life too short
TC-99	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
CO-48	13.	839.25	1.7889E-08
CR-51	26.	320.08	4.0690E-07
MN-54	13.	834.83	1.0136E-08
CO-56	21.	1238.25	3.7409E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	41.	122.06	1.2562E-08
CO-58	8.	810.76	1.3560E-08
FE-59	11.	1099.22	4.9336E-08
CO-60	9.	1332.49	1.0259E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	0.	1115.52	2.1640E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	43.	136.00	2.1303E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	38.	513.99	2.3475E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	38.	513.99	2.0996E-08
RB-86	14.	1076.63	1.5817E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	1.4210E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	7.7916E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	14.	702.63	7.6611E-09
NB-95	13.	765.79	3.6590E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	16.	756.72	3.3271E-08
NB-97	0.	657.90	Half Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.56	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	66.	497.08	2.0046E-08
TC-104	0.	357.90	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	19.	621.84	9.1806E-08
CD-109	25.	88.03	3.3690E-07
AG-110M	3.	937.48	1.9008E-08
SN-113	29.	391.69	1.0265E-08
SN-117M	36.	158.56	2.8187E-07
SB-122	0.	563.93	Half-Life too short
SB-124	23.	602.71	1.9402E-08
SB-125	35.	427.89	3.1636E-08
TE-125M	38.	109.28	8.0012E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	34.	57.60	4.7070E-05
XE-127	50.	202.84	4.6013E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	22.	695.88	1.1609E-06
XE-129M	39.	196.56	3.4257E-05
I-130	0.	536.09	Half-Life too short
BA-131	32.	123.80	1.5780E-06
I-131	30.	364.48	3.6347E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	32.	163.93	1.9737E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	32.	302.84	4.2371E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	24.	604.70	9.4546E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	12.	818.50	3.1068E-07
I-136	0.	1313.02	Half-Life too short
CS-137	9.	661.65	6.9107E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-137	0.	1436.58	Half-Life too short
CE-139	42.	165.85	1.3587E-08
CS-139	0.	1053.23	Half-Life too short
BA-140	22.	537.32	1.3295E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.23	Half-Life too short
CE-141	30.	145.44	6.8834E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	32.	133.54	8.2060E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	32.	91.10	3.2977E-06
PM-140M	17.	550.27	2.3919E-08
EU-152	31.	344.27	2.9319E-08
EU-154	7.	1004.76	4.4389E-08
EU-156	20.	646.29	2.7131E-08
[redacted]-101	22.	482.03	2.0306E-08
[redacted]-102	11.	1221.42	5.7452E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	32.	279.19	2.6525E-08
BI-207	31.	569.67	9.7696E-09
TL-200	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	45.	186.21	2.4062E-07
AC-228	25.	338.32	6.2784E-08
TH-228	34.	84.37	1.2796E-06
PA-234	0.	131.28	Half-Life too short
TH-234	22.	63.29	6.9288E-06
U-235	40.	143.76	7.5328E-08
NP-239	0.	106.13	Half-Life too short
AM-241	28.	59.54	1.8983E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-5S102004

Sample Location (Well Number): 5 Shallow

1. Representative sample collected. Date/Time 10/20/04 / 0920

Sample collected by: Joy Marie Sloback / Joy Marie Sloback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cavillard / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected

Performed by: William V. Lipton / [signature] Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-5S102004	
2 . Date Sampled	10/20/2004	
3 . Time Sampled	09:20	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:00	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.8	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}} \Big/ \text{Efficiency x 2.22E6 dpm/uCi x Sample Volume} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-SS102004

Sample Location (Well Number): S Shallow

1. Representative sample collected. Date/Time 10/20/04 / 0920

Sample collected by: Joy Marie Stabnik Joy Marie Stabnik Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Goulland / Jon Goulland Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy [signature] Date: 12/28/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-SS102004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L.M. [illegible] Date: 12/28/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 1/13/05
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48051 1/13/05

DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 14:35:47.85

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-SS102004

Sample End Time: 20-OCT-2004 09:20:00.00

REMARKS 662.5 keV and 610.74 keV peaks unidentified, do not match peaks for any expected licensed material - can ignore. William V Lytn 48651 1/13/2005

PERFORMED BY:

[illegible] SIGNATURE

REVIEWED BY:

William V Lytn 48651 / 1/13/2005
SIGNATURE/DATE

PAGE_____ of _____

Sample ID : EFT-SS102004 Acquisition date : 28-DEC-2004 14:09:44

Fermi 2 Radiation Protection Gamma Spectroscopy Report

Sample Parameters

Sample ID Number: EFT-SS102004
Sample collection start date: 20-OCT-2004 09:20:00.00
Sample collection end date : 20-OCT-2004 09:20:00.00
Type of sample : 1 L Marl. Liquid
Sample quantity : 1.000000E+00 ea
Sample geometry : MALL Operator: LKM

Acquisition Parameters

Detector number : DET 4 Acquire date : 28-DEC-2004 14:09:44.15
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.04 Percent dead time : 0.05 %

Calibration Parameters

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55709E-01
Daily cal date : 28-DEC-2004 10:02:01.27

Peak Search Parameters

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

Nuclide Identification Parameters

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	66.25	45	49	1.16	132.70	129	0	2.52E-02	30.7	unidentified Pb214
2	0	352.49	33	63	1.37	704.62	698	11	1.04E-02	49.5	annihilation
3	0	511.10	97	42	1.13	1021.93	1016	12	5.39E-02	16.8	Bi-214 Cs-134m
4	0	559.02	41	26	1.10	1117.76	1112	13	2.20E-02	30.0	
5	0	610.74	73	11	2.51	1221.16	1213	20	4.03E-02	17.4	unidentified Pb214
6	0	691.86	19	10	3.30	1383.39	1376	14	1.04E-02	43.2	
7	0	1461.20	76	4	1.67	2922.67	2915	15	3.90E-02	13.4	K-40

Post-NID Peak Search Report

Ib	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	66.25	45	49	1.16	132.78	129	8	38.7		
0	352.49	33	63	1.37	704.62	698	11	49.5		
0	511.12	37	45	1.13	1021.37	1016	10	16.8		
0	559.02	41	26	1.10	1117.76	1112	13	30.0		
0	610.74	73	11	2.51	1221.16	1213	22	17.1		
0	691.86	19	10	3.30	1383.39	1376	14	43.2		
0	1461.23	78	1	1.67	2922.67	2915	13	13.4		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	70	10.67%	2.389E+00	4.140E-07	4.140E-07	13.35

Flag: "*" = Keyline

Sample ID : EFT-SS102004 Acquisition date : 28-DEC-2004 14:05:44

Total number of lines in spectrum	7	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	7	100.00%

Nuclide Type : natural

Nuclide	Half-life	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.28E+09Y	1.00	4.140E-07	4.140E-07	8.553E-07	13.33	
Total Activity :			4.140E-07	4.140E-07			
Grand Total Activity :			4.140E-07	4.140E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	908.19	511.00*	193.46	1.000E-35	16.75	Decay
		% Abundances Found =		100.00			
CE-75	119.70D	8.58	66.05	1.02	7.410E-06	30.67	Abun.
			96.73	3.41	--- Not Found ---		
			121.12	10.78	Not Found		
			135.00*	59.20	--- Not Found ---		
			198.60	1.45	-- Not Found --		
			264.66	59.00	--- Not Found ---		
			279.53	25.20	-- Not Found --		
			303.91	1.32	--- Not Found ---		
			400.65	11.10	-- Not Found --		
		% Abundances Found =		0.57			
AS-76	26.32H	63.11	559.10*	44.70	3.010E+11	30.02	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1189.67	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.76	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	1.503E-06	17.30	
		% Abundances Found =		5.92			
SB-122	2.70D	25.63	563.93*	70.60	--- Not Found ---		Decay,Abun.
			692.80	3.70	9.008E+00	43.19	
		% Abundances Found =		4.98			
CS-136	13.16D	5.26	66.91	12.50	1.551E-05	30.67	Abun.
			86.29	6.30	--- Not Found ---		
			153.22	7.46	--- Not Found ---		
			163.89	4.61	--- Not Found ---		
			176.55	13.56	--- Not Found ---		
			273.65	12.66	--- Not Found ---		
			340.57	48.50	--- Not Found ---		
			818.50*	99.70	--- Not Found ---		
			1048.07	79.60	--- Not Found ---		
			1235.34	19.70	--- Not Found ---		
		% Abundances Found =		4.10			
PM-148M	41.30D	1.68	288.11	12.56	--- Not Found ---		Abun.

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity 1-Sigma (uCi/cc)	%Error	Rejected by
PM-148M	41.30D	1.68	414.07	18.66	--- Not Found ---		Abun.
			432.70	5.35	--- Not Found ---		
			501.26	6.75	--- Not Found ---		
			550.27*	94.98	--- Not Found ---		
			599.74	12.54	--- Not Found ---		
			611.26	3.48	1.450E-06	17.38	
			620.97	60.20	--- Not Found ---		
			725.70	32.00	--- Not Found ---		
			915.33	17.17	--- Not Found ---		
			1013.01	28.30	--- Not Found ---		
	% Abundances Found =			1.74			
PB-214	26.80M	3710.83	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	49.46	
			785.91	1.10	--- Not Found ---		
	% Abundances Found =			53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

Pk	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	66.25	45	49	1.16	132.79	129	6	2.52E-02	30.7	1.35E+00	T
0	352.49	33	63	1.37	704.82	698	11	1.84E-02	49.5	5.52E+00	T
0	511.10	97	42	1.13	1021.93	1016	12	5.39E-02	16.9	4.74E+00	T
0	559.02	41	26	1.10	1117.76	1112	13	2.28E-02	30.0	4.55E+00	T
0	610.74	73	11	2.51	1221.16	1213	20	4.03E-02	17.4	4.30E+00	T
0	791.66	17	10	3.30	1583.30	1573	14	1.04E-02	42.2	4.05E+00	T

Flags: "T" - Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 26-DEC-2004 14:39:53.12

Sample ID : EFT-53102004

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	80.	477.59	1.9600E-07
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0156E-08
NA-24	0.	1368.53	Half Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	14.	889.25	1.7057E-08
CR-51	20.	320.08	4.1293E-07
MN-54	11.	834.83	9.4230E-09
CO-56	16.	1238.25	3.3147E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	32.	122.06	1.1164E-08
CO-58	15.	810.76	1.7936E-08
FE-59	10.	1099.22	4.9379E-08
CO-60	10.	1332.49	1.0691E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	2.1543E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	47.	136.00	2.2115E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	38.	513.99	2.3336E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	38.	513.99	2.8926E-08
RB-86	10.	1076.63	1.3652E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	1.	1836.01	8.2178E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	14.	1204.90	8.5823E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	17.	702.63	8.1717E-09
NB-95	14.	765.79	3.2454E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	16.	756.72	3.3024E-08
NB-97	0.	657.98	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	25.	497.08	3.0812E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	21.	621.84	9.5849E-08
CD-109	35.	88.03	3.9365E-07
AG-110M	13.	937.46	3.4547E-08
SN-113	26.	391.69	1.7353E-08
SN-117M	45.	158.56	3.1512E-07
SB-122	0.	563.93	Half-Life too short
SB-124	19.	602.71	1.7076E-08
SB-125	25.	427.89	2.6985E-08
TE-125M	34.	109.28	7.5703E-06
I-127	0.	417.90	Half-Life too short
TE-127M	22.	57.60	3.9230E-05
XE-127	44.	202.84	4.3669E-08
TE-129	0.	459.50	Half-Life too short
TE-129M	13.	695.88	9.3298E-07
XE-129M	46.	196.56	3.7688E-05
I-130	0.	536.09	Half-Life too short
BA-131	31.	183.80	1.5648E-06
I-131	25.	364.48	3.4217E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	42.	163.93	2.2600E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	27.	302.84	3.9383E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	20.	604.70	8.7782E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	17.	818.50	3.6771E-07
I-136	0.	1313.00	Half-Life too short
CS-137	19.	661.65	9.5432E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.80	Half-Life too short
XE-138	0.	258.31	Half-Life too short
CS-139	0.	1420.50	Half-Life too short
CE-139	46.	165.85	1.4170E-08
CS-139	0.	1013.23	Half-Life too short
BA-140	21.	537.32	1.3324E-08
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.28	Half-Life too short
CE-141	45.	145.44	7.5206E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	41.	133.54	9.2017E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	32.	91.10	3.3636E-06
PM-148M	17.	550.27	2.4172E-08
EU-152	33.	344.27	3.9193E-08
EU-154	10.	1004.76	5.1087E-08
EU-156	11.	646.29	2.0691E-06
HF-181	16.	482.03	2.4666E-08
TA-182	11.	1221.42	5.7013E-08
W-187	0.	685.81	Half-Life too short
RE-186	0.	155.03	Half-Life too short
HG-203	48.	279.19	3.1917E-08
BI-207	30.	569.67	9.6644E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	47.	186.21	2.4643E-07
AC-228	35.	338.32	7.2962E-08
TH-228	33.	84.37	1.2595E-06
PA-234	0.	131.20	Half-Life too short
TH-234	39.	63.29	8.9863E-06
U-235	42.	143.76	7.7085E-08
NP-239	0.	106.13	Half-Life too short
AM-241	26.	59.54	-1.8321E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-SD102004

Sample Location (Well Number): S Deep

1. Representative sample collected. Date/Time 10/20/04 / 1105

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couilland / Jcouillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / JRM Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium Detected.

