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2) Facility Operating License No. NPF-43
Appendix A, Technical Specifications 5.6.2 and 5.6.3

Subject: Annual Radiological Environmental Operating Report and Radioactive Effluent Release Report

The 2009 Annual Radiological Environmental Operating Report and The Radioactive Effluent Release Report for Fermi 2 are enclosed. These reports are being transmitted in accordance with Reference 2 and Regulatory Guide 1.21, Revision 1. The enclosed reports cover the time period from January 1 through December 31, 2009.

Should you have any questions regarding these reports, please contact Mr. David Keskitalo, General Supervisor, Radiological Engineering at (734) 586-5112.

Sincerely,

Joseph H. Plona

Enclosures

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FERMI 2 NUCLEAR POWER PLANT

DETROIT EDISON COMPANY

OPERATING LICENSE NO. NPF - 43

Fermi 2 - 2009 Annual
Radioactive Effluent Release Report

for the period of
January 1, 2009 through December 31, 2009

Prepared by:

Fermi 2
Radiological Engineering

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Executive Summary

This report is published to provide information regarding radioactive effluent monitoring at the Fermi 2 Nuclear Power Plant. The 2009 Annual Radioactive Effluent Release Report covers the period from January 1, 2009 through December 31, 2009.

The Radioactive Effluent Release Report is produced annually, as required by the Nuclear Regulatory Commission, to present detailed results of extensive monitoring of plant releases and offsite dose resulting from these releases. The data presented indicate that the operation of Fermi 2 results in offsite radiation exposures which are well below the applicable allowable levels set by the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA).

There were no releases of liquid radioactive effluents from Fermi 2 in 2009. There has not been a liquid radioactive discharge from Fermi 2 since 1994. Data on radioactive isotopes released in gaseous effluents are contained in the body of the report and in Appendix A.

The highest potential single organ dose to a person living offsite due to iodines, particulates, and tritium released from the plant was calculated to be 0.07 mrem, which is 0.5% of the applicable limit found in 10 CFR 50, Appendix I.

During 2009, no direct radiation dose to members of the public beyond the site boundary was attributed to the operation of Fermi 2, based on analysis of readings of thermoluminescent dosimeters (TLD) placed at various locations near the Fermi site. The offsite dose due to effluents is an extremely small fraction of the 40 CFR 190 limits. Therefore, the combined direct radiation and effluent dose due to Fermi 2 was in compliance with 40 CFR 190 in 2009.

Data on radioactivity contained in radwaste shipments to points offsite are contained in the body of the report and in Appendix A. Additional sections address whether there were any effluent monitors which were out of service for more than 30 days in 2009, any revisions to the Offsite Dose Calculation Manual, or any major changes in radwaste processing.

Appendix B of this report describes the Fermi Integrated Ground Water Protection Program. This program was established as part of the site's commitment to conformance with an industry-wide ground water protection initiative. This appendix also contains the results of 2009 quarterly ground water sampling, from approximately 40 monitor wells around Fermi 2 (ground water sampling has been performed under this program since the fall of 2007). Some of these monitor wells, primarily to the east and south of Fermi 2, have yielded sporadic and variable trace quantities of tritium that have been attributed to the recapture of tritium in precipitation from the plant's gaseous effluent or to background concentrations of tritium in the environment.

Introduction

During the normal operation of a nuclear power plant, most of the fission products are retained within the fuel and fuel cladding. However, small amounts of radioactive fission products and trace amounts of the component and structure surfaces which have been activated are present in the primary coolant water. The four types of radioactive material released are noble gases, iodine, particulates, and tritium.

Noble Gases

Some of the fission products released in airborne effluents are radioactive isotopes of noble gases, such as xenon and krypton. These noble gases are released continuously at low levels while the reactor is operating. Noble gas releases to the environment are reduced by plant systems which delay release of these gases from the plant, which allows a portion of the noble gas activity to decay within plant systems prior to release.

Noble gases are biologically and chemically nonreactive. They do not concentrate in humans or other organisms. They contribute to human radiation dose by being an external source of radiation exposure to the body. They are readily dispersed in the atmosphere.

Iodines and Particulates

Fermi 2 is required to calculate offsite dose due to releases of iodine-131 and iodine-133, which are radioisotopes of iodine with half lives of 8 days and 1 day, respectively, and particulates with half-lives greater than 8 days in gaseous and liquid effluents, and tritium. The principal radioactive particulates released are fission products (e.g., yttrium-91m and barium-139) and activation products (e.g., cobalt-58 and cobalt-60). Annual releases of these radionuclides are well within industry norms. Factors such as their high chemical reactivity and solubility in water, combined with the high efficiency of gaseous and liquid processing and radwaste systems, minimize their discharge.

The main contribution of radioactive iodine to human radiation dose is to the thyroid gland, where the body concentrates iodine. This exposure results from inhalation or ingestion of these iodines. Radioactive cesiums and cobalts, when ingested or inhaled, contribute to radiation exposure of tissues such as the muscle, liver, and intestines. These iodines and particulates are also a source of external radiation exposure if deposited on the ground.

Tritium

Tritium, a radioactive isotope of hydrogen, is the predominant radionuclide in radioactive gaseous effluents. It is detected at Fermi 2 in ventilation exhaust samples. Tritium is also the predominant radionuclide in liquid effluents; however Fermi 2 has not conducted liquid radioactive waste discharges since 1994. Plant personnel are alert for evidence of unmonitored liquid tritium releases, but no such releases have been detected.

Plant Effluent Monitoring

Effluents are strictly monitored to ensure that radioactivity released to the environment is as low as reasonably achievable and does not exceed regulatory limits. Effluent control includes the operation of monitoring systems, in-plant and environmental sampling and analyses programs, quality assurance programs for effluent and environmental programs, and procedures covering all aspects of effluent and environmental monitoring.

The radioactive waste treatment systems at Fermi 2 are designed to collect, process, and/or delay the release of liquid and gaseous wastes which contain radioactivity. For example, the 2.0 and 2.2 minute holdup pipes delay the release of radioactive gases so that radioactive decay can occur prior to release. The offgas system provides additional delay for such gases.

Radioactivity monitoring systems are used to verify that all releases are below regulatory limits. These instruments provide a continuous indication of the radioactivity present at the release points. Each instrument is equipped with alarms and indicators in the control room. The alarm setpoints are low enough to ensure that applicable limits will not be exceeded. In some cases, these alarms restrict the release. For example, several alarms cause building ventilation systems to be shut down and/or gaseous releases to be diverted to the standby gas treatment system.

All wastes are evaluated to identify the specific concentrations of radionuclides being released. Sampling and analysis provide a more sensitive and precise method of determining effluent composition than monitoring instruments.

A meteorological tower is located on the Fermi 2 site. It is linked to computers which record the meteorological data. This data is used in calculating dispersion and deposition factors, which are essentially dilution factors between plant release points and points offsite. Coupled with the effluent release data, these factors are used to calculate dose to the public.

Beyond the plant, devices maintained in conjunction with the Radiological Environmental Monitoring Program constantly sample the air in the surrounding environment. Frequent samples of other environmental media, such as water and vegetation, are also taken to determine if buildup of deposited radioactive material has occurred in the area.

Exposure Pathways to People

Radiological exposure pathways define the methods by which people may become exposed to radioactive material. The major pathways of concern are those which could cause the highest calculated radiation dose. These projected pathways are determined from the type and amount of radioactive material released, the environmental transport mechanism, and the use of the environment. The environmental transport mechanism includes consideration of physical factors, such as the hydrological and meteorological characteristics of the area.

An important factor in evaluating the exposure pathways is the use of the environment. This is evaluated in the annual Land Use Census. Many factors are considered, such as the locations of homes, gardens, and milk or meat animals in the area.

The release of radioactive gaseous effluents involves pathways such as external whole body exposure, deposition of radioactive material on plants, deposition on soil, inhalation and ingestion by animals raised for human consumption, and inhalation by humans. The release of radioactive material in liquid effluents involves pathways such as drinking water and fish consumption.

Although radionuclides can reach humans by many different pathways, some result in greater dose than others. The most significant pathway is the exposure pathway which will provide the greatest dose to a population, or to a specific individual. Identification of the most significant pathway depends on the radionuclides involved, the age and diet of the individual, and the location of the individual's residence. The doses calculated may be delivered to the whole body or to a specific organ. The organ receiving the greatest dose is important in determining compliance with dose limits. The standard assumptions used in dose calculation result in conservative dose estimates.

Dose Assessment

Dose is energy deposited by radiation in an exposed individual. Whole body exposure to radiation involves the exposure of all organs. Most exposures due to external sources of radiation are of this type. Both non-radioactive and radioactive elements can enter the body through inhalation or ingestion. When they do, they are usually not distributed evenly. For example, iodine concentrates in the thyroid gland, cesium collects in muscle and liver tissue, and strontium collects in bone tissue.

The total dose to organs from a given radionuclide depends on the amount of radioactive material present in the organ and the amount of time that the radionuclide remains in the organ. Some radionuclides remain for very short times due to their rapid radioactive decay and/or elimination rate from the body, while other radionuclides may remain in the body for longer periods of time. The form of the radionuclide (soluble vs. insoluble) and the method of uptake also influence residence times in the body.

The dose to the general public in the area surrounding Fermi 2 is calculated for periods of gaseous release and for each liquid release. The dose due to radioactive material released in gaseous effluents is calculated using factors such as the amount of radioactive material released, the concentration beyond the site boundary, the locations of exposure pathways (cow milk, goat milk, vegetable gardens and residences), and usage factors (inhalation and food consumption). The dose due to radioactive material released in liquid effluents is calculated using factors such as the total volume of liquid, the total volume of dilution water, near field dilution, and usage factors (water and fish consumption). These calculations produce a conservative estimation of the dose.

Radioactive Effluent Monitoring Results

This section summarizes the results of effluent monitoring and offsite dose calculation for the year 2009. Calculated offsite doses are compared with Nuclear Regulatory Commission limits, and these limits are summarized in Appendix A. Appendix A also contains a detailed discussion of the methods used to determine quantities of radioactivity released in effluents, the types of solid radwaste, as well as tables of individual radionuclides released in effluents and shipped as solid radwaste.

There were no releases of liquid radioactive effluents from Fermi 2 in 2009. There has not been a liquid radioactive discharge from Fermi 2 since 1994. The 2009 gaseous effluent releases are summarized in the following tables. There were no abnormal releases of radioactive material, i.e., releases not performed in accordance with the Fermi 2 license and implementing procedures, in 2009.

The data in the following tables represent continuous and batch releases. In 2009, there were six containment purges in which radioactivity was detected. The total time for these purges was 6954 minutes. Based on recorded start and stop times, the shortest of these purges lasted 137 minutes, the longest lasted 2815 minutes, and the average purge length was 1159 minutes.

Note that some values in the following summary tables are preceded by the "less than" symbol. For gross alpha radioactivity releases, the "less than" value is in units of microcuries per cubic centimeter (μCi/cc) and represents the lower limit of detection (LLD) value for a single sample.

Table 1 - Fission and Activation Gases (Noble Gases) Summary

	Quarter 1	**Quarter 2**	**Quarter 3**	**Quarter 4**
Release (curies)	5.66E+00	2.07E+00	4.97E+00	1.70E+00
Average Release Rate for Period (μCi/sec)	7.28E-01	2.63E-01	6.25E-01	2.14E-01

Table 2 - Radioiodines Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total I-131 (curies)	9.51E-04	3.19E-04	2.76E-04	1.44E-04
Average Release Rate for Period (μCi/sec)	1.22E-04	4.06E-05	3.47E-05	1.81E-05

Table 3 - Particulates Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Particulates with half lives > 8 days (curies)	1.17E-04	5.94E-04	9.88E-04	3.25E-04
Average Release Rate for Period (μCi/sec)	1.50E-05	7.56E-05	1.24E-04	4.09E-05
Gross Alpha Radioactivity (μCi/cc)	<5.2E-15	<5.2E-15	<5.2E-15	<5.2E-15

Table 4 - Tritium Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Total Release (curies)	2.05E+01	1.42E+01	2.80E+01	1.09E+01
Average Release Rate for Period (μCi/sec)	2.63E+00	1.81E+00	3.52E+00	1.37E+00

The offsite dose impact of the above releases was evaluated by calculating organ doses to the most highly exposed individual living near the plant due to I-131, I-133, tritium, and particulates with half lives greater than 8 days. This exposure is assumed to be occurring via the pathways of inhalation, vegetation ingestion, and direct radiation from material deposited on the ground. The results of this calculation are shown in the following table:

Table 5

Organ	2009 Gaseous Effluent Dose to Receptor with Highest Single Organ Dose
Bone	5.65E-03 mrem
Liver	2.59E-02 mrem
Thyroid	6.96E-02 mrem
Kidney	2.59E-02 mrem
Lung	2.58E-02 mrem
GI-LLI	2.59E-02 mrem
Total body	2.59E-02 mrem

The highest single organ dose is 6.96E-02 mrem to the thyroid. This is 0.5% of the federal limit of 15 mrem specified in 10 CFR 50, Appendix I.

Another dose calculation normally performed on the above release data is that for gamma and beta air dose at the site boundary due to noble gases. In 2009, gamma air dose was 3.33E-03 mrad, 0.03% of the 10 mrad annual limit; beta air dose in 2009 was 3.23E-03 mrad, 0.02% of the 20 mrad annual limit.

Title 40, Part 190 of the Code of Federal Regulations requires that dose to an individual in the unrestricted area from the uranium fuel cycle, including direct radiation dose, be limited to 25 mrem/year to the total body and 75 mrem/year to the thyroid. During 2009, there was no direct radiation dose attributed to the operation of Fermi 2 beyond the site boundary, based on analysis of offsite TLD readings. Also, as shown above, offsite dose due to effluents is a small fraction of the 40 CFR 190 limits. Therefore, Fermi 2 was in compliance with 40 CFR 190 in 2009.

Potential dose to visitors at Fermi 2 due to all radioactive effluents, including noble gases, was also calculated. The Offsite Dose Calculation Manual (ODCM) considers persons visiting the Fermi 2 Visitors Center (4 hours/year), and persons ice fishing on Lake Erie near the plant (240 hours/year), to be visitors. Using ODCM assumptions about these categories of visitors, the maximum potential dose to a visitor to Fermi 2 in 2009 was 2.40E-03 mrem to the maximally exposed organ (thyroid) and 1.70E-03 mrem to the total body.

Summary of Radioactive Waste Shipments

The radioactivity and volume of Fermi 2 solid waste received at the Clive, UT, facility in 2009 is summarized in the following table:

Table 6 - Solid Waste Received At Burial Sites

Type of waste	Unit	12 month period	Est. total activity error, %
Spent resins, sludges, etc.	m^3 curies	5.24E+01 2.20E+02	 ± 25
Dry compressible waste, contaminated equipment, etc.	m^3 curies	1.21E+02 8.62E+00	 ± 25
Irradiated components, control rods, etc.	m^3 curies	0 0	 N/A
Other	m^3 curies	0 0	 N/A

Radioactive solid waste shipments from Fermi 2 in 2009 (to either disposal or to intermediate processors) are summarized in the following table:

Table 7 - Solid Waste Shipments

Type of shipment/ solidification process	Number of shipments	Mode of transportation	Destination
Spent resin, sludges, etc.	12	Tractor trailer with cask	EnergySolutions, Oak Ridge, TN EnergySolutions, Clive, UT
Dry compressible waste, contaminated equipment, etc.	23	Tractor trailer	EnergySolutions, Oak Ridge, TN
Oil	1	Tractor trailer	EnergySolutions, Oak Ridge, TN
Mixed waste	1	Closed van	Permafix (D.S.S.I.), Kingston, TN

Additional Required Information

Appendices

The contents of Appendix A, Effluent and Radwaste Data, are described on page 9. The Fermi 2 Integrated Groundwater Protection Program was implemented in the fourth quarter of 2007. Appendix B contains a description of this program, sampling data, and a discussion of sampling results.

ODCM Revisions

The ODCM was not revised once in 2009; therefore no ODCM appendix is included.

ODCM Monitors Out of Service

The Offgas Radiation Monitor, Division 2, was out of service from January 6, 2009 to June 15, 2009, and again from October 8, 2009 to November 10, 2009. Difficulties in maintaining this offgas radiation monitor are related to equipment age. Efforts are underway to improve monitor maintenance, upgrade monitor components, and purchase replacement equipment. The Division 1 Offgas Radiation Monitor remained in service throughout 2009 so that there was no loss of ability to monitor offgas radiation levels, and no compensatory sampling was required.

Outside Temporary Tanks

No outside temporary tank exceeded the 10 curie content limit (excluding tritium and dissolved or entrained noble gases) in 2009.

Meteorological Tables

Meteorological tables for 2009 are not included in this report. Instead, in accordance with Section 5.9.1.8 of the Fermi 2 Offsite Dose Calculation Manual (ODCM), a summary file of required meteorological data for 2009 is retained on site and is available upon request.

Major Changes to Radioactive Waste Systems

There were no major changes to radioactive waste systems in 2009.

Appendix A

Effluent and Radwaste Data

Regulatory Limits for Radioactive Effluents

The Nuclear Regulatory Commission (NRC) limits on liquid and gaseous effluents are incorporated into the Fermi 2 Offsite Dose Calculation Manual. These limits prescribe the maximum doses and dose rates due to radioactive effluents resulting from normal operation of Fermi 2. These limits are described in the following sections.

A. Gaseous Effluents

I. Dose rate due to radioactivity released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

a) Noble gases

Less than or equal to 500 mrem/year to the total body.
Less than or equal to 3000 mrem/year to the skin.

b) Iodine-131, iodine-133, tritium, and for all radionuclides in particulate form with half lives greater than 8 days

Less than or equal to 1500 mrem/year to any organ.

II. Air dose due to noble gases to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 5 mrad for gamma radiation
Less than or equal to 10 mrad for beta radiation
- During any calendar quarter

b) Less than or equal to 10 mrad for gamma radiation
Less than or equal to 20 mrad for beta radiation
- During any calendar year

III. Dose to a member of the public from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a) Less than or equal to 7.5 mrem to any organ
   - During any calendar quarter

b) Less than or equal to 15 mrem to any organ
   - During any calendar year

Note: The calculated site boundary dose rates for Fermi 2 are based on identification of individual isotopes and on use of dose factors specific to each identified isotope or a highly conservative dose factor. Average energy values are not used in these calculations, and therefore need not be reported.

B. Liquid Effluents

I. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to ten times the concentrations specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 20 (Standards for Protection Against Radiation), Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases, as required by the Fermi 2 Offsite Dose Calculation Manual. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 (.0002) microcuries/ml total activity. This limit is based on the Xe-135 air submersion dose limit converted to an equivalent concentration in water as discussed in the International Commission on Radiological Protection (ICRP) Publication 2.

II. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

a) Less than or equal to 1.5 mrem to the total body
   Less than or equal to 5 mrem to any organ
   - During any calendar quarter

b) Less than or equal to 3 mrem to the total body
   Less than or equal to 10 mrem to any organ
   - During any calendar year

Measurements and Approximations of Total Activity in Radioactive Effluents

As required by NRC Regulatory Guide 1.21, this section describes the methods used to measure the total radioactivity in effluent releases and to estimate the overall errors associated with these measurements. The effluent monitoring systems are described in Chapter 11.4 of the Fermi 2 Updated Final Safety Analysis Report (UFSAR).

A. Gaseous Effluents

I. Fission and Activation Gases

Samples are obtained from each of the six plant radiation monitors which continuously monitor the five ventilation exhaust points. The fission and activation gases are quantified by gamma spectroscopy analysis of periodic samples.

The summary values reported are the sums of all fission and activation gases quantified at all monitored release points.

II. Radioiodines

Samples are obtained from each of the six plant radiation monitors which continuously monitor the five ventilation exhaust points. The radioiodines are entrained on charcoal and then quantified by gamma spectroscopy analysis. For each sample, the duration of sampling and continuous flow rate through the charcoal are used in determining the concentration of radioiodines. From the flow rate of the ventilation system, a rate of release can be determined.

The summary values reported are the sums of all radioiodines quantified at all continuously monitored release points.

III. Particulates

Samples are obtained from each of the six plant effluent radiation monitors which continuously monitor the five ventilation exhaust points. The particulates are collected on a filter and then quantified by gamma spectroscopy analysis.

For each sample, the duration of sampling and continuous flow rate through the filter are used in determining the concentration of particulates. From the flow rate of the ventilation system, a rate of release can be determined.

Quarterly, the filters from each ventilation release point are composited and then radiochemically separated and analyzed for strontium (Sr)-89/90.

The summary values reported are the sums of all particulates quantified at all monitored release points.

IV. Tritium

Samples are obtained from each of the six plant effluent radiation monitors which continuously monitor the five ventilation exhaust points. The sample is passed through a bottle containing water and the tritium is "washed" out to the collecting water. Portions of the collecting water are analyzed for tritium using liquid scintillation counting techniques. For each sample, the duration of sample and sample flow rate is used to determine the concentration. From the flow rate of the ventilation system, a release rate can be determined.

The summary values reported are the sums of all tritium quantified at all monitored release points.

V. Gross Alpha

The gaseous particulate filters from the six plant effluent radiation monitors are stored for one week to allow for decay of naturally occurring alpha emitters. These filters are then analyzed for gross alpha radioactivity by gas proportional counting, and any such radioactivity found is assumed to be plant related. The quantity of alpha emitters released can then be determined from sample flow rate, sample duration, and stack flow rate.

The summary values reported are the sums of all alpha emitters quantified at all monitored release points.

B. Liquid Effluents

The liquid radwaste processing system and the liquid effluent monitoring system are described in the Fermi 2 UFSAR. Fermi 2 released no radioactive liquid effluents in 2009.

C. Statistical Measurement Uncertainties

The statistical uncertainty of the measurements in this section has been calculated and summarized in the following table:

Measurement Type	Sample Type	One Sigma Uncertainty
Fission and Activation Gases	Gaseous	30%
Radioiodines	Gaseous	17%
Particulates	Gaseous	16%
Tritium	Gaseous	25%
Gross Alpha	Gaseous	16%

Gaseous Releases by Individual Nuclide

Values in the following tables which are preceded by the "less than" symbol represent the lower limit of detection (LLD) in units of microcuries per cubic centimeter (µCi/cc) for individual samples, and indicate that the nuclide in question was not detected in gaseous effluent samples in the indicated quarter of 2009. For quantities of gross alpha radioactivity and tritium in gaseous effluents, see Tables 3 and 4 on page 10 of this report.

A. Particulate Radionuclides (Curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Mn-54	1.03E-05	4.63E-05	1.95E-04	2.41E-05
Co-58	4.37E-06	1.76E-05	2.52E-04	1.89E-05
Co-60	6.03E-06	7.16E-05	1.84E-04	2.50E-05
Na-24	<1.4E-11	<1.4E-11	3.28E-03	<1.4E-11
Cr-51	<8.2E-13	2.26E-04	9.20E-05	7.77E-05
Zn-65	<4.3E-13	<4.3E-13	5.91E-05	8.74E-06
Zn-69m	<1.0E-11	5.18E-05	1.47E-03	<1.0E-11
Tc-99m	<3.3E-13	2.32E-05	1.01E-03	2.08E-05
Ba-139	9.62E-02	1.22E-02	2.44E-02	7.02E-02
La-140	5.47E-05	<1.4E-12	<1.4E-12	6.90E-05
Ba-140	7.18E-06	<5.3E-13	<5.3E-13	4.55E-05
Y-91m	1.05E-02	6.85E-04	2.99E-03	1.00E-02
Rb-89	9.78E-03	<7.2E-11	<7.2E-11	<7.2E-11
Cs-138	3.32E-02	<3.8E-11	3.18E-03	4.66E-02
As-76	6.41E-03	4.21E-03	3.57E-03	9.76E-03
Br-82	7.04E-06	<1.1E-12	1.50E-05	5.03E-06
Mn-56	<1.4E-11	<1.4E-11	9.32E-03	<1.4E-11
Re-188	<1.1E-11	<1.1E-11	5.67E-05	<1.1E-11
Sr-89	8.93E-05	<1.4E-14	3.99E-05	3.77E-05
Sr-90	<6.7E-15	<6.7E-15	<6.7E-15	<6.7E-15
Fe-55	<5.2E-15	2.32E-04	1.66E-04	8.69E-05
Cs-134	<4.6E-14	<4.6E-14	<4.6E-14	<4.6E-14
Cs-137	<2.3E-13	<2.3E-13	<2.3E-13	<2.3E-13
Ce-141	<1.8E-13	<1.8E-13	<1.8E-13	<1.8E-13
Ce-143	<1.6E-12	<1.6E-12	<1.6E-12	<1.6E-12
Ce-144	<6.2E-13	<6.2E-13	<6.2E-13	<6.2E-13
Total	**1.56E-01**	**1.78E-02**	**5.03E-02**	**1.37E-01**

B. Noble Gases (Curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	<1.0E-07	3.58E-01	1.29E+00	6.77E-01
Kr-87	<1.5E-07	<1.5E-07	<1.5E-07	<1.5E-07
Kr-88	<7.7E-08	<7.7E-08	<7.7E-08	<7.7E-08
Kr-85m	<3.0E-08	8.97E-02	4.89E-01	2.07E-01
Xe-133	<7.5E-08	<7.5E-08	1.72E-01	<7.5E-08
Xe-133m	<1.7E-07	<1.7E-07	<1.7E-07	<1.7E-07
Xe-135	<2.5E-08	<2.5E-08	7.18E-02	<2.5E-08
Xe-135m	6.23E-01	4.15E-01	8.34E-01	3.32E-01
Xe-137	3.60E+00	<1.8E-06	<1.8E-06	<1.8E-06
Xe-138	1.44E+00	1.21E+00	2.11E+00	4.88E-01
Total	**5.66E+00**	**2.07E+00**	**4.97E+00**	**1.70E+00**

C. Radioiodines (Curies)

Nuclide	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	9.51E-04	3.19E-04	2.76E-04	1.44E-04
I-132	1.39E-02	7.05E-04	4.38E-04	3.71E-04
I-133	9.68E-03	1.46E-03	1.86E-03	9.39E-04
I-134	2.15E-02	<2.9E-11	1.13E-03	<2.9E-11
I-135	1.30E-02	6.46E-04	8.80E-04	2.08E-04
Total	**5.90E-02**	**3.13E-03**	**4.58E-03**	**1.66E-03**

Shipments of Radwaste

Fermi 2 complies with the extensive federal regulations which govern radioactive waste shipments. Radioactive solid waste shipments from the Fermi 2 site consist of waste generated during water treatment, radioactive trash, irradiated components, etc. Shipment destinations are either a licensed burial site or intermediate processing facilities. Waste shipped to intermediate processing facilities is shipped directly from these facilities to a licensed burial site after processing. The following tables contain estimates of major nuclide composition, by class of waste, of Fermi 2 solid radwaste received at the Clive, UT, facility in 2009.

a. **Spent resins, sludges, etc.** All waste in this category in 2009 was Class A waste and consisted of spent resins and sludges. It was shipped in Polyethylene Liners, within shielded transportation casks, directly to the Clive, UT, burial facility or to an intermediate processor. Waste sent directly to a disposal facility was dewatered prior to shipment. All quantities were determined by measurement.

Spent resins, sludges, etc.

Isotope	Activity mCi	Percent
Ag-110m	2.27E+01	0.01%
Ba-140	3.68E-01	0.00%
C-14	1.18E+01	0.01% LLD
Co-57	2.63E+00	0.00%
Co-58	9.65E+02	0.44%
Co-60	2.54E+04	11.54%
Cr-51	1.27E+03	0.58%
Cs-134	1.64E+02	0.07%
Cs-137	1.04E+03	0.47%
Fe-55	1.71E+05	77.52%
Fe-59	6.96E+02	0.32%
H-3	1.67E+02	0.08%
I-129	1.40E+00	0.00%
I-131	1.34E-01	0.00%
La-140	1.61E-01	0.00%
Mn-54	1.55E+04	7.02%
Nb-95	8.90E+00	0.00%
Ni-63	1.73E+03	0.78%
Sb-124	5.08E+01	0.02%
Sr-89	1.17E+02	0.05%
Tc-99	1.23E+01	0.01%
Zn-65	2.37E+03	1.08%
Zr-95	1.27E+01	0.01%
Total Activity	2.20E+05	100.00%
Volume Shipped (m^3)	5.24E+01	

b. Dry compressible waste, contaminated equipment, etc. Waste in this category in 2009 was shipped in strong tight containers, and was classified as dry active waste (DAW). All waste in this category was Class A waste. The DAW was compacted, and sent for direct disposal or incinerated by an intermediate processor. All quantities were determined by measurement.

Dry Active Waste

Isotope	Activity mCi	Percent
C-14	8.21E+01	0.95%
Co-58	4.05E+01	0.47%
Co-60	1.41E+03	16.41%
Cr-51	7.12E+01	0.83%
Cs-137	1.95E-02	0.00%
Fe-55	6.40E+03	74.18%
Fe-59	2.92E+01	0.34%
H-3	9.35E+01	1.08%
I-129	3.84E+00	0.04%
Mn-54	5.35E+02	6.21%
Ni-63	1.05E+01	0.12%
Sb-124	4.50E-01	0.01%
Tc-99	8.91E+01	1.03%
Zn-65	7.05E+01	0.82%
Total Activity (mCi)	8.62E+03	100.00%
Volume Disposed (m^3)	1.21E+02	

c. **Irradiated components, control rods, etc.:** No waste in this category

d. **Other:** No waste in this category was shipped to a disposal site.

Appendix B

Ground Water Protection Program Data and Analysis

INTRODUCTION

In conformance with the voluntary industry ground water protection initiative (Nuclear Energy Institute 07-07), Fermi 2 maintains an Integrated Ground Water Protection Program (IGWPP) comprised of 56 monitor wells, 38 of which are sampled quarterly for plant-related radioisotopes. These monitor wells are not only used to monitor ground-water flow in the shallow (surficial) and deep (bedrock) aquifers, but they also provide ground-water sample points, separate of the site's existing, long-term Radiological Environmental Monitoring Program (REMP) wells.

Fermi 2 utilizes a contract laboratory for analysis of ground-water samples taken as part of the site's IGWPP. Ground-water samples taken as part of the quarterly sampling program are analyzed for tritium (H-3) using liquid scintillation and plant-related gamma-emitting radioisotopes using gamma spectroscopy. Each year Fermi 2 also takes ground-water samples from selected wells to test for the presence of plant-related hard-to-detect (HTD) radionuclides (iron-55, Strontium-89, and Strontium-90).

Ground-water samples taken during the first half of 2009 were only analyzed by gamma spectroscopy if the corresponding split sample was positive for tritium. During the second half of 2009 all samples of ground water were analyzed by gamma spectroscopy regardless of the results of the tritium analysis on the corresponding split sample.

RESULTS

Samples analyzed for gamma-emitting radionuclides, as well as HTDs, are counted to environmental lower limits of detection (LLD) for each given radioisotope of interest. For tritium there is no required limit of detection, beyond what is prescribed for ground water samples taken as part of the site's REMP. The REMP LLD is set at 2,000 pCi/L which is 1/10 of the EPA's drinking water limit of 20,000 pCi/L. Fermi 2's contract laboratory achieved LLDs for tritium of 562 pCi/L, or less, for all ground-water samples taken during 2009.

Deep Wells (Table 1)
Tritium was not detected in samples of ground water from the Fermi 2 deep monitor wells, with the periodic exception of ground-water samples from monitor wells EF2-07-004D, EF2-07-006D, EF2-07-009D, EF2-07-015D, and EF2-07-020D. The positive results for tritium from water in these monitor wells range from 279 – 527 pCi/L. The monitor wells where tritium has been detected in ground water are evenly distributed across the Fermi 2 site.

Plant-related gamma-emitting radioisotopes were not detected in any samples collected from deep monitor wells in 2009.

Shallow Wells (Table 2)
Most shallow monitor wells have consistently yielded results indicating that tritium is not present at the detection limit. Shallow monitor wells, where trace levels of tritium have been detected, yielded sporadic and variable tritium activities that are all less than 550 pCi/L.

Plant-related gamma-emitting radioisotopes and hard-to-detect radioisotopes were not detected in any ground-water samples collected from shallow monitor wells in 2009.

DISCUSSION

This is the second annual review of results of ground-water sampling performed in compliance with the Fermi Energy Center IGWPP. Results of tritium analysis of ground water sampled in 2009 have shown that most of the site's wells have never had a positive result for that radionuclide. In 2009, positive ground water results for tritium ranged from 206 to 549 pCi/L. During the first quarter sampling all ground water samples produced results for tritium less than the lower-limit of detection.

Because Fermi's contract laboratory has started using a lower LLD, the apparent distribution of positive tritium results is more wide-spread than in previous years. The contract laboratory is achieving detection limits that are below levels that the state of Michigan periodically finds when sampling surface water in Lake Erie. This suggests that current levels of detection used by the Fermi contract laboratory for tritium are so low that some positive values are most likely the upper levels of the range of background values for tritium in the region.

If the tritium found in ground water from shallow wells were attributable to a leaking plant system then one would expect the levels to steadily increase over time, especially during the winter when there is less recharge from surface water. Instead the results from shallow monitor wells show periodic low-level hits for tritium in ground water with no trend. This pattern is more consistent with what one would expect to see if the tritium were attributable to recapture from washout. Recapture of tritium emitted from nuclear power plant stacks in precipitation is well documented and these emissions are continuously monitored and reported annually by the utility as part of an approved effluents program.

In 2009 tritium was found at very low levels in several deep monitor wells. The positive results were sporadic, low level, and do not show any spatial trend. The deep monitor wells are screened 40-45 feet below ground surface in bedrock. An approximately 10-foot thick inorganic clay layer between surficial aquifer and the bedrock aquifer impedes flow to such a degree that the bedrock aquifer is saturated and under pressure to the point that static pressure in deep monitor wells rises to a level several feet above the top of the clay layer. These conditions suggest that if any ground-water flow occurs between the two aquifers it would be upward from the bedrock aquifer to the surficial aquifer. Plant components, outside of buildings, that contain large quantities of tritiated water are either above ground in tanks or in piping running through aggregate at or above the water table. If these components were to generate a leak the contamination would be evident in monitor wells screened in the surficial aquifer. Under these conditions (hydrogeological and plant construction) it is highly improbable that the positive tritium values are indicative of plant-related tritium because there is no known pathway for plant-related tritium to contaminate the bedrock aquifer.

Furthermore, natural radioisotopes commonly found in bedrock, such as Pb-210, produce low-energy betas in a similar energy range as tritium and may cause spurious results. The low-level of activity in ground water from the deep monitor wells may also be attributed to the high uncertainty associated with results at or near an analytical method's lower detection limit.

Table 1: Deep Monitor Well Tritium Analysis Results for Year 2009

MONITOR WELL	EVENT ID	QA TYPE	LAB ID	PARAMETER	PREFIX	VALUE	UNITS
EF2-07-001D	P-2009-G-Q1	Note 1					
EF2-07-001D	P-2009-G-Q2	Note 1					
EF2-07-001D	P-2009-G-Q3	Note 1					
EF2-07-001D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003D	P-2009-G-Q1	Note 1					
EF2-07-003D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003D	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-004D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-004D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-004D	P-2009-G-Q3	NORMAL	GEL	H-3		339	PCI/L
EF2-07-004D	P-2009-G-Q4	NORMAL	GEL	H-3		321	PCI/L
EF2-07-006D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-006D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-006D	P-2009-G-Q3	NORMAL	GEL	H-3		279	PCI/L
EF2-07-006D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008D	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-009D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-009D	P-2009-G-Q2	NORMAL	GEL	H-3		489	PCI/L
EF2-07-009D	P-2009-G-Q3	DUPLICATE	GEL	H-3		527	PCI/L
EF2-07-009D	P-2009-G-Q3	NORMAL	GEL	H-3		517	PCI/L
EF2-07-009D	P-2009-G-Q4	NORMAL	GEL	H-3		312	PCI/L
EF2-07-015D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-015D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-015D	P-2009-G-Q3	NORMAL	GEL	H-3		239	PCI/L
EF2-07-015D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-020D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-020D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L

EF2-07-020D	P-2009-G-Q3	NORMAL	GEL	H-3		363	PCI/L
EF2-07-020D	P-2009-G-Q4	DUPLICATE	GEL	H-3		415	PCI/L
EF2-07-020D	P-2009-G-Q4	NORMAL	GEL	H-3		442	PCI/L
EF2-07-029D	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-029D	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-029D	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-029D	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L

Note 1: Well could not be sampled – in construction area.

Table 2: Shallow Monitor Well Tritium Analysis Results for Year 2009

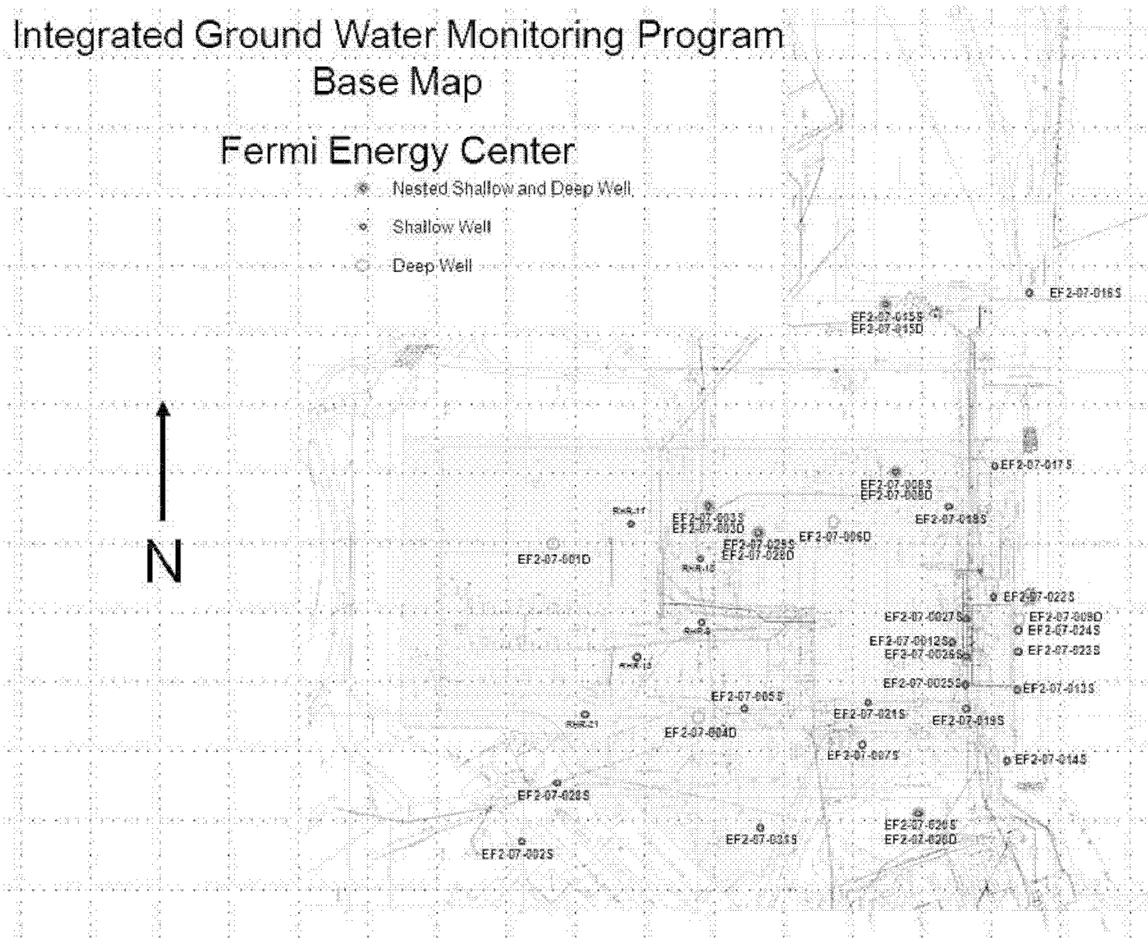
MONITOR WELL	EVENT ID	QA TYPE	LAB ID	PARAMETER	PREFIX	VALUE	UNITS
EF2-07-002S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-002S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-002S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-002S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003S	P-2009-G-Q2	Note 1					
EF2-07-003S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-003S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-005S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-005S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-005S	P-2009-G-Q3	NORMAL	GEL	H-3		253	PCI/L
EF2-07-005S	P-2009-G-Q4	NORMAL	GEL	H-3		267	PCI/L
EF2-07-007S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-007S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-007S	P-2009-G-Q3	NORMAL	GEL	H-3		378	PCI/L
EF2-07-007S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008S	P-2009-G-Q2	DUPLICATE	GEL	H-3	<	LLD	PCI/L
EF2-07-008S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-008S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-012S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-012S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-012S	P-2009-G-Q3	NORMAL	GEL	H-3		251	PCI/L
EF2-07-012S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-013S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-013S	P-2009-G-Q2	NORMAL	GEL	H-3		376	PCI/L
EF2-07-013S	P-2009-G-Q3	NORMAL	GEL	H-3		409	PCI/L
EF2-07-013S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-014S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-014S	P-2009-G-Q2	NORMAL	GEL	H-3		446	PCI/L
EF2-07-014S	P-2009-G-Q3	NORMAL	GEL	H-3		363	PCI/L
EF2-07-014S	P-2009-G-Q4	NORMAL	GEL	H-3		303	PCI/L
EF2-07-015S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-015S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L

EF2-07-015S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-015S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-016S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-016S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-016S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-016S	P-2009-G-Q4	NORMAL	GEL	H-3		267	PCI/L
EF2-07-017S	P-2009-G-Q1	DUPLICATE	GEL	H-3	<	LLD	PCI/L
EF2-07-017S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-017S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-017S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-018S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-018S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-018S	P-2009-G-Q4	Note 2					
EF2-07-018S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-019S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-019S	P-2009-G-Q2	NORMAL	GEL	H-3		462	PCI/L
EF2-07-019S	P-2009-G-Q3	NORMAL	GEL	H-3		517	PCI/L
EF2-07-019S	P-2009-G-Q3	DUPLICATE	GEL	H-3		386	PCI/L
EF2-07-019S	P-2009-G-Q4	NORMAL	GEL	H-3		234	PCI/L
EF2-07-020S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-020S	P-2009-G-Q2	NORMAL	GEL	H-3	<	263	PCI/L
EF2-07-020S	P-2009-G-Q3	NORMAL	GEL	H-3	<	219	PCI/L
EF2-07-020S	P-2009-G-Q4	NORMAL	GEL	H-3		345	PCI/L
EF2-07-021S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-021S	P-2009-G-Q2	NORMAL	GEL	H-3		461	PCI/L
EF2-07-021S	P-2009-G-Q3	NORMAL	GEL	H-3		549	PCI/L
EF2-07-021S	P-2009-G-Q4	NORMAL	GEL	H-3		524	PCI/L
EF2-07-022S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-022S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-022S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-022S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-023S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-023S	P-2009-G-Q2	NORMAL	GEL	H-3		275	PCI/L
EF2-07-023S	P-2009-G-Q3	NORMAL	GEL	H-3		259	PCI/L
EF2-07-023S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-024S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-024S	P-2009-G-Q2	NORMAL	GEL	H-3		279	PCI/L
EF2-07-024S	P-2009-G-Q3	NORMAL	GEL	H-3		330	PCI/L
EF2-07-024S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-025S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-025S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-025S	P-2009-G-Q3	NORMAL	GEL	H-3		442	PCI/L
EF2-07-025S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-026S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-026S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-026S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-026S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-027S	P-2009-G-Q1	DUPLICATE	GEL	H-3	<	LLD	PCI/L
EF2-07-027S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-027S	P-2009-G-Q2	NORMAL	GEL	H-3		413	PCI/L

EF2-07-027S	P-2009-G-Q3	NORMAL	GEL	H-3		249	PCI/L
EF2-07-027S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-028S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-028S	P-2009-G-Q2	DUPLICATE	GEL	H-3	<	LLD	PCI/L
EF2-07-028S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-028S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-028S	P-2009-G-Q4	NORMAL	GEL	H-3		263	PCI/L
EF2-07-029S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-029S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-029S	P-2009-G-Q3	NORMAL	GEL	H-3		220	PCI/L
EF2-07-029S	P-2009-G-Q3	DUPLICATE	GEL	H-3		286	PCI/L
EF2-07-029S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-031S	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-031S	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-031S	P-2009-G-Q3	NORMAL	GEL	H-3	<	LLD	PCI/L
EF2-07-031S	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-10	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-10	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-10	P-2009-G-Q3	NORMAL	GEL	H-3		225	PCI/L
RHR-10	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-11	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-11	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-11	P-2009-G-Q3	NORMAL	GEL	H-3		231	PCI/L
RHR-11	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-18	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-18	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-18	P-2009-G-Q2	DUPLICATE	GEL	H-3	<	LLD	PCI/L
RHR-18	P-2009-G-Q3	NORMAL	GEL	H-3		212	PCI/L
RHR-18	P-2009-G-Q4	NORMAL	GEL	H-3		434	PCI/L
RHR-21	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-21	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-21	P-2009-G-Q4	Note 2					
RHR-21	P-2009-G-Q4	NORMAL	GEL	H-3		307	PCI/L
RHR-9	P-2009-G-Q1	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-9	P-2009-G-Q2	NORMAL	GEL	H-3	<	LLD	PCI/L
RHR-9	P-2009-G-Q3	NORMAL	GEL	H-3		206	PCI/L
RHR-9	P-2009-G-Q4	NORMAL	GEL	H-3	<	LLD	PCI/L

Note 1: Well could not be sampled – in construction area.
Note 2: Well could not be sampled – obstructed by equipment.

Map of Monitor Well Locations



FERMI 2 NUCLEAR POWER PLANT

DETROIT EDISON COMPANY

OPERATING LICENSE NO. NPF - 43

Fermi 2 - 2009 Annual
Radiological Environmental Operating Report

for the period of
January 1, 2009 through December 31, 2009

Prepared by:

Fermi 2
Radiological Engineering

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Executive Summary

This Annual Radiological Environmental Operating Report is a detailed report on the Radiological Environmental Monitoring Program (REMP) conducted at Detroit Edison's Fermi 2 nuclear power plant from January 1 through December 31, 2009.

Samples collected as part of the REMP program are analyzed by AREVA NP Inc. Environmental Laboratory. Radioactivity measurements for these samples are reported in terms of sample concentration. Standard units of measure for reporting radioactivity are the Curie (Ci) for the amount of activity, and the Roentgen (R) for the amount of radiation exposure in free air. The unit of radioactivity used in this report is the picocurie (pCi). A picocurie is one-one trillionth of a curie. The unit of direct radiation used in this report is milliroentgen (mR). A milliroentgen is one-one thousandth of a roentgen. All radioactivity measurements for samples found to contain radioactivity are reported with a 2 sigma counting error, a standard counting practice.

The Radiological Environmental Monitoring Program is divided into four major parts. These four parts are direct radiation monitoring, atmospheric monitoring, terrestrial monitoring, and aquatic monitoring. The results of 2009 data showed that environmental radioactivity levels have not increased from background radioactivity levels detected prior to the operation of Fermi 2.

Direct radiation measurements were taken at 71 locations using thermoluminescent dosimeters (TLD). The average quarterly exposure was 14.9 mR/standard quarter for indicating locations. This average exposure is equivalent to the ambient radiation levels measured prior to the operation of Fermi 2.

Atmospheric monitoring results for 2009 showed only naturally occurring radioactivity and were consistent with levels measured prior to the operation of Fermi 2. No radioactivity attributable to activities at Fermi 2 was detected in any atmospheric samples during 2009.

Terrestrial monitoring results for 2009 of milk, groundwater, and leafy garden vegetable samples, showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing. The radioactivity levels detected were consistent with levels measured prior to the operation of Fermi 2. No radioactivity attributable to activities at Fermi 2 was detected in any terrestrial samples during 2009.

Aquatic monitoring results for 2009 of drinking water, surface water, sediment, and fish, showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing and were consistent with levels measured prior to the operation of Fermi 2. No radioactivity attributable to activities at Fermi 2 was detected in any aquatic samples during 2009.

REMP sampling did not identify any radioactivity attributable to the operation of Fermi 2.

Radiological Environmental Monitoring Program Results

Direct Radiation Monitoring

Radiation is a normal component of the environment resulting primarily from natural sources, such as cosmic radiation and naturally occurring radionuclides; and to a lesser extent, from manmade sources such as fallout from past nuclear weapons testing. The earth is constantly bombarded by cosmic radiation in the form of high energy gamma rays and particulates. The earth's crust also contains natural radioactive material, such as uranium and potassium-40, which contributes to the background radiation. Direct radiation monitoring primarily measures ionizing radiation from cosmic and terrestrial sources.

Thermoluminescent Dosimeters

Fermi 2 uses thermoluminescent dosimeters (TLDs) to measure direct gamma radiation in the environs of Fermi 2

Fermi 2 has 71 TLD locations within a fifteen mile radius of the plant. Of the 71 TLD locations, 16 are located on-site and are not used for comparison with the control locations. These 16 TLDs are affected by Hydrogen Water Chemistry's sky shine and are not representative of off-site dose. The TLDs are thoroughly tested to comply with NRC Regulatory Guide 4.13 and American National Standards Institute's (ANSI) publication N545-1975, which assure accurate measurements under varying environmental conditions before being placed in the field. Indicator TLDs are located within a ten mile radius of the plant and control TLDs are located at a distance that is outside the potential influence of the plant. While in the field, TLDs are exposed to background radiation and, if measurable, gaseous effluents and direct radiation from Fermi 2. Environmental TLDs are exchanged and processed on a quarterly basis. The TLDs' data are reported in terms of milliroentgen per standard quarter (mR/std qtr), with a standard quarter being 91 days.

In 2009, the average exposure for TLDs at all off-site indicator locations was 14.9 mR/std qtr and for all control locations was 14.0 mR/std qtr. These exposures are consistent with preoperational and past operational measurements as shown in Figure 1.

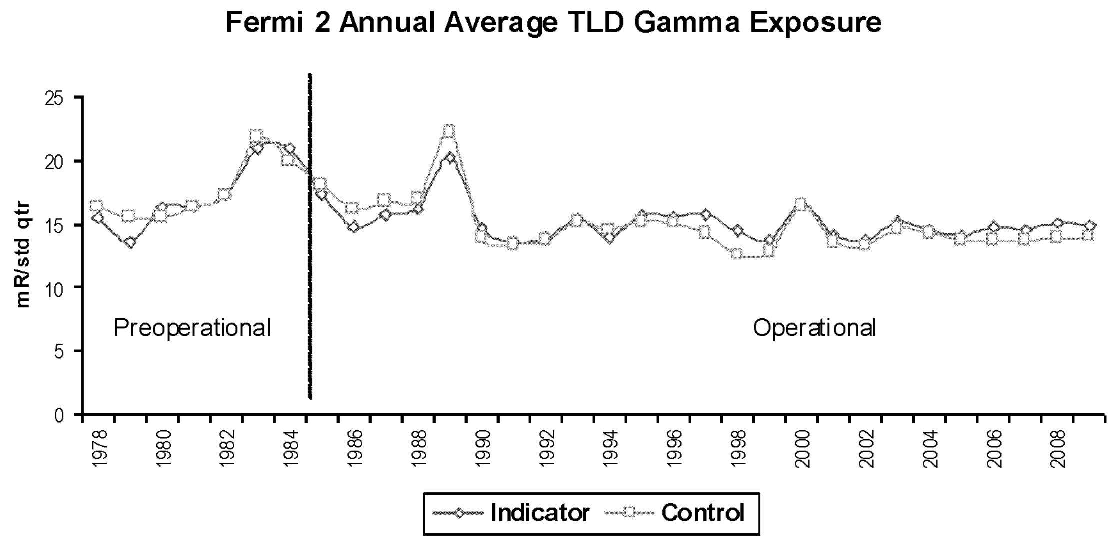


Figure 1 - Fermi 2 Annual Average TLD Gamma Exposure: The similarity between indicator and control results demonstrates that the operation of Fermi 2 has not caused any abnormal gamma exposure.

Atmospheric Monitoring

A potential exposure pathway to people is inhalation of airborne radioactive materials. Fermi 2 continuously samples the ambient air surrounding Fermi 2 for radioactivity. Air sampling began in 1979 during the preoperational program. At each sampling location, a mechanical air sampler is used to draw a continuous volume of air through two filters designed to collect particulates and radioiodines. Air samples are collected weekly and analyzed for gross beta radiation and iodine-131 gamma radiation. The particulate filters for each sampling location are combined on a quarterly basis to form a "composite sample" and are analyzed for gamma emitting radionuclides. There are four indicator sampling locations which were selected based on an evaluation of the predominant wind directions. A fifth sampling location is approximately fourteen miles west of the plant and is considered to be in a location unaffected by the operation of the plant. This is used as the control location.

Air Sampling

On October 16, 1980, the People's Republic of China conducted an atmospheric nuclear weapon test. The fallout from this test was detected in Fermi 2 preoperational environmental air samples in 1981 (see Figure 2). The average gross beta for 1981 was 1.60E-1 pCi/cubic meter for indicator samples and 2.40E-1 pCi/cubic meter for control samples which was a factor of ten times greater than background gross beta. Gamma spectroscopic analyses of the particulate filters indicated cesium-137, cerium-141, cerium-144, ruthenium-103, ruthenium-106, zirconium-95, niobium-95, manganese-54, and antimony-125 in the atmosphere as a result of this test. In 1986, as shown in Figure 2, there was a slight increase in gross beta activity and a 2.70E-1 pCi/cubic meter "spike" in the iodine-131 activity. These elevated levels in 1986 are attributed to the nuclear accident at Chernobyl on April 26, 1986. For all other years, the iodine-131 activity was below the lower limit of detection (LLD) of 7.0E-2 pCi/cubic meter.

During 2009, two hundred and fifty-four (254) particulate air filters and charcoal cartridges were collected and analyzed for gross beta activity and iodine-131 respectively. The average gross beta for indicator samples was 3.13E-2 pCi/cubic meter and 3.07E-2 pCi/cubic meter for control samples. None of the charcoal filters collected showed detectable levels of iodine-131. The following table contains the annual average gross beta results of all five sample locations for 2009.

2009 Average Gross Beta Concentrations in Air Particulates
(pCi/m^3)

Table 1

Station	Description (sector/distance)	Annual Average
API-1 (I)	Estral Beach (NE/1.4 mi.)	2.68E-2
API-2 (I)	Site Boundary (NNW/0.6 mi.)	2.94E-2
API-3 (I)	Site Boundary (NW/0.6 mi.)	2.80E-2
API-4 (C)	North Custer Rd. (W/14 mi.)	3.07E-2
API-5 (I)	Site Boundary (S/1.2 mi.)	4.09E-2

(I) = Indicator Station (C) = Control Station

Twenty (20) quarterly particulate filter composites were prepared and analyzed for gamma emitting radionuclides. Naturally occurring beryllium-7 was detected in both indicator and control samples.

In conclusion, the atmospheric monitoring data are consistent with preoperational and prior operational data and show no adverse long-term trends in the environment attributable to operation of Fermi 2 as illustrated in Figures 2 and 3.

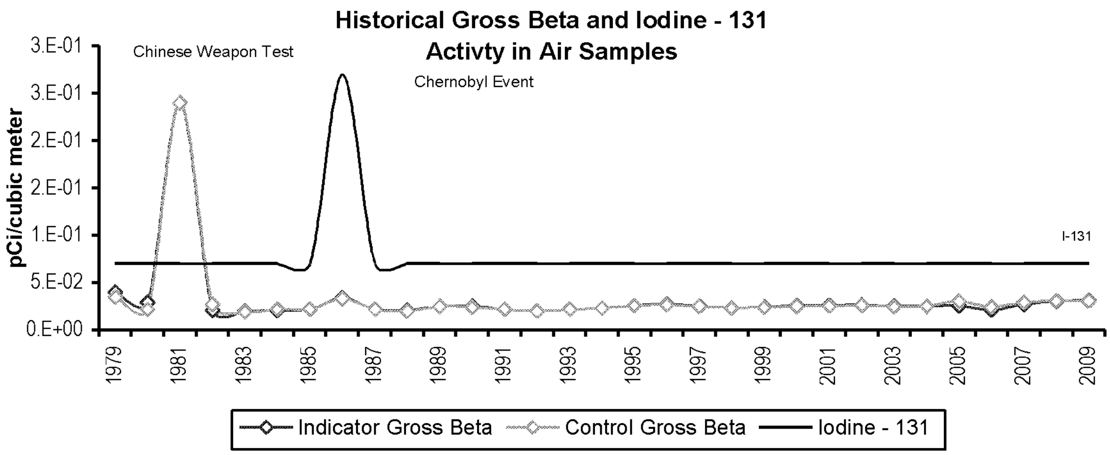


Figure 2 - Historical Gross Beta and Iodine-131 Activity in Air Samples; The similarity between indicator and control gross beta results demonstrates that the operation of Fermi 2 has had no adverse long-term trends in the environment. The lower limit of detection (LLD) for iodine-131 is 0.07 pCi/cubic meter.

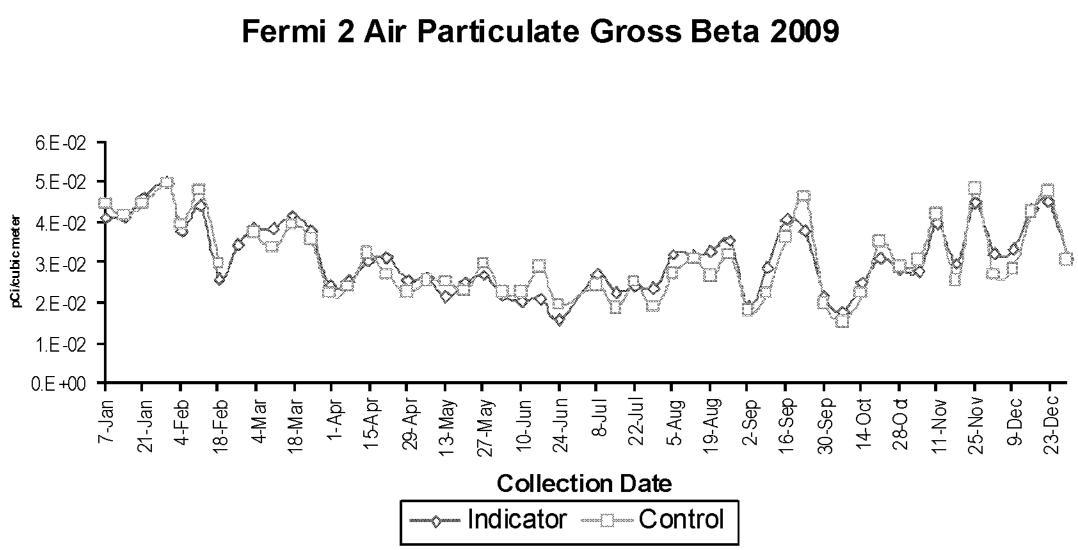


Figure 3 - Fermi 2 Air Particulate Gross Beta for 2009; the concentration of beta emitting radionuclides in airborne particulates samples was essentially identical at indicator and control locations. Gross beta activity varies throughout the year and is primarily an effect of seasonal precipitation.

Terrestrial Monitoring

Radionuclides released to the atmosphere may deposit on soil and vegetation, and therefore, may eventually be incorporated into the human food chain. To assess the impact of Fermi 2 operations to humans from the ingestion pathway, samples of milk, green leafy vegetables, and groundwater are collected and analyzed for radioactivity. The following sections discuss the type and frequency of terrestrial sampling, analyses performed, and a comparison of 2009 data to previous operational and preoperational data.

Milk Sampling

A major pathway in the human food chain is the consumption of milk from grazing animals (dairy cows or goats) due to biological concentration and the short turn around time in this pathway. Milk is collected from one indicator location and one control location semimonthly when animals are in the pasture, and monthly when the animals are on stored feed. The milk is analyzed for iodine-131, gamma emitting radionuclides, and strontium-89/90. At times when milk samples are not available, grass samples are collected at both the control milk sample location and the location where milk is not available. Grass samples are analyzed for iodine-131 and other gamma emitting radionuclides. During 2009, no grass samples were scheduled or collected for the REMP.

Milk sampling began in 1979 during the preoperational program. During this time period, milk samples were analyzed for iodine-131 and other gamma emitting radionuclides. Cesium-137 and naturally occurring potassium-40 were the only radionuclides detected in milk samples during the preoperational program. The cesium-137 concentration averaged 3.60E+0 pCi/liter and is due to past atmospheric nuclear weapons testing. In 1986, after the nuclear accident at Chernobyl, iodine-131 and cesium-137 were detected in both indicator and control milk samples. The average concentration was 3.70E+0 pCi/liter for iodine-131 and 6.60E+0 pCi/liter for cesium-137.

The analysis for strontium-89/90 began in 1988, and strontium-90 is routinely detected in both indicator and control milk samples because of past atmospheric nuclear weapons testing.

During 2009, thirty four (34) milk samples were collected and analyzed for iodine-131, gamma emitting radionuclides, and strontium-89/90. No iodine-131 was detected in any of the samples. Strontium-90 was detected in two indicator milk samples and one control milk sample and is due to fallout from past atmospheric weapons testing (see Figure 4).

The indicator samples had an average strontium-90 concentration of 1.65E+0 pCi/liter and the control sample had concentration of 1.32E+0 pCi/liter. Naturally occurring potassium-40 was detected in both indicator and control samples.

