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AEP
INDIANA MICHIGAN POWER

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Donald C. Cook Nuclear Plant Units 1 and 2
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Enclosed is the Donald C. Cook Nuclear Plant Annual Radiological Environmental Operating Report. This report covers the period from January 1, 2001, through December 31, 2001, and it was prepared in accordance with the requirements of Technical Specification 6.9.1.6 and 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3 and IV.C.

There are no new commitments in this submittal. Should you have any questions, please contact Mr. Gordon P. Arent, Manager of Regulatory Affairs at (616) 697-5553.

Sincerely,

Scot A. Greenlee
Director, Nuclear Technical Services

/dmb

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ATTACHMENT 1 TO AEP:NRC:2691-07

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

DONALD C. COOK NUCLEAR PLANT

UNITS 1 & 2

Annual Radiological Environmental Operating Report

January 1 to December 31, 2001

Prepared by

Indiana Michigan Power Company
and
Teledyne Brown Engineering

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SUMMARY

INDIANA MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

SUMMARY

This report summarizes the collection and analysis of various environmental sample media in 2001 for the Radiological Environmental Monitoring Program for the Donald C. Cook Nuclear Plant.

The various analyses of most sample media suggest that there was no discernible impact of the Donald C. Cook Nuclear Plant on the environment. The analysis of air particulate filters, charcoal cartridges, direct radiation by thermoluminescent dosimeters, fish, water, milk, sediments from Lake Michigan, drinking water, and food products, either did not detect any radioactivity or measured only normal background levels of naturally occurring or normal background levels of ambient manmade radionuclides.

Tritium, measured at low levels in on-site wells, appears to be the only radionuclide attributable to the plant operations. However, the associated groundwater does not provide a direct dose pathway to humans.

I. INTRODUCTION

I. INTRODUCTION

The Donald C. Cook Nuclear Plant's Radiological Environmental Monitoring Program (REMP) is conducted in compliance with NRC Regulatory Guide 1.21 and 4.1, licensing commitments, and Technical Specifications. The REMP was developed in accordance with the NRC Radiological Assessment Branch Technical Position (BTP), Rev. 1, November 1979. A synopsis of the sampling program and maps can be found in Section III, Sampling and Analysis Program. This report represents the Annual Radiological Environmental Operating Report (AREOR) for Units 1 and 2 of the Donald C. Cook Nuclear Plant for the operating period from January 1, 2001 through December 31, 2001.

A. The Donald C. Cook Nuclear Plant of Indiana Michigan Power Company is located on the southeastern shore of Lake Michigan approximately one mile northwest of Bridgman, Michigan. The plant consists of two pressurized water reactors, Unit 1, 1030 MWE and Unit 2, 1100 MWE. Unit 1 achieved initial criticality on January 18, 1975 and Unit 2 achieved initial criticality on March 10, 1978.

B. Objectives

The objectives of the operational radiological environmental monitoring program are:

1. Identify and measure radiation and radioactivity in the plant environs for the calculation of potential dose to the population.

2. Verify the effectiveness of in-plant measures used for controlling the release of radioactive materials.

3. Provide reasonable assurance that the predicted doses, based on effluent data, have not been substantially underestimated and are consistent with applicable standards.

4. Comply with regulatory requirements and Station Technical Specifications and provide records to document compliance.

II. CHANGES

II. CHANGES

REMP, PCP, and ODCM Procedure Changes for the AREOR

Administrative corrections were performed on the below listed procedures for the following reasons: corrected procedure number format, added various words or phrases of clarification to steps with no change of method or intent to the step, corrected typos or information incorrectly referenced but referenced correctly elsewhere, placed statements in the form of IF/THEN statements, utilized standard notation, removing redundant information, and other minor editorial corrections.

REMP

12-THP-6010-RPP-63 Rev 4a, "Collection of REMP Groundwater Samples"
Administrative corrections only (as stated above).

12-THP-6010-RPP-633 Rev 5, "Collection on Environmental Radiation Dosimeters"
Removed instructions for the Member of Public (MOP) TLDs from this procedure, there is a separate procedure covering MOP TLDs.
Added a new step informing the user of where the TLDs may be obtained (storage location).
Added an equipment list, which indicates the materials needed for successful TLD deployment/retrieval.
Added the shipment of samples as a final condition.
Corrected a utility pole number on which a TLD is located.
Revised the map legend.
Updated map for clarity and to add consistency.

PCP

PMP-6010-PCP-900 Rev 4a, "Radioactive Waste Process Control Program"
Added statements that allow radwaste to be packaged and shipped to a processor for further processing.
Added clarification as to where filters may be shipped.
Added clarification for free standing water requirements for filters.
Added a reference to NRC commitment #1357.

ODCM

PMP-6010-OSD-001 Rev 16, "Off-site Dose Calculation Manual"
Added "and projected" to several steps to ensure the requirement for a 31 day projected dose is clear.
Changed wording from cow-milk-infant to child via the inhalation pathway to align with Tech Specs, GL 89-01 and NuReg 0472 (note: issue captured, no impact on dose to public).
Added "or used in the ESW system (Eberline)" to describe that the new monitors monitor the whole ESW system not just the portion associated with the CTS heat exchanger.
Added evaluation to step 3.10.5 in response to C/R 00-6882 to ensure the latest data is acceptable.
Added generator blowdown, blowdown treatment, and the ESW Eberline monitors since they are attendant monitors. Also modified action 3 for ESW for proper compensating actions.
Added the routing of attachment 3.17 to NS&A for impact evaluation.reference in Attachments 3.2 and 3.3 to the sample flow switches of the steam
Changed a utility pole number from 152 to 99 on which a TLD is located. Changed the distance and direction of REMP wells W-8 and W-2 due to drilling new wells to upgrade well type and construction.

Also reformatted ONS-1 (T-1) for consistency and added location description information to SWL-2 and SWL-3 sample collection locations.
Deleted attachment 3.25 due to the low level contaminated blocks being shipped for permanent disposal.

PMP-6010-OSD-001 Rev 16, Cs-1, "Off-site Dose Calculation Manual"
An action was divided by the monitor manufacturer and broken into two steps using the IF/THEN format.

Teledyne Brown Engineering Changes

During the year 2001, Teledyne Brown Engineering updated their technical procedures to the EPA standardized format. These formatting changes were done without impact to the procedures.

III. SAMPLING AND ANALYSIS PROGRAM

III. SAMPLING AND ANALYSIS PROGRAM

Table 1 summarizes the sampling and analysis program for the Donald C. Cook Nuclear Plant for 2001. For each sample medium, the table lists the sample locations, including distance and direction from the center of the two units, and the station identification. The station identifications for the sampling locations are shown on Figures 1 and 2. Also for each sample medium the sample collection frequency, type of analysis, and frequency of analysis are listed.

TABLE 1
DONALD C. COOK NUCLEAR PLANT - 2001
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM PLANT AXIS

LOCATION	STATION	DISTANCE	DIRECTION	DEGREES	COLLECTION FREQUENCY	ANALYSIS/FREQUENCY
Environmental (TLDs)						
ONS-1	(T-01)	1945 ft.		18°	Quarterly	Direct Radiation/Quarterly
ONS-2	(T-02)	2338 ft.		48°		
ONS-3	(T-03)	2407 ft.		90°		
ONS-4	(T-04)	1852 ft.		118°		
ONS-5	(T-05)	1895 ft.		189°		
ONS-6	(T-06)	1917 ft.		210°		
Rosemary Beach	(T-07)	2103 ft.		36°		
Radioactive Material Bldg.	(T-08)	2208 ft.		82°		
Sewage Settling Pond	(T-09)	1368 ft.		149°		
2nd U/2 transmission tower to the 765 yard	(T-10)	1390 ft.		127°		
Well W-01	(T-11)	1969 ft.		11°		
Well W-02	(T-12)	2292 ft.		63°		
New Buffalo	(NBF)	15.6 mi	SSW			
South Bend	(SBN)	26.2 mi	SE			
Dowagiac	(DOW)	24.3 mi	ENE			
Coloma	(COL)	18.9 mi	NNE			
Intersection of Red Arrow Hwy & Marquette Woods Rd., Pole #B294-44	(OFT-1)	4.5 mi	NE			
Stevensville Substation	(OFT-2)	3.6 mi	NE			
Pole #B296-13	(OFT-3)	5.1 mi	NE			
Pole #B350-72	(OFT-4)	4.1 mi	E			
Intersection of Shawnee & Cleveland, Pole #B387-32	(OFT-5)	4.2 mi	ESE			
Snow Rd., west of Landon Rd., Pole #B426-1	(OFT-6)	4.9 mi	SE			
Bridgman Substation	(OFT-7)	2.5 mi	S			
California Rd., Pole #B424-20	(OFT-8)	4.0 mi	S			
Ruggles Rd., Pole #B369-214	(OFT-9)	4.4 mi	ESE			
Intersection of Red Arrow Hwy. & Floral Rd., west of Red Arrow Hwy Pole #B422-99	(OFT-10)	3.8 mi	S			
Intersection of Snow Rd & Baldwin Rd., Pole #B423-12	(OFT-11)	3.8 mi	S			