Performed by: William V. Lipton William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-5D102004	
2 . Date Sampled	10/20/2004	
3 . Time Sampled	11:05	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:10	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.5	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT. 5D102004

Sample Location (Well Number): 5Deep

1. Representative sample collected. Date/Time 10/20/04 / 1105

Sample collected by: Joy Marie Slabaugh / Joy Marie Slabaugh Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: C. McCoy / [signature] Date: 12/29/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-5D102004

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 12-28-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipka / William V. Lipka Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected. William V. Lipka 48659/1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 15:40:26.75

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-5D102004

Sample End Time: 20-OCT-2004 11:05:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-SD102004 Acquisition date : 28-DEC-2004 15:13:21

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-SD102004
Sample collection start date: 20-OCT-2004 11:05:00.00
Sample collection end date : 20-OCT-2004 11:05:00.00
Type of sample : 1 L Marl. 'liquid'
Sample quantity : 1.000000E+03 cc
Sample geometry : MELL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 28-DEC-2004 13:13:01.43
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.02
Elapsed real time : 0 00:30:01.06 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55709E-01
Daily cal date : 28-DEC-2004 10:02:01.27

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.66	134	41	2.02	1023.04	1016	17	7.44E-02	14.1	annihilation
2	0	558.92	35	26	3.62	1117.55	1109	15	1.97E-02	35.7	Hf-181
3	0	609.29	53	9	2.04	1218.26	1214	9	2.94E-02	17.1	Bi-214
4	0	1460.86	72	3	2.63	2922.00	2915	13	3.98E-02	12.9	K-40

Sample Title : EFT-SD102004 Page : 1
Decay Time = 69 04:13:21.43 Acquisition Time = 28-DEC-2004 15:10:21.4
3

Ge-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.66	134	41	2.62	1023.04	1016	17	14.1		
0	556.92	38	26	3.62	1117.55	1109	15	35.7		
0	600.20	53	0	2.84	1210.86	1204	0	17.1		
0	1460.86	72	3	2.83	2922.00	2915	13	12.9		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	72	10.67*	2.389E+00	4.217E-07	4.217E-07	12.92

Flags: "*" = Keyline

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.217E-07	4.217E-07	8.545E-07	12.92	
	Total Activity :		4.217E-07	4.217E-07			
	Grand Total Activity :		4.217E-07	4.217E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : CFT-SD102004 Acquisition date : 28-DEC-2004 15:16:21

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	907.06	511.00*	193.46	1.000E+35	14.08	Decay
		% Abundances Found =		100.00			
AG-76	26.32H	63.09	559.10*	44.70	2.564E+11	35.67	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.38	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.18	3.12	--- Not Found ---		
			771.76	3.12	--- Not Found ---		
			887.63	0.12	--- Not Found ---		
			1120.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.76	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	1.096E-06	17.11	
		% Abundances Found =		5.92			
XE-135	9.11H	102.27	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.09	1.000E+35	17.11	
		% Abundances Found =		3.11			
SI-214	19.90M	5006.45	609.31*	46.30	1.000E+35	17.11	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		40.40	(Abn. Limit = 40.40%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Fw	Cts/Sec	%Err	%Eff	Flags
2	511.66	134	41	2.02	1023.04	1016	17	7.44E-02	14.1	4.73E+00	T
0	558.02	35	26	3.62	1117.55	1109	15	1.97E-02	35.7	4.55E+00	T
3	609.29	53	9	2.04	1218.26	1214	9	2.94E-02	17.1	4.39E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 15:48:31.73 *
****
* Sample ID : EFT-5D10E304
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/ml)
BE-7	25.	477.59	1.5644E-07
F-18	0.	511.00	Half-Life too short
NA-22	15.	1274.54	1.2568E-08
NA-24	0.	1368.53	Half Life too short
MG-27	0.	1014.44	Half Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	3.	1293.64	Half-Life too short
SC-46	14.	889.25	1.7183E-08
CR-51	37.	320.08	4.6854E-07
MN-54	12.	834.83	9.9944E-09
CO-56	16.	1238.25	3.3274E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	36.	122.06	1.1872E-08
CO-58	12.	810.76	1.6608E-08
FE-59	6.	1099.22	3.9155E-08
CO-60	14.	1332.49	1.2334E-05
CU-64	0.	1345.98	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.6887E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	50.	136.00	2.2859E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	43.	513.99	2.4965E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	43.	513.99	2.2381E-08
RB-86	17.	1076.63	1.7139E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	1.3413E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	9.	1204.90	6.9990E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	598.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	13.	702.63	7.3160E-09
NB-95	11.	765.79	2.0057E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	16.	756.72	3.3140E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	14.	497.05	2.3694E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	21.	621.84	9.6443E-08
CD-109	33.	88.03	3.8380E-07
AG-110M	13.	937.48	3.4923E-08
SN-113	30.	391.69	1.8585E-08
SN-117M	45.	158.56	3.1553E-07
SB-122	0.	563.93	Half-Life too short
SB-124	24.	602.71	1.9758E-08
SB-125	21.	427.89	2.4949E-08
TE-125M	28.	109.28	6.9738E-06
[redacted]-127	0.	417.90	Half-Life too short
TE-127M	19.	57.60	3.6708E-05
XE-127	47.	202.84	4.4908E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	1.1186E-06
XE-129M	36.	196.56	3.3428E-05
I-130	0.	536.09	Half-Life too short
BA-131	34.	123.80	1.6390E-06
I-131	30.	364.48	3.7260E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	31.	163.93	1.9629E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	33.	302.84	4.2882E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	28.	604.70	1.0166E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
[redacted]-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum		Energy (keV)	MDA (uCi/cc)
CS-135	10.		818.50	2.9204E-07
I-136	0.		1313.00	Half-Life too short
CS-137	12.		661.65	9.5826E-09
XE-137	0.		455.49	Half-Life too short
CS-138	2.		1435.84	Half-Life too short
XE-138	0.		258.31	Half-Life too short
BA-139	0.		1420.50	Half-Life too short
CE-139	40.		165.85	1.3159E-08
CS-139	0.		1383.20	Half-Life too short
BA-140	23.		537.32	1.3704E-06
LA-140	0.		1596.49	Half-Life too short
BA-141	0.		190.22	Half-Life too short
CE-141	50.		145.44	7.8451E-08
LA-141	0.		1354.52	Half-Life too short
BA-142	0.		255.12	Half-Life too short
LA-142	0.		641.17	Half-Life too short
CE-143	0.		293.26	Half-Life too short
CE-144	41.	<	133.54	9.1551E-08
PR-144	0.		1489.15	Half-Life too short
ND-147	24.		91.10	2.9476E-06
PM-148M	19.		550.27	2.5601E-08
EU-152	38.		344.27	3.2210E-08
EU-154	7.		1004.76	4.4391E-08
EU-156	11.		646.29	2.0720E-06
HF-181	31.		482.03	3.3152E-08
TA-182	6.		1221.42	4.5471E-08
W-187	0.		685.81	Half-Life too short
RE-188	0.		155.03	Half-Life too short
HG-203	38.		279.19	2.8742E-08
BI-207	18.		569.67	7.7046E-09
TL-200	0.		583.14	Half-Life too short
PB-212	0.		238.63	Half-Life too short
BI-214	0.		609.31	Half-Life too short
PB-214	0.		351.92	Half-Life too short
RA-224	0.		240.98	Half-Life too short
RA-226	49.		186.21	2.5090E-07
AC-228	27.		338.32	6.4341E-08
TH-228	38.		84.37	1.3358E-06
PA-234	0.		131.20	Half-Life too short
TH-234	39.		63.29	8.9690E-06
U-235	49.		143.76	8.2328E-08
NP-239	6.		106.13	Half-Life too short
AM-241	26.		59.54	1.8218E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-6S101904

Sample Location (Well Number): 6 Shallow

1. Representative sample collected. Date/Time 10/19/04 / 1522

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6S101904	
2 . Date Sampled	10/19/2004	
3 . Time Sampled	15:22	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.2	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.3	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

Sample number: EFT- 65101904

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L McCoy / J. McCoy Date: 12/28/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipka William V. Lipka Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected. William V. Lipka 48681/1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 28-DEC-2004 15:17:35.75

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-GS101904

Sample End Time: 19-OCT-2004 15:22:00.00

REMARKS 1015.12 keV peak unidentified. Does not match peak of any expected licensed material. Can ignore.
William V. Lipton 48051 / 1/13/2005

PERFORMED BY:

J. McG
SIGNATURE

REVIEWED BY:

William V. Lipton 48051 / 1/13/2005
SIGNATURE/DATE

PAGE _____ of _____

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

************************* Sample Parameters *************************

Sample ID Number: EFT-68101904
Sample collection start date: 19-OCT-2004 15:22:00.00
Sample collection end date : 19-OCT-2004 15:22:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M211 Operator: LKM

************************* Acquisition Parameters *************************

Detector number : DET 4 Acquire date : 28-DEC-2004 14:47:30.00
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.02 Percent dead time : 0.05 %

************************* Calibration Parameters *************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00433E-01 Zero offset: -1.55789E-01
Daily cal date : 28-DEC-2004 10:02:01.27

************************* Peak Search Parameters *************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********************* Nuclide Identification Parameters *********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.71	89	66	2.61	1023.15	1015	17	4.95E-02	24.1	annihilation
2	0	559.03	38	40	1.61	1117.76	1111>	16	2.11E-02	40.6	Hg-Hf/Hm
3	0	609.81	27	23	1.47	1219.31	1214	10	1.50E-02	39.3	Bi214
4	0	1015.12	16	0	1.09	2030.00	2025	11	8.89E-03	25.0	unidentified
5	0	1461.86	82	4	1.50	2922.44	2915	15	4.57E-02	12.2	K40

Peak-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.71	99	66	2.61	1023.15	1015	17	24.1		
0	559.03	38	40	1.61	1117.76	1111	16	40.6		
0	609.61	27	23	1.47	1219.31	1214	10	39.3		
0	1015.12	16	0	1.69	2030.00	2025	11	25.8		
0	1461.60	62	4	1.58	2922.44	2915	15	18.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	82	10.67*	2.389E+00	4.045E-07	4.045E-07	12.16

Flag: "*" = Keyline

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.845E-07	4.845E-07	8.539E-07	12.16	
	Total Activity :		4.845E-07	4.845E-07			
	Grand Total Activity :		4.845E-07	4.845E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
AG-108	109.74M	910.36	511.00*	193.46	1.000E+35	24.11	Decay
		% Abundances Found =		100.00			
MG-27	9.46M	10655.58	843.76	71.80	--- Not Found ---		Decay,Abun.
			1014.44*	28.00	1.000E+35	25.00	
		% Abundances Found =		28.06			
AS-76	26.32H	63.62	559.10*	44.70	4.565E+11	40.60	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.03	6.16	--- Not Found		
			665.31	0.39	--- Not Found ---		
			748.12	0.12	Not Found		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
BR-84	31.80M	3169.20	604.80 @	1.80	--- Not Found ---		Decay,Abun.
			736.50	1.31	--- Not Found ---		
			802.20	6.10	--- Not Found ---		
			881.50*	42.00	--- Not Found ---		
			1015.90	6.20	1.000E+35	25.00	
			1213.30	2.60	--- Not Found ---		
			1463.80	2.00	--- Not Found ---		
			1741.20	1.60	--- Not Found ---		
			1877.50	1.14	--- Not Found ---		
			1897.30	14.90	--- Not Found ---		
			2029.60	2.10	--- Not Found ---		
		% Abundances Found =		7.50			
RU-103	39.35D	1.78	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	5.661E-07	39.31	
		% Abundances Found =		5.92			
BI-214	19.90M	5064.35	609.31*	46.30	1.000E+35	39.31	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		

Flags: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.71	89	66	2.61	1023.15	1015	17	4.95E-02	24.1	4.73E+00	T
0	559.03	38	40	1.61	1117.76	1111	16	2.11E-02	40.6	4.55E+00	T
0	609.81	27	23	1.47	1219.31	1214	10	1.50E-02	39.3	4.38E+00	T
0	1015.12	16	0	1.09	2030.00	2025	11	8.89E-03	25.0	2.91E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 28-DEC-2004 15:17:42.00 *
****
* Sample ID : EFT-S0101904 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	26.	477.39	1.9475E-07
F-18	3.	511.00	Half-Life too short
NA-22	7.	1274.54	9.2077E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
SI-31	0.	1266.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	10.	889.25	1.4937E-08
CR-51	35.	320.08	4.6652E-07
MN-54	8.	834.83	8.4023E-09
CO-56	16.	1238.25	3.3999E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	31.	122.06	1.1017E-08
CO-58	13.	810.76	1.6879E-08
FE-59	9.	1099.22	4.5891E-08
CO-60	13.	1332.49	1.1907E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
[redacted]65	13.	1115.52	2.5343E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	43.	136.00	2.1433E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
SR-85	0.	802.41	Half-Life too short
KR-85	38.	513.99	2.3449E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	38.	513.99	2.1199E-08
RB-86	8.	1076.63	1.2995E-08
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.5352E-08
KR-89	0.	220.98	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	8.	1024.39	Half-Life too short
Y-91	18.	1204.98	7.4631E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]92	8.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	598.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	12.	702.63	7.0354E-09
NB-95	18.	765.79	3.6958E-08
NB-95M	6.	235.69	Half-Life too short
ZR-95	11.	756.72	2.0168E-08
NB-97	8.	657.93	Half-Life too short
ZR-97	0.	743.35	Half-Life too short
MO-99	2.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	17.	497.08	2.6584E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.58	Half-Life too short
RU-106	16.	621.84	8.5703E-08
CD-109	27.	88.03	3.5472E-07
AG-110M	13.	937.48	3.4882E-08
SN-113	30.	391.69	1.8557E-08
SN-117M	37.	158.56	3.0015E-07
SB-122	0.	563.93	Half-Life too short
SB-124	19.	602.71	1.8059E-08
SB-125	21.	427.89	2.5238E-08
TE-125M	37.	109.28	7.9851E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	25.	57.60	4.1706E-05
XE-127	52.	202.84	4.7713E-06
TE-129	0.	459.60	Half-Life too short
TE-129M	13.	695.88	9.3941E-07
XE-129M	38.	196.56	3.6734E-05
I-130	0.	536.09	Half-Life too short
BA-131	28.	123.80	1.5631E-06
I-131	30.	364.48	3.9474E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	38.	163.93	2.2674E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	36.	302.84	4.4702E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	25.	604.70	9.6096E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	10.	818.50	3.0924E-07
I-136	0.	1313.02	Half-Life too short
CS-137	17.	661.65	9.3834E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
I-139	2.	1420.50	Half-Life too short
BE-139	34.	165.85	1.2295E-08
CS-139	0.	1263.63	Half-Life too short
BA-140	21.	537.32	1.3095E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.28	Half-Life too short
CE-141	42.	145.44	7.4832E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	28.	133.54	7.7463E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	23.	91.10	3.0604E-06
PM-148M	16.	550.27	2.5134E-08
EU-152	25.	344.27	2.6639E-08
EU-154	11.	1004.76	5.2993E-08
EU-156	15.	646.29	2.4591E-06
[redacted]-181	18.	482.63	2.6297E-08
[redacted]-182	13.	1221.42	6.1065E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	33.	279.19	2.7263E-06
BI-207	25.	569.67	8.8856E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214 0	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	54.	186.21	2.6316E-07
AC-228	36.	338.32	7.4011E-08
TH-228	39.	84.37	1.3618E-06
PA-234	0.	131.20	Half-Life too short
TH-234	24.	63.29	< 7.3267E-06
U-235	44.	143.76	7.9027E-08
NP-239	0.	106.13	Half-Life too short
AM-241	22.	59.54	0 1.5771E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT - 6D101904