In 1970, the concentration of strontium-90 in Monroe County milk was 6.00E+0 pCi/liter according to the Michigan Department of Health's "Milk Surveillance," Radiation Data and Reports, Vol. 11-15, 1970-1974. Figure 4 shows the calculated radiological decay curve for the 1970 concentration of strontium-90 and the average concentrations since 1988. This graph illustrates that the inventory of strontium-90 in the local environment is decreasing with time and closely follows the calculated decay curve. This supports the determination that the inventory of strontium-90 in the environment is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

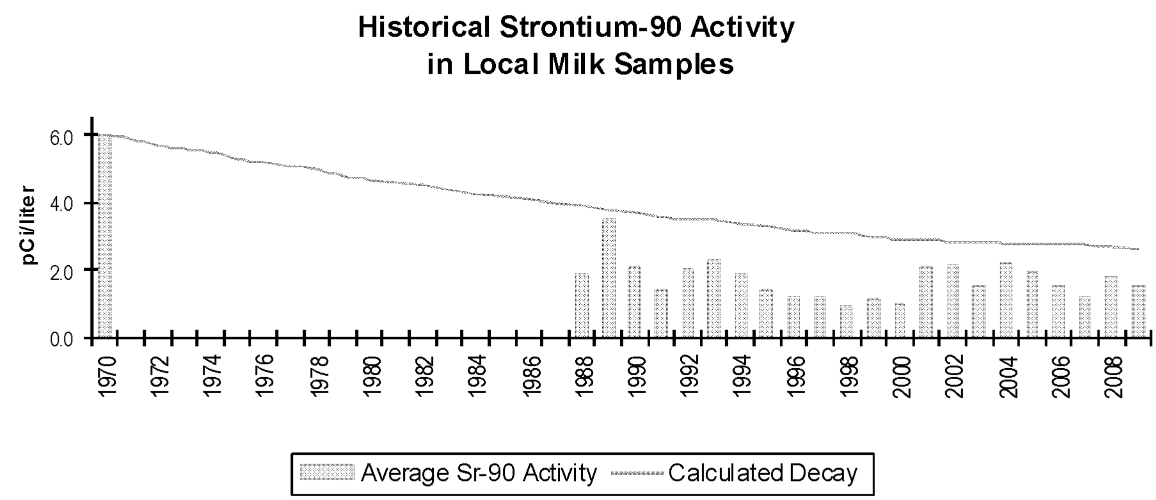


Figure 4 - Historical Strontium-90 Activity in Local Milk Samples; the concentration of strontium-90 in local milk samples is decreasing with time and is below the calculated decay curve. This supports the fact that strontium-90 in local milk is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

Groundwater Sampling

In areas not served by municipal water systems, water supplies for domestic use are generally obtained from private wells. The network of private wells presently in use forms the source of water for domestic and livestock purposes in farms and homes west and north of the site. With the construction of new water plants and distribution systems, the water use trend in the area is from groundwater (local wells) to surface water (municipal water supply).

Groundwater is collected on a quarterly basis from four wells surrounding Fermi 2. The groundwater is analyzed for gamma emitting radionuclides and tritium. Sampling location GW-4, which is located approximately 0.6 miles west northwest, is designated as the control location because it is up-gradient and is least likely to be affected by the operation of the plant. The other three sampling locations are down-gradient from Fermi 2 and designated as indicator locations.

Groundwater sampling began in 1987, during the operational period of the REMP program. From 1987 to 1996, naturally occurring potassium-40, cesium-137, and tritium were detected in both indicator and control samples. The average concentration was 7.71E+0 pCi/liter for cesium-137 and 1.50E+2 pCi/liter for tritium. The presence of cesium-137 and tritium in groundwater samples is due to fallout from past atmospheric nuclear weapons testing leaching into the soil and becoming incorporated into the groundwater. From 1997 to 2008, only naturally occurring potassium-40 activity was detected in groundwater samples.

In 2009, sixteen (16) groundwater samples were collected and analyzed for gamma emitting radionuclides and tritium. During 2009, naturally occurring potassium-40 activity was detected in one indicator groundwater sample. No other samples detected any activity.

Garden Sampling

Fermi 2 collects samples of broad leaf vegetables from indicator locations identified by the annual Land Use Census. Samples are also collected at a control location that is at a distance and direction which is considered to be unaffected by plant operations. Samples are collected once a month during the growing season (June through September) and are analyzed for iodine-131 and other gamma emitting radionuclides.

Vegetable sampling started in 1982. During the preoperational period from 1982 to 1985, only naturally occurring potassium-40 was detected in both indicator and control vegetable samples. During the operational period from 1985 to 1990 and 1994 to 1995, only naturally occurring potassium-40 was detected in both indicator and control vegetable samples. However, in 1991, 1992, and 1993, cesium-137 was detected in one indicator sample each year and had an average concentration of 1.2E+1 pCi/kilogram.

Cesium-137 may become incorporated into plants by either uptake from the soil or direct deposition on foliar surfaces. Since cesium-137 is normally not detected in gaseous effluent samples from Fermi 2, and there have been no recent atmospheric weapons testing or nuclear accidents, the incorporation of cesium-137 by direct deposition is highly unlikely. The most probable source of cesium-137 in vegetable samples is the uptake of previously deposited cesium-137, which has leached into the soil. This cesium activity is attributed to fallout from past atmospheric weapons testing and to the nuclear accident at Chernobyl.

During 2009, twelve (12) vegetable samples were collected and analyzed for iodine-131 and other gamma emitting radionuclides. No iodine-131 was detected in vegetable samples during 2009. The only gamma emitting radionuclides detected were naturally occurring potassium-40 and beryllium-7 in both indicator and control samples.

Terrestrial monitoring results for 2009 of milk, groundwater and leafy garden vegetable samples, showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing. The radioactivity levels detected were consistent with levels measured prior to the operation of Fermi 2 and no radioactivity attributable to activities at Fermi 2 was detected in any terrestrial sample. In conclusion, the terrestrial monitoring data show no adverse long-term trends in the terrestrial environment.

Aquatic Monitoring

Lake Erie, on which Fermi 2 borders, is used as a source for drinking water, as well as for recreational activities such as fishing, swimming, sunbathing, and boating. For this reason, Lake Erie and its tributaries are routinely monitored for radioactivity.

The aquatic monitoring portion of the REMP consists of sampling raw municipal drinking water, surface water, lake sediments, and fish for the presence of radioactivity. The following sections discuss the type and frequency of aquatic sampling, analyses performed, and a comparison of 2009 data to previous operational and preoperational data.

Drinking Water Sampling

Fermi 2 monitors drinking water at one control location and one indicator location using automatic samplers. The automatic samplers collect samples at time intervals that are very short (hourly) relative to the sample collection period (monthly) in order to assure that a representative sample is obtained. Indicator water samples are obtained at the Monroe water intake located approximately 1.1 miles south of the plant. Detroit municipal water is used for the control samples and is obtained at the Allen Park water intake located approximately 18.6 miles north of the plant. Drinking water samples are collected on a monthly basis and analyzed for gross beta, strontium-89/90, and gamma emitting radionuclides. The monthly samples for each location are combined on a quarterly basis and analyzed for tritium activity.

In late 1980, as shown in Figure 5, an atmospheric nuclear weapon test was conducted by the People's Republic of China. As a result of this test, the average gross beta for 1981 was 9.80E+0 pCi/liter for water samples. Figure 5 also shows that, except for the Chinese weapons testing, the historic drinking water sample data are below or slightly above the lower limit of detection (4.00E+0 pCi/liter) required by US Environmental Protection Agency (USEPA) National Interim Primary Drinking Water regulations. Even during the Chinese weapons testing, the drinking water samples did not exceed the USEPA maximum allowable criteria of 5.00E+1 pCi/liter gross beta. In 1980 and 1983, cesium-137 was detected in drinking water samples at levels ranging from 5.40E+0 pCi/liter to 1.90E+1 pCi/liter. Tritium was also detected during the preoperational program and had an average of 3.25E+2 pCi/liter. The presence of cesium-137 and detectable levels of tritium in these water samples is due to fallout from past atmospheric nuclear weapons testing and naturally occurring tritium.

From 1985 to 2008, the average annual gross beta activity for indicator samples was 3.64E+0 pCi/liter and 3.09E+0 pCi/liter for control samples. The analysis for strontium-89/90 began in 1988, and strontium-90 has in the past been detected in both indicator and control samples. The average strontium-90 activity for indicator samples was 7.25E-1 pCi/liter and 7.56E-1 pCi/liter for control samples during this time period. Tritium was also detected in both indicator and control drinking water samples during this time period. The average tritium activity for indicator samples was 2.52E+2 pCi/liter and 2.60E+2 pCi/liter for control samples. The presence of strontium-90 and detectable levels of tritium in these water samples is due to fallout from past atmospheric nuclear weapons testing and naturally occurring tritium.

In 2009, twenty-four (24) drinking water samples were collected and analyzed for gross beta, gamma emitting radionuclides, strontium-89/90, and tritium. The average gross beta for indicator samples was 4.53E+0 and 4.00E+0 pCi/liter for control samples. No gamma emitting radionuclides or strontium-89/90 activity was detected in drinking water samples during 2009. Eight (8) quarterly composite drinking water samples were prepared and analyzed for tritium. No tritium activity was detected in drinking water samples during 2009.

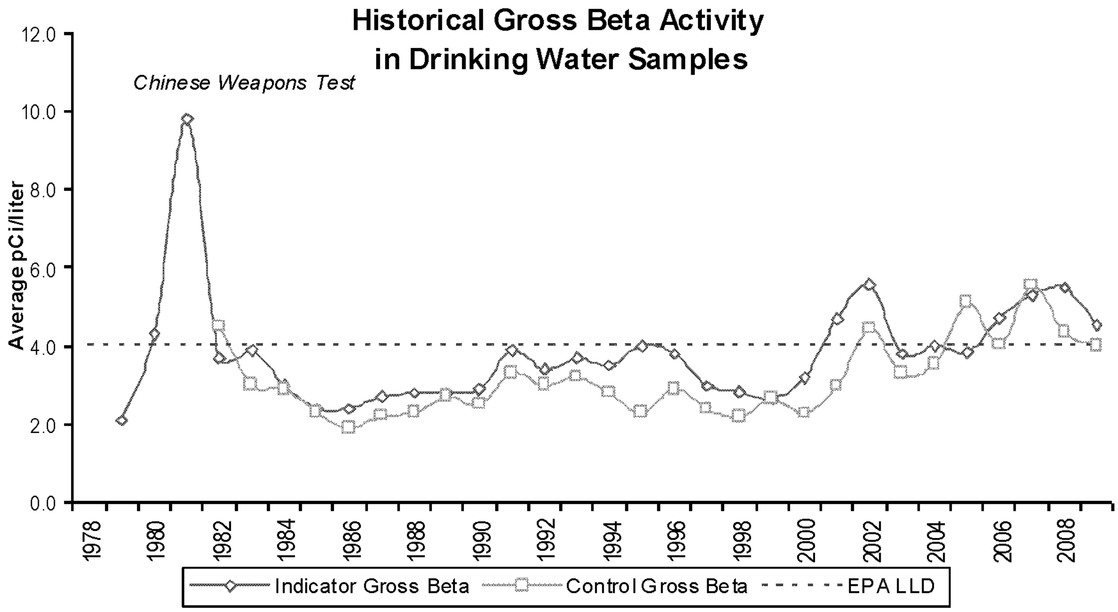


Figure 5 - Historical Gross Beta Activity in Drinking Water Samples. Since 1982, the annual concentrations of beta emitting radionuclides in drinking water samples collected from indicator locations have been consistent with those from control locations. This shows that Fermi 2 has had no measurable radiological impact on local drinking water.

Surface Water Sampling

Fermi 2 monitors surface water at two locations using automatic samplers. As with drinking water, surface water samples are collected at time intervals that are very short (hourly) relative to the sample collection period (monthly) in order to assure obtaining a representative sample. Indicator surface water samples are obtained at the Fermi 2 General Service Water building, located approximately 0.3 miles south southeast from Fermi 2. The control surface water samples are obtained from Trenton Channel Power Plant's cooling water intake on the Detroit River, which is approximately 11.7 miles north northeast of Fermi 2. Surface water samples are collected on a monthly basis and analyzed for strontium-89/90 and gamma emitting radionuclides. The monthly samples for each location are combined on a quarterly basis to form a quarterly composite sample and are analyzed for tritium.

Surface water sampling began in 1979, and the samples were analyzed for gamma emitting radionuclides and tritium. During this preoperational program, no gamma emitting radionuclides, except for naturally occurring potassium-40, were detected. Tritium was detected in both indicator and control samples during this time period and had an average concentration of 3.15E+2 pCi/liter. This tritium activity represents the background concentration due to naturally occurring tritium and tritium produced during past atmospheric nuclear weapons testing.

From 1985 to 2008, as part of the operational program, surface water samples were analyzed for gamma emitting radionuclides and tritium. The analysis for strontium-89/90 did not begin until 1988, and strontium-90 was detected in both indicator and control samples. The average strontium-90 concentration for this time period was 1.13E+0 pCi/liter. In 1990, two indicator samples showed detectable activity for cesium-137 at an average concentration of 1.20E+1 pCi/liter. The presence of cesium-137 and strontium-90 in these water samples is due to fallout from past atmospheric nuclear weapons testing. Tritium was detected in both indicator and control surface water samples during this time period at a concentration of 2.31E+2 pCi/liter. This tritium activity is consistent with background levels measured during the preoperational program.

In 2009, twenty-four (24) surface water samples were collected and analyzed for gamma emitting radionuclides and strontium-89/90. From these samples, eight (8) quarterly composite samples were prepared and analyzed for tritium. During 2009, no gamma emitting radionuclides, strontium-89/90 or tritium was detected in surface water samples.

Sediment Sampling

Sediments often act as a sink (temporary or permanent) for radionuclides, but they may also become a source, as when they are resuspended during periods of increased turbulence or are dredged and deposited elsewhere. Sediment, in the vicinity of the liquid discharge point, represents the most likely site for accumulation of radionuclides in the aquatic environment, and with long-lived radionuclides, a gradual increase in radioactivity concentration would be expected over time if discharges occur. Sediment, therefore, provides a long-term indication of change that may appear in other sample media (i.e., water and fish samples).

Lake Erie shoreline and bottom sediments from five locations are collected on a semiannual basis (Spring and Fall) and are analyzed for gamma emitting radionuclides and strontium-89/90. There is one control location and four indicator locations. The control sample is collected near the Trenton Channel Power Plant's cooling water intake. The indicator samples are collected at Estral Beach, north of the Fermi 2 liquid discharge area, the shoreline at the end of Pointe Aux Peaux, and Indian Trails Community Beach.

During the preoperational program, there was not a control location, and indicator samples were analyzed for gamma emitting radionuclides. During the preoperational program, except for naturally occurring radionuclides, only cesium-137 was detected in sediment samples. For this time period, the average cesium-137 concentration was 3.27E+2 pCi/kilogram. The presence of cesium-137 in these sediment samples is due to fallout from past atmospheric nuclear weapons testing.

From 1985 to 2008, cesium-137, strontium-90, and naturally occurring radionuclides were detected in sediment samples. The average cesium-137 concentration was 1.22E+2 pCi/kilogram for all samples. The analysis for strontium-89/90 began in 1988, and strontium-90 has been routinely detected at similar concentrations in both indicator and control samples. The average strontium-90 activity for indicator samples was 1.80E+2 pCi/kilogram and 1.98E+2 pCi/kilogram for control samples. The presence of cesium-137 and strontium-90 in these sediment samples is due to fallout from past atmospheric nuclear weapons testing.

In 1990 and 1991, the Spring samples taken at the Fermi 2 liquid discharge line (Location S-2) showed activity for plant related radionuclides (manganese-54, cobalt-58, cobalt-60, and zinc-65) and was determined to be a result of liquid effluent from Fermi 2. The sample results were well below any regulatory reporting limits and were consistent with the activity released from the plant in liquid effluents as per the approved effluent program. The dose impact was negligible due to these effluents.

In 2009, ten (10) sediment samples were collected and analyzed for gamma emitting radionuclides and strontium 89/90. Strontium-90 was detected in one indicator sample with a concentration of 4.46E+2 pCi/kilogram. Cesium-137 was not detected in any indicating sediment samples. The presence of strontium-90 in sediment samples is due to fallout from past atmospheric nuclear weapons testing. Naturally occurring radionuclides potassium-40 and beryllium-7 were also detected in sediment samples for this sampling period.

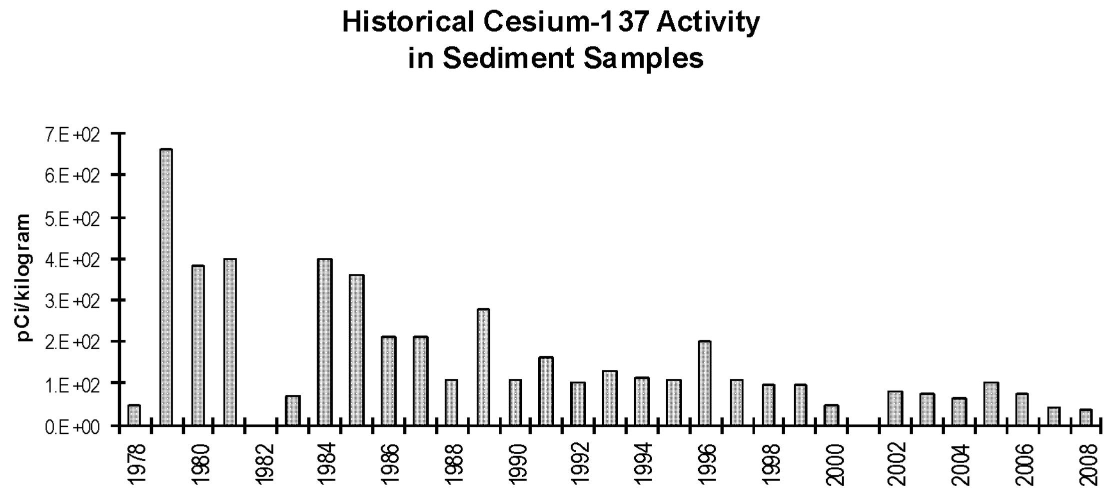


Figure 6 - Historical Cesium-137 Activity in Sediment Samples. As the calculated trend shows, the concentration of cesium-137 in Lake Erie sediments is decreasing with time. This supports the fact that cesium-137 in Lake Erie sediments is due to fallout from past atmospheric nuclear weapons testing and not the operation of Fermi 2.

Figure 6 shows the historical concentration of cesium-137 in sediment samples from 1978 to 2009. Using the data from these years, and the statistical method of least squares, an exponential curve can be calculated that represents the cesium-137 concentration in sediment. This curve has a negative slope which indicates the overall concentration of cesium-137 in the environment is decreasing with time. This supports the fact that the inventory of cesium-137 in the environment is due to fallout from past atmospheric nuclear weapons testing and not from the operation of Fermi 2.

Fish Sampling

Samples of fish are collected from Lake Erie at three locations on a semiannual basis. There are two control locations and one indicator location. The two control locations are offshore of Celeron Island and in Brest Bay. The indicator location is approximately 1200 feet offshore of the Fermi 2 liquid effluent discharge. Edible portions of the fish are analyzed for gamma emitting radionuclides and strontium-89/90.

During the preoperational program, fish samples were analyzed for gamma emitting radionuclides. Only cesium-137 and naturally occurring potassium-40 were detected during this time period. The average concentration of cesium-137 for indicator samples was 3.53E+1 pCi/kilogram and 4.20E+1 pCi/kilogram for control samples. The presence of cesium-137 in these fish samples is due to fallout from past atmospheric nuclear weapons testing.

From 1985 to 2008, cesium-137 and naturally occurring potassium-40 were detected in fish samples. The average cesium-137 concentration for indicator samples was 3.82E+1 pCi/kilogram and 3.92E+1 pCi/kilogram for control samples. The analysis for strontium-89/90 began in 1990, and strontium-90 was routinely detected at similar concentrations in both indicator and control samples. The average strontium-90 concentration for indicator samples was 3.84E+1 pCi/kilogram and 3.15E+1 pCi/kilogram for control samples. The presence of cesium-137 and strontium-90 in these fish samples is due to fallout from past atmospheric nuclear weapons testing.

In 2009, twenty-two (22) fish samples were collected and analyzed for gamma emitting radionuclides and strontium-89/90. Only naturally occurring potassium-40 was detected in both control and indicator fish samples for 2009.

Aquatic monitoring results for 2009 of water, sediment, and fish showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing and were consistent with levels measured prior to the operation of Fermi 2. In conclusion, no radioactivity attributable to activities at Fermi 2 was detected in any aquatic sample during 2009 and no adverse long-term trends are shown in the aquatic monitoring data.

Land Use Census

The Land Use Census is conducted in accordance with the Fermi 2 Offsite Dose Calculation Manual (ODCM), control 3.12.2, and satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. This census identifies changes in the use of unrestricted areas to permit modifications to monitoring programs for evaluating doses to individuals from principal pathways of exposure. The pathways of concern are listed below:

- **Inhalation Pathway** - Internal exposure as a result of breathing radionuclides carried in the air.

- **Ground Exposure Pathway** - External exposure from radionuclides deposited on the ground.

- **Plume Exposure Pathway** - External exposure directly from a plume or cloud of radioactive material.

- **Vegetation Pathway** - Internal exposure as a result of eating vegetables which have absorbed deposited radioactive material or which have absorbed radionuclides through the soil.

- **Milk Pathway** - Internal exposure as a result of drinking milk which may contain radioactive material as a result of dairy animals grazing on a pasture contaminated by radionuclides.

The Land Use Census is conducted during the growing season and is used to identify, within a radius of 5 miles, the location of the nearest residences, milk animals, meat animals, and gardens (greater than 50 square meters and containing broad leaf vegetation) in each of 16 meteorological sectors surrounding Fermi 2. Gardens greater than 50 square meters are the minimum size required to produce the quantity (26 kg/year) of leafy vegetables assumed in NRC Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden is used for growing broad leaf vegetation (i.e., lettuce and cabbage); and (2) a vegetation yield of 2 kg/square meter.

2009 Land Use Census Results

The Land Use Census is conducted in accordance with ODCM control 3.12.2 and satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. This census identifies changes in the use of unrestricted areas to permit modifications to monitoring programs for evaluating doses to individuals from principal pathways of exposure. The annual Land Use Census is conducted during the growing season and is used to identify, within a radius of 5 miles, the location of the closest residences, milk animals, meat animals, and gardens in each of the 11 land based meteorological sectors surrounding Fermi 2.

The 2009 Land Use Census was performed during the month of August. The 2009 census data were obtained with the use of a hand-held Global Positioning System (GPS) and aerial imagery using Google Earth. These data were compared to the 2006 data to determine any significant changes in the use of the land. The results of the census are tabulated in Tables 2 – 5 of this report.

No significant changes in the land use between 2008 and 2009 were found that would require changing the location of the "maximum exposed individual". There were no changes in the category of closest residences. There were slight changes in four meteorological sectors in the category of closest gardens. See Table 3 for these changes. The "maximum exposed individual" is located in the West-North-West sector and at one time participated in the REMP program. In the past few years this location did not have a garden, but in 2007-2009 a garden was planted at this location. In the category of closest milk locations, there were no changes. All milk locations that were identified are pets and, any milk produced, is not use for human consumption. There was one change found in the category of closest meat locations. Beef identified during 2008 in the West South West sector, was not identified in 2009. As with past surveys, this census identified new residential housing construction that shows a continuing trend of converting agricultural land to other uses in the area surrounding Fermi 2.

As stated above, there were no significant changes in the 2009 land use that would require changing the location of the "maximum exposed individual". For that reason, the location of "maximum exposed individual" remains the same and is described as follows:

Pathway	Sector	Azimuth (degrees)	Distance (miles)	Age Group	Maximum Organ
Ingestion (vegetation)	WNW	300.6	0.72	Child	Thyroid

2009 LAND USE CENSUS
Closest Residences

Table 2

Sector	Year	Azimuth (degrees)	Distance (miles)	Change (miles)
N	2008	8.9	1.11	
	2009	8.9	1.11	0.00
NE	2008	34.7	1.10	
	2009	34.7	1.10	0.00
NNE	2008	16.6	1.08	
	2009	16.6	1.08	0.00
NNW	2008	334.9	1.09	
	2009	334.9	1.09	0.00
NW	2008	309.7	1.07	
	2009	309.7	1.07	0.00
S	2008	169.6	1.03	
	2009	169.6	1.03	0.00
SSW	2008	200.1	1.12	
	2009	200.1	1.12	0.00
SW	2008	229.3	1.26	
	2009	229.3	1.26	0.00
W	2008	259.2	1.19	
	2009	259.2	1.19	0.00
WNW(a)	2008	302.3	0.71	
	2009	302.3	0.71	0.00
WSW	2008	236.3	1.39	
	2009	236.3	1.39	0.00

(a) = Location of "maximum exposed individual"

2009 LAND USE CENSUS

Closest Gardens

Table 3

Sector	Year	Azimuth (degrees)	Distance (miles)	Change (miles)
N	2008	358.5	2.13	
	2009	358.5	2.13	0.00
NE	2008	38.9	1.98	
	2009	51.8	1.85	0.13
NNE	2008	30.6	1.91	
	2009	30.6	1.91	0.00
NNW	2008	326.7	1.40	
	2009	332.1	2.57	-1.17
NW	2008	319.3	2.34	
	2009	315.5	1.51	0.83
S	2008	185.4	1.38	
	2009	169.6	1.03	1.38
SSW	2008	No Data	No Data	
	2009	201.9	1.59	1.59
SW	2008	No Data	No Data	
	2009	No Data	No Data	
W	2008	266.7	1.70	
	2009	266.7	1.70	0.00
WNW	2008	297.7	4.40	
	2009	297.7	4.40	0.00
WSW	2008	250.5	2.38	
	2009	250.5	2.38	0.00

2009 LAND USE CENSUS
Milk Locations

Table 4

Sector	Year	Azimuth (degrees)	Distance (miles)	Change (miles)	Type
N	2008	No Data			
	2009	No Data			
NE	2008	No Data			
	2009	No Data			
NNE	2008	No Data			
	2009	No Data			
NNW	2008	No Data			
	2009	No Data			
NW	2008	No Data			
	2009	No Data			
S	2008	No Data			
	2009	No Data			
SSW	2008	No Data			
	2009	No Data			
SW	2008	No Data			
	2009	No Data			
W	2008	No Data			
	2009	No Data			
WNW	2008	297.4	2.38		Goat
	2009	297.4	2.38	0.00	Goat
WSW	2008	No Data			
	2009	No Data			

2008 LAND USE CENSUS

Closest Meat Locations

Table 5

Sector	Year	Azimuth (degrees)	Distance (miles)	Change (miles)	Type
N	2008	9.6	4.29		
	2009	No Data	No Data		
NE	2008	No Data	No Data		
	2009	No Data	No Data		
NNE	2008	12.1	2.17		Beef
	2009	No Data	No Data		
NNW	2008	338.2	4.36		Sheep
	2009	338.2	4.36	0.00	Sheep
NW	2008	321.4	3.02		Beef
	2009	321.4	3.02	0.00	Beef
S	2008	No Data	No Data		
	2009	No Data	No Data		
SSW	2008	No Data	No Data		
	2009	No Data	No Data		
SW	2008	No Data	No Data		
	2009	No Data	No Data		
W	2008	No Data	No Data		
	2009	No Data	No Data		
WNW	2008	287.5	1.65		Beef
	2009	287.5	1.65	0.00	Beef
WSW	2008	252.4	2.94		Beef
	2009	No Data	No Data	2.94	Beef

Appendix A

Sampling Locations

Direct Radiation Sample Locations

Table A-1

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T1	NE/38°	1.3 mi.	Estral Beach, Pole on Lakeshore 23 Poles S of Lakeview. (Special Area)	Q	I
T2	NNE/22°	1.2 mi.	Pole at termination of Brancheau St. (Special Area)	Q	I
T3	N/9°	1.1 mi.	Pole, NW corner of Swan Boat Club fence. (Special Area)	Q	I
T4	NNW/337°	0.6 mi.	Site boundary and Toll Rd. on Site fence by API #2.	Q	I
T5	NW/313°	0.6 mi.	Site boundary and Toll Rd. on Site fence by API #3.	Q	I
T6	WNW/294°	0.6 mi.	On Site fence at south end of N. Bullet Rd.	Q	I
T7	W/270°	14.0 mi.	Pole, at Michigan Gas substation on N. Custer Rd., 0.66 miles west of Doty Rd.	Q	C
T8	NW/305°	1.9 mi.	Pole on Post Rd. near NE corner of Dixie Hwy. and Post Rd.	Q	I
T9	NNW/334°	1.5 mi.	Pole, NW corner of Trombley and Swan View Rd.	Q	I
T10	N/6°	2.1 mi.	Pole, S side of Massarant-2 poles W of Chinavare.	Q	I

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T11	NNE/23°	6.2 mi.	Pole, NE corner of Milliman and Jefferson.	Q	I
T12	NNE/29°	6.3 mi.	Pointe Mouille Game Area Field Office, Pole near tree, N area of parking lot.	Q	I
T13	N/356°	4.1 mi.	Labo and Dixie Hwy. Pole on SW corner with light.	Q	I
T14	NNW/337°	4.4 mi.	Labo and Brandon Pole on SE corner near RR.	Q	I
T15	NW/315°	3.9 mi.	Pole, behind building at the corner of Swan Creek and Mill St.	Q	I
T16	WNW/283°	4.9 mi.	Pole, SE corner of War and Post Rd.	Q	I
T17	W/271°	4.9 mi.	Pole, NE corner of Nadeau and Laprad near mobile home park.	Q	I
T18	WSW/247°	4.8 mi.	Pole, NE corner of Mentel and Hurd Rd.	Q	I
T19	SW/236°	5.2 mi.	Fermi siren pole on Waterworks Rd. NE corner of intersection - Sterling State Park Rd. Entrance Drive/Waterworks.	Q	I
T20	WSW/257°	2.7 mi.	Pole, S side of Williams Rd, 9 poles W of Dixie Hwy. (Special Area)	Q	I
T21	WSW/239°	2.7 mi.	Pole, N side of Pearl at Parkview Woodland Beach. (Special Area)	Q	I

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T22	S/172°	1.2 mi.	Pole, N side of Pointe Aux Peaux 2 poles W of Long - Site Boundary.	Q	I
T23	SSW/195°	1.1 mi.	Pole, S side of Pointe Aux Peaux 1 pole W of Huron next to Vent Pipe - Site Boundary.	Q	I
T24	SW/225°	1.2 mi.	Fermi Gate along Pointe Aux Peaux Rd. on fence wire W of gate Site Boundary.	Q	I
T25	WSW/252°	1.4 mi.	Pole, Toll Rd. - 12 poles S of Fermi Drive.	Q	I
T26	WSW/259°	1.1 mi.	Pole, Toll Rd. - 6 poles S of Fermi Drive.	Q	I
T27	SW/225°	6.8 mi.	Pole, NE corner of McMillan and East Front St. (Special Area)	Q	I
T28	SW/229°	10.6 mi.	Pole, N side of Mortar Creek between Hull and LaPlaisance.	Q	C
T29	WSW/237°	10.3 mi.	Pole, NE corner of S Dixie and Albain.	Q	C
T30	WSW/247°	7.8 mi.	E side S end of foot bridge, St. Mary's Park corner of Elm and Monroe St. (Special Area)	Q	I
T31	WSW/255°	9.6 mi.	1st pole W of entrance drive Milton "Pat" Munson Recreational Reserve on North Custer Rd.	Q	C

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T32	WNW/295°	10.3 mi.	Pole, corner of Stony Creek and Finzel Rd.	Q	I
T33	NW/317°	9.2 mi.	Pole, W side of Grafton Rd. 1 pole N of Ash and Grafton intersection.	Q	I
T34	NNW/338°	9.8 mi.	Pole, SW corner of Port Creek and Will-Carleton Rd.	Q	I
T35	N/359°	6.9 mi.	Pole, S Side of S Huron River Dr. across from Race St. (Special Area)	Q	I
T36	N/358°	9.1 mi.	Pole, NE corner of Gibraltar and Cahill Rd.	Q	I
T37	NNE/21°	9.8 mi.	Pole, S corner of Adams and Gibraltar across from Humbug Marina.	Q	I
T38	WNW/294°	1.7 mi.	Residence - 6594 N. Dixie Hwy.	Q	I
T39	S/176°	0.3 mi.	SE corner of Protected Area Fence (PAF).	Q	O
T40	S/170°	0.3 mi.	Midway along OBA - PAF.	Q	O
T41	SSE/161°	0.2 mi.	Midway between OBA and Shield Wall on PAF.	Q	O
T42	SSE/149°	0.2 mi.	Midway along Shield Wall on PAF.	Q	O
T43	SE/131°	0.1 mi.	Midway between Shield Wall and Aux Boilers on PAF.	Q	O
T44	ESE/109°	0.1 mi.	Opposite OSSF door on PAF.	Q	O

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T45	E/86°	0.1 mi.	NE Corner of PAF.	Q	O
T46	ENE/67°	0.2 mi.	NE side of barge slip on fence.	Q	O
T47	S/185°	0.1 mi.	South of Turbine Bldg. rollup door on PAF.	Q	O
T48	SW/235°	0.2 mi.	30 ft. from corner of AAP on PAF.	Q	O
T49	WSW/251°	1.1 mi.	Corner of Site Boundary fence north of NOC along Critical Path Rd.	Q	I
T50	W/270°	0.9 mi.	Site Boundary fence near main gate by the south Bullet Street sign.	Q	I
T51	N/3°	0.4 mi.	Site Boundary fence north of north Cooling Tower.	Q	O
T52	NNE/20°	0.4 mi.	Site Boundary fence at the corner of Arson and Tower.	Q	O
T53	NE/55°	0.2 mi.	Site Boundary fence east of South Cooling Tower.	Q	O
T54	S/189°	0.3 mi.	Pole next to Fermi 2 Visitors Center.	Q	O
T55	WSW/251°	3.3 mi.	Pole, north side of Nadeau Rd. across from Sodt Elementary School Marquee.	Q	I
T56	WSW/256°	2.9 mi.	Pole, entrance to Jefferson Middle School on Stony Creek Rd.	Q	I

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Direct Radiation Sample Locations (Table A-1 continued)

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
T57	W/260°	2.7 mi.	Pole, north side of Williams Rd. across from Jefferson High School entrance.	Q	I
T58	WSW/249°	4.9 mi.	Pole west of Hurd Elementary School Marquee.	Q	I
T59	NW/325°	2.6 mi.	Pole north of St. Charles Church entrance on Dixie Hwy.	Q	I
T60	NNW/341°	2.5 mi.	1st pole north of North Elementary School entrance on Dixie Hwy.	Q	I
T61	W/268°	10.1 mi.	Pole, SW corner of Stewart and Raisinville Rd.	Q	I
T62	SW/232°	9.7 mi.	Pole, NE corner of Albain and Hull Rd.	Q	I
T63	WSW/245°	9.6 mi.	Pole, NE corner of Dunbar and Telegraph Rd.	Q	I
T64	WNW/286°	0.2 mi.	West of switchgear yard on PAF.	Q	O
T65	NW/322°	0.1 mi.	PAF switchgear yard area NW of RHR complex.	Q	O
T66	NE/50°	0.1 mi.	Behind Bldg. 42 on PAF.	Q	O
T67	NNW/338°	0.2 mi.	Site Boundary fence West of South Cooling Tower.	Q	O
T68	WNW/303°	0.6 mi	Langton Rd. seven poles East of Leroux Rd.	Q	I
T69	NW/306°	0.8 mi	Langton Rd. five poles East of Leroux Rd.	Q	I
T70	NNW/333°	1.1 mi	Leroux Rd. last pole North of Fermi Dr.	Q	I
T71	WNW/300°	1.1 mi	Leroux Rd. six poles North of Fermi Dr.	Q	I

I = Indicator *C = Control* *O = On-site* *Q = Quarterly*

Air Particulate and Air Iodine Sample Locations

Table A-2

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
API-1	NE/39°	1.4 mi.	Estral Beach Pole on Lakeshore, 18 Poles S of Lakeview (Nearest Community with highest X/Q).	W	I
API-2	NNW/337°	0.6 mi.	Site Boundary and Toll Road, on Site Fence by T-4.	W	I
API-3	NW/313°	0.6 mi.	Site Boundary and Toll Road, on Site Fence by T-5.	W	I
API-4	W/270°	14.0 mi.	Pole, at Michigan Gas substation on N. Custer Rd., 0.66 miles west of Doty Rd.	W	C
API-5	S/188°	1.2 mi.	Pole, N corner of Pointe Aux Peaux and Dewey Rd.	W	I

I = Indicator *C = Control* *W = Weekly*

Milk Sample Locations

Table A-3

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
M-2	NW/319°	5.4 mi.	Reaume Farm - 2705 E Labo.	M-SM	I
M-8	WNW/289°	9.9 mi.	Calder Dairy - 9334 Finzel Rd.	M-SM	C

I = Indicator *C = Control* *M = Monthly* *SM = Semimonthly*

Garden Sample Locations

Table A-4

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
FP-1	NNE/21°	3.8 mi.	9501 Turnpike Highway.	M	I
FP-9	W/261°	10.9 mi.	4074 North Custer Road.	M	C

I = Indicator *C = Control* *M = Monthly (when available)*

Drinking Water Sample Locations

Table A-5

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
DW-1	S/174°	1.1 mi.	Monroe Water Station N Side of Pointe Aux Peaux 1/2 Block W of Long Rd.	M	I
DW-2	N/8°	18.5 mi.	Detroit Water Station 14700 Moran Rd, Allen Park.	M	C

I = Indicator *C = Control* *M = Monthly*

Surface Water Sample Locations

Table A-6

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
SW-2	NNE/20°	11.7 mi.	DECo's Trenton Channel Power Plant Intake Structure (Screenhouse #1).	M	C
SW-3	SSE/160°	0.2 mi.	DECO's Fermi 2 General Service Water Intake Structure.	M	I

I = Indicator *C = Control* *M = Monthly*

Groundwater Sample Locations

Table A-7

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
GW-1	S/175°	0.4 mi.	Approx. 100 ft W of Lake Erie, EF-1 Parking lot near gas fired peakers.	Q	I
GW-2	SSW/208°	1.0 mi.	4 ft S of Pointe Aux Peaux (PAP) Rd. Fence 427 ft W of where PAP crosses over Stoney Point's Western Dike.	Q	I
GW-3	SW/226°	1.0 mi.	143 ft W of PAP Rd. Gate, 62 ft N of PAP Rd. Fence.	Q	I
GW-4	WNW/299°	0.6 mi.	42 ft S of Langton Rd, 8 ft E of Toll Rd. Fence.	Q	C

I = Indicator *C = Control* *Q = Quarterly*

Sediment Sample Locations

Table A-8

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
S-1	SSE/165°	0.9 mi.	Pointe Aux Peaux, Shoreline to 500 ft offshore sighting directly to Land Base Water Tower.	SA	I
S-2	E/81°	0.2 mi.	Fermi 2 Discharge, approx. 200 ft offshore.	SA	I
S-3	NE/39°	1.1 mi.	Estral Beach, approx. 200 ft offshore, off North shoreline where Swan Creek and Lake Erie meet.	SA	I
S-4	WSW/241°	3.0 mi.	Indian Trails Community Beach.	SA	I
S-5	NNE/20°	11.7 mi.	DECo's Trenton Channel Power Plant intake area.	SA	C

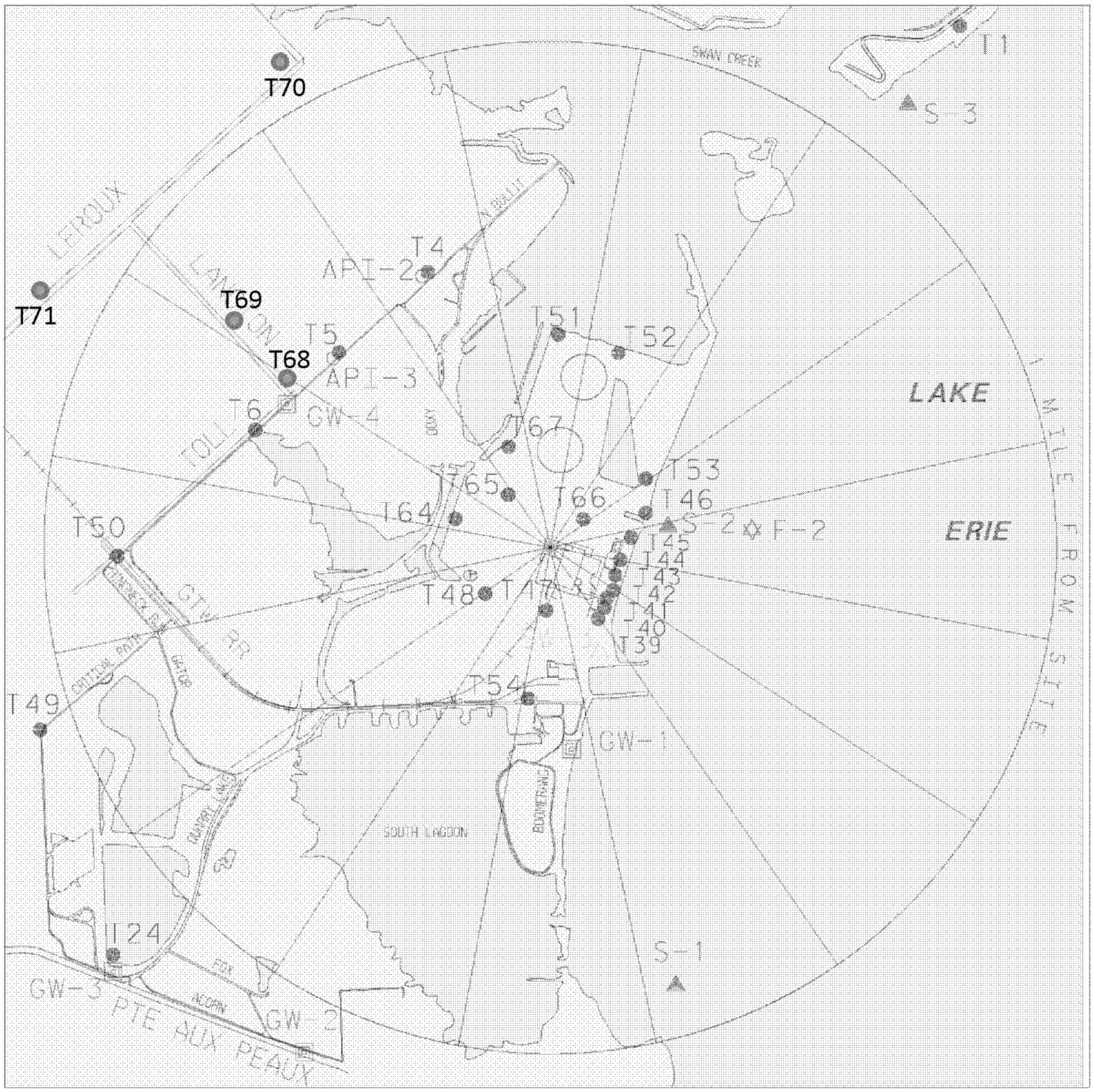
I = Indicator *C = Control* *SA = Semiannually*

Fish Sample Locations

Table A-9

Station Number	Meteorological Sector/Azimuth (Degrees)	Distance from Reactor (Approx.)	Description	Collection Frequency	Type
F-1	NNE/31°	9.5 mi.	Near Celeron Island.	SA	C
F-2	E/86°	0.4 mi.	Fermi 2 Discharge (approx. 1200 ft offshore).	SA	I
F-3	SW/227°	3.5 mi.	Brest Bay.	SA	C

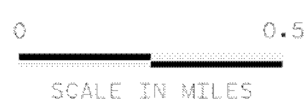
I = Indicator *C = Control* *SA = Semiannually*

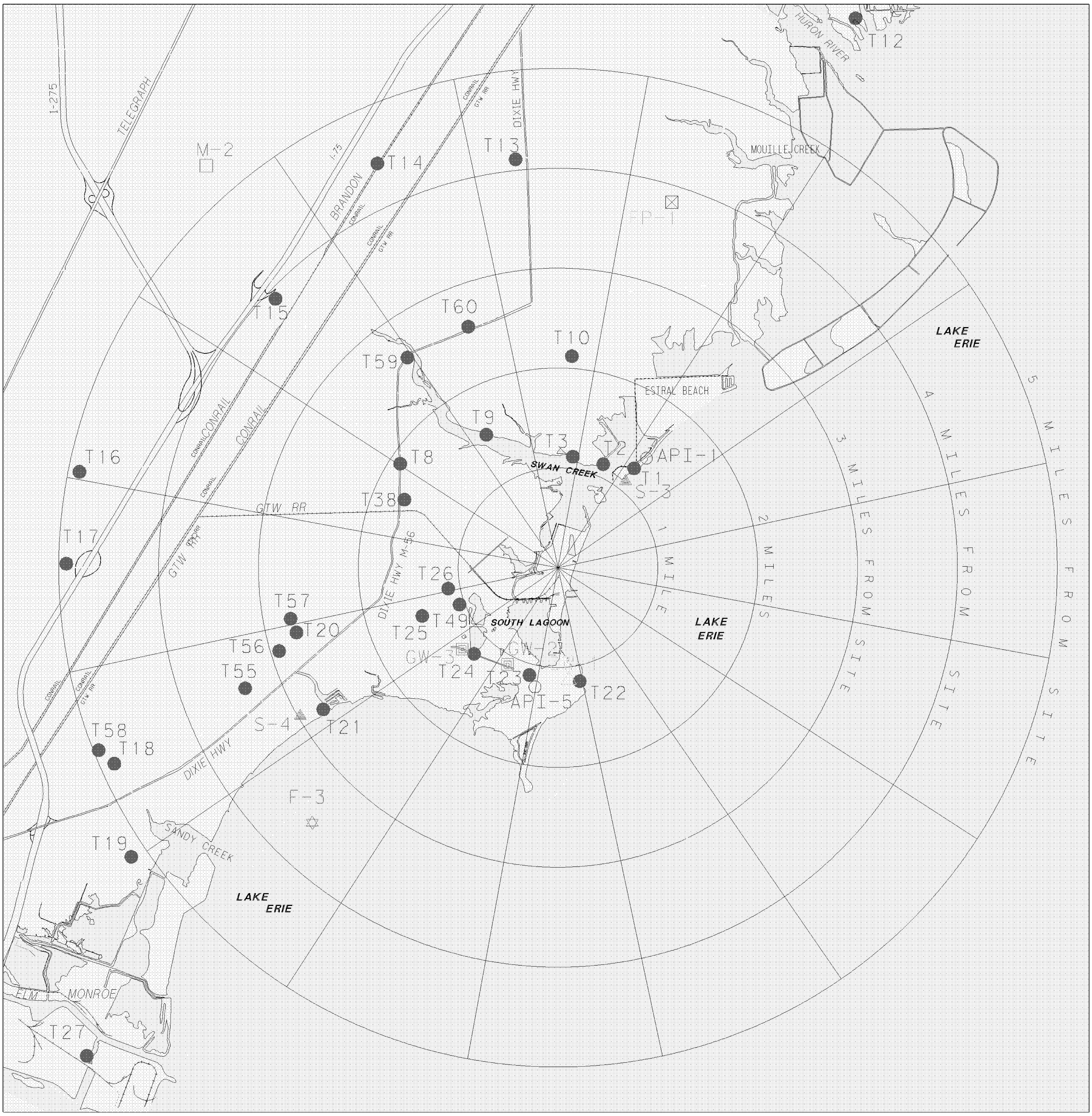


MAP - 1
SAMPLING LOCATIONS
BY STATION NUMBER
WITHIN 1 MILE

LEGEND

- T- DIRECT RADIATION
- API- AIR PARTICULATES/AIR IODINE
- S- SEDIMENTS
- DW/SW- DRINKING WATER/SURFACE WATER
- GW- GROUND WATER
- M- MILK
- FP- FOOD PRODUCTS
- F- FISH

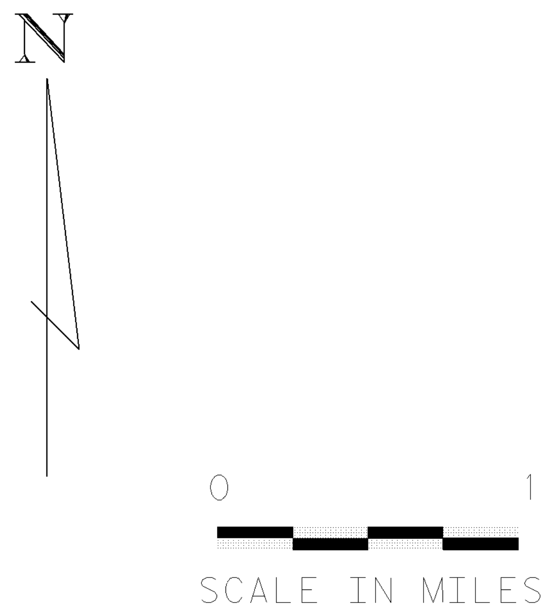


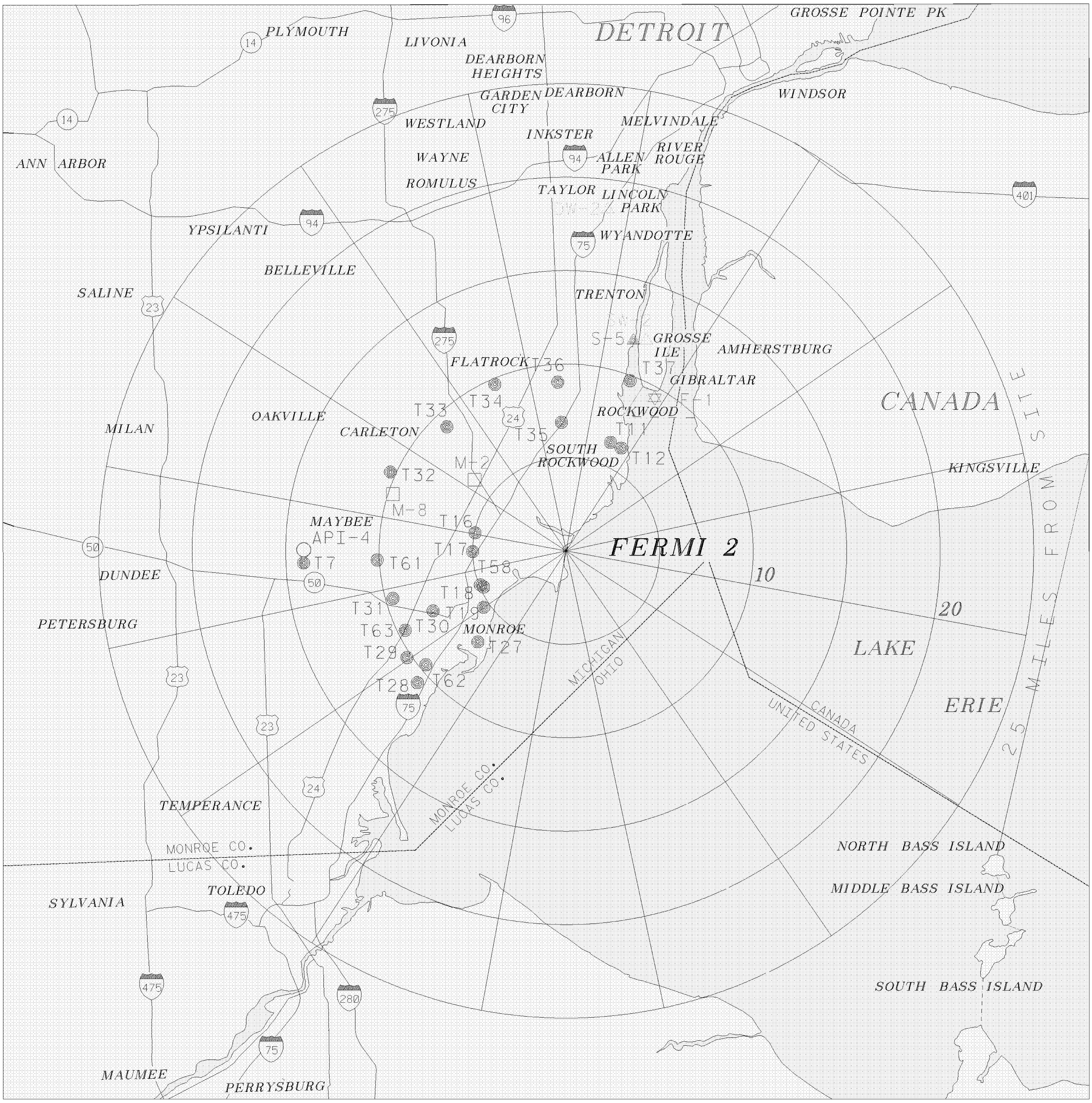


MAP - 2
SAMPLING LOCATIONS
BY STATION NUMBER
(1 To 5 MILES)

LEGEND

- T- DIRECT RADIATION
- API- AIR PARTICULATES/AIR IODINE
- S- SEDIMENTS
- DW/SW- DRINKING WATER/SURFACE WATER
- GW- GROUND WATER
- M- MILK
- FP- FOOD PRODUCTS
- F- FISH





MAP - 3
SAMPLING LOCATIONS
BY STATION NUMBER
(GREATER THAN 5 MILES)

LEGEND

- T- DIRECT RADIATION
- API- AIR PARTICULATES OR AIR IODINE
- S- SEDIMENTS
- DW/SW- DRINKING WATER/SURFACE WATER
- GW- GROUND WATER
- M- MILK
- FP- FOOD PRODUCTS
- F- FISH

N

5 0 5 10

SCALE IN MILES

Appendix B

Environmental Data Summary

Table B-1 Radiological Environmental Monitoring Program Summary

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Direct Radiation *mR/std qtr*	Gamma (TLD) 206	1.0	14.9 (190/190) 10.9 to 21.9	T-49 (Indicator)	19.4 (4/4) 16.7 to 21.9	14.0 (16/16) 12.1 to 16.4	None
Airborne Particulates *pCi/cu. m.*	Gross Beta 254	1.00E-2	3.13E-2 (204/204) 1.12E-2 to 6.26E-2	API-5 (Indicator)	4.09E-2 (51/51) 1.12E-2 to 6.26E-2	3.07E-2 (50/50) 1.52E-2 to 4.94E-2	None
	Gamma Spec. 20						
	Be-7	N/A	1.33E-1 (14/16) 8.20E-2 to 2.39E-1	API-5 (Indicator)	1.89E-1 (4/4) 1.40E-1 to 2.39E-1	1.47E-1 (4/4) 1.06E-1 to 1.72E-1	None
	K-40	N/A	<MDA			<MDA	None
	Mn-54	N/A	<MDA			<MDA	None
	Co-58	N/A	<MDA			<MDA	None
	Fe-59	N/A	<MDA			<MDA	None
	Co-60	N/A	<MDA			<MDA	None
	Zn-65	N/A	<MDA			<MDA	None
	Zr-95	N/A	<MDA			<MDA	None
	Nb-95	N/A	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	5.00E-2	<MDA			<MDA	None
	Cs-137	6.00E-2	<MDA			<MDA	None
	Ba-140	N/A	<MDA			<MDA	None
	La-140	N/A	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
Airborne Iodine *pCi/cu. m.*	I-131 254	7.00E-2	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Milk	I-131 34	1.00E+0	<MDA			<MDA	None
pCi/l	Sr-89 34	N/A	<MDA			<MDA	None
	Sr-90	N/A	1.65E+0 (2/17) 1.25E+0 to 2.04E+0	M-2 (Indicator)	1.65E+0 (2/17) 1.25E+0 to 2.04E+0	1.32E+0 (1/17)	None
	Gamma Spec. 34						
	Be-7	N/A	<MDA			<MDA	None
	K-40	N/A	1.37E+3 (17/17) 1.20E+3 to 1.54E+3	M-8 (Control)	1.45E+3 (17/17) 1.30E+3 to 1.69E+3	1.45E+3 (17/17) 1.30E+3 to 1.69E+3	None
	Mn-54	N/A	<MDA			<MDA	None
	Co-58	N/A	<MDA			<MDA	None
	Fe-59	N/A	<MDA			<MDA	None
	Co-60	N/A	<MDA			<MDA	None
	Zn-65	N/A	<MDA			<MDA	None
	Zr-95	N/A	<MDA			<MDA	None
	Nb-95	N/A	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.50E+1	<MDA			<MDA	None
	Cs-137	1.80E+1	<MDA			<MDA	None
	Ba-140	1.50E+1	<MDA			<MDA	None
	La-140	1.50E+1	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
Vegetation	I-131 12	6.00E+1	<MDA			<MDA	None
pCi/kg wet	Gamma Spec. 12						
	Be-7	N/A	4.20E+2 (1/7)	FP-1 (Indicator)	4.20E+2 (1/7)	<MDA	None
	K-40	N/A	2.94E+3 (7/7) 1.61E+3 to 3.65E+3	FP-9 (Control)	3.85E+3 (5/5) 2.85E+3 to 4.94E+3	3.85E+3 (5/5) 2.85E+3 to 4.94E+3	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Vegetation (cont.) *pCi/kg wet*	Mn-54	N/A	<MDA			<MDA	None
	Co-58	N/A	<MDA			<MDA	None
	Fe-59	N/A	<MDA			<MDA	None
	Co-60	N/A	<MDA			<MDA	None
	Zn-65	N/A	<MDA			<MDA	None
	Zr-95	N/A	<MDA			<MDA	None
	Nb-95	N/A	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	6.00E+1	<MDA			<MDA	None
	Cs-137	8.00E+1	<MDA			<MDA	None
	Ba-140	N/A	<MDA			<MDA	None
	La-140	N/A	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
Drinking Water *pCi/l*	Gross Beta 24	4.00E+0	4.53E+0 (8/12) 3.50E+0 to 7.80E+0	DW-1 (Indicator)	4.53E+0 (8/12) 3.50E+0 to 7.80E+0	4.00E+0 (3/12) 3.20E+0 to 4.80E+0	None
	Sr-89 24	N/A	<MDA			<MDA	None
	Sr-90	N/A	<MDA			<MDA	None
	Gamma Spec. 24						
	Be-7	N/A	<MDA			<MDA	None
	K-40	N/A	<MDA			<MDA	None
	Cr-51	N/A	<MDA			<MDA	None
	Mn-54	1.50E+1	<MDA			<MDA	None
	Co-58	1.50E+1	<MDA			<MDA	None
	Fe-59	3.00E+1	<MDA			<MDA	None
	Co-60	1.50E+1	<MDA			<MDA	None
	Zn-65	3.00E+1	<MDA			<MDA	None
	Zr-95	1.50E+1	<MDA			<MDA	None
	Nb-95	1.50E+1	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Drinking Water (cont.) *pCi/l*	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.50E+1	<MDA			<MDA	None
	Cs-137	1.80E+1	<MDA			<MDA	None
	Ba-140	1.50E+1	<MDA			<MDA	None
	La-140	1.50E+1	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
	H-3 8	2.00E+3	<MDA			<MDA	None
Surface Water *pCi/l*	Sr-89 24	N/A	<MDA			<MDA	None
	Sr-90	N/A	<MDA			<MDA	None
	Gamma Spec. 24						
	Be-7	N/A	<MDA			<MDA	None
	K-40	N/A	<MDA			<MDA	None
	Cr-51	N/A	<MDA			<MDA	None
	Mn-54	1.50E+1	<MDA			<MDA	None
	Co-58	1.50E+1	<MDA			<MDA	None
	Fe-59	3.00E+1	<MDA			<MDA	None
	Co-60	1.50E+1	<MDA			<MDA	None
	Zn-65	3.00E+1	<MDA			<MDA	None
	Zr-95	1.50E+1	<MDA			<MDA	None
	Nb-95	1.50E+1	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.50E+1	<MDA			<MDA	None
	Cs-137	1.80E+1	<MDA			<MDA	None
	Ba-140	1.50E+1	<MDA			<MDA	None
	La-140	1.50E+1	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Surface Water (cont.) *pCi/l*	Ce-144	N/A	<MDA			<MDA	None
	H-3 8	2.00E+3	<MDA			<MDA	None
Groundwater *pCi/l*	Gamma Spec. 16						
	Be-7	N/A	<MDA			<MDA	None
	K-40	N/A	9.60E+1 (1/12)	GW-2 (Indicator)	9.60E+1 (1/4)	<MDA	None
	Cr-51	N/A	<MDA			<MDA	None
	Mn-54	1.50E+1	<MDA			<MDA	None
	Co-58	1.50E+1	<MDA			<MDA	None
	Fe-59	3.00E+1	<MDA			<MDA	None
	Co-60	1.50E+1	<MDA			<MDA	None
	Zn-65	3.00E+1	<MDA			<MDA	None
	Zr-95	1.50E+1	<MDA			<MDA	None
	Nb-95	1.50E+1	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.50E+1	<MDA			<MDA	None
	Cs-137	1.80E+1	<MDA			<MDA	None
	Ba-140	1.50E+1	<MDA			<MDA	None
	La-140	1.50E+1	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
	H-3 16	2.00E+3	<MDA			<MDA	None
Sediment *pCi/kg dry*	Sr-89 10	N/A	<MDA			<MDA	
	Sr-90	N/A	4.46E+2 (1/2)	S-3 (Indicator)	4.46E+2 (1/2)	<MDA	None
	Gamma Spec. 10						
	Be-7	N/A	<MDA	S-5 (Control)	6.90E+2 (1/2)	6.90E+2 (1/2)	None
	K-40	N/A	1.15E+4 (8/8) 3.84E+3 to 2.22E+4	S-2 (Indicator)	1.66E+4 (2/2) 1.09E+4 to 2.22E+4	1.32E+4 (2/2) 1.10E+4 to 1.54E+4	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Sediment (cont.)	Mn-54	N/A	<MDA			<MDA	None
pCi/kg dry	Co-58	N/A	<MDA			<MDA	None
	Fe-59	N/A	<MDA			<MDA	None
	Co-60	N/A	<MDA			<MDA	None
	Zn-65	N/A	<MDA			<MDA	None
	Zr-95	N/A	<MDA			<MDA	None
	Nb-95	N/A	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.50E+2	<MDA			<MDA	None
	Cs-137	1.80E+2	<MDA			<MDA	None
	Ba-140	N/A	<MDA			<MDA	None
	La-140	N/A	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None
Fish	Sr-89 22	N/A	<MDA			<MDA	None
pCi/kg wet	Sr-90	N/A	<MDA			<MDA	None
	Gamma Spec. 22						
	Be-7	N/A	<MDA			<MDA	None
	K-40	N/A	2.74E+3 (7/7) 1.92E+3 to 3.64E+3	F-2 (Indicator)	2.74E+3 (7/7) 1.92E+3 to 3.64E+3	2.66E+3 (15/15) 2.10E+3 to 3.16E+3	None
	Mn-54	1.30E+2	<MDA			<MDA	None
	Co-58	1.30E+2	<MDA			<MDA	None
	Fe-59	2.60E+2	<MDA			<MDA	None
	Co-60	1.30E+2	<MDA			<MDA	None
	Zn-65	2.60E+2	<MDA			<MDA	None

Table B-1 Radiological Environmental Monitoring Program Summary (cont.)