TABLE 1(cont)
DONALD C. COOK NUCLEAR PLANT - 2001
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM PLANT AXIS

LOCATION	STATION	DISTANCE	DIRECTION	DEGREES	COLLECTION FREQUENCY	ANALYSIS/FREQUENCY
Air Charcoal Particulates						
ONS-1	(ONS-1)	1945 ft.		18°	Weekly	Gross Beta/Weekly
ONS-2	(ONS-2)	2338 ft.		48°		I-131/Weekly
ONS-3	(ONS-3)	2407 ft.		90°		Gamma Isotopic/
ONS-4	(ONS-4)	1852 ft.		118°		Quarterly Composite
ONS-5	(ONS-5)	1895 ft.		189°		
ONS-6	(ONS-6)	1917 ft.		210°		
New Buffalo	(NBF)	15.6 mi	SSW			
South Bend	(SBN)	26.2 mi	SE			
Dowagiac	(DOW)	24.3 mi	ENE			
Coloma	(COL)	18.9 mi	NNE			
Groundwater						
Onsite	(W-1)	1969 ft.		11°	Quarterly	Gamma Isotopic/Quarterly
Onsite	(W-2)	2302 ft.		63°		Tritium/Quarterly
Onsite	(W-3)	3279 ft.		107°		
Onsite	(W-4)	418 ft.		301°		
Onsite	(W-5)	404 ft.		290°		
Onsite	(W-6)	424 ft.		273°		
Onsite	(W-7)	1895 ft.		189°		
Onsite	(W-8)	1274 ft.		54°		
Onsite	(W-9)	1447 ft.		22°		
Onsite	(W-10)	4216 ft.		129°		
Onsite	(W-11)	3206 ft.		153°		
Onsite	(W-12)	2631 ft.		162°		
Onsite	(W-13)	2152 ft.		182°		
Onsite	(W-14)	1780 ft.		164°		

TABLE 1(cont)
DONALD C. COOK NUCLEAR PLANT - 2001
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM PLANT AXIS

LOCATION	STATION	DISTANCE	DIRECTION	DEGREES	COLLECTION FREQUENCY	ANALYSIS/FREQUENCY
Steam Generator Groundwater						
Steam Generator Storage Facility	(SG-1)	0.8 mi		95°	Quarterly	Gross Beta/Quarterly
Steam Generator Storage Facility	(SG-2)	0.7 mi		92°		Gross Alpha/Quarterly
Steam Generator Storage Facility	(SG-4)	0.7 mi		93°		Gamma Isotopic/Quarterly
Steam Generator Storage Facility	(SG-5)	0.7 mi		92°		
Drinking Water						
St. Joseph Public Intake	(STJ)	9.0 mi	NE		Daily	Gross Beta/14 Day Composite
Lake Township Public Intake Station	(LTW)	0.6 mi	S			Gamma Isotopic/14 Day Composite
						I-131/14 Day Composite
						Tritium/Quarterly Composite
Surface Water						
Condenser Circulating Water Intake	SWL-1				Daily	Gamma Isotopic/Monthly Composite
Lake Michigan Shoreline	SWL-2	500 ft.	South of Plant Centerline			Tritium/Quarterly Composite
Lake Michigan Shoreline	SWL-3	500 ft.	North of Plant Centerline			
Sediment						
Lake Michigan Shoreline	SL-2	500 ft.	S			
Lake Michigan Shoreline	SL-3	500 ft.	N		Semi-annually	Gamma Isotopic/Semi-anually
Milk-Indicator						
Baroda	Monroe Residence	5.0 mi	SE		Weekly	I-131/14 Day
Baroda	Schuler Farm	4.1 mi	SSE			Gamma Isotopic/14 Day
Buchanan	Glen Troy Farm	7.0 mi	SSE			

TABLE 1(cont)
DONALD C. COOK NUCLEAR PLANT - 2001
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM PLANT AXIS

LOCATION	STATION	DISTANCE	DIRECTION	DEGREES	COLLECTION FREQUENCY	ANALYSIS/FREQUENCY
Milk Background						
La Porte	Livinghouse	20.0 mi	S		Weekly	I-131/14 Days
Dowagiac	Wyant Farm	20.7 mi	E			Gamma Isotopic/14 Days
Broadleaf Vegetation						
Indicator Sample	Sector-D	8 mi.	Highest D/Q Land Sector		Monthly when	Gamma Isotopic/Monthly
Indicator Sample	ONS-V	8 mi.	Highest D/Q Land Sector		available	I-131 Monthly
Control Sample	Sector J	15-25 mi.				
Fish						
Lake Michigan	ONS-N	0.3 mi	N		2/yr	Gamma Isotopic/Twice a Year
Lake Michigan	ONS-S	0.4 mi	S			
Lake Michigan	OFS-N	3.5 mi	N			
Lake Michigan	OFS-S	5.0 mi	S			
Grapes/Broadleaf						
Nearest Sample to Plant in highest /Q land sector containing media.	Sector D				At time of harvest	Gamma Isotopic at time of harvest

TABLE 1(cont)
DONALD C. COOK NUCLEAR PLANT - 2001
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM PLANT AXIS

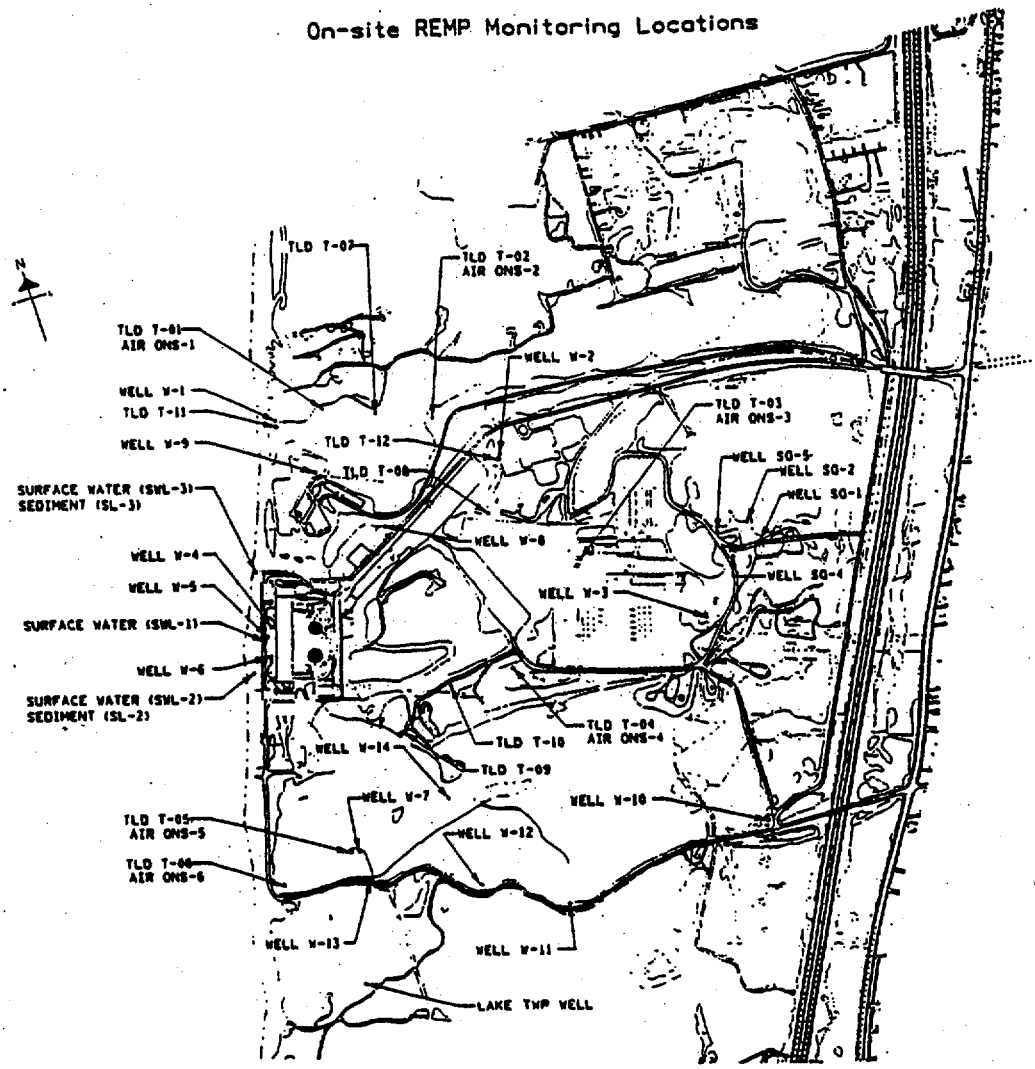
LOCATION	STATION	DISTANCE	DIRECTION	DEGREES	COLLECTION FREQUENCY	ANALYSIS/FREQUENCY
Grapes						
In a land sector containing grapes approximately 20 miles from the Plant in one of the less prevelant D/Q land sectors	Sector J				At time of harvest	Gamma Isotopic at time of harvest

* Composite samples of Drinking and Surface water shall be collected at least daily

Particulate sample filters should be analyzed for gross beta activity 24 or more hours following filter removal. This will allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than 10 times the yearly mean of control samples for any medium, gamma isotopic analysis should be perfromed on the individual samples.