Sample Location (Well Number): 6 Deep

1. Representative sample collected. Date/Time 10/19/04 / 1342

Sample collected by: Jay Slabach / Jay Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Gouillard / Jon Gouillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / James May Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

_____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6D101904	
2 . Date Sampled	10/19/2004	
3 . Time Sampled	13:42	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.9	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-6D101904

Sample Location (Well Number): 6 Deep

1. Representative sample collected. Date/Time 10/19/04 / 1342

Sample collected by: Joy Marie Slobodk / Joy Marie Slobodk Date: 10-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 12/29/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-6D101904

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 12/29/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V. Lipton 4869 / 1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 09:14:24.55

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6D101904

Sample End Time: 19-OCT-2004 13:42:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-6D101904 Acquisition date : 29-DEC-2004 00:44:20

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-6D101904
Sample collection start date: 19-OCT-2004 13:42:00.00
Sample collection end date : 19 OCT 2004 13:42:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 29-DEC-2004 00:44:20.43
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.43 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 00:39:30.00

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	294.70	99	39	1.62	589.39	582	13	5.50E-02	16.4	Pb214
2	0	352.44	81	60	1.17	704.31	700	12	4.48E-02	24.9	Pb214
3	0	511.46	64	83	2.89	1022.72	1017	13	3.54E-02	32.6	annihilation
4	0	600.93	23	15	3.36	1201.72	1196	10	1.30E-02	37.2	Bi214
5	0	609.42	119	31	0.90	1218.60	1211	16	6.60E-02	14.0	Bi214
6	0	1120.39	41	3	1.57	2240.66	2235	11	2.30E-02	17.4	Bi214
7	0	1154.19	14	0	1.50	2308.29	2304	9	7.70E-03	26.7	Bi214
8	0	1461.19	61	4	2.30	2922.69	2914	15	3.38E-02	14.6	K40

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	294.70	99	39	1.62	589.33	582	13	16.4		
0	352.44	51	80	1.17	704.91	700	12	24.9		
0	511.46	64	83	2.09	1022.72	1017	13	32.6		
0	600.96	23	15	3.36	1201.72	1196	10	37.2		
0	609.42	119	31	0.90	1218.60	1211	16	14.9		
0	1120.39	41	3	1.57	2240.66	2235	11	17.4		
0	1154.19	14	0	1.50	2308.29	2304	9	26.7		
0	1461.19	61	4	2.32	2922.69	2914	15	14.6		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.61	61	10.67*	2.389E+00	3.553E-07	3.583E-07	14.62

Flag: "*" = Keyline

Sample ID : EFT-6D101904 Acquisition date : 29-DEC-2004 08:44:20

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	6	100.00%

Nuclide Type : natural

Nuclide	Half-life	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+05Y	1.00	3.503E-07	3.503E-07	0.524E-07	14.62	
	Total Activity :		3.503E-07	3.503E-07			
	Grand Total Activity :		3.503E-07	3.503E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	929.08	511.00*	193.46	1.000E+35	32.60	Decay
		% Abundances Found =		100.00			
SC-46	83.83D	0.84	142.53	68.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	4.012E-08	17.37	
		% Abundances Found =		38.07			
RU-103	39.35D	1.00	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.69	8.530E-06	14.03	
		% Abundances Found =		5.02			
SB-125	2.77Y	0.07	176.33	6.80	--- Not Found ---		Abun.
			380.44	1.50	--- Not Found ---		
			427.89*	29.33	--- Not Found ---		
			463.30	10.35	--- Not Found ---		
			600.56	17.80	4.690E-08	37.22	
			606.64	5.02	--- Not Found ---		
			635.90	11.32	--- Not Found ---		
			671.41	1.81	--- Not Found ---		
		% Abundances Found =		21.19			
TE-131	25.00M	4078.29	149.72*	68.90	--- Not Found ---		Decay,Abun.
			452.32	10.22	--- Not Found ---		
			492.66	4.84	--- Not Found ---		
			602.04	4.20	1.000E+35	37.23	
			654.26	1.53	--- Not Found ---		
			948.54	2.26	--- Not Found ---		
			997.25	3.34	--- Not Found ---		
			1146.96	4.96	--- Not Found ---		
		% Abundances Found =		3.80			
XE-135	9.11H	186.53	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.00	1.000E+35	14.03	
		% Abundances Found =		3.11			
PM-148M	41.30D	1.71	288.11	12.56	--- Not Found ---		Abun.
			414.07	10.66	--- Not Found ---		
			432.78	5.35	--- Not Found ---		
			501.26	6.75	--- Not Found ---		
			550.27*	94.90	--- Not Found ---		
			599.74	12.54	2.081E-07	37.22	
			611.26	5.48	--- Not Found ---		
			629.97	89.00	--- Not Found ---		
			725.70	32.60	--- Not Found ---		
			915.33	17.17	--- Not Found ---		
			1013.61	20.30	--- Not Found ---		
		% Abundances Found =		3.97			
EU-156	15.19D	4.66	88.96	9.80	--- Not Found ---		Abun.
			646.29*	7.10	--- Not Found ---		
			723.47	6.00	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
EU-156	15.19D	4.66	811.77	10.40	--- Not Found ---		Abun.
			1065.14	5.20	--- Not Found ---		
			1153.47	7.20	2.696E-06	26.73	
			1154.09	5.30	3.662E-06	26.73	
			1230.71	6.90	--- Not Found ---		
			1242.42	6.80	--- Not Found ---		
		% Abundances Found =		10.97			
BI-214	19.90M	3123.48	609.31*	46.30	1.000E+35	14.03	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	17.37	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.00	--- Not Found ---		
		% Abundances Found =		64.29	(Abn. Limit = 48.48%)		
PB-214	26.80M	3804.38	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	1.000E+35	16.44	
			351.92*	37.20	1.000E+35	24.93	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		80.96	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	294.70	99	39	1.62	569.39	562	13	5.50E-02	16.4	5.83E+00	T
0	352.44	81	60	1.17	704.81	700	12	4.46E-02	24.9	5.52E+00	T
0	511.46	64	83	2.09	1022.72	1017	13	3.54E-02	32.6	4.73E+00	T
0	600.98	23	15	3.36	1201.72	1196	10	1.30E-02	37.2	4.41E+00	T
0	609.42	119	31	0.98	1218.60	1211	16	6.60E-02	14.0	4.39E+00	T
0	1108.39	41	3	1.57	2240.66	2235	11	2.30E-02	17.4	3.78E+00	T
0	1154.19	14	0	1.50	2308.29	2304	9	7.78E-03	26.7	2.74E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 09:14:38.17 *
****
* Sample ID: EFT-6D101704
****

Minimum Detectable Activity Report

Nuclide	BckGnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	12.	477.59	1.4129E-07
F 18	8.	511.00	Half-Life too short
NA-22	4.	1274.54	7.3284E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	11.	889.25	1.5676E-08
CR-51	36.	320.08	4.6081E-07
MN-54	19.	834.83	1.2136E-08
CO-56	22.	1238.25	3.0626E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	36.	122.06	1.1839E-08
CO-58	19.	810.76	2.0228E-08
FE-59	10.	1099.22	5.0171E-08
CO-60	12.	1332.49	1.1373E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	2.1640E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	38.	136.00	2.0235E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	40.	513.99	2.4148E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	40.	513.99	2.2019E-08
RB-86	13.	1076.63	1.6208E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.5697E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	13.	1204.90	8.4737E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EFT-6D101904 Acquisition date : 29-DEC-2004 00:44:20

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	19.	702.63	3.6834E-08
NB-95	13.	765.79	3.2861E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	17.	756.72	3.4446E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half Life too short
MO-99	0.	739.53	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	15.	497.08	2.5578E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	17.	621.84	8.8864E-08
CD-109	45.	88.03	4.4417E-07
AG-110M	10.	937.48	3.1538E-08
SN-113	29.	391.69	1.8277E-08
SN-117M	51.	158.56	3.6289E-07
SB-122	0.	563.93	Half-Life too short
SB-124	29.	602.71	2.1875E-08
[illegible]-125	26.	427.89	2.7402E-08
[illegible]-125M	36.	109.28	7.9115E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	33.	57.60	4.7202E-05
XE-127	52.	202.84	4.0668E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	13.	695.85	9.5007E-07
XE-129M	49.	196.56	4.3925E-05
I-130	0.	536.09	Half-Life too short
BA-131	43.	123.80	2.0122E-06
I-131	38.	364.48	4.7652E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	43.	163.93	2.5011E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	35.	302.84	4.4377E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	20.	604.70	8.8555E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
[illegible]-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	17.	818.50	4.0344E-07
I-136	0.	1313.02	Half-Life too short
CS-137	14.	661.65	3.4327E-07
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.96	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	46.	165.85	1.4147E-08
CS-139	0.	1263.23	Half-Life too short
BA-140	26.	537.32	1.5763E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	43.	145.44	7.5866E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	41.	133.54	9.2447E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	41.	91.10	4.1360E-06
PM-148M	20.	550.27	2.6837E-08
EU-152	46.	344.27	3.5093E-08
EU-154	9.	1004.76	4.8155E-08
EU-156	23.	646.29	3.1399E-06
HF-181	23.	482.03	2.9809E-08
TA-182	9.	1221.42	5.2871E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	2.8051E-06
BI-207	23.	569.67	8.6340E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	49.	186.21	2.5065E-07
AC-228	36.	338.32	7.3370E-08
TH-228	43.	84.37	1.4129E-06
PA-234	0.	131.28	Half-Life too short
TH-234	41.	63.29	9.6349E-06
U-235	52.	143.76	8.5085E-08
NP-239	0.	106.13	Half-Life too short
AM-241	35.	59.54	2.0792E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT · 6D101904D

Sample Location (Well Number): 6Deep

1. Representative sample collected. Date/Time 10/19/04 / 1400

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cailliard / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium Detected

Performed by: William V. Lipton / William V Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-6D101904D	
2 . Date Sampled	10/19/2004	
3 . Time Sampled	14:00	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:40	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.2	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.3	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-6D101904D

Sample Location (Well Number): 6 Deep

1. Representative sample collected. Date/Time 10-19-04 / 1400

Sample collected by: JoyMarie Slabach / JoyMarie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 12/29/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-6D101904D

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L McCoy / J McCoy Date: 12/29/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William Wrighton / William Wrighton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected
William Wrighton 48651 1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 09:46:10.03

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-6D101904D

Sample End Time: 19-OCT-2004 14:00:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-6D1019D4D Acquisition date : 29-DEC-2004 09:16:12

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-6D1019D4D
Sample collection start date: 19-OCT-2004 14:00:00.00
Sample collection end date : 19-OCT-2004 14:00:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : MELL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 29-DEC-2004 09:16:12.10
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.06 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:38.00

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	190.54	39	56	0.71	397.20	394	9	2.16E-02	37.9	At 228 annihilation KE
2	0	511.43	95	50	2.30	1022.66	1016	14	5.30E-02	19.9	
3	0	1460.90	80	0	2.39	2922.27	2914	15	4.44E-02	11.2	

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	198.54	39	56	0.71	397.20	394	9	37.9		
0	511.43	95	58	2.30	1022.66	1016	14	19.9		
0	1460.98	80	0	2.39	2922.27	2914	15	11.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	80	10.67*	2.389E+00	4.713E-07	4.713E-07	11.16

Flag: "*" = Keyline

Sample ID : EFT-6D101904D Acquisition date : 29-DEC-2004 09:16:12

Total number of lines in spectrum	3	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	3	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.713E-07	4.713E-07	0.527E-07	11.18	
Total Activity :			4.713E-07	4.713E-07			
Grand Total Activity :			4.713E-07	4.713E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E"> = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	929.21	511.00*	193.46	1.000E+35	19.92	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.59	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	9.626E-07	37.95	
			264.65	59.00	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
B	198.54	39	56	0.71	397.20	394	9	2.18E-02	37.9	5.36E+00	T
	511.43	95	50	2.30	1022.66	1016	14	5.30E-02	19.9	4.73E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 09:46:22.07
****
* Sample ID : EFT-6D1019040
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	12.	477.59	1.4072E-07
F 18	0.	511.00	Half-Life too short
NA-22	10.	1274.54	1.0716E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	19.	889.25	2.0137E-08
CR-51	32.	320.08	4.5489E-07
MN-54	12.	834.83	1.0008E-08
CO-56	17.	1238.25	3.4632E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	34.	122.06	1.1601E-08
CO-58	14.	810.76	1.7861E-08
FE-59	16.	1099.22	6.0531E-08
CO-60	20.	1332.49	1.4557E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	19.	1115.52	2.9771E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	45.	136.00	2.2017E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	36.	513.99	2.3030E-06
KR-85M	8.	151.18	Half-Life too short
SR-85	36.	513.99	2.1002E-08
RB-86	5.	1076.63	1.0577E-06
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	2.	1836.01	1.0479E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.86	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	12.	1204.90	8.1910E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Sample ID : EF7-6D1019040 Acquisition date : 29-DEC-2004 09:16:12