Name of Facility: Enrico Fermi Unit 2 Docket No.: 50-341 Reporting Period: January - December 2009
Location of Facility: 30 miles southeast of Detroit, Michigan (Frenchtown Township)

Sample Type (Units)	Type and Number of Analysis	LLD	Indicator Locations Mean and Range	Location with Highest Annual Mean		Control Locations Mean and Range	Number of Non-routine Results
				Location	Mean and Range		
Fish (cont.)	Zr-95	N/A	<MDA			<MDA	None
pCi/kg wet	Nb-95	N/A	<MDA			<MDA	None
	Ru-103	N/A	<MDA			<MDA	None
	Ru-106	N/A	<MDA			<MDA	None
	Cs-134	1.30E+2	<MDA			<MDA	None
	Cs-137	1.50E+2	<MDA			<MDA	None
	Ba-140	N/A	<MDA			<MDA	None
	La-140	N/A	<MDA			<MDA	None
	Ce-141	N/A	<MDA			<MDA	None
	Ce-144	N/A	<MDA			<MDA	None

Direct Radiation mean and range values are based on off-site TLDs
LLD = Fermi 2 ODCM LLD: nominal lower limit of detection based on 4.66 sigma error for background sample.
<MDA = Less than the lab's minimum detectable activity which is less than the LLD.
Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).
Locations are specified by Fermi 2 code and are described in Appendix A Sampling Locations.
Non-routine results are those which are reportable according to Fermi 2 ODCM control 3.12.1.

Note: Other nuclides were considered in analysis results, but only those identifiable were reported in addition to ODCM listed nuclides.

Appendix C

Environmental Data Tables

FERMI 2
TLD ANALYSIS
(mR/Std Qtr)

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T-1	13.41	12.63	14.13	12.95
T-2	(a)	13.64	13.63	12.54
T-3	10.94	12.11	13.11	12.62
T-4	13.47	15.25	15.16	14.59
T-5	14.35	15.37	16.89	15.75
T-6	14.40	14.43	16.55	14.87
T-7	14.42	15.40	16.36	15.74
T-8	14.07	16.15	16.02	15.47
T-9	13.17	13.82	15.48	14.34
T-10	14.66	14.09	15.55	15.24
T-11	13.09	12.85	14.05	13.45
T-12	12.67	12.04	14.32	13.64
T-13	14.45	15.09	16.85	16.32
T-14	14.67	15.67	16.38	16.19
T-15	12.67	12.79	14.06	12.96
T-16	15.88	17.06	18.47	18.55
T-17	12.96	12.51	13.63	12.99
T-18	13.35	13.77	15.27	13.64
T-19	16.17	15.84	16.81	16.27
T-20	15.72	15.64	17.26	16.10
T-21	12.94	13.10	14.09	13.14
T-22	14.29	14.38	15.27	13.46
T-23	12.86	14.01	15.14	13.67
T-24	12.66	11.92	15.77	13.10
T-25	15.40	16.29	16.93	16.84
T-26	18.42	16.80	17.90	17.48
T-27	12.16	11.32	12.97	12.06
T-28	12.13	12.75	14.04	14.10
T-29	12.28	12.78	13.68	13.12
T-30	13.19	13.72	13.93	13.94
T-31	14.17	13.83	15.63	13.95
T-32	14.71	15.32	15.99	15.12
T-33	11.78	12.61	13.37	12.39
T-34	13.60	14.63	15.94	14.55
T-35	13.97	13.38	14.41	13.51
T-36	13.74	13.21	15.69	14.72
T-37	13.64	14.01	15.39	14.21
T-38	15.88	15.30	16.31	16.18
T-39	61.50	50.49	56.85	56.33
T-40	51.31	38.35	47.12	37.72
T-41	92.48	76.89	82.93	79.67
T-42	91.80	78.65	85.23	81.83
T-43	108.96	76.09	90.35	89.03
T-44	86.29	45.62	80.98	78.16
T-45	57.10	45.62	50.14	47.34
T-46	40.82	36.38	43.77	36.03
T-47	101.85	74.96	82.04	68.82

(a) TLD missing, see Appendix D - Program Execution.

FERMI 2
TLD ANALYSIS (CONT.)
(mR/Std Qtr)

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
T-48	46.53	38.12	43.83	42.25
T-49	16.73	19.32	21.88	19.78
T-50	14.99	15.22	17.11	15.78
T-51	11.53	10.82	12.69	12.66
T-52	14.25	14.40	15.85	15.32
T-53	26.49	23.51	27.86	25.93
T-54	18.15	16.30	18.84	18.22
T-55	14.58	15.81	16.90	15.86
T-56	(a)	14.55	15.98	15.09
T-57	16.56	16.98	19.82	18.04
T-58	12.54	12.38	14.98	13.05
T-59	12.78	12.88	15.99	13.82
T-60	14.44	15.07	16.94	15.24
T-61	14.98	15.48	16.62	15.97
T-62	14.68	14.98	16.41	15.98
T-63	12.87	12.37	14.75	13.71
T-64	25.09	23.00	23.86	21.95
T-65	25.77	(a)	(a)	24.81
T-66	143.13	115.08	122.86	128.06
T-67	17.75	17.03	19.15	17.64
T-68	16.50	17.14	18.70	17.14
T-69	14.89	16.20	17.95	16.79
T-70	14.08	15.11	16.83	15.50
T-71	15.16	16.53	18.40	16.89

(a) TLD missing, see Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-1 FIRST QUARTER

Date	Activity		
1/7/2009	3.57E-02	+/-	2.80E-03
1/14/2009	2.85E-02	+/-	2.70E-03
1/21/2009	3.93E-02	+/-	2.90E-03
1/30/2009	4.12E-02	+/-	2.70E-03
2/4/2009	3.03E-02	+/-	3.30E-03
2/11/2009	3.30E-02	+/-	2.70E-03
2/18/2009	1.96E-02	+/-	2.30E-03
2/25/2009	3.07E-02	+/-	2.70E-03
3/3/2009	3.57E-02	+/-	3.10E-03
3/10/2009	3.27E-02	+/-	2.50E-03
3/17/2009	3.18E-02	+/-	2.50E-03
3/24/2009	3.08E-02	+/-	2.40E-03
3/31/2009	1.63E-02	+/-	2.60E-03

API-1 SECOND QUARTER

Date	Activity		
4/7/2009	1.96E-02	+/-	2.30E-03
4/14/2009	2.73E-02	+/-	2.40E-03
4/21/2009	2.40E-02	+/-	2.40E-03
4/29/2009	2.29E-02	+/-	2.30E-03
5/6/2009	1.73E-02	+/-	2.30E-03
5/13/2009	1.61E-02	+/-	2.50E-03
5/20/2009	2.23E-02	+/-	2.60E-03
5/27/2009	2.23E-02	+/-	2.50E-03
6/3/2009	2.00E-02	+/-	2.40E-03
6/10/2009	1.36E-02	+/-	2.50E-03
6/17/2009	1.60E-02	+/-	2.40E-03
6/24/2009	2.08E-02	+/-	2.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-1 THIRD QUARTER

Date	Activity		
7/8/2009	1.84E-02	+/-	2.50E-03
7/15/2009	2.27E-02	+/-	2.40E-03
7/22/2009	1.89E-02	+/-	2.20E-03
7/29/2009	3.08E-02	+/-	2.70E-03
8/5/2009	3.07E-02	+/-	2.60E-03
8/13/2009	2.67E-02	+/-	2.70E-03
8/19/2009	3.59E-02	+/-	2.80E-03
8/26/2009	1.96E-02	+/-	2.20E-03
9/2/2009	1.88E-02	+/-	2.50E-03
9/9/2009	4.32E-02	+/-	3.20E-03
9/16/2009	4.55E-02	+/-	3.20E-03
9/23/2009	1.88E-02	+/-	2.70E-03
9/30/2009	2.43E-02	+/-	2.90E-03

API-1 FOURTH QUARTER

Date	Activity		
10/7/2009	1.83E-02	+/-	2.80E-03
10/14/2009	2.34E-02	+/-	2.70E-03
10/21/2009	2.48E-02	+/-	2.80E-03
10/28/2009	2.21E-02	+/-	2.90E-03
11/4/2009	2.47E-02	+/-	2.90E-03
11/11/2009	3.37E-02	+/-	3.10E-03
11/18/2009	2.54E-02	+/-	2.90E-03
11/25/2009	3.66E-02	+/-	3.00E-03
12/2/2009	3.16E-02	+/-	3.00E-03
12/9/2009	2.33E-02	+/-	2.40E-03
12/16/2009	3.78E-02	+/-	3.50E-03
12/22/2009	3.59E-02	+/-	2.90E-03
12/29/2009	2.87E-02	+/-	3.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-2 FIRST QUARTER

Date	Activity		
1/7/2009	3.55E-02	+/-	2.80E-03
1/14/2009	3.64E-02	+/-	2.80E-03
1/21/2009	4.32E-02	+/-	2.90E-03
1/30/2009	4.76E-02	+/-	2.80E-03
2/4/2009	3.31E-02	+/-	3.30E-03
2/11/2009	4.48E-02	+/-	2.90E-03
2/18/2009	2.65E-02	+/-	2.40E-03
2/25/2009	3.19E-02	+/-	2.70E-03
3/3/2009	3.77E-02	+/-	3.10E-03
3/10/2009	3.41E-02	+/-	2.50E-03
3/17/2009	3.99E-02	+/-	2.60E-03
3/24/2009	3.76E-02	+/-	2.50E-03
3/31/2009	2.07E-02	+/-	2.60E-03

API-2 SECOND QUARTER

Date	Activity		
4/7/2009	2.06E-02	+/-	2.30E-03
4/14/2009	2.47E-02	+/-	2.30E-03
4/21/2009	2.68E-02	+/-	2.40E-03
4/29/2009	2.06E-02	+/-	2.30E-03
5/6/2009	2.30E-02	+/-	2.40E-03
5/13/2009	2.11E-02	+/-	2.50E-03
5/20/2009	2.18E-02	+/-	2.60E-03
5/27/2009	2.28E-02	+/-	2.60E-03
6/3/2009	1.76E-02	+/-	2.40E-03
6/10/2009	2.18E-02	+/-	2.60E-03
6/17/2009	1.95E-02	+/-	2.40E-03
6/24/2009	1.59E-02	+/-	2.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-2 THIRD QUARTER

Date	Activity		
7/1/2009	2.61E-02	+/-	2.70E-03
7/8/2009	2.14E-02	+/-	2.50E-03
7/15/2009	1.97E-02	+/-	2.40E-03
7/22/2009	1.86E-02	+/-	2.20E-03
7/29/2009	2.74E-02	+/-	2.60E-03
8/5/2009	2.38E-02	+/-	2.50E-03
8/13/2009	2.49E-02	+/-	2.60E-03
8/19/2009	3.42E-02	+/-	2.70E-03
8/26/2009	1.64E-02	+/-	2.10E-03
9/2/2009	1.95E-02	+/-	2.50E-03
9/9/2009	3.41E-02	+/-	3.10E-03
9/16/2009	3.81E-02	+/-	3.10E-03
9/23/2009	1.60E-02	+/-	2.70E-03

API-2 FOURTH QUARTER

Date	Activity		
10/7/2009	1.59E-02	+/-	2.70E-03
10/14/2009	2.37E-02	+/-	2.80E-03
10/21/2009	3.17E-02	+/-	2.90E-03
10/28/2009	3.20E-02	+/-	3.10E-03
11/4/2009	2.83E-02	+/-	2.90E-03
11/11/2009	4.79E-02	+/-	3.30E-03
11/18/2009	2.83E-02	+/-	3.00E-03
11/25/2009	4.60E-02	+/-	3.20E-03
12/2/2009	3.31E-02	+/-	3.00E-03
12/9/2009	3.49E-02	+/-	2.60E-03
12/16/2009	5.22E-02	+/-	3.40E-03
12/22/2009	4.96E-02	+/-	3.10E-03
12/29/2009	3.29E-02	+/-	3.30E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-3 FIRST QUARTER

Date	Activity		
1/7/2009	3.92E-02	+/-	2.90E-03
1/14/2009	4.28E-02	+/-	2.90E-03
1/21/2009	4.03E-02	+/-	2.90E-03
1/30/2009	4.76E-02	+/-	2.80E-03
2/4/2009	3.49E-02	+/-	3.30E-03
2/11/2009	4.03E-02	+/-	2.80E-03
2/18/2009	2.61E-02	+/-	2.40E-03
2/25/2009	3.10E-02	+/-	2.70E-03
3/3/2009	3.53E-02	+/-	3.10E-03
3/10/2009	3.37E-02	+/-	2.50E-03
3/17/2009	3.54E-02	+/-	2.50E-03
3/24/2009	2.84E-02	+/-	2.40E-03
3/31/2009	2.07E-02	+/-	2.60E-03

API-3 SECOND QUARTER

Date	Activity		
4/7/2009	2.24E-02	+/-	2.30E-03
4/14/2009	2.68E-02	+/-	2.40E-03
4/21/2009	2.83E-02	+/-	2.40E-03
4/29/2009	2.08E-02	+/-	2.30E-03
5/6/2009	2.41E-02	+/-	2.40E-03
5/13/2009	1.71E-02	+/-	2.50E-03
5/20/2009	2.02E-02	+/-	2.50E-03
5/27/2009	2.40E-02	+/-	2.60E-03
6/3/2009	1.94E-02	+/-	2.40E-03
6/10/2009	1.80E-02	+/-	2.50E-03
6/17/2009	1.70E-02	+/-	2.40E-03
6/24/2009	1.56E-02	+/-	2.10E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-3 THIRD QUARTER

Date	Activity		
7/1/2009	2.50E-02	+/-	2.70E-03
7/8/2009	1.75E-02	+/-	2.40E-03
7/15/2009	2.14E-02	+/-	2.40E-03
7/22/2009	1.73E-02	+/-	2.10E-03
7/29/2009	2.93E-02	+/-	2.60E-03
8/5/2009	2.79E-02	+/-	2.50E-03
8/13/2009	2.56E-02	+/-	2.60E-03
8/19/2009	3.28E-02	+/-	2.70E-03
8/26/2009	1.50E-02	+/-	2.10E-03
9/2/2009	2.13E-02	+/-	2.50E-03
9/9/2009	3.33E-02	+/-	3.00E-03
9/16/2009	3.53E-02	+/-	3.00E-03
9/23/2009	1.74E-02	+/-	2.70E-03

API-3 FOURTH QUARTER

Date	Activity		
10/7/2009	1.55E-02	+/-	2.70E-03
10/14/2009	2.76E-02	+/-	2.80E-03
10/21/2009	2.43E-02	+/-	2.80E-03
10/28/2009	2.56E-02	+/-	3.00E-03
11/4/2009	2.12E-02	+/-	2.80E-03
11/11/2009	3.54E-02	+/-	3.10E-03
11/18/2009	2.88E-02	+/-	3.00E-03
11/25/2009	4.62E-02	+/-	3.20E-03
12/2/2009	3.05E-02	+/-	3.00E-03
12/9/2009	3.07E-02	+/-	2.50E-03
12/16/2009	3.93E-02	+/-	3.20E-03
12/22/2009	4.19E-02	+/-	3.00E-03
12/29/2009	3.00E-02	+/-	3.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-4 FIRST QUARTER

Date	Activity		
1/7/2009	4.45E-02	+/-	3.00E-03
1/14/2009	4.16E-02	+/-	2.90E-03
1/21/2009	4.45E-02	+/-	2.90E-03
1/30/2009	4.94E-02	+/-	2.80E-03
2/4/2009	3.92E-02	+/-	3.40E-03
2/11/2009	4.79E-02	+/-	3.00E-03
2/18/2009	2.97E-02	+/-	2.40E-03
2/25/2009	(a)		
3/3/2009	3.72E-02	+/-	3.70E-03
3/10/2009	3.36E-02	+/-	2.50E-03
3/17/2009	3.92E-02	+/-	2.60E-03
3/24/2009	3.57E-02	+/-	2.50E-03
3/31/2009	2.22E-02	+/-	2.60E-03

API-4 SECOND QUARTER

Date	Activity		
4/7/2009	2.39E-02	+/-	2.40E-03
4/14/2009	3.23E-02	+/-	2.40E-03
4/21/2009	2.68E-02	+/-	2.40E-03
4/29/2009	2.25E-02	+/-	2.30E-03
5/6/2009	2.53E-02	+/-	2.40E-03
5/13/2009	2.50E-02	+/-	2.60E-03
5/20/2009	2.28E-02	+/-	2.60E-03
5/27/2009	2.97E-02	+/-	2.70E-03
6/3/2009	2.27E-02	+/-	2.50E-03
6/10/2009	2.26E-02	+/-	2.60E-03
6/17/2009	2.89E-02	+/-	2.60E-03
6/24/2009	1.95E-02	+/-	2.10E-03

(a) See Appendix D - Program Execution.

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-4 THIRD QUARTER

Date	Activity		
7/1/2009	2.43E-02	+/-	2.70E-03
7/8/2009	1.85E-02	+/-	2.40E-03
7/15/2009	2.51E-02	+/-	2.50E-03
7/22/2009	1.89E-02	+/-	2.20E-03
7/29/2009	2.71E-02	+/-	2.60E-03
8/5/2009	3.08E-02	+/-	2.60E-03
8/13/2009	2.63E-02	+/-	2.70E-03
8/19/2009	3.19E-02	+/-	2.70E-03
8/26/2009	1.78E-02	+/-	2.20E-03
9/2/2009	2.22E-02	+/-	2.50E-03
9/9/2009	3.62E-02	+/-	3.20E-03
9/16/2009	4.61E-02	+/-	3.20E-03
9/23/2009	1.98E-02	+/-	2.70E-03

API-4 FOURTH QUARTER

Date	Activity		
10/7/2009	1.52E-02	+/-	2.70E-03
10/14/2009	2.23E-02	+/-	2.70E-03
10/21/2009	3.49E-02	+/-	2.90E-03
10/28/2009	2.88E-02	+/-	3.10E-03
11/4/2009	3.03E-02	+/-	2.90E-03
11/11/2009	4.17E-02	+/-	3.20E-03
11/18/2009	2.52E-02	+/-	2.90E-03
11/25/2009	4.82E-02	+/-	3.20E-03
12/2/2009	2.67E-02	+/-	2.90E-03
12/9/2009	2.82E-02	+/-	2.50E-03
12/16/2009	4.26E-02	+/-	3.20E-03
12/22/2009	4.75E-02	+/-	3.00E-03
12/29/2009	3.05E-02	+/-	3.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-5 FIRST QUARTER

Date	Activity		
1/7/2009	5.34E-02	+/-	3.10E-03
1/14/2009	5.70E-02	+/-	3.10E-03
1/21/2009	6.08E-02	+/-	3.10E-03
1/30/2009	6.26E-02	+/-	3.00E-03
2/4/2009	5.24E-02	+/-	3.60E-03
2/11/2009	5.77E-02	+/-	3.10E-03
2/18/2009	3.08E-02	+/-	2.50E-03
2/25/2009	4.37E-02	+/-	2.90E-03
3/3/2009	4.44E-02	+/-	3.20E-03
3/10/2009	5.28E-02	+/-	2.80E-03
3/17/2009	5.93E-02	+/-	2.90E-03
3/24/2009	5.42E-02	+/-	2.70E-03
3/31/2009	3.89E-02	+/-	2.90E-03

API-5 SECOND QUARTER

Date	Activity		
4/7/2009	3.80E-02	+/-	2.60E-03
4/14/2009	4.27E-02	+/-	2.60E-03
4/21/2009	4.53E-02	+/-	2.70E-03
4/29/2009	3.78E-02	+/-	2.50E-03
5/6/2009	4.04E-02	+/-	2.60E-03
5/13/2009	3.17E-02	+/-	2.70E-03
5/20/2009	3.60E-02	+/-	2.80E-03
5/27/2009	3.86E-02	+/-	2.80E-03
6/3/2009	3.09E-02	+/-	2.60E-03
6/10/2009	2.82E-02	+/-	2.70E-03
6/17/2009	3.13E-02	+/-	2.60E-03
6/24/2009	1.12E-02	+/-	2.20E-03

FERMI 2
AIR PARTICULATE GROSS BETA
(pCi/cubic meter)

API-5 THIRD QUARTER

Date	Activity		
7/1/2009	3.86E-02	+/-	3.00E-03
7/8/2009	2.82E-02	+/-	2.60E-03
7/15/2009	3.69E-02	+/-	2.60E-03
7/22/2009	2.77E-02	+/-	2.30E-03
7/29/2009	4.04E-02	+/-	2.80E-03
8/5/2009	4.81E-02	+/-	2.80E-03
8/13/2009	4.40E-02	+/-	2.90E-03
8/19/2009	5.45E-02	+/-	3.00E-03
8/26/2009	2.58E-02	+/-	2.30E-03
9/2/2009	3.13E-02	+/-	2.70E-03
9/9/2009	4.99E-02	+/-	3.40E-03
9/16/2009	5.85E-02	+/-	3.40E-03
9/23/2009	2.88E-02	+/-	2.90E-03

API-5 FOURTH QUARTER

Date	Activity		
10/7/2009	2.01E-02	+/-	2.80E-03
10/14/2009	2.49E-02	+/-	2.80E-03
10/21/2009	4.30E-02	+/-	3.00E-03
10/28/2009	3.34E-02	+/-	3.10E-03
11/4/2009	3.71E-02	+/-	3.10E-03
11/11/2009	4.17E-02	+/-	3.20E-03
11/18/2009	3.64E-02	+/-	3.10E-03
11/25/2009	5.03E-02	+/-	3.30E-03
12/2/2009	3.33E-02	+/-	3.00E-03
12/9/2009	4.40E-02	+/-	2.70E-03
12/16/2009	4.35E-02	+/-	3.20E-03
12/22/2009	5.36E-02	+/-	3.10E-03
12/29/2009	3.24E-02	+/-	3.20E-03

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-1 FIRST QUARTER

Date	Activity	
1/7/2009	<	2.90E-02
1/14/2009	<	3.20E-02
1/21/2009	<	2.40E-02
1/30/2009	<	3.50E-02
2/4/2009	<	4.10E-02
2/11/2009	<	2.80E-02
2/18/2009	<	3.00E-02
2/25/2009	<	2.40E-02
3/3/2009	<	3.10E-02
3/10/2009	<	2.60E-02
3/17/2009	<	3.10E-02
3/24/2009	<	2.80E-02
3/31/2009	<	2.60E-02

API-1 SECOND QUARTER

Date	Activity	
4/7/2009	<	4.60E-02
4/14/2009	<	3.40E-02
4/21/2009	<	3.30E-02
4/29/2009	<	2.00E-02
5/6/2009	<	3.10E-02
5/13/2009	<	3.50E-02
5/20/2009	<	2.70E-02
5/27/2009	<	2.40E-02
6/3/2009	<	3.60E-02
6/10/2009	<	2.70E-02
6/17/2009	<	2.10E-02
6/24/2009	<	3.10E-02

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-1 THIRD QUARTER

Date	Activity	
7/8/2009	<	2.70E-02
7/15/2009	<	3.10E-02
7/22/2009	<	2.30E-02
7/29/2009	<	2.80E-02
8/5/2009	<	3.10E-02
8/13/2009	<	3.20E-02
8/19/2009	<	3.00E-02
8/26/2009	<	2.60E-02
9/2/2009	<	2.80E-02
9/9/2009	<	2.80E-02
9/16/2009	<	3.40E-02
9/23/2009	<	2.90E-02
9/30/2009	<	3.80E-02

API-1 FOURTH QUARTER

Date	Activity	
10/7/2009	<	4.60E-02
10/14/2009	<	4.50E-02
10/21/2009	<	2.60E-02
10/28/2009	<	3.80E-02
11/4/2009	<	4.30E-02
11/11/2009	<	3.60E-02
11/18/2009	<	2.20E-02
11/25/2009	<	5.50E-02
12/2/2009	<	2.60E-02
12/9/2009	<	2.60E-02
12/16/2009	<	3.20E-02
12/22/2009	<	4.80E-02
12/29/2009	<	3.70E-02

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-2 FIRST QUARTER

Date	Activity	
1/7/2009	<	4.10E-02
1/14/2009	<	2.90E-02
1/21/2009	<	3.10E-02
1/30/2009	<	3.30E-02
2/4/2009	<	4.00E-02
2/11/2009	<	3.20E-02
2/18/2009	<	3.30E-02
2/25/2009	<	2.60E-02
3/3/2009	<	3.30E-02
3/10/2009	<	3.20E-02
3/17/2009	<	3.40E-02
3/24/2009	<	3.00E-02
3/31/2009	<	2.20E-02

API-2 SECOND QUARTER

Date	Activity	
4/7/2009	<	5.60E-02
4/14/2009	<	3.40E-02
4/21/2009	<	2.40E-02
4/29/2009	<	2.30E-02
5/6/2009	<	3.80E-02
5/13/2009	<	4.00E-02
5/20/2009	<	2.60E-02
5/27/2009	<	3.40E-02
6/3/2009	<	3.90E-02
6/10/2009	<	3.50E-02
6/17/2009	<	2.90E-02
6/24/2009	<	2.90E-02

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-2 THIRD QUARTER

Date	Activity	
7/1/2009	<	2.80E-02
7/8/2009	<	2.40E-02
7/15/2009	<	4.00E-02
7/22/2009	<	3.00E-02
7/29/2009	<	3.40E-02
8/5/2009	<	2.90E-02
8/13/2009	<	3.60E-02
8/19/2009	<	4.10E-02
8/26/2009	<	2.40E-02
9/2/2009	<	3.50E-02
9/9/2009	<	2.60E-02
9/16/2009	<	3.70E-02
9/23/2009	<	2.60E-02

API-2 FOURTH QUARTER

Date	Activity	
10/7/2009	<	2.90E-02
10/14/2009	<	4.90E-02
10/21/2009	<	2.40E-02
10/28/2009	<	3.30E-02
11/4/2009	<	3.80E-02
11/11/2009	<	2.40E-02
11/18/2009	<	3.60E-02
11/25/2009	<	4.70E-02
12/2/2009	<	3.60E-02
12/9/2009	<	2.80E-02
12/16/2009	<	2.80E-02
12/22/2009	<	4.40E-02
12/29/2009	<	3.80E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-3 FIRST QUARTER

Date	Activity
1/7/2009	< 3.80E-02
1/14/2009	< 3.30E-02
1/21/2009	< 3.40E-02
1/30/2009	< 4.30E-02
2/4/2009	< 3.10E-02
2/11/2009	< 2.90E-02
2/18/2009	< 2.80E-02
2/25/2009	< 2.80E-02
3/3/2009	< 2.90E-02
3/10/2009	< 2.80E-02
3/17/2009	< 3.70E-02
3/24/2009	< 3.90E-02
3/31/2009	< 2.90E-02

API-3 SECOND QUARTER

Date	Activity
4/7/2009	< 4.70E-02
4/14/2009	< 3.10E-02
4/21/2009	< 2.40E-02
4/29/2009	< 3.20E-02
5/6/2009	< 4.40E-02
5/13/2009	< 3.90E-02
5/20/2009	< 1.90E-02
5/27/2009	< 3.30E-02
6/3/2009	< 3.60E-02
6/10/2009	< 2.90E-02
6/17/2009	< 2.70E-02
6/24/2009	< 3.70E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-3 THIRD QUARTER

Date	Activity	
7/1/2009	<	3.40E-02
7/8/2009	<	2.60E-02
7/15/2009	<	3.60E-02
7/22/2009	<	4.10E-02
7/29/2009	<	3.40E-02
8/5/2009	<	3.90E-02
8/13/2009	<	3.40E-02
8/19/2009	<	3.50E-02
8/26/2009	<	2.60E-02
9/2/2009	<	3.40E-02
9/9/2009	<	2.90E-02
9/16/2009	<	3.20E-02
9/23/2009	<	4.10E-02

API-3 FOURTH QUARTER

Date	Activity	
10/7/2009	<	3.50E-02
10/14/2009	<	3.40E-02
10/21/2009	<	2.40E-02
10/28/2009	<	4.30E-02
11/4/2009	<	4.40E-02
11/11/2009	<	3.20E-02
11/18/2009	<	4.00E-02
11/25/2009	<	4.40E-02
12/2/2009	<	3.10E-02
12/9/2009	<	6.50E-02
12/16/2009	<	2.50E-02
12/22/2009	<	5.50E-02
12/29/2009	<	4.40E-02

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-4 FIRST QUARTER

Date	Activity	
1/7/2009	<	3.90E-02
1/14/2009	<	3.30E-02
1/21/2009	<	2.80E-02
1/30/2009	<	4.00E-02
2/4/2009	<	3.40E-02
2/11/2009	<	2.00E-02
2/18/2009	<	3.40E-02
2/25/2009	<	(a)
3/3/2009	<	4.30E-02
3/10/2009	<	1.90E-02
3/17/2009	<	2.00E-02
3/24/2009	<	3.10E-02
3/31/2009	<	2.40E-02

API-4 SECOND QUARTER

Date	Activity	
4/7/2009	<	4.40E-02
4/14/2009	<	4.40E-02
4/21/2009	<	2.70E-02
4/29/2009	<	1.60E-02
5/6/2009	<	3.50E-02
5/13/2009	<	3.70E-02
5/20/2009	<	2.50E-02
5/27/2009	<	2.60E-02
6/3/2009	<	3.30E-02
6/10/2009	<	2.30E-02
6/17/2009	<	2.80E-02
6/24/2009	<	3.60E-02

(a) See Appendix D - Program Execution.

FERMI 2
AIR IODINE - 131
(pCi/cubic meter)

API-4 THIRD QUARTER

Date	Activity	
7/1/2009	<	4.40E-02
7/8/2009	<	2.80E-02
7/15/2009	<	2.70E-02
7/22/2009	<	2.10E-02
7/29/2009	<	3.40E-02
8/5/2009	<	3.10E-02
8/13/2009	<	3.20E-02
8/19/2009	<	2.80E-02
8/26/2009	<	2.60E-02
9/2/2009	<	4.10E-02
9/9/2009	<	3.30E-02
9/16/2009	<	3.10E-02
9/23/2009	<	4.20E-02

API-4 FOURTH QUARTER

Date	Activity	
10/7/2009	<	4.10E-02
10/14/2009	<	4.10E-02
10/21/2009	<	2.70E-02
10/28/2009	<	3.70E-02
11/4/2009	<	5.20E-02
11/11/2009	<	3.00E-02
11/18/2009	<	3.40E-02
11/25/2009	<	4.20E-02
12/2/2009	<	2.90E-02
12/9/2009	<	6.50E-02
12/16/2009	<	2.80E-02
12/22/2009	<	4.70E-02
12/29/2009	<	4.50E-02

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-5 FIRST QUARTER

Date	Activity	
1/7/2009	<	4.40E-02
1/14/2009	<	2.60E-02
1/21/2009	<	2.80E-02
1/30/2009	<	3.50E-02
2/4/2009	<	4.20E-02
2/11/2009	<	3.20E-02
2/18/2009	<	3.30E-02
2/25/2009	<	2.30E-02
3/3/2009	<	3.00E-02
3/10/2009	<	2.30E-02
3/17/2009	<	3.40E-02
3/24/2009	<	3.80E-02
3/31/2009	<	3.50E-02

API-5 SECOND QUARTER

Date	Activity	
4/7/2009	<	4.30E-02
4/14/2009	<	4.60E-02
4/21/2009	<	2.60E-02
4/29/2009	<	3.40E-02
5/6/2009	<	4.20E-02
5/13/2009	<	2.90E-02
5/20/2009	<	2.00E-02
5/27/2009	<	3.00E-02
6/3/2009	<	3.90E-02
6/10/2009	<	2.10E-02
6/17/2009	<	2.80E-02
6/24/2009	<	2.40E-02

FERMI 2
AIR IODINE – 131
(pCi/cubic meter)

API-5 THIRD QUARTER

Date	Activity	
7/1/2009	<	3.60E-02
7/8/2009	<	2.80E-02
7/15/2009	<	3.50E-02
7/22/2009	<	3.70E-02
7/29/2009	<	2.80E-02
8/5/2009	<	3.50E-02
8/13/2009	<	3.10E-02
8/19/2009	<	3.10E-02
8/26/2009	<	2.30E-02
9/2/2009	<	3.80E-02
9/9/2009	<	3.70E-02
9/16/2009	<	3.90E-02
9/23/2009	<	2.60E-02

API-5 FOURTH QUARTER

Date	Activity	
10/7/2009	<	4.30E-02
10/14/2009	<	3.40E-02
10/21/2009	<	2.70E-02
10/28/2009	<	3.50E-02
11/4/2009	<	4.00E-02
11/11/2009	<	3.00E-02
11/18/2009	<	3.70E-02
11/25/2009	<	5.80E-02
12/2/2009	<	3.70E-02
12/9/2009	<	4.40E-02
12/16/2009	<	3.00E-02
12/22/2009	<	4.40E-02
12/29/2009	<	5.10E-02

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-1 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
Be-7	<	7.80E-02				1.17E-01	+/-	3.50E-02
K-40	<	3.30E-02			<	3.50E-02		
Mn-54	<	3.20E-03			<	4.30E-03		
Co-58	<	4.40E-03			<	6.00E-03		
Fe-59	<	1.30E-02			<	6.00E-03		
Co-60	<	9.30E-04			<	1.50E-03		
Zn-65	<	8.20E-03			<	3.00E-03		
Zr-95	<	6.30E-03			<	8.00E-03		
Nb-95	<	9.20E-03			<	7.80E-03		
Ru-103	<	7.20E-03			<	6.60E-03		
Ru-106	<	2.60E-02			<	3.40E-02		
Cs-134	<	2.00E-03			<	3.10E-03		
Cs-137	<	2.10E-03			<	8.50E-04		
Ba-140	<	1.20E-01			<	4.00E-02		
La-140	<	1.20E-01			<	4.00E-02		
Ce-141	<	9.90E-03			<	6.50E-03		
Ce-144	<	9.60E-03			<	9.50E-03		

API-1 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
Be-7		1.12E-01	+/-	1.60E-02		9.40E-02	+/-	1.40E-02
K-40	<	2.10E-02			<	3.00E-02		
Mn-54	<	2.30E-03			<	2.20E-03		
Co-58	<	3.00E-03			<	1.90E-03		
Fe-59	<	9.30E-03			<	7.00E-03		
Co-60	<	1.60E-03			<	7.30E-04		
Zn-65	<	5.60E-03			<	7.20E-03		
Zr-95	<	4.20E-03			<	4.90E-03		
Nb-95	<	6.10E-03			<	5.60E-03		
Ru-103	<	5.10E-03			<	3.90E-03		
Ru-106	<	1.70E-02			<	2.10E-02		
Cs-134	<	1.70E-03			<	1.70E-03		
Cs-137	<	1.90E-03			<	1.50E-03		
Ba-140	<	5.00E-02			<	3.60E-02		
La-140	<	5.00E-02			<	3.60E-02		
Ce-141	<	6.20E-03			<	4.40E-03		
Ce-144	<	6.70E-03			<	6.40E-03		

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-2 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
Be-7		1.40E-01	+/-	2.80E-02		1.26E-01	+/-	2.50E-02
K-40	<	4.10E-02			<	4.40E-02		
Mn-54	<	2.60E-03			<	3.80E-03		
Co-58	<	1.40E-03			<	5.10E-03		
Fe-59	<	1.90E-02			<	5.30E-03		
Co-60	<	3.70E-03			<	1.40E-03		
Zn-65	<	1.20E-02			<	2.80E-03		
Zr-95	<	6.50E-03			<	9.00E-03		
Nb-95	<	9.10E-03			<	2.60E-03		
Ru-103	<	6.00E-03			<	5.80E-03		
Ru-106	<	3.00E-02			<	7.40E-03		
Cs-134	<	2.20E-03			<	3.30E-03		
Cs-137	<	2.60E-03			<	2.40E-03		
Ba-140	<	2.20E-01			<	9.60E-02		
La-140	<	2.20E-01			<	9.60E-02		
Ce-141	<	8.40E-03			<	6.70E-03		
Ce-144	<	8.60E-03			<	9.00E-03		

API-2 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
Be-7	<	7.70E-02				8.20E-02	+/-	1.80E-02
K-40	<	5.40E-02			<	2.90E-02		
Mn-54	<	3.50E-03			<	3.10E-03		
Co-58	<	4.50E-03			<	4.60E-03		
Fe-59	<	5.80E-03			<	1.40E-02		
Co-60	<	4.90E-03			<	1.20E-03		
Zn-65	<	1.50E-02			<	7.90E-03		
Zr-95	<	7.60E-03			<	9.10E-03		
Nb-95	<	9.50E-03			<	8.70E-03		
Ru-103	<	7.40E-03			<	4.40E-03		
Ru-106	<	2.20E-02			<	2.30E-02		
Cs-134	<	2.60E-03			<	2.80E-03		
Cs-137	<	8.00E-04			<	3.70E-03		
Ba-140	<	1.10E-01			<	1.70E-02		
La-140	<	1.10E-01			<	1.70E-02		
Ce-141	<	1.10E-02			<	5.90E-03		
Ce-144	<	8.00E-03			<	7.50E-03		

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-3 (indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
Be-7		1.03E-01	+/-	2.20E-02		1.43E-01	+/-	2.20E-02
K-40	<	4.10E-02			<	3.70E-02		
Mn-54	<	2.00E-03			<	2.30E-03		
Co-58	<	3.60E-03			<	2.80E-03		
Fe-59	<	1.40E-02			<	1.00E-02		
Co-60	<	4.60E-03			<	2.60E-03		
Zn-65	<	9.70E-03			<	6.60E-03		
Zr-95	<	2.50E-03			<	4.70E-03		
Nb-95	<	1.00E-02			<	6.30E-03		
Ru-103	<	6.80E-03			<	1.10E-03		
Ru-106	<	2.80E-02			<	2.10E-02		
Cs-134	<	2.50E-03			<	2.20E-03		
Cs-137	<	3.20E-03			<	1.50E-03		
Ba-140	<	2.10E-01			<	1.80E-02		
La-140	<	2.10E-01			<	1.80E-02		
Ce-141	<	9.10E-03			<	4.80E-03		
Ce-144	<	6.70E-03			<	7.10E-03		

API-3 (indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
Be-7		8.20E-02	+/-	2.70E-02		1.09E-01	+/-	1.80E-02
K-40	<	5.30E-02			<	3.80E-02		
Mn-54	<	1.00E-03			<	2.00E-03		
Co-58	<	6.30E-03			<	3.40E-03		
Fe-59	<	1.60E-02			<	6.90E-03		
Co-60	<	6.20E-03			<	2.70E-03		
Zn-65	<	7.70E-03			<	6.90E-03		
Zr-95	<	1.30E-02			<	7.90E-03		
Nb-95	<	1.20E-02			<	6.60E-03		
Ru-103	<	1.90E-03			<	4.90E-03		
Ru-106	<	2.20E-02			<	1.60E-02		
Cs-134	<	3.70E-03			<	1.70E-03		
Cs-137	<	3.50E-03			<	1.80E-03		
Ba-140	<	4.00E-02			<	3.70E-02		
La-140	<	4.00E-02			<	3.70E-02		
Ce-141	<	8.50E-03			<	4.60E-03		
Ce-144	<	8.20E-03			<	9.50E-03		

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-4 (control)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
Be-7		1.72E-01	+/-	2.60E-02		1.57E-01	+/-	2.10E-02
K-40	<	3.80E-02			<	4.00E-02		
Mn-54	<	1.90E-03			<	1.20E-03		
Co-58	<	4.30E-03			<	4.70E-03		
Fe-59	<	2.10E-02			<	1.80E-02		
Co-60	<	3.10E-03			<	9.50E-04		
Zn-65	<	4.20E-03			<	5.00E-03		
Zr-95	<	7.90E-03			<	7.70E-03		
Nb-95	<	9.00E-03			<	4.50E-03		
Ru-103	<	6.70E-03			<	4.50E-03		
Ru-106	<	2.70E-02			<	1.80E-02		
Cs-134	<	2.10E-03			<	2.20E-03		
Cs-137	<	2.30E-03			<	2.30E-03		
Ba-140	<	1.60E-01			<	5.00E-02		
La-140	<	1.60E-01			<	5.00E-02		
Ce-141	<	1.00E-02			<	6.30E-03		
Ce-144	<	9.90E-03			<	8.40E-03		

API-4 (control)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
Be-7		1.06E-01	+/-	2.30E-02		1.53E-01	+/-	2.50E-02
K-40	<	3.70E-02			<	2.90E-02		
Mn-54	<	2.80E-03			<	2.70E-03		
Co-58	<	4.60E-03			<	5.20E-03		
Fe-59	<	1.40E-02			<	1.60E-02		
Co-60	<	3.20E-03			<	3.10E-03		
Zn-65	<	5.40E-03			<	6.30E-03		
Zr-95	<	1.20E-02			<	5.70E-03		
Nb-95	<	6.40E-03			<	7.20E-03		
Ru-103	<	5.10E-03			<	7.40E-03		
Ru-106	<	2.60E-02			<	2.30E-02		
Cs-134	<	2.10E-03			<	2.80E-03		
Cs-137	<	2.20E-03			<	2.60E-03		
Ba-140	<	8.60E-02			<	4.50E-02		
La-140	<	8.60E-02			<	4.50E-02		
Ce-141	<	6.70E-03			<	5.90E-03		
Ce-144	<	8.70E-03			<	6.90E-03		

FERMI 2
AIR PARTICULATE QUARTERLY COMPOSITE ANALYSIS

API-5 (Indicator)
(pCi/cubic meter)

Nuclide	First Quarter				Second Quarter			
Be-7		2.39E-01	+/-	3.30E-02		1.82E-01	+/-	2.20E-02
K-40	<	2.90E-02			<	4.10E-02		
Mn-54	<	2.50E-03			<	2.30E-03		
Co-58	<	5.80E-03			<	4.60E-03		
Fe-59	<	2.10E-02			<	1.00E-02		
Co-60	<	4.50E-03			<	9.40E-04		
Zn-65	<	9.60E-03			<	1.80E-03		
Zr-95	<	6.60E-03			<	6.80E-03		
Nb-95	<	1.10E-02			<	6.30E-03		
Ru-103	<	9.80E-03			<	3.00E-03		
Ru-106	<	2.50E-02			<	2.40E-02		
Cs-134	<	2.50E-03			<	2.50E-03		
Cs-137	<	2.60E-03			<	5.30E-04		
Ba-140	<	2.40E-01			<	7.70E-02		
La-140	<	2.40E-01			<	7.70E-02		
Ce-141	<	9.50E-03			<	5.10E-03		
Ce-144	<	8.50E-03			<	6.90E-03		

API-5 (Indicator)
(pCi/cubic meter)

Nuclide	Third Quarter				Fourth Quarter			
Be-7		1.93E-01	+/-	3.10E-02		1.40E-01	+/-	1.90E-02
K-40	<	4.50E-02			<	3.00E-02		
Mn-54	<	2.70E-03			<	1.50E-03		
Co-58	<	7.40E-03			<	2.90E-03		
Fe-59	<	1.70E-02			<	9.90E-03		
Co-60	<	6.30E-03			<	2.10E-03		
Zn-65	<	1.00E-02			<	5.70E-03		
Zr-95	<	3.00E-03			<	7.90E-03		
Nb-95	<	7.60E-03			<	8.70E-03		
Ru-103	<	7.40E-03			<	5.20E-03		
Ru-106	<	3.20E-02			<	2.20E-02		
Cs-134	<	2.60E-03			<	2.80E-03		
Cs-137	<	8.00E-04			<	1.60E-03		
Ba-140	<	4.00E-02			<	3.00E-02		
La-140	<	4.00E-02			<	3.00E-02		
Ce-141	<	6.80E-03			<	6.20E-03		
Ce-144	<	1.10E-02			<	8.70E-03		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	22-JAN				19-FEB				26-MAR			
I-131	<	7.40E-01			<	8.60E-01			<	7.90E-01		
Sr-89	<	6.20E+00			<	6.90E+00			<	7.10E+00		
Sr-90	<	1.40E+00			<	1.70E+00			<	1.40E+00		
Be-7	<	4.90E+01			<	7.00E+01			<	5.20E+01		
K-40		1.54E+03	+/-	7.20E+01		1.30E+03	+/-	7.90E+01		1.36E+03	+/-	5.80E+01
Mn-54	<	5.40E+00			<	7.70E+00			<	6.00E+00		
Co-58	<	6.60E+00			<	8.10E+00			<	5.70E+00		
Fe-59	<	1.60E+01			<	1.70E+01			<	1.30E+01		
Co-60	<	8.10E+00			<	7.80E+00			<	6.70E+00		
Zn-65	<	3.20E+01			<	2.00E+01			<	1.80E+01		
Zr-95	<	1.30E+01			<	1.40E+01			<	1.10E+01		
Nb-95	<	8.60E+00			<	8.90E+00			<	7.60E+00		
Ru-103	<	6.70E+00			<	8.30E+00			<	6.40E+00		
Ru-106	<	6.00E+01			<	6.30E+01			<	5.20E+01		
Cs-134	<	7.80E+00			<	7.50E+00			<	6.20E+00		
Cs-137	<	7.00E+00			<	8.70E+00			<	6.00E+00		
Ba-140	<	1.10E+01			<	1.40E+01			<	1.30E+01		
La-140	<	1.10E+01			<	1.40E+01			<	1.30E+01		
Ce-141	<	1.00E+01			<	1.10E+01			<	8.70E+00		
Ce-144	<	3.50E+01			<	4.20E+01			<	3.20E+01		

Nuclide	22-APR				21-MAY				28-MAY			
I-131	<	9.30E-01			<	9.10E-01			<	9.00E-01		
Sr-89	<	9.90E+00			<	6.50E+00			<	7.00E+00		
Sr-90	<	1.70E+00				1.25E+00	+/-	3.70E-01	<	1.80E+00		
Be-7	<	4.50E+01			<	5.10E+01			<	6.80E+01		
K-40		1.39E+03	+/-	6.80E+01		1.47E+03	+/-	7.10E+01		1.21E+03	+/-	7.90E+01
Mn-54	<	6.50E+00			<	7.60E+00			<	7.40E+00		
Co-58	<	6.70E+00			<	7.40E+00			<	7.90E+00		
Fe-59	<	1.70E+01			<	1.70E+01			<	1.80E+01		
Co-60	<	8.20E+00			<	7.50E+00			<	8.20E+00		
Zn-65	<	1.80E+01			<	2.90E+01			<	1.70E+01		
Zr-95	<	1.00E+01			<	1.20E+01			<	1.40E+01		
Nb-95	<	6.10E+00			<	8.50E+00			<	8.10E+00		
Ru-103	<	5.60E+00			<	8.00E+00			<	9.20E+00		
Ru-106	<	5.40E+01			<	6.60E+01			<	7.60E+01		
Cs-134	<	5.50E+00			<	7.40E+00			<	7.90E+00		
Cs-137	<	6.40E+00			<	6.50E+00			<	6.90E+00		
Ba-140	<	1.30E+01			<	1.50E+01			<	1.50E+01		
La-140	<	1.30E+01			<	1.50E+01			<	1.50E+01		
Ce-141	<	7.60E+00			<	1.10E+01			<	1.10E+01		
Ce-144	<	2.80E+01			<	3.70E+01			<	4.20E+01		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	11-JUN				25-JUN				16-JUL			
I-131	<	7.90E-01			<	9.30E-01			<	8.80E-01		
Sr-89	<	5.40E+00			<	7.00E+00			<	5.40E+00		
Sr-90	<	1.10E+00			<	1.30E+00			<	1.40E+00		
Be-7	<	6.80E+01			<	5.80E+01			<	6.40E+01		
K-40		1.42E+03	+/-	8.80E+01		1.42E+03	+/-	6.90E+01		1.28E+03	+/-	7.40E+01
Mn-54	<	7.60E+00			<	7.10E+00			<	7.60E+00		
Co-58	<	5.80E+00			<	7.10E+00			<	7.50E+00		
Fe-59	<	1.70E+01			<	1.60E+01			<	1.70E+01		
Co-60	<	9.70E+00			<	7.20E+00			<	8.40E+00		
Zn-65	<	2.40E+01			<	1.80E+01			<	1.80E+01		
Zr-95	<	1.80E+01			<	1.20E+01			<	1.50E+01		
Nb-95	<	9.60E+00			<	8.40E+00			<	7.30E+00		
Ru-103	<	8.80E+00			<	8.10E+00			<	7.60E+00		
Ru-106	<	8.20E+01			<	5.80E+01			<	7.60E+01		
Cs-134	<	8.10E+00			<	6.50E+00			<	6.50E+00		
Cs-137	<	9.60E+00			<	7.20E+00			<	7.70E+00		
Ba-140	<	1.00E+01			<	1.50E+01			<	1.30E+01		
La-140	<	1.00E+01			<	1.50E+01			<	1.30E+01		
Ce-141	<	1.20E+01			<	1.00E+01			<	1.00E+01		
Ce-144	<	4.30E+01			<	3.60E+01			<	3.40E+01		

Nuclide	30-JUL				13-AUG				27-AUG			
I-131	<	7.60E-01			<	9.00E-01			<	8.10E-01		
Sr-89	<	7.20E+00			<	6.60E+00			<	9.20E+00		
Sr-90	<	1.40E+00			<	1.50E+00				2.04E+00	+/-	4.70E-01
Be-7	<	6.30E+01			<	5.40E+01			<	4.40E+01		
K-40		1.54E+03	+/-	8.00E+01		1.49E+03	+/-	6.80E+01		1.24E+03	+/-	6.70E+01
Mn-54	<	7.30E+00			<	6.20E+00			<	5.00E+00		
Co-58	<	7.60E+00			<	6.00E+00			<	7.10E+00		
Fe-59	<	1.70E+01			<	1.60E+01			<	2.00E+01		
Co-60	<	9.10E+00			<	7.30E+00			<	6.60E+00		
Zn-65	<	1.70E+01			<	1.30E+01			<	1.60E+01		
Zr-95	<	1.40E+01			<	1.20E+01			<	1.10E+01		
Nb-95	<	9.20E+00			<	8.70E+00			<	5.60E+00		
Ru-103	<	7.30E+00			<	6.70E+00			<	6.30E+00		
Ru-106	<	6.80E+01			<	5.30E+01			<	5.80E+01		
Cs-134	<	6.10E+00			<	6.00E+00			<	6.30E+00		
Cs-137	<	7.70E+00			<	6.00E+00			<	8.00E+00		
Ba-140	<	1.50E+01			<	1.40E+01			<	1.40E+01		
La-140	<	1.50E+01			<	1.40E+01			<	1.40E+01		
Ce-141	<	1.00E+01			<	9.70E+00			<	8.00E+00		
Ce-144	<	3.10E+01			<	3.30E+01			<	2.90E+01		

FERMI 2
MILK ANALYSIS

M-2 (Indicator)
(pCi/liter)

Nuclide	9-SEP				24-SEP				15-OCT			
I-131	<	8.50E-01			<	9.20E-01			<	8.90E-01		
Sr-89	<	7.40E+00			<	4.20E+00			<	8.50E+00		
Sr-90	<	1.80E+00			<	1.30E+00			<	1.70E+00		
Be-7	<	5.80E+01			<	5.90E+01			<	7.20E+01		
K-40		1.46E+03	+/-	7.50E+01		1.37E+03	+/-	6.70E+01		1.27E+03	+/-	7.70E+01
Mn-54	<	6.20E+00			<	6.70E+00			<	7.20E+00		
Co-58	<	7.30E+00			<	7.30E+00			<	9.00E+00		
Fe-59	<	1.70E+01			<	1.70E+01			<	1.60E+01		
Co-60	<	9.00E+00			<	6.90E+00			<	9.10E+00		
Zn-65	<	2.00E+01			<	1.70E+01			<	2.50E+01		
Zr-95	<	1.50E+01			<	1.30E+01			<	1.50E+01		
Nb-95	<	9.50E+00			<	8.20E+00			<	1.10E+01		
Ru-103	<	8.80E+00			<	7.50E+00			<	8.80E+00		
Ru-106	<	6.80E+01			<	5.50E+01			<	6.00E+01		
Cs-134	<	7.90E+00			<	7.00E+00			<	6.40E+00		
Cs-137	<	7.10E+00			<	6.60E+00			<	7.10E+00		
Ba-140	<	1.40E+01			<	1.50E+01			<	1.40E+01		
La-140	<	1.40E+01			<	1.50E+01			<	1.40E+01		
Ce-141	<	1.10E+01			<	9.50E+00			<	1.10E+01		
Ce-144	<	3.90E+01			<	3.50E+01			<	4.00E+01		

Nuclide	19-NOV				13-DEC			
I-131	<	9.40E-01			<	8.00E-01		
Sr-89	<	6.70E+00			<	6.60E+00		
Sr-90	<	1.80E+00			<	2.00E+00		
Be-7	<	4.40E+01			<	8.00E+01		
K-40		1.36E+03	+/-	6.00E+01		1.20E+03	+/-	8.30E+01
Mn-54	<	5.20E+00			<	9.70E+00		
Co-58	<	5.80E+00			<	9.70E+00		
Fe-59	<	1.50E+01			<	2.00E+01		
Co-60	<	6.60E+00			<	9.40E+00		
Zn-65	<	1.70E+01			<	3.80E+01		
Zr-95	<	1.10E+01			<	1.60E+01		
Nb-95	<	6.10E+00			<	1.50E+01		
Ru-103	<	5.70E+00			<	1.10E+01		
Ru-106	<	5.60E+01			<	7.50E+01		
Cs-134	<	5.40E+00			<	1.00E+01		
Cs-137	<	5.30E+00			<	9.50E+00		
Ba-140	<	1.50E+01			<	1.20E+01		
La-140	<	1.50E+01			<	1.20E+01		
Ce-141	<	7.40E+00			<	1.40E+01		
Ce-144	<	2.60E+01			<	5.00E+01		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	22-JAN				19-FEB				26-MAR			
I-131	<	9.10E-01			<	9.60E-01			<	8.20E-01		
Sr-89	<	7.00E+00			<	5.90E+00			<	7.80E+00		
Sr-90	<	1.70E+00			<	1.40E+00			<	1.60E+00		
Be-7	<	4.50E+01			<	5.60E+01			<	5.10E+01		
K-40		1.38E+03	+/-	6.40E+01		1.40E+03	+/-	7.50E+01		1.44E+03	+/-	7.80E+01
Mn-54	<	6.00E+00			<	7.50E+00			<	6.20E+00		
Co-58	<	6.00E+00			<	7.50E+00			<	7.00E+00		
Fe-59	<	1.80E+01			<	1.90E+01			<	1.80E+01		
Co-60	<	8.10E+00			<	8.20E+00			<	8.80E+00		
Zn-65	<	1.60E+01			<	1.80E+01			<	1.80E+01		
Zr-95	<	9.30E+00			<	1.30E+01			<	1.50E+01		
Nb-95	<	6.80E+00			<	9.00E+00			<	9.00E+00		
Ru-103	<	6.10E+00			<	8.30E+00			<	8.10E+00		
Ru-106	<	4.60E+01			<	6.80E+01			<	6.80E+01		
Cs-134	<	5.90E+00			<	7.30E+00			<	6.40E+00		
Cs-137	<	6.80E+00			<	7.50E+00			<	7.90E+00		
Ba-140	<	1.50E+01			<	1.10E+01			<	1.50E+01		
La-140	<	1.50E+01			<	1.10E+01			<	1.50E+01		
Ce-141	<	7.60E+00			<	1.00E+01			<	9.20E+00		
Ce-144	<	2.70E+01			<	3.80E+01			<	3.40E+01		

Nuclide	22-APR				21-MAY				28-MAY			
I-131	<	7.50E-01			<	9.20E-01			<	9.40E-01		
Sr-89	<	8.60E+00			<	5.70E+00			<	5.70E+00		
Sr-90	<	1.40E+00			<	1.00E+00			<	1.40E+00		
Be-7	<	5.30E+01			<	5.00E+01			<	6.80E+01		
K-40		1.40E+03	+/-	7.40E+01		1.43E+03	+/-	6.90E+01		1.30E+03	+/-	8.70E+01
Mn-54	<	6.10E+00			<	7.10E+00			<	8.10E+00		
Co-58	<	7.70E+00			<	6.60E+00			<	8.10E+00		
Fe-59	<	1.60E+01			<	1.80E+01			<	1.80E+01		
Co-60	<	8.60E+00			<	7.90E+00			<	1.10E+01		
Zn-65	<	1.80E+01			<	1.80E+01			<	1.60E+01		
Zr-95	<	1.00E+01			<	1.20E+01			<	1.50E+01		
Nb-95	<	8.10E+00			<	7.90E+00			<	1.00E+01		
Ru-103	<	8.10E+00			<	7.10E+00			<	1.30E+01		
Ru-106	<	6.80E+01			<	5.70E+01			<	8.30E+01		
Cs-134	<	7.40E+00			<	6.90E+00			<	8.60E+00		
Cs-137	<	7.20E+00			<	6.50E+00			<	8.00E+00		
Ba-140	<	1.20E+01			<	1.50E+01			<	1.30E+01		
La-140	<	1.20E+01			<	1.50E+01			<	1.30E+01		
Ce-141	<	1.00E+01			<	9.70E+00			<	1.20E+01		
Ce-144	<	3.80E+01			<	3.80E+01			<	4.40E+01		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	11-JUN				25-JUN				16-JUL			
I-131	<	7.90E-01			<	9.20E-01			<	9.00E-01		
Sr-89	<	5.00E+00			<	7.10E+00			<	6.90E+00		
Sr-90	<	1.00E+00				1.32E+00	+/-	4.10E-01	<	2.00E+00		
Be-7	<	5.20E+01			<	4.60E+01			<	6.70E+01		
K-40		1.54E+03	+/-	8.20E+01		1.45E+03	+/-	5.60E+01		1.46E+03	+/-	8.90E+01
Mn-54	<	7.00E+00			<	5.00E+00			<	9.00E+00		
Co-58	<	6.80E+00			<	5.70E+00			<	8.00E+00		
Fe-59	<	1.90E+01			<	1.40E+01			<	2.30E+01		
Co-60	<	8.50E+00			<	6.00E+00			<	9.90E+00		
Zn-65	<	1.60E+01			<	1.60E+01			<	2.00E+01		
Zr-95	<	1.20E+01			<	9.70E+00			<	1.70E+01		
Nb-95	<	8.30E+00			<	7.00E+00			<	1.30E+01		
Ru-103	<	6.80E+00			<	5.80E+00			<	1.10E+01		
Ru-106	<	7.30E+01			<	5.10E+01			<	7.80E+01		
Cs-134	<	6.90E+00			<	5.70E+00			<	8.50E+00		
Cs-137	<	8.60E+00			<	5.70E+00			<	9.10E+00		
Ba-140	<	1.50E+01			<	1.20E+01			<	1.40E+01		
La-140	<	1.50E+01			<	1.20E+01			<	1.40E+01		
Ce-141	<	8.60E+00			<	8.30E+00			<	8.00E+00		
Ce-144	<	3.20E+01			<	2.90E+01			<	3.90E+01		

Nuclide	30-JUL				13-AUG				27-AUG			
I-131	<	7.90E-01			<	9.50E-01			<	9.60E-01		
Sr-89	<	8.60E+00			<	6.90E+00			<	7.20E+00		
Sr-90	<	1.70E+00			<	1.50E+00			<	1.10E+00		
Be-7	<	5.60E+01			<	4.30E+01			<	5.10E+01		
K-40		1.47E+03	+/-	6.60E+01		1.46E+03	+/-	5.60E+01		1.48E+03	+/-	7.00E+01
Mn-54	<	6.20E+00			<	5.40E+00			<	6.80E+00		
Co-58	<	6.10E+00			<	4.90E+00			<	7.00E+00		
Fe-59	<	1.10E+01			<	1.30E+01			<	1.70E+01		
Co-60	<	6.80E+00			<	6.40E+00			<	7.30E+00		
Zn-65	<	1.60E+01			<	1.40E+01			<	1.80E+01		
Zr-95	<	1.10E+01			<	9.40E+00			<	1.10E+01		
Nb-95	<	6.80E+00			<	6.20E+00			<	7.80E+00		
Ru-103	<	6.30E+00			<	6.00E+00			<	7.60E+00		
Ru-106	<	6.40E+01			<	4.80E+01			<	6.10E+01		
Cs-134	<	6.10E+00			<	5.20E+00			<	6.00E+00		
Cs-137	<	5.80E+00			<	5.40E+00			<	6.70E+00		
Ba-140	<	1.30E+01			<	9.90E+00			<	1.10E+01		
La-140	<	1.30E+01			<	9.90E+00			<	1.10E+01		
Ce-141	<	9.00E+00			<	7.70E+00			<	9.60E+00		
Ce-144	<	3.30E+01			<	2.90E+01			<	3.20E+01		

FERMI 2
MILK ANALYSIS

M-8 (Control)
(pCi/liter)

Nuclide	9-SEP				24-SEP				15-OCT			
I-131	<	9.50E-01			<	9.50E-01			<	9.10E-01		
Sr-89	<	6.50E+00			<	6.50E+00			<	7.70E+00		
Sr-90	<	1.60E+00			<	1.60E+00			<	1.50E+00		
Be-7	<	4.60E+01			<	4.60E+01			<	6.20E+01		
K-40		1.48E+03	+/-	6.20E+01		1.48E+03	+/-	6.20E+01		1.40E+03	+/-	7.70E+01
Mn-54	<	4.70E+00			<	4.70E+00			<	7.60E+00		
Co-58	<	5.70E+00			<	5.70E+00			<	7.50E+00		
Fe-59	<	1.40E+01			<	1.40E+01			<	1.60E+01		
Co-60	<	7.20E+00			<	7.20E+00			<	9.80E+00		
Zn-65	<	1.50E+01			<	1.50E+01			<	2.00E+01		
Zr-95	<	9.60E+00			<	9.60E+00			<	1.30E+01		
Nb-95	<	6.40E+00			<	6.40E+00			<	8.70E+00		
Ru-103	<	6.20E+00			<	6.20E+00			<	8.10E+00		
Ru-106	<	5.30E+01			<	5.30E+01			<	4.80E+01		
Cs-134	<	5.70E+00			<	5.70E+00			<	6.10E+00		
Cs-137	<	5.60E+00			<	5.60E+00			<	1.00E+01		
Ba-140	<	1.40E+01			<	1.40E+01			<	1.30E+01		
La-140	<	1.40E+01			<	1.40E+01			<	1.30E+01		
Ce-141	<	8.00E+00			<	8.00E+00			<	8.60E+00		
Ce-144	<	2.40E+01			<	2.40E+01			<	3.00E+01		