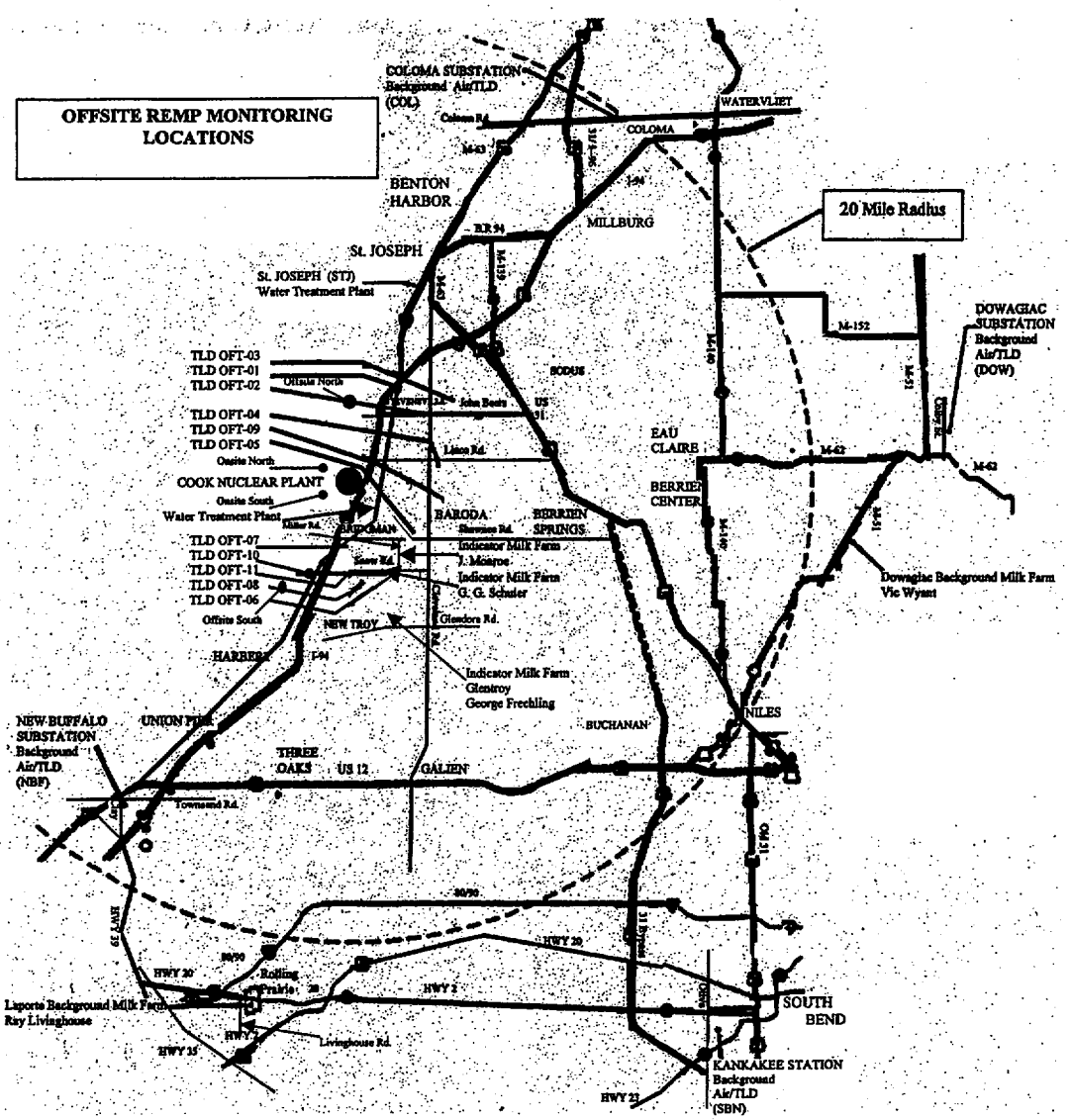
Please note the following definitions:

Weekly	-	at least once every seven (7) days
Monthly	-	at least once every thirty-one (31) days
Quarterly	-	at least once every ninety-two (92) days
Semi-annually	-	at least once every one hundred eighty-four (184) days



LEGEND

ONS-1 – ONS-6: Air Sampling Stations
T-01 - T-12: TLD Sampling Stations
W-1 - W-14: REMP T/S Groundwater Wells
SG-1, SG-2, SG-4, SG-5: REMP Non T/S Groundwater Wells
SWL-1, 2, 3: Surface Water Sampling Stations
SL-2, SL-3: Sediment Sampling Stations


OFFSITE REMP MONITORING LOCATIONS
COLOMA SUBSTATION
Background Air/TLD
(COL)
WATERVLIET
COLOMA
BENTON HARBOR
MILLBURG
20 Mile Radius
St. JOSEPH
St. JOSEPH (STJ)
Water Treatment Plant
DOWAGIAC SUBSTATION
Background
Air/TLD
(DOW)
TLD OFT-03
TLD OFT-01
TLD OFT-02
Offsite North
BODUS
TLD OFT-04
TLD OFT-09
TLD OFT-05
Onsite North
EAU CLAIRE
COOK NUCLEAR PLANT
Onsite South
Water Treatment Plant
BERRIEN CENTER
BARODA
BERRIEN SPRINGS
TLD OFT-07
TLD OFT-10
TLD OFT-11
TLD OFT-08
TLD OFT-06
Offsite South
Indicator Milk Farm
J. Monroe
Indicator Milk Farm
G. G. Schuler
Dowaghac Background Milk Farm
Vic Wyant
NEW TROY
Glendora Rd.
HARBERT
Indicator Milk Farm
Glenroy
George Frechling
NILES
NEW BUFFALO SUBSTATION
Background
Air/TLD
(NBF)
UNION PIER
BUCHANAN
THREE OAKS
US 12
GALIEN
Townsend Rd.
HWY 20
Rolling Prairie
HWY 2
SOUTH BEND
Laporte Background Milk Farm
Ray Livinghouse
Livinghouse Rd.
HWY 35
KANKAKEE STATION
Background
Air/TLD
(SBN)
HWY 23

IV. SUMMARY AND DISCUSSION OF 2001 ANALYTICAL RESULTS

IV. SUMMARY AND DISCUSSION OF 2001 ANALYTICAL RESULTS

A discussion of the data from the radiological analyses of environmental media collected during the report period is provided in this section. Samples for 2001 were analyzed by Teledyne Brown Engineering Environmental Services, Inc. in Knoxville, TN. The procedures and specifications followed at Teledyne Brown Engineering are in accordance with the Teledyne Brown Engineering Quality Assurance Manual. A synopsis of analytical procedures used for the environmental samples is provided in Appendix C. In addition to internal quality control measures performed by Teledyne Brown Engineering, the laboratory also participates in Interlaboratory Comparison Programs. Participation in these programs ensures that independent checks on the precision and accuracy of the measurements of radioactive material in environmental samples are performed. The results of the Interlaboratory Comparison are provided in Appendix D.

The transition of the laboratory from Westwood, New Jersey to Knoxville, Tennessee resulted in a longer than anticipated interruption in production. This interruption caused a backlog in the count room, which resulted in a delay of sample counting. As radionuclides with short half-lives decay, we are less able to detect their presence. This is reflected by an abnormally large decay correction factor in the activity calculation and elevated minimum detection levels. Consequently, there were a number of missed LLDs in the first half of 2001. Routinely, radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods. Under normal conditions, Teledyne Brown Engineering analytical methods meet or exceed the Lower Limit of Detection (LLD) requirements given in Table 2 of the USNRC Branch Technical Position of Radiological Monitoring, Revision 1, November 1979, and PMP-6010-OSD-001, "Off-Site Dose Calculation Manual".

The following is a discussion and summary of the results of the environmental measurements performed during the reporting period. Comparison is made where possible with radioactivity concentrations measured in the preoperational period of August 1971 to the initial criticality of Unit 1 on January 18, 1975. A brief summary of the preoperational program is found in Appendix G.