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
[redacted]-93	0.	598.28	Half-Life too short
[redacted]-93	0.	266.90	Half-Life too short
NB-94	10.	702.63	8.3775E-09
NB-95	21.	765.79	4.0704E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	17.	756.72	3.4480E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.56	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	26.	497.08	3.2122E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	14.	621.84	8.0729E-08
CD-109	37.	88.03	4.0674E-07
AG-110M	11.	937.48	3.2706E-08
SN-113	25.	391.69	1.7359E-08
SN-117M	35.	158.56	3.0344E-07
SB-122	0.	563.93	Half-Life too short
SB-124	30.	602.71	2.2294E-08
SB-125	19.	427.89	2.4160E-08
TE-125M	37.	109.28	8.0311E-06
TE-127	0.	417.90	Half-Life too short
[redacted]-127M	20.	57.60	3.7372E-05
[redacted]-127	46.	202.84	4.6004E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	17.	695.88	1.0606E-06
XE-129M	51.	196.56	4.4479E-05
I-130	0.	536.89	Half-Life too short
BA-131	22.	123.80	1.4922E-06
I-131	32.	364.48	4.3974E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	34.	163.93	2.2624E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	26.	302.84	3.8671E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	35.	604.70	1.1314E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgrd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	17.	818.50	4.0547E-07
I-136	0.	1313.02	Half-Life too short
CS-137	23.	661.65	1.0527E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	34.	165.85	1.2411E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	22.	537.32	1.4615E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	51.	145.44	8.6023E-09
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	46.	133.54	9.6752E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	24.	91.10	3.2679E-06
PM-148M	27.	550.27	3.0488E-08
EU-152	38.	344.27	3.2084E-08
EU-154	11.	1004.76	5.3637E-08
EU-156	16.	646.29	2.6312E-06
HF-181	23.	482.03	2.9839E-08
TA-182	10.	1221.42	5.5771E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	41.	279.19	3.0216E-08
BI-207	20.	569.67	8.0517E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	46.	186.21	2.4441E-07
AC-228	33.	338.32	7.0797E-08
TH-228	35.	84.37	1.2894E-06
PA-234	0.	131.20	Half-Life too short
TH-234	49.	63.29	1.0391E-05
U-235	55.	143.76	8.6828E-06
NP-239	0.	106.13	Half-Life too short
AM-241	24.	59.54	1.7724E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-7S110104

Sample Location (Well Number): 7 Shallow

1. Representative sample collected. Date/Time 11/01/04 / 1052

Sample collected by: Jay Marie Slaback / Jay Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12.27.04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium Detected.

Performed by: William V. Lipton / [signature] Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-7S110104	
2 . Date Sampled	11/01/2004	
3 . Time Sampled	10:52	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	09:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-7S110104

Sample Location (Well Number): 7 Shallow

1. Representative sample collected. Date/Time 11/01/04 / 1052

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulland / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McC Date: 12/29/04
Fermi 2 RP Printed Name Signature

Sample number: EFT-7S110104

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy / [signature] Date: 12/25/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / [signature] Date: 1/11/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48651 / 1/13/2005

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-7S110104

Sample End Time: 1-NOV-2004 10:52:00.00

REMARKS

PERFORMED BY:

SIGNATURE

0 REVIEWED BY:

SIGNATURE/DATE

Sample ID : EFT-7S110104 Acquisition date : 29-DEC-2004 09:47:43

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-7S110104
Sample collection start date: 1-NOV-2004 10:52:00.00
Sample collection end date : 1-NOV-2004 10:52:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : MALL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 29-DEC-2004 09:47:43.36
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.33 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00452E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:30.00

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	510.89	137	27	2.60	1021.50	1012	18	7.61E-02	12.3	Annihilation
2	0	558.64	55	16	1.24	1117.06	1111	13	3.03E-02	20.4	Bi-214
3	0	610.14	37	42	1.13	1220.03	1213	14	2.06E-02	40.6	Bi-214
4	0	1460.77	83	5	2.47	2921.06	2914	17	4.64E-02	12.3	K40

Peak-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	510.69	137	27	2.60	1021.58	1012	18	12.3		
0	558.54	55	16	1.24	1117.06	1111	13	20.4		
0	610.14	27	42	1.13	1220.03	1213	14	40.6		
0	1460.77	83	5	2.47	2921.36	2914	17	12.3		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	83	10.67*	2.309E+00	4.917E-07	4.917E-07	12.34

Flag: "*" = Keyline

Sample ID : EFT-7S110104 Acquisition date : 29-DEC-2004 09:47:43

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.917E-07	4.917E-07	0.607E-07	12.34	
0							
	Total Activity :		4.917E-07	4.917E-07			
Grand Total Activity :			4.917E-07	4.917E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	760.62	511.00*	193.46	1.000E+35	12.33	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	52.06	559.10*	44.70	3.288E+00	20.39	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.32	0.14	--- Not Found ---		
			657.03	6.16	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1189.07	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.64	--- Not Found ---		
			1328.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	1.47	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	6.283E-07	40.63	
		% Abundances Found =		5.92			
PM-148M	41.30D	1.40	288.11	12.56	--- Not Found ---		Abun.
			414.07	10.66	--- Not Found ---		
			432.76	5.35	--- Not Found ---		
			501.26	6.75	--- Not Found ---		
			550.27*	94.90	--- Not Found ---		
			599.74	12.54	--- Not Found ---		
			611.26	5.48	6.119E-07	40.63	
			629.97	99.00	--- Not Found ---		
			725.70	32.80	--- Not Found ---		
			915.33	17.17	--- Not Found ---		
			1013.81	20.30	--- Not Found ---		
		% Abundances Found =		1.74			
BI-214	19.90M	4194.51	609.31*	46.30	1.000E+35	40.63	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

Id	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
	510.69	137	27	2.60	1021.58	1012	10	7.61E-02	12.3	4.74E+00	T
0	550.64	55	16	1.24	1117.06	1111	13	3.03E-02	20.4	4.55E+00	T
0	610.14	37	42	1.13	1220.03	1213	14	2.06E-02	40.6	4.30E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 10:17:53.27 *
****
* Sample ID : EFT-78110104 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	24.	477.59	1.5878E-07
F 18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0185E-08
NA-24	0.	1368.53	Half-Life too short
MG-27	3.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	16.	889.25	1.6854E-08
CR-51	28.	320.08	3.1107E-07
MN-54	13.	834.83	9.9908E-09
CO-56	11.	1238.25	2.5257E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	45.	158.38	5.0821E-06
CO-57	44.	122.06	1.2666E-08
CO-58	12.	810.76	1.4397E-08
FE-59	16.	1099.22	4.9908E-08
CO-60	11.	1332.49	1.1196E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	7.	1115.52	1.9337E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	32.	136.00	1.7543E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
SR-83	0.	529.64	Half-Life too short
SR-84	0.	881.50	Half-Life too short
SR-85	0.	802.41	Half-Life too short
KR-85	31.	513.99	2.1481E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	31.	513.99	1.7114E-08
RB-86	11.	1076.63	9.3099E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	6.	1836.01	1.4193E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	17.	1204.90	5.1682E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	20.	702.63	8.9319E-09
NB-95	4.	765.79	1.5666E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	12.	756.72	2.6280E-08
NB-97	0.	657.98	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	33.	497.08	2.8771E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	24.	621.84	1.0043E-07
CD-109	23.	88.03	3.2189E-07
AG-110M	14.	937.48	3.4264E-08
SN-113	31.	391.69	1.7503E-08
SN-117M	46.	158.56	1.7958E-07
SB-122	0.	563.93	Half-Life too short
SB-124	21.	602.71	1.6319E-08
SB-125	24.	427.89	2.6239E-08
TE-125M	43.	109.28	7.3918E-06
[redacted]-127	0.	417.90	Half-Life too short
[redacted]-127M	26.	57.60	3.9206E-05
XE-127	44.	202.84	3.5457E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	8.7078E-07
XE-129M	53.	196.56	1.6642E-05
I-130	0.	536.09	Half-Life too short
BA-131	31.	123.80	8.1710E-07
I-131	33.	364.48	1.4678E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	41.	163.93	1.1503E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	33.	302.64	4.3203E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	8.6870E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
[redacted]-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	18.	818.50	2.1036E-07
I-136	0.	1313.02	Half-Life too short
CS-137	22.	661.65	1.0263E-08
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	30.	165.85	1.1010E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	23.	537.32	7.5241E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	43.	145.44	5.7512E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	29.	133.54	7.5723E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	38.	91.10	1.7868E-06
PM-148M	17.	550.27	2.0183E-08
EU-152	38.	344.27	3.2119E-06
EU-154	0.	1004.76	4.7106E-08
EU-156	12.	646.29	1.3086E-06
HF-181	14.	482.03	1.9346E-08
TA-182	14.	1221.42	5.9269E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	38.	279.19	2.4136E-08
BI-207	24.	569.67	8.6447E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	52.	186.21	2.5809E-07
AC-228	38.	338.32	7.4955E-08
TH-228	38.	84.37	1.1833E-06
PA-234	0.	131.20	Half-Life too short
TH-234	32.	63.29	5.9085E-06
U-235	37.	143.76	7.2961E-08
NP-239	0.	106.13	Half-Life too short
AM-241	29.	59.54	1.9821E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-8S112204

Sample Location (Well Number): 8 Shallow

1. Representative sample collected. Date/Time 11/22/04 / 0930

Sample collected by: Jay Marie Slaback / Jay Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coullard / [signature] Date: 11/27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected.

Performed by: William V. Lipka / William V. Lipka Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-8S112204	
2 . Date Sampled	11/22/2004	
3 . Time Sampled	09:30	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	10:00	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.1	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.2	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-85112204

Sample Location (Well Number): 8 Shallow

1. Representative sample collected. Date/Time 11/22/04 / 0930

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulliard / Jon Coulliard Date: 11-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McCoy Date: 12-29-04
Fermi 2 RP Printed Name Signature

Sample number: EFT-85112204

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L McCoy L Zerr Date: 12-29-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V. Lipton 4851 1/13/2005

****
DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 11:50:58.74
****

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-AS112204

Sample End Time: 22-NOV-2004 09:30:00.00

REMARKS

PERFORMED BY:

J. m

SIGNATURE

REVIEWED BY:

William V Sutton / 1/13/2005
48651

SIGNATURE/DATE

PAGE ____ of ____

Sample ID : EFT 68112204 Acquisition date : 29-DEC-2004 11:33:33

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: EFT-68112204
Sample collection start date: 22-NOV-2004 09:30:00.00
Sample collection end date : 22-NOV-2004 09:30:00.00
Type of sample : 1 L Marl. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 29-DEC-2004 11:33:33.00
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.06 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:30.00

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.44	122	37	2.03	1022.68	1016	14	6.79E-02	14.0	annihilation
2	0	556.92	43	43	1.29	1117.61	1112	13	2.39E-02	34.7	Hg Hospital
3	0	609.14	51	38	1.68	1218.04	1209	15	2.82E-02	27.4	Bi-214
4	0	1384.36	11	0	1.46	2768.91	2765	8	6.11E-03	30.2	K-40
5	0	1461.65	83	0	2.65	2923.61	2915	17	4.60E-02	13.6	

Post-NID Peak Search Report

Id	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.44	122	37	2.08	1022.68	1016	14	14.0		
0	558.92	43	43	1.29	1117.61	1112	13	34.7		
0	609.14	51	30	1.62	1218.04	1209	15	27.4		
0	1364.36	11	0	1.46	2728.91	2725	6	38.2		
0	1461.65	33	6	2.65	2923.61	2915	17	13.6		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	83	10.67*	2.388E+00	4.001E-07	4.001E-07	13.61

Flags: "*" = Keyline

Sample ID : EFT-85116204 Acquisition date : 29-DEC-2004 11:28:58

Total number of lines in spectrum	5	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	5	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.08E+09Y	1.00	4.681E-07	4.681E-07	8.664E-07	13.61	
	Total Activity :		4.681E-07	4.681E-07			
	Grand Total Activity :		4.681E-07	4.681E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-Life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	486.73	511.00*	193.46	1.000E+35	14.01	Decay
		% Abundances Found =		100.00			
AS-76	26.32H	33.82	559.10*	44.70	4.040E+02	34.68	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.30	0.14	--- Not Found ---		
			657.33	6.18	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.12	2.12	--- Not Found ---		
			771.76	0.18	--- Not Found ---		
			867.63	0.10	--- Not Found ---		
			1120.37	5.11	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.64	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
SR-92	2.71H	328.50	241.52	3.00	--- Not Found ---		Decay
			430.56	3.30	--- Not Found ---		
			953.32	3.60	--- Not Found ---		
		B	1142.30	2.90	--- Not Found ---		
			1383.94*	90.00	1.000E+35	30.15	
		% Abundances Found =		87.55			
RU-103	39.35D	0.94	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	5.973E-07	27.36	
		% Abundances Found =		5.92			
AG-110M	249.85D	0.15	657.75	94.40	--- Not Found ---		Abun.
			677.61	10.60	--- Not Found ---		
			686.99	6.47	--- Not Found ---		
			706.67	16.60	--- Not Found ---		
			763.93	22.20	--- Not Found ---		
			818.02	7.30	--- Not Found ---		
			884.67	72.60	--- Not Found ---		
			937.48*	34.20	--- Not Found ---		
			1384.27	24.26	3.072E-06	30.15	
			1505.00	13.06	--- Not Found ---		
		% Abundances Found =		8.03			
XE-135	9.11H	97.72	249.79*	89.90	--- Not Found ---		Decay,Abun.
			608.19	2.89	1.572E+23	27.36	
		% Abundances Found =		3.11			
SI-214	19.90M	8504.12	609.31*	46.30	1.000E+35	27.36	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
-214	19.90M	2664.12	1377.67	4.11	--- Not Found ---		Decay
			1764.49	15.80	--- Not Found ---		
		% Abundances Found =		40.40	(Abn. Limit = 40.40%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Rw	Cts/Sec	%Err	%Eff	Flags
0	511.44	122	37	2.00	1022.60	1016	14	6.79E-02	14.0	4.73E+00	T
0	550.02	43	43	1.20	1117.61	1112	13	2.39E-02	34.7	4.55E+00	T
0	609.14	51	30	1.62	1210.04	1209	15	2.82E-02	27.4	4.39E+00	T
0	1384.36	11	0	1.46	2768.91	2765	8	6.11E-03	38.2	2.46E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 11:59:03.78

