AmerenUE
Callaway Plant

PO Box 620
Fulton, MO 65251

April 20, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC05276

Ameren UE

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
2005 ANNUAL ENVIRONMENTAL OPERATING REPORT

Please find enclosed the 2005 Annual Environmental Operating Report for the Callaway Plant. This report is submitted in accordance with Section 5.6.2 of the Technical Specification and Appendix B to the Callaway Plant Operating License.

Sincerely,

Keith D. Young
Manager, Regulatory Affairs

HAO/slk

Enclosure: Annual Environmental Operating Report

IE25

cc: U.S. Nuclear Regulatory Commission (Original and 1 copy)
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

Mr. Bruce S. Mallett
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-7D1
Washington, DC 20555-2738

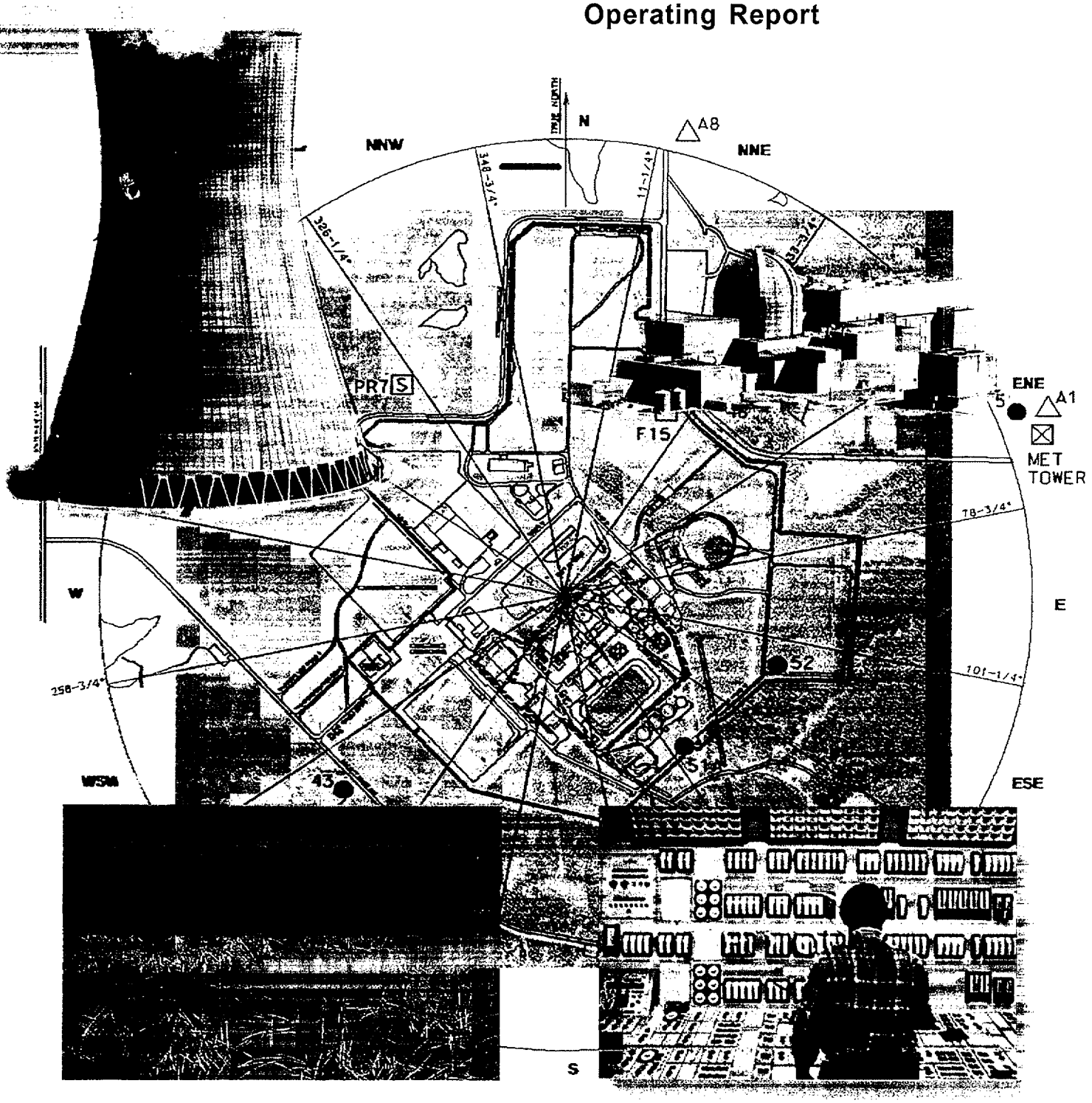
Missouri Public Service Commission
Governor Office Building
200 Madison Street
PO Box 360
Jefferson City, MO 65102-0360

Mr. Edward Everett
ANI Account Engineer
95 Glastonbury,
Glastonbury, CT 06033

Regional Administrator
Department of Natural Resources
Central Regional Office
P.O. Box 176
Jefferson City, MO 65102-0176

2005 Callaway Plant

Annual Radiological Environmental Operating Report



Docket no. 50-483

Table of Contents

List of Figures

List of Tables

1.0 Executive Summary

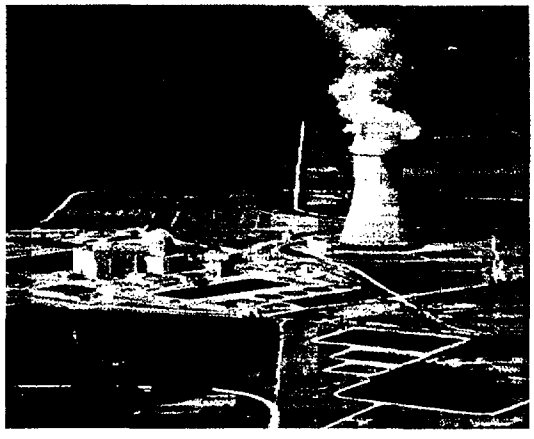
This Annual Radiological Environmental Operating Report describes the Union Electric Company, Callaway Plant Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2005. It is submitted in accordance with section 5.6.2 of the Callaway Plant Technical Specifications.

Section 2.0 describes the Radiological Environmental Monitoring Program. Included is the identification of sampling locations, descriptions of sampling and analysis procedures, analysis results, data interpretations, and program modifications. Quality assurance results, sampling deviations, unavailable samples, and program changes are also discussed.

Section 3.0 describes the Non-Radiological Monitoring Program. Included are any unusual or important events, Environmental Protection Plan noncompliance, non-routine reports, and plant design and operational environmental evaluations.

During 2005 the Callaway Plant operated in compliance with the Offsite Dose Calculation Manual (ODCM) requirements. Comparison of results for 2005 to preoperational data and data from previous years show no significant differences.

Results from the REMP indicate the Callaway Plant has had no significant radiological impact on the health and safety of the public or on the environment.



2.0 Radiological Monitoring Program

2.1 Introduction

This report presents an analysis of the results of the REMP conducted during 2005 for Union Electric Company, Callaway Plant.

The radiological environmental monitoring program began in April 1982.

The objectives of the REMP are to monitor potential critical pathways of radioactive effluent to man and determine the radiological impact on the environment caused by operation of Callaway Plant.

Callaway Plant consists of one 1239 MWe pressurized water reactor, which achieved initial criticality on October 2, 1984. The plant is located on a plateau approximately ten miles southeast of the City of Fulton in Callaway County, Missouri and approximately eighty miles west of the St. Louis metropolitan area. The Missouri River flows by the site in an easterly direction approximately five miles south of the site at its closest point.

2.2 Program Design

The sample locations, frequency of sampling, and sample analysis requirements originate from the Callaway Plant Off Site Dose Calculation Manual, NPDES Permit, and continuation of the Callaway Plant Pre-Operational Environmental Monitoring Program.

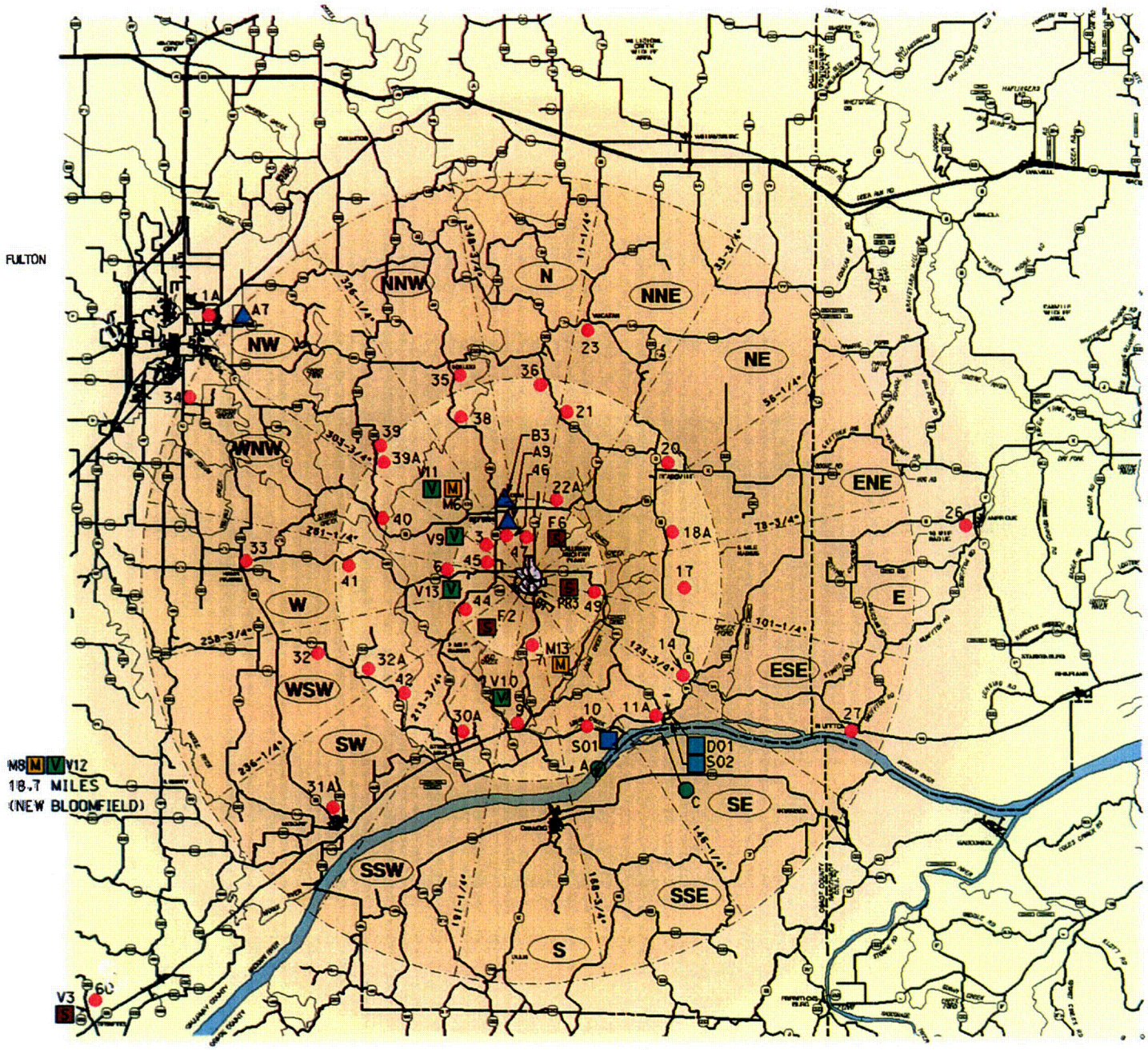
Samples are collected from waterborne, airborne, ingestion, and direct radiation pathways. The types of sample media collected are: milk, surface water, ground water, shoreline sediment, bottom sediment, soil, wetlands, fish, vegetation, airborne particulate, airborne radioiodine, and direct radiation (TLD). Indicator samples are collected from locations which could be influenced by plant effluents. Control samples are collected at locations that are not significantly affected by plant operation.

Samples are collected by Union Electric personnel or contractors to Union Electric and shipped to Environmental Inc. - Midwest Laboratory (EIML) and Framatone for analysis. The data is reported monthly and summarized in the annual report.

2.3 Program Description

Sample locations for the REMP are shown in Figures I and II. Table I identifies the location code, description, and sample type. Table II specifies the collection frequency and required analysis.

Figure I Distant Collection Locations

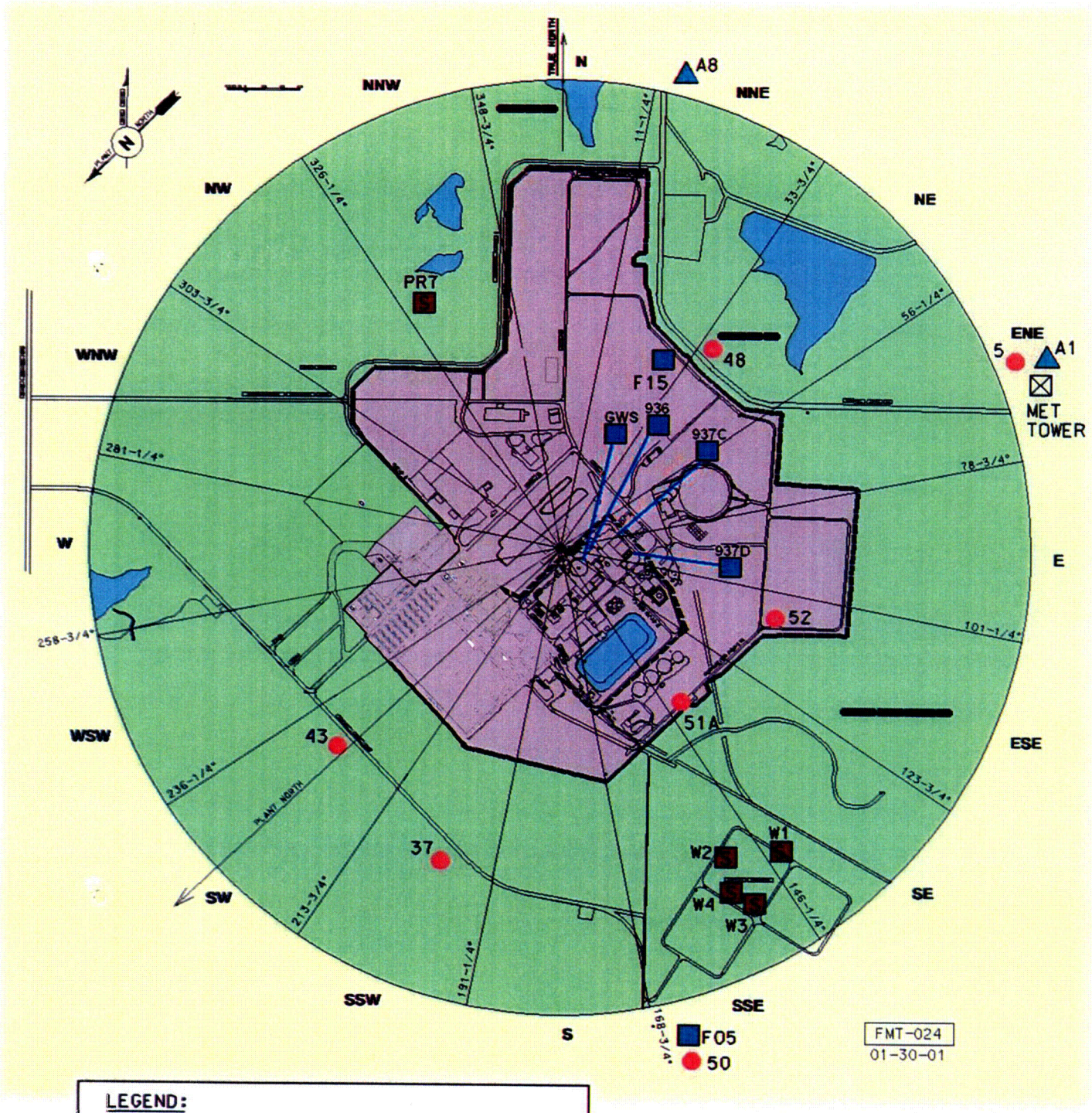


FMT-023
01-30-01

LEGEND:

- = TLD
- = AIR
- = WATER
- = VEGETATION
- = MILK
- = SOIL
- = FISH, SEDIMENT

Figure II Near Site Collection Locations



LEGEND:

- = TLD
- = AIR
- = WATER
- = VEGETATION
- = MILK
- = SOIL
- = FISH, SEDIMENT

Table I REMP Sample Locations

Location Code	Description[1]	Sample Types[2]
1a	10.8 mi. NW; City of Fulton on Hwy Z, 0.65 mi. East of Business 54, West of Campus Apartments.	IDM
3	1.2 mi. NW; 0.1 mi. West of Hwy CC on Gravel Road, 0.8 mi. South Hwy O, Callaway Electric Cooperative Utility Pole No. 18559.	IDM
5	1.3 mi. ENE; Primary Meteorological Tower.	IDM
6	2.0 mi. W; County Road 428, 1.2 mi. West of Hwy CC, Callaway Electric Cooperative Utility Pole No. 18609.	IDM
7	1.4 mi. S; County Road 459, 2.6 mi. North of Hwy 94, Callaway Electric Cooperative Utility Pole No. 35097.	IDM
9	3.8 mi. S; NW Side of the County Road 459 and Hwy 94 Junction, Callaway Electric Cooperative Utility Pole No. 06754.	IDM
10	3.9 mi. SSE; Hwy 94, 1.8 mi. East of County Road 459, Callaway Electric Cooperative Utility Pole No. 12182.	IDM
11a	4.7 mi. SE; City of Portland, Callaway Electric Cooperative Utility Pole No. 12110.	IDM
14	4.9 mi. ESE; SE Side of Intersection D and 94, Callaway Electric Cooperative Utility Pole No. 11940.	IDM
17	3.8 mi. E; County Road 4053, 0.3 mi. East of Hwy 94, Kingdom Telephone Company Pole No. 3X12.	IDM
18a	3.7 mi. ENE; East side of Hwy D, 0.5 mi. South of O, Callaway Electric Cooperative Utility Pole No. 38579.	IDM
20	4.7 mi. NE; City of Readsville, Callaway Electric Cooperative Utility Pole No. 12830.	IDM
21	3.8 mi. NNE; County Road 155, 1.9 mi. North of Hwy O, Callaway Electric Cooperative Utility Pole No. 19100.	IDM
22a	1.9 mi. NNE; North side of Hwy O, 100 feet East of County Road 150, Callaway Electric Cooperative Utility Pole No. 31094.	IDM
23	6.6 mi. NNE; City of Yucatan, Callaway Electric Cooperative Utility Pole No. 12670.	IDM
26[3]	11.7 mi. E; Town of Americus, Callaway Cooperative Utility Pole No. 11159.	IDM
27[3]	9.3 mi. ESE; Town of Bluffton, Callaway Electric Cooperative Utility Pole No. 11496.	IDM
30a	4.4 mi. SSW; City of Steedman, N side of Belgian Dr., 150 feet East of Hwy CC, Callaway Electric Cooperative Utility Pole No. 06557.	IDM

Table I REMP Sample Locations Continued

Location Code	Description[1]	Sample Types[2]
31a	7.8 mi. SW; City of Mokane, Junction Hwy C and County Road 400, 0.9 mi. North of Hwy 94, Callaway Electric Cooperative Utility Pole.	IDM
32	5.4 mi. WSW; Hwy VV, 0.6 mi. West of County Road 447, Callaway Electric Cooperative Utility Pole No. 27031.	IDM
32a	5.0 mi. WSW; County Road 447, Callaway Electric Cooperative Utility Pole No. 06354.	IDM
33	7.4 mi. W; City of Hams Prairie, SE of Hwy C and AD Junction.	IDM
34	9.5 mi. WNW; NE Side of Hwy C and County Road 408 Junction.	IDM
35	5.8 mi. NNW; City of Toledo, Callaway Electric Cooperative Utility Pole No. 17684.	IDM
36	4.9 mi. N; County Road 155, 0.8 mi. South of County Road 132, Callaway Electric Cooperative Utility Pole No. 19137.	IDM
37	0.5 mi. SSW; County Road 459, 0.9 mi. South of Hwy CC, Callaway Electric Cooperative Utility Pole No. 35077.	IDM
38	4.6 mi. NNW; County Road 133, 1.5 mi. South of Hwy UU, Callaway Electric Cooperative Utility Pole No. 34708.	IDM
39	5.4 mi. NW; County Road 111, Callaway Electric Cooperative Utility Pole No. 17516.	IDM
39a	5.0 mi. NW; County Road 111, Callaway Electric Cooperative Utility Pole No. 17526.	IDM
40	4.2 mi. WNW; NE Side of County Road 112 and Hwy O, Callaway Electric Cooperative Utility Pole No. 18145.	IDM
41	4.9 mi. W; Hwy AD, 2.8 mi. East of Hwy C, Callaway Electric Cooperative Utility Pole No. 18239.	IDM
42	4.4 mi. SW; County Road 447, 2.6 mi. North of County Road 463, Callaway Electric Cooperative Utility Pole No. 06326.	IDM
43	0.5 mi. SW; County Road 459, 0.7 mi. South of Hwy CC, Callaway Electric Cooperative Utility Pole No. 35073.	IDM
44	1.6 mi. WSW; Hwy CC, 1.0 mi. South of County Road 459, Callaway Electric Cooperative Utility Pole No. 18769.	IDM
45	1.0 mi. WNW; County Road 428, 0.1 mi. West of Hwy CC, Callaway Electric Cooperative Utiility Pole No. 18580.	IDM

Table I REMP Sample Locations Continued

Location Code	Description[1]	Sample Types[2]
46	1.5 mi. NNW; NE Side of Hwy CC and County Road 466 Intersection, Callaway Electric Cooperative Utility Pole No. 28242.	IDM
47	1.0 mi. N; County Road 448, 0.9 mi. South of Hwy O, Callaway Electric Cooperative Utility Pole No. 28151.	IDM
48	0.4 mi. NE; County Road 448, 1.5 mi. South of Hwy O, Plant Security Sign Post.	IDM
49	1.6 mi. E; County Road 448, Callaway Electric Cooperative Utility Pole No. 06959, Reform Wildlife Management Parking Area.	IDM
50	0.9 mi. SSE; County Road 459, 3.3 mi. North of Hwy 94, Callaway Electric Cooperative Utility Pole No. 35086.	IDM
51a	0.3 mi. SE; Owner Control Fence, SE of the Water Treatment Plant.	IDM
52	0.4 mi. ESE; Light Pole Near the East Plant Security Fence.	IDM
60[3]	13.5 mi. SW; Callaway Electric Cooperative Utility Pole No. 43744 just past Tebbetts City sign.	IDM
A1	1.3 mi. ENE; Primary Meteorological Tower.	APT, AIO
A7	9.5 mi. NW; C. Bartley Farm.	APT, AIO
A8	0.9 mi. NNE; County Road 448, 0.9 miles South of Hwy 0.	APT, AIO
A9	1.9 mi. NNW; Community of Reform.	APT, AIO
B3	1.8 mi. NNW; 0.3 mi. East of the O and CC Junction, Callaway Electric Cooperative Utility Pole No. 50422.	APT, AIO
D01	5.0 mi. SE; Holzhouser Grocery Store/Tavern (Portland, MO).	WWA
F05	0.9 mi. SSE; Onsite Groundwater Monitoring Well.	WWA
F15	0.4 mi. NNE; Onsite Groundwater Monitoring Well.	WWA
PW1	Callaway Cafeteria.	WWA
M6	2.6 mi. NW; Pierce's Farm (Cow's Milk).	MLK
M8[3]	18.7 mi. WSW, Kissock's Farm, South of New Bloomfield, MO (Cow's Milk).	MLK
M13	2.53 mi. SSE; Miller's Farm, located on Highway 448.	MLK
V3[3]	15.0 mi. SW; Beazley Farm, West of Tebbetts, MO.	SOL

Table I REMP Sample Locations Continued

Location Code	Description[1]	Sample Types[2]
V9	2.0 mi. WNW; Meehan Farm.	FPL
V10	3.4 mi. SSW; Brandt Farm.	FPL
V11	3.2 mi. NW; Hickman Farm.	FPL
V12[3]	18.7 mi. WSW; Kissock's Farm, South of New Bloomfield, MO.	FPL
V13[5]	2.02 mi. W; Buchholz's Farm, County Road 428, 1.2 mi. West of Hwy CC.	FPL
A[3,4]	4.9 mi. SSE; 0.6 River Miles Upstream of Discharge North Bank.	AQS, AQF
C[4]	4.9 mi. SE; 1.0 River Miles Downstream of Discharge North Bank.	AQS, AQF
S01[3]	4.7 mi. SSE; 105 feet Upstream of Discharge North Bank.	SWA
S02	4.9 mi. SE; 1.1 River Miles Downstream of Discharge North Bank.	SWA
F2	1.64 mi. SW; Callaway Plant Forest Ecology Plot F2.	SOL
F6	1.72 mi. NE; Callaway Plant Forest Ecology Plot F6.	SOL
PR3	1.02 mi. ESE; Callaway Plant Prairie Ecology Plot PR3.	SOL
PR7	0.45 mi. NNW; Callaway Plant Prairie Ecology Plant PR7.	SOL
W4	0.68 mi. SSE; Callaway Plant Wetlands, SW Bank.	SOL
W2	0.60 mi. SSE; Callaway Plant Wetlands, Inlet Area.	SOL
W1[3]	0.61 mi. SE; Callaway Plant Wetlands, High Ground.	SOL
W3	0.72 mi. SSE; Callaway Plant Wetlands, Discharge Area.	SOL
GWS[5]	Ground Water Sump, Plant East of containment and Spent Fuel Pool Bldg.	WWA
936[5]	Diesel Fuel Remediation Well, Plant SE of Spent Fuel Pool Bldg.	WWA
937C[5]	Monitoring Well, Plant East of Radwaste Building Drum Stor age.	WWA
937D[5]	Monitoring Well, Plant South of Discharge Monitor Tanks.	WWA

[1] All distances are measured from the midpoint of the two reactors as described in Final Safety Analysis Report (FSAR) Section 2.1.1.1.

[2] AIO = Air Iodine, APT = Air Particulate, AQF = Fish, AQS = Sediment, FPL = Leafy Green Vegetables, GWS = Ground Water Sump, IDM = TLD, MLK = Milk, SOL = Soil, SWA = Surface Water, WWA = Ground Water.

[3] Control Location.

[4] The fish collection area for location "A" is between 0.6 and 3.0 river miles upstream of the plant discharge on the north bank and for location "C" is between discharge area and 1.5 miles downstream of the discharge on the north bank. The expanded collection areas are needed to guarantee there is sufficient habitat for sampling to insure the ability to collect the required number of fish species.

[5] New REMP location for 2005.

Table II REMP Sample Collection

Frequencies and Required Analysis[1]

Sample Type	Sample Code	Collection Frequency	Required Analysis
Airborne Iodine	AIO	Weekly	I-131 weekly
Air Particulate	APT	Weekly	Gross Beta weekly[2] and Gamma Isotopic of quarterly filter composite
Fish	AQF	Semiannually (April 1st and Oct 1st)	Gamma Isotopic
Sediment (Shoreline and Bottom)	AQS	Semiannually (April 1st and Oct 1st)	Gamma Isotopic (Bottom sample NPDES requirement)
Leafy Green Vegetables Isotopic	FPL	Monthly during the growing season (2nd Tues. of month)[3]	Gross Alpha, Gross Beta, I-131, and Gamma
TLD	IDM	Quarterly (1st day of each quarter)	Gamma Dose
Milk	MLK	Semimonthly when animals are on pasture; monthly otherwise	I-131 and Gamma Isotopic
Soil	SOL	Annually (November 1st)	Gross Alpha, Gross Beta Gamma Isotopic (Continuation of preoperational program)
Surface Water	SWA	Monthly composite (2nd Tues. of month)	H-3 and Gamma Isotopic
Drinking / Ground Water	WWA	Quarterly Grab (1st day of each quarter)	H-3 and Gamma Isotopic

[1] Samples required by ODCM and NPDES permit. Additional sampling is performed as a continuation of the preoperational monitoring program.

[2] If gross beta activity is greater than the established base line activity level, gamma isotopic analysis is performed on the individual sample.

[3] The growing season is defined as the months of May through November; however, the growing season will vary from year to year due to weather conditions.

2.4 Sampling Program Execution and Results

2.4.1 Program Modifications and Exceptions

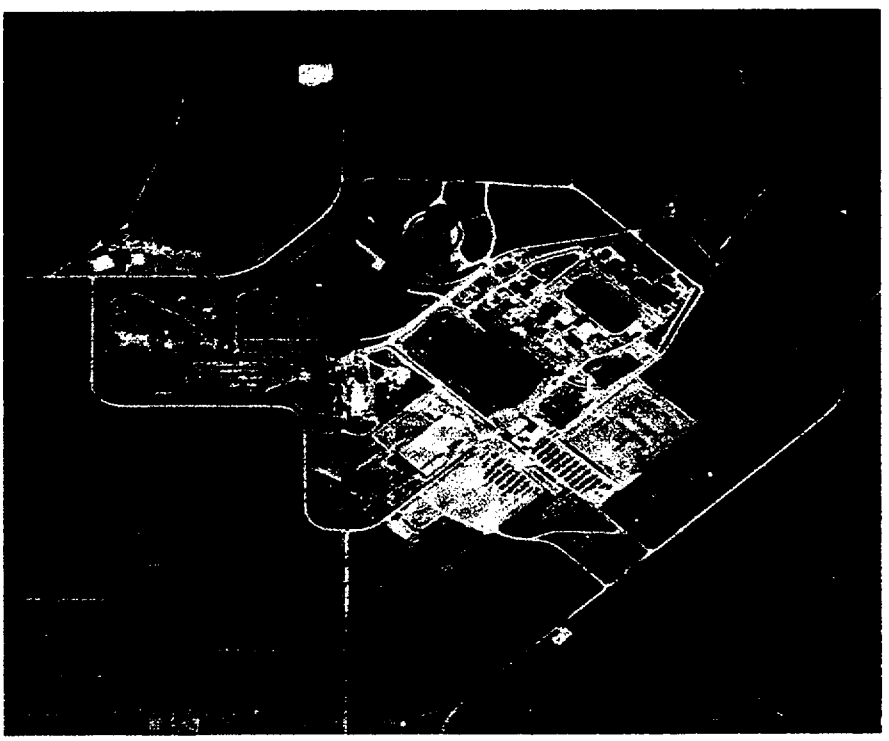
During 2005, no significant changes were made to the Radiological Environmental Monitoring Program.

The Radiological Environmental Monitoring Program was executed as described in the ODCM with any exceptions listed in this report.

2.4.2 Detection and Reporting Limits

Table III gives the minimun required detection limits for radiological environmental sample analysis. For each sample type, the table lists the detection level for each isotope. The lower limit of detection (LLD) used in this report is described in NRC Regulatory Guide 4.1 Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants" and the NRC Radiological Assessment Branch Technical Position, Rev. 1, November 1979, "An Acceptable Radiological Environmental Monitoring Program".