A. Airborne Particulates

Airborne particulate samples are collected with an oil-less pump at approximately 56 LPM using a 47 mm particulate filter. Results of gross beta activities are presented in Table B-1. The measurement of the gross beta activity on the weekly air particulate filters is a good indication of the levels of natural and/or manmade radioactivity in the environment. The average gross beta concentration of the six indicator locations was 0.020 pCi/m^3 with a range of individual values between 0.005 and 0.048 pCi/m^3. The average gross beta concentration of the four control locations was 0.020 pCi/m^3 with a range between 0.006 and 0.047 pCi/m^3. In Trending Graph 1 the monthly average gross beta concentrations for the indicator locations and for the control locations are plotted. The gross beta concentrations in air particulates filters in 2001 were lower than at the end of the preoperational period when the effects of recent atmospheric nuclear tests were being detected.

Air particulate filters were composited by location on a quarterly basis and were analyzed by gamma ray spectroscopy. Results are presented in Table B-2. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation, was measured in all forty samples. The average concentration for the control locations was 0.112 pCi/m^3 and the values ranged from 0.087 to 0.138 pCi/m^3. The average concentration for the indicator locations was 0.110 pCi/m^3 with a range of 0.082 to 0.179 pCi/m^3. These values are typical of beryllium-7 measured at various locations throughout the United States. Naturally occurring potassium-40 was not measured in 2001. Thorium-228 was measured in one of the twenty-four indicator quarterly composites with a concentration of 0.0002 pCi/m^3. Thorium-228 was measured in two of the control quarterly composites with an average concentration of 0.0005 pCi/m^3 and a range of 0.0004 to 0.0007 pCi/m^3. No other gamma emitting radioactivity was detected.

B. Airborne Iodine

Airborne iodine samples are collected with an oil-less pump at approximately 56 LPM using a charcoal filter cartridge. Charcoal cartridges are installed downstream of the particulate filters and are used to collect airborne radioiodine. The results of the weekly analysis of the charcoal cartridges are presented in Table B-3. All results were below the lower level of detection of 0.30 pCi/m^3 with no positive activity detected.

C. Direct Radiation - Thermoluminescent Dosimeters

Thermoluminescent dosimeters (TLDs) measure external radiation exposure from several sources including naturally occurring radionuclides in the air and soil, radiation from cosmic origin, fallout from atomic weapons testing, potential radioactive airborne releases from the power station and direct radiation from the power station. The TLDs record exposure from all of these potential sources. The TLDs are deployed quarterly at 27 locations in the environs surrounding the D. C. Cook Nuclear Plant. The average value of the four areas of each dosimeter (calibrated individually after each field exposure period for response to a known exposure and for transit exposure) are presented in Table B-4. Those exposure rates are quite typical of observed rates at many other locations in the country. The average annual measurement for the control samples was 3.13 mR/standard month with a range of 1.0 to 5.3 mR/standard month. The annual accumulation of indicator samples had a measurement of 3.17 mR/standard month with a range of 1.1 to 5.9 mR/standard month. The 2001 annual average in the environs of the Donald C. Cook Nuclear Plant is at the low range of the exposure rates (1.0 to 2.0 mR/week) measured during the preoperational period. The results of the indicator and control TLDs are in good agreement and are plotted in Trending Graph 2.

D. Surface Water

Two 125 milliliter surface water samples were collected from the intake forebay and from two shoreline locations, all within 0.3 miles of the two reactors and were composited daily over a monthly period. The gamma isotopic sample is preserved with nitric acid. The thirty-six samples were analyzed for iodine-131 by gamma ray spectroscopy. All results were less than or equal to the lower limit of detection. The quarterly composite was analyzed for tritium by liquid scintillation method described on page 73. Results are presented in Table B-5. Tritium was detected in one of the four indicator samples with a concentration of 160 pCi/liter. Tritium was detected in three of the eight control samples with an average concentration of 207 pCi/liter and a range of 120 to 350 pCi/liter. During the preoperational period tritium was measured in surface water samples at concentrations of approximately 400 pCi/liter. Naturally occurring potassium-40 was measured in one of the twenty-four control samples with a concentration of 476 pCi/liter. Potassium-40 was not detected in any of the indicator samples. Cesium-137 was not measured in any of the samples during 2001.

E. Groundwater

Water samples are collected quarterly from fourteen wells, all within 4300 feet of the reactors. First, a static water elevation is determined and three well bore volumes are purged from the well using a groundwater pump, or equivalent. Two 1-liter and one 125 mL samples are then obtained and the gamma isotopic samples are preserved with nitric acid. The samples are analyzed for gamma emitters and tritium. The results are presented in Table B-6. Naturally occurring potassium-40 was measured in six samples with an average concentration of 188 pCi/liter and a range of 77.2 to 369 pCi/liter. Thorium-228 was measured in seven samples with an average concentration of 13.3 pCi/liter and a range of 3.91 to 29.1 pCi/liter. There were no other gamma emitting isotopes measured. The groundwater wells W-4, W-5, W-6, and W-14 had measurable tritium activity throughout 2001. Tritium was measured in 16 of the 56 samples at the locations with an average concentration of 548 pCi/liter and a range of 180 to 1700 pCi/liter. The annual concentrations of tritium in wells W-1 through W-7 are plotted in Trending Graph 3. Tritium concentration in groundwater wells during the preoperational period typically averaged 400 pCi/liter. Groundwater does not provide a dose pathway for the Cook plant environs.

F. Drinking Water

Daily samples are collected at the intake of the water purification plants for St. Joseph and Lake Township. The 1000 ml daily samples at each location are composited and analyzed for gross beta, iodine-131, and gamma emitters. These samples were composited and the gamma isotopic sample was preserved with nitric acid. On a quarterly basis the daily samples are composited and analyzed for tritium. The results of analyses of drinking water samples are shown in Table B-7.

Gross beta activity was measured in nineteen of the twenty-six samples from the Lake Township intake with an average concentration of 2.59 pCi/liter and a range of 1.7 to 4.5 pCi/liter. Gross beta activity was measured in twenty-four of the twenty-six samples from the St. Joseph intake with an average concentration of 2.83 pCi/liter and a range of 2.1 to 4.0 pCi/liter. Naturally occurring potassium-40 was measured in one of the twenty-six samples from the Lake Township intake with a concentration of 192 pCi/liter. Naturally occurring potassium-40 was measured in one of the twenty-six samples from the St. Joseph intake with a concentration of 375 pCi/liter. Iodine-131 was measured in one of twenty-six samples from the Lake Township intake with a concentration of 0.93 pCi/liter. Iodine-131 activity was measured in one of the twenty-six samples from the St. Joseph intake with a concentration of 0.96 pCi/liter. No other gamma emitting isotopes were detected. Tritium was

measured in all four of the Lake Township intake sample with an average concentration of 153 pCi/liter and a range of 92.0 to 190 pCi/liter. Tritium was measured in all four of the St. Joseph intake samples with an average concentration of 138 pCi/liter and a range of 93.0 to 180 pCi/liter. Tritium (or LLD values) in drinking water are plotted in Trending Graph 4.

There were no drinking water analyses performed in the preoperational program.

G. Sediment

Sediment samples are collected semiannually along the shoreline of Lake Michigan at the same two locations as the surface water samples. Two liters of lake sediment are collected using a small dredge in an area covered part time by wave action. The sediment samples are analyzed by gamma ray spectroscopy, the results of which are shown in Table B-8. In March and October one sample was collected from location SL-2 and SL-3. Gamma ray spectroscopy detected naturally occurring potassium-40 in all four samples. The average potassium-40 concentration was 7515 pCi/kg (dry weight) with a range of 7190 to 7960 pCi/kg (dry weight). Thorium-228, also naturally occurring, was measured in all four samples with an average concentration of 89.8 pCi/kg (dry weight) and a range of 82.7 to 94.5 pCi/kg (dry weight). All other gamma emitters were below the lower limits of detection.

H. Milk

Milk samples of one gallon are collected from a 500 gallon bulk tank every fourteen days from four farms located between 4.1 miles and 20.7 miles from the site. The fifth farm is a goat farm located 5.0 miles from the plant site, where no bulk tank is used. Milk samples are preserved by adding 40 grams per gallon of sodium bisulfite when the samples are collected. The samples are analyzed for iodine-131 and other gamma emitters. The results are shown in Table B-9. Naturally occurring potassium-40 was measured in all of the fifty-two control samples with an average concentration of 1309 pCi/liter and a range of 1190 to 1470 pCi/liter. Potassium-40 was measured in all of the seventy-eight indicator samples with an average concentration of 1414 pCi/liter and a range of 922 to 2000 pCi/liter. I-131 was not measured in any of the 130 samples analyzed in 2001.

I. Broadleaf Vegetation

Broadleaf in lieu of milk collection was discontinued due to reimplementation of the milk sampling program in 2000.