Sample ID : EFT-65112204

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	18.	477.59	1.8797E-07
F-18	0.	511.00	Half-Life too short
NA-22	6.	1274.54	6.4427E-09
NP-24	2.	1368.52	Half-Life too short
MO-87	3.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	3.	1293.64	Half-Life too short
SC-46	14.	889.25	1.3007E-08
CR-51	39.	320.08	2.1471E-07
MN-54	13.	834.83	9.4953E-09
CO-56	12.	1238.25	2.1891E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	43.	158.38	5.3525E-07
CO-57	44.	122.06	1.2011E-08
CO-58	13.	810.76	1.2422E-08
FE-59	13.	1099.22	3.2587E-08
CO-60	20.	1332.49	1.4382E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
[redacted]65	4.	1115.52	1.4183E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	40.	136.00	1.7978E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	40.	513.99	2.4016E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	40.	513.99	1.5364E-08
RB-86	15.	1076.63	4.5001E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	1.1882E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.86	Half-Life too short
KR-90	0.	1116.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	11.	1204.90	5.2630E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.26	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	15.	702.63	7.7324E-09
NB-95	16.	765.79	1.0574E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	22.	756.72	2.7167E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	2.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	23.	497.08	1.7055E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	22.	621.84	9.2092E-08
CD-109	34.	88.03	3.7093E-07
AG-110M	19.	937.46	3.7191E-08
SN-113	23.	391.69	1.3565E-08
SN-117M	44.	158.56	6.0633E-08
SB-122	0.	563.93	Half-Life too short
SB-124	19.	602.71	1.2140E-08
SB-125	25.	427.89	2.6371E-08
TE-125M	33.	109.28	5.0997E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	17.	57.60	2.8672E-05
XE-127	42.	202.84	2.3141E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	16.	695.88	5.1494E-07
XE-129M	46.	196.56	3.0540E-06
I-130	0.	536.09	Half-Life too short
BA-131	32.	123.80	2.4265E-07
I-131	25.	364.48	2.1303E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	50.	163.93	3.7264E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	27.	302.84	3.9065E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	24.	81.00	5.0073E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	24.	604.70	9.2530E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	9.	818.50	5.1906E-08
I-136	0.	1313.02	Half-Life too short
CS-137	12.	661.65	7.8491E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1428.50	Half-Life too short
CE-139	42.	165.85	1.1545E-08
CS-139	0.	1203.23	Half-Life too short
BA-140	19.	537.32	2.2433E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	198.22	Half-Life too short
CE-141	42.	145.44	3.6483E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	46.	133.54	8.9541E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	31.	91.10	4.3587E-07
PM-148M	20.	550.27	1.7497E-08
EU-152	30.	344.27	2.9015E-08
EU-154	13.	1004.76	5.5897E-08
EU-156	15.	646.29	5.6159E-07
[illegible]-181	26.	482.03	1.7917E-08
[illegible]-182	8.	1221.42	4.1814E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	30.	279.19	1.5949E-08
BI-207	21.	569.67	3.1788E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	50.	186.21	2.5276E-07
AC-228	32.	338.32	6.9275E-08
TH-228	35.	84.37	1.2442E-06
PA-234	0.	131.20	Half-Life too short
TH-234	26.	63.29	2.9350E-06
U-235	38.	143.76	7.3883E-08
NP-239	0.	106.13	Half-Life too short
AM-241	27.	59.54	1.8418E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: EFT-95102804

Sample Location (Well Number): 9 Shallow

1. Representative sample collected. Date/Time 10/28/04 / 1100

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / Jon Couillard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	EFT-9S102804	
2 . Date Sampled	10/28/2004	
3 . Time Sampled	11:00	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	10:20	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.7	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: EFT-9 $102804

Sample Location (Well Number): 9 Shallow

1. Representative sample collected. Date/Time 10/28/04 / 1100

Sample collected by: JoyMarie Sleback / Joy Marie Sleback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / [signature] Date: 12-29-04
Fermi 2 RP Printed Name Signature

Sample number: EFT. 9$102804

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L.McCoy / J. McC Date: 12/29/04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 1/13/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48651 / 1/13/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 14:12:13.43

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: EFT-9S102604

Sample End Time: 28-OCT-2004 11:00:00.00

REMARKS 353.82 KeV peak unidentified, does not match any expected licensed material, can ignore.
William V. Lipton 4865 / 1/13/2005

PERFORMED BY:
J. McC
SIGNATURE

REVIEWED BY:
William V Lipton 4865 / 1/13/2005
SIGNATURE/DATE

PAGE_____of_____

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Fermi 2 Radiation Protection Gamma Spectroscopy Report

**************************** Sample Parameters ****************************

Sample ID Number: EFT-9S102804
Sample collection start date: 28-OCT-2004 11:00:00.00
Sample collection end date : 28-OCT-2004 11:00:00.00
Type of sample : 1>L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

************************** Acquisition Parameters **************************

Detector number : DET 4 Acquire date : 29-DEC-2004 13:40:09.00
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.04 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:38.08

*************************** Peak Search Parameters ***************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

*********************** Nuclide Identification Parameters ***********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m2ll Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	353.82	47	73	1.66	707.57	699	18	2.60E-02	46.1	unidentified
2	0	511.24	113	42	2.74	1022.28	1015	13	6.26E-02	15.2	annihilation
3	2	558.74	53	21	2.13	1117.26	1111	19	2.95E-02	22.0	2.30E+00 [illegible]
4	2	562.84	29	10	2.13	1125.46	1111	19	1.60E-02	27.2	
5	0	609.81	40	31	1.45	1219.37	1214	11	2.23E-02	31.7	Bi214
6	0	1461.16	84	4	1.97	2922.62	2915	16	4.66E-02	12.2	K40

Decay Time = 62 02:40:09.00 Acquisition Time = 29-DEC-2004 13:40:05.0
0

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	353.62	47	73	1.66	787.57	699	13	46.1		
0	511.24	113	42	2.74	1022.20	1015	13	15.2		
2	558.74	33	21	2.13	1117.26	1111	10	22.0	2.30E+00	
2	562.94	29	19	2.13	1125.46	1111	10	27.2		
0	609.01	40	31	1.45	1219.37	1214	11	21.7		
0	1461.16	84	4	1.97	2922.62	2915	16	12.2		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	84	10.67*	2.389E+00	4.940E-07	4.940E-07	12.16

Flag: "*" = Keyline

Total number of lines in spectrum 6
Number of unidentified lines 1
Number of lines tentatively identified by NID 5 83.33%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.940E-07	4.940E-07	8.681E-07	12.16	
	Total Activity :		4.940E-07	4.940E-07			
	Grand Total Activity :		4.940E-07	4.940E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
[redacted]	109.74M	815.16	511.00*	193.46	1.000E+35	15.18	Decay
		% Abundances Found =		100.00			
AG-76	26.38H	58.65	559.10*	44.70	4.428E+09	21.97	Decay
			563.23	1.17	9.211E+10	27.16	
			571.33	2.14	--- Not Found ---		
			657.73	5.18	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			740.18	3.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1109.67	0.14	--- Not Found ---		
			1212.78	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1220.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		75.63			
RU-103	39.35D	1.50	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	7.341E-07	31.65	
		% Abundances Found =		5.92			
SB-122	2.70D	23.01	563.93*	70.60	1.142E-01	27.16	Decay
			692.00	3.70	--- Not Found ---		
		% Abundances Found =		95.02			
CS-134	2.06Y	0.00	127.42	12.90	--- Not Found ---		Abun.
			475.35	1.46	--- Not Found ---		
			563.23	8.30	1.200E-07	27.16	
			569.32	15.43	--- Not Found ---		
			604.70*	97.60	--- Not Found ---		
			795.85	85.40	--- Not Found ---		
			801.93	8.73	--- Not Found ---		
			1038.57	1.00	--- Not Found ---		
			1167.94	1.80	--- Not Found ---		
			1365.15	3.04	--- Not Found ---		
		% Abundances Found =		3.55			
BI-214	19.90M	4495.23	609.31*	46.30	1.000E+35	31.65	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	--- Not Found ---		
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.60	--- Not Found ---		
		% Abundances Found =		48.48	(Abn. Limit = 48.48%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	353.02	47	73	1.66	797.57	699	18	2.60E-02	46.1	5.52E+00	
0	511.24	113	42	2.74	1022.26	1013	13	6.26E-02	15.2	4.74E+00	T
0	558.74	53	21	2.13	1117.26	1111	19	2.95E-02	22.0	4.55E+00	T
0	562.84	29	10	2.13	1125.46	1111	19	1.60E-02	27.2	4.53E+00	T
0	609.61	40	31	1.45	1219.37	1214	11	2.23E-02	31.7	4.38E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 14:10:10.43 *
****
* Sample ID : EFT-9S102004 *
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	25.	477.59	1.7130E-07
F-18	0.	511.00	Half-Life too short
NA-22	8.	1274.54	9.7325E-09
NA-24	0.	1368.53	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	13.	889.25	1.5734E-08
CR-51	27.	320.08	3.3860E-07
MN-54	17.	834.83	1.1311E-08
CO-56	16.	1238.25	3.1419E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	0.	158.38	Half-Life too short
CO-57	31.	122.06	1.0830E-08
CO-58	10.	810.76	1.4170E-08
FE-59	16.	1099.22	5.2771E-08
CO-60	13.	1332.49	1.1006E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	12.	1115.52	2.3566E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	31.	136.00	1.7648E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	41.	513.99	2.4193E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	41.	513.99	2.0136E-08
RB-86	5.	1076.63	7.9061E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	4.	1836.01	1.2810E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	10.	1204.90	6.8610E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]9C	0.	1383.94	Half-Life too short
[redacted]92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	25.	702.63	9.7286E-09
NB-95	9.	765.79	2.3611E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	17.	756.72	3.1099E-08
ND-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	15.	497.08	2.1517E-08
TC-104	0.	357.95	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	23.	621.84	9.8070E-08
CD-109	30.	88.03	3.6317E-07
AG-110M	16.	937.48	3.6732E-08
SN-113	24.	391.69	1.6055E-08
SN-117M	49.	158.56	2.2829E-07
SB-122	0.	563.93	Half-Life too short
SB-124	21.	602.71	1.7123E-08
SB-125	20.	427.89	2.8166E-08
TE-125M	29.	109.28	6.4990E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	29.	57.60	4.2016E-05
XE-127	35.	202.84	3.4273E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	9.6453E-07
XE-129M	45.	196.56	2.1472E-05
I-130	0.	536.09	Half-Life too short
BA-131	30.	123.80	1.1396E-06
I-131	27.	364.48	1.9171E-08
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	46.	163.93	1.5500E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	36.	302.84	4.0129E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	21.	604.70	8.9195E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	2.2894E-07
I-136	0.	1313.02	Half-Life too short
CS-137	16.	661.65	8.8358E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	253.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	39.	165.85	1.2555E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	20.	537.32	1.0506E-06
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	31.	145.44	5.4609E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	45.	133.54	9.3805E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	41.	91.10	2.3929E-06
PM-148M	14.	550.27	1.9704E-08
EU-152	28.	344.27	2.8020E-08
EU-154	12.	1004.76	5.4273E-08
EU-156	14.	646.29	1.6931E-06
[redacted]-101	26.	482.03	2.7067E-08
[redacted]-102	10.	1221.42	5.2910E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	35.	279.19	2.4851E-08
BI-207	22.	569.67	8.4133E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	44.	186.21	2.3748E-07
AC-228	36.	338.32	7.3610E-08
TH-228	39.	84.37	1.3452E-06
PA-234	0.	131.28	Half-Life too short
TH-234	30.	63.29	6.4718E-06
U-235	42.	143.76	7.6671E-08
NP-239	0.	106.13	Half-Life too short
AM-241	30.	59.54	1.9538E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BICG RANGE 110104

Sample Location (Well Number): Shooting RANGE

1. Representative sample collected. Date/Time 11-01-04 / 0902

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Guillard / [signature] Date: 12.27.04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks No tritium detected William V Lipton 4851 1/14/2005

Tritium Activity Calculation

Sample Information

1 . Sample Location	BKG Range 110104	
2 . Date Sampled	11/01/2004	
3 . Time Sampled	09:02	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	07:40	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	8.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.4	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BICG - RANGE 110104

Sample Location (Well Number): Shooting Range

1. Representative sample collected. Date/Time 11-01-04 / 0902

Sample collected by: Joy Marie Slaback Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulliard / [signature] Date: 12/27/04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: C. McCoy / [signature] Date: 12-29-04
Fermi 2 RP Printed Name Signature

Sample number: BKG-RANGE110104

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McG J. McG Date: 12-29-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 4815 / 1/14/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 15:17:55.37

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-RANGE110104

Sample End Time: 1-NOV-2004 09:02:00.00

REMARKS _____

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

***************************** Sample Parameters *****************************

Sample ID Number: BKG-RANGE110104
Sample collection start date: 1-NOV-2004 09:02:00.00
Sample collection end date : 1-NOV-2004 09:02:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M2LL Operator: LKM

*************************** Acquisition Parameters ***************************

Detector number : DET 4 Acquire date : 29-DEC-2004 14:47:51.27
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.08 Percent dead time : 0.05 %

*************************** Calibration Parameters ***************************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:38.08

*************************** Peak Search Parameters ***************************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********************* Nuclide Identification Parameters *********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	198.24	45	34	1.[illegible]	396.59	392	9	2.50E-02	27.7	Ac-228
2	0	352.23	36	43	0.91	704.39	698	10	1.97E-02	39.0	Pb214
3	0	511.35	168	25	2.68	1022.51	1014	17	9.32E-02	10.3	annihilation
4	0	1461.06	75	7	2.60	2922.42	2915	14	4.17E-02	13.8	K-40

Decay Time = 38 05:45:51.27 Acquisition Time = 29-DEC-2004 14:47:51.2
7

Post-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
@	198.24	45	34	1.38	396.59	392	9	27.7		
@	352.23	36	43	0.91	704.39	698	10	39.0		
@	511.35	168	25	2.68	1022.51	1014	17	10.3		
@	1461.86	75	7	2.68	2922.42	2915	14	13.8		K-40