Nuclide	19-NOV				17-DEC			
I-131	<	9.50E-01			<	9.40E-01		
Sr-89	<	6.70E+00			<	8.60E+00		
Sr-90	<	1.80E+00			<	1.70E+00		
Be-7	<	4.80E+01			<	4.20E+01		
K-40		1.69E+03	+/-	6.50E+01		1.41E+03	+/-	4.20E+01
Mn-54	<	5.90E+00			<	4.60E+00		
Co-58	<	5.90E+00			<	4.80E+00		
Fe-59	<	1.40E+01			<	1.10E+01		
Co-60	<	5.60E+00			<	4.50E+00		
Zn-65	<	1.40E+01			<	1.80E+01		
Zr-95	<	1.10E+01			<	8.50E+00		
Nb-95	<	7.50E+00			<	3.80E+00		
Ru-103	<	7.10E+00			<	5.70E+00		
Ru-106	<	5.70E+01			<	3.70E+01		
Cs-134	<	6.30E+00			<	4.80E+00		
Cs-137	<	6.60E+00			<	4.50E+00		
Ba-140	<	1.30E+01			<	1.50E+01		
La-140	<	1.30E+01			<	1.50E+01		
Ce-141	<	9.90E+00			<	9.50E+00		
Ce-144	<	3.30E+01			<	2.30E+01		

FERMI 2
VEGETABLE ANALYSIS

FP-1 (Indicator)
(pCi/kg wet)

Nuclide	30-JUL Cabbage				30-JUL Collards				30-JUL Mustard Greens			
I-131	<	3.90E+01			<	4.20E+01			<	5.20E+01		
Be-7	<	3.60E+02			<	3.60E+02			<	6.70E+02		
K-40		3.01E+03	+/-	3.10E+02		3.65E+03	+/-	4.10E+02		3.42E+03	+/-	4.10E+02
Mn-54	<	3.60E+01			<	5.50E+01			<	5.50E+01		
Co-58	<	4.10E+01			<	5.50E+01			<	5.80E+01		
Fe-59	<	7.10E+01			<	1.40E+02			<	1.30E+02		
Co-60	<	5.20E+01			<	6.70E+01			<	5.50E+01		
Zn-65	<	9.70E+01			<	1.10E+02			<	8.90E+01		
Zr-95	<	7.10E+01			<	9.40E+01			<	8.50E+01		
Nb-95	<	4.20E+01			<	5.00E+01			<	6.50E+01		
Ru-103	<	3.20E+01			<	4.10E+01			<	5.40E+01		
Ru-106	<	3.50E+02			<	4.20E+02			<	5.30E+02		
Cs-134	<	3.50E+01			<	4.70E+01			<	5.40E+01		
Cs-137	<	3.60E+01			<	4.10E+01			<	5.70E+01		
Ba-140	<	7.50E+01			<	1.20E+02			<	1.50E+02		
La-140	<	7.50E+01			<	1.20E+02			<	1.50E+02		
Ce-141	<	5.90E+01			<	5.30E+01			<	6.40E+01		
Ce-144	<	1.90E+02			<	1.70E+02			<	2.40E+02		

FP-1 (Indicator)
(pCi/kg wet)

Nuclide	30-JUL Red Cabbage				2-SEP Broccoli				2-SEP Cabbage			
I-131	<	4.30E+01			<	5.00E+01			<	4.50E+01		
Be-7	<	4.50E+02			<	2.10E+02			<	2.40E+02		
K-40		2.99E+03	+/-	4.20E+02		2.33E+03	+/-	2.40E+02		1.61E+03	+/-	2.70E+02
Mn-54	<	4.70E+01			<	2.60E+01			<	3.20E+01		
Co-58	<	5.90E+01			<	2.90E+01			<	3.90E+01		
Fe-59	<	1.10E+02			<	6.90E+01			<	9.00E+01		
Co-60	<	5.60E+01			<	3.20E+01			<	5.40E+01		
Zn-65	<	1.20E+02			<	5.90E+01			<	7.70E+01		
Zr-95	<	1.00E+02			<	4.00E+01			<	6.70E+01		
Nb-95	<	9.10E+01			<	3.10E+01			<	4.10E+01		
Ru-103	<	6.00E+01			<	3.20E+01			<	3.30E+01		
Ru-106	<	5.30E+02			<	2.60E+02			<	3.20E+02		
Cs-134	<	5.60E+01			<	3.00E+01			<	2.70E+01		
Cs-137	<	5.40E+01			<	3.00E+01			<	3.80E+01		
Ba-140	<	1.10E+02			<	4.50E+01			<	3.90E+01		
La-140	<	1.10E+02			<	4.50E+01			<	3.90E+01		
Ce-141	<	6.80E+01			<	4.10E+01			<	4.20E+01		
Ce-144	<	2.50E+02			<	1.50E+02			<	1.50E+02		

FP-1 (Indicator)
(pCi/kg wet)

Nuclide	2-SEP Lettuce			
I-131	<	4.50E+01		
Be-7		4.20E+02	+/-	1.30E+02
K-40		3.54E+03	+/-	3.80E+02
Mn-54	<	4.50E+01		
Co-58	<	4.80E+01		
Fe-59	<	8.00E+01		
Co-60	<	5.20E+01		
Zn-65	<	7.70E+01		
Zr-95	<	5.90E+01		
Nb-95	<	5.30E+01		
Ru-103	<	4.00E+01		
Ru-106	<	4.00E+02		
Cs-134	<	3.60E+01		
Cs-137	<	4.10E+01		
Ba-140	<	7.30E+01		
La-140	<	7.30E+01		
Ce-141	<	4.50E+01		
Ce-144	<	1.50E+02		

FERMI 2
VEGETABLE ANALYSIS

FP-9 (Control)
(pCi/kg wet)

Nuclide	30-JUL Collards				30-JUL Cabbage				30-JUL Red Cabbage			
I-131	<	5.40E+01			<	4.60E+01			<	4.00E+01		
Be-7	<	3.80E+02			<	3.40E+02			<	4.20E+02		
K-40		4.94E+03	+/-	3.80E+02		2.85E+03	+/-	3.50E+02		3.63E+03	+/-	4.30E+02
Mn-54	<	3.80E+01			<	4.20E+01			<	5.50E+01		
Co-58	<	3.90E+01			<	3.70E+01			<	4.50E+01		
Fe-59	<	8.50E+01			<	1.10E+02			<	1.10E+02		
Co-60	<	5.20E+01			<	4.70E+01			<	5.90E+01		
Zn-65	<	1.10E+02			<	1.20E+02			<	8.20E+01		
Zr-95	<	7.90E+01			<	9.20E+01			<	1.10E+02		
Nb-95	<	4.50E+01			<	5.30E+01			<	4.50E+01		
Ru-103	<	4.80E+01			<	4.90E+01			<	5.50E+01		
Ru-106	<	3.70E+02			<	4.80E+02			<	4.00E+02		
Cs-134	<	3.50E+01			<	4.30E+01			<	4.90E+01		
Cs-137	<	3.20E+01			<	4.80E+01			<	3.00E+01		
Ba-140	<	8.30E+01			<	1.10E+02			<	7.00E+01		
La-140	<	8.30E+01			<	1.10E+02			<	7.00E+01		
Ce-141	<	5.80E+01			<	6.30E+01			<	4.50E+01		
Ce-144	<	1.90E+02			<	1.90E+02			<	1.40E+02		

FP-9 (Control)
(pCi/kg wet)

Nuclide	2-SEP Broccoli				2-SEP Cabbage			
I-131	<	4.80E+01			<	4.40E+01		
Be-7	<	4.40E+02			<	3.90E+02		
K-40		3.37E+03	+/-	4.60E+02		4.47E+03	+/-	4.50E+02
Mn-54	<	4.50E+01			<	3.90E+01		
Co-58	<	5.90E+01			<	5.10E+01		
Fe-59	<	8.70E+01			<	1.10E+02		
Co-60	<	4.80E+01			<	4.60E+01		
Zn-65	<	1.40E+02			<	8.00E+01		
Zr-95	<	1.10E+02			<	7.90E+01		
Nb-95	<	6.40E+01			<	5.90E+01		
Ru-103	<	5.70E+01			<	4.30E+01		
Ru-106	<	4.90E+02			<	3.20E+02		
Cs-134	<	4.80E+01			<	4.20E+01		
Cs-137	<	6.50E+01			<	5.00E+01		
Ba-140	<	1.00E+02			<	1.80E+01		
La-140	<	1.00E+02			<	1.80E+01		
Ce-141	<	5.60E+01			<	6.10E+01		
Ce-144	<	1.80E+02			<	2.00E+02		

FERMI 2
DRINKING WATER ANALYSIS

DW-1 (Indicator)
(pCi/liter)

Nuclide	29-JAN				25-FEB				31-MAR			
GR-B		3.50E+00	+/-	1.10E+00		3.90E+00	+/-	1.10E+00		3.50E+00	+/-	1.00E+00
Sr-89	<	4.80E+00			<	4.30E+00			<	5.30E+00		
Sr-90	<	1.40E+00			<	1.20E+00			<	1.60E+00		
Be-7	<	6.20E+01			<	5.10E+01			<	5.50E+01		
K-40	<	8.20E+01			<	9.90E+01			<	1.10E+02		
Mn-54	<	6.80E+00			<	6.90E+00			<	6.10E+00		
Co-58	<	7.30E+00			<	7.00E+00			<	6.20E+00		
Fe-59	<	1.20E+01			<	2.00E+01			<	1.60E+01		
Co-60	<	5.80E+00			<	5.40E+00			<	6.20E+00		
Zn-65	<	2.10E+01			<	1.70E+01			<	1.80E+01		
Zr-95	<	1.30E+01			<	1.20E+01			<	1.30E+01		
Nb-95	<	8.20E+00			<	8.10E+00			<	7.60E+00		
Ru-103	<	7.10E+00			<	7.60E+00			<	7.60E+00		
Ru-106	<	7.50E+01			<	5.40E+01			<	6.30E+01		
Cs-134	<	6.70E+00			<	8.40E+00			<	7.50E+00		
Cs-137	<	6.30E+00			<	6.90E+00			<	6.90E+00		
Ba-140	<	1.20E+01			<	1.40E+01			<	1.30E+01		
La-140	<	1.20E+01			<	1.40E+01			<	1.30E+01		
Ce-141	<	1.10E+01			<	1.20E+01			<	1.10E+01		
Ce-144	<	3.50E+01			<	4.00E+01			<	3.70E+01		

Nuclide	29-APR				27-MAY				24-JUN			
GR-B		3.80E+00	+/-	1.10E+00		4.20E+00	+/-	1.10E+00		4.50E+00	+/-	1.10E+00
Sr-89	<	7.90E+00			<	6.60E+00			<	7.20E+00		
Sr-90	<	1.70E+00			<	1.70E+00			<	1.40E+00		
Be-7	<	3.20E+01			<	4.10E+01			<	4.30E+01		
K-40	<	6.70E+01			<	8.20E+01			<	7.40E+01		
Mn-54	<	4.00E+00			<	5.80E+00			<	5.10E+00		
Co-58	<	4.10E+00			<	5.50E+00			<	5.80E+00		
Fe-59	<	9.60E+00			<	1.10E+01			<	1.30E+01		
Co-60	<	4.10E+00			<	4.20E+00			<	6.50E+00		
Zn-65	<	9.20E+00			<	1.40E+01			<	1.20E+01		
Zr-95	<	7.50E+00			<	1.10E+01			<	9.40E+00		
Nb-95	<	5.40E+00			<	5.80E+00			<	6.80E+00		
Ru-103	<	5.20E+00			<	6.70E+00			<	6.10E+00		
Ru-106	<	3.50E+01			<	5.90E+01			<	5.00E+01		
Cs-134	<	4.00E+00			<	5.80E+00			<	5.90E+00		
Cs-137	<	3.60E+00			<	5.60E+00			<	5.70E+00		
Ba-140	<	1.10E+01			<	1.30E+01			<	1.30E+01		
La-140	<	1.10E+01			<	1.30E+01			<	1.30E+01		
Ce-141	<	7.60E+00			<	8.50E+00			<	8.10E+00		
Ce-144	<	2.30E+01			<	3.10E+01			<	2.50E+01		

FERMI 2
DRINKING WATER ANALYSIS

DW-1 (Indicator)
(pCi/liter)

Nuclide	29-JUL				26-AUG				30-SEP			
GR-B	<	3.10E+00				7.80E+00	+/-	1.20E+00	<	3.00E+00		
Sr-89	<	6.60E+00			<	5.70E+00			<	5.50E+00		
Sr-90	<	1.40E+00			<	1.80E+00			<	9.50E-01		
Be-7	<	5.10E+01			<	4.50E+01			<	4.70E+01		
K-40	<	1.00E+02			<	1.00E+02			<	9.30E+01		
Mn-54	<	6.80E+00			<	5.40E+00			<	6.50E+00		
Co-58	<	6.30E+00			<	5.70E+00			<	6.90E+00		
Fe-59	<	1.50E+01			<	1.10E+01			<	1.60E+01		
Co-60	<	6.90E+00			<	5.70E+00			<	7.00E+00		
Zn-65	<	1.50E+01			<	1.10E+01			<	2.20E+01		
Zr-95	<	1.00E+01			<	1.10E+01			<	1.10E+01		
Nb-95	<	7.30E+00			<	5.30E+00			<	6.40E+00		
Ru-103	<	8.00E+00			<	5.80E+00			<	6.20E+00		
Ru-106	<	6.30E+01			<	4.20E+01			<	5.20E+01		
Cs-134	<	6.80E+00			<	4.70E+00			<	6.30E+00		
Cs-137	<	5.90E+00			<	5.20E+00			<	6.00E+00		
Ba-140	<	1.30E+01			<	8.60E+00			<	1.40E+01		
La-140	<	1.30E+01			<	8.60E+00			<	1.40E+01		
Ce-141	<	1.10E+01			<	1.20E+01			<	7.90E+00		
Ce-144	<	3.40E+01			<	2.90E+01			<	2.70E+01		

Nuclide	28-OCT				25-NOV				29-DEC			
GR-B		3.30E+00	+/-	1.00E+00		5.00E+00	+/-	1.10E+00	<	3.00E+00		
Sr-89	<	7.80E+00			<	5.80E+00			<	5.60E+00		
Sr-90	<	2.00E+00			<	2.00E+00			<	1.40E+00		
Be-7	<	4.20E+01			<	2.30E+01			<	6.10E+01		
K-40	<	4.70E+01			<	4.80E+01			<	8.70E+01		
Mn-54	<	4.40E+00			<	2.80E+00			<	6.80E+00		
Co-58	<	4.50E+00			<	3.00E+00			<	6.10E+00		
Fe-59	<	9.40E+00			<	6.80E+00			<	1.30E+01		
Co-60	<	5.20E+00			<	3.40E+00			<	7.20E+00		
Zn-65	<	1.10E+01			<	6.00E+00			<	2.70E+01		
Zr-95	<	7.60E+00			<	5.20E+00			<	1.10E+01		
Nb-95	<	5.00E+00			<	4.00E+00			<	8.50E+00		
Ru-103	<	5.30E+00			<	3.40E+00			<	7.50E+00		
Ru-106	<	4.10E+01			<	2.20E+01			<	6.10E+01		
Cs-134	<	4.60E+00			<	2.60E+00			<	6.70E+00		
Cs-137	<	4.40E+00			<	2.90E+00			<	7.90E+00		
Ba-140	<	1.10E+01			<	1.00E+01			<	1.30E+01		
La-140	<	1.10E+01			<	1.00E+01			<	1.30E+01		
Ce-141	<	1.00E+01			<	4.30E+00			<	9.90E+00		
Ce-144	<	2.20E+01			<	1.20E+01			<	3.80E+01		

FERMI 2
DRINKING WATER ANALYSIS

DW-2 (Control)
(pCi/liter)

Nuclide	29-JAN				25-FEB				31-MAR			
GR-B		3.20E+00	+/-	1.00E+00	<	3.10E+00			<	3.00E+00		
Sr-89	<	5.00E+00			<	4.50E+00			<	6.00E+00		
Sr-90	<	1.50E+00			<	1.30E+00			<	1.90E+00		
Be-7	<	4.70E+01			<	6.60E+01			<	4.20E+01		
K-40	<	1.00E+02			<	1.10E+02			<	8.50E+01		
Mn-54	<	6.40E+00			<	8.90E+00			<	6.30E+00		
Co-58	<	6.50E+00			<	8.30E+00			<	5.80E+00		
Fe-59	<	1.60E+01			<	1.40E+01			<	1.40E+01		
Co-60	<	7.70E+00			<	1.00E+01			<	7.10E+00		
Zn-65	<	1.70E+01			<	2.30E+01			<	1.20E+01		
Zr-95	<	1.10E+01			<	1.50E+01			<	8.40E+00		
Nb-95	<	6.80E+00			<	1.20E+01			<	5.50E+00		
Ru-103	<	6.90E+00			<	8.70E+00			<	7.60E+00		
Ru-106	<	5.40E+01			<	6.90E+01			<	4.60E+01		
Cs-134	<	5.70E+00			<	8.80E+00			<	5.60E+00		
Cs-137	<	6.70E+00			<	7.20E+00			<	6.00E+00		
Ba-140	<	1.10E+01			<	1.30E+01			<	1.50E+01		
La-140	<	1.10E+01			<	1.30E+01			<	1.50E+01		
Ce-141	<	1.40E+01			<	9.70E+00			<	8.00E+00		
Ce-144	<	2.80E+01			<	3.70E+01			<	2.40E+01		

Nuclide	29-APR				27-MAY				24-JUN			
GR-B	<	3.00E+00			<	2.90E+00			<	3.10E+00		
Sr-89	<	8.00E+00			<	7.00E+00			<	7.60E+00		
Sr-90	<	1.70E+00			<	1.80E+00			<	1.50E+00		
Be-7	<	3.40E+01			<	5.60E+01			<	4.80E+01		
K-40	<	6.20E+01			<	1.10E+02			<	7.20E+01		
Mn-54	<	3.20E+00			<	7.40E+00			<	5.30E+00		
Co-58	<	3.90E+00			<	8.40E+00			<	6.20E+00		
Fe-59	<	8.40E+00			<	1.60E+01			<	1.00E+01		
Co-60	<	4.50E+00			<	6.00E+00			<	4.90E+00		
Zn-65	<	9.30E+00			<	1.80E+01			<	1.20E+01		
Zr-95	<	6.80E+00			<	1.40E+01			<	1.00E+01		
Nb-95	<	5.00E+00			<	8.80E+00			<	7.30E+00		
Ru-103	<	4.60E+00			<	7.70E+00			<	6.40E+00		
Ru-106	<	3.70E+01			<	7.10E+01			<	5.70E+01		
Cs-134	<	3.60E+00			<	8.10E+00			<	5.80E+00		
Cs-137	<	3.80E+00			<	8.20E+00			<	5.00E+00		
Ba-140	<	1.00E+01			<	9.90E+00			<	1.30E+01		
La-140	<	1.00E+01			<	9.90E+00			<	1.30E+01		
Ce-141	<	5.90E+00			<	8.50E+00			<	8.70E+00		
Ce-144	<	2.20E+01			<	4.10E+01			<	2.80E+01		

FERMI 2
DRINKING WATER ANALYSIS

DW-2 (Control)
(pCi/liter)

Nuclide	29-JUL				26-AUG				30-SEP			
GR-B		4.80E+00	+/-	1.10E+00	<	3.00E+00			<	3.00E+00		
Sr-89	<	6.40E+00			<	4.90E+00			<	6.00E+00		
Sr-90	<	1.30E+00			<	1.50E+00			<	9.50E-01		
Be-7	<	4.50E+01			<	5.20E+01			<	5.00E+01		
K-40	<	8.10E+01			<	8.40E+01			<	1.00E+02		
Mn-54	<	5.50E+00			<	6.70E+00			<	5.80E+00		
Co-58	<	5.70E+00			<	6.60E+00			<	5.50E+00		
Fe-59	<	1.20E+01			<	1.30E+01			<	1.20E+01		
Co-60	<	6.20E+00			<	6.30E+00			<	7.40E+00		
Zn-65	<	1.10E+01			<	1.50E+01			<	1.50E+01		
Zr-95	<	9.70E+00			<	1.40E+01			<	1.00E+01		
Nb-95	<	6.40E+00			<	6.40E+00			<	7.00E+00		
Ru-103	<	5.70E+00			<	6.90E+00			<	6.30E+00		
Ru-106	<	4.60E+01			<	5.90E+01			<	4.90E+01		
Cs-134	<	5.00E+00			<	5.50E+00			<	5.30E+00		
Cs-137	<	5.80E+00			<	6.20E+00			<	6.70E+00		
Ba-140	<	1.10E+01			<	1.40E+01			<	1.50E+01		
La-140	<	1.10E+01			<	1.40E+01			<	1.50E+01		
Ce-141	<	6.50E+00			<	9.80E+00			<	8.10E+00		
Ce-144	<	2.20E+01			<	3.30E+01			<	2.70E+01		

Nuclide	28-OCT				25-NOV				29-DEC			
GR-B	<	3.00E+00				4.00E+00	+/-	1.10E+00	<	3.00E+00		
Sr-89	<	5.10E+00			<	6.30E+00			<	5.70E+00		
Sr-90	<	1.30E+00			<	1.70E+00			<	1.50E+00		
Be-7	<	3.50E+01			<	3.40E+01			<	5.00E+01		
K-40	<	8.00E+01			<	5.20E+01			<	1.10E+02		
Mn-54	<	4.00E+00			<	3.60E+00			<	7.90E+00		
Co-58	<	4.50E+00			<	3.90E+00			<	7.40E+00		
Fe-59	<	1.00E+01			<	9.50E+00			<	1.50E+01		
Co-60	<	5.00E+00			<	3.90E+00			<	5.40E+00		
Zn-65	<	1.10E+01			<	1.10E+01			<	2.20E+01		
Zr-95	<	7.60E+00			<	6.80E+00			<	1.20E+01		
Nb-95	<	4.80E+00			<	4.90E+00			<	8.60E+00		
Ru-103	<	4.90E+00			<	4.90E+00			<	9.10E+00		
Ru-106	<	3.80E+01			<	2.90E+01			<	6.20E+01		
Cs-134	<	4.20E+00			<	3.30E+00			<	8.00E+00		
Cs-137	<	4.40E+00			<	3.50E+00			<	7.70E+00		
Ba-140	<	1.20E+01			<	1.10E+01			<	1.40E+01		
La-140	<	1.20E+01			<	1.10E+01			<	1.40E+01		
Ce-141	<	6.20E+00			<	6.50E+00			<	1.80E+01		
Ce-144	<	1.80E+01			<	1.80E+01			<	4.10E+01		

FERMI 2
SURFACE WATER ANALYSIS

SW-2 (Control)
(pCi/liter)

Nuclide	29-JAN	25-FEB	31-MAR
Sr-89	< 6.10E+00	< 4.50E+00	< 5.80E+00
Sr-90	< 1.70E+00	< 1.30E+00	< 1.10E+00
Be-7	< 6.20E+01	< 5.90E+01	< 4.80E+01
K-40	< 8.70E+01	< 1.10E+02	< 9.90E+01
Mn-54	< 6.80E+00	< 7.50E+00	< 7.70E+00
Co-58	< 7.80E+00	< 6.10E+00	< 6.90E+00
Fe-59	< 1.30E+01	< 1.30E+01	< 1.70E+01
Co-60	< 8.40E+00	< 7.30E+00	< 7.60E+00
Zn-65	< 1.50E+01	< 1.90E+01	< 1.60E+01
Zr-95	< 1.20E+01	< 1.30E+01	< 1.00E+01
Nb-95	< 1.30E+01	< 9.00E+00	< 8.30E+00
Ru-103	< 7.10E+00	< 8.10E+00	< 6.30E+00
Ru-106	< 6.60E+01	< 6.90E+01	< 5.80E+01
Cs-134	< 6.70E+00	< 8.00E+00	< 6.60E+00
Cs-137	< 8.70E+00	< 6.40E+00	< 8.10E+00
Ba-140	< 1.30E+01	< 1.30E+01	< 1.40E+01
La-140	< 1.30E+01	< 1.30E+01	< 1.40E+01
Ce-141	< 1.10E+01	< 1.00E+01	< 8.20E+00
Ce-144	< 4.10E+01	< 3.90E+01	< 2.80E+01

Nuclide	29-APR	27-MAY	24-JUN
Sr-89	< 7.40E+00	< 6.70E+00	< 6.80E+00
Sr-90	< 1.50E+00	< 1.70E+00	< 1.40E+00
Be-7	< 3.10E+01	< 6.00E+01	< 5.00E+01
K-40	< 5.70E+01	< 9.10E+01	< 8.90E+01
Mn-54	< 3.60E+00	< 5.20E+00	< 5.00E+00
Co-58	< 3.90E+00	< 6.60E+00	< 5.90E+00
Fe-59	< 8.70E+00	< 1.50E+01	< 1.10E+01
Co-60	< 3.70E+00	< 7.10E+00	< 7.80E+00
Zn-65	< 1.20E+01	< 1.80E+01	< 1.50E+01
Zr-95	< 6.60E+00	< 1.30E+01	< 1.20E+01
Nb-95	< 6.00E+00	< 8.20E+00	< 8.60E+00
Ru-103	< 4.80E+00	< 7.30E+00	< 7.60E+00
Ru-106	< 3.30E+01	< 6.50E+01	< 6.00E+01
Cs-134	< 3.80E+00	< 6.60E+00	< 7.40E+00
Cs-137	< 3.60E+00	< 8.20E+00	< 5.90E+00
Ba-140	< 1.10E+01	< 1.30E+01	< 1.40E+01
La-140	< 1.10E+01	< 1.30E+01	< 1.40E+01
Ce-141	< 7.90E+00	< 1.10E+01	< 1.00E+01
Ce-144	< 1.90E+01	< 3.50E+01	< 3.40E+01

FERMI 2
SURFACE WATER ANALYSIS

SW-2 (Control)
(pCi/liter)

Nuclide	29-JUL	26-AUG	30-SEP
Sr-89	< 7.10E+00	< 5.10E+00	< 6.00E+00
Sr-90	< 1.50E+00	< 1.50E+00	< 9.30E-01
Be-7	< 6.30E+01	< 5.70E+01	< 4.50E+01
K-40	< 1.20E+02	< 9.30E+01	< 7.20E+01
Mn-54	< 6.90E+00	< 7.00E+00	< 5.90E+00
Co-58	< 7.60E+00	< 6.50E+00	< 6.40E+00
Fe-59	< 1.50E+01	< 1.50E+01	< 1.50E+01
Co-60	< 7.10E+00	< 7.10E+00	< 6.70E+00
Zn-65	< 1.70E+01	< 1.40E+01	< 1.40E+01
Zr-95	< 1.10E+01	< 1.00E+01	< 9.30E+00
Nb-95	< 8.20E+00	< 5.10E+00	< 6.40E+00
Ru-103	< 5.80E+00	< 7.80E+00	< 5.80E+00
Ru-106	< 6.80E+01	< 6.00E+01	< 5.00E+01
Cs-134	< 6.20E+00	< 7.00E+00	< 5.30E+00
Cs-137	< 8.40E+00	< 7.10E+00	< 6.90E+00
Ba-140	< 1.50E+01	< 1.10E+01	< 1.30E+01
La-140	< 1.50E+01	< 1.10E+01	< 1.30E+01
Ce-141	< 1.10E+01	< 9.40E+00	< 6.20E+00
Ce-144	< 3.20E+01	< 3.80E+01	< 2.30E+01

Nuclide	28-OCT	25-NOV	29-DEC
Sr-89	< 4.90E+00	< 5.50E+00	< 5.90E+00
Sr-90	< 1.20E+00	< 1.90E+00	< 1.50E+00
Be-7	< 4.30E+01	< 4.60E+01	< 5.90E+01
K-40	< 8.00E+01	< 7.50E+01	< 1.20E+02
Mn-54	< 4.90E+00	< 5.10E+00	< 8.40E+00
Co-58	< 5.10E+00	< 5.30E+00	< 7.70E+00
Fe-59	< 1.00E+01	< 1.20E+01	< 1.80E+01
Co-60	< 5.00E+00	< 6.20E+00	< 9.60E+00
Zn-65	< 1.10E+01	< 1.60E+01	< 1.60E+01
Zr-95	< 9.00E+00	< 8.60E+00	< 1.40E+01
Nb-95	< 6.10E+00	< 6.40E+00	< 9.40E+00
Ru-103	< 5.70E+00	< 6.40E+00	< 8.90E+00
Ru-106	< 4.20E+01	< 5.50E+01	< 7.10E+01
Cs-134	< 4.40E+00	< 5.50E+00	< 7.40E+00
Cs-137	< 5.10E+00	< 6.20E+00	< 8.20E+00
Ba-140	< 1.40E+01	< 1.50E+01	< 1.50E+01
La-140	< 1.40E+01	< 1.50E+01	< 1.50E+01
Ce-141	< 7.40E+00	< 8.00E+00	< 1.10E+01
Ce-144	< 2.60E+01	< 2.50E+01	< 4.10E+01

FERMI 2
SURFACE WATER ANALYSIS

SW-3 (Indicator)
(pCi/liter)

Nuclide	29-JAN				25-FEB				31-MAR			
Sr-89	<	5.10E+00			<	5.60E+00			<	5.60E+00		
Sr-90	<	1.40E+00			<	1.70E+00			<	1.70E+00		
Be-7	<	6.20E+01			<	4.40E+01			<	5.90E+01		
K-40	<	9.20E+01			<	9.40E+01			<	1.10E+02		
Mn-54	<	7.40E+00			<	7.40E+00			<	7.60E+00		
Co-58	<	7.40E+00			<	6.00E+00			<	7.80E+00		
Fe-59	<	1.50E+01			<	1.60E+01			<	1.80E+01		
Co-60	<	7.00E+00			<	6.90E+00			<	7.80E+00		
Zn-65	<	3.00E+01			<	1.60E+01			<	1.90E+01		
Zr-95	<	1.20E+01			<	1.10E+01			<	1.40E+01		
Nb-95	<	1.10E+01			<	7.00E+00			<	9.70E+00		
Ru-103	<	7.80E+00			<	5.10E+00			<	7.70E+00		
Ru-106	<	7.50E+01			<	6.50E+01			<	7.00E+01		
Cs-134	<	6.90E+00			<	6.00E+00			<	6.60E+00		
Cs-137	<	7.50E+00			<	6.40E+00			<	7.00E+00		
Ba-140	<	1.20E+01			<	1.30E+01			<	1.50E+01		
La-140	<	1.20E+01			<	1.30E+01			<	1.50E+01		
Ce-141	<	1.20E+01			<	8.70E+00			<	9.60E+00		
Ce-144	<	4.00E+01			<	2.90E+01			<	3.60E+01		

Nuclide	30-APR				27-MAY				24-JUN			
Sr-89	<	7.50E+00			<	6.50E+00			<	7.60E+00		
Sr-90	<	1.50E+00			<	1.60E+00			<	1.50E+00		
Be-7	<	6.50E+01			<	4.50E+01			<	4.70E+01		
K-40	<	1.20E+02			<	9.20E+01			<	7.10E+01		
Mn-54	<	8.30E+00			<	5.50E+00			<	6.00E+00		
Co-58	<	8.30E+00			<	6.40E+00			<	5.30E+00		
Fe-59	<	2.10E+01			<	1.40E+01			<	1.20E+01		
Co-60	<	9.90E+00			<	6.20E+00			<	5.30E+00		
Zn-65	<	1.80E+01			<	1.40E+01			<	1.30E+01		
Zr-95	<	1.30E+01			<	1.10E+01			<	1.10E+01		
Nb-95	<	1.10E+01			<	7.70E+00			<	6.70E+00		
Ru-103	<	8.30E+00			<	7.50E+00			<	6.70E+00		
Ru-106	<	8.20E+01			<	5.90E+01			<	5.00E+01		
Cs-134	<	8.60E+00			<	5.60E+00			<	5.60E+00		
Cs-137	<	7.80E+00			<	5.40E+00			<	5.20E+00		
Ba-140	<	1.30E+01			<	1.20E+01			<	1.20E+01		
La-140	<	1.30E+01			<	1.20E+01			<	1.20E+01		
Ce-141	<	1.70E+01			<	8.10E+00			<	9.00E+00		
Ce-144	<	4.00E+01			<	3.30E+01			<	3.10E+01		

FERMI 2
SURFACE WATER ANALYSIS

SW-3 (Indicator)
(pCi/liter)

Nuclide	29-JUL		26-AUG		30-SEP	
Sr-89	<	7.10E+00	<	5.30E+00	<	5.70E+00
Sr-90	<	1.50E+00	<	1.60E+00	<	9.10E-01
Be-7	<	4.10E+01	<	4.30E+01	<	6.10E+01
K-40	<	1.10E+02	<	8.60E+01	<	8.20E+01
Mn-54	<	7.70E+00	<	5.80E+00	<	7.60E+00
Co-58	<	7.10E+00	<	5.80E+00	<	7.50E+00
Fe-59	<	1.60E+01	<	1.20E+01	<	1.30E+01
Co-60	<	8.30E+00	<	6.40E+00	<	7.70E+00
Zn-65	<	1.70E+01	<	1.40E+01	<	2.80E+01
Zr-95	<	9.30E+00	<	8.50E+00	<	1.10E+01
Nb-95	<	7.60E+00	<	5.20E+00	<	1.10E+01
Ru-103	<	6.90E+00	<	5.90E+00	<	7.50E+00
Ru-106	<	7.40E+01	<	5.30E+01	<	6.40E+01
Cs-134	<	6.40E+00	<	5.30E+00	<	6.60E+00
Cs-137	<	6.60E+00	<	6.30E+00	<	7.70E+00
Ba-140	<	1.50E+01	<	1.10E+01	<	1.50E+01
La-140	<	1.50E+01	<	1.10E+01	<	1.50E+01
Ce-141	<	8.60E+00	<	7.10E+00	<	1.00E+01
Ce-144	<	3.20E+01	<	2.50E+01	<	3.90E+01

Nuclide	28-OCT		25-NOV		29-DEC	
Sr-89	<	4.90E+00	<	5.90E+00	<	6.10E+00
Sr-90	<	1.20E+00	<	2.00E+00	<	1.60E+00
Be-7	<	5.90E+01	<	4.10E+01	<	5.00E+01
K-40	<	8.20E+01	<	7.90E+01	<	8.70E+01
Mn-54	<	5.60E+00	<	4.80E+00	<	7.00E+00
Co-58	<	5.20E+00	<	4.70E+00	<	7.30E+00
Fe-59	<	1.10E+01	<	1.00E+01	<	1.70E+01
Co-60	<	6.20E+00	<	5.50E+00	<	7.10E+00
Zn-65	<	1.20E+01	<	1.70E+01	<	1.50E+01
Zr-95	<	8.70E+00	<	8.00E+00	<	1.20E+01
Nb-95	<	5.40E+00	<	5.80E+00	<	6.60E+00
Ru-103	<	6.90E+00	<	5.10E+00	<	6.40E+00
Ru-106	<	4.30E+01	<	4.70E+01	<	6.40E+01
Cs-134	<	6.20E+00	<	4.50E+00	<	6.40E+00
Cs-137	<	5.70E+00	<	4.80E+00	<	6.70E+00
Ba-140	<	1.20E+01	<	1.40E+01	<	1.30E+01
La-140	<	1.20E+01	<	1.40E+01	<	1.30E+01
Ce-141	<	7.60E+00	<	7.60E+00	<	8.00E+00
Ce-144	<	2.70E+01	<	1.80E+01	<	2.90E+01

FERMI 2
DRINKING AND SURFACE WATER
QUARTERLY COMPOSITE SAMPLES

Tritium
(pCi/liter)

Station	First Quarter				Second Quarter			
DW-1	<	4.30E+02			<	4.50E+02		
DW-2	<	4.30E+02			<	4.50E+02		
SW-2	<	4.30E+02			<	4.40E+02		
SW-3	<	4.30E+02			<	4.50E+02		

Station	Third Quarter				Fourth Quarter			
DW-1	<	4.10E+02			<	4.00E+02		
DW-2	<	4.10E+02			<	4.00E+02		
SW-2	<	4.10E+02			<	4.00E+02		
SW-3	<	4.10E+02			<	4.00E+02		

FERMI 2
GROUNDWATER ANALYSIS

GW-1 (Indicator)
(pCi/liter)

Nuclide	First Quarter	Second Quarter
Be-7	< 5.00E+01	< 6.40E+01
K-40	< 1.00E+02	< 8.60E+01
Mn-54	< 7.30E+00	< 5.50E+00
Co-58	< 6.80E+00	< 6.80E+00
Fe-59	< 1.30E+01	< 1.70E+01
Co-60	< 9.60E+00	< 6.60E+00
Zn-65	< 1.80E+01	< 1.70E+01
Zr-95	< 1.00E+01	< 1.30E+01
Nb-95	< 6.60E+00	< 8.70E+00
Ru-103	< 6.60E+00	< 7.20E+00
Ru-106	< 6.60E+01	< 7.50E+01
Cs-134	< 5.70E+00	< 7.20E+00
Cs-137	< 7.10E+00	< 6.50E+00
Ba-140	< 1.50E+01	< 1.40E+01
La-140	< 1.50E+01	< 1.40E+01
Ce-141	< 7.90E+00	< 1.10E+01
Ce-144	< 3.00E+01	< 3.70E+01
H-3	< 4.30E+02	< 4.20E+02

Nuclide	Third Quarter	Fourth Quarter
Be-7	< 3.50E+01	< 5.40E+01
K-40	< 6.80E+01	< 9.00E+01
Mn-54	< 4.00E+00	< 6.40E+00
Co-58	< 4.60E+00	< 7.40E+00
Fe-59	< 9.20E+00	< 1.30E+01
Co-60	< 4.40E+00	< 8.90E+00
Zn-65	< 9.30E+00	< 2.60E+01
Zr-95	< 7.10E+00	< 1.10E+01
Nb-95	< 5.00E+00	< 6.80E+00
Ru-103	< 4.30E+00	< 6.50E+00
Ru-106	< 3.70E+01	< 5.80E+01
Cs-134	< 3.90E+00	< 6.00E+00
Cs-137	< 4.00E+00	< 6.60E+00
Ba-140	< 1.30E+01	< 1.30E+01
La-140	< 1.30E+01	< 1.30E+01
Ce-141	< 9.00E+00	< 8.50E+00
Ce-144	< 1.80E+01	< 2.90E+01
H-3	< 2.40E+02	< 3.90E+02

FERMI 2
GROUNDWATER ANALYSIS

GW-2 (Indicator)
(pCi/liter)

Nuclide	First Quarter				Second Quarter			
Be-7	<	5.00E+01			<	5.80E+01		
K-40	<	8.60E+01			<	1.10E+02		
Mn-54	<	5.90E+00			<	7.60E+00		
Co-58	<	6.10E+00			<	6.80E+00		
Fe-59	<	1.40E+01			<	1.50E+01		
Co-60	<	8.60E+00			<	8.70E+00		
Zn-65	<	2.60E+01			<	1.80E+01		
Zr-95	<	9.60E+00			<	1.30E+01		
Nb-95	<	9.90E+00			<	9.30E+00		
Ru-103	<	6.50E+00			<	8.70E+00		
Ru-106	<	5.90E+01			<	6.70E+01		
Cs-134	<	6.00E+00			<	7.60E+00		
Cs-137	<	6.60E+00			<	8.00E+00		
Ba-140	<	1.40E+01			<	1.40E+01		
La-140	<	1.40E+01			<	1.40E+01		
Ce-141	<	7.90E+00			<	1.10E+01		
Ce-144	<	2.80E+01			<	3.80E+01		
H-3	<	4.30E+02			<	4.30E+02		

Nuclide	Third Quarter				Fourth Quarter			
Be-7	<	3.10E+01			<	6.00E+01		
K-40	<	7.00E+01				9.60E+01	+/-	2.40E+01
Mn-54	<	3.50E+00			<	7.20E+00		
Co-58	<	4.40E+00			<	7.20E+00		
Fe-59	<	9.10E+00			<	1.50E+01		
Co-60	<	4.30E+00			<	8.60E+00		
Zn-65	<	1.50E+01			<	1.80E+01		
Zr-95	<	7.20E+00			<	1.30E+01		
Nb-95	<	4.50E+00			<	8.60E+00		
Ru-103	<	4.20E+00			<	8.00E+00		
Ru-106	<	3.70E+01			<	6.10E+01		
Cs-134	<	3.50E+00			<	7.20E+00		
Cs-137	<	3.90E+00			<	7.20E+00		
Ba-140	<	1.10E+01			<	1.30E+01		
La-140	<	1.10E+01			<	1.30E+01		
Ce-141	<	4.60E+00			<	1.10E+01		
Ce-144	<	1.80E+01			<	4.10E+01		
H-3	<	2.30E+02			<	3.90E+02		

FERMI 2
GROUNDWATER ANALYSIS

GW-3 (Indicator)
(pCi/liter)

Nuclide	First Quarter				Second Quarter			
Be-7	<	5.40E+01			<	4.80E+01		
K-40	<	9.70E+01			<	8.70E+01		
Mn-54	<	5.40E+00			<	6.40E+00		
Co-58	<	5.60E+00			<	7.10E+00		
Fe-59	<	1.10E+01			<	1.40E+01		
Co-60	<	7.90E+00			<	6.20E+00		
Zn-65	<	2.00E+01			<	2.30E+01		
Zr-95	<	1.20E+01			<	1.30E+01		
Nb-95	<	7.60E+00			<	8.50E+00		
Ru-103	<	6.90E+00			<	7.60E+00		
Ru-106	<	6.50E+01			<	6.40E+01		
Cs-134	<	8.40E+00			<	6.00E+00		
Cs-137	<	7.40E+00			<	5.20E+00		
Ba-140	<	1.40E+01			<	1.50E+01		
La-140	<	1.40E+01			<	1.50E+01		
Ce-141	<	8.10E+00			<	8.70E+00		
Ce-144	<	2.90E+01			<	3.60E+01		
H-3	<	4.20E+02			<	4.30E+02		

Nuclide	Third Quarter				Fourth Quarter			
Be-7	<	3.00E+01			<	5.20E+01		
K-40	<	6.10E+01			<	9.50E+01		
Mn-54	<	3.40E+00			<	7.70E+00		
Co-58	<	4.00E+00			<	6.80E+00		
Fe-59	<	9.80E+00			<	1.40E+01		
Co-60	<	4.50E+00			<	8.40E+00		
Zn-65	<	8.90E+00			<	2.10E+01		
Zr-95	<	5.70E+00			<	1.10E+01		
Nb-95	<	4.50E+00			<	6.50E+00		
Ru-103	<	3.90E+00			<	8.00E+00		
Ru-106	<	3.00E+01			<	6.00E+01		
Cs-134	<	3.30E+00			<	6.40E+00		
Cs-137	<	3.60E+00			<	8.30E+00		
Ba-140	<	1.30E+01			<	1.40E+01		
La-140	<	1.30E+01			<	1.40E+01		
Ce-141	<	5.20E+00			<	8.10E+00		
Ce-144	<	1.50E+01			<	3.10E+01		
H-3	<	2.40E+02			<	3.90E+02		

FERMI 2
GROUNDWATER ANALYSIS

GW-4 (Control)
(pCi/liter)

Nuclide	First Quarter		Second Quarter	
Be-7	<	5.70E+01	<	4.50E+01
K-40	<	1.10E+02	<	8.20E+01
Mn-54	<	7.40E+00	<	4.40E+00
Co-58	<	6.20E+00	<	5.00E+00
Fe-59	<	1.70E+01	<	1.10E+01
Co-60	<	8.10E+00	<	5.90E+00
Zn-65	<	1.60E+01	<	1.10E+01
Zr-95	<	1.30E+01	<	8.10E+00
Nb-95	<	8.70E+00	<	6.30E+00
Ru-103	<	8.60E+00	<	5.30E+00
Ru-106	<	7.00E+01	<	4.40E+01
Cs-134	<	7.90E+00	<	4.60E+00
Cs-137	<	7.40E+00	<	5.40E+00
Ba-140	<	1.20E+01	<	1.40E+01
La-140	<	1.20E+01	<	1.40E+01
Ce-141	<	1.00E+01	<	6.30E+00
Ce-144	<	3.50E+01	<	2.20E+01
H-3	<	4.30E+02	<	4.30E+02

Nuclide	Third Quarter		Fourth Quarter	
Be-7	<	3.10E+01	<	6.00E+01
K-40	<	5.90E+01	<	1.20E+02
Mn-54	<	3.50E+00	<	7.00E+00
Co-58	<	3.30E+00	<	7.20E+00
Fe-59	<	9.00E+00	<	1.60E+01
Co-60	<	4.20E+00	<	8.60E+00
Zn-65	<	1.30E+01	<	2.00E+01
Zr-95	<	7.00E+00	<	1.20E+01
Nb-95	<	4.50E+00	<	8.90E+00
Ru-103	<	4.00E+00	<	6.90E+00
Ru-106	<	3.10E+01	<	6.70E+01
Cs-134	<	3.50E+00	<	7.40E+00
Cs-137	<	3.70E+00	<	7.50E+00
Ba-140	<	1.30E+01	<	1.30E+01
La-140	<	1.30E+01	<	1.30E+01
Ce-141	<	5.20E+00	<	9.10E+00
Ce-144	<	1.60E+01	<	2.90E+01
H-3	<	3.80E+02	<	4.00E+02

FERMI 2
SEDIMENT ANALYSIS

S-1 (Indicator)
(pCi/kg dry)

Nuclide	28-MAY				9-NOV			
Sr-89	<	1.70E+02			<	2.00E+02		
Sr-90	<	1.50E+02			<	1.80E+02		
Be-7	<	1.30E+02			<	1.80E+02		
K-40		1.40E+04	+/-	2.70E+02		8.98E+03	+/-	2.90E+02
Mn-54	<	1.70E+01			<	2.00E+01		
Co-58	<	1.60E+01			<	2.00E+01		
Fe-59	<	4.20E+01			<	5.00E+01		
Co-60	<	1.80E+01			<	2.10E+01		
Zn-65	<	7.70E+01			<	9.30E+01		
Nb-95	<	3.10E+01			<	4.10E+01		
Zr-95	<	2.00E+01			<	2.20E+01		
Ru-103	<	1.70E+01			<	2.00E+01		
Ru-106	<	1.30E+02			<	1.40E+02		
Cs-134	<	1.60E+01			<	2.00E+01		
Cs-137	<	1.70E+01			<	1.90E+01		
Ba-140	<	8.20E+01			<	1.40E+02		
La-140	<	4.70E+01			<	7.20E+01		
Ce-141	<	2.90E+01			<	3.40E+01		
Ce-144	<	1.10E+02			<	1.10E+02		

S-2 (Indicator)
(pCi/kg dry)

Nuclide	28-MAY				9-NOV			
Sr-89	<	2.00E+02			<	2.70E+02		
Sr-90	<	1.90E+02			<	2.40E+02		
Be-7	<	5.70E+02			<	2.90E+02		
K-40		2.22E+04	+/-	8.20E+02		1.09E+04	+/-	5.30E+02
Mn-54	<	7.80E+01			<	4.00E+01		
Co-58	<	7.30E+01			<	4.60E+01		
Fe-59	<	2.00E+02			<	1.20E+02		
Co-60	<	7.50E+01			<	4.00E+01		
Zn-65	<	3.10E+02			<	2.30E+02		
Zr-95	<	1.30E+02			<	6.60E+01		
Nb-95	<	9.40E+01			<	5.10E+01		
Ru-103	<	7.50E+01			<	4.40E+01		
Ru-106	<	5.80E+02			<	3.40E+02		
Cs-134	<	7.10E+01			<	3.60E+01		
Cs-137	<	7.20E+01			<	5.00E+01		
Ba-140	<	4.00E+02			<	2.40E+02		
La-140	<	2.40E+02			<	1.20E+02		
Ce-141	<	1.30E+02			<	6.60E+01		
Ce-144	<	4.20E+02			<	2.20E+02		

FERMI 2
SEDIMENT ANALYSIS

S-3 (Indicator)
(pCi/kg dry)

Nuclide	19-MAY				19-NOV			
Sr-89	<	2.70E+02			<	1.20E+02		
Sr-90		4.46E+02	+/-	7.60E+01	<	1.00E+02		
Be-7	<	2.00E+02			<	3.20E+02		
K-40		3.84E+03	+/-	1.30E+02		1.21E+04	+/-	5.40E+02
Mn-54	<	1.80E+01			<	3.40E+01		
Co-58	<	1.90E+01			<	3.80E+01		
Fe-59	<	4.40E+01			<	9.90E+01		
Co-60	<	1.70E+01			<	3.90E+01		
Zn-65	<	6.80E+01			<	1.20E+02		
Zr-95	<	3.50E+01			<	7.00E+01		
Nb-95	<	2.90E+01			<	4.30E+01		
Ru-103	<	2.30E+01			<	3.80E+01		
Ru-106	<	1.50E+02			<	3.20E+02		
Cs-134	<	2.40E+01			<	3.90E+01		
Cs-137	<	1.60E+01			<	3.50E+01		
Ba-140	<	1.80E+02			<	2.00E+02		
La-140	<	8.60E+01			<	1.10E+02		
Ce-141	<	3.50E+01			<	5.20E+01		
Ce-144	<	8.80E+01			<	1.60E+02		

S-4 (Indicator)
(pCi/kg dry)

Nuclide	2-JUN				12-NOV			
Sr-89	<	2.00E+02			<	2.30E+02		
Sr-90	<	2.10E+02			<	2.20E+02		
Be-7	<	1.40E+02			<	2.40E+02		
K-40		9.02E+03	+/-	3.10E+02		1.12E+04	+/-	3.90E+02
Mn-54	<	2.00E+01			<	2.40E+01		
Co-58	<	2.20E+01			<	2.60E+01		
Fe-59	<	5.70E+01			<	6.40E+01		
Co-60	<	2.10E+01			<	2.80E+01		
Zn-65	<	6.80E+01			<	1.20E+02		
Zr-95	<	3.10E+01			<	4.70E+01		
Nb-95	<	3.10E+01			<	3.40E+01		
Ru-103	<	1.60E+01			<	2.50E+01		
Ru-106	<	1.60E+02			<	1.90E+02		
Cs-134	<	1.60E+01			<	3.00E+01		
Cs-137	<	2.40E+01			<	2.40E+01		
Ba-140	<	8.60E+01			<	1.50E+02		
La-140	<	4.50E+01			<	8.10E+01		
Ce-141	<	2.40E+01			<	4.50E+01		
Ce-144	<	9.50E+01			<	1.60E+02		

FERMI 2
SEDIMENT ANALYSIS

S-5 (Control)
(pCi/kg dry)

Nuclide	19-MAY				9-NOV			
Sr-89	<	2.80E+02			<	1.40E+02		
Sr-90	<	2.70E+02			<	1.30E+02		
Be-7	<	4.60E+02				6.90E+02	+/-	2.00E+02
K-40		1.10E+04	+/-	6.10E+02		1.54E+04	+/-	8.60E+02
Mn-54	<	5.30E+01			<	6.30E+01		
Co-58	<	5.40E+01			<	4.40E+01		
Fe-59	<	1.50E+02			<	2.30E+02		
Co-60	<	5.60E+01			<	8.40E+01		
Zn-65	<	2.30E+02			<	2.20E+02		
Zr-95	<	9.40E+01			<	1.10E+02		
NB-95	<	6.60E+01			<	8.80E+01		
Ru-103	<	7.00E+01			<	5.50E+01		
Ru-106	<	4.10E+02			<	4.60E+02		
Cs-134	<	7.00E+01			<	1.40E+02		
Cs-137	<	4.60E+01			<	7.40E+01		
Ba-140	<	5.60E+02			<	4.00E+02		
La-140	<	3.30E+02			<	2.40E+02		
Ce-141	<	1.20E+02			<	1.00E+02		
Ce-144	<	3.60E+02			<	3.40E+02		

FERMI 2
FISH ANALYSIS

F-1 (Control)
(pCi/kg wet)

Nuclide	19-MAY Crappie				19-MAY White Perch				19-MAY Yellow Perch			
Sr-89	<	2.70E+02			<	2.00E+02			<	1.80E+02		
Sr-90	<	2.40E+02			<	1.80E+02			<	1.60E+02		
Be-7	<	8.50E+02			<	4.50E+02			<	3.70E+02		
K-40		3.16E+03	+/-	5.70E+02		2.84E+03	+/-	3.10E+02		2.85E+03	+/-	4.00E+02
Mn-54	<	9.50E+01			<	3.50E+01			<	5.80E+01		
Co-58	<	1.10E+02			<	3.60E+01			<	4.60E+01		
Fe-59	<	2.40E+02			<	1.10E+02			<	1.50E+02		
Co-60	<	1.00E+02			<	4.40E+01			<	4.30E+01		
Zn-65	<	2.30E+02			<	1.00E+02			<	1.30E+02		
Zr-95	<	1.60E+02			<	8.30E+01			<	8.70E+01		
Nb-95	<	1.30E+02			<	4.30E+01			<	6.00E+01		
Ru-103	<	9.40E+02			<	3.60E+02			<	4.30E+02		
Ru-106	<	8.40E+01			<	4.00E+01			<	3.80E+01		
Cs-134	<	9.60E+01			<	3.20E+01			<	5.20E+01		
Cs-137	<	4.10E+02			<	2.20E+02			<	2.50E+02		
Ba-140	<	4.10E+02			<	2.20E+02			<	2.50E+02		
La-140	<	1.70E+02			<	6.90E+01			<	7.80E+01		
Ce-141	<	4.00E+02			<	2.10E+02			<	1.90E+02		
Ce-144	<	2.70E+02			<	2.00E+02			<	1.80E+02		

Nuclide	10-NOV Shad				10-NOV Rock Bass				10-NOV Steel Head			
Sr-89	<	1.10E+02			<	2.10E+02			<	1.00E+02		
Sr-90	<	9.30E+01			<	1.70E+02			<	8.50E+01		
Be-7	<	5.80E+02			<	7.70E+02			<	7.10E+02		
K-40		2.90E+03	+/-	5.70E+02		2.99E+03	+/-	5.70E+02		2.69E+03	+/-	5.90E+02
Mn-54	<	4.90E+01			<	9.80E+01			<	6.70E+01		
Co-58	<	7.90E+01			<	1.10E+02			<	9.70E+01		
Fe-59	<	1.20E+02			<	2.50E+02			<	1.30E+02		
Co-60	<	9.30E+01			<	1.10E+02			<	9.60E+01		
Zn-65	<	2.30E+02			<	2.60E+02			<	2.40E+02		
Zr-95	<	1.70E+02			<	1.70E+02			<	1.70E+02		
Nb-95	<	6.90E+01			<	1.10E+02			<	6.60E+01		
Ru-103	<	7.80E+02			<	7.20E+02			<	7.00E+02		
Ru-106	<	8.10E+01			<	1.00E+02			<	7.50E+01		
Cs-134	<	8.30E+01			<	1.00E+02			<	9.40E+01		
Cs-137	<	1.80E+02			<	4.00E+02			<	2.50E+02		
Ba-140	<	1.80E+02			<	4.00E+02			<	2.50E+02		
La-140	<	1.10E+02			<	1.20E+02			<	9.90E+01		
Ce-141	<	3.20E+02			<	3.40E+02			<	3.10E+02		
Ce-144	<	1.10E+02			<	2.10E+02			<	1.00E+02		

FERMI 2
FISH ANALYSIS

F-2 (Indicator)
(pCi/kg wet)

Nuclide	14-May Sucker				14-MAY Sun Bass				14-MAY Walleye			
Sr-89	<	1.50E+02			<	1.60E+02			<	1.70E+02		
Sr-90	<	1.30E+02			<	1.30E+02			<	1.40E+02		
Be-7	<	4.60E+02			<	3.40E+02			<	3.40E+02		
K-40		2.57E+03	+/-	2.90E+02		2.49E+03	+/-	3.20E+02		2.83E+03	+/-	4.10E+02
Mn-54	<	3.90E+01			<	4.90E+01			<	5.90E+01		
Co-58	<	5.00E+01			<	5.20E+01			<	6.30E+01		
Fe-59	<	1.30E+02			<	1.50E+02			<	1.90E+02		
Co-60	<	4.20E+01			<	4.20E+01			<	5.60E+01		
Zn-65	<	1.20E+02			<	1.20E+02			<	9.50E+01		
Zr-95	<	8.10E+01			<	8.70E+01			<	1.10E+02		
Nb-95	<	5.90E+01			<	6.90E+01			<	3.80E+01		
Ru-103	<	3.40E+02			<	4.50E+02			<	5.70E+02		
Ru-106	<	4.50E+01			<	3.00E+01			<	4.40E+01		
Cs-134	<	3.10E+01			<	3.80E+01			<	5.00E+01		
Cs-137	<	3.20E+02			<	3.20E+02			<	2.60E+02		
Ba-140	<	3.20E+02			<	3.20E+02			<	2.60E+02		
La-140	<	9.50E+01			<	9.10E+01			<	1.00E+02		
Ce-141	<	1.80E+02			<	2.00E+02			<	1.90E+02		
Ce-144	<	1.50E+02			<	1.60E+02			<	1.70E+02		

Nuclide	14-MAY White Perch				22-OCT Muskellunge				22-OCT Walleye			
Sr-89	<	2.70E+02			<	2.20E+02			<	1.40E+02		
Sr-90	<	2.20E+02			<	1.40E+02			<	9.10E+01		
Be-7	<	5.10E+02			<	9.00E+02			<	6.00E+02		
K-40		2.33E+03	+/-	4.00E+02		3.64E+03	+/-	6.70E+02		3.40E+03	+/-	4.70E+02
Mn-54	<	3.80E+01			<	8.00E+01			<	7.10E+01		
Co-58	<	5.60E+01			<	1.10E+02			<	8.00E+01		
Fe-59	<	1.90E+02			<	2.10E+02			<	2.00E+02		
Co-60	<	5.50E+01			<	7.10E+01			<	6.00E+01		
Zn-65	<	1.40E+02			<	2.50E+02			<	2.30E+02		
Zr-95	<	1.50E+02			<	1.90E+02			<	1.80E+02		
Nb-95	<	8.00E+01			<	1.20E+02			<	9.30E+01		
Ru-103	<	4.60E+02			<	5.60E+02			<	4.60E+02		
Ru-106	<	5.40E+01			<	6.90E+01			<	9.80E+01		
Cs-134	<	5.30E+01			<	7.30E+01			<	6.50E+01		
Cs-137	<	4.20E+02			<	6.40E+02			<	5.40E+02		
Ba-140	<	4.20E+02			<	6.40E+02			<	5.40E+02		
La-140	<	9.10E+01			<	1.60E+02			<	1.40E+02		
Ce-141	<	2.00E+02			<	2.60E+02			<	3.40E+02		
Ce-144	<	2.70E+02			<	2.20E+02			<	1.40E+02		

FERMI 2
FISH ANALYSIS

F-2 (Indicator)
(pCi/kg wet)

Nuclide	22-OCT White Perch			
Sr-89	<	1.90E+02		
Sr-90	<	1.20E+02		
Be-7	<	9.30E+02		
K-40		1.92E+03	+/-	5.60E+02
Mn-54	<	1.10E+02		
Co-58	<	1.10E+02		
Fe-59	<	2.60E+02		
Co-60	<	7.40E+01		
Zn-65	<	2.40E+02		
Zr-95	<	2.30E+02		
Nb-95	<	1.20E+02		
Ru-103	<	1.00E+03		
Ru-106	<	9.20E+01		
Cs-134	<	9.30E+01		
Cs-137	<	6.60E+02		
Ba-140	<	6.60E+02		
La-140	<	1.70E+02		
Ce-141	<	1.90E+02		
Ce-144	<	1.20E+02		

FERMI 2
FISH ANALYSIS

F-3 (Control)
(pCi/kg wet)

Nuclide	15-MAY Catfish				15-MAY Drum				15-MAY Sucker			
Sr-89	<	1.90E+02			<	2.30E+02			<	2.60E+02		
Sr-90	<	1.40E+02			<	1.50E+02			<	1.70E+02		
Be-7	<	5.00E+02			<	8.70E+02			<	6.10E+02		
K-40		2.19E+03	+/-	4.60E+02		2.10E+03	+/-	5.20E+02		2.64E+03	+/-	4.40E+02
Mn-54	<	7.20E+01			<	8.30E+01			<	7.80E+01		
Co-58	<	6.90E+01			<	1.10E+02			<	7.30E+01		
Fe-59	<	2.30E+02			<	2.50E+02			<	2.50E+02		
Co-60	<	8.80E+01			<	1.20E+02			<	8.20E+01		
Zn-65	<	1.30E+02			<	2.40E+02			<	1.90E+02		
Zr-95	<	1.10E+02			<	1.90E+02			<	1.50E+02		
Nb-95	<	7.80E+01			<	1.20E+02			<	7.70E+01		
Ru-103	<	6.20E+02			<	6.70E+02			<	5.90E+02		
Ru-106	<	5.50E+01			<	8.60E+01			<	6.60E+01		
Cs-134	<	7.50E+01			<	8.10E+01			<	7.40E+01		
Cs-137	<	5.00E+02			<	3.70E+02			<	3.80E+02		
Ba-140	<	5.00E+02			<	3.70E+02			<	3.80E+02		
La-140	<	1.00E+02			<	1.30E+02			<	1.20E+02		
Ce-141	<	2.50E+02			<	3.00E+02			<	2.40E+02		
Ce-144	<	1.90E+02			<	2.30E+02			<	2.60E+02		

Nuclide	15-MAY Sun Bass				15-MAY Walleye				15-MAY White Perch			
Sr-89	<	1.70E+02			<	2.50E+02			<	2.40E+02		
Sr-90	<	1.20E+02			<	1.60E+02			<	1.60E+02		
Be-7	<	5.20E+02			<	4.30E+02			<	6.30E+02		
K-40		2.96E+03	+/-	3.40E+02		2.72E+03	+/-	5.00E+02		2.72E+03	+/-	3.70E+02
Mn-54	<	6.10E+01			<	6.30E+01			<	4.20E+01		
Co-58	<	4.80E+01			<	5.20E+01			<	7.50E+01		
Fe-59	<	1.40E+02			<	2.20E+02			<	1.60E+02		
Co-60	<	5.40E+01			<	5.40E+01			<	5.50E+01		
Zn-65	<	1.00E+02			<	1.90E+02			<	1.10E+02		
Zr-95	<	1.10E+02			<	1.10E+02			<	1.10E+02		
Nb-95	<	6.80E+01			<	1.00E+02			<	6.90E+01		
Ru-103	<	4.20E+02			<	6.20E+02			<	3.90E+02		
Ru-106	<	5.00E+01			<	6.60E+01			<	5.00E+01		
Cs-134	<	4.00E+01			<	7.90E+01			<	5.30E+01		
Cs-137	<	2.60E+02			<	4.40E+02			<	3.00E+02		
Ba-140	<	2.60E+02			<	4.40E+02			<	3.00E+02		
La-140	<	1.00E+02			<	1.00E+02			<	1.10E+02		
Ce-141	<	2.40E+02			<	2.60E+02			<	2.60E+02		
Ce-144	<	1.70E+02			<	2.50E+02			<	2.40E+02		

FERMI 2
FISH ANALYSIS

F-3 (Control)
(pCi/kg wet)

Nuclide	4-NOV Sucker				4- NOV Walleye				4-NOV Yellow Perch			
Sr-89	<	1.50E+02			<	1.40E+02			<	1.80E+02		
Sr-90	<	1.10E+02			<	1.00E+02			<	1.30E+02		
Be-7	<	5.50E+02			<	7.00E+02			<	5.50E+02		
K-40		2.15E+03	+/-	4.30E+02		2.22E+03	+/-	5.10E+02		2.83E+03	+/-	4.30E+02
Mn-54	<	6.10E+01			<	6.40E+01			<	6.70E+01		
Co-58	<	8.40E+01			<	1.00E+02			<	7.90E+01		
Fe-59	<	1.60E+02			<	1.90E+02			<	1.80E+02		
Co-60	<	7.30E+01			<	7.00E+01			<	7.70E+01		
Zn-65	<	1.80E+02			<	2.00E+02			<	2.00E+02		
Zr-95	<	1.50E+02			<	1.40E+02			<	1.30E+02		
Nb-95	<	7.70E+01			<	6.00E+01			<	8.10E+01		
Ru-103	<	3.80E+02			<	6.10E+02			<	6.40E+02		
Ru-106	<	4.40E+01			<	8.40E+01			<	5.40E+01		
Cs-134	<	5.20E+01			<	7.30E+01			<	7.40E+01		
Cs-137	<	2.20E+02			<	2.20E+02			<	2.40E+02		
Ba-140	<	2.20E+02			<	2.20E+02			<	2.40E+02		
La-140	<	8.60E+01			<	1.10E+02			<	8.70E+01		
Ce-141	<	2.00E+02			<	3.50E+02			<	2.30E+02		
Ce-144	<	1.50E+02			<	1.40E+02			<	1.80E+02		

Appendix D

Environmental Program Exceptions

Environmental Program Exceptions

On occasions, samples cannot be collected. This can be due to a variety of events, such as equipment malfunction, loss of electrical power, severe weather conditions, or vandalism. In 2009, missed samples were a result of missing field TLDs and air sampling equipment failure. The following sections list all missed samples, changes and corrective actions taken during 2009. These missed samples did not have a significant impact on the execution of the REMP.