Positive sample results are reported with a 2 sigma counting uncertainty (corresponding to the 95% confidence level). Cases where the activity is found to be below the sample analysis minimum detection level are reported as Not Detected (ND).



Aerial view of the Callaway Plant site. Included is some of the land worked by a local farmer to produce feed for cattle and for growing soybeans for commercial use.

Table III Minimum Detection Capabilities for REMP Sample Analysis[1]

Analysis	Water (pCi/l)	Airborne (pCi/m^3)	Fish (pCi/kg wet)	Milk (pCi/l)	Food Products (pCi/kg wet)	Soil and Sediment (pCi/kg dry)
Gross beta	4	0.01				
H-3	3000/2000[3]					
Mn-54	15		130			
Fe-59	30		260			
Co-58/60	15		130			
Zn-65	30		260			
Zr-Nb-95[2]	15					
I-131	1000/1[3]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140[2]	15			15		

[1] This list does not mean only these nuclides will be detected and reported. Other peaks which are measurable and identifiable will be reported.

[2] Total activity, parent plus daughter activity.

[3] LLDs for Surface and Drinking / Ground water are the same, with the exception of H-3 and I-131. The drinking/ground water LLDs for H-3 and I-131 are 2000 and 1 pCi/liter respectively.

2.4.3 Quality Control Program

The vendor laboratory, Environmental Inc. - Midwest Laboratory, maintains a quality assessment (QC) program in accordance with Regulatory Guide 4.15. The program includes laboratory procedures designed to prevent cross contamination and to ensure accuracy and precision of analyses. QC checks include blind, duplicate, and spiked samples as necessary to verify laboratory analysis activities are being maintained at a high level of accuracy.

The contractor laboratory participates in the Department of Energy's Environmental Measurements Laboratory Quality Assessment Program (EML), Mixed Analyte Performance Evaluation Program (MAPEP), and Environmental Resource Associates (ERA). The results of these cross check programs are presented in Section 2.6.

The Environmental TLDs are processed by Framatome. This lab meets the required quality control by maintaining a NVLAP (National Voluntary Laboratory Accreditation Program) Certification.

2.4.4 Data Interpretations

Sample analysis results are evaluated to determine if the result was due to the operation of the Callaway Plant or other sources.

One evaluation method used is the indicator-control concept. Most sample types are collected at both indicator (areas potentially affected by plant operations) and control locations (areas not significantly affected by plant discharge). A possible plant effect would be indicated if the detected level at an indicator location was statistically greater than at the control location.

Another method involves determining if the result originated from weapons testing. The indicator or control sample result can be compared to established environmental levels produced from weapons testing.

Sample results can also be compared with preoperational levels or samples collected in other parts of the country. Results can also be related to events known to have caused elevated levels of radiation in the environment.

2.4.5 Waterborne Pathway

Surface Water

Analysis

Tritium: A 60-70 ml aliquot of water is purified by distillation. A portion of the distillate is transferred to a counting vial and scintillation fluid added. The contents of the vial are thoroughly mixed and counted in a liquid scintillation counter.

Gamma Spectrometry: A suitable aliquot of sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Monthly composite samples of surface water from the Missouri River are collected from one indicator location (SO2) and from one control location (SO1) and shipped to EIML for analysis.

Results

The indicator water sampler (S02) was operational 90.7% of the time during 2005. Sampler operability is verified shiftly (every 8 hours) by use of a dial up modem. Actions are promptly taken to return the sampler to service when a problem is identified. If the sampler does not collect >250 mls per day, daily grab samples are collected and composited.

Most of the thirty-three days of indicator water

Sampling of the Missouri River is accomplished using an automated compositor. Samples are collected on an hourly basis and mixed to make the monthly composite sample. River sampling verifies that Callaway Plant discharges meet stringent regulatory requirements.

sampler inoperability (S02) were due to the pump or piping failures.(CARs 200503122, 200504843, 200509665, and 200510134).

Deviations during 2005 included a missed grab sample on December 8th due to snow and ice on the shoreline of the Missouri River when the composite sampler had failed. (CAR 200510055).

Tritium was the only radionuclide detected in surface water samples collected during 2005. Five of the twelve samples collected at indicator location S02 contained measurable levels of tritium with a mean concentration of 327.6 pCi/L. The Tritium results from S02 for 2005 were less than 1.5% of the reporting limit in surface water and well within regulatory requirements. Tritium results at S02 are being trended along with monthly liquid H-3 releases and Missouri river flow. The analysis results are consistent with previous operational levels and there was no significant radiological impact on the health and safety of the public or on the environment.

The control water sampler (S01) was operational 91.2% of the time in 2005. This sampler is checked weekly. Actions are taken to promptly return the sampler to service when a problem is identified. If the sampler cannot be returned to service within 24 hours, daily grab samples are collected. Eight of the thirty-two days of inoperability in April, was due to scheduled power outages, 7 days in June to replace and repair the sample pump (JOB 05104857), 2 days in September to repair sampler piping (CAR 200506775), and 15 days in October to replace the sample pump and piping (CAR 200508313).

Deviations during 2005 included a grab sample in September that could not be obtained in the pre-designated location due to debris that had accumulated along the shoreline of the Missouri River. The sample was obtained several yards upstream of the normal grab sample location at the steam generator loading dock (CAR 200506775).

Tritium was the only radionuclide detected in surface water samples collected during 2005. Five of the twelve samples collected at the control location S01 contained measurable levels of tritium with a mean concentration of 332.7 pCi/L. This is due to tritium recirculation into the intake from the plant outfall CARs 200502277, 200507774, and 200505407.

The gamma analysis results for surface water samples were consistent with previously accumulated data and no plant operational effects were identified.

Drinking / Ground Water

Analysis

Tritium: A 60-70 ml aliquot of water is purified by distillation. A portion of the distillate is transferred to a counting vial and scintillation fluid added. The contents of the vial are thoroughly mixed and counted in a liquid scintillation counter.

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are

identified and quantified using a germanium detector coupled to a computer based multichannel analyzer. Analysis for I-131 is accomplished using chemical separation followed by gas flow proportional counting techniques.

Sampling and Frequency

Ground water samples are collected quarterly from two sampling (deep) wells (F05 and F15) and two (deep) drinking water wells (D01 and PW1). Four additional shallow wells (GWS/936/937C/937D) were added to the Callaway REMP due to positive tritium results found in these on site aquifers. The samples were taken as a result of NRC Information Notice 2004-05, Spent Fuel Pool Leakage to Onsite Groundwater at Salem. An exhaustive study of the source of tritium was conducted in 2004 and determined to be from recirculation of liquid effluents (CAR 200403826). The study indicated that no additional pathways, other than those identified in the Callaway ODCM, were affected.

The well samples are collected using an electric pump that is located in the well. The drinking water samples are collected from a faucet after allowing the line to flush for two minutes. The shallow well samples are collected by Engineering Surveys & Services. Samples are shipped to EIML for analysis.

Results

Tritium was the only radionuclide detected in the shallow wells collected during 2005. Twelve of the sixteen samples collected contained measurable levels of tritium with a mean concentration of 333.0 pCi/L.

The analysis results for all drinking/ground water samples were consistent with previously accumulated data and no plant operational effects were identified. (Note: groundwater samples are analyzed with the more conservative LLD limits associated with drinking water.)

Bottom Sediment

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Bottom sediment samples are collected semiannually from one indicator location (C) and one control location (A). The samples are taken from water at least 2 meters deep to prevent influence of bank erosion. A Ponar dredge is used to obtain the samples, consisting of the uppermost layer of sediment. Each sample is placed, without preservative, in a plastic bag, sealed and shipped to EIML for analysis.

Results

The analysis results for bottom sediment samples in 2005 were consistent with previously accumulated data including pre-operation and no plant operational effects were identified.

Shoreline Sediment

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Shoreline sediment samples are collected semiannually in the same area as bottom sediment. These samples are collected within two feet of the edge of the water and consist of 2 six-inch diameter by two-inch deep sediment plugs. Each sample is placed in a plastic bag, sealed and shipped to EIML for analysis.

Results

Cs-137 was the only isotope identified in one of the two samples from the control location (A). The level of Cs-137 was consistent with the levels identified during pre-operation of the plant. This was documented in CAR 200507792.

The analysis results for shoreline sediment samples in 2005 were consistent with previously accumulated data including pre-operation and no plant operational effects were identified.

Shoreline sediment samples are collected two feet from the edge of the water in the same location as the bottom sediment samples. Sediment samples indicate there has been no impact on the environment from Callaway Plant liquid discharges/effluents.

Wetlands Soil

Analysis

Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Wetlands soil samples are collected annually from 3 indicator locations (W2, W3, and W4) and one control location (W1). Two 6-inch square soil plugs consisting of the uppermost two-inch layer of soil are taken at each location. The samples are placed in plastic bags, sealed and shipped to EIML for analysis.

Results

Cesium 137 (Cs-137) was detected in the Wetlands soil samples. Station (W1) indicated 103 pCi/Kg dry, station (W2) indicated 181 pCi/Kg dry, station (W3) indicated 139 pCi/Kg dry, and station (W4) indicated 44 pCi/Kg dry.

The analysis results for Wetlands soil samples in 2005 were consistent with previously accumulated data and no plant operational effects were identified. The Cs-137 activity is due to world wide fallout from atmospheric nuclear testing.

2.4.6 Airborne Pathway

Airborne

Analysis

Gross Beta: The filters are analyzed approximately five days after collection to allow for decay of natural short-lived radionuclides. A glass fiber type filter is placed into a stainless steel planchet and counted for gross beta radioactivity using a proportional counter.

Iodine: Each Charcoal cartridge is placed on the germanium detector and counted. A peak of 0.36 MeV is used to calculate the concentration at counting time. The equilibrium concentration at the end of the collection is then calculated. Decay correction for the time interval between sample collection and counting is then made.

Gamma Spectrometry: Filters are composited according to location and counted using a germanium detector coupled to a computer based multichannel analyzer. The resulting spectrum is analyzed by computer and specific nuclides, if present, identified and quantified.

Sampling and Frequency

Airborne particulate samples are collected on a 47mm diameter glass fiber filter type A/E (99 percent removal efficiency at 1 micron particulate) at a volumetric rate of one and one-half cubic feet per minute.

Radiological Monitoring Program

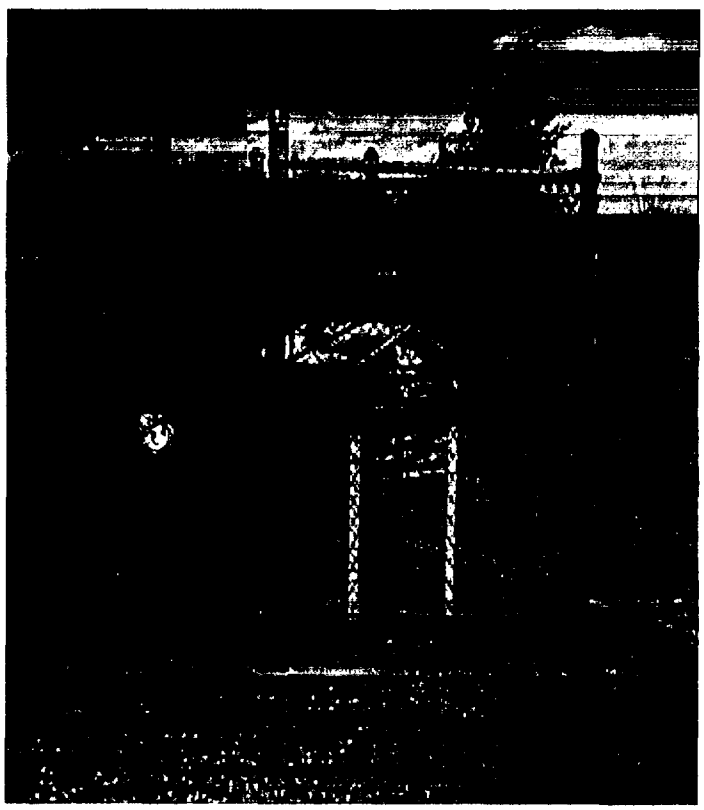
Each airborne particulate air sampler is equipped with a charcoal cartridge filter in-line after the particulate filter holder.

The filters are collected weekly and shipped to EIML for analysis.

All five sample locations are considered indicator locations (A1, A7, A8, A9, and B3). One indicator station (A9) is located at the community with the highest D/Q.

Results

Air station A7, A9, and B3 were operational 100% of the time in 2005 with the annual sampler calibration change out the only out of service time assigned.



Airborne samples are continuously collected. Particulates are gathered on a glass fiber filter. A charcoal filter is in line after the particulate filter to collect iodines. Air samples indicate the Callaway Plant has had no impact on the surrounding environment.

Air station A1 was operable 100% of the time in 2005, but was inoperable 0.1 hours in May to replace a defective fitting (CAR200503542). Air station B3 had an hour meter failure. No out of service time was warranted for B3 due to the run time being calculated based on the power usage of the air station (CAR 200504019).

In September, an overgrown weeping willow tree in the vicinity of air station A7 was found affecting its ability to sample the environs. The area surrounding the air station was cleared as noted in CAR 200506938.

Air Station A8 was operational for 96.0% of the time in 2005. Most of the inoperability is due to hour meter failures or loss of power to the sample pump as documented in CARs 200508165, 200507874, 200507586, 200506015, and 200505830. This sampler is located in an area where it is exposed to a dustier environment than any of the other samplers and this may be a contributing factor to the repeated failures at this location.

A deviation to the sampling occurred for all the air stations for the week of March 24, 2005 to March 30, 2005 when the air samples were lost in shipping to the vendor lab (CAR 200502314). A second deviation is when the samples were sent with a cooling tower blowdown sample on September 29, 2005. The samples were dried by the lab and analyzed. The results of the air samples do not appear to have been impacted due to the samples getting wet in transport (CAR 200506304).

Gross beta activity sample results ranged from 0.005 to 0.052 pCi/m^3. The average gross beta activity for all sample locations was 0.024 pCi/m^3. In 2005, there were 16 weekly samples with gross beta activities greater then the base line action level of 0.037 pCi/m^3. Gamma spectral analysis was performed on these filters and no gamma emitting isotopes of plant origin were detected.

The analysis results for airborne samples are consistent with previously accumulated data and no plant operational effects were identified.

2.4.7 Ingestion Pathway

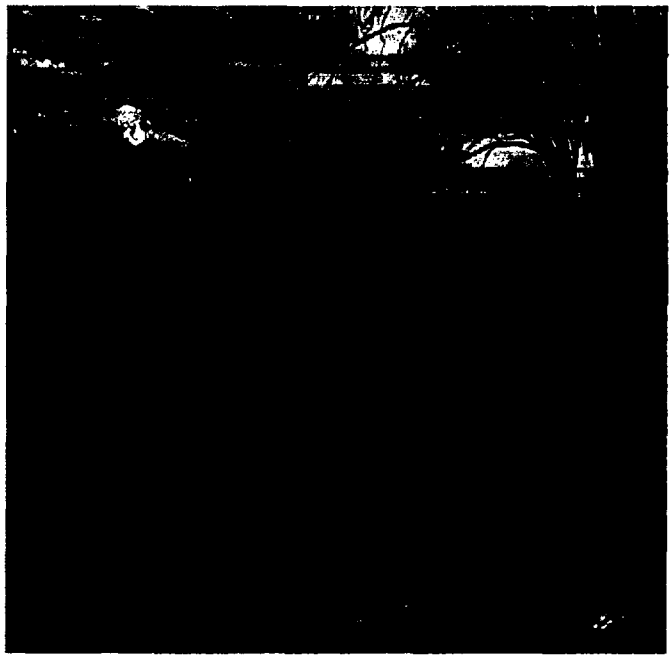
Milk

Analysis

Iodine-131: Two liters of milk containing standardized Iodine carrier is stirred with anion exchange resin for one hour. The resin is washed with NaCl and the iodine is eluted with sodium Hypochlorite. Iodine in the iodate form is reduced to I_2 and the elemental iodine extracted into CCl_4, back-extracted into water, then precipitated as palladium iodide. The precipitate is counted for I-131 using a proportional counter.