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	75	10.67*	2.389E+00	4.418E-07	4.418E-07	13.76

Flag: "*" = Keyline

Sample ID : BKG-RANGE110104 Acquisition date : 29-DEC-2004 14:47:51

Total number of lines in spectrum	4	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	4	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.41GE-07	4.41GE-07	6.08GE-07	13.76	
	Total Activity :		4.41GE-07	4.41GE-07			
	Grand Total Activity :		4.41GE 07	4.41GE 07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-Life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	764.36	511.00*	193.46	1.000E+35	10.35	Decay
		% Abundances Found =		100.00			
SE-75	119.78D	0.49	66.05	1.02	--- Not Found ---		Abun.
			96.73	3.41	--- Not Found ---		
			121.12	16.70	--- Not Found ---		
			136.00*	59.20	--- Not Found ---		
			198.60	1.45	1.026E-06	27.68	
			264.65	59.80	--- Not Found ---		
			279.53	25.20	--- Not Found ---		
			303.91	1.32	--- Not Found ---		
			400.65	11.40	--- Not Found ---		
		% Abundances Found =		0.81			
PB-214	26.80M	3129.80	87.30	4.67	--- Not Found ---		Decay
			241.98	7.49	--- Not Found ---		
			295.21	19.20	--- Not Found ---		
			351.92*	37.20	1.000E+35	38.96	
			785.91	1.10	--- Not Found ---		
		% Abundances Found =		53.40	(Abn. Limit = 37.20%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flag
0	198.24	45	34	1.32	396.59	392	9	2.50E-02	27.7	6.36E+00	T
0	352.63	36	43	0.91	704.39	698	10	1.97E-02	39.8	5.52E+00	T
0	511.35	168	25	2.65	1022.51	1014	17	9.32E-02	10.3	4.74E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 15:18:00.46

Sample ID : BKG-RANGE110104

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	29.	477.35	1.7360E-07
F-18	0.	511.00	Half-Life too short
NA-22	9.	1274.54	1.0131E-08
NA-24	0.	1368.63	Half-Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	15.	889.25	1.6066E-08
CR-51	24.	320.08	2.9336E-07
MN-54	9.	834.83	8.4979E-09
CO-56	8.	1238.25	2.2632E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	51.	158.38	6.4161E-06
CO-57	45.	122.06	1.2707E-08
CO-58	10.	810.76	1.3396E-08
FE-59	19.	1099.22	5.3954E-08
CO-60	14.	1332.49	1.2311E-08
CU-64	0.	1345.90	Half-Life too short
[redacted]-65	0.	1481.84	Half-Life too short
ZN-65	9.	1115.52	2.0782E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	32.	136.00	1.7482E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	46.	513.99	2.5625E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	46.	513.99	2.0477E-08
RB-86	12.	1076.63	9.9855E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	5.	1836.01	1.3634E-08
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
[redacted]-91	5.	1204.90	4.8876E-08
[redacted]-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	10.	702.63	8.5359E-09
NB-95	14.	765.79	2.5750E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	25.	756.72	3.6119E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC 101	0.	306.81	Half-Life too short
RU-103	19.	497.08	2.2697E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	16.	621.84	8.4523E-08
CD-109	37.	88.03	3.3723E-07
AG-110M	17.	937.48	3.7215E-08
SN-113	39.	391.69	1.9594E-08
SN-117M	52.	158.56	1.9337E-07
SB-122	0.	563.93	Half-Life too short
SB-124	23.	602.71	1.7111E-08
SB-125	26.	427.89	2.7394E-08
TE-125M	37.	109.28	6.9455E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	42.	57.60	4.8560E-05
XE-127	63.	202.84	4.1029E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	14.	695.88	7.5114E-07
XE-129M	31.	196.56	1.3329E-05
I-130	0.	536.09	Half-Life too short
BA-131	29.	123.80	7.9808E-07
I-131	27.	364.48	1.3725E-06
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	42.	163.93	1.1903E-05
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	20.	302.84	3.9892E-08
BA-133M	0.	275.89	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	0.	81.00	Half-Life too short
XE-133M	0.	233.22	Half-Life too short
CS-134	22.	604.70	8.9994E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : BKG-RANGE110104 Acquisition date : 29-DEC-2004 14:47:51

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	13.	818.50	1.8521E-07
I-136	0.	1313.02	Half-Life too short
CS-137	15.	661.65	8.7213E-09
XE-137	0.	455.49	Half-Life too short
CS-138	2.	1435.84	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	43.	165.85	1.2972E-08
CS-139	8.	1283.83	Half-Life too short
BA-140	17.	537.32	6.5957E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.28	Half-Life too short
CE-141	38.	145.44	5.5210E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	29.	133.54	7.6888E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	29.	91.10	1.6126E-06
PM-148M	20.	550.27	2.1399E-08
EU-152	34.	344.27	3.0577E-08
EU-154	11.	1004.76	5.2275E-08
EU-156	13.	646.29	1.3898E-06
HF-181	16.	482.03	2.0586E-08
TA-182	12.	1221.42	5.6245E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	37.	279.19	2.3940E-08
BI-207	22.	569.67	8.3045E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	54.	186.21	2.6192E-07
AC-228	24.	338.32	6.1330E-08
TH-228	36.	84.37	1.2979E-06
PA-234	0.	131.20	Half-Life too short
TH-234	35.	63.29	6.2345E-06
U-235	40.	143.76	7.5254E-08
NP-239	0.	106.13	Half-Life too short
AM-241	29.	59.54	1.9070E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BKG-PAP112204

Sample Location (Well Number): Point Au Peaux Road

1. Representative sample collected. Date/Time 11-22-04 / 1425

Sample collected by: Joy Marie Slaback / Joy Marie Slaback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Cailliard / Jon Cailliard Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / James May Date: 1-5-05 (1-7-05)
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No Tritium detected.

Performed by: William V. Lipps / William V. Lipps Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

Tritium Activity Calculation

Sample Information

1 . Sample Location	Point Aux Peaux Rd	
2 . Date Sampled	11/22/2004	
3 . Time Sampled	14:25	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	07:50	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	9.0	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	1.1	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{\text{(Bkg cpm)}}{\text{(Bkg min.)}} + \frac{\text{(Bkg cpm)}}{\text{(Smpl min.)}}}}{\text{Efficiency x 2.22E6 dpm/uCi x Sample Volume}} = 1.22\text{E-}06 \text{ uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency x 2.22E6 dpm/Uci x Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BKG-PAP112204

Sample Location (Well Number): Point Au Peaux Road

1. Representative sample collected. Date/Time 11-22-04 / 1425

Sample collected by: Joy Marie Slabach / Joy Marie Slabach Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Couillard / [signature] Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: L. McCoy / J. McCoy Date: 12-29-04
Fermi 2 RP Printed Name Signature

Sample number: BKG - PAP112204

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: C. McCoy [signature] Date: 12-29-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 48651 / 1/14/2005

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-PAP112204

Sample End Time: 22-NOV-2004 14:25:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE

Sample ID : BKG-PAP112204 Acquisition date : 29-DEC-2004 15:10:31

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********

Sample ID Number: BKG-PAP112204
Sample collection start date: 22-NOV-2004 14:25:00.00
Sample collection end date : 22-NOV-2004 14:25:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : M2LL Operator: LKM

********** Acquisition Parameters **********

Detector number : DET 4 Acquire date : 29-DEC-2004 15:10:31.06
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.10 Percent dead time : 0.05 %

********** Calibration Parameters **********

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offset: -2.14560E-01
Daily cal date : 29-DEC-2004 00:39:30.00

********** Peak Search Parameters **********

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m211 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	295.09	40	44	1.21	590.16	585	10	2.24E-02	34.7	Pb214
2	0	511.27	92	70	2.05	1022.35	1015	14	5.11E-02	21.9	annihilation
3	0	559.37	44	41	1.65	1118.51	1111	13	2.45E-02	33.8	Bi214/Pb212
4	0	609.49	54	40	1.62	1218.73	1211	15	2.99E-02	29.3	Bi214
5	0	1121.34	18	11	1.48	2242.55	2235	11	9.80E-03	43.6	Bi214
6	4	1459.63	13	0	2.23	2919.56	2914	17	7.35E-03	59.5	1.30E+00
7	4	1460.59	30	0	2.63	2921.48	2914	17	1.65E-02	29.3	K40
8	4	1461.42	18	0	1.88	2923.14	2914	17	9.98E-03	47.2	
9	0	1764.85	35	0	0.71	3530.63	3524	13	1.94E-02	16.9	Bi214

Post-NID Peak Search Report

Ib	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	295.89	40	44	1.21	590.16	585	10	34.7		
0	511.27	92	70	2.05	1022.35	1015	14	21.9		
0	550.37	44	41	1.65	1110.51	1111	13	33.8		
0	609.49	54	48	1.62	1216.73	1211	15	29.3		
0	1121.34	18	11	1.43	2242.55	2235	11	43.6		
4	1455.63	13	0	2.23	2919.56	2914	17	59.5	1.325+00	
4	1460.59	30	0	2.63	2921.48	2914	17	29.3		K-40
4	1461.42	18	0	1.88	2923.14	2914	17	47.6		
0	1764.85	35	0	0.71	3530.63	3524	13	16.9		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	30	10.67*	2.389E+00	1.751E-07	1.751E-07	29.32

Flag: "*" = Keyline

Total number of lines in spectrum	9	
Number of unidentified lines	2	
Number of lines tentatively identified by NID	7	77.78%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	1.751E-07	1.751E-07	0.513E-07	29.32	
		Total Activity :	1.751E-07	1.751E-07			
		Grand Total Activity :	1.751E-07	1.751E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
16	109.74M	406.14	511.00*	193.46	1.000E+35	21.93	Decay
	% Abundances Found =		100.00				
SC-46	83.83D	0.44	142.53	62.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	1.296E-03	43.64	
	% Abundances Found =		38.07				
AG-76	26.32H	33.70	559.10*	44.70	4.824E+02	33.75	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.39	0.14	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			748.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1129.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.04	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
	% Abundances Found =		73.70				
RU-103	39.35D	0.94	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	6.329E-07	29.26	
	% Abundances Found =		5.92				
BI-214	19.90M	2600.63	609.31*	46.30	1.000E+35	29.26	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	43.64	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	16.90	
	% Abundances Found =		80.84	(Abn. Limit = 40.48%)			
PB-214	26.80M	1990.62	87.30	4.67	--- Not Found ---		Decay,Abun.
			241.90	7.49	--- Not Found ---		
			295.21	19.20	1.000E+35	34.72	
			351.92*	37.20	--- Not Found ---		
			785.91	1.10	--- Not Found ---		
	% Abundances Found =		27.56	(Abn. Limit = 37.20%)			

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	295.09	40	44	1.21	590.16	585	10	2.24E-02	34.7	5.83E+00	T
0	511.27	92	70	2.05	1022.35	1015	14	5.11E-02	21.9	4.74E+00	T
0	559.37	44	41	1.65	1118.51	1111	13	2.45E-02	33.8	4.54E+00	T
0	609.49	54	40	1.62	1218.73	1211	15	2.99E-02	29.3	4.39E+00	T
0	1121.34	10	11	1.48	2242.55	2235	11	9.80E-03	43.6	2.78E+00	T
4	1459.63	13	0	2.23	2919.56	2914	17	7.35E-03	59.5	2.29E+00	
4	1461.42	18	0	1.00	2923.14	2914	17	9.96E-03	47.6	2.39E+00	
0	1764.85	35	0	0.71	3530.63	3524	13	1.94E-02	16.9	2.15E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 15:48:40.11

Sample ID : BKG-PAP112204

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	15.	477.59	1.0257E-07
F-18	0.	511.00	Half-Life too short
NA-22	12.	1274.54	1.1222E-08
NA-24	0.	1368.53	Half Life too short
MG-27	0.	1014.44	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	12.	889.25	1.2265E-08
CR-51	33.	320.08	1.9779E-07
MN-54	10.	834.83	8.5602E-09
CO-56	16.	1238.25	2.5206E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	50.	158.38	5.7055E-07
CO-57	58.	122.06	1.3648E-08
CO-58	16.	810.76	1.3569E-08
FE-59	12.	1099.22	3.2128E-08
CO-60	17.	1332.49	1.3355E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.4259E-08
[redacted]69M	0.	438.63	Half-Life too short
SE-75	41.	136.00	1.7398E-08
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.58	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	49.	513.99	2.6235E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	49.	513.99	1.6776E-08
RB-86	8.	1076.63	3.0655E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	7.	1836.01	1.3246E-08
KR-89	5.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	10.	1204.90	5.0868E-06
Y-91M	0.	555.60	Half-Life too short
[redacted]92	0.	1383.94	Half-Life too short
[redacted]Z	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	21.	702.63	8.9737E-09
NB-95	14.	765.79	1.7595E-08
NB-95M	0.	235.69	Half-Life too short
ZR-95	13.	756.72	2.1330E-08
NB-97	0.	657.90	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	140.50	Half-Life too short
TC 101	0.	306.81	Half-Life too short
RU-103	20.	497.08	1.5977E-08
TC 104	3.	357.99	Half-Life too short
RH-105	0.	318.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	11.	621.84	6.7363E-08
CD-109	44.	88.03	4.1825E-07
AG-110M	10.	937.48	2.8200E-08
SN-113	20.	391.69	1.4697E-08
SN-117M	48.	158.56	6.2863E-08
SB-122	0.	563.93	Half-Life too short
SB-124	23.	602.71	1.3471E-08
SB-125	31.	427.89	2.9302E-08
TE-125M	34.	109.28	5.1744E-06
TE-127	0.	417.90	Half-Life too short
TE-127M	32.	57.60	3.7700E-05
XE-127	47.	202.84	2.4461E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	19.	695.88	5.5198E-07
XE-129M	45.	196.56	3.0252E-06
I-130	0.	536.09	Half-Life too short
BA-131	46.	123.80	2.0616E-07
I-131	33.	364.48	2.4101E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	45.	163.93	3.5511E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	28.	302.84	3.9919E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	33.	81.00	5.7473E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	29.	604.70	1.0020E-08
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	15.	818.50	6.5383E-08
I-136	0.	1313.02	Half-Life too short
CS-137	16.	661.65	8.8800E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	43.	165.85	1.1634E-08
CS-139	0.	1283.23	Half-Life too short
BA-140	15.	537.32	1.9750E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	190.22	Half-Life too short
CE-141	49.	145.44	3.9138E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	50.	133.54	9.3192E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	27.	91.10	4.0993E-07
PM-148M	25.	550.27	1.6808E-08
EU-152	21.	344.27	2.4567E-08
EU-154	7.	1004.76	4.3514E-08
EU-156	22.	646.29	6.5108E-07
[redacted]-181	20.	482.03	1.5977E-08
[redacted]-182	10.	1221.42	4.4762E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	41.	279.19	1.8468E-08
BI-207	24.	569.67	8.7195E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	0.	240.98	Half-Life too short
RA-226	52.	186.21	2.5849E-07
AC-228	39.	338.32	7.5534E-08
TH-228	41.	84.37	1.3451E-06
PA-234	0.	131.20	Half-Life too short
TH-234	37.	63.29	3.4569E-06
U-235	41.	143.76	7.6215E-08
NP-239	0.	106.13	Half-Life too short
AM-241	31.	59.54	1.9608E-07