Direct Radiation Monitoring

All TLDs are placed in the field in inconspicuous locations to minimize the loss of TLDs due to vandalism. During 2009, two hundred eighty-four (284) TLDs were placed in the field for the REMP program and all but four (4) TLDs were collected and processed.

- T-2 was found missing during the first quarter collection and was replaced with the next quarter's TLD.
- T-56 was found missing during the first quarter collection and was replaced with the next quarter's TLD.
- T-65 was unobtainable during the second and third quarters due to Independent Spent Fuel Storage Installation (ISFSI) pad construction.

Atmospheric Monitoring

During 2009, two hundred sixty (260) air samples were placed in the field and all but one (1) particulate filter and charcoal filter was collected and processed. There were no changes to the Atmospheric Monitoring program during 2009.

- On 2/25/2009, air sample located at API-4 was not collected due to pump failure. Air sampling equipment was replaced with a spare sampler. For this reason, the first quarter composite sample is considered less than representative.

Terrestrial Monitoring - None

Milk Sampling - None

Garden Sampling - None

Groundwater Sampling - None

Aquatic Monitoring - None

Drinking Water Sampling - None

Surface Water Sampling - None

Sediment Sampling

All scheduled sediment samples were collected in 2009. On 12/02/09, Radiological Engineering was notified by the REMP vendor analysis Lab (Areva NP Inc.) that iodine - 131 was detected in the sediment sample collected at location S-5 on 11/9/09. Location S-5 is located approximately 15 miles north and upstream from Fermi 2 Power Plant near Trenton Channel Power Plant. Due to the distance and flow direction S-5 is designated as the control or background sample and is considered to be unaffected by Fermi 2 operations. The iodine-131 was determined to be the result of effluent from the city of Trenton's municipal wastewater treatment facility as a result of nuclear medicine.

Fish Sampling - None

Appendix E

Interlaboratory Comparison Data
Areva NP Inc. Environmental Laboratory's
Quality Assurance Programs

Interlaboratory Comparison Program for 2009

In an interlaboratory comparison program, participant laboratories receive from a commerce source, environmental samples of known activity concentration for analysis. After the samples have been analyzed by the laboratory, the manufacturer of the sample reports the known activity concentration of the samples to the laboratory. The laboratory compares its results to the reported concentrations to determine any significant deviations, investigates such deviations if found, and initiates corrective action if necessary. Participation in this program provides assurance that the contract laboratory is capable of meeting accepted criteria for radioactivity analysis. The following is Areva NP Inc.'s participation in an interlaboratory comparison program.

AREVA

March 02, 2010
EL 034/10

TO: Distribution

FROM: J. M. Raimondi

SUBJECT: AREVA NP Environmental Laboratory
Annual Quality Assurance Report for Environmental Analyses
(January – December 2009)

Attached is the AREVA NP Environmental Laboratory (E-LAB) annual quality assurance report covering Environmental Analyses. This report includes analytical Quality Control (QC) programs in support of client Radiological Environmental Monitoring Programs (REMP), analysis of additional radionuclides in environmental samples that are typically outside the REMP scope, and QC of environmental Thermoluminescent Dosimetry (TLD). QC programs associated with the analysis of effluent samples (10CFR 50), waste samples (10CFR61), bioassay samples, and personnel dosimetry are included in separate reports.

For Radiological Environmental Monitoring Programs (REMP):

- 99.2% of 904 individual QC analyses evaluated during this annual period met E-LAB acceptance criteria for bias.
- 99.0% of 705 QC analyses met the Laboratory QC acceptance criteria for precision.

For All Environmental Analyses:

- 99.1% of 923 individual QC analyses evaluated during this annual period met E-LAB acceptance criteria for bias.
- 99.1% of 765 QC analyses met the Laboratory QC acceptance criteria for precision.

The AREVA NP Environmental Laboratory (ID# 11823) maintained accreditation for six radiological analytes in the potable and non-potable water categories from the State of New York Department of Health under the National Environmental Laboratory Accreditation Program (NELAP). A total of 18 out of the 18 Proficiency Test results were rated "Acceptable" this period.

For Environmental Dosimetry:

- 100% of the 84 individual environmental dosimeters met E-LAB acceptance criteria for bias and precision.
- 100% of the 14 mean dosimeter responses met E-LAB acceptance criteria for bias.

Please contact Cynthia Harrington at (508) 573-6660 or me at (508) 573-6651 if you have any questions.

Jeffrey M Raimondi

J. M. Raimondi
Manager, Environmental Laboratory

CLH/kem
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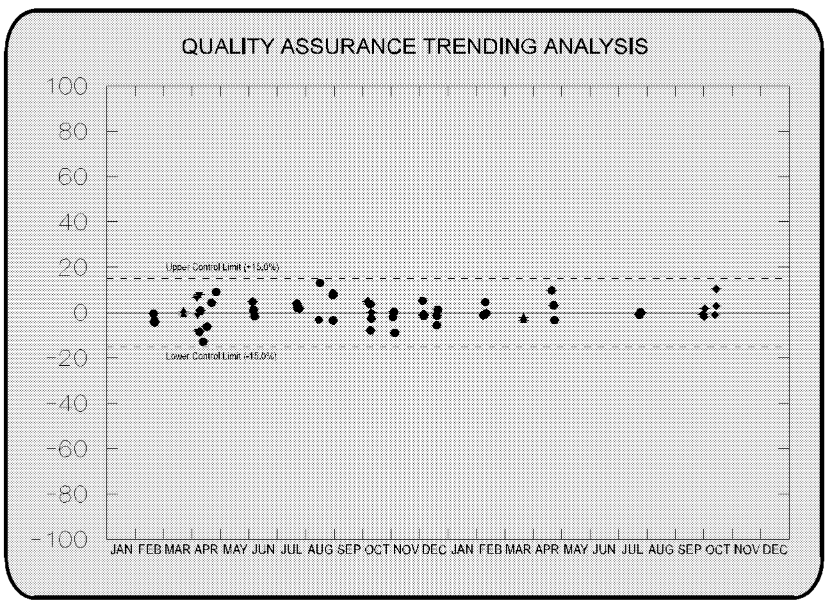
ANNUAL QUALITY ASSURANCE STATUS REPORT

For Environmental Analyses
January - December 2009



AREVA NP Inc.
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ENVIRONMENTAL LABORATORY

ANNUAL QUALITY ASSURANCE STATUS REPORT

FOR ENVIRONMENTAL ANALYSES

JANUARY – DECEMBER 2009

EL 034/10

Prepared By: ______________________ Date: 03/02/10

Approved By: ______________________ Date: 3/2/10

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I. INTRODUCTION

This report covers the Quality Assurance (QA) Program for the environmental monitoring aspects of the AREVA NP Environmental Laboratory (E-LAB) for 2009. The AREVA NP Environmental Laboratory QA Program is designed to monitor the quality of analytical processing associated with environmental, bioassay, effluent (10CFR Part 50), and waste (10CFR Part 61) sample analysis, as well as dosimetry processing. Due to the broad scope of quality control programs in which the E-LAB participates, this report covers only the following categories: Radiological Environmental Monitoring Program (REMP) analyses, additional environmental analyses that are outside the typical REMP scope, and direct radiation monitoring using environmental Thermoluminescent Dosimeters (TLDs). QA activities associated with waste analyses (10CFR 61), effluent analyses (10CFR 50), bioassay analyses, and personnel dosimetry are presented in separate reports.

This report includes:

- Intra-laboratory QC results analyzed during the reporting period.
- Inter-laboratory QC results, analyzed prior to the reporting period, for which "known values" were not previously available.
- Inter-laboratory QC results, analyzed during the reporting period, for which "known values" were available.

Any other inter-laboratory QC results for which performance results are not available will be included in the next annual report.

Manual 100, "Laboratory Quality Assurance Plan", Revision 13 (Reference 1), became effective on June 4, 2009, and Manual 120, "Dosimetry Services Quality System Manual", Revision 15 (Reference 2), became effective on October 16, 2009. The text of this report reflects the latest revisions of these manuals, as do the trending graphs and any data evaluations performed after the effective date.

A. Quality Control Programs for Environmental Sample Analyses

1. Inter-laboratory and Third Party

The E-LAB participates in the following inter-laboratory and third party quality control programs for environmental radioanalyses:

- Environmental Crosscheck Program administered by Eckert & Ziegler Analytics, Inc.,
- Environmental Resource Associates (ERA) Proficiency Test (PT) Program or equivalent State administered ELAP PT program,
- Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP)

The E-LAB purchases single-blind QC matrix spike samples from Eckert & Ziegler to verify the analysis of sample matrices processed at the E-LAB. The E-LAB's Third-Party Cross-Check Program provides environmental matrices encountered in a typical nuclear utility REMP. The Third-Party Cross-Check Program is intended to meet or exceed the inter-laboratory comparison program requirements discussed in NRC Regulatory Guide 4.15, revision 1.

The MAPEP program is administered by the Radiological and Environmental Sciences Laboratory (RESL) and consists of four media (water, soil, vegetation, and air filter) submitted twice each year. The MAPEP samples are designed to evaluate the ability and quality of analytical facilities performing sample measurements that contain hazardous and radioactive (mixed) analytes.

The ERA PT program and state administered ELAP PT programs consist of radionuclides in water submitted twice per year. These programs are used to maintain certification with the National Environmental Laboratory Accreditation Program (NELAP). The certification is necessary to perform analysis for projects that must meet EPA regulations for the Clean Water Act (CWA), Resource Conservation & Recovery Act (RCRA), or the Safe Drinking Water Act (SDWA).

2. Intra-laboratory

The internal QC Program is designed to include QC functions such as instrumentation checks (to insure proper instrument response), blank samples (to which no analyte radioactivity has been added), instrumentation backgrounds, duplicates, as well as overall staff qualification analyses and process controls. Both process control and qualification analyses samples seek to mimic the media type of those samples submitted for analysis by the various laboratory clients. These process controls (or process checks) are either actual samples submitted in duplicate in order to evaluate the precision of laboratory measurements, or blank samples which have been "spiked" with a known quantity of a radioisotope that is of interest to Laboratory clients. These QC samples, which represent either "single" or "double blind" unknowns, are intended to evaluate the entire radiochemical and radiometric process.

The E-LAB administers the QC program in accordance with an annual quality control and audit assessment schedule (Reference 3). The plan, which is approved on or before January 15th of each year and reviewed for adequacy at monthly LQARC meetings, describes the scheduled frequency and scope of quality assurance and control actions considered necessary for an adequate program. The magnitude of the process control program combines both internal and external sources targeted at 5% of the routine sample analysis load.

B. Quality Control Programs for Environmental Dosimetry

1. Inter-laboratory and Third Party

The E-LAB participates in the following inter-laboratory and third party quality control programs for Panasonic environmental dosimeters:

- Third-party testing conducted by Battelle Pacific Northwest Laboratories

- In-plant testing programs conducted by various users of E-LAB dosimetry.

Under the third party program, sets of six dosimeters are irradiated to ANSI specified testing criteria by Battelle Pacific Northwest Laboratories and are submitted for processing as “unknowns.” The bias and precision of TLD processing is measured against this standard (Reference 4) and are used to indicate trends and changes in performance.

Standard test methods for in plant testing of Panasonic whole body and extremity dosimeters are described in the E-LAB report entitled "In Plant External Dosimetry Quality Assurance Testing Program" (Reference 5). This protocol provides standard test methods that may be used at plant sites utilizing E-LAB dosimeters. Clients have developed their own dosimetry test procedures modeled after Reference 5. Results of In-plant testing programs are not included in this report.

2. Intra-laboratory

The in house testing program conducted by the E-LAB QA Officer, involves in-house irradiations of sets of six Panasonic environmental dosimeters according to the schedule given in Reference 3. These dosimeters are submitted for processing as “unknowns.” The bias and precision of TLD processing is measured against criteria given in Reference 2 and are used to indicate trends and changes in performance. Instrumentation checks, although routinely performed and representing between 5-10% of the TLDs processed, are not presented in this report.

C. Quality Assurance Program (Internal and External Assessments and Audits)

During each annual reporting period, at least one internal assessment is conducted in accordance with the pre-established schedule in Reference 3. In addition, the E-Lab may be audited by prospective customers during a pre-contract audit, and/or by existing clients who wish to conduct periodic audits in accordance with their contractual arrangements. A National Environmental Laboratory Accreditation Program (NELAP) audit is performed every two years as part of maintaining certification to perform EPA-related analyses.

An internal assessment of Dosimetry Services activities is conducted annually by the E-LAB QA Officer (Reference 3). The purpose of this assessment is to review analytical procedures, results, materials or components to identify opportunities to improve or enhance processes and/or services. In addition, a National Voluntary Laboratory Accreditation Program (NVLAP) audit is performed triennially of the dosimetry services area.

II. PERFORMANCE EVALUATION CRITERIA

A. Acceptance Criteria for Environmental Sample Analysis

The E-LAB has adopted a QC acceptance protocol based upon two performance models:

- For those inter-laboratory programs that already have established performance criteria for bias (i.e., MAPEP, and ERA/ELAP), the E-LAB will utilize the criteria for the specific program.

- For inter-laboratory or third party QC programs that have no preset acceptance criteria (e.g. the Analytics Environmental Cross-check Program), results will be evaluated in accordance with E-LAB internal acceptance criteria. Replicate analyses, performed in support of third party QC programs, will also be evaluated for precision in accordance with E-LAB internal acceptance criteria.

1. Internal Process Control Samples

Internal Process Control (PC) results are evaluated in accordance with two separate E-LAB acceptance criteria. A full discussion of the analytical services acceptance criteria can be found in Reference 1. The first criterion concerns bias, which is defined as the deviation of any one result from the known value. The second criterion concerns precision, which deals with the ability of the measurement to be faithfully replicated by comparison of an individual result with the mean of all results for a given sample set. Quality control deviations falling outside the E-LAB acceptance criteria are discussed in the appendices.

(a) Bias

For each analytical measurement tested, the bias is the percent deviation of the reported result relative to the expected value (value of the spike known by comparison with or derivation from a standard reference material). The percent deviation relative to the known is calculated as follows:

$$\frac{(H_i' - H_i)}{H_i}100$$

where:

H_i' = the value of the ith measurement in a category being tested

H_i = the actual quantity in the test sample as defined by the spike

The Laboratory internal criterion for bias is that an analysis is considered in agreement if the value is within ±20% of the known value. If this condition is not met, the two-sigma range about the analyzed value is established. If the known value falls within the specified range, the analysis is considered in agreement.

Deviations from this general criterion, for specific radionuclides, are given in Table 1 and Reference 1.

E-LAB acceptance criteria are applied when the sample concentration is 10 or more times the method MDC. Otherwise, the “known value” and associated uncertainty are compared to the measured result and uncertainty using a two-tailed standard statistical test at the 95% confidence level.

(b) Precision

For a group of test measurements containing a given spiked level, the precision is the percent deviation of individual results relative to the mean reported measurement. At least two values are required for the determination of precision. The percent deviation relative to the mean reported measurement is calculated as follows:

$$\left(\frac{H_i' - \bar{H}}{\bar{H}}\right)100$$

where:

H_i' = the reported measurement for the ith analytical measurement

$\bar{H}$ = the mean analytical measurement

$\bar{H} = \sum H_i' \left(\frac{1}{n}\right)$

n = the number of samples in the test group

The E-LAB criterion for precision is that an analysis is considered in agreement if the individual value is within ±20% of the mean value. If this condition is not met, the two-sigma range about the analyzed value is established. If the mean value falls within the specified range, the analysis is considered in agreement.

Deviations from this general criterion, for specific radionuclides, are given in Tables 1.

(c) Mean Bias

For each group of analytical measurements tested, the mean bias is the percent deviation of the mean reported result relative to the expected value. The mean percent deviation relative to the expected value is calculated as follows:

$$\left(\left(\frac{(\bar{H}-H_i)}{H_i}\right)100\right)$$

where:

$\bar{H}$ = the mean analytical measurement

H_i = the actual quantity in the test sample as defined by the spike

2. Backgrounds

As discussed in Reference 1, backgrounds represent the ambient signal response, recorded by measuring instruments, which is independent of radioactivity contributed by the radionuclides being measured in the sample. Backgrounds will not normally contain any three-sigma statistically positive activity of the target parameters. The background signal is subtracted from the sample's signal.

3. Blanks

Wherever possible, equivalent media for preparing laboratory processing blanks will be used. Synthetic matrices may be used for bioassay if equivalency is proven.

4. NRC Resolution Criteria

Some Laboratory clients use the NRC Resolution Criteria to evaluate double blind Part 50 performance. NRC Resolution Criteria are based on an empirical relationship that combines prior experience and the accuracy needs of the program. As "Resolution" increases, the acceptability of one's measurement becomes more selective. Conversely, as "Resolution" decreases, agreement levels are widened to account for the increase in uncertainty.

5. DOE Evaluation Criteria

The Radiological & Environmental Sciences Laboratory (RESL) inter-comparison program, MAPEP, defines three levels of performance: Acceptable, Acceptable with Warning, and Not Acceptable. Performance is considered acceptable for a mean with a bias ≤20% of the reference value for the analyte. Performance is acceptable with warning for a mean result bias of >20% but ≤30% of the reference value. If the bias is greater than 30%, the results are deemed not acceptable. The MAPEP includes low activity "sensitivity tests" and individual radionuclide-free "false positive tests."

B. QC Investigation Criteria and Result Reporting for Environmental Sample Analysis

1. QC Investigation Criteria

Summarized below are the investigation criteria applied to QC analyses that failed E-LAB bias criteria. The Condition Report process tracks investigation results.

(a) No investigation is necessary when an individual QC result falls outside the QC performance criteria for bias or precision.

(b) Investigations shall be initiated when the mean of a QC process batch or the mean of three consecutive individual QC processes is outside the performance criterion for bias. Investigations shall also be initiated when more than one sample in a QC process batch or the mean of three consecutive individual QC processes is outside the performance criterion for precision.

2. Reporting of Analytical Results to Laboratory Customers

A similar set of guidelines was developed, applicable to reporting of results. The guidelines are as follows:

If an investigation is required for a process (normally after consecutive QC process check failures), and if the QC results requiring the investigation have a mean bias from the known of greater than ± (applicable E-LAB bias criterion +5%) for environmental processing then the Laboratory Quality Assurance Review Committee (LQARC) shall meet to determine the disposition of client results.

C. Acceptance Criteria for Environmental Dosimetry

1. Internal and Third Party Evaluations

(a) Bias

For each dosimeter tested, the measure of bias is the percent deviation of the reported result relative to the delivered exposure. The percent deviation relative to the delivered exposure is calculated as follows:

$$\frac{(H_i' - H_i)}{H_i}100$$

where:

H_i' = the corresponding reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

H_i = the exposure delivered to the i^{th} irradiated dosimeter (i.e., the delivered exposure)

(b) Mean Bias

For each group of test dosimeters, the mean bias is the average percent deviation of the reported result relative to the delivered exposure. The mean percent deviation relative to the delivered exposure is calculated as follows:

$$\sum\left(\frac{(H_i' - H_i)}{H_i}\right)100\left(\frac{1}{n}\right)$$

where:

H_i' = the corresponding reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

H_i = the exposure delivered to the i^{th} irradiated test dosimeter (i.e., the delivered exposure)

n = the number of dosimeters in the test group

(c) Precision

For a group of test dosimeters irradiated to a given exposure, the measure of precision is the percent deviation of individual results relative to the mean reported exposure. At least two values are required for the determination of precision. The measure of precision for the i^{th} dosimeter is:

$$\left(\frac{(H_i' - \bar{H})}{\bar{H}}\right)100$$

where:

H_i' = the reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

$\bar{H}$ = the mean reported exposure; i.e., $\bar{H} = \sum H_i' \left(\frac{1}{n}\right)$

n = the number of dosimeters in the test group

(d) E-LAB Internal Tolerance Limits

Tolerance limits for bias and precision applied to in-house and accredited third party testing were adopted on November 13, 1987. These criteria are only applied to individual test dosimeters irradiated with high-energy photons (Cs-137 or Co-60) and are as follows for Panasonic Environmental dosimeters: ± 20.1% for bias and ± 12.8% for precision.

D. QC Investigation Criteria and Result Reporting for Environmental Dosimetry

1. QC Investigation Criteria

E-LAB Manual 120 (Reference 2) specifies when an investigation is required due to a QC analysis that has failed the E-LAB bias criteria. The criteria are as follows:

(a) No investigation is necessary when an individual QC result falls outside the QC performance criteria for accuracy.

(b) Investigations are initiated when the mean of a QC processing batch is outside the performance criterion for bias.

2. Reporting of Environmental Dosimetry Results to Laboratory Customers

(a) All results are to be reported in a timely fashion.

(b) If the QA Officer determines that an investigation is required for a process, the results shall be issued as normal. If the QC results, prompting the investigation, have a mean bias from the known of greater than ±20% for environmental dosimetry, the results shall be issued with a note indicating that they may be updated in the future, pending resolution of a QA issue.

(c) Environmental dosimetry results do not require updating if the investigation has shown that the mean bias between the original results and the corrected results, based on applicable correction factors from the investigation, does not exceed ±20%.

E. Self-Assessment Program

In accordance with Reference 1, the E-LAB has established a Self-Assessment policy where all Laboratory staff members are strongly encouraged to continually evaluate laboratory activities for quality enhancements, cost savings, and time savings.

III. QUALITY CONTROL SYNOPSIS FOR ENVIRONMENTAL SAMPLE ANALYSES

A. General Discussion

Two-year trending graphs are provided in Appendix A of this report to allow evaluation of trends or biases. In the event that an analysis does not meet E-LAB performance criteria, a brief explanation is included on the graph. It should be noted that MAPEP and ERA/ELAP samples are evaluated against criteria specific to those programs. Therefore, only MAPEP sample results which fell in the "Warning" or "Non-Agreement" categories will be addressed in Appendix A. Beginning in 2009, ELAP samples are no longer included on the trending graphs due to the unique way in which the acceptance limits are calculated.

If any questions arise regarding previous analyses, please refer to the annual status report corresponding to the sample analysis date. In all cases, the QC database is available for each individual analysis to back-up the data presented on the graph.

B. Result Summary

During this annual reporting period, thirty-two nuclides associated with seven media types were analyzed by means of the E-LAB's internal process control, MAPEP, ERA/ELAP and by Eckert & Ziegler Analytics QC programs. Media types representative of client company analyses performed during this reporting period were selected.

Presented below is a synopsis of the media types evaluated.

Air Filter	Charcoal (Air Iodine)	Water
Milk	Sediment/soil	Vegetation
Fish		

1. Analytics Environmental Cross Check Program

During this period the Eckert & Ziegler Analytics cross check program provided 426 individual environmental analyses for bias and 426 for precision evaluation (Table 1). Of the 426 analyses evaluated for bias, 98.6% (420/426) of all results fell within E-LAB acceptance criteria. Of the 426 analyses evaluated for precision, 99.8% (425/426) fell within E-LAB tolerance limits. Appendix A graphically summarizes the results by two-year trending graphs.

Table 2 provides a report of the E-LAB's participation in the Eckert & Ziegler Analytics' cross check program for the fourth quarter of 2008 and the first three quarters of 2009. Using the E-LAB's internal acceptance criteria as the basis of evaluation, 141 out of 142 mean results were within agreement criteria. The single failure pertained to the gross alpha analysis of the 1st quarter 2009 water sample and was addressed by Condition Report (CR) 09-21.

2. Summary of Participation in the MAPEP Monitoring Program.

   During this reporting period, two sets of MAPEP samples were processed and reported (Table 3). Using the DOE acceptance criteria as the basis of evaluation, 65 out of 74 mean results came within agreement criteria. For MAPEP 20, six results fell into the "warning" category as follows: Pu-238 and Pu-239/40 on the filter, Cs-137, Mn-54, and K-40 in soil, and Am-241 in water. CR 09-12 and CR-09-13 were issued to investigate the plutonium and americium low biases, respectively. CR-09-14 was issued to investigate the high biases in soil, including Zn-65, which was "not acceptable". Two results for MAPEP 21 fell into the "warning" category, as follows: Pu-239/40 in water and Am-241 in water. CR 09-12 and CR-09-13 remain open to investigate the plutonium and americium low biases, respectively.

3. ERA PT Program and New York ELAP PT Program

   During this reporting period, a total of 18 individual results were evaluated by the New York State Department of Health ELAP program. Using the evaluation criteria set by NELAP, 100% (18/18) of the radionuclides were "Satisfactory". Table 4 provides a report of the Laboratory's participation in this PT program.

   The AREVA NP Environmental Laboratory (Lab ID# 11823) maintained NELAP accreditation from the New York State Department of Health through the Environmental Laboratory Approval Program for the following methods for both potable and non-potable waters:

   - Gross Alpha, Method EPA 900.0
   - Gross Beta, Method EPA 900.0
   - Iodine-131, Method ASTM D4785-00a
   - Photon Emitters, Method EPA 901.1
   - Radioactive Cesium, Method EPA 901.1
   - Tritium, Method EPA 906.0

4. Process Control Program for REMP Analyses

   The E-Lab internal (intra-laboratory) process control program evaluated 478 individual analyses for bias and 133 analyses for precision for standard REMP media and nuclides. The results are summarized in Table 5.

   Of the 478 internal process control analyses evaluated for bias, 99.8% met Laboratory acceptance criteria. Also, 95.5% of the 133 results for precision were found to be acceptable.

Table 6 presents the internal process control data combined with Eckert & Ziegler Analytics cross-check data (evaluated for bias and precision) and individual MAPEP analyses (evaluated for precision only) for standard REMP media and nuclides. For this data set, 99.2% of the 904 analyses evaluated for bias and 99.0% of the 705 analyses evaluated for precision met Laboratory acceptance criteria.

To support the efforts required for the EPRI Groundwater Monitoring Program at client sites, the E-LAB performs low-level QC testing specifically for H-3 in water. The E-LAB prepares these spikes internally using a low activity H-3 spike obtained from Eckert & Ziegler Analytics. Activities ranged from approximately 1,700 – 9,000 pCi/L. A chart of low activity H-3 spike performance is provided in Appendix A. All 2009 analyses were within the acceptance criteria.

5. Process Control Program for Environmental Analysis of Additional Radionuclides

To support the efforts of various monitoring programs at client sites, the E-LAB performs low-level analyses of additional nuclides that are not normally included in a standard REMP. The QC analysis results for these nuclides are presented in Table 7 by analysis type. Eighteen of 19 analyses (94.7%) evaluated for accuracy met E-Lab acceptance criteria. One hundred percent of the 60 analyses evaluated for precision met the E-LAB acceptance criteria.

6. Analytical Blanks

During this reporting period, statistically positive activity, (activity greater than three (3) times the standard deviation) was not reported for any of the 149 environmental analytical blanks analyzed.

7. Overall Data Summary for the Reporting Period January-December 2009

The intra- and inter-laboratory QC data for all environmental process control nuclide analyses, evaluated to internal E-LAB performance criteria, are summarized in Table 8, presented by analysis type. Excluded from this table are evaluations of MAPEP and ELAP samples for accuracy, as these samples are evaluated to program specific acceptance criteria. Nine hundred fifteen of 923 individual results evaluated to internal E-LAB performance criteria (99.1%) fell within the E-LAB bias acceptance criteria, while 99.1% of the 765 analyses passed the acceptance criteria for precision.

8. Summary of Environmental Quality Control Results by Year

The historical summary of the E-LAB process control program performance for the environmental monitoring function is provided in Table 9. For 2009, 99.1% of the analyses fell within the E-LAB acceptance criteria for bias as compared to a historical percentage of 97.0. Similarly, 99.1% of the analyses evaluated for precision met the E-LAB acceptance criteria as compared to 99.4% of analyses for the 33-year operating history.

Trending graphs associated with the performance results for this program are given in Appendix A.

IV. QUALITY CONTROL SYNOPSIS FOR ENVIRONMENTAL DOSIMETERY

A. General Discussion

Summaries of the performance tests for the reporting period are given in Tables 10 through 12 and Appendix B. Results are presented only for performance tests conducted under well-characterized conditions. Results are reported for the twelve-month period January-December 2009.

Table 10 provides a summary of individual dosimeter results evaluated against the E-LAB internal acceptance criteria for high-energy photons only. During this period, 100% (84/84) of the individual dosimeters, evaluated against these criteria met the tolerance limits for accuracy and 100% (84/84) met the criterion for precision.

Table 11 presents the third-party testing results for dosimeters processed during this annual period. The mean percent bias and standard deviation for each group of six dosimeters are shown.

Table 12 provides the performance results for each group (N=6) of dosimeters evaluated against the internal tolerance criteria (third party and in-house irradiations). Overall, 100% (14/14) of the dosimeter sets evaluated against the internal tolerance performance criteria met these criteria.

B. Result Trending

One of the main benefits of performing quality control tests on a routine basis is to identify trends or performance changes. The results of the Panasonic environmental dosimeter performance tests are presented in Appendix B for a two year period. The results are evaluated against each of the performance criteria listed in Section II, namely: individual dosimeter bias, individual dosimeter precision, and mean bias.

All of the results presented in Appendix B are fade corrected to the irradiation date and plotted sequentially by processing date. This allows assessment of performance without the confounding effect of the variation in number of days between irradiation and readout. Therefore, the results include any bias produced by the fade algorithm.

If fade is not corrected to the date of irradiation, the possibility of a bias due to signal fading exists. When Dosimetry Services processes a TLD, the software calculates a fade correction using one half the number of days between the processing date and the anneal date. The use of the midpoint for fade correction can bias the results of performance tests of TLDs irradiated at either the beginning or end of a wear period. Results for performance tests conducted near the beginning of the period will be biased low and those irradiated near the end of a period will be biased high, assuming there are no other system biases.

For individual Panasonic environmental TLDs processed in 2009, 100% of the 84 tests came within the E-LAB bias and precision tolerance limits. All 14

Panasonic environmental TLD test sets (mean bias, n=6) were reported within the internal tolerance criteria for bias.

V. STATUS OF CONDITION REPORTS (CR)

Table 13 provides a synopsis of CR activity for environmental processing during 2009. Twenty-two condition reports were closed and nineteen were opened during this reporting period. As of December 31, 2009, a total of eight CRs remain open, two of which are older than 6 months.

VI. STATUS OF AUDITS/ASSESSMENTS

A. Internal

Corporate QA Audit No. 09-11, was conducted from July 6, 2009 through July 10, 2009. The audit was conducted to verify compliance with E-LAB QA Manual 100 and Dosimetry QA Manual 120. There were no findings or recommendations pertaining to the E-LAB.

One additional internal QA assessment was conducted for processes involved in the environmental monitoring area during 2009. Internal Assessment 09-02 evaluated areas of the E-Lab Quality Assurance Program applicable to NELAC accredited techniques. Condition reports were issued to document the findings from this assessment, and recommendations were entered into the E-Lab task tracking system.

B. External

A National Voluntary Laboratory Accreditation Program (NVLAP) audit was conducted from May 6, 2009 to May 8, 2009 in the Dosimetry Services area. No nonconformities were reported. Recommendations were entered into the E-Lab task tracking system.

The Exelon Nuclear audit, No. SR-2009-23, was conducted from August 10, 2009 through August 14, 2009. There were three findings issued. The E-LAB responded to these items and the findings were closed on October 1, 2009.

VII. UPDATED PROCEDURES ISSUED DURING JANUARY-DECEMBER 2009

A list of procedures, pertaining to environmental monitoring, which were updated during 2009 is included in Table 14.

VIII. REFERENCES

1. AREVA NP Environmental Laboratory Manual 100 “Laboratory Quality Assurance Plan”, Revision 13, June 4, 2009.
2. E-LAB Manual No.120, “Dosimetry Services Quality System Manual”, Rev. 15, October 16, 2009.
3. AREVA NP Environmental Laboratory 2009 Quality Control and Audit Assessment Schedule.
4. American National Standard for Performance Testing of Extremity Dosimeters, ANSI N13.32-1995 (Draft), Health Physics Society, 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101.
5. "In-Plant External Dosimetry Quality Assurance Testing Program," E-LAB, Revision 2, December 1986.

TABLE 1

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL
CROSSCHECK PROGRAM RESULTS BY
ACCEPTANCE CRITERIA, MEDIA AND ANALYSIS CATEGORIES
JANUARY – DECEMBER 2009

	Bias Criteria (1)		Precision Criteria (1)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
I. Air Particulate				
Gross Alpha	11	1	12	0
Gross Beta	12	0	12	0
Gamma	54	0	54	0
II. Air Charcoal				
Gamma	12	0	12	0
III. Milk				
Gamma	120	0	120	0
Iodine (LL)	12	0	12	0
Sr-89	6	0	6	0
Sr-90	6	0	6	0
IV. Water				
Gross Alpha	9	3	12	0
Gross Beta	12	0	12	0
Gamma	118	2	119	1
Iodine (LL)	12	0	12	0
Sr-89	12	0	12	0
Sr-90	12	0	12	0
Tritium	12	0	12	0
Total Number In Range:	**420**	**6**	**425**	**1**
Percentage of Total Processed	**98.6**	**1.4**	**99.8**	**0.2**
Sum of Analyses:	**426**		**426**	

(1) Bias and Precision as noted in Table 1.

TABLE 1

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL CROSSCHECK PROGRAM RESULTS BY ACCEPTANCE CRITERIA, MEDIA AND ANALYSIS CATEGORIES
JANUARY – DECEMBER 2009
(Continued)

A. Percent Bias Acceptance Criteria

$\leq$20 (or within 2 sigma of known, see Reference 1)

For Gross Alpha and Beta	$\leq$25 (or within 2 sigma of known)
For Sr-89/90	$\leq$25 (or within 2 sigma of known)

B. Percent Precision Acceptance Criteria

$\leq$20 (or within 2 sigma of mean, see Reference 1). Exceptions as above.

TABLE 2

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL CROSS CHECK PROGRAM
PERFORMANCE EVALUATION

SAMPLE NUMBER	QUARTER/ YEAR	SAMPLE MEDIA	NUCLIDE	UNITS	REPORTED VALUE	KNOWN VALUE	RATIO E-LAB/ ANALYTICS	PERFORMANCE EVALUATION
E6346-162	4th/2008	Water	Gross Alpha	pCi/L	104	114	0.91	Agreement
E6346-162	4th/2008	Water	Gross Beta	pCi/L	208	204	1.02	Agreement
E6347-162	4th/2008	Water	I-131LL	pCi/L	57.5	64.1	0.90	Agreement
E6347-162	4th/2008	Water	I-131	pCi/L	54.3	64.1	0.85	Agreement
E6347-162	4th/2008	Water	Ce-141	pCi/L	209	224	0.93	Agreement
E6347-162	4th/2008	Water	Cr-51	pCi/L	299	288	1.04	Agreement
E6347-162	4th/2008	Water	Cs-134	pCi/L	141	157	0.90	Agreement
E6347-162	4th/2008	Water	Cs-137	pCi/L	134	140	0.96	Agreement
E6347-162	4th/2008	Water	Co-58	pCi/L	115	122	0.94	Agreement
E6347-162	4th/2008	Water	Mn-54	pCi/L	172	178	0.97	Agreement
E6347-162	4th/2008	Water	Fe-59	pCi/L	122	117	1.04	Agreement
E6347-162	4th/2008	Water	Zn-65	pCi/L	203	214	0.95	Agreement
E6347-162	4th/2008	Water	Co-60	pCi/L	154	156	0.99	Agreement
E6348-162	4th/2008	Water	Sr-89	pCi/L	78.8	97.7	0.81	Agreement
E6348-162	4th/2008	Water	Sr-90	pCi/L	14.1	13.4	1.05	Agreement
E6349-162	4th/2008	Water	H-3	pCi/L	10300	10200	1.01	Agreement
E6350-162	4th/2008	Charcoal	I-131	pCi	53.1	53.6	0.99	Agreement
E6351-162	4th/2008	Filter	Gross Alpha	pCi	72.3	63.2	1.14	Agreement
E6351-162	4th/2008	Filter	Gross Beta	pCi	127	113	1.12	Agreement
E6352-162	4th/2008	Filter	Ce-141	pCi	112	119	0.94	Agreement
E6352-162	4th/2008	Filter	Cr-51	pCi	152	153	0.99	Agreement
E6352-162	4th/2008	Filter	Cs-134	pCi	77.8	83.6	0.93	Agreement
E6352-162	4th/2008	Filter	Cs-137	pCi	76.8	74.6	1.03	Agreement
E6352-162	4th/2008	Filter	Co-58	pCi	63.1	64.9	0.97	Agreement
E6352-162	4th/2008	Filter	Mn-54	pCi	91.8	94.6	0.97	Agreement
E6352-162	4th/2008	Filter	Fe-59	pCi	60.4	62.5	0.97	Agreement
E6352-162	4th/2008	Filter	Zn-65	pCi	110	114	0.96	Agreement
E6353-162	4th/2008	Milk	I-131LL	pCi/L	72.4	79.9	0.91	Agreement
E6353-162	4th/2008	Milk	I-131	pCi/L	74.3	79.9	0.93	Agreement
E6353-162	4th/2008	Milk	Ce-141	pCi/L	184	191	0.96	Agreement
E6353-162	4th/2008	Milk	Cr-51	pCi/L	235	246	0.96	Agreement
E6353-162	4th/2008	Milk	Cs-134	pCi/L	125	134	0.93	Agreement
E6353-162	4th/2008	Milk	Cs-137	pCi/L	119	120	1.00	Agreement
E6353-162	4th/2008	Milk	Co-58	pCi/L	105	104	1.01	Agreement
E6353-162	4th/2008	Milk	Mn-54	pCi/L	152	152	1.00	Agreement
E6353-162	4th/2008	Milk	Fe-59	pCi/L	107	100	1.06	Agreement
E6353-162	4th/2008	Milk	Zn-65	pCi/L	177	183	0.97	Agreement
E6353-162	4th/2008	Milk	Co-60	pCi/L	135	133	1.01	Agreement

TABLE 2

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL CROSS CHECK PROGRAM
PERFORMANCE EVALUATION
(Continued)

SAMPLE NUMBER	QUARTER/ YEAR[3]	SAMPLE MEDIA	NUCLIDE	UNITS	REPORTED VALUE	KNOWN VALUE	RATIO E-LAB/ ANALYTICS	PERFORMANCE EVALUATION
E6558-162	1st/2009	Water	Gross Alpha	pCi/L	120	162	0.75	Non-Agreement[1]
E6558-162	1st/2009	Water	Gross Beta	pCi/L	189	203	0.93	Agreement
E6559-162	1st/2009	Water	I-131LL	pCi/L	63.2	69.0	0.92	Agreement
E6559-162	1st/2009	Water	I-131	pCi/L	58.8	69.0	0.85	Agreement
E6559-162	1st/2009	Water	Ce-141	pCi/L	114	120	0.95	Agreement
E6559-162	1st/2009	Water	Cr-51	pCi/L	365	387	0.94	Agreement
E6559-162	1st/2009	Water	Cs-134	pCi/L	107	119	0.90	Agreement
E6559-162	1st/2009	Water	Cs-137	pCi/L	136	141	0.96	Agreement
E6559-162	1st/2009	Water	Co-58	pCi/L	145	151	0.96	Agreement
E6559-162	1st/2009	Water	Mn-54	pCi/L	165	162	1.02	Agreement
E6559-162	1st/2009	Water	Fe-59	pCi/L	128	127	1.01	Agreement
E6559-162	1st/2009	Water	Zn-65	pCi/L	192	197	0.97	Agreement
E6559-162	1st/2009	Water	Co-60	pCi/L	184	180	1.02	Agreement
E6560-162	1st/2009	Water	Sr-89	pCi/L	80.5	94.5	0.85	Agreement
E6560-162	1st/2009	Water	Sr-90	pCi/L	14.9	15.1	0.99	Agreement
E6561-162	1st/2009	Water	H-3	pCi/L	4090	4480	0.91	Agreement
E6562-162	1st/2009	Charcoal	I-131	pCi	70.5	79.4	0.89	Agreement
E6563-162	1st/2009	Filter	Gross Alpha	pCi	140	122	1.15	Agreement[2]
E6563-162	1st/2009	Filter	Gross Beta	pCi	168	153	1.10	Agreement
E6564-162	1st/2009	Milk	I-131LL	pCi/L	72.9	79.3	0.92	Agreement
E6564-162	1st/2009	Milk	I-131	pCi/L	69.1	79.3	0.87	Agreement
E6564-162	1st/2009	Milk	Ce-141	pCi/L	91.7	94.9	0.97	Agreement
E6564-162	1st/2009	Milk	Cr-51	pCi/L	300	305	0.98	Agreement
E6564-162	1st/2009	Milk	Cs-134	pCi/L	85	93.7	0.91	Agreement
E6564-162	1st/2009	Milk	Cs-137	pCi/L	115	111	1.04	Agreement
E6564-162	1st/2009	Milk	Co-58	pCi/L	121	119	1.01	Agreement
E6564-162	1st/2009	Milk	Mn-54	pCi/L	135	128	1.05	Agreement
E6564-162	1st/2009	Milk	Fe-59	pCi/L	109	99.9	1.09	Agreement
E6564-162	1st/2009	Milk	Zn-65	pCi/L	155	156	0.99	Agreement
E6564-162	1st/2009	Milk	Co-60	pCi/L	146	142	1.03	Agreement
E6565-162	1st/2009	Milk	Sr-89	pCi/L	80.1	97.7	0.82	Agreement
E6565-162	1st/2009	Milk	Sr-90	pCi/L	14.5	15.6	0.93	Agreement

[1] The percent difference of the mean value from the known value exceeded the Manual 100 criterion for accuracy. CR 09-21 was issued to investigate the failure.

[2] Eckert & Ziegler Analytics changed the filter preparation method by reducing the thickness of the filter coating from 0.85 mg/cm^2 to 0.5 mg/cm^2. An instrument recalibration, performed with a .5 mg/cm^2 coated filter, yielded an increase in alpha efficiency of 16%. Application of the new efficiency to the measured result yields a percent difference from the Analytics known value of -1.1%.

[3] These results were erroneously decay corrected to 03/20/09 rather than the true reference date of 03/19/09. This table reflects the results as reported to Analytics, prior to correction. All corrected results, other than gross alpha in water, met the agreement criteria. CR 09-29 was issued to address the reference date error.

TABLE 2

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL CROSS CHECK PROGRAM
PERFORMANCE EVALUATION
(Continued)

SAMPLE NUMBER	QUARTER/ YEAR	SAMPLE MEDIA	NUCLIDE	UNITS	REPORTED VALUE	KNOWN VALUE	RATIO E-LAB/ ANALYTICS	PERFORMANCE EVALUATION
E6711-162	2nd/2009	Water	Gross Alpha	pCi/L	272	281	0.97	Agreement
E6711-162	2nd/2009	Water	Gross Beta	pCi/L	157	141	1.11	Agreement
E6712-162	2nd/2009	Water	I-131LL	pCi/L	83.5	88.3	0.95	Agreement
E6712-162	2nd/2009	Water	I-131	pCi/L	87.4	88.3	0.99	Agreement
E6712-162	2nd/2009	Water	Ce-141	pCi/L	206	216	0.96	Agreement
E6712-162	2nd/2009	Water	Cr-51	pCi/L	290	304	0.95	Agreement
E6712-162	2nd/2009	Water	Cs-134	pCi/L	111	126	0.88	Agreement
E6712-162	2nd/2009	Water	Cs-137	pCi/L	148	146	1.02	Agreement
E6712-162	2nd/2009	Water	Co-58	pCi/L	70.3	69.8	1.01	Agreement
E6712-162	2nd/2009	Water	Mn-54	pCi/L	107	104	1.03	Agreement
E6712-162	2nd/2009	Water	Fe-59	pCi/L	97.7	92.9	1.05	Agreement
E6712-162	2nd/2009	Water	Zn-65	pCi/L	142	133	1.07	Agreement
E6712-162	2nd/2009	Water	Co-60	pCi/L	231	237	0.97	Agreement
E6713-162	2nd/2009	Water	Sr-89	pCi/L	77.8	91.1	0.85	Agreement
E6713-162	2nd/2009	Water	Sr-90	pCi/L	13.1	13.6	0.96	Agreement
E6714-162	2nd/2009	Water	H-3	pCi/L	12300	13300	0.92	Agreement
E6715-162	2nd/2009	Charcoal	I-131	pCi	92.5	95.1	0.97	Agreement
E6716-162	2nd/2009	Filter	Gross Alpha	pCi	102	118	0.86	Agreement
E6716-162	2nd/2009	Filter	Gross Beta	pCi	60.3	59.3	1.02	Agreement
E6717-162	2nd/2009	Filter	Ce-141	pCi	79.7	85.6	0.93	Agreement
E6717-162	2nd/2009	Filter	Cr-51	pCi	116	121	0.96	Agreement
E6717-162	2nd/2009	Filter	Cs-134	pCi	46.9	49.9	0.94	Agreement
E6717-162	2nd/2009	Filter	Cs-137	pCi	59.8	57.9	1.03	Agreement
E6717-162	2nd/2009	Filter	Co-58	pCi	27.4	27.7	0.99	Agreement
E6717-162	2nd/2009	Filter	Mn-54	pCi	41.0	41.3	0.99	Agreement
E6717-162	2nd/2009	Filter	Fe-59	pCi	34.8	36.9	0.94	Agreement
E6717-162	2nd/2009	Filter	Zn-65	pCi	52.4	52.9	0.99	Agreement
E6717-162	2nd/2009	Filter	Co-60	pCi	88.3	94.0	0.94	Agreement
E6718-162	2nd/2009	Milk	I-131LL	pCi/L	94.7	102	0.93	Agreement
E6718-162	2nd/2009	Milk	I-131	pCi/L	97.7	102	0.96	Agreement
E6718-162	2nd/2009	Milk	Ce-141	pCi/L	275	284	0.97	Agreement
E6718-162	2nd/2009	Milk	Cr-51	pCi/L	395	400	0.99	Agreement
E6718-162	2nd/2009	Milk	Cs-134	pCi/L	146	166	0.88	Agreement
E6718-162	2nd/2009	Milk	Cs-137	pCi/L	187	192	0.97	Agreement
E6718-162	2nd/2009	Milk	Co-58	pCi/L	90.0	91.9	0.98	Agreement
E6718-162	2nd/2009	Milk	Mn-54	pCi/L	138	137	1.01	Agreement
E6718-162	2nd/2009	Milk	Fe-59	pCi/L	130	122	1.06	Agreement
E6718-162	2nd/2009	Milk	Zn-65	pCi/L	185	175	1.05	Agreement
E6718-162	2nd/2009	Milk	Co-60	pCi/L	316	312	1.01	Agreement

TABLE 2

AREVA NP ENVIRONMENTAL LABORATORY
ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL CROSS CHECK PROGRAM
PERFORMANCE EVALUATION
(Continued)

SAMPLE NUMBER	QUARTER/ YEAR	SAMPLE MEDIA	NUCLIDE	UNITS	REPORTED VALUE	KNOWN VALUE	RATIO E-LAB/ ANALYTICS	PERFORMANCE EVALUATION
E6823-162	3rd/2009	Water	Gross Alpha	pCi/L	275	324	0.85	Agreement
E6823-162	3rd/2009	Water	Gross Beta	pCi/L	281	287	0.98	Agreement
E6824-162	3rd/2009	Water	I-131LL	pCi/L	100.9	98.4	1.02	Agreement
E6824-162	3rd/2009	Water	I-131	pCi/L	87.7	98.4	0.89	Agreement
E6824-162	3rd/2009	Water	Ce-141	pCi/L	258	264	0.98	Agreement
E6824-162	3rd/2009	Water	Cr-51	pCi/L	199	212	0.94	Agreement
E6824-162	3rd/2009	Water	Cs-134	pCi/L	108	118	0.92	Agreement
E6824-162	3rd/2009	Water	Cs-137	pCi/L	175	177	0.99	Agreement
E6824-162	3rd/2009	Water	Co-58	pCi/L	94.8	95.4	0.99	Agreement
E6824-162	3rd/2009	Water	Mn-54	pCi/L	200	198	1.01	Agreement
E6824-162	3rd/2009	Water	Fe-59	pCi/L	146	141	1.04	Agreement
E6824-162	3rd/2009	Water	Zn-65	pCi/L	198	195	1.01	Agreement
E6824-162	3rd/2009	Water	Co-60	pCi/L	149	154	0.97	Agreement
E6825-162	3rd/2009	Water	Sr-89	pCi/L	88.9	105	0.85	Agreement
E6825-162	3rd/2009	Water	Sr-90	pCi/L	18.1	18.5	0.98	Agreement
E6826-162	3rd/2009	Water	H-3	pCi/L	13500	14100	0.96	Agreement
E6827-162	3rd/2009	Charcoal	I-131	pCi	89.5	92.0	0.97	Agreement
E6828-162	3rd/2009	Filter	Gross Alpha	pCi	251	265	0.95	Agreement
E6828-162	3rd/2009	Filter	Gross Beta	pCi	239	235	1.02	Agreement
E6829-162	3rd/2009	Milk	I-131LL	pCi/L	97.2	98.6	0.99	Agreement
E6829-162	3rd/2009	Milk	I-131	pCi/L	104	98.6	1.06	Agreement
E6829-162	3rd/2009	Milk	Ce-141	pCi/L	270	275	0.98	Agreement
E6829-162	3rd/2009	Milk	Cr-51	pCi/L	217	221	0.98	Agreement
E6829-162	3rd/2009	Milk	Cs-134	pCi/L	111	123	0.90	Agreement
E6829-162	3rd/2009	Milk	Cs-137	pCi/L	188	185	1.02	Agreement
E6829-162	3rd/2009	Milk	Co-58	pCi/L	99.2	99.4	1.00	Agreement
E6829-162	3rd/2009	Milk	Mn-54	pCi/L	210	206	1.02	Agreement
E6829-162	3rd/2009	Milk	Fe-59	pCi/L	159	147	1.08	Agreement
E6829-162	3rd/2009	Milk	Zn-65	pCi/L	209	204	1.02	Agreement
E6829-162	3rd/2009	Milk	Co-60	pCi/L	160	160	1.00	Agreement
E6830-162	3rd/2009	Milk	Sr-89	pCi/L	91.8	107	0.86.	Agreement
E6830-162	3rd/2009	Milk	Sr-90	pCi/L	18.1	18.8	0.96	Agreement

TABLE 3
DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM RESULTS
AREVA NP ENVIRONMENTAL LABORATORY

SAMPLE ID	MATRIX/ UNITS	REFERENCE DATE	RADIO-NUCLIDE	REPORTED MEAN VALUE Bq/Units	MAPEP VALUE Bq/Units	% BIAS	PERFORMANCE EVALUATION
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Am-241	0.1712	0.205	-16.5	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Cs-134	2.85	2.93	-2.7	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Cs-137	1.576	1.52	3.7	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Co-57	1.302	1.30	0.2	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Co-60	1.196	1.22	-2.0	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Mn-54	2.36	2.2709	3.9	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Pu-238	0.1394	0.1763	-20.9	Warning[1]
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Pu-239/240	0.1246	0.157	-20.6	Warning[1]
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Sr-90	0.571	0.640	-10.8	Acceptable
MAPEP-09-RdF20	Filter (Bq/filter)	1-Jan-09	Zn-65	1.374	1.36	1.0	Acceptable
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Cs-134	521	467	11.6	Acceptable
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Cs-137	750	605	24.0	Warning[2]
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Co-57	0.33	N/A	N/A	Acceptable
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Co-60	3.97	4.113	N/A	Acceptable
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Mn-54	387	307	26.1	Warning[2]
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	K-40	714	570	25.3	Warning[2]
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Sr-90	250	257	-2.7	Acceptable
MAPEP-09-MaS20	Soil (Bq/kg)	1-Jan-09	Zn-65	317	242	31.0	Unacceptable[2]
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Cs-134	3.22	3.40	-5.3	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Cs-137	0.984	0.93	5.8	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Co-57	2.50	2.36	5.9	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Co-60	0.037	N/A	N/A	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Mn-54	2.37	2.30	3.0	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Sr-90	1.184	1.260	-6.0	Acceptable
MAPEP-09-RdV20	Veg.(Bq/sample)	1-Jan-09	Zn-65	1.52	1.354	12.3	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Am-241	0.506	0.636	-20.4	Warning[3]
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Cs-134	19.9	22.5	-11.6	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Cs-137	0.045	N/A	N/A	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Co-57	18.11	18.9	-4.2	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Co-60	16.58	17.21	-3.7	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	H-3	337	330.9	1.8	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Fe-55	52.1	48.2	8.1	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Mn-54	14.67	14.66	0.1	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Ni-63	43.4	53.5	-18.9	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Pu-238	0.987	1.18	-16.4	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Pu-239/240	0.689	0.853	-19.2	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Sr-90	6.66	7.21	-7.6	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	U-234	2.84	2.77	2.5	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	U-238	2.92	2.88	1.4	Acceptable
MAPEP-09-MaW20	Water (Bq/L)	1-Jan-09	Zn-65	13.36	13.6	-1.8	Acceptable

[1]CR-09-12 was issued to investigate these negative biases. [2]CR-09-14 was issued to investigate these positive biases. [3]CR-09-13 was issued to investigate this negative bias

TABLE 3
DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM RESULTS
AREVA NP ENVIRONMENTAL LABORATORY
Continued

SAMPLE ID	MATRIX/ UNITS	REFERENCE DATE	RADIO-NUCLIDE	REPORTED MEAN VALUE Bq/Units	MAPEP VALUE Bq/Units	% BIAS	PERFORMANCE EVALUATION
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Cs-134	-0.006		N/A	Acceptable
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Cs-137	1.437	1.40	2.6	Acceptable
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Co-57	6.7	6.48	3.4	Acceptable
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Co-60	1.010	1.03	-1.9	Acceptable
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Mn-54	5.77	5.49	5.1	Acceptable
MAPEP-09-RdF21	Filter (Bq/filter)	1-Jul-09	Zn-65	4.44	3.93	13.0	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Cs-134	1.7		N/A	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Cs-137	730	669	9.1	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Co-57	624	586	6.5	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Co-60	342	327	4.6	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Mn-54	880	796	10.6	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	K-40	403	375	7.5	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Sr-90	410	455	-9.9	Acceptable
MAPEP-09-MaS21	Soil (Bq/kg)	1-Jul-09	Zn-65	1328	1178	12.7	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Cs-134	0.02		N/A	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Cs-137	2.41	2.43	-0.8	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Co-57	7.63	8.0	-4.6	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Co-60	2.46	2.57	-4.3	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Mn-54	7.75	7.9	-1.9	Acceptable
MAPEP-09-RdV21	Veg.(Bq/sample)	1-Jul-09	Zn-65	-0.10		N/A	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Am-241	0.811	1.04	-22.0	Warning[1]
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Cs-134	28.6	32.2	-11.2	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Cs-137	40.9	41.2	-0.7	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Co-57	34.8	36.6	-4.9	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Co-60	14.67	15.4	-4.7	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	H-3	585	634.1	-7.7	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Fe-55	58.9	60.8	-3.1	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Mn-54	-0.082		N/A	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Ni-63	39.6	44.2	-10.4	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Pu-238	0.0111	0.018	N/A	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Pu-239/240	1.260	1.64	-23.2	Warning[2]
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Sr-90	12.06	12.99	-7.2	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Tc-99	8.89	10	-11.1	Acceptable
MAPEP-09-MaW21	Water (Bq/L)	1-Jul-09	Zn-65	27.8	26.9	3.3	Acceptable

[1] These results are being addressed in conjunction with CR 09-13.
[2] These results are being addressed in conjunction with CR 09-12.

TABLE 4

NEW YORK STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM
PROFICIENCY TEST RESULTS
AREVA NP ENVIRONMENTAL LABORATORY

ELAP LOT #/ REF. DATE	MATRIX/ UNITS	RADIO-NUCLIDE	REPORTED VALUE pCi/L	ELAP VALUE pCi/L	ELAP ACCEPTANCE LIMITS	PERFORMANCE EVALUATION
ALPBT 2263 04/07/09	Water pCi/L	Gross Alpha	31.8	43.7	25.6 – 61.8	Satisfactory
ALPBT 2263 04/07/09	Water pCi/L	Gross Beta	51.0	49.4	37.3 – 61.5	Satisfactory
PWTRIT 2266 04/07/09	Water pCi/L	Tritium	13100	14200	12600 – 15800	Satisfactory
PWGAMA 2262 04/07/09	Water pCi/L	Ba-133	56.4	56.2	48.1 – 64.3	Satisfactory
PWGAMA 2262 04/07/09	Water pCi/L	Cs-134	48.5	49.1	42.2 – 56.0	Satisfactory
PWGAMA 2262 04/07/09	Water pCi/L	Cs-137	88.3	87.5	78.5 – 96.4	Satisfactory
PWGAMA 2262 04/07/09	Water pCi/L	Co-60	101	107	97.3 – 117	Satisfactory
PWGAMA 2262 04/07/09	Water pCi/L	Zn-65	312	318	282 – 354	Satisfactory
PWIODINE 2264 4/07/09	Water pCi/L	I-131	21.8	23.0	18.9 – 27.2	Satisfactory

ELAP LOT #/ REF. DATE	MATRIX/ UNITS	RADIO-NUCLIDE	REPORTED VALUE pCi/L	ELAP VALUE pCi/L	ELAP ACCEPTANCE LIMITS	PERFORMANCE EVALUATION
ALPBT 2763 09/29/09	Water pCi/L	Gross Alpha	28.0	39.2	22.8 - 55.6	Satisfactory
ALPBT 2763 09/29/09	Water pCi/L	Gross Beta	35.1	31.2	21.6 - 40.9	Satisfactory
PWTRIT 2766 09/29/09	Water pCi/L	Tritium	19600	20800	18500 - 23100	Satisfactory
PWGAMA 2762 09/29/09	Water pCi/L	Ba-133	23.9	26.5	21.4 - 31.5	Satisfactory
PWGAMA 2762 09/29/09	Water pCi/L	Cs-134	71.2	69.7	60.7 - 78.7	Satisfactory
PWGAMA 2762 09/29/09	Water pCi/L	Cs-137	159	173	158 -188	Satisfactory
PWGAMA 2762 09/29/09	Water pCi/L	Co-60	63.2	66.8	59.8 - 73.8	Satisfactory
PWGAMA 2762 09/29/09	Water pCi/L	Zn-65	154	171	150 -192	Satisfactory
PWIODINE 2764 09/29/09	Water pCi/L	I-131	14.5	15.1	12.0 - 18.2	Satisfactory

TABLE 5

AREVA NP ENVIRONMENTAL LABORATORY
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
INTRA-LABORATORY ENVIRONMENTAL PROCESS CONTROL RESULTS BY ACCEPTANCE CRITERIA, MEDIA, AND ANALYSIS CATEGORIES
JANUARY - DECEMBER 2009

	Bias Criteria (1)		Precision Criteria (1), (2)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
I. Air Particulate				
Gross Beta	255	0	0	0
II. Air Charcoal				
Gamma-Quantitative	156	0	0	0
III. Food (Aquatic/Terrestrial)				
Gamma	0	0	16	0
Sr-90	0	0	4	0
IV. Milk				
Gamma	0	0	0	0
Iodine (LL)	3	0	3	0
Sr-89	0	0	0	0
Sr-90	0	0	0	0
V. Soil/Sed.				
Gamma	0	0	0	0
Sr-90	0	0	0	0
H-3	0	0	6	0
VI. Vegetation (Aquatic/Terrestrial)				
Gamma	0	0	0	0
Iodine (LL)	0	0	0	0
VII. Water				
Gross Alpha	5	1	8	0
Gross Beta	6	0	10	2
Gamma	26	0	56	2
Iodine (LL)	0	0	0	2
Sr-89	0	0	0	0
Sr-90	3	0	0	0
Tritium	23	0	24	0
Total Number In Range:	**477**	**1**	**127**	**6**
Percentage of Total Processed	**99.8**	**0.2**	**95.5**	**4.5**
Sum of Analyses:	**478**		**133**	

(1) Bias and Precision as noted in Table 1, (2) Some Precision data generated from non-positive client samples for specific contractual evaluations.