Gamma Spectrometry: An aliquot of milk is placed in a standard counting container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer. Analysis for I-131 is accomplished using chemical separation followed by gas proportional counting techniques.

Sampling and Frequency



Fish are collected by Union Electric biologists. Fish samples indicate there has been no impact on the environment due to operation of the Callaway Plant.

When available, one-gallon milk samples are collected semimonthly during the grazing season (typically April through September) and monthly during the winter from two indicator stations near the Plant (M6 and M13) and one control location away from the Plant (M8). Milk samples have sodium bisulfite added as a preservative, and are shipped on ice to EIML for analysis within eight days after collection.

Results

Milk samples were unavailable due to animals not producing milk during the following periods:

Location M13:

Milk samples were unavailable 1/11, 2/6, 4/12, 4/26, 5/10, 5/24, 6/14, 6/28, 7/12, and 12/12 (CARs 200503066, 200500059, and 200501269).

Location M8 & M6:

All samples were collected as scheduled. Samples were collected monthly in January, February, March, and December (stored feed). Samples were collected semimonthly for all other months since the milking animal was spending a portion of it's time grazing.

The analysis results for milk samples were consistent with previously accumulated data and no plant operational effects were identified.

Fish

Analysis

Gamma Spectrometry: A prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

The five most abundant recreational or commercial fish species are collected semiannually from one indicator location (C) and one control location (A). After collection, fish samples are shipped on ice to EIML analysis.

Results

The analysis results for fish samples were consistent with previously accumulated data and no plant operational effects were identified.

Vegetation

Analysis

Iodine-131: A suitable aliquot of wet (as received) sample is placed into a standard calibrated container and counted using a germanium detector coupled to a computer based, multichannel analyzer. A peak of 0.36 MeV is used to calculate the concentration at counting time. The equilibrium concentration at the end of collection is calculated by decay correcting for the time interval between sample collection and counting.

Gamma Spectrometry: A suitable aliquot of wet (as received) sample is placed into a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based multichannel analyzer.

Sampling and Frequency

Monthly during the growing season, green leafy vegetation is collected from four indicator locations V9, V10, V11, and V13 and from one control location V12. Vegetation samples consisted of mustard greens, turnip greens, cabbage, lettuce, collards, radish greens, swiss chard, broccoli, and poke. Other broad leaf vegetation is requested and/or collected if primary varieties are not available. Samples are shipped to EIML for analysis.

Results

Vegetation samples were collected as available from May through December due to unseasonably milder temperatures in November and December. The following indicates the months where no vegetation samples were collected:

Location V9:
June through November.

Location V10:
May through July, and September through November.

Location V11:

May through December

Location V12:
May through October

Location V13:
May, June, and August

The analysis results for vegetation samples were consistent with previously accumulated data and no plant operational effects were identified.

2.4.8 Direct Radiation Exposure Pathway

Direct Radiation

Analysis

The Union Electric program uses the Panasonic Model UD-814 TLD dosimeter. Each dosimeter consists of three elements of $CaSO_4$:Tm. The dosimeters are sealed in a water proof plastic bag and placed inside a polypropylene mesh cylindrical holder in the environment. After exposure in the environment the dosimeters are read and the result is adjusted to a standard quarter of 90 days.

Sampling and Frequency

Thermoluminescent Dosimetry (TLD) is used to determine direct radiation levels in and around the Callaway site. Forty-three dosimeters are placed in 16 sectors around the plant as specified in the ODCM. The dosimeters are read once per quarter. Three locations are designated as controls (IDM26, IDM27 and IDM60).

Results

Direct radiation data for IDM-10 was unavailable in the second quarter, apparently due to vandalism (CAR 200503541). The fourth quarter IDM-5 sample was lost during processing by the vendor.

The analysis results for TLD samples were consistent with previously accumulated data and no plant operational effects were identified.

2.4.9 Other Exposure Pathways

Soil

Analysis

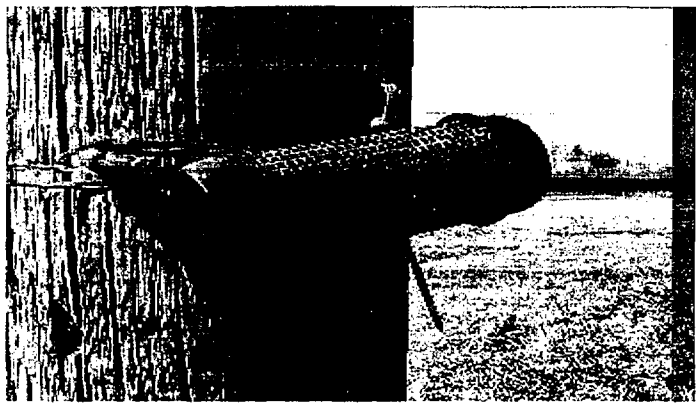
Gamma Spectrometry: A suitable aliquot of prepared sample is placed in a standard calibrated container and specific nuclides are identified and quantified using a germanium detector coupled to a computer based, multichannel analyzer.

Sampling and Frequency

Soil samples are collected annually from four indicator locations (F2, PR3, F6, and PR7) and one control location (V3). To ensure only the most recent deposition is sampled, the uppermost two-inch layer of soil is taken at each location. Samples consist of 2 six-inch square soil plugs. The litter at the surface and the root mat is considered part of the sample. The samples are placed in plastic bags, sealed and shipped to EIML for analyses.

Results

Cesium 137 (Cs-137) was detected at control station V3 at 308 pCi/Kg dry, while the highest indicator station result was 873 pCi/L dry.



Pictured is one of the forty three dosimeter locations used to measure direct radiation. Direct radiation data indicates there has been no impact from the operation of the Callaway Plant.

The analysis results for soil samples in 2005 were consistent with previously accumulated data including pre-operation and no plant operational effects were identified. The Cs-137 activity is due to worldwide fallout from atmospheric nuclear testing.

The analysis results for soil samples were consistent with previously accumulated data. Soil sampling is a continuation of the preoperational environmental monitoring program.

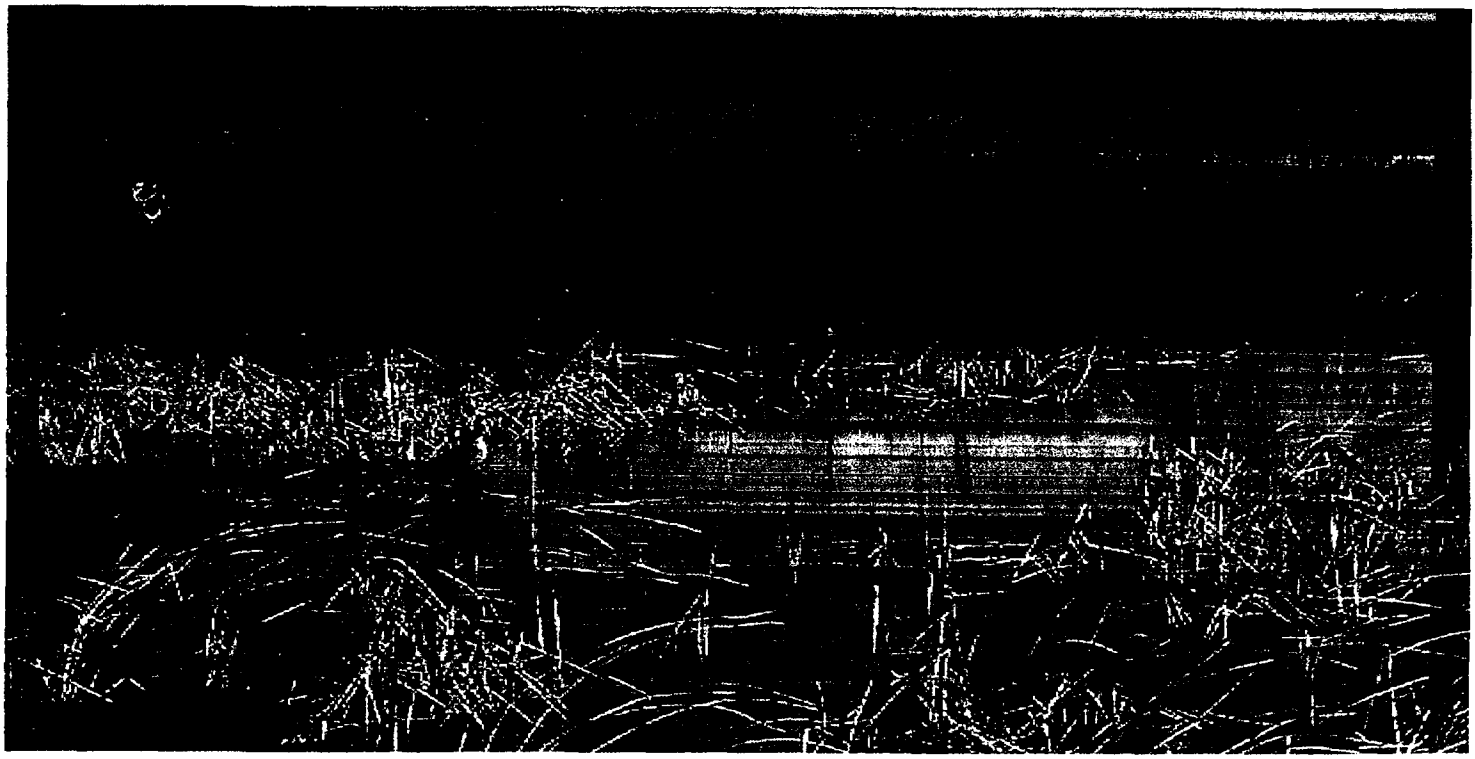
REMP Supplemental Samples

Several supplemental samples were taken during 2005 which were not required by FSAR-SP Table 16.11-7. A corn sample was collected from a field within the site bourndary to further assess the impact of plant operation on the environment. The corn field within the site boundary was harvested for commercial purposes. Sample results are listed in Table XVI.

In January 2005, it was identified that the plant discharge line had ruptured in a field near the Missouri river where a cement crossing was created to facilitate bringing Callaway's replacement steam generators and low pressure turbines from the river (CAR 200500214). Soil and water samples were taken from the area and the results are documented in Table XVI.

Vegetation samples were also taken during the growing season in areas of the field near and away from the pipe break to assess the impact on the vegetation in the area. The results are also reported in table XVI.

The samples were sent to EIML for analysis. The results listed in Table XVI are consistent with previously accumulated data and no plant operational effects were identified.



This photo shows some of the wildlife in a wetland area near Callaway Nuclear Power Plant.

2.5 Land Use Census

The Land Use Census is performed annually during the growing season within a five-mile radius of the Callaway Plant. The location of the nearest resident, milking animal, and garden greater than 50 m^2 (500 ft^2) is identified by contacting residents by phone and/or in field surveys for each of the sixteen meteorological sectors using the midpoint of the two units.

The Union Electric Real Estate Department conducted the 2005 Land Use Census the last two days of August and the first day of September.

Results

The results of the 2005 Land Use Census are presented in Table IV. The table includes radial direction and distance from the Callaway Plant for each location. These parameters were determined using a combination of map position, aerial photography, and a Global Positioning System (GPS) receiver.

View of land near the Callaway Plant during late Winter. In the background is the Missouri River.

Nearest Resident

The distance of the nearest resident with the highest D/Q was unchanged for 2005. This resident lives 1.82 miles from the plant in the NNW sector. New construction was observed during the field inspection; however, none qualified as closest resident in any of the sectors.

Milking Animals

No new residents with milking animals were located in any of the sectors.

Comparison of the current REMP milk sample participants with residents identified as having milking animals in the 2005 Land Use Census indicates that no changes are necessary.

Vegetable Gardens

No new residents with vegetable gardens were determined to have a 20% higher average ground level D/Q than current REMP sample participants. Therefore, no changes to the REMP vegetable garden sampling are necessary.

Table IV 2005 Land Use Census Results

Closest Receptor in Miles

Sector	Residence	Garden[1]	Milk[1]
N(A)	2.2	NI	NI
NNE(B)	2.2	2.4	NI
NE(C)	2.3	4.0	NI
ENE(D)	1.7	2.9	NI
E(E)	3.5	NI	NI
ESE(F)	2.1	2.1	NI
SE(G)	2.2	2.2	NI
SSE(H)	2.5	2.5	2.5
S(J)	2.7	NI	NI
SSW(K)	2.4	3.2	NI
SW(L)	2.6	3.1	NI
WSW(M)	1.2	3.2	NI
W(N)	1.6	2.0	4.0
WNW(P)	1.9	1.9	NI
NW(Q)	2.1	3.2	2.6
NNW(R)	1.8	3.1	NI

[1] NI = None Identified

2.6 Cross Check Results

The cross check results performed by the vendor laboratory during 2005 are presented in Table V. The results indicate satisfactory laboratory performance.

Table V 2005 MAPEP Cross Check Results

Date	Reported Type	Reference Nuclide	Control Value[1]	Value	Limits[2]	Result
Jan-05	Water	Am-241	1.62 ± 0.12	1.72	1.20 - 2.24	**PASS**
Jan-05	Water	Co-57	239.40 ± 1.20	227.00	158.90 - 295.10	**PASS**
Jan-05	Water	Co-60	248.70 ± 1.00	251.00	175.70 - 326.30	**PASS**
Jan-05	Water	Cs-134	115.50 ± 1.80	127.00	88.90 - 165.10	**PASS**
Jan-05	Water	Cs-137	328.50 ± 1.70	332.00	232.40 - 431.60	**PASS**
Jan-05	Water	Fe-55	64.90 ± 7.00	75.90	53.13 - 98.67	**PASS**
Jan-05	Water	H-3	304.00 ± 9.70	280.00	196.00 - 364.00	**PASS**
Jan-05	Water	Mn-54	334.80 ± 1.90	331.00	231.70 - 430.30	**PASS**
Jan-05	Water	Ni-63	7.10 ± 1.60	9.00	0.00 - 20.00	**PASS**
Jan-05	Water	Pu-238	0.01 ± 0.02	0.20	0.00 - 1.00	**PASS**
Jan-05	Water	Pu-239/40	2.50 ± 0.14	2.40	1.68 - 3.12	**PASS**
Jan-05	Water	Sr-90	0.70 ± 0.80	0.00	0.00 - 5.00	**PASS**
Jan-05	Water	Tc-99	43.20 ± 1.40	42.90	30.03 - 55.77	**PASS**
Jan-05	Water	U-233/4	3.31± 0.20	3.24	2.27 - 4.21	**PASS**
Jan-05	Water	U-238	3.38 ± 0.20	3.33	2.33 - 4.33	**PASS**
Jan-05	Water	Zn-65	538.40 ± 27.90	496.00	347.20 - 644.80	**PASS**
Jan-05	Water	Gr. Alpha	0.45 ± 0.10	0.53	0.00 - 1.05	**PASS**
Jan-05	Water	Gr. Beta	1.90 ± 0.10	1.67	0.84 - 2.51	**PASS**
Jan-05	Soil	Am-241	96.60 ± 10.00	109.00	76.30 - 141.70	**PASS**
Jan-05	Soil	Co-57	264.00 ± 2.00	242.00	169.40 - 314.60	**PASS**
Jan-05	Soil	Co-60	226.50 ± 2.20	212.00	148.40 - 275.60	**PASS**
Jan-05	Soil	Cs-134	760.60 ± 4.60	759.00	531.30 - 986.70	**PASS**
Jan-05	Soil	Cs-137	336.20 ± 3.60	315.00	220.50 - 409.50	**PASS**
Jan-05	Soil	K-40	663.70 ± 18.00	604.00	422.80 - 785.20	**PASS**
Jan-05	Soil	Mn- 54	541.30 ± 3.90	485.00	339.50 - 630.50	**PASS**
Jan-05	Soil	Ni-63	924.30 ± 17.20	1220.00	854.00 - 1586.00	**PASS**
Jan-05	Soil	Pu-238	0.60 ± 0.80	0.48	0.00 - 1.00	**PASS**
Jan-05	Soil	Pu-239/40	78.0 ± 4.80	89.50	62.65 - 116.35	**PASS**
Jan-05	Soil	Sr- 90	514.60 ± 18.70	640.00	448.00 - 832.00	**PASS**
Jan-05	Soil	U-233/4	47.90 ± 4.00	62.50	43.75 - 81.25	**PASS**
Jan-05	Soil	U-238	226.30 ± 8.60	249.00	174.30 - 323.70	**PASS**
Jan-05	Soil	Zn-65	851.30 ± 7.30	810.00	567.000 - 1053.00	**PASS**

[1]Results are reported as: Bq/Kg or Bq/L for MAPEP and pCi/L for ERA.