J. Fish

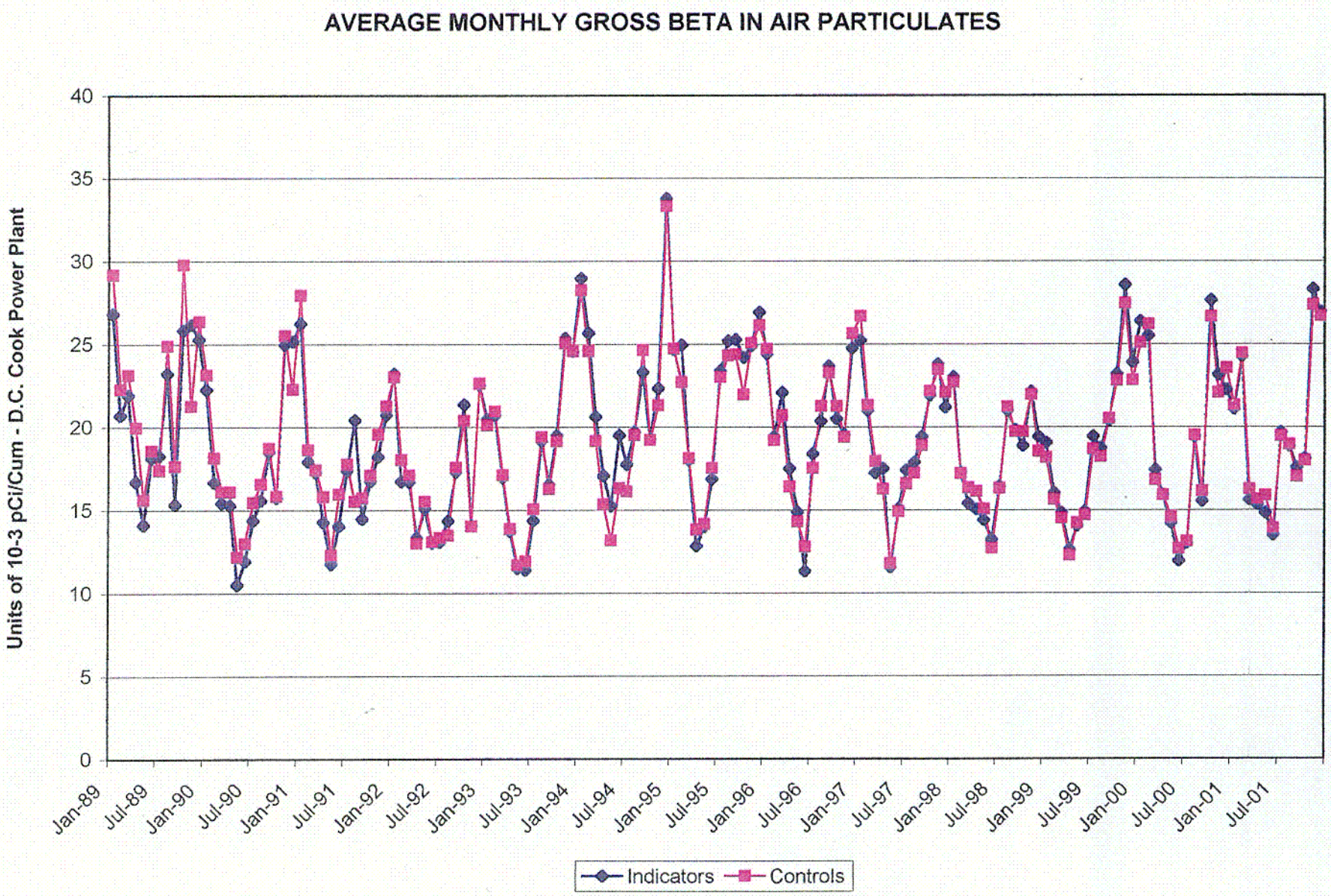
Using gill nets in approximately twenty feet of water in Lake Michigan, 4.5 pounds of fish are collected 2 times per year from each of four locations. The samples were then analyzed by gamma ray spectroscopy. Results are presented in Table B-11. Naturally occurring potassium-40 was measured in the four control samples with an average concentration of 3145 pCi/kg (wet weight) and a range of 2390 to 3920 pCi/kg (wet weight). Potassium-40 was measured in all four indicator samples with an average concentration of 2893 pCi/kg (wet weight) and a range of 2680 to 3130 pCi/kg (wet weight). Cesium-137 was measured in two control samples with an average concentration of 43.7 pCi/kg (wet weight) and a range of 32.3 to 55.0 pCi/kg (wet weight). Cesium-137 was measured in three of the four indicator samples with an average concentration of 20.9 pCi/kg (wet weight) and a range of 11.7 to 37.6 pCi/kg (wet weight). The level of cesium-137 found in these samples during 2001 are equivalent to the cesium-137 detected during the preoperational period.

K. Food Products

Food samples are collected annually at harvest, at three locations, as near the site boundary as possible, and approximately twenty miles from the plant. Each sample consists of greater than 300 grams of grapes and/or a large (12" x 15") zip lock bag moderately stuffed with broadleaves. Three vegetation samples and two grape samples were collected in 2001. The samples were analyzed by gamma ray spectroscopy. Results are presented in Table B-10. Cosmogenically produced beryllium-7 was measured in the control sample with a concentration of 1040 pCi/kg (wet weight). Beryllium-7 was measured in both indicator samples with an average concentration of 5020 pCi/kg (wet weight) and a range of 2800 to 7240 pCi/kg (wet weight). Naturally occurring potassium-40 was measured in the control sample with a concentration of 4000 pCi/kg (wet weight). Potassium-40 was measured in both indicator samples with an average concentration of 4865 pCi/kg (wet weight) and a range of 4490 to 5240 pCi/kg (wet weight). Cesium-137 was not measured during 2001. Two grape samples were collected in 2001. Beryllium-7 was measured in the control sample with a concentration of 115 pCi/kg (wet weight). Beryllium-7 was measured in the indicator sample with a concentration of 109 pCi/kg (wet weight). Naturally occurring potassium-40 was measured in the control sample with a concentration of 5300 pCi/kg (wet weight). Potassium-40 was measured in the indicator sample with a concentration of 2290 pCi/kg (wet weight). Cesium-137 was not measured during 2001.