Sample number: BKG-NOC112304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
. (Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy L. McCoy Date: 12-29-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V. Lipton 1/14/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 16:19:26.22

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-NOC112304

Sample End Time: 23-NOV-2004 13:30:00.00

REMARKS:

PERFORMED BY:

SIGNATURE

REVIEWED BY:

SIGNATURE/DATE 1/14/05

Sample ID : BKG-NOC112304 Acquisition date : 29-DEC-2004 15:40:21

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

********** Sample Parameters **********
Sample ID Number: BKG-NOC112304
Sample collection start date: 23-NOV-2004 13:50:00.00
Sample collection end date : 23-NOV-2004 13:50:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.000000E+03 cc
Sample geometry : MBLL Operator: LKM

********** Acquisition Parameters **********
Detector number : DET 4 Acquire date : 29-DEC-2004 15:40:21.07
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.05 Percent dead time : 0.05 %

********** Calibration Parameters **********
Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.004595E-01 Zero offset: -2.145600E-01
Daily cal date : 29-DEC-2004 08:39:30.00

********** Peak Search Parameters **********
Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

********** Nuclide Identification Parameters **********
Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFF04_m211 Efficiencies at : Peak energy
****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.68	142	29	2.96	1023.17	1013	20	7.89E-02	12.6	annihilation
2	0	583.68	56	19	1.65	1117.14	1112	11	3.09E-02	20.1	Tl 208
3	0	609.95	40	20	1.89	1219.66	1213	11	2.19E-02	30.2	Bi 214
4	0	1120.32	26	6	2.22	2240.53	2234	11	1.45E-02	26.2	Bi 214
5	0	1461.01	31	9	2.03	2922.32	2914	16	4.52E-02	13.5	K 40
6	0	1765.16	20	5	1.81	3531.85	3526	10	1.13E-02	30.1	Bi 214

Gest-NID Peak Search Report

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.68	142	29	2.36	1023.17	1013	20	12.6		
0	558.68	56	19	1.65	1117.14	1112	11	20.3		
0	609.05	40	30	1.09	1219.06	1213	11	28.2		
0	1120.32	26	6	2.22	2240.53	2234	11	26.3		
0	1461.01	61	8	2.03	2922.22	2914	12	13.5		K-40
2	1763.15	20	5	1.01	3531.25	3526	10	23.1		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	81	10.67*	2.389E+00	4.795E-07	4.795E-07	13.51

Flag: "*" = Keyline

Sample ID : BKG-NOC112304 Acquisition date : 29-DEC-2004 15:49:21

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	6	100.00%

Nuclide Type : natural

Nuclide	Half-life	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.795E-07	4.795E-07	8.648E-07	13.51	
Total Activity :			4.795E-07	4.795E-07			
Grand Total Activity :			4.795E-07	4.795E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide	Half-life	Half-Life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
F-18	109.74M	473.61	511.00*	193.46	1.000E+35	10.62	Decay
		% Abundances Found =		100.00			
SC-46	83.83D	0.43	142.53	68.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	1.794E-03	76.21	
		% Abundances Found =		38.27			
AS-76	26.32H	32.91	559.10*	44.72	2.212E-02	28.35	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.00	2.11	--- Not Found ---		
			657.03	6.10	--- Not Found ---		
			665.31	0.39	--- Not Found ---		
			748.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.63	0.12	--- Not Found ---		
			1189.87	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.70			
RU-103	39.35D	0.92	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	4.562E-07	30.23	
		% Abundances Found =		5.92			
BI-214	19.90M	2611.78	609.31*	46.30	1.000E+35	30.23	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	26.21	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	30.14	
		% Abundances Found =		80.84	(Abn. Limit = 40.48%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.68	142	29	2.96	1023.17	1013	20	7.89E-02	12.6	4.73E+00	T
0	558.62	56	19	1.65	1117.14	1112	11	3.09E-02	20.3	4.55E+00	T
0	609.95	40	20	1.89	1219.66	1213	11	2.19E-02	30.2	4.38E+00	T
0	1120.32	26	6	2.22	2240.53	2234	11	1.45E-02	26.2	2.78E+00	T
0	1765.16	20	5	1.81	3531.25	3526	10	1.13E-02	30.1	2.16E+00	T

Flags: "T" = Tentatively associated

****
* Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 16:19:31.32 *
****
* Sample ID : DKG-NOC112304
****

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
BE-7	21.	477.59	1.1303E-07
I 13	0.	511.00	Half Life too short
NA-22	13.	1274.54	1.1710E-08
MN 54	0.	1333.53	Half Life too short
MN 57	0.	1014.11	Half-Life too short
CL 38	0.	1642.42	Half-Life too short
AR-41	0.	1293.64	Half-Life too short
SC-46	9.	889.25	1.0338E-08
CR-51	44.	320.00	2.2174E-07
MN 54	14.	834.83	9.7866E-09
CO-56	18.	1238.25	2.5999E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	43.	158.38	4.7751E-07
CO-57	31.	122.06	1.0115E-08
CO-58	11.	810.76	1.1569E-08
FE-59	12.	1099.22	3.1300E-08
CO-60	13.	1332.49	1.1915E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.4355E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.6123E-06
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	48.	513.99	2.5931E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	46.	513.99	1.6416E-08
RB-86	8.	1076.63	3.6307E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.40	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	9.6931E-09
KR-89	0.	220.90	Half-Life too short
RB-89	0.	1031.88	Half-Life too short
KR-90	8.	1118.69	Half-Life too short
RB-99	0.	831.69	Half-Life too short
RB-99M	0.	824.83	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	6.	1204.90	4.4857E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgrnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	0.	590.28	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	24.	702.63	9.6765E-09
NB-95	15.	765.79	1.7534E-08
NB-95M	43.	235.69	3.3504E-05
ZR-95	16.	756.72	2.3394E-08
MO-97	0.	657.99	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.58	Half-Life too short
TC-99M	3.	140.48	Half-Life too short
TC-101	0.	306.81	Half-Life too short
RU-103	-17.	497.08	1.4713E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	318.99	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	15.	621.84	7.8463E-08
CD-109	39.	88.03	3.9342E-07
AG-110M	14.	937.48	3.8426E-08
SN-113	36.	391.69	1.6403E-08
SN-117M	44.	158.56	5.7621E-08
SB-122	0.	563.93	Half-Life too short
SB-124	24.	602.71	1.3406E-08
SB-125	30.	427.89	2.8917E-08
TE-125M	40.	109.28	5.4942E-06
I-127	0.	417.90	Half-Life too short
TE-127M	26.	57.60	3.4089E-05
XE-127	51.	202.84	2.4906E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	5.6346E-07
XE-129M	50.	196.56	2.9527E-06
I-130	0.	536.09	Half-Life too short
BA-131	32.	183.80	2.2703E-07
I-131	32.	364.48	2.1966E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	41.	163.93	3.2263E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	33.	302.84	4.0636E-08
BA-133M	9.	276.09	Half-Life too short
I-133	0.	529.87	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	83.	81.00	4.3097E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	23.	604.70	9.9210E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
XE-135	0.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	2.	818.50	4.8330E-08
I-136	0.	1313.02	Half-Life too short
CS-137	20.	661.65	9.7535E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.86	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1428.50	Half-Life too short
CE-139	51.	165.85	1.2509E-08
CS-139	0.	1693.23	Half-Life too short
BA-140	21.	537.32	2.1842E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	0.	198.20	Half-Life too short
CE-141	38.	145.44	3.4337E-08
LA-141	0.	1354.52	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	44.	133.54	8.7026E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	33.	91.10	4.2168E-07
PM-148M	19.	550.27	1.4656E-08
EU-152	37.	344.27	3.1085E-08
EU-154	20.	1004.76	6.8505E-08
EU-156	14.	646.29	5.1056E-07
HF-181	17.	482.03	1.4620E-08
TA-182	9.	1221.42	4.3638E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	38.	279.19	1.7564E-08
BI-207	21.	569.67	8.2163E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-224	46.	240.98	2.1501E-04
RA-226	40.	186.21	2.2850E-07
AC-228	26.	338.32	6.3250E-08
TH-228	36.	84.37	1.2648E-06
PA-234	0.	131.20	Half-Life too short
TH-234	34.	63.29	3.2559E-06
U-235	35.	143.76	7.0529E-08
NP-239	0.	106.13	Half-Life too short
AM-241	25.	59.54	1.8845E-07

FERMI 1 GROUND WATER MONITORING TRITIUM ANALYSIS CHECKLIST

Sample number: BKG-NOC112304

Sample Location (Well Number): NOC-Background

1. Representative sample collected. Date/Time 11/23/04 / 1350

Sample collected by: JayMarie Stoback / JayMarie Stoback Date: 12-28-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Prepare sample ≥ 50 milliliters. Seal sample adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coulliard / [signature] Date: 12-27-04
Printed Name / Signature

3. Sample counted in accordance with 76.000.70 or 79 "Operation of the Packard TRICARB 1000 or 2100TR".

Performed by: James May / [signature] Date: 1-7-05
Fermi 2 Chemistry Printed Name Signature

4. Tritium analysis printout reviewed by Radiation Protection Supervision or delegate. No tritium detected.

Performed by: William V. Lipton / William V. Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, analysis printout, and completed form to Fermi 1 Radiological Engineer

Remarks _____

_____

Tritium Activity Calculation

Sample Information

1 . Sample Location	BKG NOC112304	
2 . Date Sampled	11/23/2004	
3 . Time Sampled	13:50	
4 . Sample Volume, (ml)	4	ml

Instrument Count Data

1 . Date Sample Counted	01/05/2004	
2 . Time Sample Counted	07:30	
3 . Background Inf.:		
Minutes Counted	10	min.
Background Count Rate (cpm)	7.9	cpm
4 . Efficiency Inf.: (Daily Spike Source ID # 111)		
Gross Spike Count Rate (cpm)	3815.3	cpm
Net Spike Count Rate (cpm)	3807.4	cpm
H3 Spike Activity (dpm on count date)	9923.2	dpm
Counter Efficiency	0.3837	cpm/dpm
5 . Sample Info:		
Sample Gross Count Rate (cpm)	7.3	cpm
Sample Count Time (min.)	10.0	min.
Net Sample Count Rate (cpm)	0.0	cpm
6 . Critical Level:		
Critical Level Count Rate (cpm)	2.0	cpm

Minimum Detectable Activity

$$\text{Minimum Detectable Activity (uCi/ml)} = 3.3 \times \frac{\sqrt{\frac{(\text{Bkg cpm})}{(\text{Bkg min.})} + \frac{(\text{Bkg cpm})}{(\text{Smpl min.})}}}{\text{Efficiency} \times 2.22\text{E6 dpm/uCi} \times \text{Sample Volume}} = 1.22\text{E-06 uCi/ml}$$

Sample Activity

$$\text{Sample Activity (uCi/ml)} = \frac{\text{Sample Net cpm}}{\text{Efficiency} \times 2.22\text{E6 dpm/Uci} \times \text{Sample Volume}} < \textbf{MDA}$$

Technician _____ Date 1-7-05

Form 76.000.39 Att 1 P1/1 DTC: TGCHEM File: 1319.02

FERMI 1 GROUND WATER MONITORING GAMMA ISOTPIC ANALYSIS CHECKLIST

Sample number: BKG-NOC112304

Sample Location (Well Number): NOC Background

1. Representative sample collected. Date/Time 11/23/04 / 1350

Sample collected by: Joy Marie Sloback / Joy Marie Sloback Date: 12-23-2004
Printed Name / Signature

Note: Qualified Fermi 1 Personnel or other qualified individual will obtain samples

2. Sample container sealed adequately to resist tampering.
Note: Use new sample containers only

Sample sealed by: Jon Coullard / Jon Coullard Date: 12-27-04
Printed Name / Signature

Note: Sample containers may simply be sealed with red duct tape and initialed by the individual performing the function

3. LLD validation

LLD and Critical Level determinations within 30 days of gamma spectrometry assay; acceptable LLDs shown for radionuclides detected by gamma spectrometry.

Fermi 2 RP Gamma Scintillation Detector # 4

Performed by: C. McCoy / [signature] Date: 12-29-04
Fermi 2 RP Printed Name Signature

Sample number: BKG-NOC112304

4. Sample counted in accordance with 65.000.115 "Operation of the Gamma Spectroscopy System".
(Note disposition of unidentified peaks in "Remarks")

Performed by: L. McCoy L. McCoy Date: 12-29-04
Fermi 2 RP Printed Name Signature

* Note: Samples may be counted on Chemistry's Gamma Spectroscopy System. If so, verify the critical levels and LLDs and count sample in accordance with the applicable procedure.