[2]Control Limits are defined by MAPEP and ERA.

Table V 2005 MAPEP Cross Check Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Jan-05	Air Filter	Gr. Alpha	0.11 ± 0.03	0.23	0.00 - 0.46	**PASS**
Jan-05	Air Filter	Gr. Beta	0.38 ± 0.05	0.30	0.15 - 0.45	**PASS**
Jan-05	Air Filter	Am-241	0.10 ± 0.04	0.10	0.07 - 0.13	**PASS**
Jan-05	Air Filter	Co-57	4.76 ± 0.64	4.92	3.44 - 6.40	**PASS**
Jan-05	Air Filter	Co-60	2.84± 0.22	3.03	2.12 - 3.94	**PASS**
Jan-05	Air Filter	Cs-134	3.54 ± 0.37	3.51	2.46 - 4.56	**PASS**
Jan-05	Air Filter	Cs-137	2.20 ± 0.27	2.26	1.58 - 2.94	**PASS**
Jan-05	Air Filter	Mn- 54	3.15± 0.21	3.33	2.33 - 4.33	**PASS**
Jan-05	Air Filter	Pu-238	0.16 ± 0.04	0.20	0.14 - 0.25	**PASS**
Jan-05	Air Filter	Pu-239/40	0.17 ± 0.02	0.17	0.14 - 0.25	**PASS**
Jan-05	Air Filter	Sr-90	2.24 ± 0.34	1.35	0.95 - 1.76	**FAIL[3]**
Jan-05	Air Filter	U-233/4	0.34 ± 0.02	0.34	0.24 - 0.44	**PASS**
Jan-05	Air Filter	U-238	0.35 ± 0.02	0.35	0.25 - 0.46	**PASS**
Jan-05	Air Filter	Zn-65	3.12 ± 0.15	3.14	2.20 - 4.08	**PASS**
Jan-05	Veg	Co-57	10.60 ± 0.20	9.88	6.92 - 12.84	**PASS**
Jan-05	Veg	Co-60	3.00 ± 0.20	3.15	2.21 - 4.10	**PASS**
Jan-05	Veg	Cs-134	4.80 ± 0.40	5.00	3.50 - 6.50	**PASS**
Jan-05	Veg	Cs-137	4.10 ± 0.30	4.11	2.88 - 5.34	**PASS**
Jan-05	Veg	Mn-54	5.10 ± 0.30	5.18	3.63 - 6.73	**PASS**
Jan-05	Veg	Zn-65	6.20 ± 0.50	6.29	4.40 - 8.18	**PASS**

[1]Results are reported as: Bq/Kg or Bq/L for MAPEP and pCi/L for ERA.

[2]Control Limits are defined by MAPEP and ERA.

[3]Strontium carbonate precipitates were redissolved and processed. The average of the three analyses was 1.34, although recovery was only 30%. The result of the new analysis was 1.56 pCi/L.

Table V 2005 MAPEP Cross Check Results

Date	Reported Type	Reference Nuclide	Control Value[1]	Value	Limits[2]	Result
Jul-05	Water	Am-241	2.21 ± 0.13	2.23	1.56 - 2.90	**PASS**
Jul-05	Water	Co-57	239.20 ± 7.30	272.00	190.40 - 353.60	**PASS**
Jul-05	Water	Co-60	275.70 ± 1.30	261.00	182.70 - 339.30	**PASS**
Jul-05	Water	Cs-134	171.80 ± 4.00	167.00	116.90 - 217.10	**PASS**
Jul-05	Water	Cs-137	342.10 ± 2.20	333.00	233.10 - 432.90	**PASS**
Jul-05	Water	Fe-55	167.80 ± 9.30	196.00	137.20 - 254.80	**PASS**
Jul-05	Water	H-3	514.20 ± 12.60	527.00	368.90 - 685.10	**PASS**
Jul-05	Water	Mn-54	437.00 ± 2.50	418.00	292.60 - 543.40	**PASS**
Jul-05	Water	Ni-63	105.10 ± 3.60	100.00	70.00 - 130.00	**PASS**
Jul-05	Water	Pu-238	1.64 ± 0.12	1.91	1.34 - 2.48	**PASS**
Jul-05	Water	Pu-239/40	2.32 ± 0.13	2.75	1.93 - 3.58	**PASS**
Jul-05	Water	Sr-90	9.20 ± 1.30	8.98	6.29 - 11.67	**PASS**
Jul-05	Water	Tc-99	72.30 ± 2.30	66.50	46.55 - 86.45	**PASS**
Jul-05	Water	U-233/4	4.11± 0.18	4.10	2.87 - 5.33	**PASS**
Jul-05	Water	U-238	4.14 ± 0.18	4.26	2.98 - 5.54	**PASS**
Jul-05	Water	Zn-65	364.60 ± 4.90	330.00	231.00 - 429.00	**PASS**
Jul-05	Water	Gr. Alpha	0.57 ± 0.05	0.79	0.21 - 1.38	**PASS**
Jul-05	Water	Gr. Beta	1.36 ± 0.05	1.35	0.85 - 1.92	**PASS**
Jul-05	Soil	Am-241	48.40 ± 3.90	81.10	56.77 - 105.43	**FAIL[3]**
Jul-05	Soil	Co-57	608.30 ± 2.80	524.00	366.80 - 681.20	**PASS**
Jul-05	Soil	Co-60	322.70 ± 2.40	287.00	200.90 - 373.10	**PASS**
Jul-05	Soil	Cs-134	632.10 ± 5.20	568.00	397.60 - 738.40	**PASS**
Jul-05	Soil	Cs-137	512.40 ± 4.20	439.00	307.30 - 570.70	**PASS**
Jul-05	Soil	K-40	720.50 ± 19.00	604.00	422.80 - 785.20	**PASS**
Jul-05	Soil	Mn- 54	516.80 ± 5.10	439.00	307.30 - 570.70	**PASS**
Jul-05	Soil	Ni-63	366.50 ± 13.30	445.00	311.50 - 578.50	**PASS**
Jul-05	Soil	Pu-238	68.80 ± 15.00	60.80	42.56 - 79.04	**PASS**
Jul-05	Soil	Pu-239/40	0.00 ± 0.00	0.00	0.00 - 0.00	**PASS**
Jul-05	Soil	Sr- 90	602.90 ± 17.20	757.00	529.90 - 984.10	**PASS**
Jul-05	Soil	U-233/4	61.50 ± 1.00	52.50	36.75 - 68.25	**PASS**
Jul-05	Soil	U-238	164.50 ± 16.70	168.00	117.60- 218.40	**PASS**
Jul-05	Soil	Zn-65	874.70 ± 8.40	823	576.10 - 1070.00	**PASS**

[1]Results are reported as: Bq/Kg or Bq/L for MAPEP and pCi/L for ERA.

[2]Control Limits are defined by MAPEP and ERA.

[3]Incorrect sample weight used in calculation. Result of recalculation : 97.0 ± 7.8

Table V 2005 MAPEP Cross Check Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Jul-05	Air Filter	Gr. Alpha	0.30 ± 0.04	0.48	0.00 - 0.80	**PASS**
Jul-05	Air Filter	Gr. Beta	0.97 ± 0.06	0.83	0.55 - 1.22	**PASS**
Jul-05	Air Filter	Am-241	0.14 ± 0.03	0.16	0.11 - 0.21	**PASS**
Jul-05	Air Filter	Co-57	5.81 ± 0.17	6.20	4.34 - 8.06	**PASS**
Jul-05	Air Filter	Co-60	2.79 ± 0.14	2.85	2.00 - 3.71	**PASS**
Jul-05	Air Filter	Cs-134	3.67 ± 0.12	3.85	2.70 - 5.01	**PASS**
Jul-05	Air Filter	Cs-137	2.93 ± 0.23	3.23	2.26 - 4.20	**PASS**
Jul-05	Air Filter	Mn- 54	4.11± 0.26	4.37	3.06 - 5.68	**PASS**
Jul-05	Air Filter	Pu-238	0.11 ± 0.02	0.10	0.07 - 0.13	**PASS**
Jul-05	Air Filter	Pu-239/40	0.10 ± 0.01	0.09	0.06 - 0.12	**PASS**
Jul-05	Air Filter	Sr-90	2.25 ± 0.29	2.25	1.58 - 2.93	**PASS**
Jul-05	Air Filter	U-233/4	0.28 ± 0.02	0.27	0.19 - 0.35	**PASS**
Jul-05	Air Filter	U-238	0.28 ± 0.02	0.28	0.20 - 0.37	**PASS**
Jul-05	Air Filter	Zn-65	4.11 ± 0.26	4.33	3.06 - 5.68	**PASS**
Jul-05	Veg	Am-241	0.18 ± 0.03	0.23	0.16 - 0.30	**PASS**
Jul-05	Veg	Co-57	15.90 ± 0.20	13.30	9.31- 17.29	**PASS**
Jul-05	Veg	Co-60	4.80 ± 0.10	4.43	3.10 - 5.76	**PASS**
Jul-05	Veg	Cs-134	4.60 ± 0.20	4.09	2.86 - 5.32	**PASS**
Jul-05	Veg	Cs-137	5.90 ± 0.30	5.43	3.80 - 7.06	**PASS**
Jul-05	Veg	Mn-54	7.20 ± 0.20	6.57	4.60 - 8.54	**PASS**
Jul-05	Veg	Pu-238	0.13 ± 0.02	0.00	0.00 - 1.00	**PASS**
Jul-05	Veg	Pu-239/40	0.13 ± 0.02	0.16	0.11 - 0.21	**PASS**
Jul-05	Veg	Sr-90	2.80 ± 0.30	2.42	1.69 - 3.15	**PASS**
Jul-05	Veg	U-233/4	0.28 ± 0.03	0.23	0.23 - 0.43	**PASS**
Jul-05	Veg	U-238	0.33 ± 0.04	0.35	0.24 - 0.45	**PASS**
Jul-05	Veg	Zn-65	11.00 ± 0.50	10.20	7.14 - 13.26	**PASS**

[1] Results are reported as: Bq/Kg or Bq/L for MAPEP and pCi/L for ERA.

[2] Control Limits are defined by MAPEP and ERA.

Table V 2005 ERA Cross Check Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Feb - 05	Water	Sr-89	28.0 ± 1.2	29.4	20.7 - 38.1	**PASS**
Feb - 05	Water	Sr-90	25.1 ± 0.7	24.4	15.7 - 33.1	**PASS**
Feb - 05	Water	Ba-133	52.9 ± 2.8	53.4	44.2 - 62.6	**PASS**
Feb - 05	Water	Co-60	54.4 ± 0.4	56.6	47.9 - 65.3	**PASS**
Feb - 05	Water	Cs-134	67.7 ± 1.8	64.9	56.2 - 73.6	**PASS**
Feb - 05	Water	Cs-137	39.6 ± 1.8	40.2	31.5 - 48.9	**PASS**
Feb - 05	Water	Zn-65	159.7 ± 3.0	161.0	133.0 - 189.0	**PASS**
Feb - 05	Water	Gr. Alpha	55.1 ± 1.8	67.9	38.5 - 97.3	**PASS**
Feb - 05	Water	Gr. Beta	46.8 ± 1.3	51.1	38.5 - 97.3	**PASS**
Feb - 05	Water	Ra-226	13.7 ± 1.5	14.1	10.4 - 17.8	**PASS**
Feb - 05	Water	Ra-228	13.3 ± 0.6	13.7	7.8 - 19.6	**PASS**
Feb - 05	Water	Uranium	5.1 ± 0.2	5.0	0.0 - 10.2	**PASS**
May - 05	Water	Sr-89	45.1 ± 4.1	41.3	32.6 - 50.0	**PASS**
May - 05	Water	Sr-90	7.5 ± 0.9	5.9	0.0 - 14.6	**PASS**
May - 05	Water	Ba-133	87.1 ± 2.0	88.4	73.1 - 104.0	**PASS**
May - 05	Water	Co-60	38.4 ± 0.8	37.0	28.3 - 45.7	**PASS**
May - 05	Water	Cs-134	75.3 ± 0.7	78.6	69.9- 87.3	**PASS**
May - 05	Water	Cs-137	201.0 ± 8.4	194.0	184.0 - 218.0	**PASS**
May - 05	Water	Zn-65	130.0 ± 6.7	118.0	97.6 - 138.0	**PASS**
May - 05	Water	Gr. Alpha	42.7 ± 2.9	37.0	21.0 - 53.0	**PASS**
May - 05	Water	Gr. Beta	34.0 ± 0.4	34.2	25.5 - 42.9	**PASS**
May - 05	Water	I-131	14.7 ± 0.5	15.5	10.3 - 20.7	**PASS**
May - 05	Water	Ra-226	6.6 ± 0.1	7.6	5.6 - 9.5	**PASS**
May - 05	Water	Ra-228	19.3 ± 0.7	18.9	10.7 - 27.1	**PASS**
May - 05	Water	Uranium	9.6 ± 0.1	10.1	4.9 - 15.3	**PASS**
May - 05	Water	H-3	24,100 ± 109	24,400	20,200 - 28,600	**PASS**

[1]Results are reported as: pCi/l for ERA.

[2]Control Limits are defined by ERA.