TABLE 6

AREVA NP ENVIRONMENTAL LABORATORY
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
INTRA-LABORATORY AND INTER-LABORATORY
DATA SUMMARY: BIAS AND PRECISION BY MEDIA
JANUARY - DECEMBER 2009

	Bias Criteria (1)		Precision Criteria (1), (2)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
I. Air Particulate				
Gross Alpha	11	1	12	0
Gross Beta	267	0	12	0
Gamma	54	0	87	0
Sr-90	0	0	2	0
II. Air Charcoal				
Gamma-Quantitative	168	0	12	0
III. Food (Aquatic/Terrestrial)				
Gamma	0	0	16	0
Sr-90	0	0	4	0
IV. Milk				
Gamma	120	0	120	0
Iodine (LL)	15	0	15	0
Sr-89	6	0	6	0
Sr-90	6	0	6	0
V. Soil/Sed.				
Gamma	0	0	36	0
Sr-90	0	0	5	0
H-3	0	0	6	0
VI. Vegetation (Aquatic/Terrestrial)				
Gamma	0	0	27	0
Iodine (LL)	0	0	0	0
Sr-90	0	0	3	0
VII. Water				
Gross Alpha	14	4	20	0
Gross Beta	18	0	22	2
Gamma	144	2	205	3
Iodine (LL)	12	0	12	2
Sr-89	12	0	12	0
Sr-90	15	0	16	0
Tritium	35	0	42	0
Total Number In Range:	**897**	**7**	**698**	**7**
Percentage of Total Processed	**99.2**	**0.8**	**99.0**	**1.0**
Sum of Analyses:	**904**		**705**	

(1) Bias and Precision as noted in Table 1. (2) Data includes intra-laboratory and Analytics cross-checks evaluated for accuracy and precision and MAPEP samples evaluated for precision only.

TABLE 7

AREVA NP ENVIRONMENTAL LABORATORY
ADDITIONAL ENVIRONMENTAL ANALYSES
INTRA-LABORATORY AND INTER-LABORATORY
BIAS AND PRECISION BY ANALYSIS TYPE
JANUARY - DECEMBER 2009

	Bias Criteria (1)		Precision Criteria (1), (2)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
I. Am-241				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
II. C-14				
Soil	0	0	6	0
Water	3	0	0	0
III. Fe-55				
Water	3	0	5	0
IV. Ni-63				
Water	3	0	5	0
V. Pu-238				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
VI. Pu-239				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
VI. Ra-226				
Water	2	0	4	0
VII. Ra-228				
Water	2	0	4	0
VIII. Tc-99				
Water	0	0	2	0
IX. Th-230				
Water	1	1	4	0
X. U-234				
Water	2	0	6	0
XI. U-238				
Water	2	0	6	0
Total Number In Range:	**18**	**1**	**60**	**0**
Percentage of Total Processed	**94.7**	**5.3**	**100**	**0**
Sum of Analyses:	19		60	

(1) Bias and Precision as noted in Table 1. (2) Data includes intra-laboratory and Analytics cross-checks evaluated for accuracy and precision and MAPEP samples evaluated for precision only.

TABLE 8

AREVA NP ENVIRONMENTAL LABORATORY
ALL ENVIRONMENTAL ANALYSES
INTRA-LABORATORY AND INTER-LABORATORY
BIAS AND PRECISION BY ANALYSIS TYPE
JANUARY - DECEMBER 2009

	Bias Criteria (1)		Precision Criteria (1), (2)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
I. Gross Alpha				
Air Filter	11	1	12	0
Water	14	4	20	0
II. Gross Beta				
Air Filter	267	0	12	0
Water	18	0	22	2
III. Gamma				
Air Filter	54	0	87	0
Charcoal-Quantitative	168	0	12	0
Food	0	0	16	0
Milk	120	0	120	0
Soil/Sediment	0	0	36	0
Vegetation	0	0	27	0
Water	144	2	205	3
IV. Iodine (LL)				
Milk	15	0	15	0
Vegetation	0	0	0	0
Water	12	0	12	2
V. Sr-89				
Milk	6	0	6	0
Water	12	0	12	0
VI. Sr-90				
Air Filter	0	0	2	0
Food	0	0	4	0
Milk	6	0	6	0
Soil/Sediment	0	0	5	0
Vegetation	0	0	3	0
Water	15	0	16	0
VII. Tritium				
Soil	0	0	6	0
Water	35	0	42	0

TABLE 8

AREVA NP ENVIRONMENTAL LABORATORY
ALL ENVIRONMENTAL ANALYSES
INTRA-LABORATORY AND INTER-LABORATORY
BIAS AND PRECISION BY ANALYSIS TYPE
JANUARY - DECEMBER 2009
Continued

	Bias Criteria (1)		Precision Criteria (1), (2)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
VII. Am-241				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
IX. C-14				
Soil	0	0	6	0
Water	3	0	0	0
X. Fe-55				
Water	3	0	5	0
XI. Ni-63				
Water	3	0	5	0
XII. Pu-238				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
XIII. Pu-239				
Filter	0	0	2	0
Soil	0	0	0	0
Water	0	0	4	0
XIV. Ra-226				
Water	2	0	4	0
XV. Ra-228				
Water	2	0	4	0
XVI. Tc-99				
Water	0	0	2	0
XVII. Th-230				
Water	1	1	4	0
XVIII. U-234				
Water	2	0	6	0
XIX. U-238				
Water	2	0	6	0
Total Number In Range:	915	8	758	7
Percentage of Total Processed	99.1	0.9	99.1	0.9
Sum of Analyses:	923		765	

TABLE 9

AREVA NP ENVIRONMENTAL LABORATORY
ENVIRONMENTAL BIAS AND PRECISION BY YEAR

	Bias			Precision		
	Deviation from Known			Deviation from Mean		
	Bias Criteria (1)			Precision Criteria (2)		
Year	# Within Criteria	# Outside Criteria	% Within Criteria	# Within Criteria	# Outside Criteria	% Within Criteria
2009	915	8	**99.1**	758	7	**99.1**
2008	1125	41	**96.5**	841	15	**98.2**
2007	798	17	**97.9**	488	1	**99.8**
2006	689	5	**99.3**	589	2	**99.7**
2005	1069	3	**99.7**	507	0	**100.0**
2004	1294	10	**99.2**	862	2	**99.8**
2003	828	13	**98.5**	515	1	**99.8**
2002	863	7	**99.2**	471	3	**99.4**
2001	578	22	**96.3**	394	2	**99.5**
2000	574	18	**97.0**	448	1	**99.8**
1999	467	13	**97.3**	357	2	**99.4**
1998	496	7	**98.6**	432	4	**99.1**
1997	515	11	**97.9**	363	0	**100.0**
1996	907	24	**97.4**	800	3	**99.6**
1995	403	12	**97.1**	267	0	**100.0**
1994	529	14	**97.4**	336	1	**99.7**
1993	443	29	**93.9**	312	1	**99.7**
1992	728	21	**97.2**	797	1	**99.9**
1991	770	19	**97.6**	822	4	**99.5**
1990	728	34	**95.5**	761	2	**99.7**
1989	689	28	**96.1**	710	4	**99.4**
1988	632	22	**96.6**	632	1	**99.8**
1987	702	27	**96.3**	718	3	**99.6**
1986	813	27	**96.8**	815	0	**100.0**
1985	718	25	**96.6**	682	0	**100.0**
1984	837	31	**96.4**	850	0	**100.0**
1983	794	36	**95.7**	798	4	**99.5**
1982	585	30	**95.1**	743	12	**98.4**
1981	443	29	**93.9**	404	1	**99.8**
1980	442	37	**92.3**	490	1	**99.8**
1979	199	20	**90.9**	354	16	**95.7**
1978	242	20	**92.4**	361	14	**96.3**
1977	58	8	**87.9**	119	7	**94.4**
Total # in Range:	**21,873**	**668**	**97.0**	**18,796**	**115**	**99.4**
% in Range	**97.0**	**3.0**		**99.4**	**0.6**	
Total Number	**22,541**			**18,911**		

(1) Bias as noted in Table 1, (2) Precision as noted in Table 1.

TABLE 10

PERCENTAGE OF INDIVIDUAL DOSIMETERS THAT PASSED E-LAB INTERNAL CRITERIA JANUARY – DECEMBER 2009[(1), (2)]

Dosimeter Type	Number Tested	% Passed Bias Criteria	% Passed Precision Criteria
Panasonic Environmental	84	100	100

[(1)]This table summarizes results of tests conducted by E-LAB and the Third-party tester.
[(2)]Environmental dosimeter results are free in air.

TABLE 11

SUMMARY OF THIRD PARTY DOSIMETER TESTING JANUARY – DECEMBER 2009[(1), (2)]

Dosimeter Type	Exposure Period	ANSI Category	% (Bias ± SD)*
Panasonic Environmental	FH 2009	II	8.1 +/- 2.0
	SH 2009	II	-1.8 +/- 2.5

[(1)]Performance criteria are the same as the internal criteria.
[(2)]Results are expressed as the delivered exposure for environmental TLD. ANSI HPS N13.29-1995 (Draft) Category II, High energy photons (Cs-137 or Co-60).

TABLE 12

PERCENTAGE OF MEAN DOSIMETER ANALYSES (N=6) WHICH PASSED TOLERANCE CRITERIA JANUARY – DECEMBER 2009[(1), (2)]

Dosimeter Type	Number of Evaluations	% Passed Tolerance Limit
Panasonic Environmental[(2)]	14	100

[(1)]This table summarizes results of tests conducted by E-LAB and the Third-party tester.
[(2)]Environmental dosimeter results are free in air.
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TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY
CONDITION REPORT (CR) STATUS
JANUARY – DECEMBER 2009

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 08-01	23-Jan-08	23-Mar-09	3rd qtr. 2007 Analytics environmental cross check filters failed bias criteria for gross alpha	CLOSED-The paperwork was checked for errors, the sample was recounted, and a new alpha filter was used to calibrate the alpha/beta system. None of these actions produced a reason found for the failure. Two subsequent sets of Analytics filters were acceptable. Since the precision for the failed filters was < 5% over time and among different calibrations, it appears that variability in the preparation of the filters themselves may be the cause of the failures. Prior to 2003, the bias and precision acceptance criteria for gross alpha on a filter were +/- 25%. Assuming that variability in either the absorption or source distribution of the filters is responsible for the variation in the observed accuracy, LQARC approved a change in the criteria to +/- 25.
CR 08-09	07- Mar-08	19-May-09	Decay correction errors on past QC Summary Report.	CLOSED- Updated QC summary reports containing results with accurate decay corrections were sent to clients as required. E-Lab Procedure 790, Laboratory Batch Quality Control Handling, was created to formalize the required steps to create an accurate QC Summary Report. The signatures of the preparer and an independent reviewer are now required on QC Summary Reports.
CR 08-23	22-Jul-08	25-Mar-09	The mean of three consecutive charcoal PCs failed the accuracy criterion	CLOSED - These QC samples contain Ba-133 to approximate an energy close to I-131. The samples were counted on the manual germanium detectors instead of the automatic sample changer. The sample geometry on these detectors is more sensitive to summing than the changer. Ba-133 summing corrections have been determined for each manual detector. Charcoal cartridges containing Ba-133 and counted on the manual detectors have been corrected for summing. All Ba-133 corrected data is within the acceptance criteria. There is no effect on client charcoal cartridges which are analyzed for I-131 concentration.
CR 08-30	15-Oct-08	22-Apr-09	Zr-95 missing from analysis report	CLOSED - The gamma spectrometry analysis report was found to be missing the Zr-95 result when greater than 29 nuclides are reported. Sixty-nine reports for five clients were affected. Updated reports were sent to clients. A multi-page report was developed and approved for use on 04/14/2009.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY CONDITION REPORT (CR) STATUS JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 08-36	4-Nov-08	26-Mar-09	Gross beta analysis of a water sample failed the Manual 100 criteria for duplicates	CLOSED - The investigation indicated that either the duplicate was not the same sample as the original or that severe settling occurred in the sample container. The reason could not be verified since the original sample had been discarded. In the future, samples will be labeled to ensure that they are not discarded until the duplicate evaluation is complete. Also, because decay correction is not applied to gross beta analyses, duplicates for this analysis will be submitted simultaneously. Training was conducted and the entire laboratory staff was counseled to ensure that water samples are shaken vigorously and the analysis aliquot is taken immediately after shaking, and to ensure that sample labels are double-checked when retrieving samples for analysis.
CR 08-38	18-Nov-08	21-Dec-09	MAPEP Series 19 Pu-238 in water fell into the warning category with a -28.6% bias	CLOSED – All spectra associated with the two MAPEP water samples were reviewed, and no improvement was noted in the peak start/stop selection by the analyst. Multiple counts were performed using different detectors and were analyzed by different people. All of the stored spectra provide virtually identical results for Pu-238. The problem does not lie with the instrumentation or the analyst's selection of peak regions. Four sample aliquots were subsequently submitted for the MAPEP 21 water. The first two were processed using standard environmental methods the third and fourth were processed using a sample fusion preparatory step. This was performed to determine if the oxidation state of the plutonium provided by MAPEP was not being converted completely during the process. There appears to be no benefit in modifying the preparation method as the bias for all samples remains consistently at (-20-25%). MAPEP Series 21 samples contained both Am-241 and Pu-239/240 and were reported with -22.0% and -23.2% biases. Continued problems with environmental transuranic analysis required a new Condition Report. This CR was closed and further investigation into the negative bias will be documented in CR 09-33.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY CONDITION REPORT (CR) STATUS JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 08-39	18-Nov-08	26-Mar-09	MAPEP Series 19 Co-60 on a filter fell into the not acceptable category due to reporting a false positive result.	CLOSED - The MAPEP AP filter was counted 3 times on the same gamma detector. Background spectra, with and without a sample holder were reviewed and no Co-60 was detected. All 3 counts of the MAPEP filter identified the 1173 peak and 2 identified the 1332 peak. The root cause appears to be the low uncertainty reported by the E-LAB. Only one of 42 other Labs reported a lower uncertainty than AREVA, and this Lab also failed the test. The distribution of results reported by the various participants showed that ten Labs reported results between 0.02 and 0.03 Bq, the highest frequency. However, the uncertainties reported by these Labs were sufficiently large that they passed the false positive test. Since the distribution of reported results centers roughly around the value reported by the E-Lab, and since Co-57 was also present on the filter at a concentration of 1.5 Bq, it appears that the source of the Co-60 found on the filter could be a contaminant in the Co-57 source used rather than contamination obtained at the E-LAB.
CR 08-40	18-Nov-08	21-Dec-09	MAPEP Series 19 Sr-90 in soil was a false positive test. No result was reported by the AREVA Lab due to inconsistent results (positive and negative).	CLOSED - The root cause of this QC failure was not determined conclusively. It appears that a low-level contaminant bled through the separation columns on only one of the strontium-90 samples and due to the low activity level, cannot be positively identified. The second analysis result was within the acceptance criteria of the MAPEP program as a false positive check. However, due to the inconsistency, neither value could be reported. The previous MAPEP test, series 18, had a successful Sr-90 in soil test with a bias of -7.3% and the subsequent MAPEP test, series 20, had a bias of -2.7%.
CR 08-41	26-Nov-08	26-Mar-09	Gamma spectrometry results generated using incorrect efficiency files were reported to three customers.	CLOSED - A new chemist, recently trained to perform sample preparation did not specify the correct geometry in LIMS. This chemist also performed the gamma spectrometry analyses and did not identify the error. All affected results were updated and reissued. The chemist was counseled and retrained on proper geometry selection. Finally, the software was revised to make it easier for a reviewer to identify similar errors.
CR 08-42	17-Dec-08	26-Mar-09	One client AP sample was inadvertently thrown in the trash.	CLOSED - The filter was retrieved prior to disposal in its original bag which was inside a larger bag containing empty filter bags from another client. A designated storage area for air filters and other small samples separate from the sample preparation area was established. The sample control staff was counseled concerning proper sample handling.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY
CONDITION REPORT (CR) STATUS
JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 08-43	17-Dec-08	07-Jul-09	U-232 tracer verification, YA942324-A was outside the limits of Procedure 730.	CLOSED - The U-232 tracer was assigned the original certificate value, not the concentration obtained from the verification analysis. The LIMS data were reviewed to ensure that the correct tracer concentration was recorded. Procedures 720 and 730 were revised to allow for broader verification limits for tracers requiring radiochemical processing as part of the verification. No client results required updating since recalculation of analysis results for the change in the tracer known value would result in a change in the reported value of less than 1/3 of the acceptance criteria for the analysis. A similar situation for Th-229 tracer, discovered during the investigation of this CR was similarly corrected.
CR 09-02	20-Jan-09	07-Aug-09	Fourth Qtr 2008 P61 Fe-55 Process Checks failed Manual 100 criteria for precision	CLOSED – No errors were identified with either the chemistry data or the source certificates. The cause of the failure was investigated in conjunction with CR 09-04, which involved another process check failure for Fe-55. No definitive cause for the failures was determined. In order to ensure accuracy of client results, the senior radiochemist is performing Fe-55 analyses for all Part 50 and Part 61 samples. The process will be closely monitored to see if any procedural steps need enhancement. In addition, an Fe-55 spike will continue to be processed with each batch of samples.
CR 09-04	18-Feb-09	25-Aug-09	Q1-2009 Fe-55 P61 PC failed with high bias.	CLOSED - The samples were reprocessed from the container submitted for the process checks and from the master stock solution. Both sets passed the Manual 100 accuracy criterion. Corrective actions are the same as those documented for CR 09-02.
CR 09-06	24-Mar-09	14-Apr-09	The gross beta count rates for a few environmental water samples were measured to be higher than expected. Recounts of these samples over a 24 hour period showed a significant decrease in the gross beta count rates for some samples. A review of Procedure 320 revealed that Step B.2.g was not performed.	CLOSED - Based upon the analysis of six duplicate samples, the omission of Step B.2.g did not have a significant effect on the gross beta activity determination. Procedure 320 was revised to add a hold time between sample preparation and analysis and to clarify the use of a desiccator to store the samples. No change was made to the requirement to dry the samples in the oven (Step B.2.g). Analysts were retrained on Procedure 320 and the necessity of adhering to the written procedures.
CR 09-10	11-May-09	08-Jul-09	Ra-224 decay correction should use Th-228 from sample collection to radium separation step	CLOSED - The spreadsheet was revised, documented, and a V&V was performed, to allow for Ra-224 decay using this option. E-Lab radium procedures were revised to incorporate this Ra-224 decay correction, and worksheets were revised to allow chemists to record the radium separation time.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY
CONDITION REPORT (CR) STATUS
JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 09-11	22-May-09	07-Aug-09	Ra-228 samples have precipitate which may be causing unusual matrix spike results and incorrect recovery values	CLOSED - E-Lab Procedure 305 was revised to incorporate additional steps, if required, to allow the Chemist to perform and document changes or additional steps taken to dissolve the solids.
CR 09-12	08-Jun-09		MAPEP Series 20 Pu-238 and Pu-239/240 on a filter fell into the warning category with mean biases of -20.9% and -20.6%, respectively.	OPEN – The MAPEP Series 21 filter was processed by the Part61 chemist with acceptable results. The apparent cause of the Series 20 failure is a small container of tracer, stored in the environmental chemistry lab., that may have concentrated over time. To verify this, an aliquot of MAPEP 21 water (which also showed a low bias for Pu) is being reanalyzed in the environmental chemistry lab., using the Part 61 tracer. There is no impact on client results, as the E-Lab does not process any environmental samples for transuranic analysis.
CR 09-13	08-Jun-09		MAPEP Series 20 Am-241 in water fell into the warning category with a mean bias of -20.4%.	OPEN - The apparent cause of the Series 20 failure is a small container of tracer, stored in the environmental chemistry lab., that may have concentrated over time. To verify this, an aliquot of MAPEP 21 water (which also showed a low bias for Am-241) is being reanalyzed in the environmental chemistry lab., using the Part 61 tracer. There is no impact on client results, as the E-Lab does not process any environmental samples for transuranic analysis.
CR 09-14	08-Jun-09	03-Sep-09	MAPEP Series 20 Gamma in soil fell into the warning and “not acceptable” categories with mean biases for several nuclides ranging from +24% to +31%.	CLOSED - It was determined that, due to the extremely fine nature of the soil particles, the material settled over time to a more compact geometry than the calibration height. A recount of the sample with additional soil added to reach the calibrated geometry produced results that were within 10% of the MAPEP values for all nuclides. The sample preparation technician was trained on techniques specific to soil samples with very fine granules.
CR 09-15	09-Jun-09	01-JUL-09	Gamma spectrometry analysis reports sent out with incorrect sample receipt date.	CLOSED - Review of the analysis report code revealed that the sample receipt date on the report was pulled from the sample reference date field in the LIMS database. Further review confirmed that all other data was correct. This incorrect database link occurred during a revision to the report. The analysis report has been revised and all affected reports were updated and sent to clients. The QA officer counseled the programmer and the reviewer on the importance of verifying the accuracy of all data appearing on a report, form, or screen, whenever a change is made, in accordance with Procedure 600.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY
CONDITION REPORT (CR) STATUS
JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 09-18	30-Jun-09	21-Dec-09	Discrepancies in Procedure 365	CLOSED - Fe-55 and Ni-63 weight and recovery calculations were performed differently depending on whether the LIMS calculations were used or the worksheet was used. The discrepancy is a result of accounting for the recovery aliquot in two different, but equally valid ways. There is no impact on customer results since the final calculated concentrations of Fe-55 and Ni-63 are the same using both methods. For clarity, the calculations were removed from the worksheet.
CR 09-21	20-Jul-09	29-Dec-09	First Qtr 2009 Analytics environmental water cross-check failed Manual 100 accuracy criteria for gross alpha analysis.	CLOSED – The same chemist prepared the second quarter cross-check samples for gross alpha analysis while being observed by a senior chemist. The second quarter results were -3.2% from the known value. The senior chemist observed the processing chemist prepare another aliquot of the first qtr. cross-check water and also the third qtr. samples. The gross alpha reanalysis results showed biases within Manual 100 criteria. Corrective actions included instructing the processing chemist to take her time and increase the rinses and policing performed for gross alpha\beta analysis of water samples.
CR 09-22	23-Jul-09	17-Nov-09	Typographical error identified on environmental gamma spectrometry analysis report.	CLOSED - The "TPU 1-Sigma" heading on the report was inappropriately changed to "TPU 2-Sigma" for some clients during the last revision of the analysis report routine. The incorrect TPU header occurred because the programmer didn't realize that the analysis reports include the TPU results calculated at 1-sigma despite the counting uncertainty value requested by the customer. Originally, the V&V of the revision to the report did not consist of a test of all of the special cases of the report. All affected clients were contacted, and updated reports were issued. Procedure 600 was revised to require that all permutations of a revised software product are tested. In addition, the testing must be reviewed by two independent people who are knowledgeable of the required specifications.
CR 09-24	13-Aug-09		Corrective Actions from Internal Assessment 08-02, Source Preparation	OPEN – One action item resulting from Internal Assessment 08-02, on Source Preparation, remains open. The verification attempt on the Th-230 secondary standard 9414-C was outside the Procedure 720 criterion. A new standard was received from NIST and has been verified. The old standard was used only to prepare matrix spikes and control spikes for select clients. The impact of using this source after the verification due date is being evaluated.

TABLE 13

AREVA NP ENVIRONMENTAL LABORATORY
CONDITION REPORT (CR) STATUS
JANUARY – DECEMBER 2009 (Continued)

CR #	(OPEN) INITIATION DATE	(CLOSED) CLOSE-OUT DATE	DESCRIPTION	STATUS AS OF 12/31/09
CR 09-26	13-Aug-09		During the 2009 EXELON audit, the E-Lab file server directory containing E-Lab manuals and procedures did not have security controls	OPEN - The AREVA IS department immediately limited access to "read-only" for all but a limited number of employees designated by the Lab Manager. Procedure and manual files in the E-Lab library directory were compared to those stored in the corporate document storage system. All of the documents in the E-Lab library directory were identical to the controlled copies in the corporate system, for the items compared. Other directories requiring security controls were identified and set to "read-only". The E-Lab has monitored these directories to assure that controls remain in place, and will continue to monitor them quarterly. This CR is ready to close.
CR 09-28	02-Oct-09	22-Dec-09	The five-year review for Procedure 466 was missed and the Manual Index listed the wrong revision for Manual 100.	CLOSED - The root cause of the missed five-year review was that it was never added to the "Next Review Date" index for procedures. This is a second index maintained in addition to regular procedure index. The "Next Review Date" indices were eliminated, and the Procedure and Manual indices were revised to allow sorting by "Next Review Date". The project administrator was counseled on the requirement to make sure that all dates are updated when issuing a revised procedure or manual index. In addition, Procedure 010, was revised to incorporate all of the steps required to revise and issue a procedure or manual.
CR 09-29	22-Oct-09		First quarter Analytics environmental cross-check reference date was in error by one day.	OPEN – The reference date used to calculate the 1st Quarter Analytics Environmental cross-check samples was in error by one day. There is no impact on client results, as the changes in concentrations are not sufficient to cause any of the analyses to fail the Manual 100 accuracy criteria. All results are being updated, however, and are discussed in the 2009 annual quality assurance report.
CR 09-30	22-Oct-09		Client EDD file had incorrect sample receipt date	OPEN – The apparent causes were determined to be an unsatisfactory turnaround time for independent review of the completed receipt paperwork, and lack of management notification of the error so that it could be corrected on the analysis report and in the EDD. Corrective actions are pending.
CR 09-31	30-NOV-09		One of 5 gamma qualification samples failed Manual 100 accuracy criteria for all 3 nuclides	OPEN – A single spiked water sample, containing 3 radionuclides, was used as a gamma instrumentation qualification sample. The sample was counted five times, and the results of one count failed the Manual 100 accuracy criteria for all three nuclides. The reason for the failure is under investigation.
CR 09-33	21-Dec-09		H-3 MDC for one client sample not <400pCi/L	OPEN – The client sample in question was an analytical blank. A review of all projects requiring batch QC was performed. The required MDCs for the blanks were not listed on the analysis reports for all projects, however, the analysis reports do not need to be updated as the required MDCs were met for the blanks. Corrective actions are pending.

TABLE 14

UPDATED INSTRUMENTATION/ANALYTICAL PROCEDURES RELEVANT TO ENVIRONMENTAL SAMPLE ANALYSIS AND ENVIRONMENTAL DOSIMETRY ISSUED DURING JANUARY – DECEMBER 2009

PROCEDURE NUMBER	TITLE	REVISION NUMBER	EFFECTIVE DATE	SUMMARY OF REVISION
120	Sample Storage and Accountability	20	09/30/09	Updated disposal discussions to place Part 50 sample disposal under LIMS control. Added verification of disposal methods by CHO/Haz Waste personnel. Clarified storage of Part 50/61 liquid scintillation vials. Deleted sewerage disposal option. Added a reference.
305	Preparation of Environmental and Bioassay Media for Analysis of Gamma Ray Emitters	24	08/10/09	Minor editorial changes. Slight changes to order of steps for ease of processing. Eliminated duplication in several sections. Added a new 0.5 L Marinelli beaker geometry. Updated Ra-228 preparation and counting sections for CR 09-11.
320	Preparation and Analysis of Environmental Water and Soil/Sediment/Sludge Samples for Gross Alpha and/or Gross Beta Radioactivity	27	09/15/09	Minor editorial changes. Added ability to modify non-EPA drinking water hold times if a client requested it and management approved.
340	The Determination of Iodine-131 in Environmental Media Using Anion Exchange Chromatography	30	11/30/09	Minor editorial changes. Section A.1 Vegetation /Food Crops sample preparation steps were revised to incorporate enhancements made to the procedure.
365	The Determination of ^{55}Fe, ^{63}Ni, ^{89,90}Sr, ^{241}Am, ^{242}Cm, $^{243/244}$Cm and ^{238}Pu, $^{239/240}$Pu, ^{241}Pu in Environmental and Bioassay Matrices	16	11/25/09	Reagents section: 15. Nickel carrier - replaced "preparation of" with "commercially available solution". 24. Strontium tracer values were changed from "5,000 - 10,000 dpm/ml," to "5,000 - 20,000 dpm/mL". The sample fraction volume taken for ICP analysis was clarified for Fe-55 and Ni-63. Weight notations in the procedure and FORMS were deleted to conform to the LIMS process.

TABLE 14

UPDATED INSTRUMENTATION/ANALYTICAL PROCEDURES RELEVANT TO ENVIRONMENTAL SAMPLE ANALYSIS AND ENVIRONMENTAL DOSIMETRY ISSUED DURING JANUARY – DECEMBER 2009 (Continued)

PROCEDURE NUMBER	TITLE	REVISION NUMBER	EFFECTIVE DATE	SUMMARY OF REVISION
368	The Determination of Sr-89,90 in Environmental Media Via Cerenkov Counting	13	11/20/09	Changed 3M HN03 to 8M as necessary in various sections of the procedure. Changed the amount of 3% EDTA rinse solution to 1000mL for a 2000g milk sample. The soil method (Strong Acid Leach) section of the procedure was changed to reflect the method that elicits the best recovery for a majority of the soil samples routinely processed. The flow chart was corrected to reflect procedural changes.
382	The Determination of Radium Isotopes In Bioassay Matrices	5	07/10/09	Precaution number 5 in the previous revision erroneously stated that Ra-224 may be in equilibrium with Th232. This revision corrects "Th-232" to "Th-228" as this is the correct parent\daughter equilibrium condition for Ra-224. No changes were required of the software as the decay correction calculation correctly uses the Th-228 half-life.
385	The Determination of Radium Isotopes in Environmental Matrices by Alpha Spectrometry	8	07/10/09	Precaution number 5 in the previous revision erroneously stated that Ra-224 may be in equilibrium with Th232. This revision corrects "Th-232" to "Th-228" as this is the correct parent\daughter equilibrium condition for Ra-224. No changes were required of the software as the decay correction calculation correctly uses the Th-228 half-life.
395	The Sequential Determination of Isotopic Uranium, Thorium and Radium in Environmental Matrices by Alpha Spectrometry	5	07/10/09	Precaution number 5 in the previous revision erroneously stated that Ra-224 may be in equilibrium with Th232. This revision corrects "Th-232" to "Th-228" as this is the correct parent\daughter equilibrium condition for Ra-224. No changes were required of the software as the decay correction calculation correctly uses the Th-228 half-life.
430	Operation and Calibration of the Beta-Gamma Coincidence Units for I-131	15	05/25/09	Revised to add the correct AREVA NP Protection of Proprietary Information statement.
600	Development, Documentation, Verification, and Validation of	13	11/02/09	Step E.7 was revised to require the analyst to ensure that all possible permutations of the end product are tested, and to require that two

TABLE 14

UPDATED INSTRUMENTATION/ANALYTICAL PROCEDURES RELEVANT TO ENVIRONMENTAL SAMPLE ANALYSIS AND ENVIRONMENTAL DOSIMETRY ISSUED DURING JANUARY – DECEMBER 2009 (Continued)

PROCEDURE NUMBER	TITLE	REVISION NUMBER	EFFECTIVE DATE	SUMMARY OF REVISION
	Computer Software			independent people knowledgeable of the required specifications review the V&V. Quality impact: This change will significantly improve the V&V process.
692	Report Generation Using LIMS	4	09/29/09	Minor editorial changes. Added a reference. Added a description of sample disposal reports.
710	Quality Control of Laboratory Instrumentation	20	08/06/09	Modified the equipment history section to permit use of a FORM or logbook. Modified the FORM for ease of use. Added dosimetry references and descriptions of calibration, QC and maintenance. Updated the liquid scintillation background statements.
715	Preparation of Tolerance Charts	21	07/14/09	Reformatted the entire procedure for ease of use. Added a reference for Beta-Gamma counter QC. Modified the Beta-Gamma QC limit to 6% based on the newly added Reference. Specified that the 1-sigma value be compared to the 1% value for nuclear instruments.
720	Preparation of Radioactive Standards and Source Matrices	21	06/18/09	Verification criteria for radioactive standards and source matrices were revised. Source verification forms were added to enable better documentation of prepared sources. Process check solutions with the exception of C-14 shall be valid for two years. Quality impact: enhanced due to non-ambiguity and better documentation.
730	Preparation and Verification of Carriers and Radiotracers	23	06/15/09	Verification criteria for stable carriers and radiotracers were revised to ensure consistency with procedure 720.
755	Good Laboratory Practices	0	07/07/09	New procedure created.
765	Guidelines for Maintaining the ELGA MEDICA 15 Water Systems	4	05/18/09	Revised the procedure to reflect the new deionized water systems installed in the environmental & part 50/61 lab areas. Quality Impact: enhanced due to state of the art water quality.

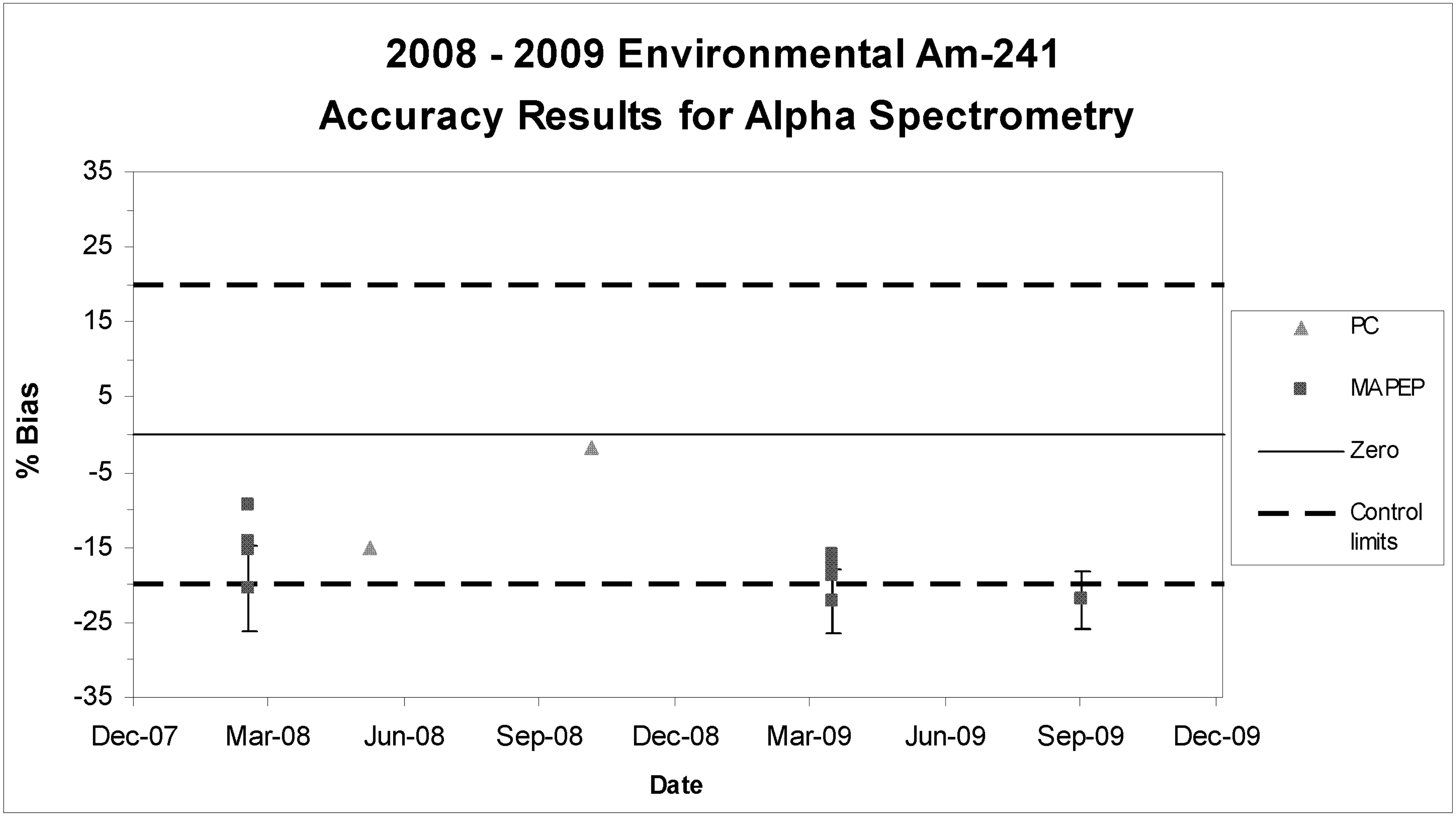
TABLE 14

UPDATED INSTRUMENTATION/ANALYTICAL PROCEDURES RELEVANT TO ENVIRONMENTAL SAMPLE ANALYSIS AND ENVIRONMENTAL DOSIMETRY ISSUED DURING JANUARY – DECEMBER 2009 (Continued)

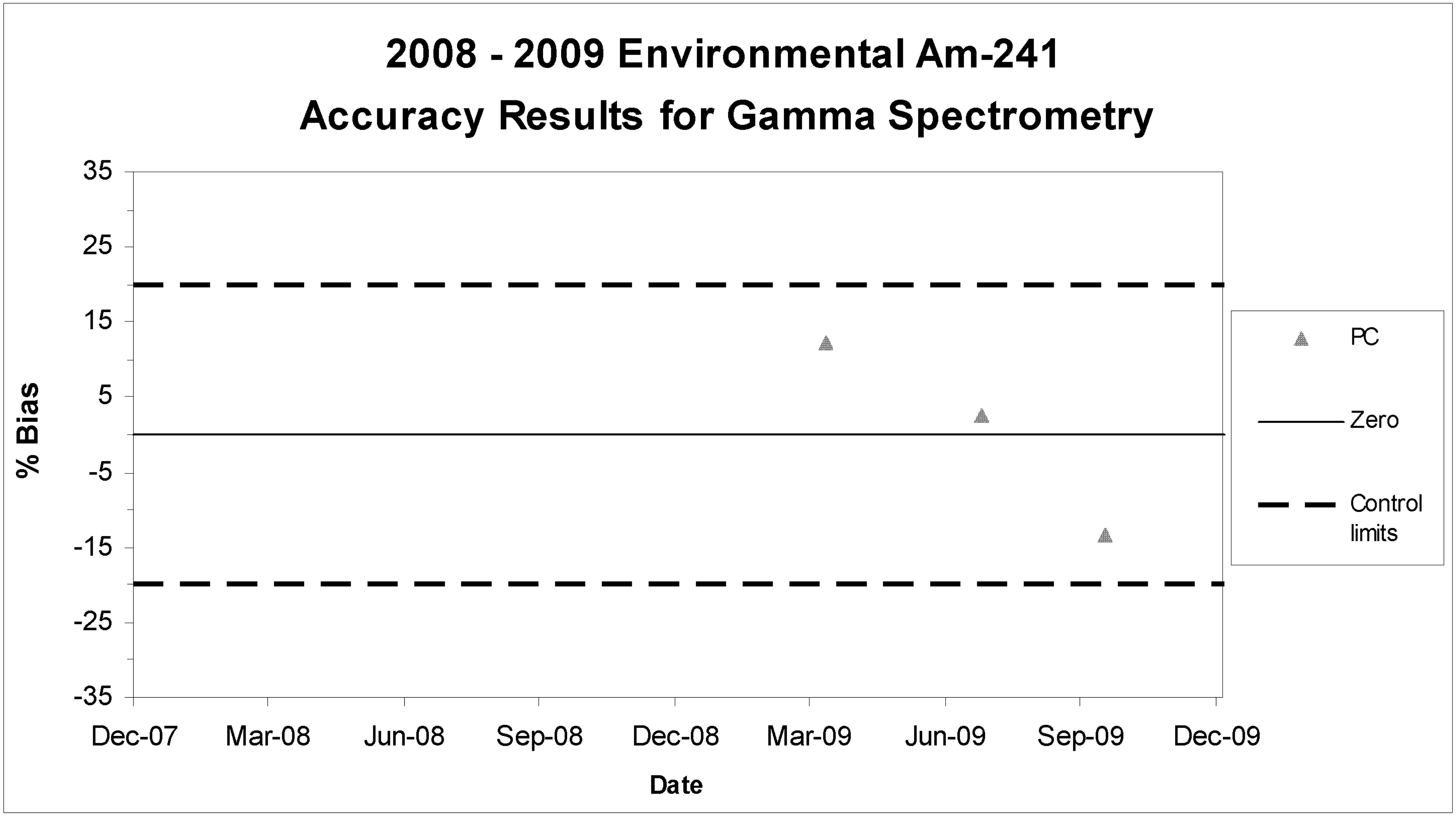
PROCEDURE NUMBER	TITLE	REVISION NUMBER	EFFECTIVE DATE	SUMMARY OF REVISION
770	Laboratory Quality Assurance and Control Programs	4	09/29/09	Duplicate sample submittal steps were added to indicate when duplicate samples should be analyzed at the same time as the reference samples. Sample preparation steps were added for MAPEP soil and vegetation samples. A step was added to require that internal assessment reports be issued within 30 days of completion of the assessment. A step was added to define internal assessment findings and recommendations and require that findings be documented in a Condition Report. Quality impact: Improved quality through timely documentation of assessment findings and recommendations.
790	Laboratory Batch Quality Control Handling	2	03/16/09	Several steps were added to make the procedure flow better. Flexibility to start sample analyses prior to creation of the batch QC samples, with management approval, was added. Unnecessary sections of FORM 790.2 were deleted.
1014	Calibration of the Panasonic UD-710A TLD Reader	12	11/03/09	A precaution was added to allow a grace period of +/-33% to the calibration periodicity requirement.
1030	Daily Quality Control Response Check of the Panasonic UD-710A TLD Reader	11	11/03/09	A step was added to require that the room temperature and humidity be recorded in the logbook each day the instrument is used.

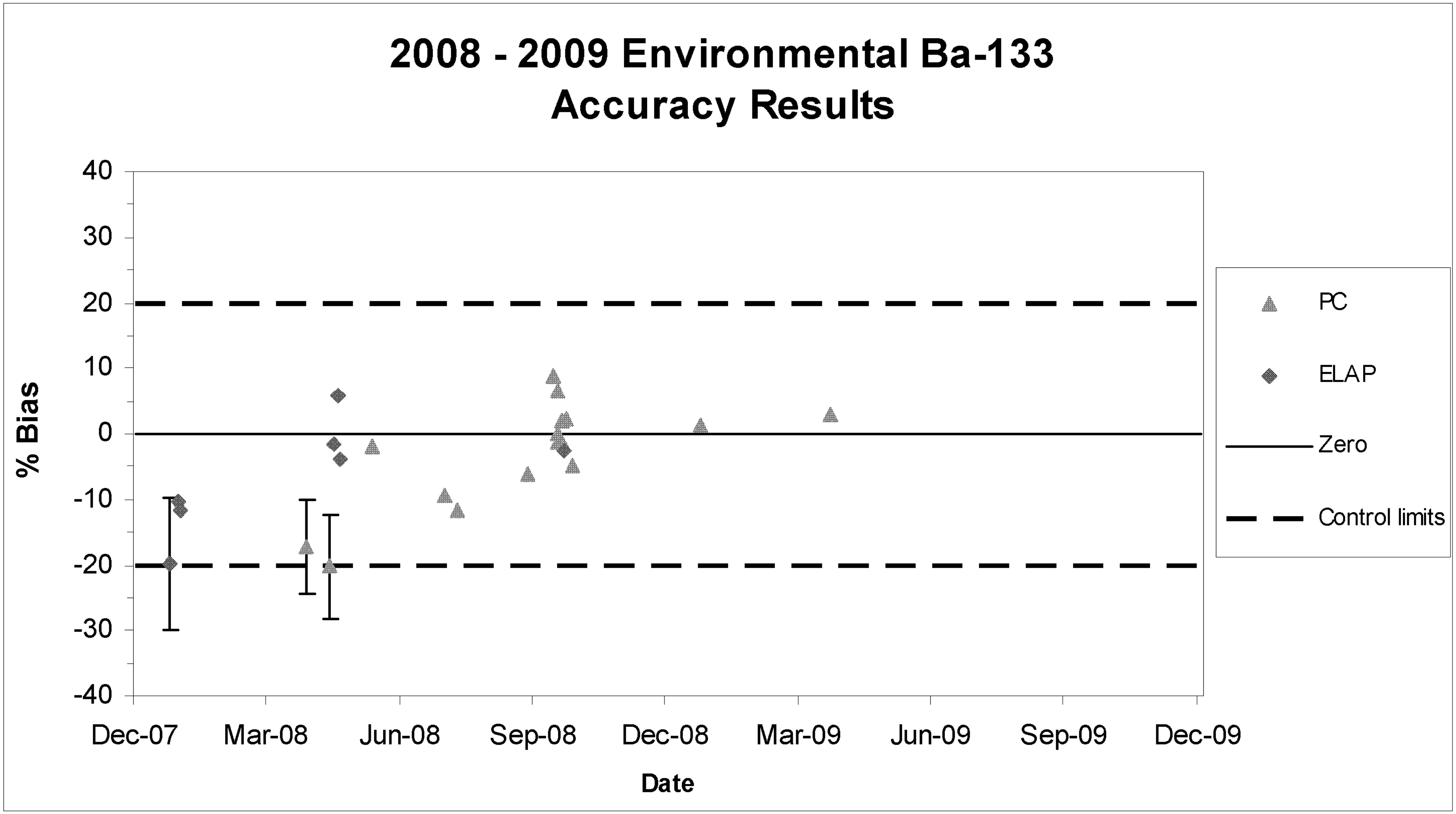
APPENDIX A

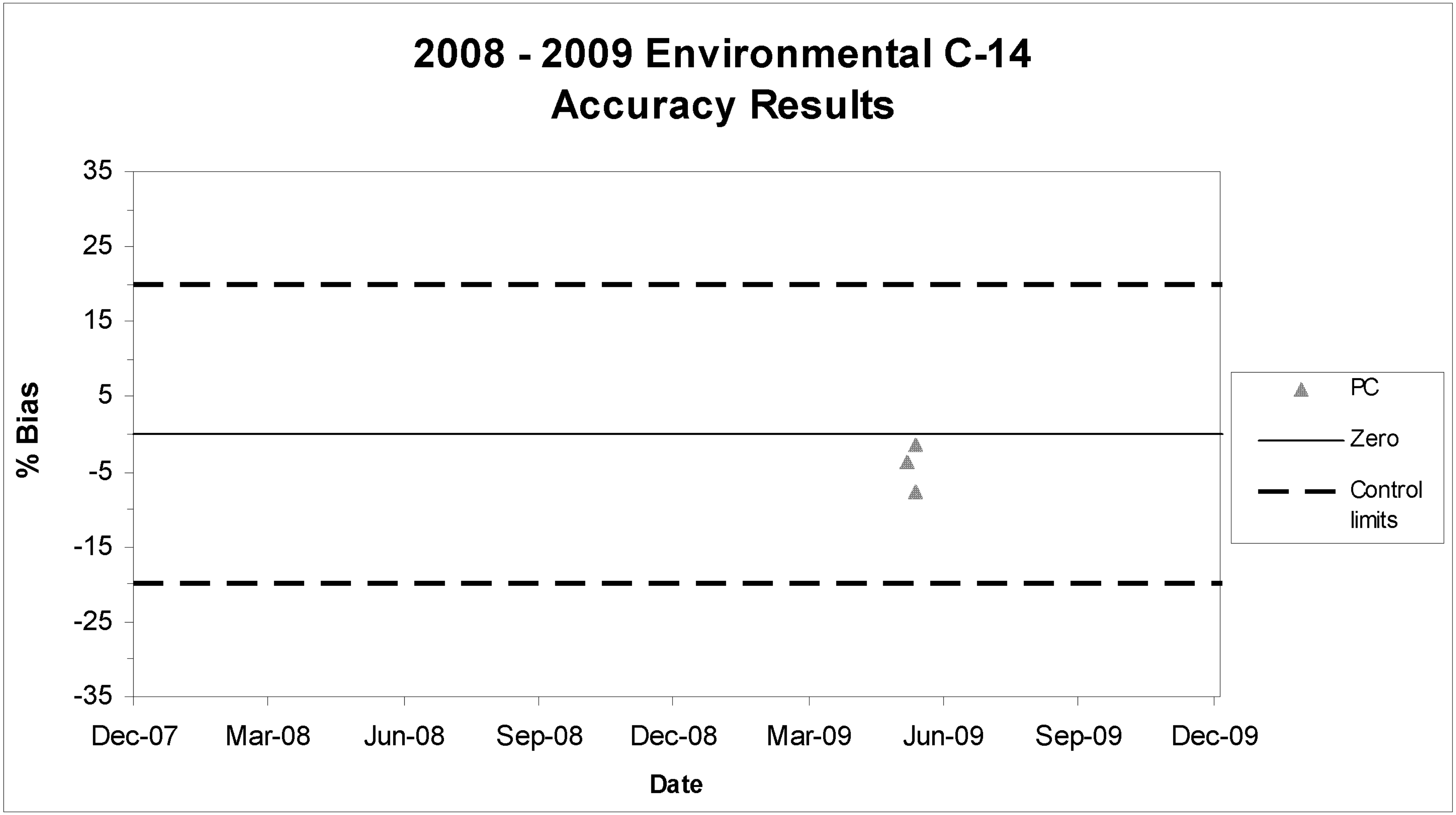
INTER/INTRA-LABORATORY, ENVIRONMENTAL MONITORING ANALYTICS, DOE, AND ERA/ELAP QUALITY CONTROL PROGRAM RESULTS



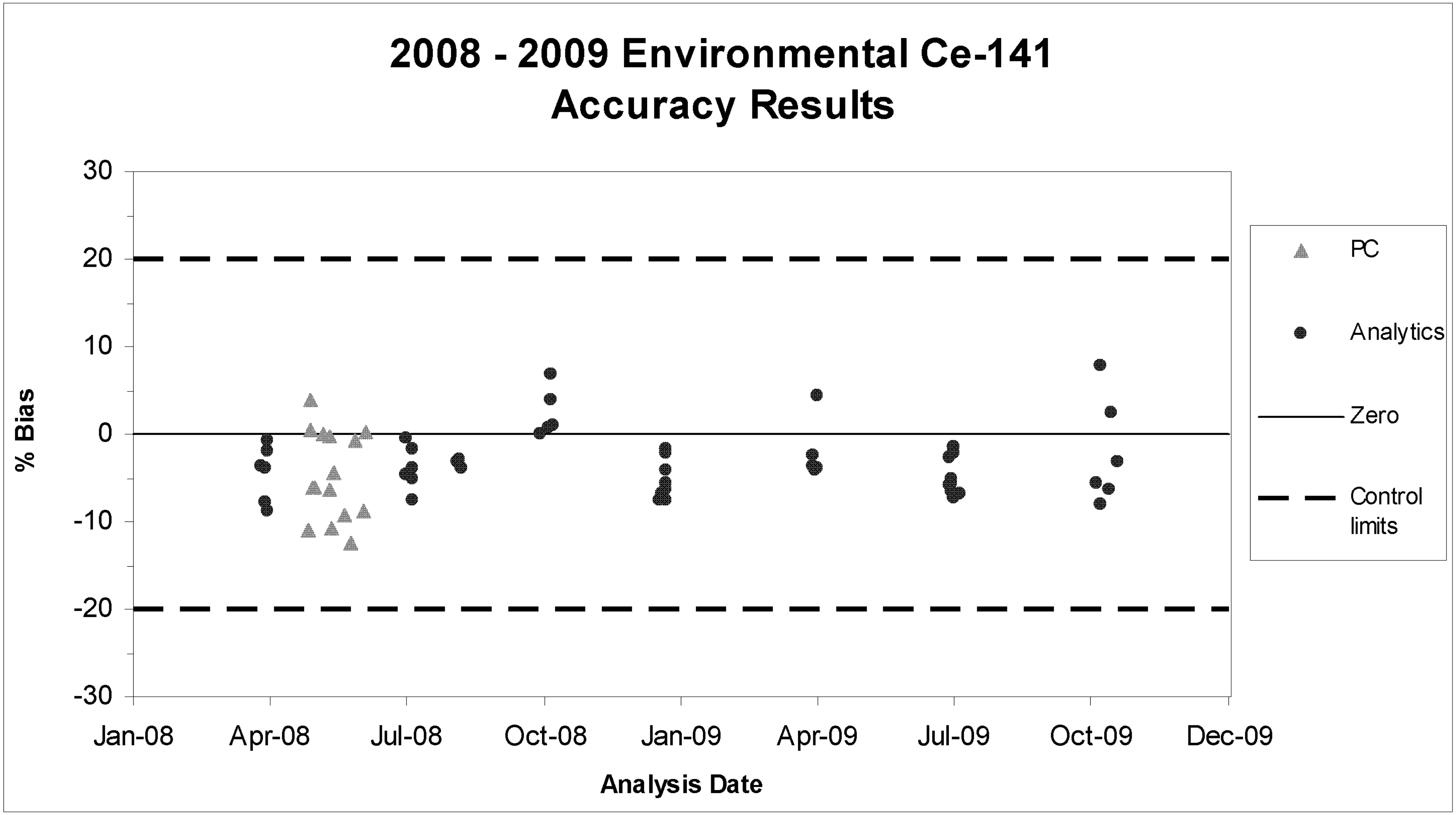
CR-09-13 was issued to investigate these negative biases.