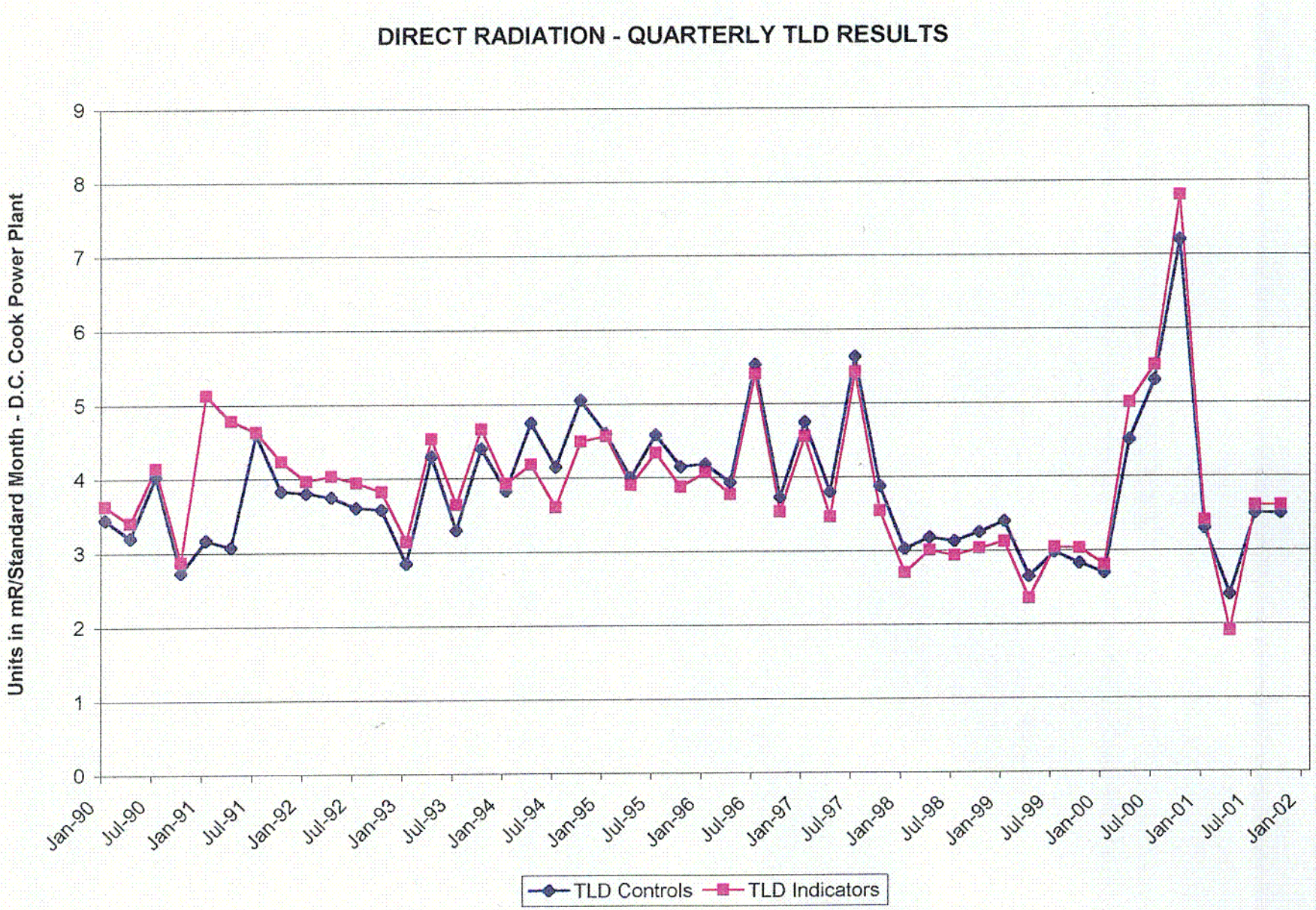
Trending Graph - 1

C-01



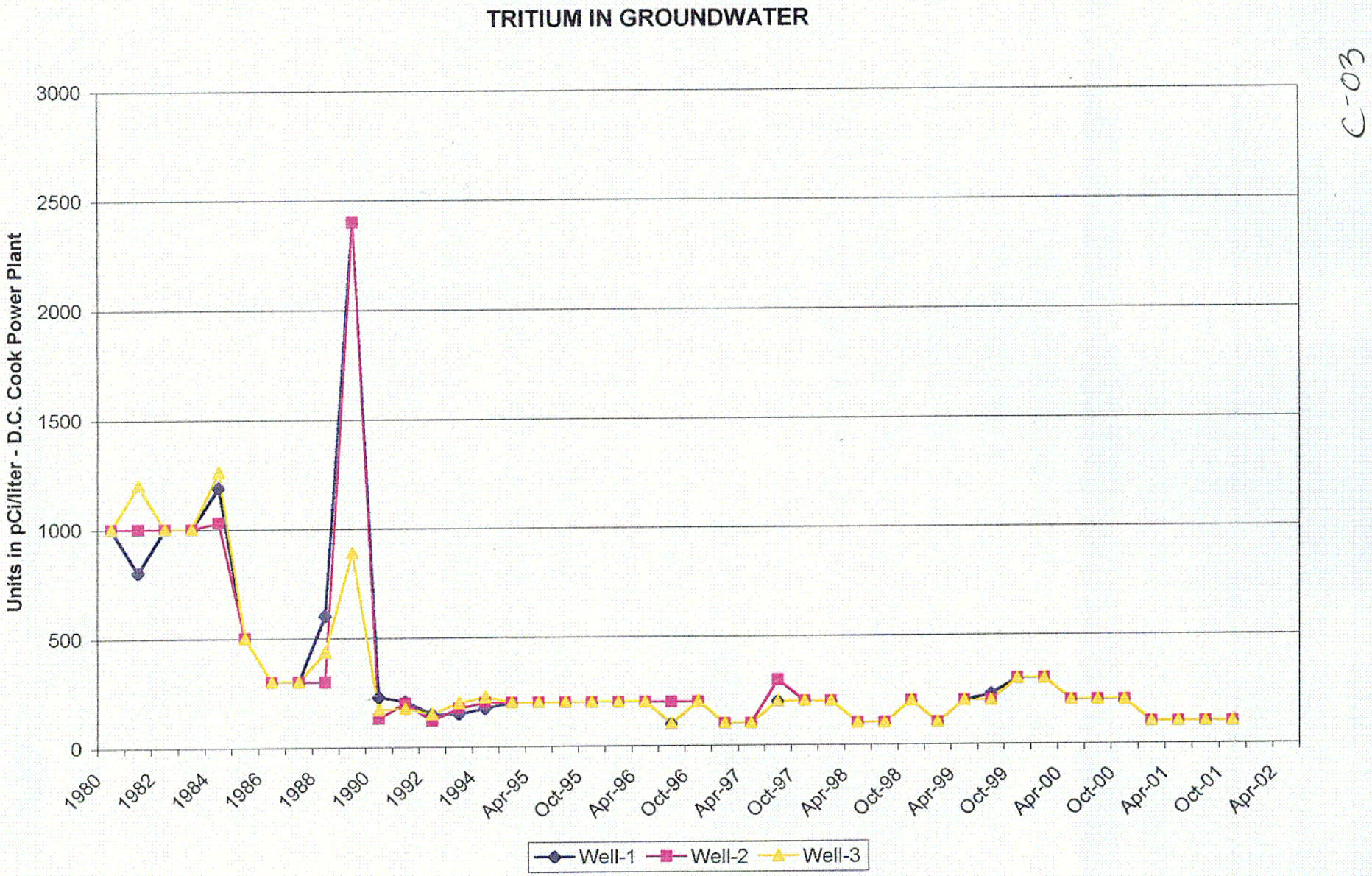
Trending Graph - 2

C-02



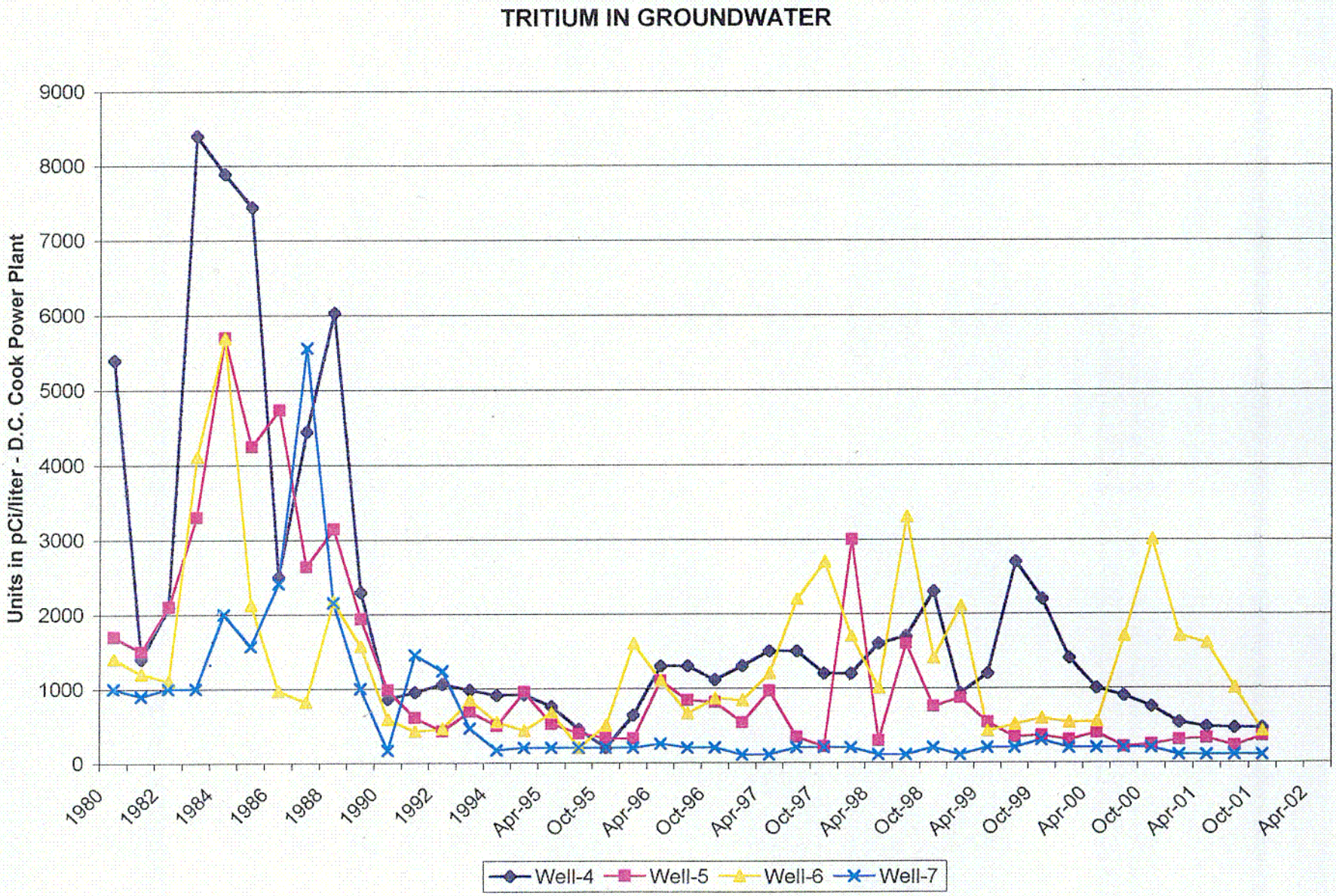
Trending Graph - 3

C-03



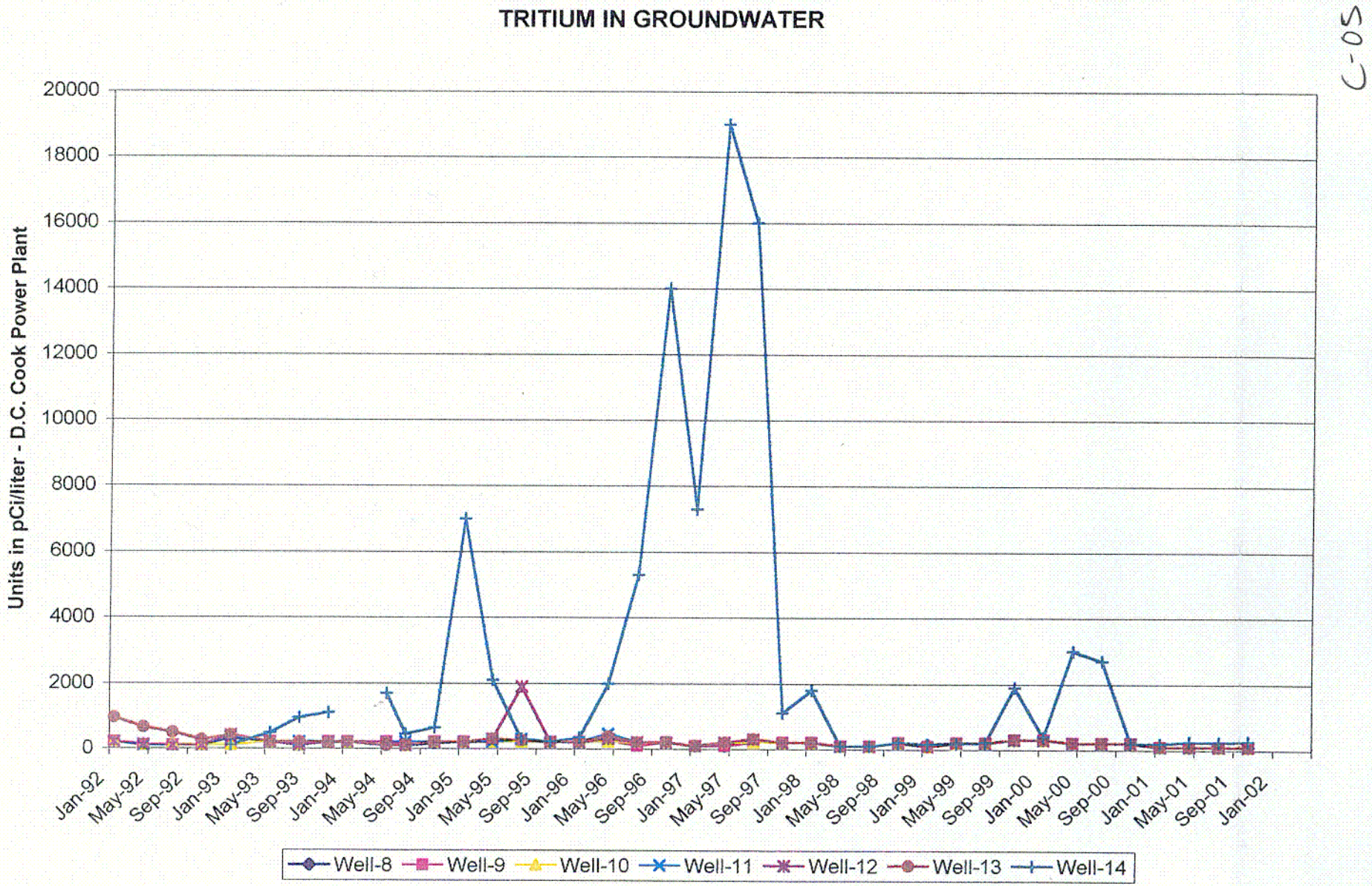
Trending Graph - 3 (cont.)

C-04

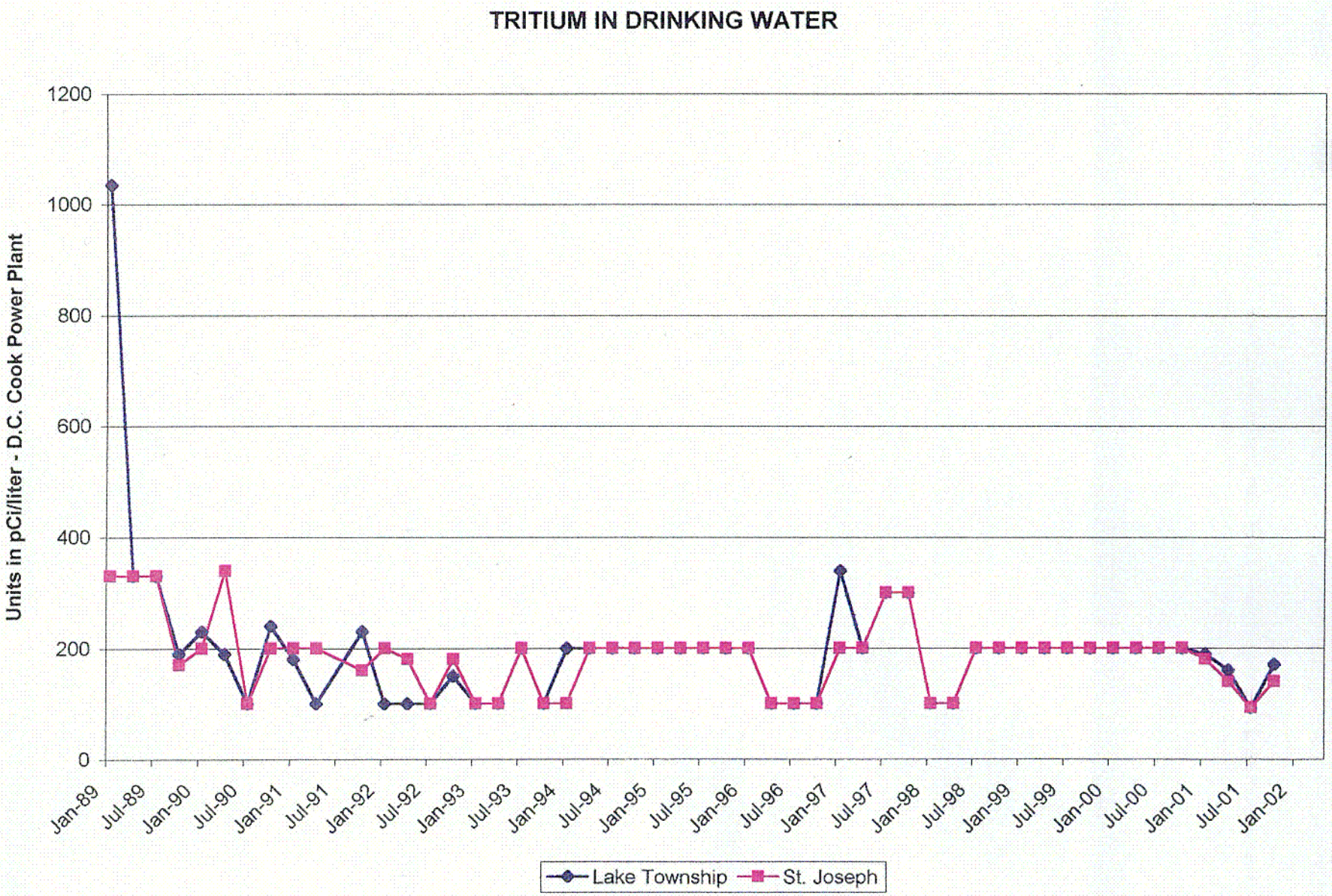


Trending Graph - 3 (Cont.)

C-05



Trending Graph - 4



C-06

V. CONCLUSIONS

V. CONCLUSIONS

The results of the 2001 Radiological Environmental Monitoring Program for the Donald C. Cook Nuclear Plant have been presented. The results were as expected for normal environmental samples. Naturally occurring radioactivity was observed in sample media in the expected activity ranges.

Occasional samples of a few media showed the presence of man-made isotopes. These have been discussed individually in the text. Observed activities were at very low concentrations and had no significant dose consequence. Specific examples of sample media with positive analysis results are discussed below.

Air particulate gross beta concentrations of all the indicator locations for 2001 appear to follow the gross beta concentrations at the control locations. The concentration levels are actually lower than during the preoperational period. Gamma isotopic analysis of the particulate samples identified the gamma emitting isotopes as natural products (beryllium-7 and potassium-40). No man-made activity was found in the particulate media during 2001. No iodine-131 was detected in charcoal filters in 2001.

Thermoluminescent dosimeters (TLDs) measure external gamma radiation from naturally occurring radionuclides in the air and soil, radiation from cosmic origin and fallout from atmospheric nuclear weapons testing, and radioactive airborne releases and direct radiation from the power plant. The average annual TLD results were at normal background exposure levels.

Surface water samples are collected daily from the intake forebay and two locations in Lake Michigan. The samples are analyzed quarterly for tritium, and monthly for gamma emitting isotopes. Naturally occurring potassium-40 was the only gamma emitter detected during 2001. Tritium was measured in three control samples and one indicator sample.