Table V 2005 ERA Cross Check Results

Date	Type	Nuclide	Reported Value[1]	Reference Value	Control Limits[2]	Result
Aug - 05	Water	Sr-89	29.1 ± 3.0	28.0	19.3 - 36.7	**PASS**
Aug - 05	Water	Sr-90	36.0 ± 0.6	33.8	25.1 - 42.5	**PASS**
Aug - 05	Water	Ba-133	107.0 ± 1.7	106.0	87.7 - 124.0	**PASS**
Aug - 05	Water	Co-60	15.2 ± 0.2	13.5	4.8 - 22.2	**PASS**
Aug - 05	Water	Cs-134	89.1 ± 0.3	92.1	83.4 - 101.0	**PASS**
Aug - 05	Water	Cs-137	72.1 ± 1.0	72.7	64.0 - 81.4	**PASS**
Aug - 05	Water	Zn-65	67.4 ± 1.4	65.7	54.3 - 77.1	**PASS**
Aug - 05	Water	Gr. Alpha	44.3 ± 1.5	55.7	31.6 - 79.8	**PASS**
Aug - 05	Water	Gr. Beta	58.4 ± 2.1	61.3	44.0 - 78.6	**PASS**
Aug - 05	Water	Ra-226	16.6 ± 1.5	16.6	12.3 - 20.9	**PASS**
Aug - 05	Water	Ra-228	6.2 ± 0.3	6.2	3.5 - 8.9	**PASS**
Aug - 05	Water	Uranium	4.5 ± 0.1	4.5	0.0 - 9.7	**PASS**
Nov - 05	Water	Sr-89	20.6 ± 0.4	19.0	10.3 - 27.7	**PASS**
Nov - 05	Water	Sr-90	15.0 ± 0.3	16.0	7.3 - 24.7	**PASS**
Nov - 05	Water	Ba-133	31.8 ± 1.8	31.2	22.5 - 39.9	**PASS**
Nov - 05	Water	Co-60	85.0 ± 1.4	84.1	75.4 - 92.8	**PASS**
Nov - 05	Water	Cs-134	37.2 ± 2.1	33.9	25.2 - 42.6	**PASS**
Nov - 05	Water	Cs-137	27.8 ± 0.7	28.3	19.6 - 37.0	**PASS**
Nov - 05	Water	Zn-65	109.0 ± 1.0	105.0	86.8 - 123.0	**PASS**
Nov - 05	Water	Gr. Alpha	41.1 ± 1.2	23.3	13.2 - 33.4	**Fail[3]**
Nov - 05	Water	Gr. Beta	42.7 ± 0.5	39.1	30.4 - 47.8	**PASS**
Nov - 05	Water	I-131	20.5 ± 0.6	17.4	12.2 - 22.6	**PASS**
Nov - 05	Water	Ra-226	7.8 ± 0.6	8.3	6.2 - 10.5	**PASS**
Nov - 05	Water	Ra-228	5.5 ± 0.6	3.5	2.0 - 5.0	**Fail[4]**
Nov - 05	Water	Uranium	15.5± 0.3	16.1	10.9 - 21.3	**PASS**
Nov - 05	Water	H-3	12,500.0 ± 238	12,200.0	10,100.0 - 14,300.0	**PASS**

[1] Results are reported as: pCi/l for ERA.

[2] Control Limits are defined by ERA.

[3] The orignal samples were calculated using an Am-241 efficiency. The samples were spiked with Th-232. Samplese were recounted and calculated using the Th-232 efficiency. Tesults of the recount: 27.01 ± 2.35 pCi/L.

[4] Decay of short-lived radium daughters contributed to a higher counting rate. Delay of counting for 100 minutes provided better results. The reported result was the average of the first cycle of 100 minutes, the average of the second cycle counts was 4.01 pCi/L.

2.7 Data Reporting Conventions

Lower Limit of Detection

The lower limit of detection (LLD) used in this report is per NRC Regulatory Guide 4.1, Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants", and the NRC Branch Technical Position, November 1979, "An Acceptable Radiological Environmental Monitoring Program". The LLD is defined as the smallest concentration of radioactivity material in a sample that will yield a net count (above system background) that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

The maximum LLDs for radiological environmental sample analysis is presented in Table III.

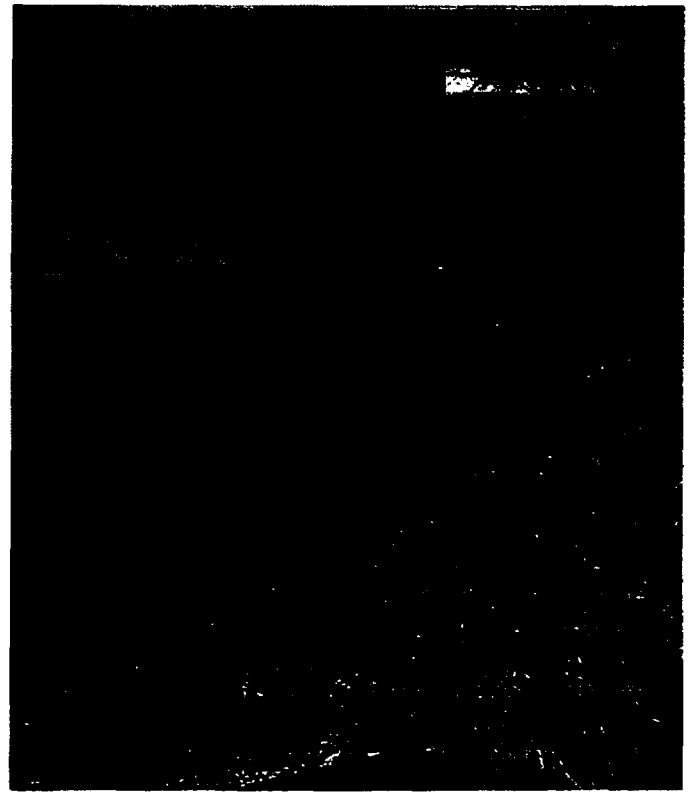
Data Reporting

Positive sample results are reported with a 2 sigma counting uncertainty (corresponding to the 95% confidence level). In cases where the activity is found to be below the sample analysis minimum, the activity is reported as Not Detected (ND).

2.8 Radiological Environmental Monitoring Program Annual Summary.

The REMP Summary is presented in Table VI in accordance with NRC Regulatory Guide 4.1, Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants", and the NRC Branch Technical Position, November 1979, "An Acceptable Radiological Environmental Monitoring Program". In cases where the activity is found to be below the sample analysis minimum, the activity is reported as < LLD.

With the exception of a small indication of tritium in river water, there was no measurable impact on the environment due to plant operation.



View of the Missouri River looking west from Portland Missouri. In the distance, you can see the Callaway Nuclear Power Plant intake structure.

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection (LLD)[1]	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean: Name Distance and Direction	Location With Highest Annual Mean: Mean (f)[2] Range	Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
Waterborne Pathway							
Surface Water (pCi/l)	H-3 (24)	3000	293.5 (10/24) (171 - 429)	S02 4.9 mi SE	327.6 (5/12) (222 - 383)	332.7 (5/12) (171 - 429) SO1 4.7 Mi SSE	0
	Gross Beta (24)	4	8.0 (24/24) (4.5 - 13.0)	SO2 4.9 mi SE	8.0 (12/12) (4.7 - 12.8)	8.1 (12/12) (4.5 - 13.0) SO1 4.7 Mi SSE	0
	Mn-54 (24)	15	< LLD	--	< LLD	< LLD	0
	Fe-59 (24)	30	< LLD	--	< LLD	< LLD	0
	Co-58/60 (24)	15	< LLD	--	< LLD	< LLD	0
	Zn-65 (24)	30	< LLD	--	< LLD	< LLD	0
	Zr-95 (24)	30	< LLD	--	< LLD	< LLD	0
	Nb-95 (24)	15	< LLD	--	< LLD	< LLD	0
	I-131 (24)	1000	< LLD	--	< LLD	< LLD	0
	Cs-134 (24)	15	< LLD	--	< LLD	< LLD	0
	Cs-137 (24)	18	< LLD	--	< LLD	< LLD	0
	Ba-La-140[3] (24)	15	< LLD	--	< LLD	< LLD	0

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection (LLD)[1]	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean: Name Distance and Direction	Location With Highest Annual Mean: Mean (f)[2] Range	Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
Waterborne Pathway							
Drinking / Ground	H-3 (16)	2000	< LLD	--	< LLD	--	0
Water (pCi/l)	Gross Beta (16)	4	7.3 (16/16)	F05	9.8 (4/4)	--	0
			(1.4 - 13.5)	0.9 mi. SSE	(7.2 - 11.3)		
Shallow Monitoring	H-3 (16)	2000	333.0 (12 - 16)	GWS	449.5 (4/4)	--	0
Wells (pCi/l)				[4]	(225 - 985)		
	Gross Beta (16)	4	8.4 (16/16)	936	10.7 (4/4)	--	0
			(3.2 - 10.5)	[5]	(4.0 - 14.6)		
Drinking / Ground	Mn-54 (16)	15	< LLD	--	< LLD	--	0
Water,& Monitoring	Fe-59 (16)	30	< LLD	--	< LLD	--	0
Wells (pCi/l)	Co-58/60 (16)	15	< LLD	--	< LLD	--	0
	Zn-65 (16)	30	< LLD	--	< LLD	--	0
	Zr-95 (16)	30	< LLD	--	< LLD	--	0
	Nb-95 (16)	15	< LLD	--	< LLD	--	0
	I-131 (16)	1	< LLD	--	< LLD	--	0
	Cs-134 (16)	15	< LLD	--	< LLD	--	0
	Cs-137 (16)	18	< LLD	--	< LLD	--	0
	Ba-La-140[3] (16)	15	< LLD	--	< LLD	--	0

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)[1]	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean		Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
					Name Distance and Direction	Mean (f)[2] Range		
Ingestion Pathway								
Vegetation	I-131	(57)	60	< LLD	--	< LLD	< LLD	0
(pCi/kg - wet)	Cs-134	(57)	60	< LLD	--	< LLD	< LLD	0
	Cs-137	(57)	80	< LLD	--	< LLD	< LLD	0
Milk	I-131	(56)	1.0	< LLD	--	< LLD	< LLD	0
	Cs-134	(56)	15	< LLD	--	< LLD	< LLD	0
	Cs-137	(56)	18	< LLD	--	< LLD	< LLD	0
	Ba-140	(56)	60	< LLD	--	< LLD	< LLD	0
	La-140	(56)	15	< LLD	--	< LLD	< LLD	0
Fish	Mn-54	(20)	130	< LLD	--	< LLD	< LLD	0
(pCi/kg - wet)	Fe-59	(20)	260	< LLD	--	< LLD	< LLD	0
	Co-58/60	(20)	130	< LLD	--	< LLD	< LLD	0
	Zn-65	(20)	260	< LLD	--	< LLD	< LLD	0
	Cs-134	(20)	130	< LLD	--	< LLD	< LLD	0
	Cs-137	(20)	150	< LLD	--	< LLD	< LLD	0

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)[1]	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean		Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
					Name Distance and Direction	Mean (f)[2] Range		
Direct Radiation								
Quarterly TLDs (mRem/Standard Quarter)	Gamma Dose	(170)	—	16.2 (158/160) (11.1 - 19.3)	20 4.7 mi. NE	17.7 (4/4) (15.6 - 18.4)	14.9 (12/12) (10.1 - 19.0)	0
Airborne Pathway								
Airborne Particulate (pCi/m^3)	Gross Beta	(255)	0.010	(0.005 – 0.052) (255/260)	B -3 1.8 mi. NNW	0.026 (51/52) (0.008 - 0.052)	--	0
	I-131	(255)	0.070	< LLD	--	< LLD	--	0
	Cs-134	(24)	0.050	< LLD	--	< LLD	--	0
	Cs-137	(24)	0.060	< LLD	--	< LLD	--	0

Table VI

REMP Summary

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed		Lower Limit of Detection (LLD)[1]	All Indicator Locations Mean (f)[2] Range	Location With Highest Annual Mean		Control Location Mean (f)[2] Range	Number of Non-routine Reported Measurements
					Name Distance and Direction	Mean (f)[2] Range		
Sediments								
(pCi/Kg, dry)	Cs-134	(8)	150	< LLD	–	< LLD	–	0
	Cs-137	(8)	180	< LLD	–	< LLD	30.5 (1/4)	0
Soil								
(pCi/Kg, dry)	Cs-134	(18)	150	< LLD	–	< LLD	–	0
	Cs-137	(18)	180	368 (12/14) (44 - 873)	F6 1.72 Mi NE	802 (2/2) (731 - 873)	213 (3/4) (103 - 308)	0

[1]Minimum Detection Capabilities for REMP sample analysis.

[2]Mean and range are based upon detectable measurements only. Fraction of detectable measurements is indicated in parentheses.

[3]Total activity, parent plus daughter activity.

[4]Ground Water Sump, Plant East of containment and Spent Fuel Pool Bldg.

[5]Diesel Fuel Remediation Well, Plant SE of Spent Fuel Pool Bldg.

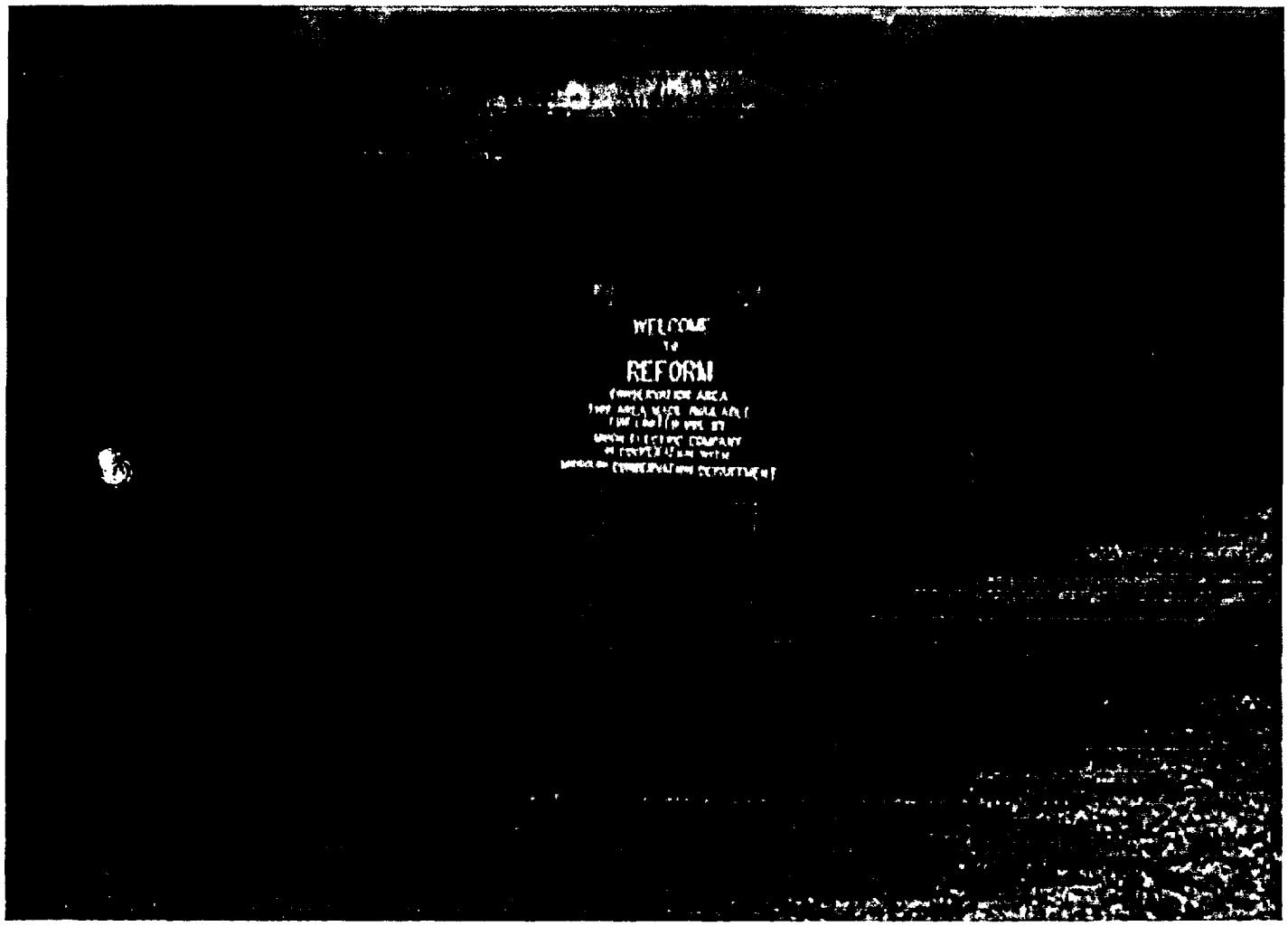
2.9 Individual Sample Results

The REMP Individual sample results are presented in Tables VII through XVI.