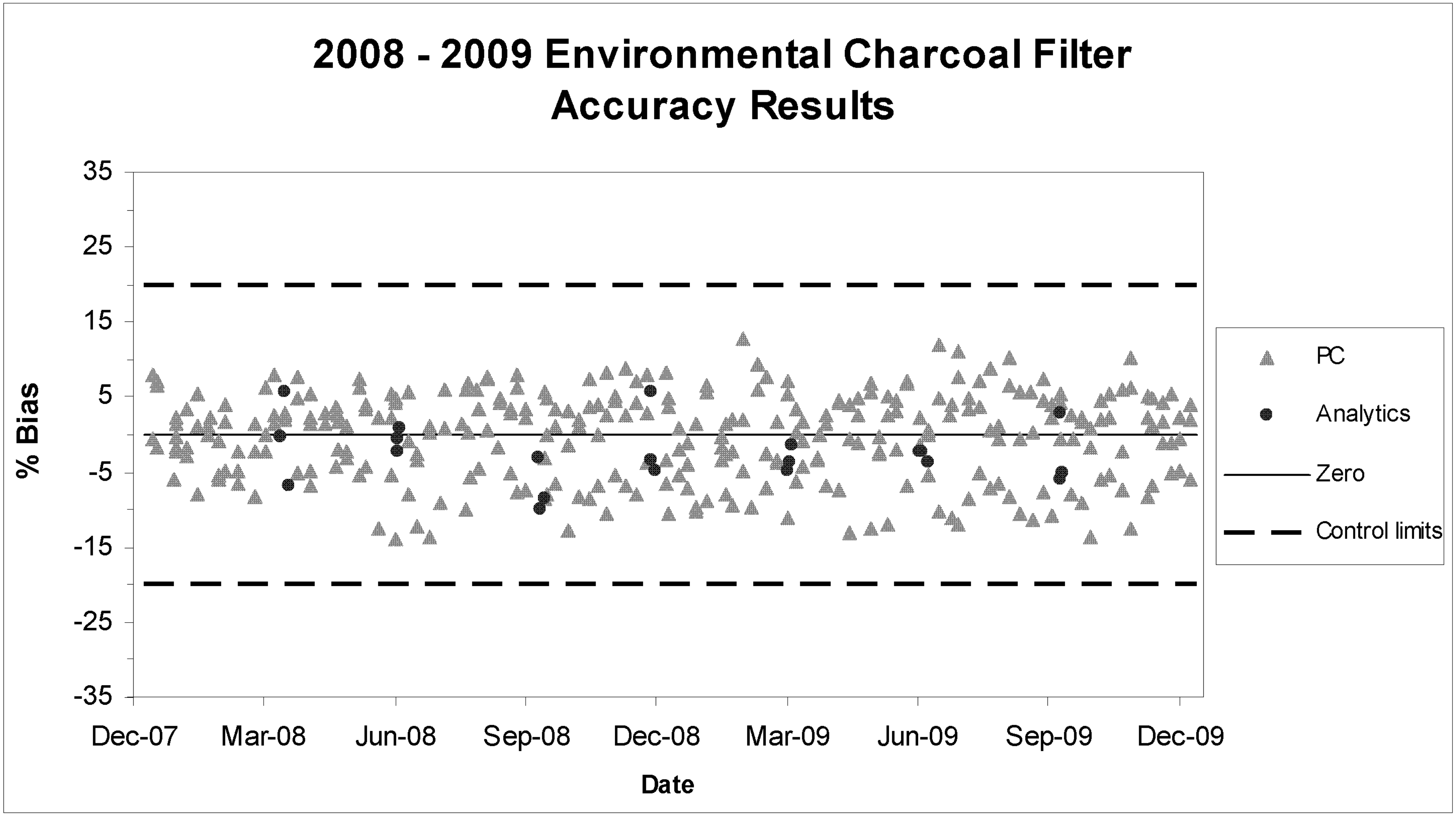

2008 - 2009 Environmental Am-241
Accuracy Results for Gamma Spectrometry
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Zero
Control limits


2008 - 2009 Environmental Ba-133
Accuracy Results
40
30
20
10
0
-10
-20
-30
-40
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
ELAP
Zero
Control limits

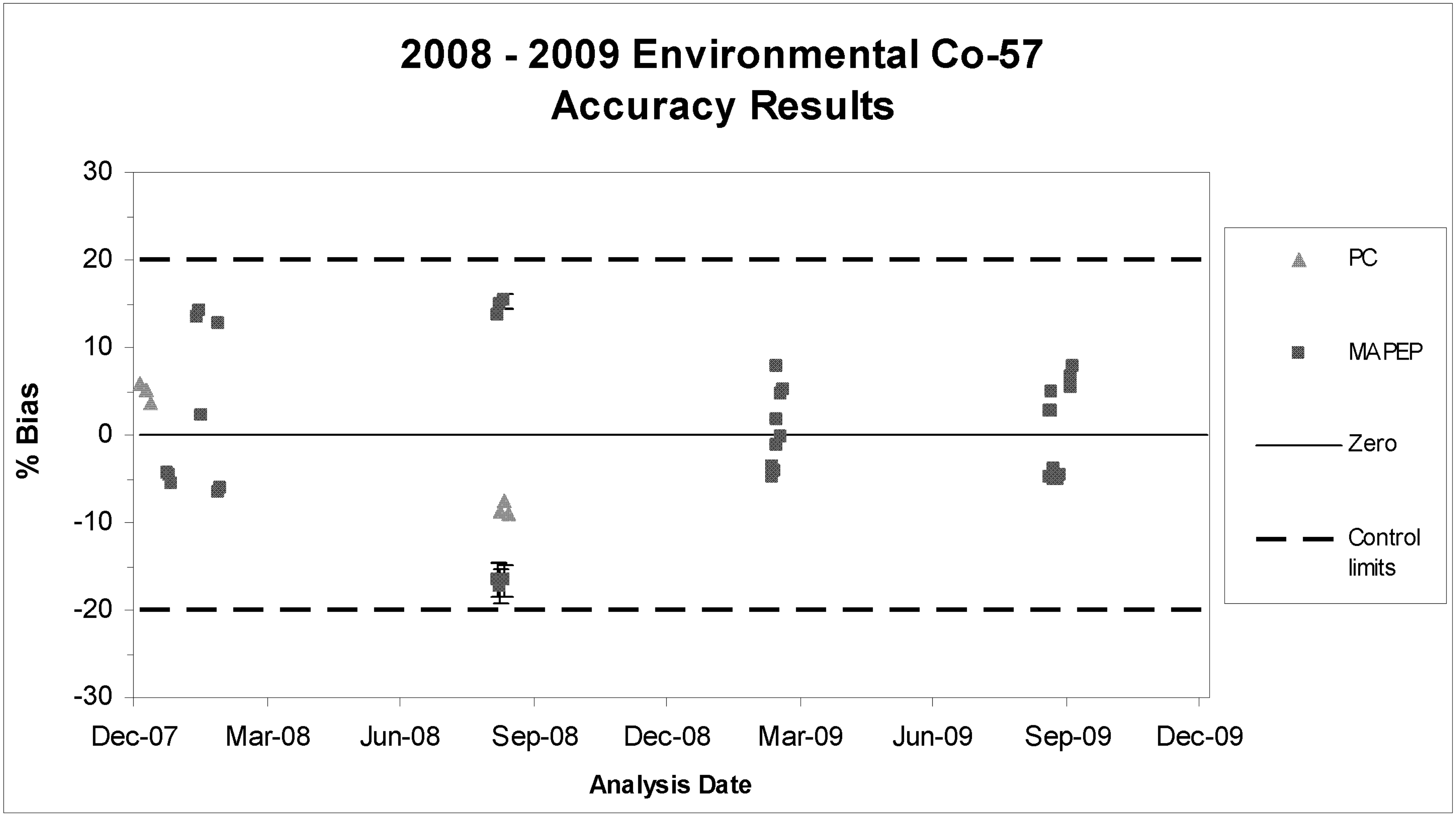


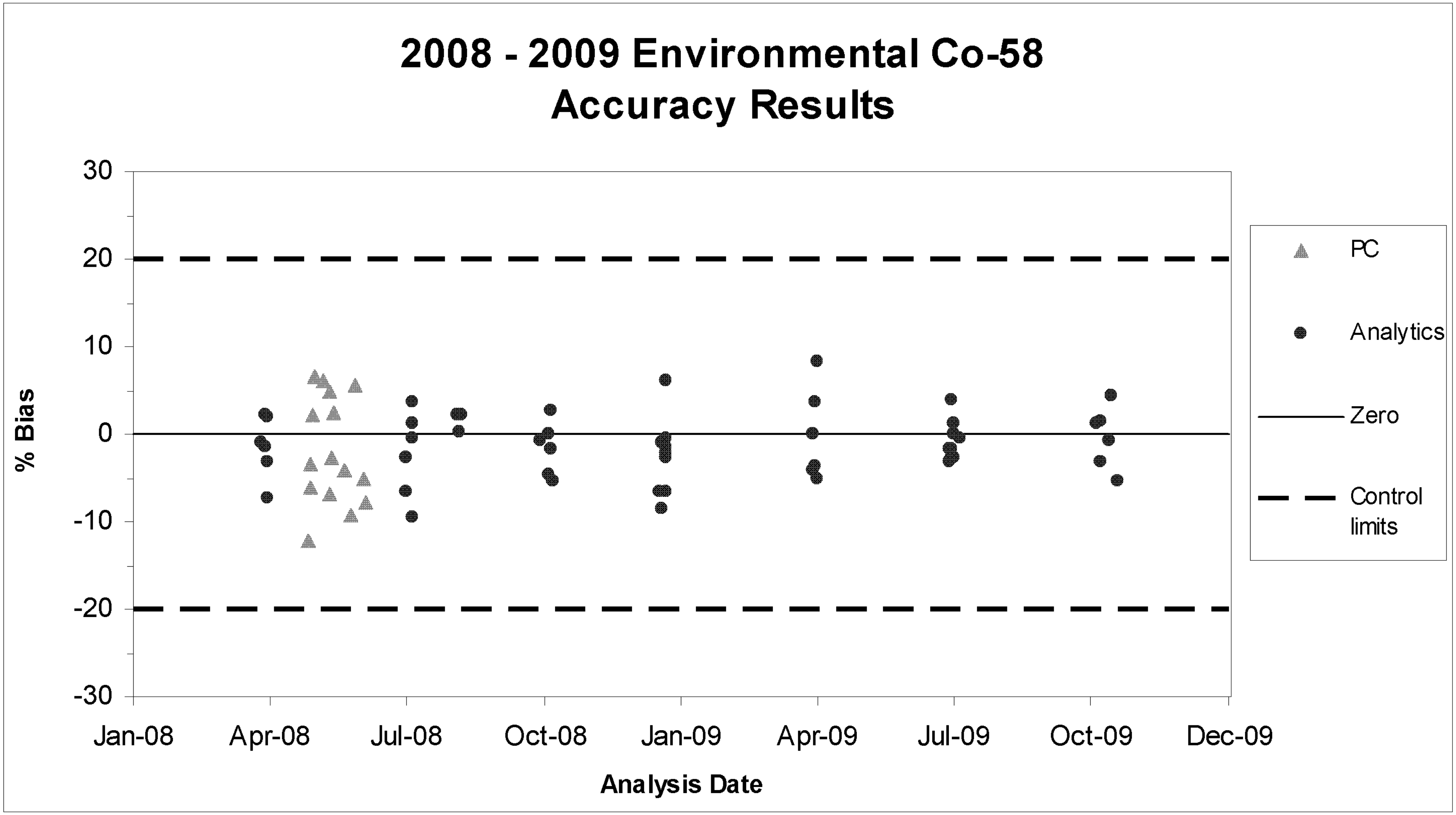
2008 - 2009 Environmental C-14
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Zero
Control limits


2008 - 2009 Environmental Ce-141
Accuracy Results
30
20
10
0
-10
-20
-30
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Analysis Date
PC
Analytics
Zero
Control limits

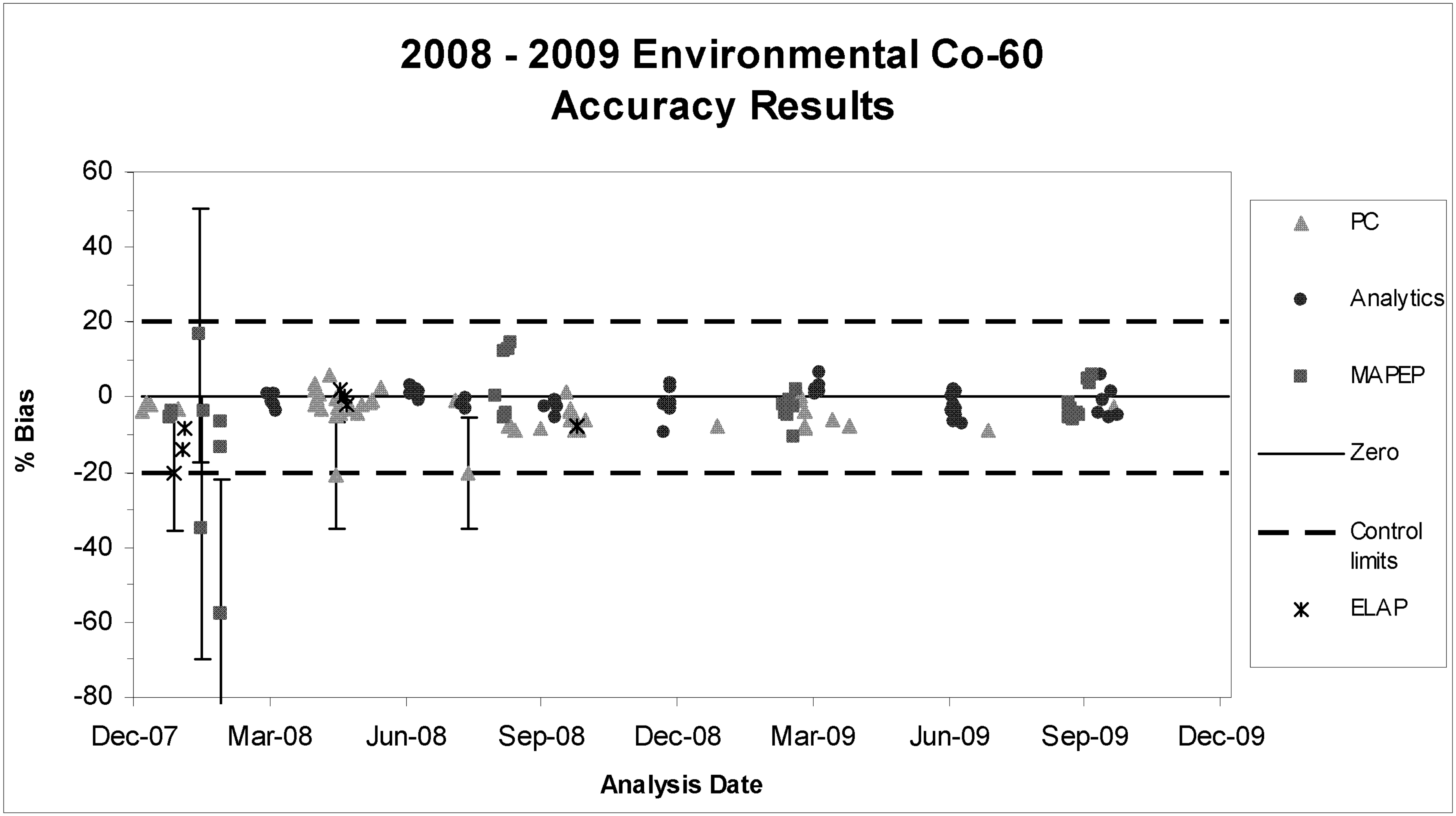


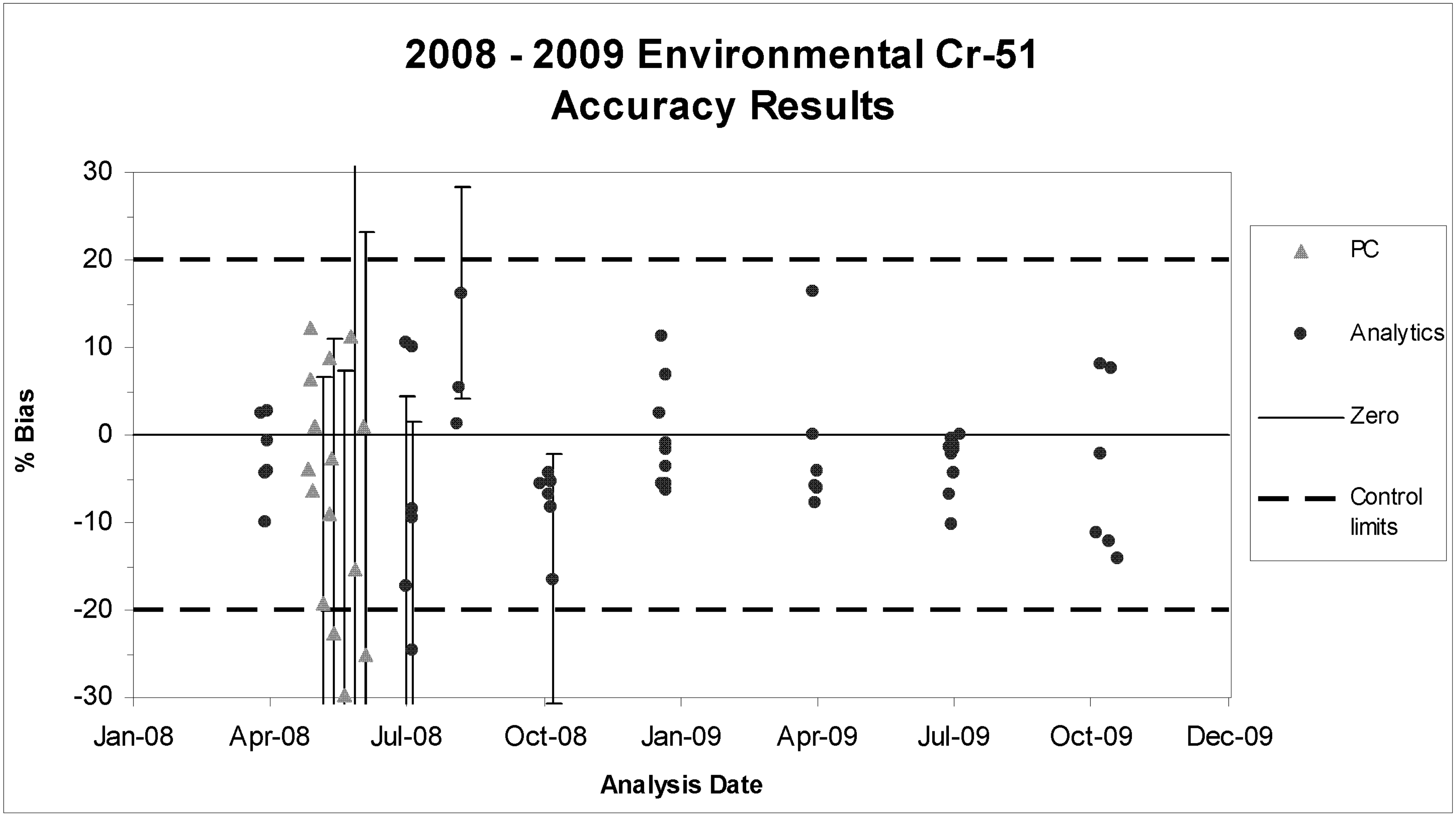
All 2008 charcoal results originally reported without the application of summing corrections were updated in accordance with CR 08-23. The graph reflects the updated data.

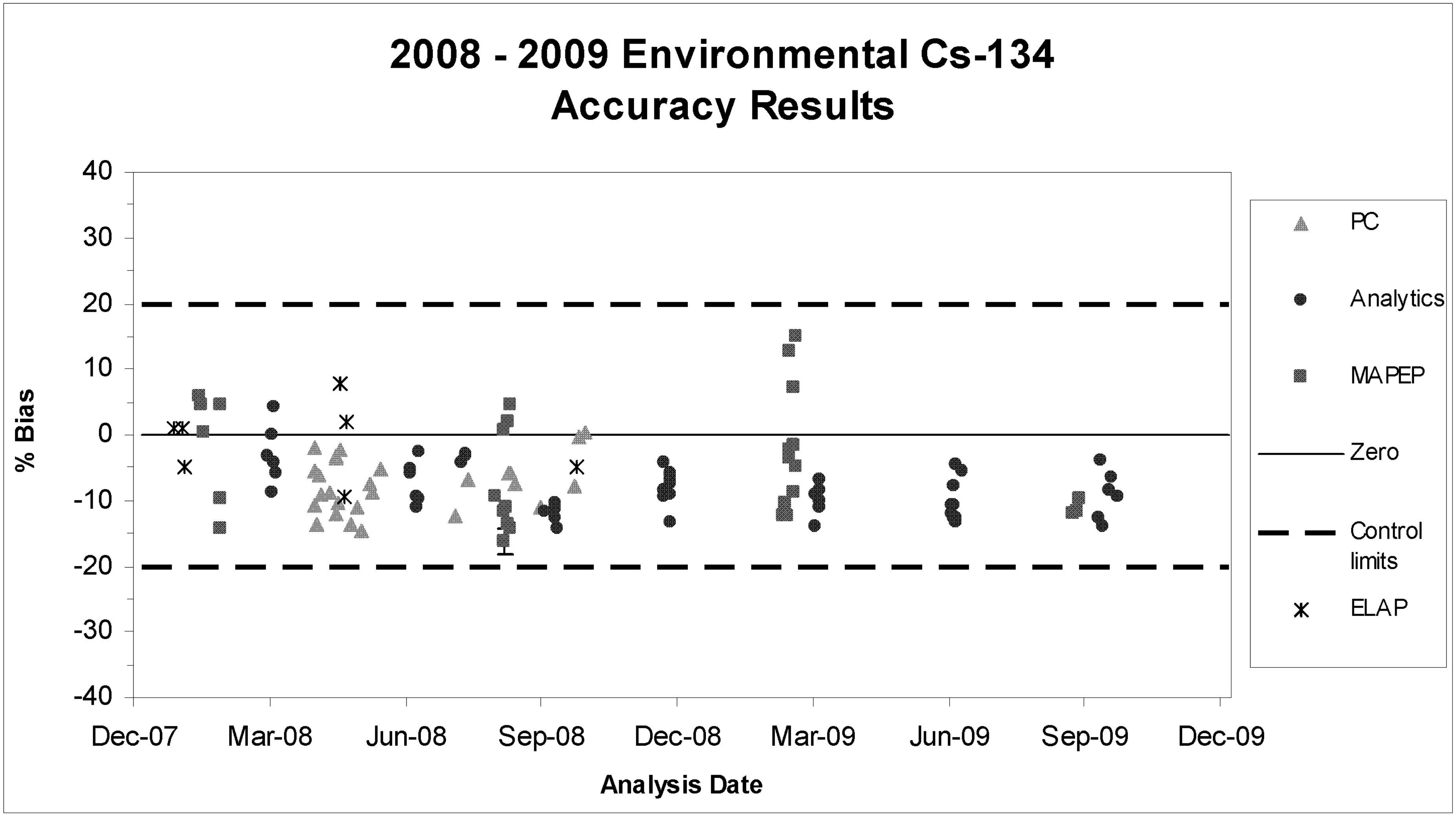

2008 - 2009 Environmental Co-57
Accuracy Results
30
20
10
0
-10
-20
-30
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
MAPEP
Zero
Control limits



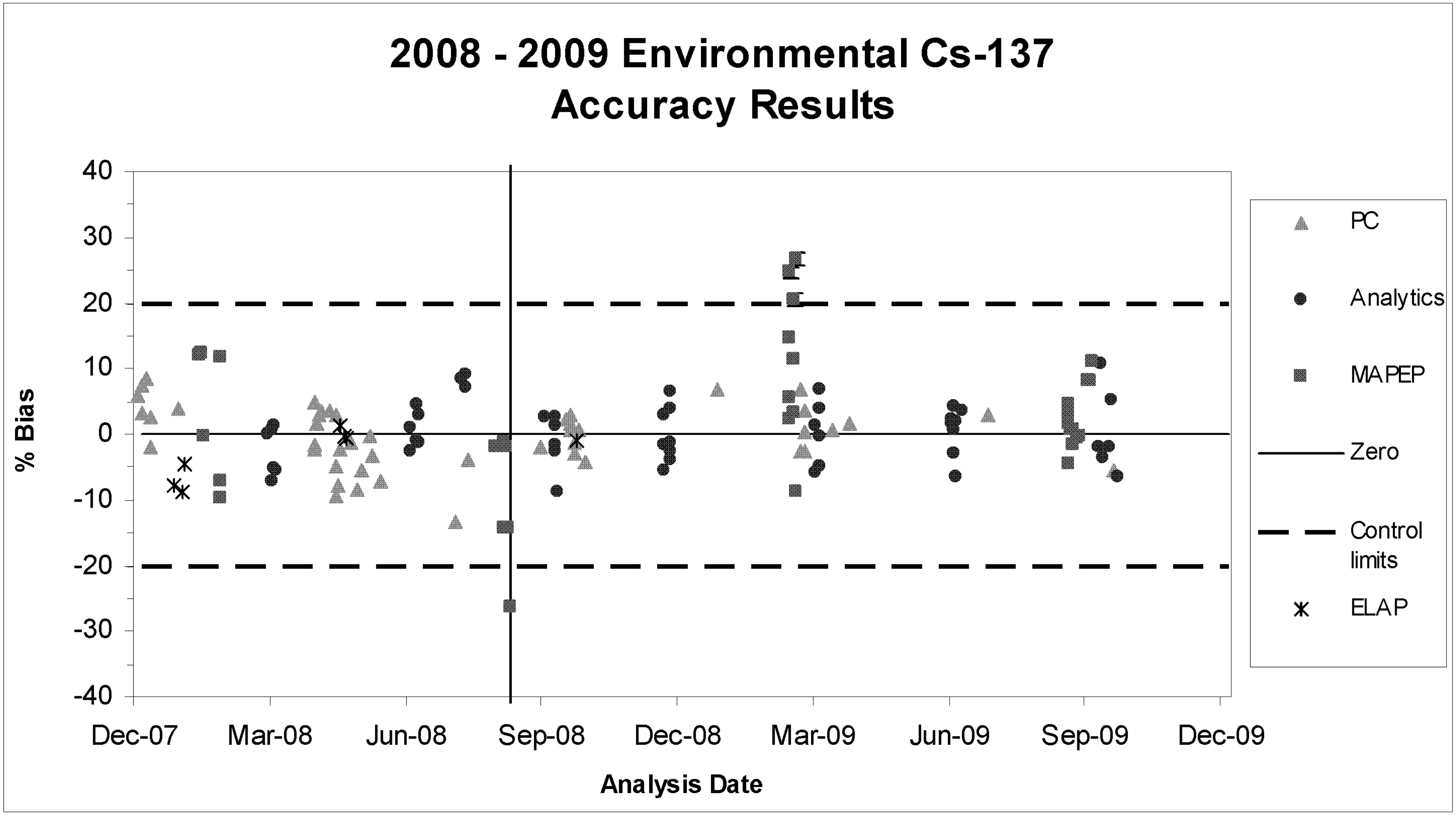
2008 - 2009 Environmental Co-58
Accuracy Results
30
20
10
0
-10
-20
-30
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Analysis Date
PC
Analytics
Zero
Control limits


2008 - 2009 Environmental Co-60
Accuracy Results
60
40
20
0
-20
-40
-60
-80
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits
ELAP

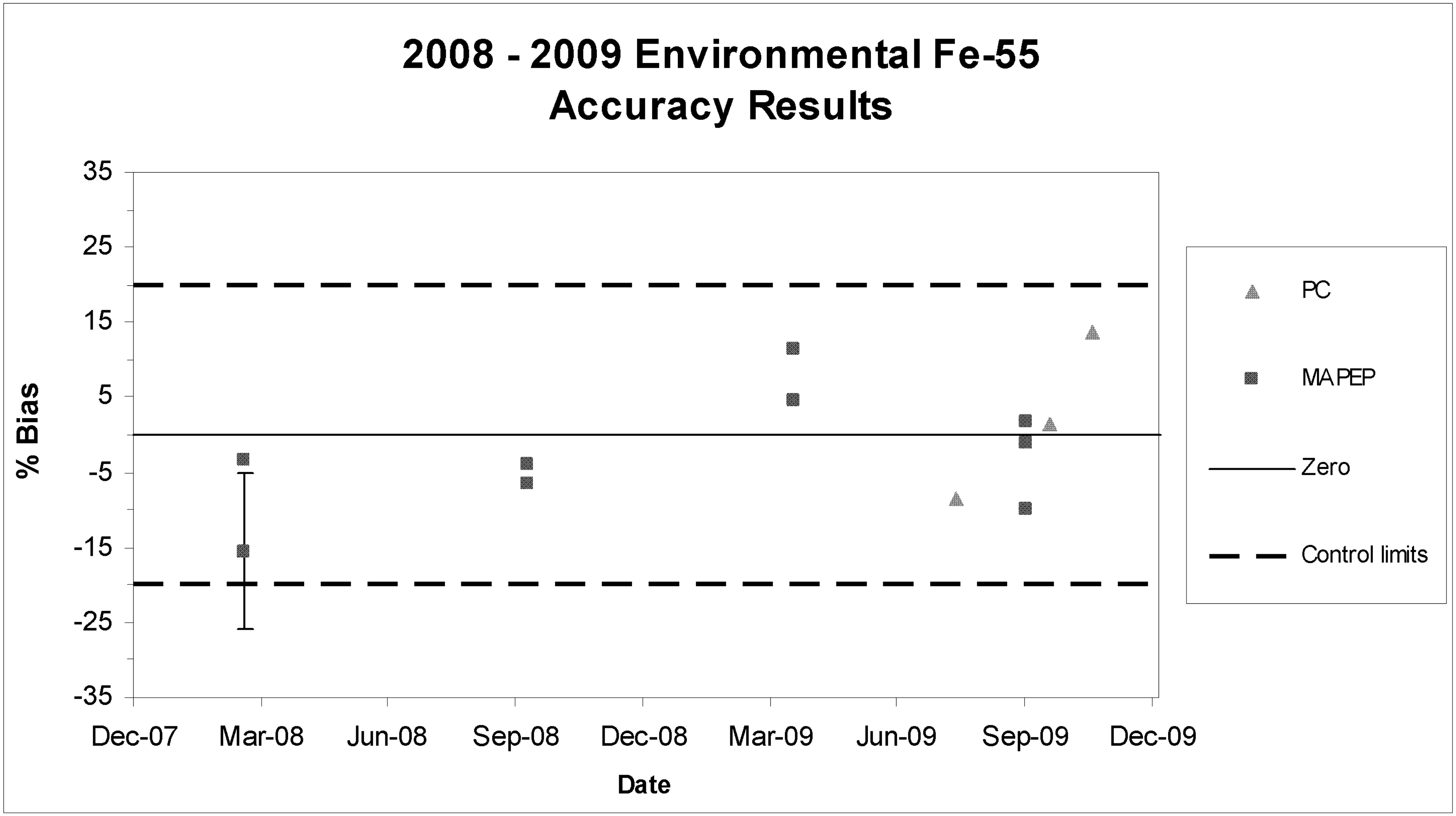

2008 - 2009 Environmental Cr-51
Accuracy Results
30
20
10
0
-10
-20
-30
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Analysis Date
PC
Analytics
Zero
Control limits



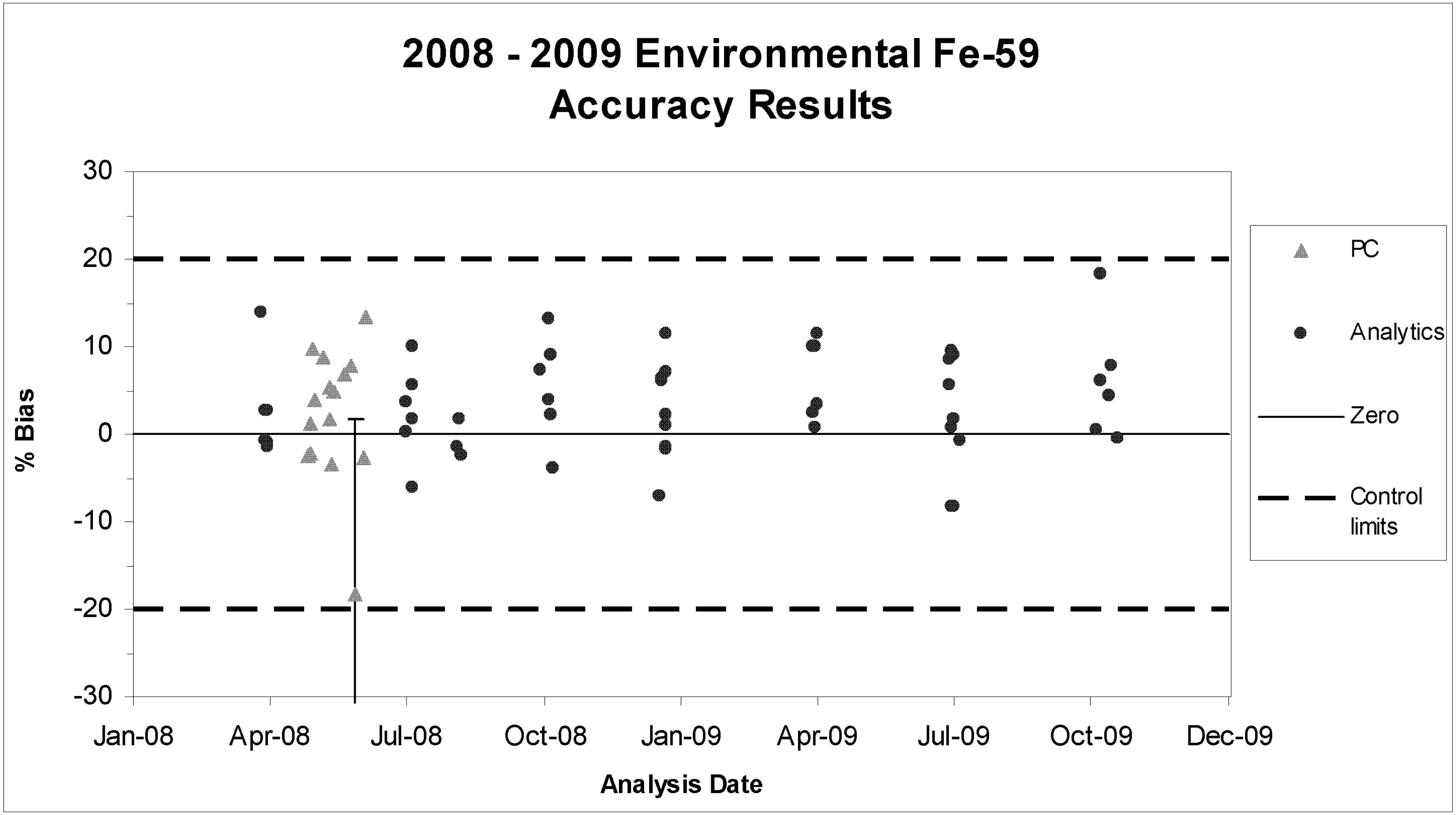
2008 - 2009 Environmental Cs-134
Accuracy Results
40
30
20
10
0
-10
-20
-30
-40
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits
ELAP

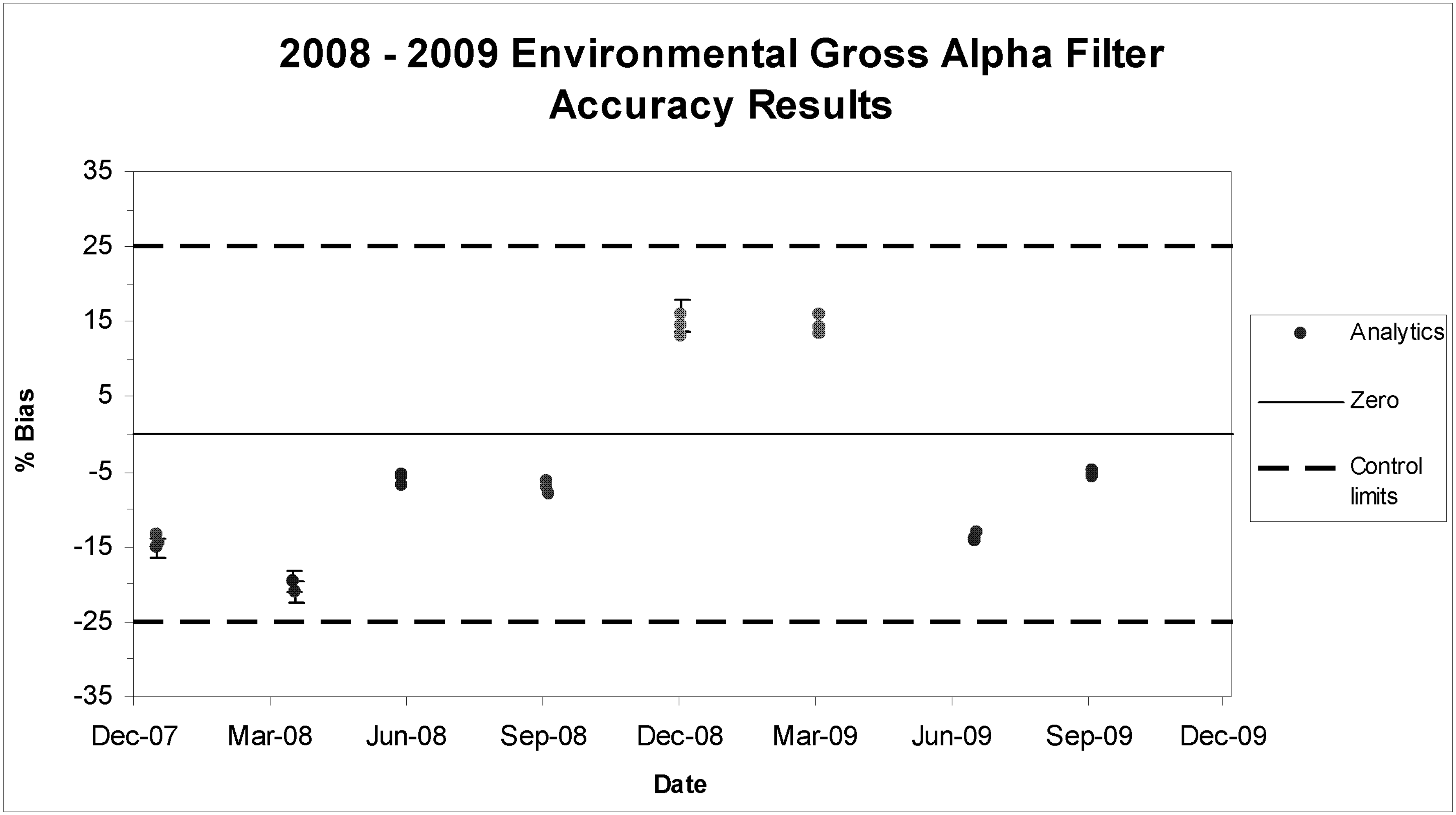


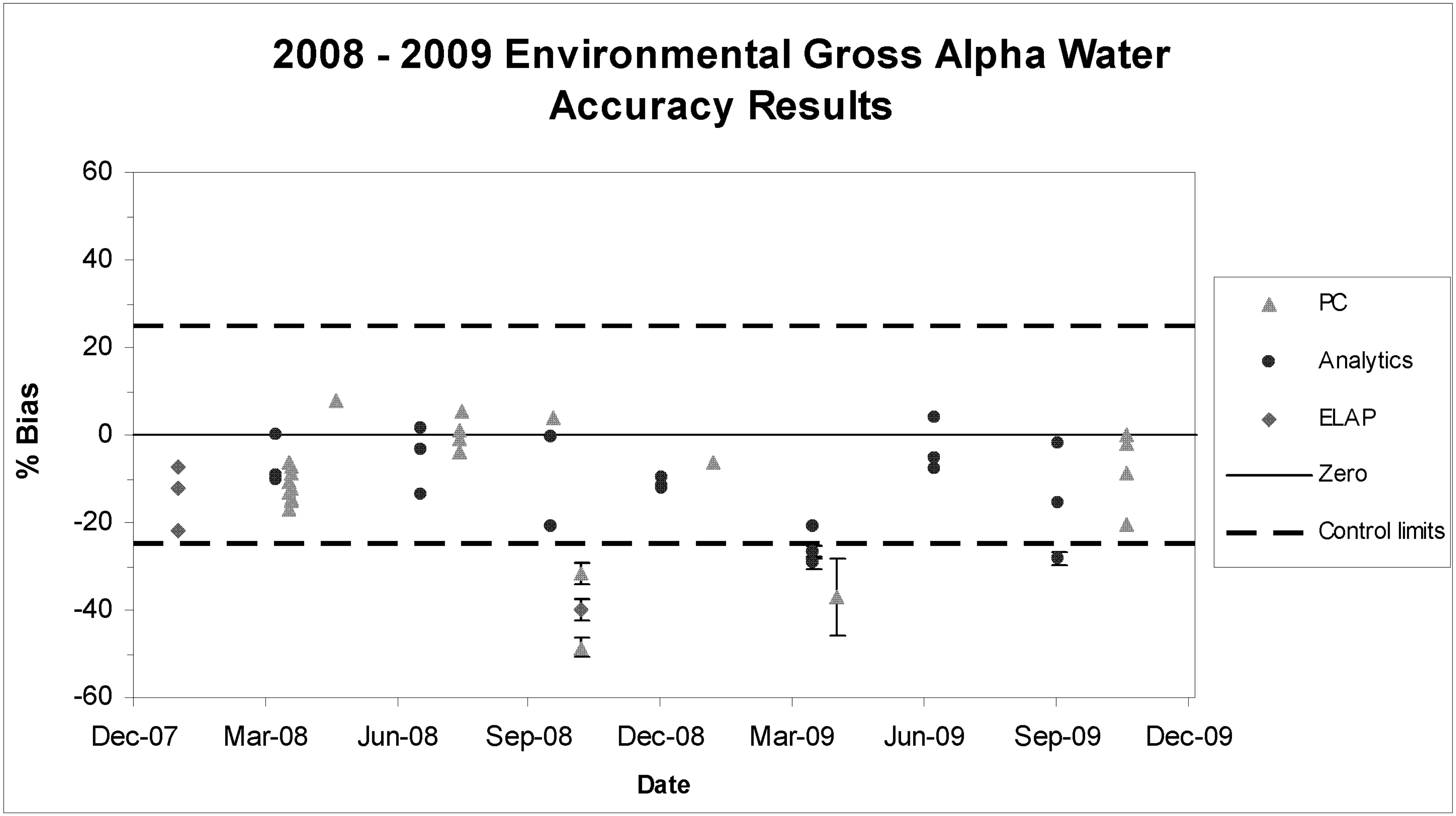
CR-09-14 was issued to investigate the positive biases in the MAPEP soil sample.



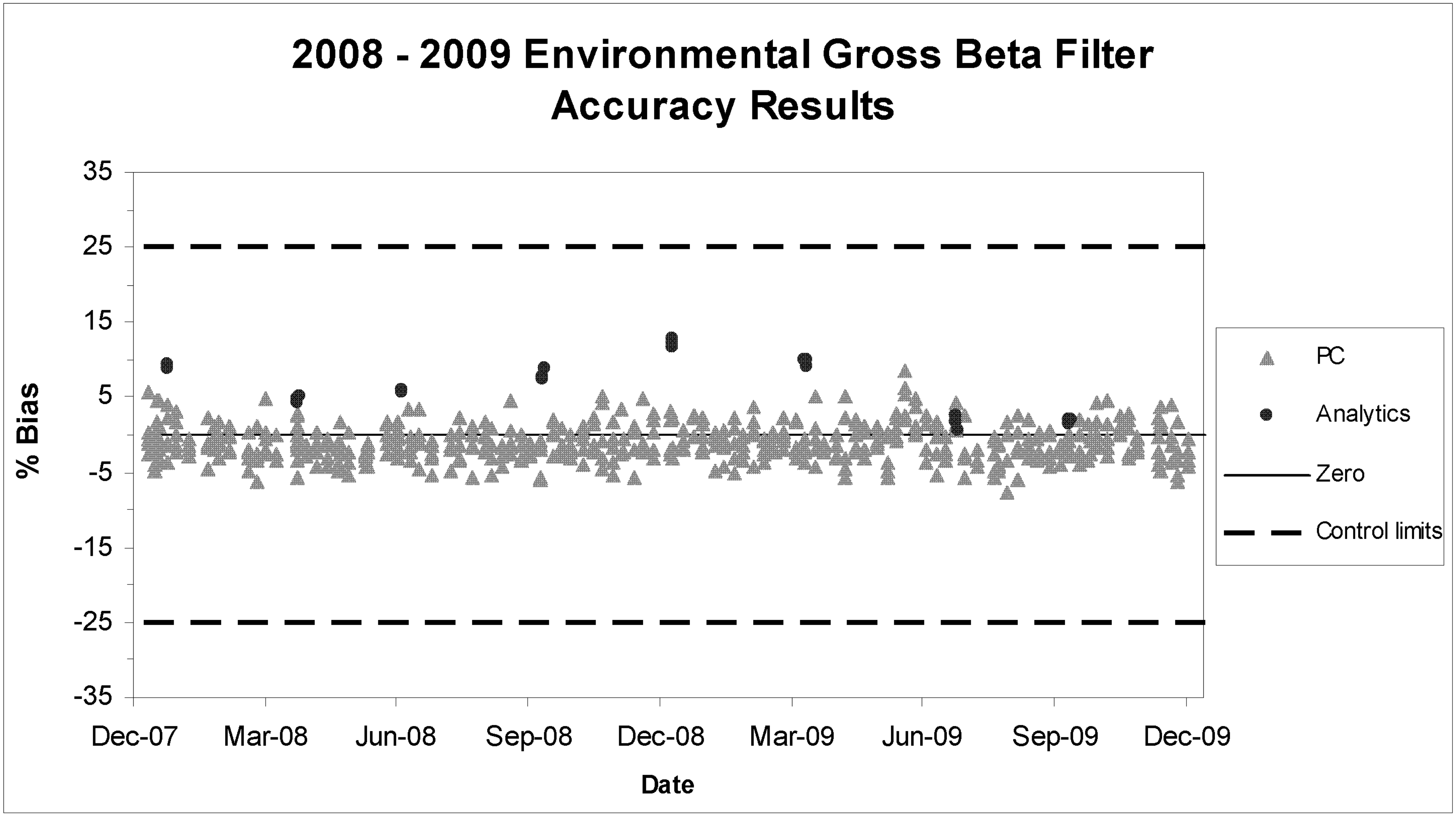
2008 - 2009 Environmental Fe-55
Accuracy Results
% Bias
35
25
15
5
-5
-15
-25
-35
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
MAPEP
Zero
Control limits

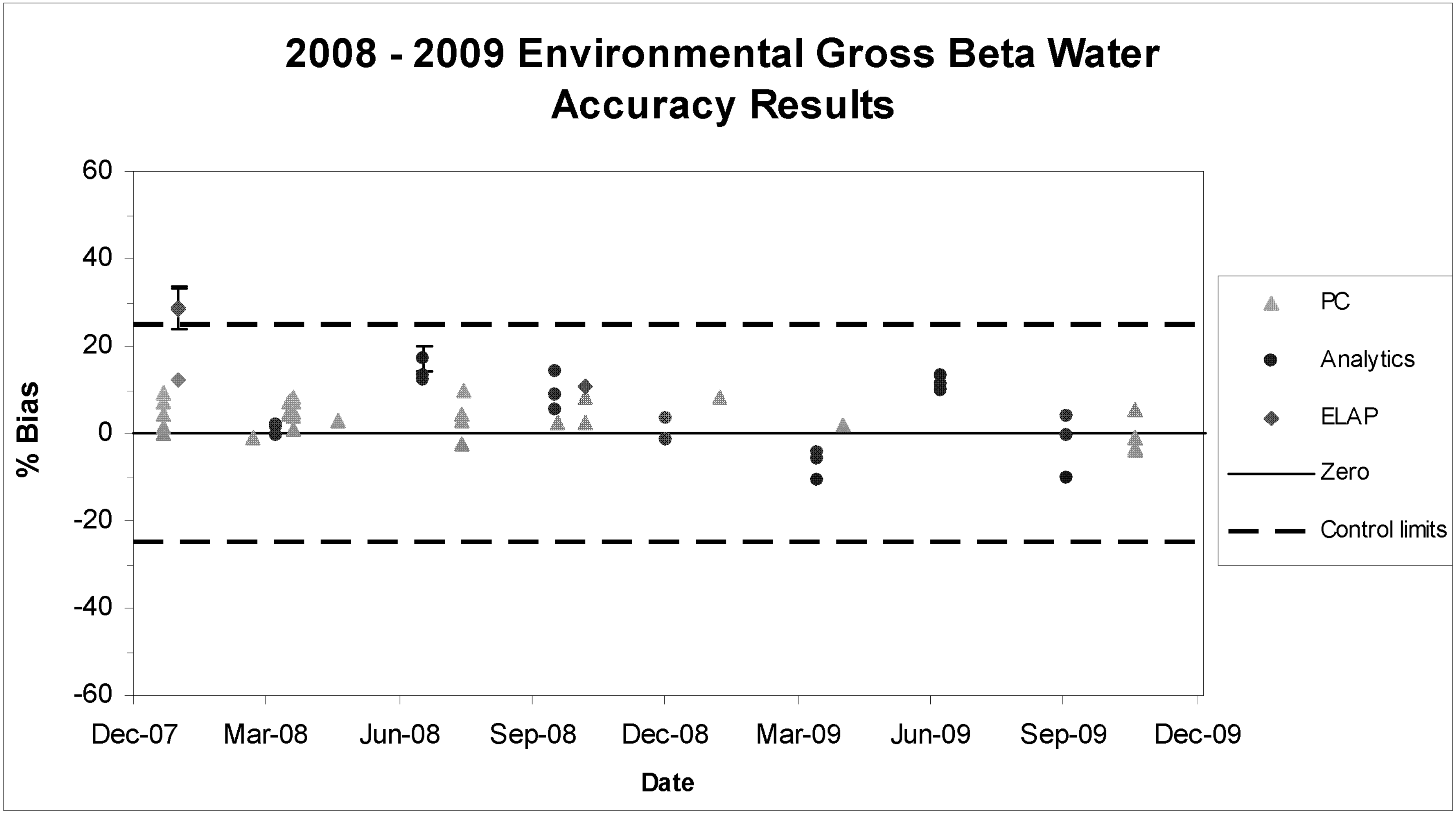

2008 - 2009 Environmental Fe-59
Accuracy Results
30
20
10
0
-10
-20
-30
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Analysis Date
PC
Analytics
Zero
Control limits


2008 - 2009 Environmental Gross Alpha Filter
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
Analytics
Zero
Control limits

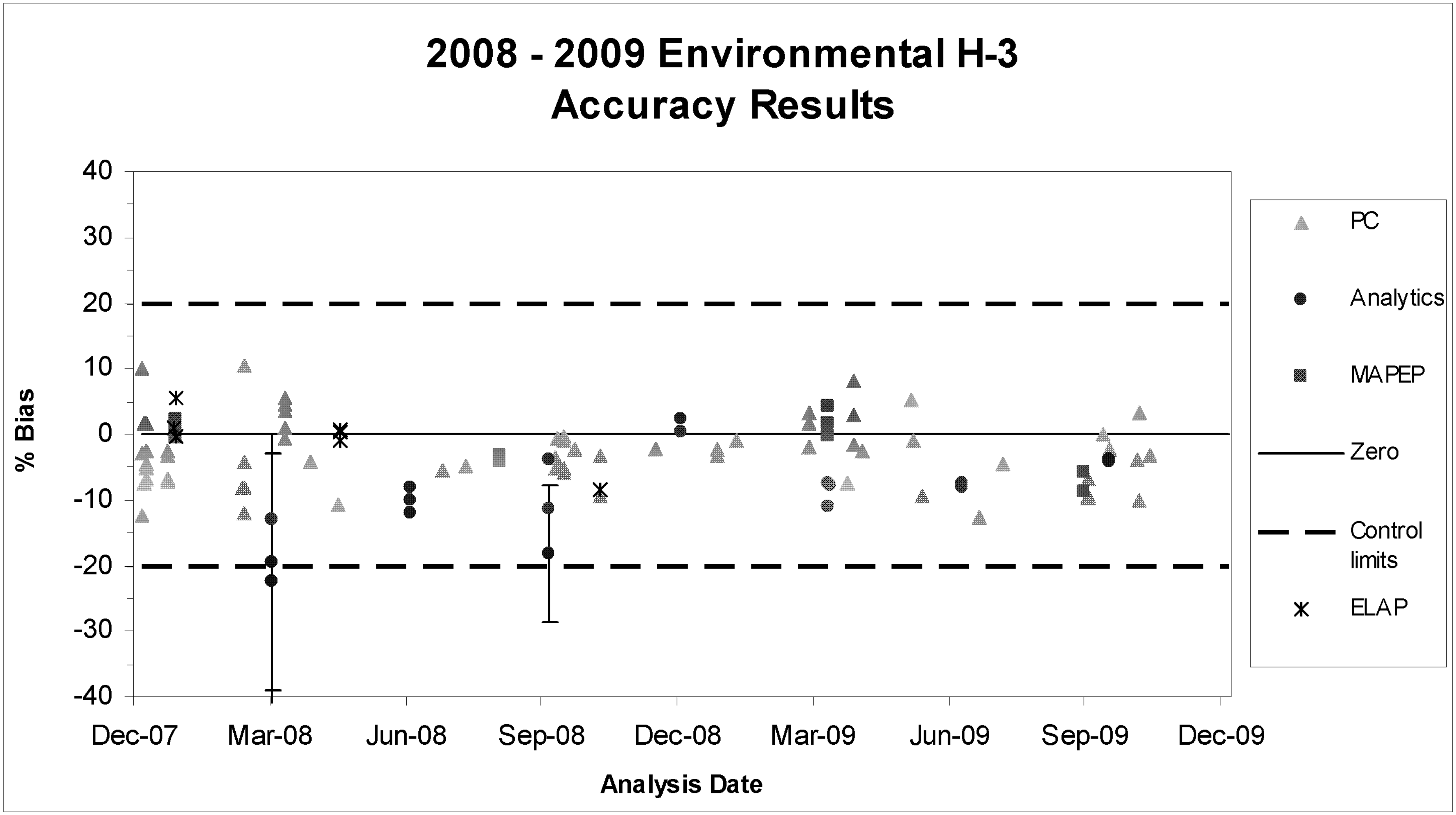


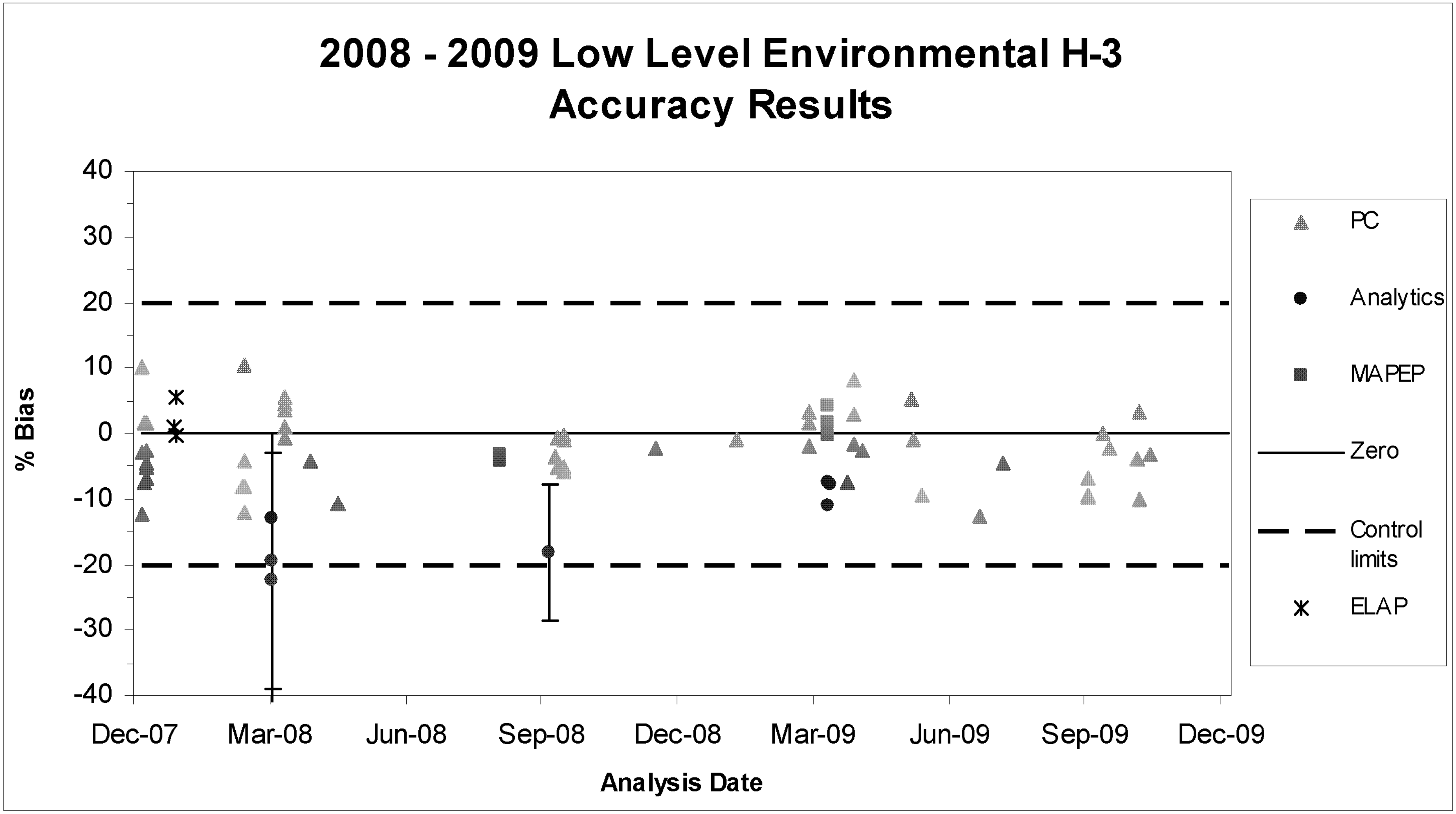
The percent difference of the mean value from the known value exceeded the Manual 100 criterion for accuracy for one set of Analytics samples. CR 09-21 was issued to investigate the failure.

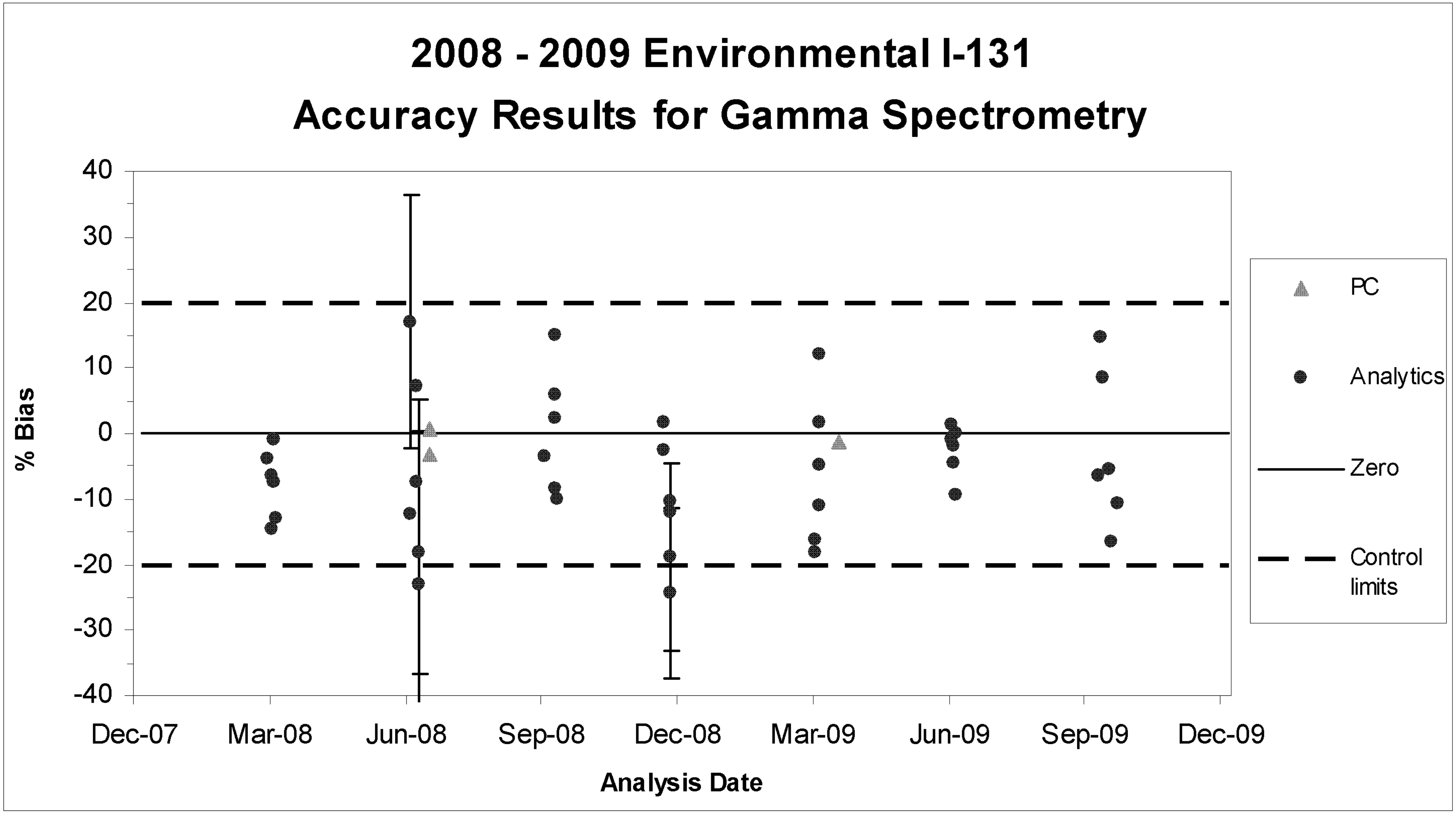

2008 - 2009 Environmental Gross Beta Filter
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Analytics
Zero
Control limits



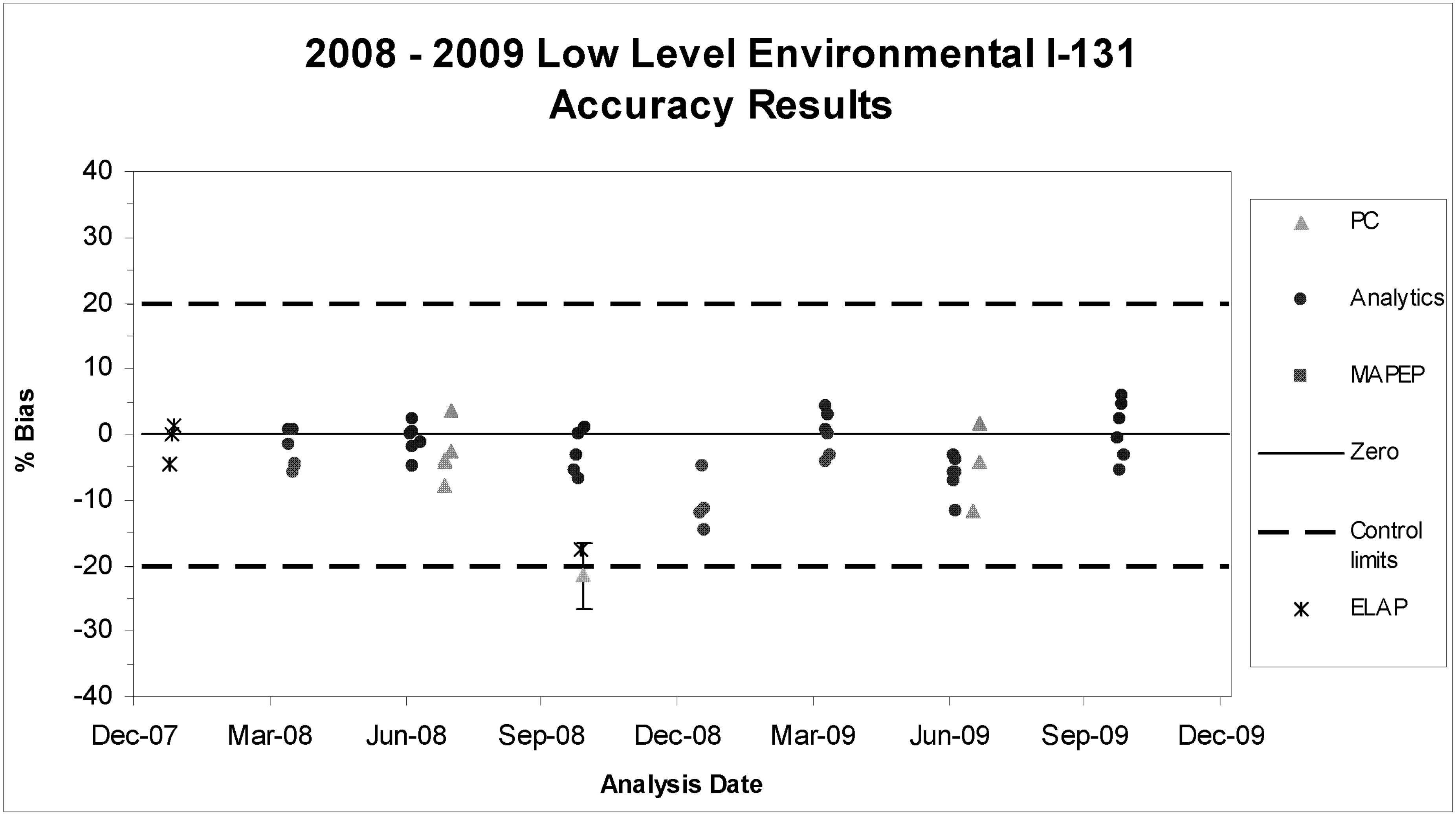
2008 - 2009 Environmental Gross Beta Water
Accuracy Results
60
40
20
0
-20
-40
-60
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Analytics
ELAP
Zero
Control limits


2008 - 2009 Environmental H-3
Accuracy Results
40
30
20
10
0
-10
-20
-30
-40
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits
ELAP

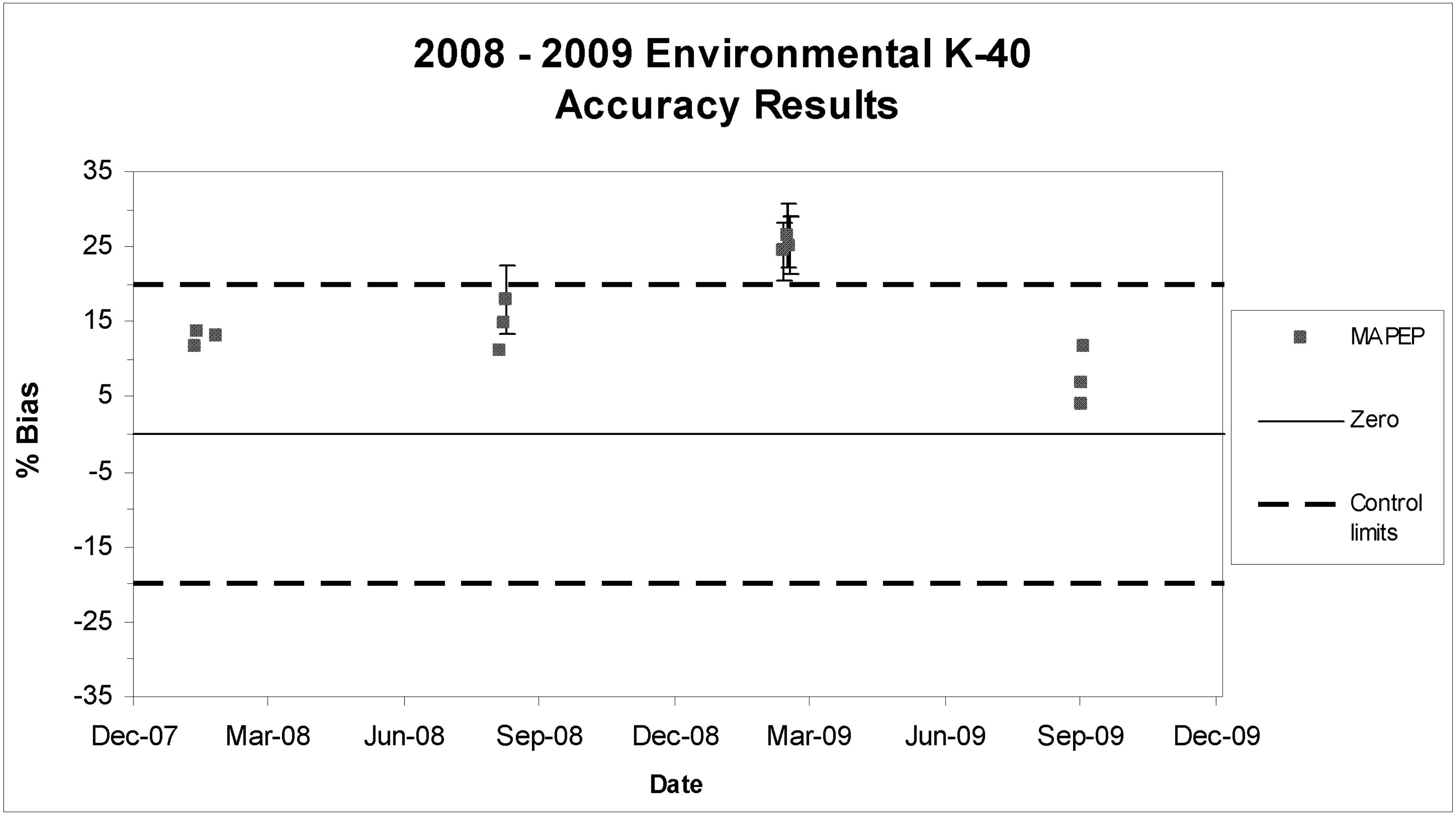

2008 - 2009 Low Level Environmental H-3
Accuracy Results
40
30
20
10
0
-10
-20
-30
-40
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits
ELAP