5. Gamma spectrometry evaluation reviewed by Radiation Protection Supervision or delegate.

Performed by: William V. Lipton William V Lipton Date: 1/14/2005
Fermi 2 Printed Name Signature
Radiation Protection Supervision/Delegate

Note: Return sample, intrinsic printout, and completed form to Fermi 1 Radiological Engineer

Remarks No licensed material detected.
William V Lipton 1/14/2005

DETROIT EDISON FERMI-2 POWER PLANT 29-DEC-2004 16:19:26.22

RADIATION PROTECTION DEPARTMENT

GAMMA SPECTROSCOPY ANALYSIS REPORT

HIGH EFFICIENCY DETECTOR

Sample ID Number: BKG-NOC112304

Sample End Time: 23-NOV-2004 13:50:00.00

REMARKS

PERFORMED BY:

SIGNATURE

REVIEWED BY: William [illegible] 48651 / 1/14/05

SIGNATURE/DATE

PAGE ____ of ____

****

Fermi 2 Radiation Protection Gamma Spectroscopy Report

************************ Sample Parameters ************************

Sample ID Number: BKG-NOC112304
Sample collection start date: 23-NOV-2004 13:50:00.00
Sample collection end date : 23-NOV-2004 13:50:00.00
Type of sample : 1 L Mari. Liquid
Sample quantity : 1.00000E+03 cc
Sample geometry : M1LL Operator : LKM

*********************** Acquisition Parameters ***********************

Detector number : DET 4 Acquire date : 29-DEC-2004 15:40:21.37
Preset live time : 0 00:30:00.00 Elapsed live time : 0 00:30:00.00
Elapsed real time : 0 00:30:01.05 Percent dead time : 0.05 %

*********************** Calibration Parameters ***********************

Detector number : DET 4 Yearly cal date : 12-APR-2004 09:17:00.00
Kev/channel : 5.00459E-01 Zero offsets : -2.14560E-01
Daily cal date : 29-DEC-2004 08:39:30.00

*********************** Peak Search Parameters ***********************

Start channel : 100 End channel : 4096
Height sensitivity : 5.00000 Shape sensitivity : 10.00000
Maximum number of iterations to resolve multiplets : 5

******************** Nuclide Identification Parameters ********************

Energy tolerance : 1.25000 Half-life ratio : 10.00000
Abundance limit : 75.00000 Library : dacmaster.nlb
Efficiency file : EFFD4_m1l1 Efficiencies at : Peak energy

****

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	511.68	142	29	2.96	1023.17	1013	20	7.89E-02	12.6	annihilation
2	0	558.68	56	19	1.65	1117.14	1112	11	3.09E-02	20.7	[illegible]
3	0	609.95	40	20	1.89	1219.56	1213	11	2.19E-02	30.2	Bi214
4	0	1120.32	26	6	2.22	2240.53	2234	11	1.45E-02	26.2	
5	0	1461.01	81	9	2.03	2922.32	2914	16	4.52E-02	13.5	K40
6	0	1765.16	20	5	1.81	3531.25	3526	10	1.13E-02	30.1	Bi214

Gamma-NID Peak Search Report

Id	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides
0	511.68	148	27	2.26	1023.17	1013	20	12.6		
0	558.48	56	19	1.68	1117.14	1110	11	20.3		
0	609.95	40	63	1.29	1219.06	1213	11	30.2		
0	1120.32	25	5	2.22	2240.53	2234	11	26.2		
0	1461.81	61	6	2.03	2922.33	2914	13	13.5		K-40
3	1765.15	20	5	1.81	3531.25	3525	10	30.1		

Nuclide Type: natural

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected uCi/cc	Decay Corr uCi/cc	1-Sigma %Error
K-40	1460.81	81	10.67*	2.309E+00	4.795E-07	4.795E-07	13.51

Flag: "*" = Keyline

Sample ID : BKG-HOC112304 Acquisition date : 29-DEC-2004 15:49:21

Total number of lines in spectrum	6	
Number of unidentified lines	0	
Number of lines tentatively identified by NID	1	100.00%

Nuclide Type : natural

Nuclide	Hlife	Decay	Uncorrected uCi/cc	Decay Corr uCi/cc	Decay Corr 1-Sigma Error	1-Sigma %Error	Flags
K-40	1.00E+09Y	1.00	4.795E-07	4.795E-07	2.643E-07	13.51	
Total Activity			4.795E-07	4.795E-07			
Grand Total Activity :			4.795E-07	4.795E-07			

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

Sample ID : BK0-NOC112384 Acquisition date : 29-DEC-2004 15:49:21

Nuclide	Half-life	Half-life Ratio	Energy	%Abund	Activity (uCi/cc)	1-Sigma %Error	Rejected by
I-10	100.74M	473.61	511.00*	193.46	1.000E+00	12.62	Decay
		% Abundances Found =		100.00			
SC-46	83.83D	0.43	140.53	62.70	--- Not Found ---		Abun.
			889.25*	99.98	--- Not Found ---		
			1120.51	99.99	1.700E-01	71.21	
		% Abundances Found =		38.87			
AS-76	26.32H	38.91	559.10*	44.70	3.319E+00	25.33	Decay,Abun.
			563.23	1.17	--- Not Found ---		
			571.38	0.14	--- Not Found ---		
			657.03	6.18	--- Not Found ---		
			665.31	2.30	--- Not Found ---		
			748.12	0.12	--- Not Found ---		
			771.76	0.12	--- Not Found ---		
			867.53	0.12	--- Not Found ---		
			1189.37	0.14	--- Not Found ---		
			1212.72	1.63	--- Not Found ---		
			1216.02	3.84	--- Not Found ---		
			1228.52	1.39	--- Not Found ---		
			1439.13	0.33	--- Not Found ---		
			1453.60	0.13	--- Not Found ---		
			1787.67	0.33	--- Not Found ---		
		% Abundances Found =		73.78			
RU-103	39.35D	8.92	497.08*	89.00	--- Not Found ---		Abun.
			610.33	5.60	4.562E-07	30.23	
		% Abundances Found =		5.92			
BI-214	19.90M	2611.76	609.31*	46.30	1.000E+35	30.23	Decay
			768.36	5.04	--- Not Found ---		
			934.06	3.21	--- Not Found ---		
			1120.29	15.10	1.000E+35	26.21	
			1238.11	5.94	--- Not Found ---		
			1377.67	4.11	--- Not Found ---		
			1764.49	15.80	1.000E+35	30.14	
		% Abundances Found =		80.84	(Abn. Limit = 40.46%)		

Flag: "*" = Keyline

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	511.68	142	29	2.96	1023.17	1013	20	7.03E-02	12.6	4.73E+00	T
0	558.08	56	17	1.65	1117.14	1112	11	3.09E-02	20.3	4.55E+00	T
0	609.95	40	28	1.89	1219.55	1213	11	2.19E-02	30.2	4.30E+00	T
0	1120.32	26	6	2.22	2240.53	2234	11	1.45E-02	26.2	2.78E+00	T
0	1765.16	20	3	1.01	3531.25	3526	10	1.10E-02	30.1	2.16E+00	T

Flags: "T" = Tentatively associated

Detroit Edison Fermi 2 MDA Report, Generated 29-DEC-2004 10:19:31.32

Sample ID : BKG-NOC118304

Minimum Detectable Activity Report

Nuclide	Bckgnd Cum	Energy (keV)	MDA (uCi/cc)
BE-7	21.	477.59	1.1303E-07
C 10	0.	511.00	Half Life too short
NA-22	13.	1274.54	1.1710E-08
NA-24	0.	1312.53	Half Life too short
MG-27	3.	1014.11	Half-Life too short
CL-38	0.	1642.42	Half-Life too short
AR-41	2.	1293.64	Half-Life too short
SC-46	2.	889.25	1.0828E-08
CR-51	44.	320.03	2.2174E-07
MN-54	14.	834.82	9.7860E-09
CO-56	10.	1238.25	2.5990E-08
MN-56	0.	1810.69	Half-Life too short
NI-56	43.	158.38	4.7751E-07
CO-57	31.	122.06	1.0115E-06
CO-58	11.	810.76	1.1569E-08
FE-59	12.	1099.22	3.1300E-08
CO-60	13.	1332.49	1.1915E-08
CU-64	0.	1345.90	Half-Life too short
NI-65	0.	1481.84	Half-Life too short
ZN-65	15.	1115.52	2.4355E-08
ZN-69M	0.	438.63	Half-Life too short
SE-75	36.	136.00	1.6183E-06
AS-76	0.	559.10	Half-Life too short
BR-82	0.	776.49	Half-Life too short
BR-83	0.	529.64	Half-Life too short
BR-84	0.	881.50	Half-Life too short
BR-85	0.	802.41	Half-Life too short
KR-85	40.	513.99	2.5931E-06
KR-85M	0.	151.18	Half-Life too short
SR-85	46.	513.99	1.6416E-06
RB-86	0.	1076.63	3.6307E-07
KR-87	0.	402.58	Half-Life too short
SR-87M	0.	388.48	Half-Life too short
KR-88	0.	196.32	Half-Life too short
RB-88	0.	1382.39	Half-Life too short
Y-88	3.	1836.01	9.8931E-09
KR-89	0.	220.98	Half-Life too short
RB-89	0.	1031.68	Half-Life too short
KR-90	0.	1118.69	Half-Life too short
RB-90	0.	831.69	Half-Life too short
RB-90M	0.	824.23	Half-Life too short
Y-90M	0.	202.51	Half-Life too short
SR-91	0.	1024.30	Half-Life too short
Y-91	0.	1204.90	4.4857E-06
Y-91M	0.	555.60	Half-Life too short
SR-92	0.	1383.94	Half-Life too short
Y-92	0.	934.46	Half-Life too short

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
SR-93	3.	590.20	Half-Life too short
Y-93	0.	266.90	Half-Life too short
NB-94	24.	702.63	9.6765E-09
NB-95	15.	765.79	1.7534E-08
NB-95M	43.	235.69	3.3584E-05
ZR-95	16.	706.72	2.3384E-08
NB-97	0.	657.99	Half-Life too short
ZR-97	0.	743.36	Half-Life too short
MO-99	0.	739.50	Half-Life too short
TC-99M	0.	142.13	Half-Life too short
TC-101	0.	306.01	Half-Life too short
RU-103	17.	497.08	1.1713E-08
TC-104	0.	357.99	Half-Life too short
RH-105	0.	319.90	Half-Life too short
RU-105	0.	724.50	Half-Life too short
RU-106	15.	521.84	7.8463E-08
CD-109	39.	88.03	3.9342E-07
AG-110M	14.	937.48	3.2425E-08
SN-113	36.	391.69	1.6403E-08
SN-117M	44.	158.56	5.7621E-06
SB-122	0.	563.93	Half-Life too short
SB-124	24.	602.71	1.3486E-08
SB-125	30.	427.89	2.8917E-08
[redacted]-125M	40.	109.28	5.4942E-06
[redacted]-127	0.	417.90	Half-Life too short
TE-127M	26.	57.60	3.4009E-05
XE-127	31.	202.84	2.4906E-08
TE-129	0.	459.60	Half-Life too short
TE-129M	20.	695.88	5.6846E-07
XE-129M	50.	196.55	2.9527E-06
I-130	0.	536.09	Half-Life too short
BA-131	32.	123.80	2.2703E-07
I-131	32.	364.48	2.1966E-07
TE-131	0.	149.72	Half-Life too short
TE-131M	0.	773.67	Half-Life too short
XE-131M	41.	163.93	3.2263E-06
I-132	0.	667.69	Half-Life too short
TE-132	0.	228.16	Half-Life too short
BA-133	33.	302.84	4.2636E-08
BA-133M	0.	276.09	Half-Life too short
I-133	0.	529.37	Half-Life too short
TE-133M	0.	912.58	Half-Life too short
XE-133	23.	81.00	4.3997E-06
XE-133M	0.	233.22	Half-Life too short
CS-134	28.	604.70	9.9210E-09
I-134	0.	884.09	Half-Life too short
TE-134	0.	210.47	Half-Life too short
BA-135M	0.	268.24	Half-Life too short
I-135	0.	1260.41	Half-Life too short
[redacted]-135	2.	249.79	Half-Life too short
XE-135M	0.	526.56	Half-Life too short

Sample ID : BKG-MOC112204 Acquisition date : 29-DEC-2004 13:49:21

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/cc)
CS-136	9.	818.50	4.5330E-08
I-136	0.	1313.00	Half-Life too short
CS-137	29.	661.65	3.7535E-09
XE-137	0.	455.49	Half-Life too short
CS-138	0.	1435.80	Half-Life too short
XE-138	0.	258.31	Half-Life too short
BA-139	0.	1420.50	Half-Life too short
CE-139	51.	165.85	1.2509E-08
CS-139	0.	1883.23	Half-Life too short
BA-140	21.	537.32	2.1042E-07
LA-140	0.	1596.49	Half-Life too short
BA-141	9.	190.26	Half-Life too short
CE-141	36.	145.44	3.4337E-08
LA-141	0.	1354.02	Half-Life too short
BA-142	0.	255.12	Half-Life too short
LA-142	0.	641.17	Half-Life too short
CE-143	0.	293.26	Half-Life too short
CE-144	44.	133.54	8.7026E-08
PR-144	0.	1489.15	Half-Life too short
ND-147	33.	91.10	4.2165E-07
PM-148M	19.	550.27	1.4656E-08
EU-152	37.	344.27	3.1885E-08
EU-154	20.	1004.76	6.8505E-08
EU-156	14.	546.29	5.1058E-07
HF-181	17.	482.03	1.4620E-08
TA-182	9.	1221.42	4.3638E-08
W-187	0.	685.81	Half-Life too short
RE-188	0.	155.03	Half-Life too short
HG-203	38.	279.19	1.7584E-08
BI-207	21.	569.67	8.2168E-09
TL-208	0.	583.14	Half-Life too short
PB-212	0.	238.63	Half-Life too short
BI-214	0.	609.31	Half-Life too short
PB-214	0.	351.92	Half-Life too short
RA-223	46.	240.98	2.1501E-04
RA-226	40.	186.21	2.2850E-07
AC-228	26.	338.32	6.3250E-08
TH-228	36.	84.37	1.2646E-06
PA-234	0.	131.20	Half-Life too short
TH-234	34.	63.29	3.2559E-05
U-235	35.	143.76	7.0529E-08
NP-239	0.	106.13	Half-Life too short
AM-241	28.	59.54	1.8345E-07