The following acronyms are used in these tables:

ND = Not Detected (Result below analysis detection limit)

NA = Not Available (Circumstances discussed in body of report)



The area surrounding the Callaway Plant includes the Reform Conservation Area. The 7,044 acres that comprise this area is owned by Union Electric and managed by the Missouri Department of Conservation.

Airborne Beta & Iodine

Table VII

(All results are the effect of natural background)

Gross Beta data is listed. All Iodine-131 results are <0.07. All results are in pCi/m³.

(2005)	A-1	B-3	A-7	A-8	A-9		A-1	B-3	A-7	A-8	A-9
1-6	0.016	0.019	0.016	0.017	0.019	**7-7**	0.013	0.016	0.014	0.014	0.017
1-14	0.033	0.037	0.034	0.033	0.039	**7-14**	0.028	0.028	0.024	0.026	0.030
1-20	0.026	0.031	0.026	0.026	0.029	**7-21**	0.032	0.023	0.021	0.022	0.026
1-27	0.030	0.035	0.026	0.029	0.032	**7-28**	0.021	0.019	0.017	0.019	0.020
2-3	0.026	0.029	0.026	0.025	0.033	**8-4**	0.027	0.030	0.029	0.029	0.027
2-10	0.023	0.027	0.024	0.026	0.029	**8-11**	0.025	0.026	0.027	0.026	0.027
2-17	0.028	0.028	0.027	0.026	0.035	**8-18**	0.018	0.017	0.022	0.017	0.015
2-24	0.030	0.035	0.028	0.029	0.033	**8-25**	0.020	0.014	0.018	0.012	0.018
3-3	0.029	0.039	0.028	0.030	0.035	**9-1**	0.026	0.030	0.026	0.028	0.026
3-10	0.025	0.028	0.019	0.021	0.026	**9-8**	0.033	0.034	0.036	0.034	0.033
3-17	0.017	0.021	0.015	0.017	0.019	**9-15**	0.036	0.039	0.038	0.041	0.039
3-24	0.012	0.015	0.011	0.014	0.014	**9-22**	0.019	0.021	0.020	0.023	0.022
3-30	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]	**9-29**	0.023	0.023	0.017	0.022	0.023
4-7	0.014	0.020	0.014	0.014	0.018	**10-6**	0.021	0.022	0.018	0.023	0.020
4-14	0.013	0.019	0.014	0.015	0.016	**10-13**	0.018	0.016	0.017	0.013	0.018
4-21	0.020	0.024	0.020	0.022	0.022	**10-20**	0.036	0.041	0.035	0.032	0.037
4-29	0.013	0.018	0.014	0.014	0.014	**10-28**	0.014	0.015	0.014	0.015	0.017
5-5	0.015	0.019	0.018	0.017	0.016	**11-3**	0.028	0.032	0.025	0.031	0.029
5-13	0.024	0.031	0.023	0.025	0.027	**11-10**	0.031	0.035	0.031	0.033	0.034
5-19	0.017	0.023	0.018	0.017	0.018	**11-18**	0.020	0.025	0.019	0.023	0.019
5-26	0.013	0.017	0.015	0.014	0.014	**11-23**	0.019	0.025	0.021	0.021	0.022
6-2	0.016	0.026	0.018	0.021	0.018	**12-1**	0.022	0.027	0.019	0.020	0.021
6-9	0.017	0.028	0.021	0.020	0.022	**12-9**	0.041	0.052	0.037	0.039	0.041
6-16	0.007	0.008	0.005	0.008	0.010	**12-15**	0.017	0.024	0.018	0.020	0.022
6-23	0.016	0.016	0.018	0.019	0.020	**12-22**	0.033	0.042	0.028	0.036	0.033
6-30	0.037	0.034	0.031	0.033	0.025	**12-29**	0.037	0.048	0.038	0.042	0.044

[1] Samples lost in transit; delivery vendor unable to locate.

(CAR 200502314)

Airborne Gamma Composites

Table VIII

(All results are the effect of natural background)

Gamma Isotopic[1] (pCi/m³)

A-1

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.074	0.072	0.071	0.047

A-7

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.057	0.080	0.068	0.052

A-8

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.060	0.082	0.069	0.054

A-9

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.080	0.080	0.057	0.046

B-3

	QTR 1	QTR 2	QTR 3	QTR 4
Be-7	0.082	0.082	0.076	0.061

[1]Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, La-140, and Ce-144. ND = Not Detectable.

Soil

Table IX (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg)

	F2	F2	F6	F6	PR3
	11/23/05	11/23/05	11/23/05	11/23/05	11/23/05
Gross Alpha	18,924	20,515	14,496	13,691	11,418
Gross Beta	25,613	23,248	24,861	24,259	21,686
K-40	13,475	11,871	11,766	12,118	10,992
Cs-137	505	337	731	873	512

	PR3	PR7	PR7	V3	V3
	11/23/05	11/22/05	11/22/05	11/22/05	11/22/05
Gross Alpha	6,510	13,07	12,751	13,383	14,664
Gross Beta	21,658	25,053	24,371	30,410	26,023
K-40	10,870	11,606	11,869	15,411	15,203
Cs-137	349	362	310	229	308

	W1	W1	W2	W2	W3
	11/22/05	11/22/05	11/22/05	11/22/05	11/22/05
Gross Alpha	8,532	9,912	9,996	13,752	12,340
Gross Beta	18,848	24,082	19,965	19,383	13,855
K-40	14,035	13,020	15,386	15,972	12,956
Cs-137	ND	103	75	181	139

	W3	W4	W4
	11/22/05	11/22/05	11/22/05
Gross Alpha	12,673	13,194	18,454
Gross Beta	21,851	25,817	23,998
K-40	11,509	9,296	11,466
Cs-137	ND	ND	44

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Ba-140, and La-140. ND = Not Detectable.

Vegetation

Table X (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

V9

	6/27/05 Lettuce	6/27/05 Cabbage	7/25/05 Cabbage	8/22/05 Cabbage	8/22/05 Collards
Gross Alpha	133	76	203	115	85
Gross Beta	7,751	5,119	6,416	4,879	5,169
K-40	7,316	4,229	5,492	3,048	4,115

	9/12/05 Collards	9/12/05 Cabbage	9/26/05 Lettuce	9/26/05 Mustard	10/10/05 Mustard
Gross Alpha	99	82	ND	245	ND
Gross Beta	5,984	6,867	4,319	7,143	6,269
K-40	4,676	4,966	5,209	5,464	6,085

	10/10/05 Collards	10/10/05 Cabbage	10/24/05 Turnips	10/24/05 Mustard	11/7/05 Collards
Gross Alpha	ND	ND	ND	ND	101
Gross Beta	5,252	6,204	4,311	5,381	5,511
K-40	4,850	4,634	3,442	4,479	4,196

	11/7/05 Turnips	11/7/05 Mustard
Gross Alpha	101	146
Gross Beta	4,694	5,464
K-40	3,577	3,936

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137. ND = Not Detectable.

Vegetation

Table X

(All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

V10

	5/10/05 Turnips	5/10/05 Lettuce	5/10/05 Mustard	6/14/05 Cabbage	6/14/05 Spinach
Gross Alpha	53	58	65	ND	ND
Gross Beta	3,512	3,227	3,832	3,087	4,833
K-40	3,497	2,932	4,044	3,130	5,288

	6/14/05 Lettuce	6/14/05 Mustard	6/14/05 Turnips	7/26/05 Mustard	7/26/05 Lettuce
Gross Alpha	ND	ND	ND	172	171
Gross Beta	4,014	5,367	4,163	6,646	7,745
K-40	3,425	4,932	3,540	5,879	6,409

	7/26/05 Cabbage	9/27/05 Mustard	10/11/05 Mustard	10/11/05 Turnips	10/25/05 Turnips
Gross Alpha	76	147	ND	ND	ND
Gross Beta	4,618	3,241	3,806	3,845	4,294
K-40	3,570	3,888	4,012	3,570	4,157

	10/25/05 Lettuce	10/25/05 Mustard	11/8/05 Lettuce	11/8/05 Turnips	11/8/05 Mustard
Gross Alpha	161	121	51	198	126
Gross Beta	5,707	5,789	3,136	4,012	5,035
K-40	3,572	4,619	3,798	3,361	3,744

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137. ND = Not Detectable.

Vegetation

Table X (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

V11

	5/9/05 Cabbage	6/13/05 Spinach	6/13/05 Lettuce	6/13/05 Swiss Chard	7/11/05 Lettuce	7/11/05 Cabbage
Gross Alpha	114	173	188	69	79	77
Gross Beta	4,833	7,036	2,734	4,216	5,243	3,095
K-40	4,041	6,814	3,072	3,913	4,157	2,764

	7/11/05 Swiss Chard	8/8/05 Cabbage	8/8/05 Lettuce	8/22/05 Swiss Chard	9/12/05 Swiss Chard	9/12/05 Cabbage
Gross Alpha	226	91	87	266	ND	105
Gross Beta	8,104	4,573	5,856	3,907	4,326	4,893
K-40	5,474	4,266	4,011	3,225	4,232	4,215

	9/26/05 Turnips	10/10/05 Swiss Chard	10/10/05 Turnips	10/24/05 Cabbage	11/7/05 Swiss Chard	11/7/05 Kale
Gross Alpha	191	ND	76	170	204	93
Gross Beta	4,934	4,384	5,048	4,496	6,239	3,318
K-40	4,482	3,855	4,234	2,911	5,175	3,439

	11/21/05 Cabbage	12/12/05 Swiss Chard	12/12/05 Turnips
Gross Alpha	169	378	471
Gross Beta	4,112	6,907	7,826
K-40	4,562	6,336	7,587

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137. ND = Not Detectable.

Vegetation

Table X (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

V12

	5/23/05 Poke	6/14/05 Lettuce	7/11/05 Lettuce	7/25/05 Cabbage
Gross Alpha	ND	ND	ND	137
Gross Beta	8,977	3,590	7,916	6,745
K-40	7,072	3,341	7,226	4,104

	8/9/05 Cabbage	9/12/05 Cabbage	9/27/05 Poke	10/11/05 Cabbage
Gross Alpha	124	153	ND	ND
Gross Beta	5,753	4,327	5,947	3,891
K-40	5,286	3,531	6,666	3,121

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137. ND = Not Detectable.

Vegetation

Table X (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

	V13				
	5/24/05 Turnips	6/28/05 Beet Leaves	6/28/05 Turnips	6/28/05 Cabbage	8/9/05 Lettuce
Gross Alpha	327	ND	224	88	124
Gross Beta	5,719	9,876	7,332	6,474	6,642
K-40	4,514	7,546	4,824	4,099	3,431

[1]Mn-54, Co-58, Co-60, I-131, Cs-134, and Cs-137. ND = Not Detectable.

Surface Water

Table XI (All results except tritium are the effect of natural background)

Gamma Isotopic[1] (pCi/L)

S01

	1/11/05	2/8/05	3/15/05	4/13/05	5/11/05	6/14/05
Gross Alpha	2.9	ND	3.7	ND	6.8	3.7
Gross Beta	5.7	7.1	4.5	8.5	9.6	13.0
H-3	ND	ND	ND	ND	245[2]	ND

	7/12/05	8/9/05	9/13/05	10/11/05	11/8/05	12/14/05
Gross Alpha	4.3	2.1	3.9	2.6	1.7	2.7
Gross Beta	11.5	5.9	8.0	8.1	7.7	7.3
H-3	429	176	171	276	ND	ND

S02

	1/11/05	2/8/05	3/15/05	4/13/05	5/11/05	6/14/05
Gross Alpha	4.1	ND	4.9	3.1	2.6	2.7
Gross Beta	8.3	6.7	4.7	8.4	9.3	12.8
H-3	ND	ND	370	ND	383[3]	ND

	7/12/05	8/9/05	9/13/05	10/11/05	11/8/05	12/14/05
Gross Alpha	3.4	3.4	2.5	3.1	1.1	2.7
Gross Beta	9.3	6.1	8.4	6.6	7.1	7.8
H-3	222	ND	282	381	ND	ND

[1]Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140, and La-140. ND = Not Detectable.

[2]Reanalyais of sample 225, Backup sample 205

[3]Backup sample 278

Table XII Ground Water

Gamma Isotopic[1] (pCi/L)

D01

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	7.7	1.4	2.2	3.9
H-3	ND	ND	ND	ND

F05

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	8.3	11.3	7.2	10.4
H-3	ND	ND	ND	ND

F015

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	9.3	6.5	5.4	10.6
H-3	ND	ND	ND	ND

PW001

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	7.1	13.5	4.3	7.1
H-3	ND	ND	ND	ND

[1] I-131, Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, and La-140 ND = Not Detectable.

Table XII Ground Water

GWS[1]

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	5.1	10.7	3.0	12.6
H-3	225	264	985	324

936[1]

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	4.0	10.8	14.6	13.2
H-3	ND[2]	301	269	529

937C[1]

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	3.3	9.7	8.0	5.1
H-3	178	165	ND[2]	255

937D[1]

	QTR 1	QTR 2	QTR 3	QTR 4
Beta	8.8	8.0	11.5	5.7
H-3	238	ND[2]	ND[2]	263

[1]Samples taken in response to NRC information notice 2004-05: SFP Leakage to onsite Groundwater.

[2]ND = Not Detectable.

Sediments

Table XIII (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg dry)

Bottom Sediments

	A			C	
	5/5/05	10/17/05		5/5/05	10/17/05
K-40	13,981	14,052	**K-40**	12,989	13,891
Cs-137	ND	ND	**Cs-137**	ND	ND

Shoreline Sediments

	A			C	
	5/5/05	10/17/05		5/5/05	10/17/05
K-40	15,018	15,248	**K-40**	14,136	14,071
Cs-137	30.5	ND	**Cs-137**	ND	ND

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Cs-134, Cs-137, Ba-140, and La-140. ND = Not Detectable.

Fish

Table XIV (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg wet)

A

	5/5/05 Carp	5/5/05 Freshwater Drum	5/5/05 Channel Catfish	5/5/05 Bigmouth Buffalo	5/5/05 River Carpsucker
K-40	2,944	3,562	2,915	3,017	2,839

	10/17/05 Carp	10/17/05 Freshwater Drum	10/17/05 Channel Catfish	10/17/05 Shorthead Redhorse	10/17/05 River Carpsucker
K-40	2,991	2,652	2,790	3,081	2,858

C

	5/5/05 Carp	5/5/05 Freshwater Drum	5/5/05 Channel Catfish	5/5/05 Bigmouth Buffalo	5/5/05 River Carpsucker
K-40	3,072	3,105	2,807	3,060	3,125

	10/17/05 Carp	10/17/05 Freshwater Drum	10/17/05 Channel Catfish	10/17/05 Shorthead Redhorse	10/17/05 River Carpsucker
K-40	3,326	3,839	3,026	3,272	2,990

[1]Mn-54, Fe-59, Co-58, Co-60, Zn-65, Cs-134, and Cs-137. ND = Not Detectable.

Milk

Table XV (All results are the effect of natural background)

Gamma Isotopic and Iodine[1] (pCi/L)

M6

	1/11/05	2/8/05	3/8/05	4/12/05	4/26/05	5/10/05
K-40	1,153	1,188	1,258	1,216	1,308	1,385
	5/24/05	6/14/05	6/28/05	7/12/05	7/26/05	8/9/05
K-40	1,377	1,208	1,182	1,414	1,491	1,298
	8/23/05	9/13/05	9/27/05	10/11/05	10/25/05	11/8/05
K-40	1,161	1,304	1,132	1,123	1,223	1,335
	12/13/05					
K-40	1,273					

M8

	1/9/05	2/6/05	3/6/05	4/11/05	4/26/05	5/8/05
K-40	1,261	1,360	1,188	1,256	1,148	1,260
	5/24/05	6/14/05	6/28/05	7/11/05	7/24/05	8/8/05
K-40	1,001	530	1,216	1,231	1,299	1,162
	8/23/05	9/13/05	9/27/05	10/10/05	10/25/05	11/6/05
K-40	970	1,116	1,194	1,051	1,217	1,068
	12/12/05					
K-40	1,265					

[1] I-131, Zn-65, Cs-134, Cs-137, Ba-140,and La-140. ND = Not Detectable.