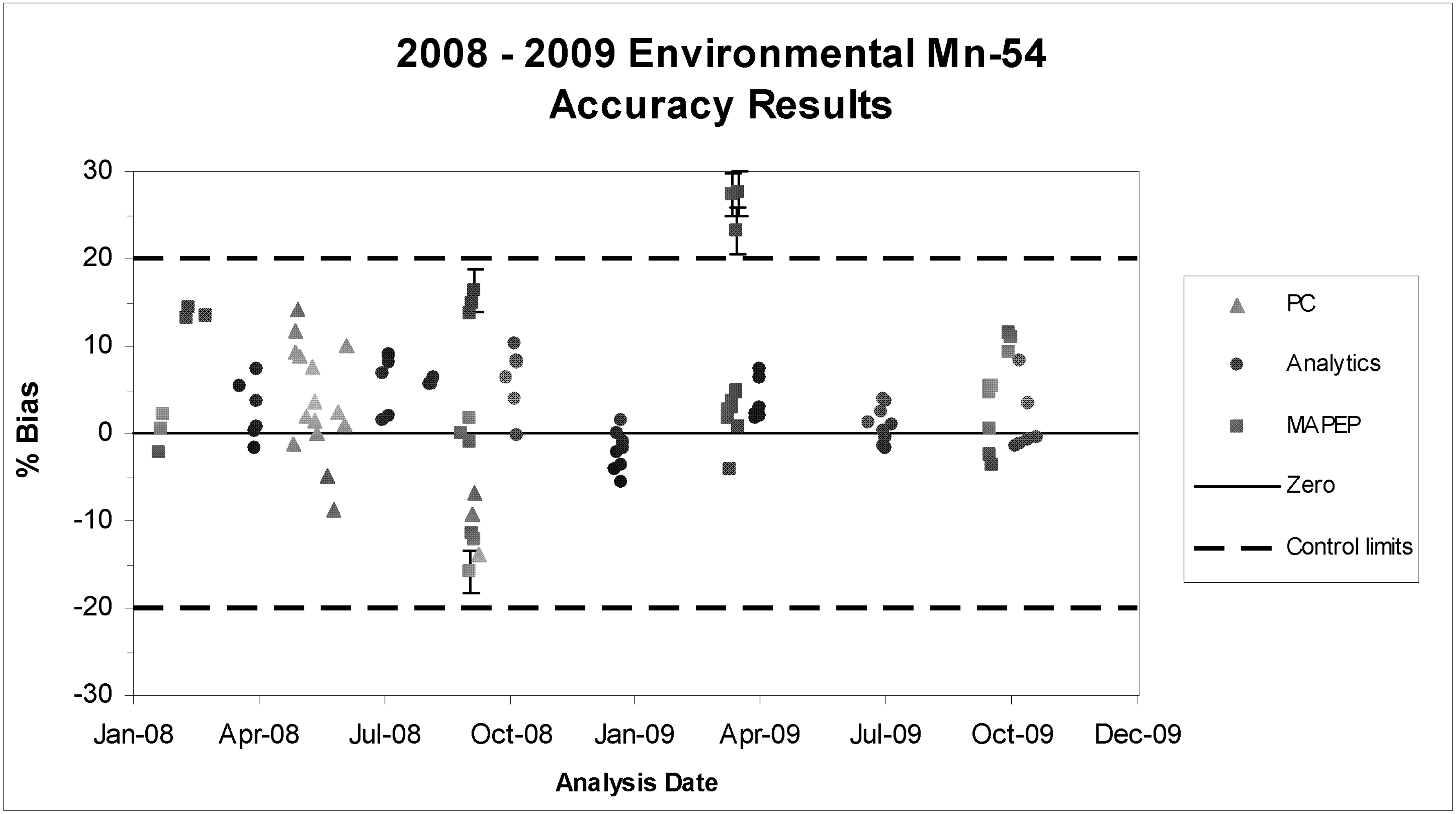
Two individual Analytics results fell outside the accuracy criterion. No investigation was necessary per Manual 100



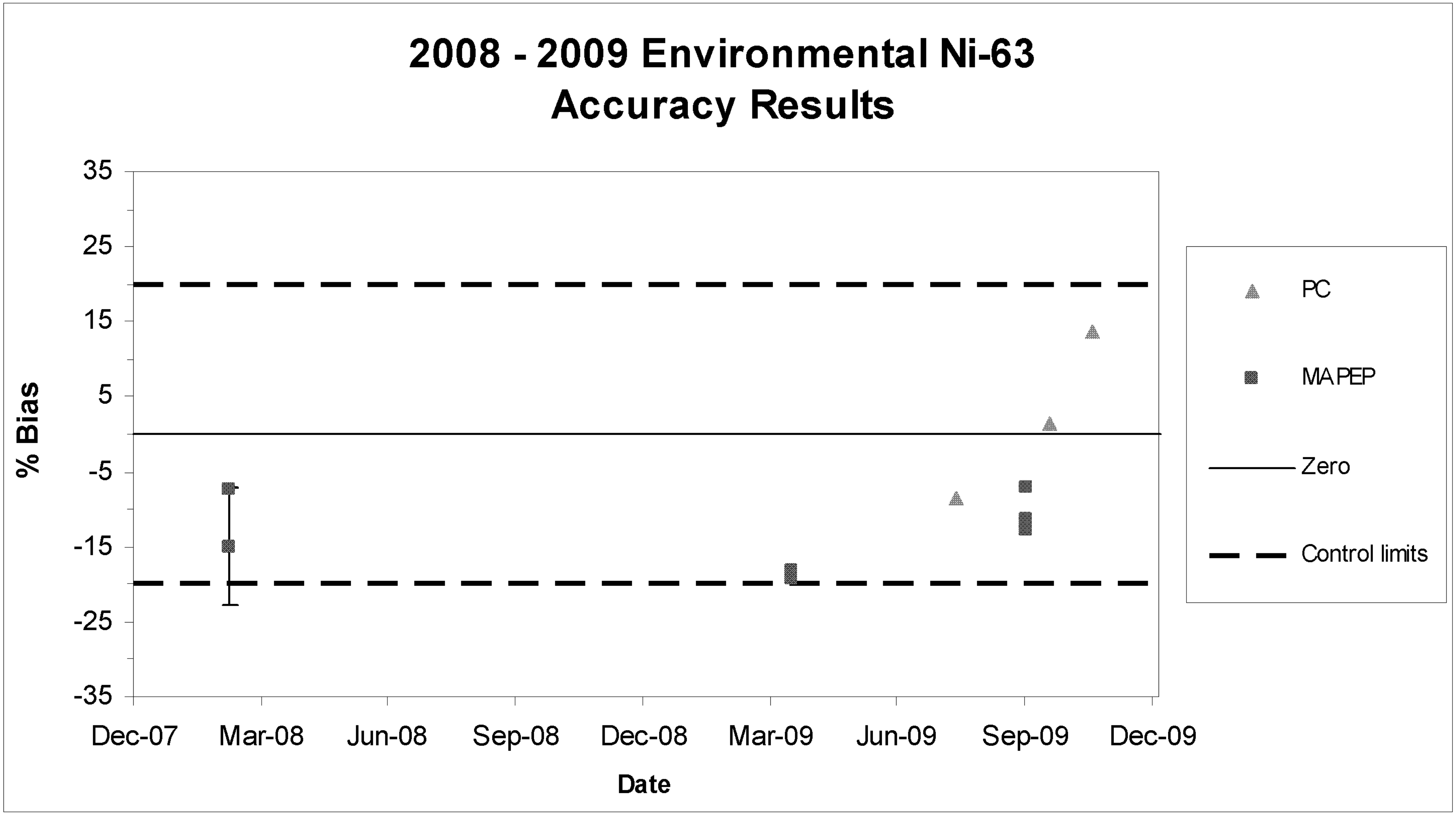
2008 - 2009 Low Level Environmental I-131
Accuracy Results
40
30
20
10
0
-10
-20
-30
-40
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits
ELAP

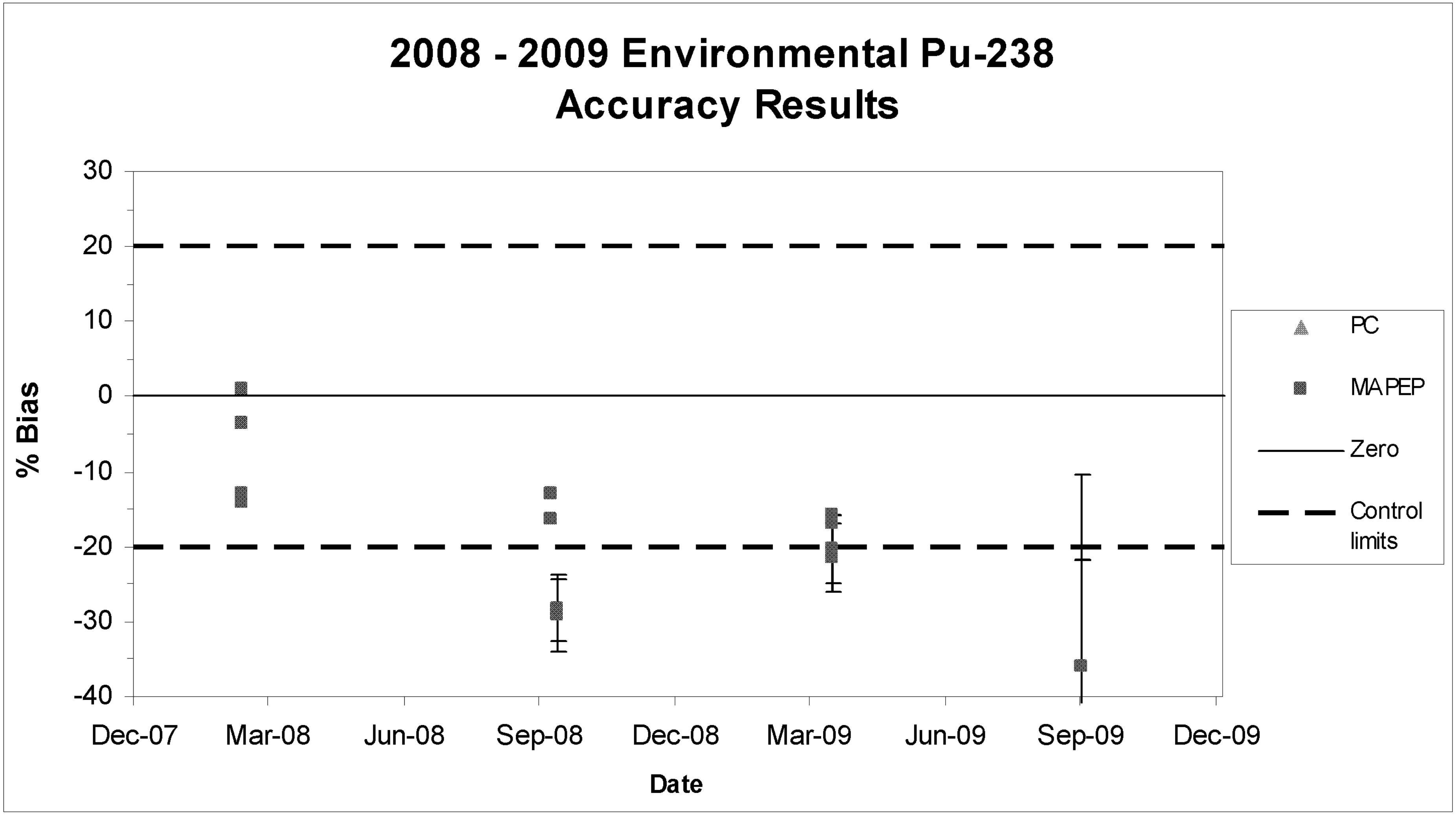


CR-09-14 was issued to investigate the positive biases in the MAPEP soil sample.

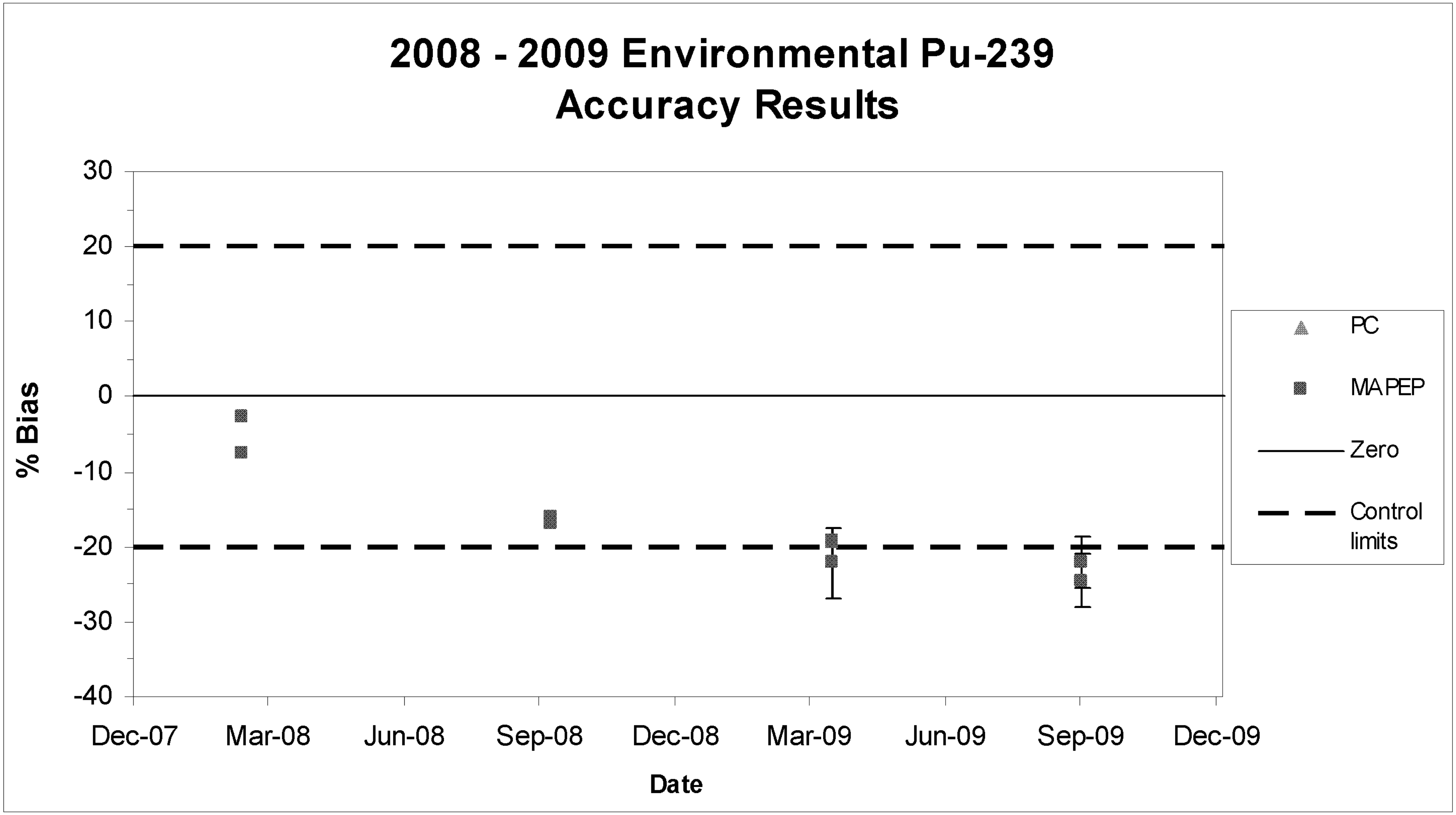


CR-09-14 was issued to investigate the positive biases in the MAPEP soil sample.

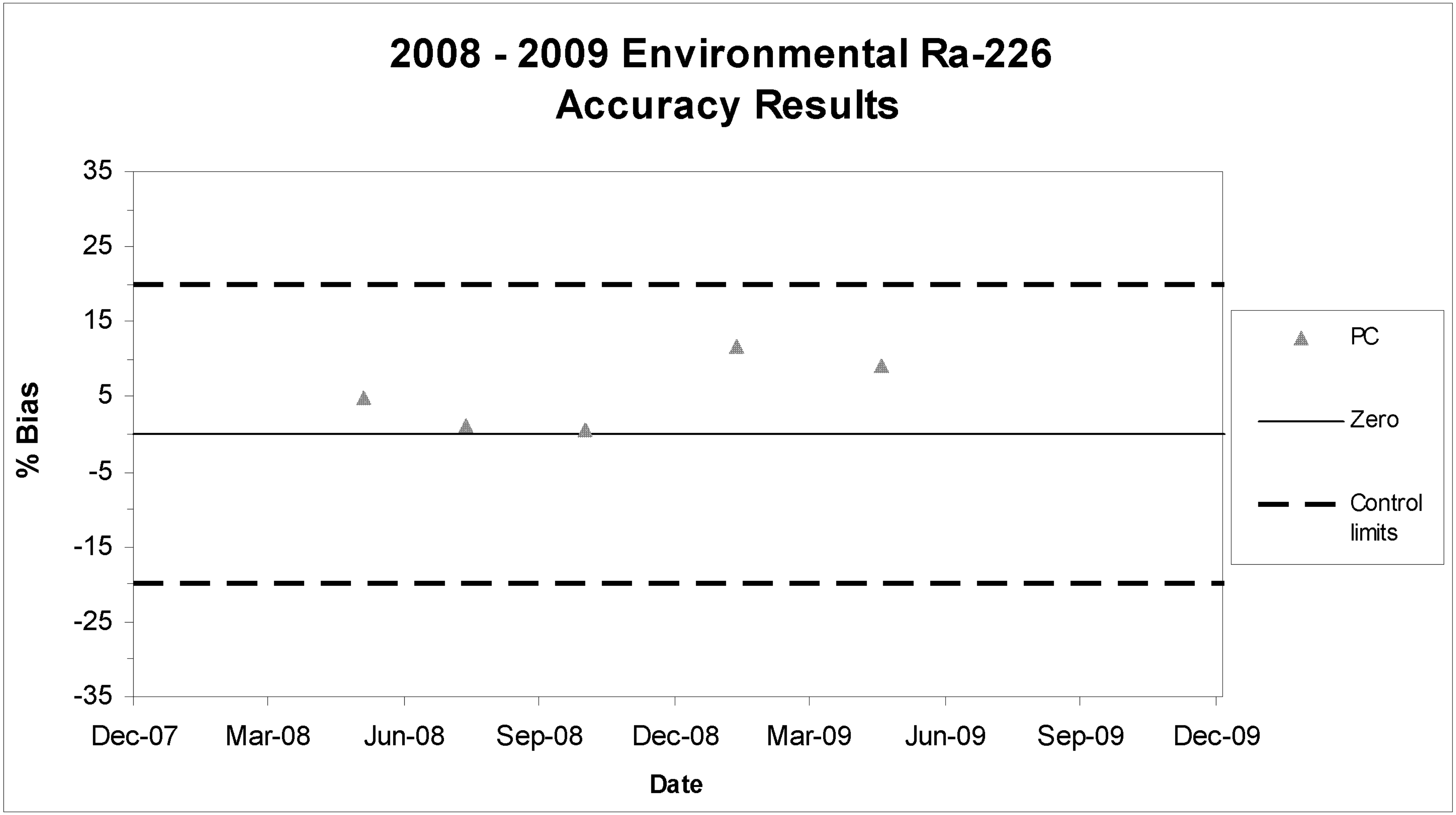

2008 - 2009 Environmental Ni-63
Accuracy Results
% Bias
35
25
15
5
-5
-15
-25
-35
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
MAPEP
Zero
Control limits

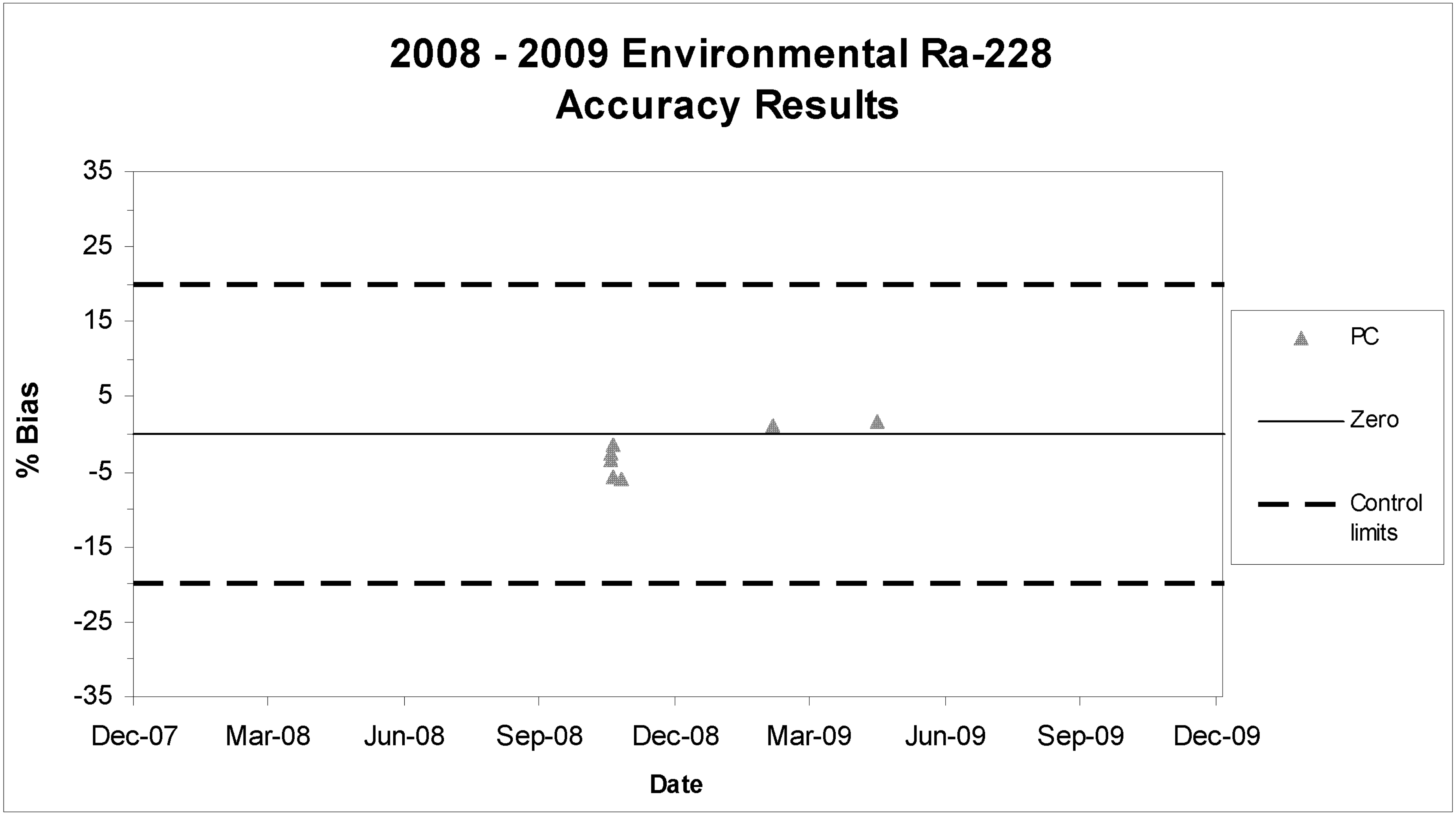


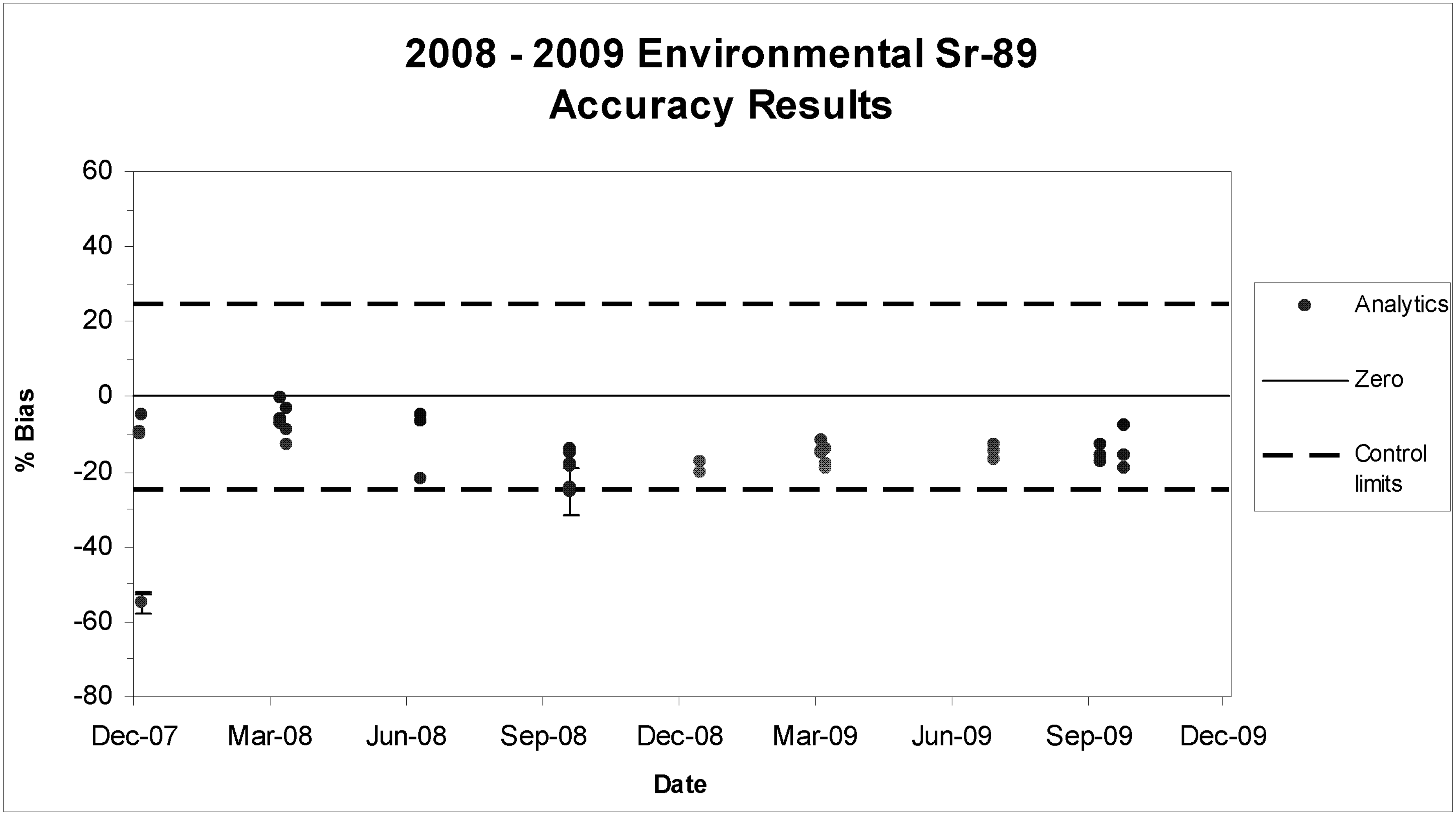
CR-09-12 was issued to investigate these negative biases.



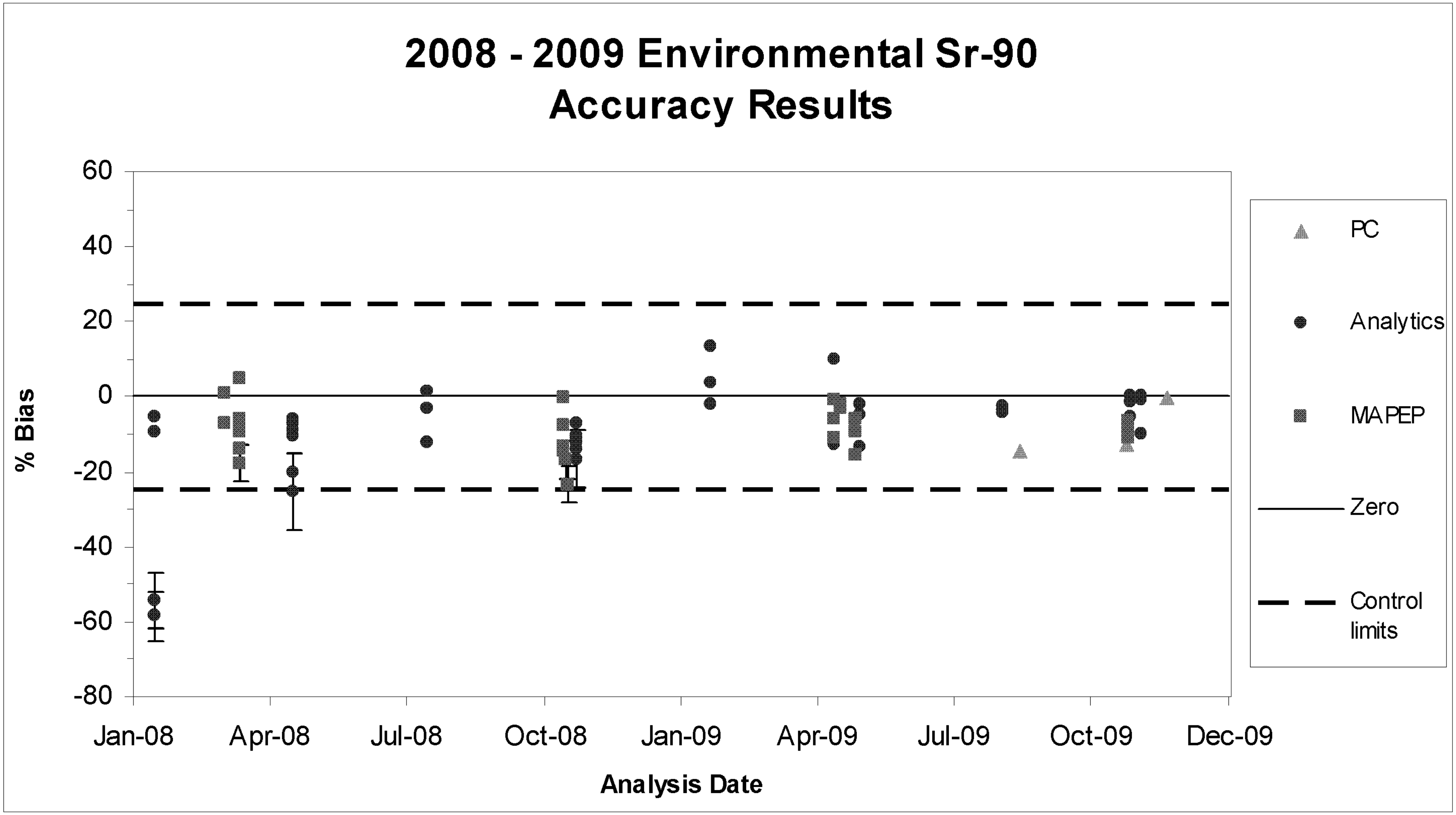
CR-09-12 was issued to investigate these negative biases.


2008 - 2009 Environmental Ra-226
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Zero
Control limits

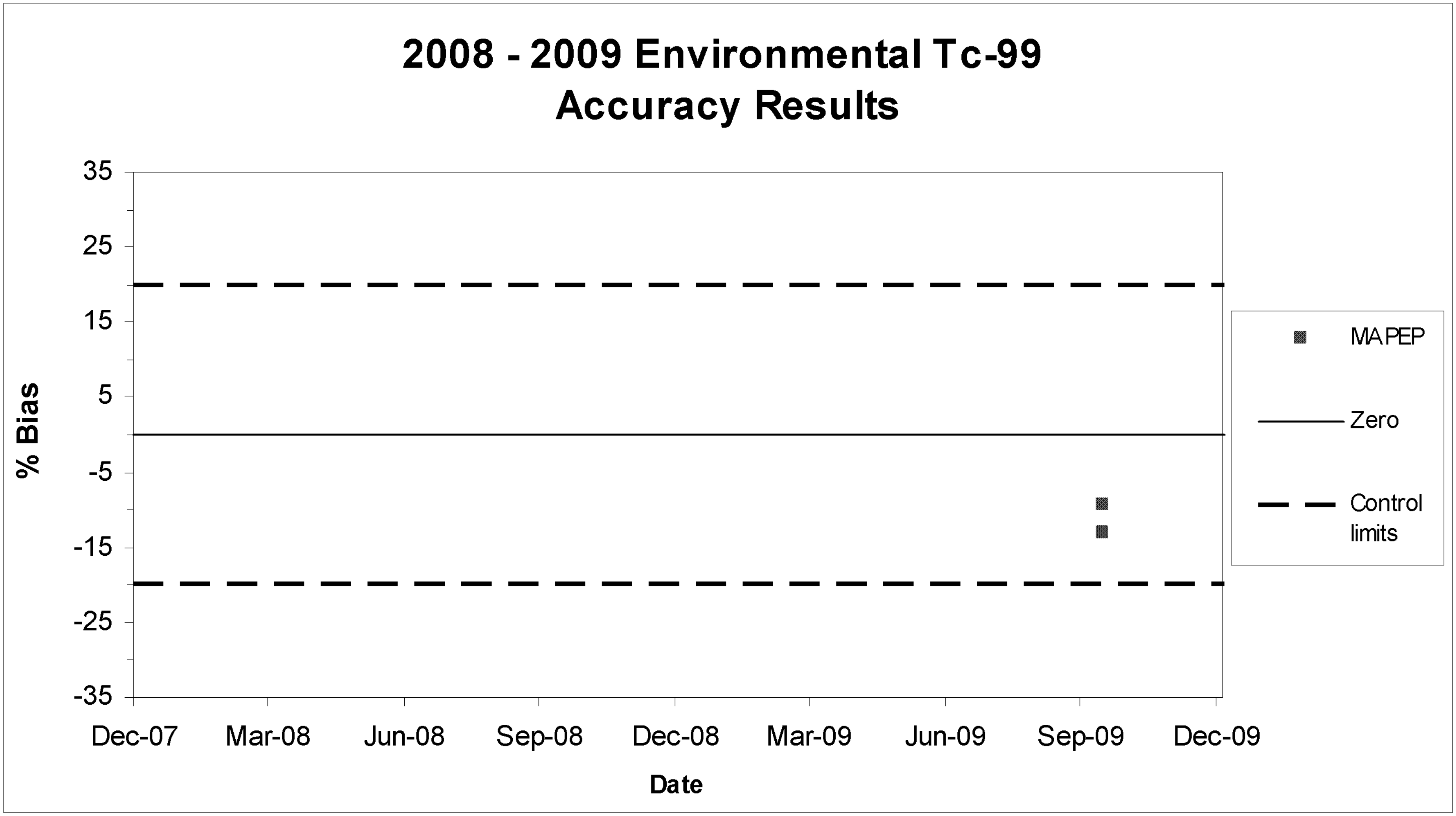

2008 - 2009 Environmental Ra-228
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Zero
Control limits

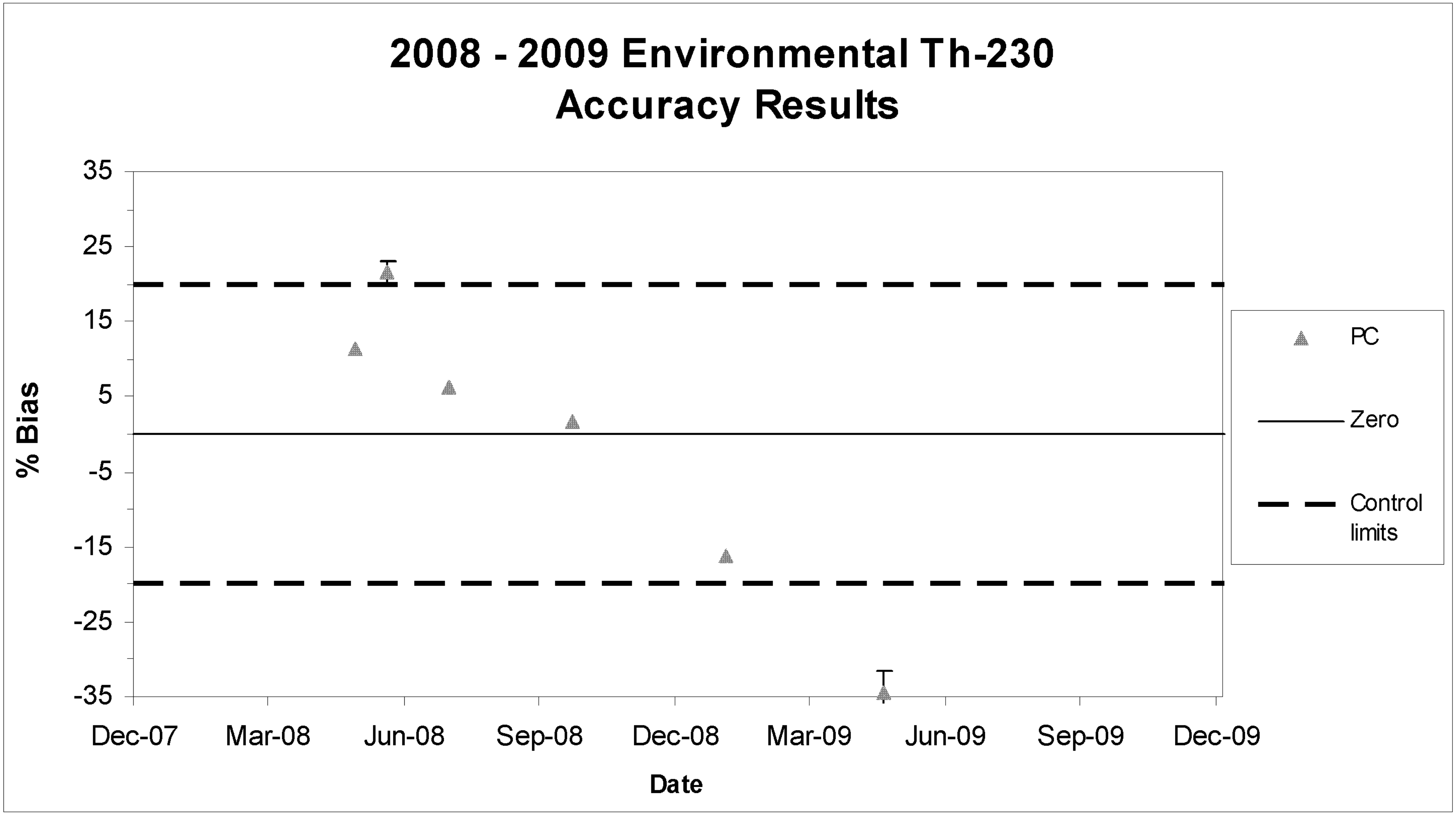


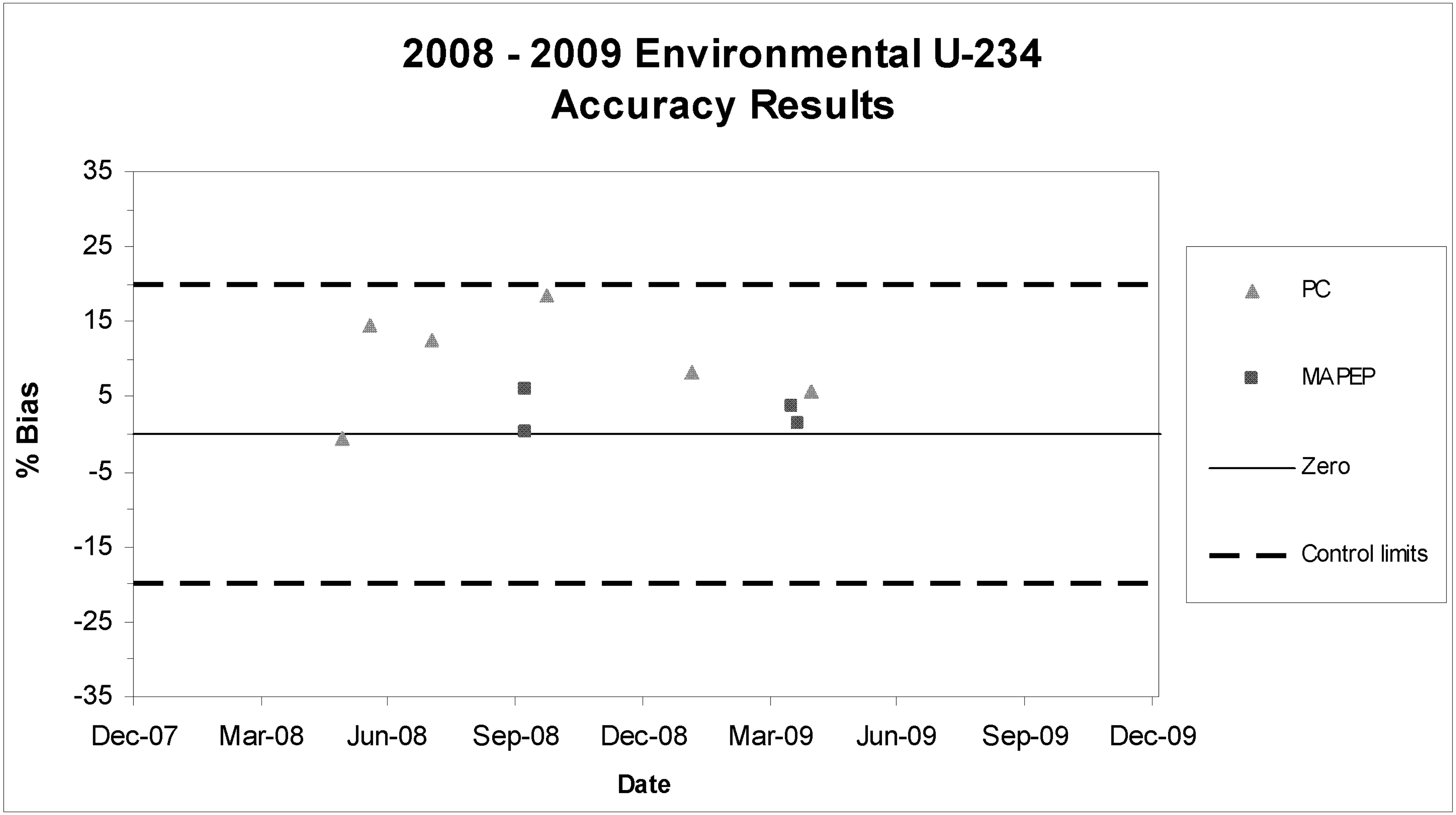
2008 - 2009 Environmental Sr-89
Accuracy Results
60
40
20
0
-20
-40
-60
-80
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
Analytics
Zero
Control limits



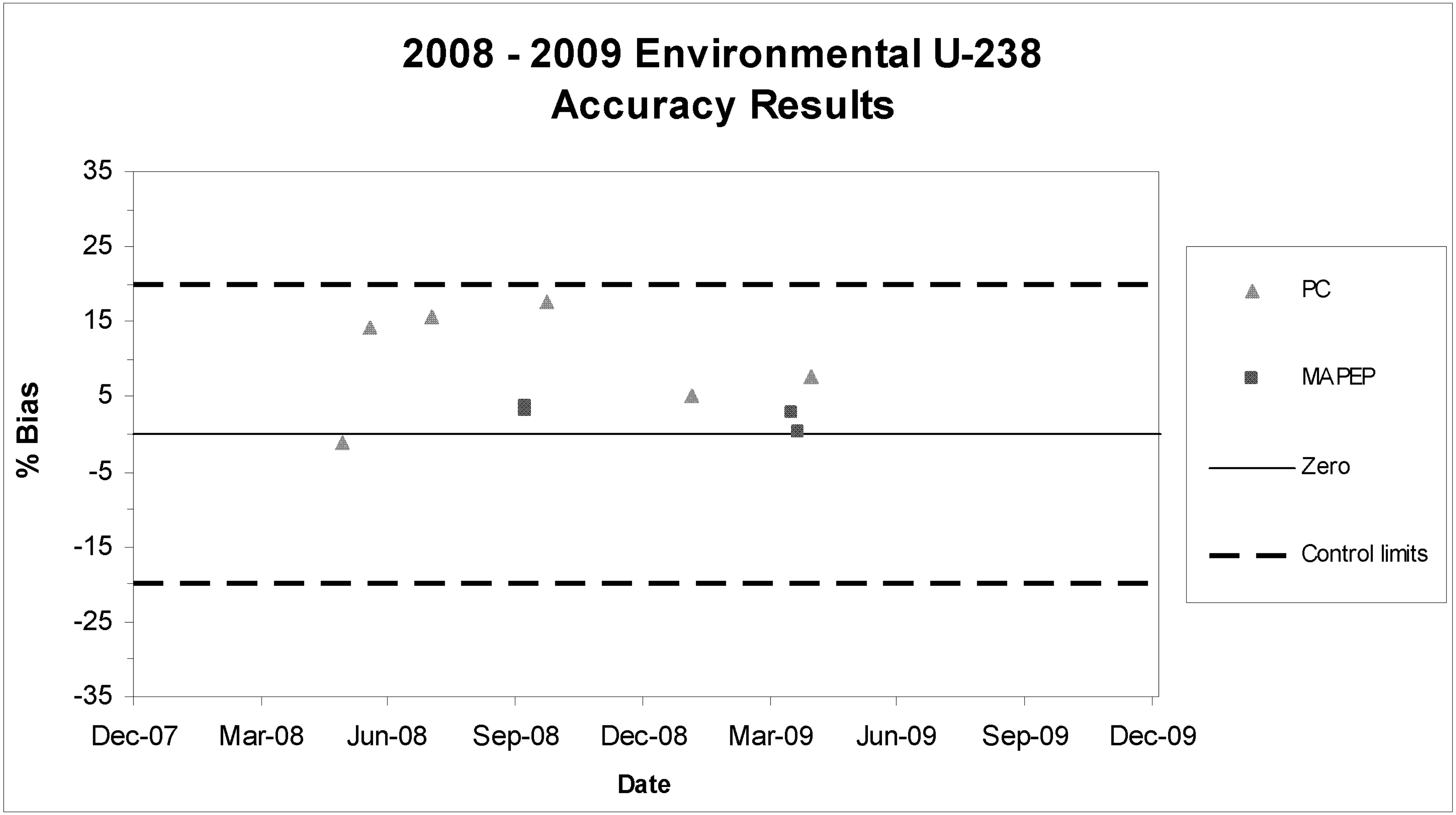
2008 - 2009 Environmental Sr-90
Accuracy Results
60
40
20
0
-20
-40
-60
-80
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Analysis Date
PC
Analytics
MAPEP
Zero
Control limits


2008 - 2009 Environmental Tc-99
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
MAPEP
Zero
Control limits

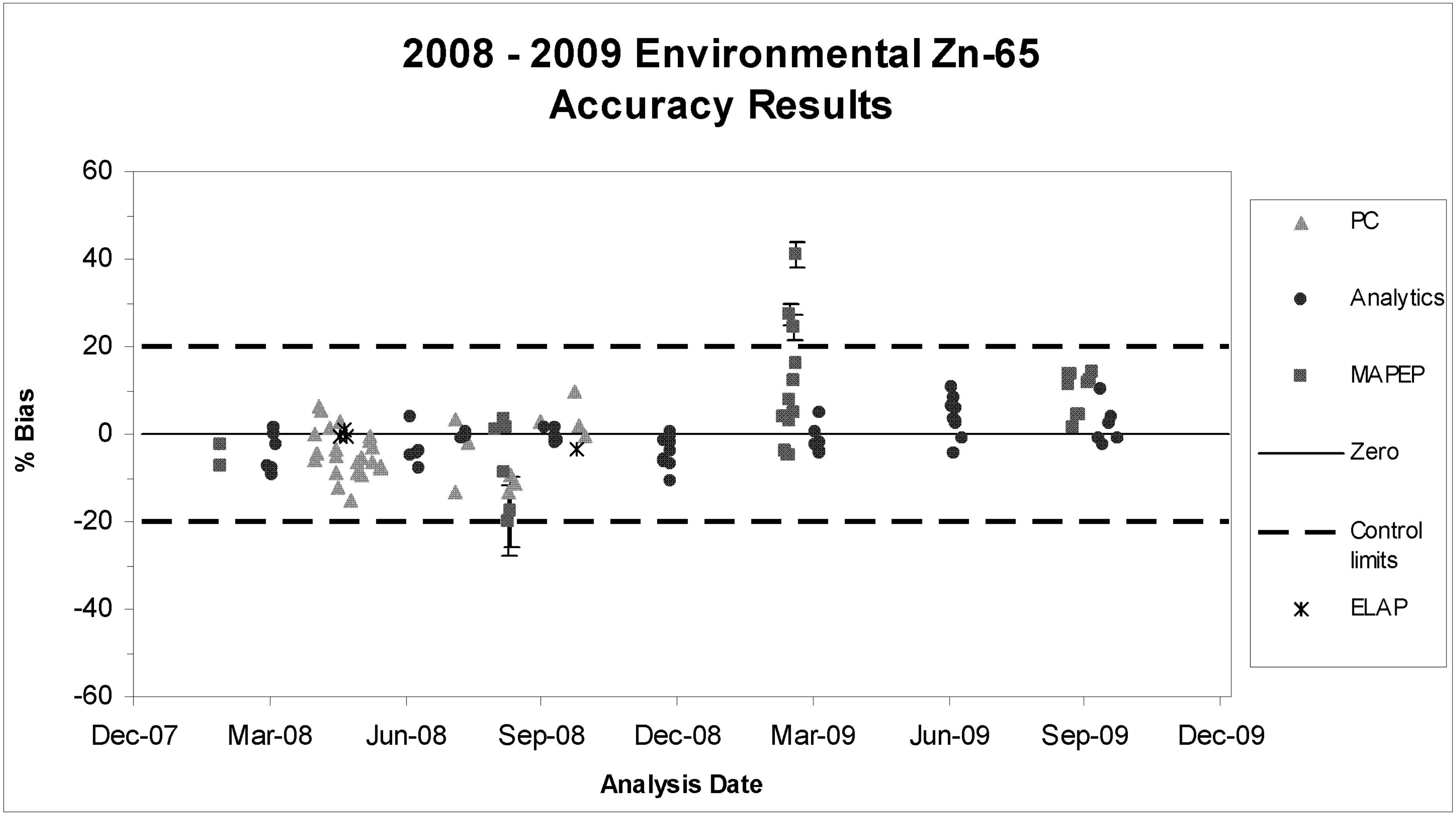

2008 - 2009 Environmental Th-230
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
Zero
Control limits



2008 - 2009 Environmental U-234
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
MAPEP
Zero
Control limits



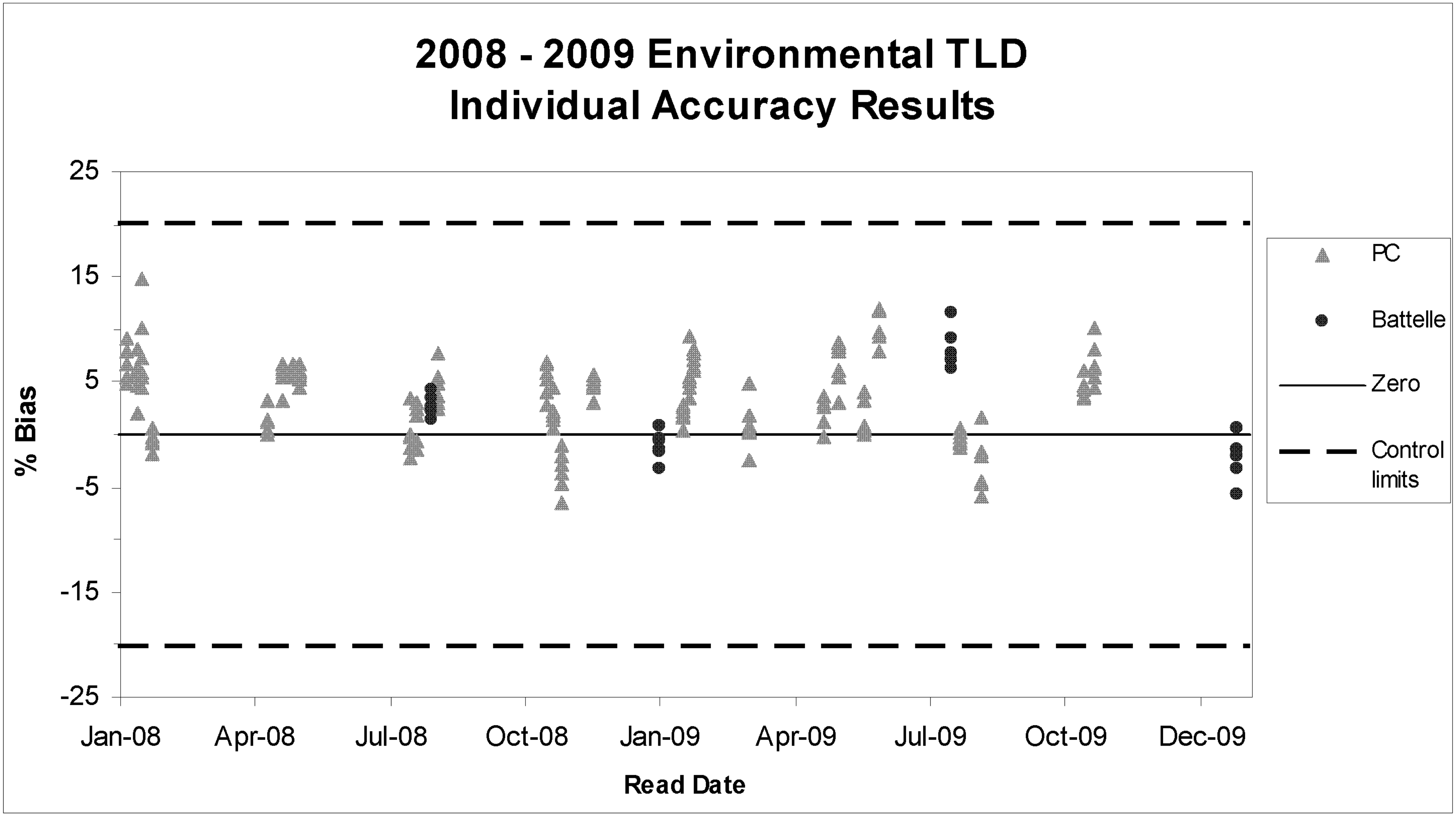
2008 - 2009 Environmental U-238
Accuracy Results
35
25
15
5
-5
-15
-25
-35
% Bias
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
Date
PC
MAPEP
Zero
Control limits

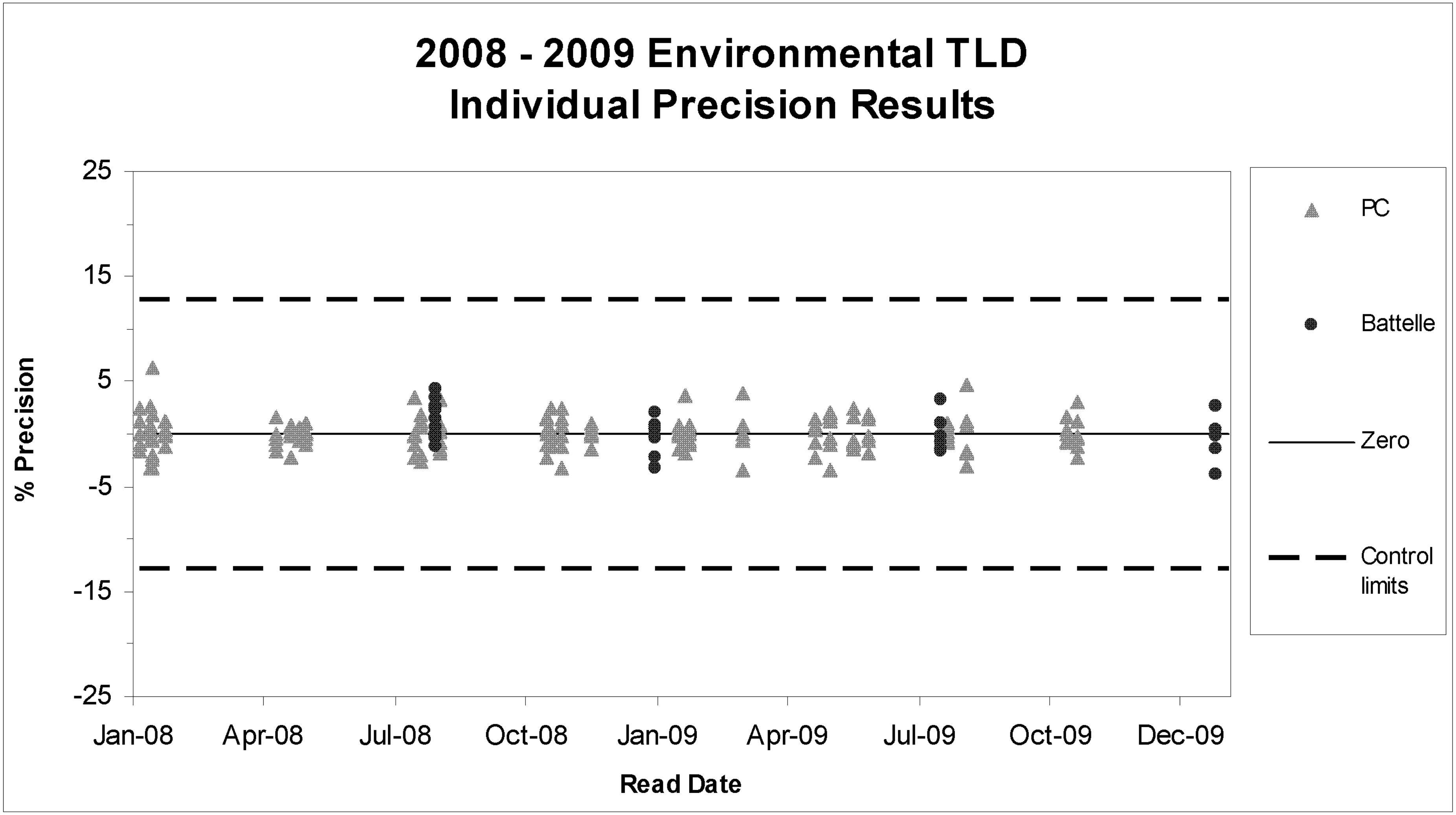


CR-09-14 was issued to investigate the positive biases in the MAPEP soil sample.

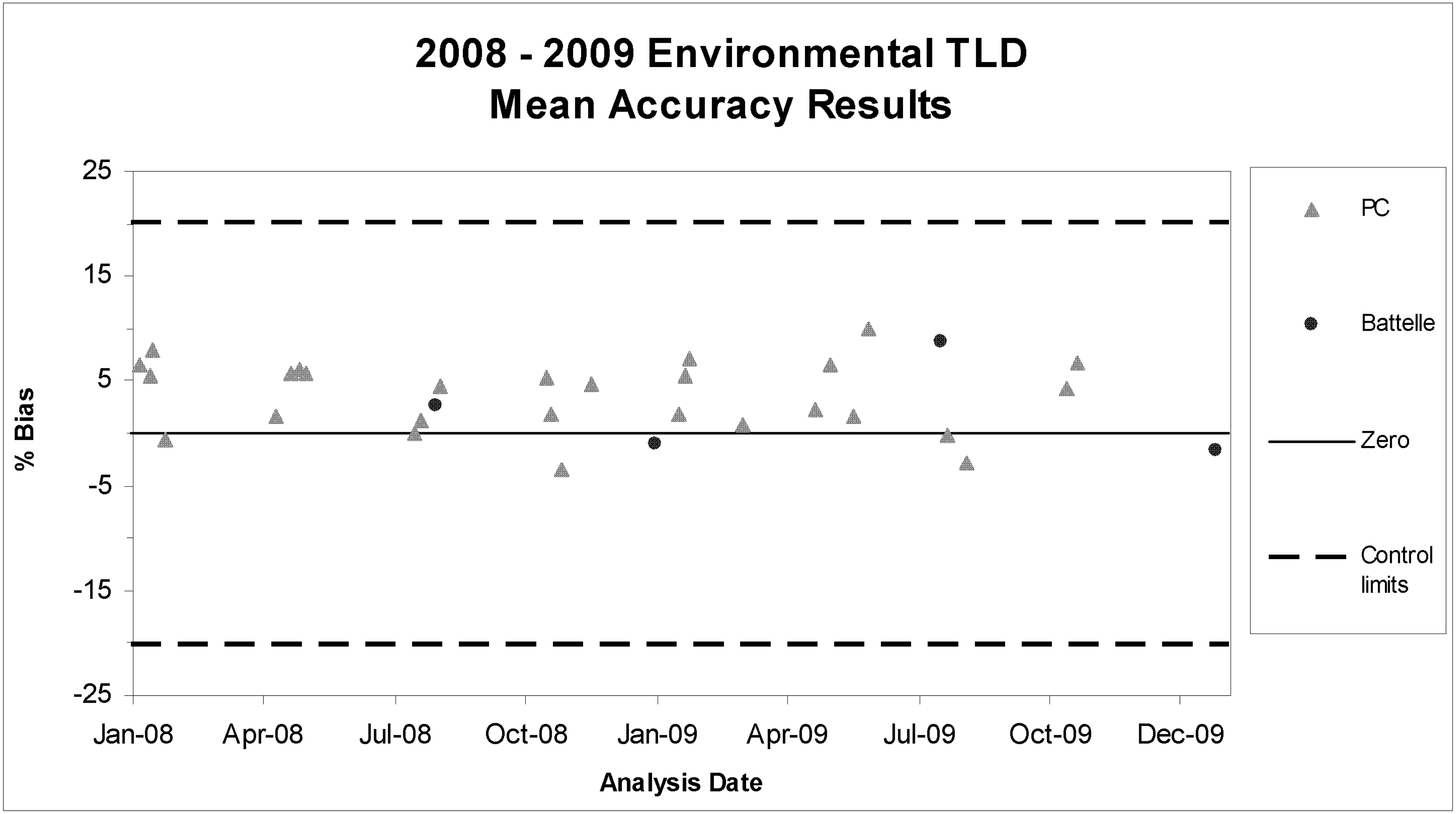
APPENDIX B

ENVIRONMENTAL DOSIMETRY
QUALITY CONTROL PROGRAM RESULTS


2008 - 2009 Environmental TLD
Individual Accuracy Results
25
15
5
-5
-15
-25
% Bias
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Read Date
PC
Battelle
Zero
Control limits



2008 - 2009 Environmental TLD
Individual Precision Results
25
15
5
-5
-15
-25
% Precision
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Dec-09
Read Date
PC
Battelle
Zero
Control limits



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