Milk

Table XV (All results are the effect of natural background)

Gamma Isotopic and Iodine[1] (pCi/L)

M13

	3/31/05	8/1/05	8/8/05	8/23/05	9/13/05	9/27/05
K-40	1,146	1,555	1,661	1,467	1,599	1,526

	10/10/05	10/24/05	11/7/05	11/21/05
K-40	1,537	1,364	1,526	1,455

[1] I-131, Zn-65, Cs-134, Cs-137, Ba-140, and La-140. ND =Not Detectable.

Supplemental REMP Samples

Table XVI

Activity Deposited In Area of Discharge Line Break (uCi)

H-3	**927**
Sb-125	**1.47E-01**
Ni-63	**4.07E-01**
Ru-103	**2.94E-02**
Cs-137	**1.46E-02**
Cr-51	**1.19E-01**
Co-60	**2.69E-02**
Co-58	**3.07E-02**

Soybeans / Other Vegetation at Discharge

Pipe Repair Location

7/29/05

	Location 1	Location 2	Location 3	Location 4[2]
Gross Alpha	110	246	126	90
Gross Beta	7281	6892	8506	5158
K-40	6507	5159	5116	4741
Gamma Isotopic	ND[1]	ND[1]	ND[1]	ND[1]

Gamma Isotopic (pCi/kg)wet

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-Nb-95, Cs-134, Cs-137, Ba-140, and La-140. ND = Not Detectable.

[2]Control location for area of pipe break. Area was undisturbed and up grade of area where repair was performed.

Supplemental REMP Samples

Table XVI

Gamma Isotopic and Iodine[1] (pCi/Kg - dry soil)

Discharge Line Break Misc. Samples

	1/13/05	1/13/05	1/13/05	1/13/05	1/13/05	1/13/05
Cs-137	44	46	69	ND	ND	ND
H-3	43	413	ND	34	ND	ND
H-3 (pCi/L)	ND					

	1/18/05	1/18/05	1/18/05	1/18/05	1/18/05	1/18/05
Cs-137	ND	ND	60	92	ND	ND
H-3	207	ND	ND	ND	ND	ND

	1/19/05	1/19/05	1/19/05	1/19/05	1/19/05	1/19/05
Cs-137	66	ND	69	ND	113	ND
H-3	ND	ND	191	317	82	ND

	1/19/05	1/19/05	1/19/05	1/21/05
Cs-137	ND	57	81	
H-3	ND	60	62	52/42

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-Nb-95, Cs-134, Cs-137, Ba-140, and La-140. ND = Not Detectable.

Supplemental REMP Samples

Table XVI (All results are the effect of natural background)

Gamma Isotopic[1] (pCi/kg)wet

	Corn
	6/17/05
Gross Beta	2330
K-40	2359
Gamma Isotopic	ND

[1]Mn-54, Fe-59, Co-58, Co-60, Zr-Nb-95, Cs-134, Cs-137, Ba-140, and La-140. ND = Not Detectable.

Supplemental REMP Samples

Table XVI — Cooling Tower Blowdown[1]

	1/13/05	2/3/05	3/2/05	4/7/05	5/3/05
H-3	ND[2]	ND[2]	313	335	1207

	6/2/05	7/6/05	7/6/05[3]	7/15/05	7/27/05
H-3	ND[2]	4190	4438	1780	644

	8/3/05	8/16/05	8/18/05	8/24/05	8/31/05
H-3	845	132	158	336	2258

	9/7/05	9/26/05	11/8/05	12/7/05	12/21/05
H-3	1926	479	1755	ND[2]	ND[2]

	12/28/05
H-3	ND[2]

[1] Tritium Samples taken due to plant outfall recirculation into intake.

[2] ND = Not Detectable.

[3] Duplicate Sample.

Direct Radiation

Table XVII (All results are the effect of natural background)

Gamma Dose (mrem)

	QTR 1	QTR 2	QTR 3	QTR 4		QTR 1	QTR 2	QTR 3	QTR 4
1a	17.4	16.4	15.5	14.0	**34**	17.8	16.2	15.5	13.3
3	18.2	17.3	15.8	14.8	**35**	16.7	15.1	15.2	13.4
5	16.0	14.4	13.5	[2]	**36**	17.7	15.6	16.1	15.2
6	18.4	16.8	15.0	14.6	**37**	18.0	17.2	16.9	14.1
7	17.8	18.1	14.7	14.7	**38**	12.8	11.6	12.2	11.1
9	17.0	15.5	14.2	13.7	**39**	18.4	15.4	16.6	14.4
10	19.3	[1]	17.0	15.6	**39a**	18.7	17.3	17.1	15.3
11a	18.7	17.5	17.2	15.5	**40**	19.0	17.7	17.4	14.9
14	17.6	17.7	16.0	14.2	**41**	18.1	16.4	16.2	13.9
17	18.3	17.7	15.9	14.7	**42**	15.6	14.6	13.9	12.5
18a	17.4	17.6	16.3	15.3	**43**	17.5	17.7	16.7	14.2
20	18.4	18.4	17.3	15.6	**44**	17.4	17.1	17.2	15.7
21	18.4	17.9	17.2	15.0	**45**	16.3	16.9	15.5	13.0
22a	17.7	17.0	16.1	13.9	**46**	18.5	17.5	16.1	15.3
23	17.7	17.9	16.7	15.0	**47**	16.1	16.7	15.6	14.4
26	12.3	12.3	11.3	10.1	**48**	17.6	17.2	16.7	15.2
27	19.0	17.8	17.0	15.5	**49**	17.9	15.9	16.5	14.7
30a	17.2	16.2	16.3	14.2	**50**	18.0	17.0	15.7	14.0
31a	18.5	17.1	17.7	14.7	**51a**	17.9	17.0	17.0	16.3
32	18.3	17.1	17.0	14.9	**52**	16.9	16.9	16.7	15.1
32a	17.9	17.5	17.6	14.7	**60**	17.3	16.3	16.2	13.9
33	17.9	16.3	16.4	14.0					

[1] TLD and holder missing from assigned location. Installed 3rd Quarter TLD and new holder.

[2] TLD lost by the vendor during the reading process.

3.0 Non-Radiological Monitoring Program

3.1 Introduction

Union Electric Company, d.b.a. AmerenUE, in accordance with federal regulations and a desire to maintain the quality of the local environment around Callaway Plant has implemented an Environmental Protection Plan, (EPP) contained in Appendix B of the Callaway Plant Operating License.

The objective of the EPP is to provide for protection of non-radiological environmental values during operation of the Callaway Plant.

This report describes the conduct of the EPP for the Callaway Plant during 2005.

3.2 Unusual or Important Events

No unusual or important events reportable under the EPP Section 4.1 were identified during 2005.

3.3 EPP Noncompliance

During 2005 there were no noncompliances with the EPP.

3.4 Nonroutine Reports

There were no nonroutine reports submitted in accordance with the EPP, Section 5.4.2 in 2005.

3.5 Plant Design and Operation Environmental Evaluations.

This section lists all changes in the plant design, operation, tests or experiments installed during 2005, which could have involved a potentially significant unreviewed environmental question in accordance with section 3.1 of Appendix B.

During 2005, there was one plant design and one operation activity that could have involved a potentially significant unreviewed environmental question. The interpretations and conclusions regarding these plant changes along with a description of the change are presented below.

Callaway Discharge Line Break

Description of Activity:

On January 11, 2005 Steam Generator Replacement Project (SGRP) Contractor identified a hole in the ground with water bubbling up near the new concrete crossing installed plant east of the Intake Structure Access Road. AmerenUE Engineering personnel went to investigate later that day and noted there was a hole but no water bubbling or movement. After checking with Radwaste Department, it was discovered that blowdown flow was raised from around 2700 gpm to 5700 gpm from 0200 until 1000 for Discharge Monitor Tank (DMT) discharge activity. A planned increase in blowdown flow was subsequently performed on January 12 at 1000. Personnel were in position prior to the blowdown flow increase and again noted no water level in crease or bubbling within the hole. After approximately 2 hours, bubbling and some minor water flow within the hole was identified. This indicated that the 24" diameter discharge line was leaking somewhere in the vicinity of the new concrete crossing installed to support the SGRP transportation activities at certain flow rates.

The amount of the leak was believed to correspond to Missouri River level since the river level was above the pipe discharge elevation, thereby causing a slight backpressure on the discharge line. The river elevation on 1/11 was around 513' and 1/12 was around 510'. It was a high 526' within the last couple of weeks.

With lower river levels and under normal plant blowdown conditions (approx. 2700 gpm), there were no indications of leakage. Repair of the piping was completed on January 21, 2005 when the weather and soil conditions permitted excavation and access for equipment and personnel.

Evaluation of Activity:

The continued use of the discharge line in its degraded condition until repairs can be completed was evaluated. As noted in the description, there are no conditions of lower river level and low discharge flow that resulted in not visible indications of discharge line leakage. A Missouri River level of 511 feet or less at the Callaway Plant intake structure combined with limiting the cooling tower blowdown discharge and bypass flow to 2700 gallons per minute or less resulted in no surface indications of discharge line leakage.

The leakage from the discharge line is located approximately 400 yards upstream from the discharge point to the Missouri River. The site is located south of highway 94 in the Missouri River Flood plain. The discharge line is buried 10 to 12 feet deep in the area of the break. In this area the subsurface water is hydraulically connected to the Missouri River.

Discharge from the cooling tower blowdown and bypass are the highest volume outfalls that are discharged from the discharge line. These outfalls have no radioactive component and are regulated by the Missouri Department of Natural Resources (MDNR). The MDNR has been advised of the degraded condition of the discharge line and that conditions are such that the line repairs can not be initiated until river level decreases. It was acceptable to continue discharge from the cooling tower as long as flow is limited to 2700 gpm even if river level is greater than 511 feel at the Callaway Intake.

Discharge from the Radwaste Treatment System is also regulated by the MDNR for non radiological components, but it also has a radioactive component that is regulated by the NRC. The system is such that after the radwaste system discharge has mixed with the water from the cooling tower blowdown or bypass, it will meet the 10 CFR 20 limits. This mixing would be complete long before it reaches the location of the discharge line that is degraded. If the flow from the cooling tower is limited to 2700 gpm and the river level is at or below 511 feet at the Callaway intake, it is acceptable to discharge from the radwaste treatment system. This was with current conditions of the discharge line and no surface indications of a leak. While discharging from the radwaste system the surface indications should be checked periodically for leakage indications.

All chemical and radiological releases will be within the established limits for the plant. In addition, the compensatory actions imposed will minimize any adverse environmental impact that would be expected from this deviation from our discharge location.

This activity did not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of Appendix B to the Callaway Plant Operating License.

Callaway Modification 02-2002:

Description of Modification:

This modification allowed the installation of approximately 8567 feet of 3 inch Class 200 PVC piping to provide potable water to the new Callaway Plant Gun Range Facility. This piping is an extension from the existing potable water system (tie in Plant South of the power block near the circ/service water pump house) to the new facility. It was estimated that approximately 0.4 acres of land will be disturbed to install this piping in a trench with a maximum width of 2 feet and a depth of 48 inches. Since this modification does involve a drinking water supply, permitting is required by the State of Missouri Department of Natural Resources prior to beginning any construction.

Evaluation of Change:

Both the ER and FES-OL were reviewed against Modification 04-9030 Revision C for any previously evaluated adverse environmental impacts and any adverse environmental impacts not previously evaluated. No adverse environmental impacts were identified. The installation of this potable water piping described above has no effect upon effluents or power level.

Some excavation will be required to install the new section of potable water piping. It is estimated that approximately 0.4 acres will be disturbed to install this 3 inch PVC piping. The routing of this new pipe was reviewed against "A Cultural Resources Management Plan for Residual Lands at the Union Electric Company Nuclear Power Plant, Callaway County, Missouri." Although land will be disturbed outside of the Callaway Plant owner controlled area, no identified cultural resources will be affected by the installation of this piping.

The entire area to be excavated is estimated to be less than one half acres and will not adversely effect stormwater runoff. Because of the total area to be disturbed is less than one half acre, no stormwater permit is required. However, any material excavated to install this piping will be contained or removed to prevent discharge to stormwater. Installation of most of the new potable water piping will be in locations where any rainfall that could result in stormwater runoff being discharged through a point source to the waters of the state, will be discharged through Outfall 010 and Outfall 011. These Callaway Plant Stormwater Outfalls are currently permitted by the State of Missouri.

Installation of this potable water piping will not result in a new, different or increased discharge of pollutants that could affect the NPDES Permit. This modification to install the potable water piping does not create an oil waste stream that could be released to the environment. Petroleum use by facility construction equipment is controlled and contained to accepted equipment standards.

This modification will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of Appendix B to the Callaway Plant Operating License. Construction of the OSGSF will require excavation of the structure's foundation, and these activities will be controlled by means appropriate to limit any potential soil erosion. The areas surrounding the facility will be surface stabilized as part of this modification. Grading of the area of the OSGSF construction will route rainfall to an acceptable water runoff pattern to account for the effects of local intense precipitation described in Section 2.4.2.3 of the Site FSAR Addendum. The stormwater runoff will ultimately be discharged through outfall 014 which is a stormwater outfall in our NPDES permit. The actions taken to minimize soil erosion along with the retention pond for this outfall will maintain all limited parameters within our NPDES limits. This modification will not significantly affect the concentrations, frequencies or types of effluent being discharged from the plant, and does not affect the current plant power level. Therefore, this change does not constitute an unreviewed environmental question per Section 3.1 of Appendix B to the Callaway Plant Operating License.

Callaway Modification 02-1010

Description of Change:

This change is to permanently expand the protected area security boundary to encompass the area outside security fence on the eastern most (oriented to Plant North) side of the existing site protected area (PA) boundary to the portion of the Unit 2 excavation that has been backfilled in. Under separate modification packages, various SGR support facilities, both temporary and permanent, are being erected in this backfilled area as well. Modification Package 02-1010 confines its scope to the ensuring that the permanent extension of the PA security boundary meets all required regulations, codes, and standards for design, construction, and operation of security/safeguards features for the Callaway Nuclear Plant. In summary, Modification Package 02-1010 will:

1. Prepare the ground surfaces of the designated new PA security boundary and permanently erect the required double security fences and install other necessary security boundary physical hardware. This includes required physical isolation of gratings/openings/culverts within the zone between the inner and outer new security boundary fences.
2. Provide appropriate access points to the extended PA security boundary area.
3. Permanently install required area lighting and monitoring/detection/alarm systems.
4. Provide for covering and surface stabilization of the new PA security boundary areas adjacent and within the inner and outer security boundary fences for acceptable water runoff, as well as for functionality of detection systems.
5. Perform functional qualification of the detection and alarm systems so that proper transition to the new permanent PA security boundary and coordinated removal of the pre-modification (defunct) security boundary fences may be accomplished.

Evaluation of Change:

The construction activities to extend the PA security boundary undertaken by Modification Package 02-1010 will be performed in a site area that has been previously evaluated and determined to not be associated with cultural resources identified in "A Cultural Resources Management Plan for Residual Lands at the Union Electric Company Nuclear Power Plant, Callaway County, Missouri."