Groundwater samples were collected quarterly at fourteen wells, all within 4300 feet of the reactors. The three wells within 500 feet had measurable tritium, which is attributed to the operation of the plant. The highest concentration measured in 2001 was 1700 pCi/liter which compares closely with the lowest concentration measured during 2000 of 1700 pCi/liter. Potassium-40, a naturally occurring nuclide was detected in six of the fifty-six samples with an average concentration of 188 pCi/liter. No other gamma emitting isotopes were detected.

Samples are collected daily at the intakes of the drinking water purification plants for St. Joseph and Lake Township. Samples composited daily over a two week period are analyzed for iodine-131, gross beta, and measured for gamma emitting isotopes. Samples are also analyzed quarterly for tritium. Naturally occurring potassium-40 was detected in two of the fifty-two samples with an average concentration of 284 pCi/liter. No other gamma emitting isotopes were detected. Iodine-131 was detected in two of the fifty-two samples with an average concentration of 0.95 pCi/liter, which is below the required LLD of 1.0 pCi/liter. Gross beta was measured in all fifty-two samples at normal background concentrations. Tritium was measured in 2001 in the eight quarterly composite samples with an average concentration of 146 pCi/liter.

Sediment samples can be a sensitive indicator of discharges from nuclear power stations. Sediment samples are collected semiannually along the shoreline of Lake Michigan at two locations in close proximity of the reactors. The samples were analyzed by gamma ray spectroscopy and only naturally occurring gamma emitters were detected. There is no evidence of station discharges affecting Lake Michigan, either in the sediments or in the water, as previously discussed.

The milk sampling program was reinstated in March of 2000. Milk samples are collected biweekly from five farms within the vicinity of the nuclear plant. Naturally occurring potassium-40 was detected in all of the one-hundred and thirty samples with an average concentration of 1372 pCi/liter. No other gamma emitters were detected.

Broadleaf sampling in lieu of milk was discontinued due to the reimplementation of the milk collection program in 2000.

Fish samples collected in Lake Michigan in the vicinity of the nuclear plant were analyzed by gamma ray spectroscopy. Naturally occurring potassium-40 was detected in all eight samples. Cesium-137 was found in three of the four indicator samples with an average concentration of 20.9 pCi/kg (wet weight) and in two of the four control samples with an average concentration of 43.7 pCi/kg (wet weight). The level of cesium-137 found in these samples during 2001 are equivalent to the cesium-137 detected during the preoperational period.

Food products, consisting of grapes and broadleaf vegetation were collected and analyzed by gamma ray spectroscopy. Vegetation samples are collected annually from three locations and grapes are collected annually from two locations within the vicinity of the nuclear plant. The samples were analyzed by gamma ray spectroscopy. Cosmogenically produced beryllium-7 was detected in all three vegetation samples with an average concentration of 3693 pC/kg (wet weight). Naturally occurring potassium-40 was detected in all three samples with an average concentration of 4577 pCi/kg (wet weight). Cosmogenically produced beryllium-7 was detected in both grape samples with an average concentration of 112 pC/kg (wet weight). Naturally occurring potassium-40 was detected in both grape samples with an average concentration of 3795 pCi/kg (wet weight). The only gamma emitting isotopes measured during 2001 were beryllium-7 and potassium-40.

The results of the analyses have been presented. Based on the evidence of the Radiological Environmental Monitoring Program the Donald C. Cook Nuclear Plant is operating within regulatory limits. Tritium in four on-site wells appears to be the only radionuclide which can be directly correlated with the plant. However the associated groundwater does not provide a direct dose pathway to humans because these wells do not supply water to the local population.

VI. REFERENCES

VI. REFERENCES

1. Data Tables from 1985-1988 CEP-AEPSC Annual Radiological Environmental Monitoring Program Reports.

2. Eberline Instrument Company. Indiana Michigan Power Company, "D. C. Cook Nuclear Plant Radiological Environmental Monitoring Program - 1974 Annual Report", May 1975.

3. Donald C. Cook Nuclear Plant, PMP-6010-0SD-001, "Offsite Dose Calculation Manual".

4. United States Nuclear Regulatory Commission, Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants", December 1975.

5. United States Nuclear Regulatory Commission, Regulatory Guide 1.21 "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants, June 1974.

6. United States Nuclear Regulatory Commission, Regulatory Guide 4.1 "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants", April 1975.

7. USNRC Branch Technical Position, "Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLER PLANT DOCKET NO. 50-315/50-316
BERRIEN COUNTY JANUARY 1 TO DECEMBER 31, 2001

MEDIUM OR PATHYWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED		ALL INDICATOR LOCATIONS MEAN (a/b) RANGE	LOCATION WITH HIGHEST MEAN NAME	DISTANCE AND DIRECTION		MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Air Iodine (pCi/m^3)	I-131	529	-(0/317) -	NA				-(0/212) -	0
Airborne Particulates (pCi/m^3)	Gross Beta	529	19.6(317/317) (5.4-48)	ONS-2	2338 ft.	48°	20.5(53/53) (6.7-47)	19.6(212/212) (5.7-47)	0
	Gamma	40							
	Be-7	40	110(24/24) (82.4-179)	ONS-2	2338 ft.	48°	123(4/4) (87.7-179)	112(16/16) (87.3-138)	0
	K-40	40	-(0/24) -	NA				-(0/16) -	0
	Th-228	40	0.22(1/24) -	NBF	15.6 mi.	SSW	0.67(1/4) -	0.54(2/16) (0.4-0.67)	0
Direct Radiation (mR/Standard Dose Month)	Gamma	107							
	Quarterly	107	3.17(91/91) (1.1-5.9)	OFT-9	4.4 mi.	ESE	4.3(4/4) (3.8-4.9)	3.13(16/16) (1.0-5.3)	0

(a/b) Ratio of samples with detectable activity to total number of samples analyzed.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLER PLANT DOCKET NO. 50-315/50-316
BERRIEN COUNTY JANUARY 1 TO DECEMBER 31, 2001

MEDIUM OR PATHYWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED		ALL INDICATOR LOCATIONS MEAN (a/b) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Surface Water (pCi/liter)	Gamma	36							
	K-40	36	-(0/12) -	SWL-3	North Comp		476(1/24) -	476(1/24) -	0
	H-3	12	160(1/12) -	SLW-2	South Comp		250(2/4) (150-350)	207(3/8) (120-350)	0
Groundwater (pCi/liter)	Gamma	56							
	K-40	56	188(6/56) (77.2-369)	Well 7	1895 ft.	189°	274(1/4) -	-(0/0) -	0
	Th-228	56	13.3(7/56) (3.91-29.1)	Well 11	3206 ft.	153°	29.1(1/4) -	-(0/0) -	0
	H-3	56	548(16/56) (180-1700)	Well 6	424 ft.	273°	1180(4/4) (420-1700)	-(0/0) -	0
Drinking Water (pCi/liter)	Gross Beta	52	2.73(43/52) (1.7-4.5)	St. Joseph	9.0 mi.	NE	2.83(24/26) (2.1-4.0)	-(0/0) -	0
	I-131	52	0.95(2/52) (0.93-0.96)	St. Joseph	9.0 mi.	NE	0.96(1/26) -	-(0/0) -	0

(a/b) Ratio of samples with detectable activity to total number of samples analyzed.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLER PLANT DOCKET NO. 50-315/50-316
BERRIEN COUNTY JANUARY 1 TO DECEMBER 31, 2001

MEDIUM OR PATHYWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED		ALL INDICATOR LOCATIONS MEAN (a/b) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Drinking Water (pCi/liter)	Gamma	52							
	K-40	52	284(2/52) (192-375)	St. Joseph	9.0 mi.	NE	375(1/26) -	-(0/0) -	0
	H-3	8	146(8/8) (92-190)	LTW	0.6 mi.	S	153(4/4) (92-190)	-(0/0) -	0
Fish (pCi/kg wet)	Gamma	8							
	K-40	8	2893(4/4) (2680-3130)	OFS-N	3.5 mi.	N	3410(2/2) (2900-3920)	3145(4/4) (2390-3920)	0
	Cs-137	8	20.9(3/4) (11.7-37.6)	OFS-N	3.5 mi.	N	32.3(1/2) -	43.7(2/4) (32.3-55.0)	0
Food/Vegetation Broadleaf (pCi/kg wet)	Gamma	3							
	Be-7	3	5020(2/2) (2800-7240)	Sector D			7240(1/1) -	1040(1/1) -	0
	K-40	3	4865(2/2) (4490-5240)	Sector D			5240(1/1) -	4000(1/1) -	0
	Cs-137	3	-(0/2) -	NA			NA	-(0/1) -	0

(a/b) Ratio of samples with detectable activity to total number of samples analyzed.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLER PLANT DOCKET NO. 50-315/50-316
BERRIEN COUNTY JANUARY 1 TO DECEMBER 31, 2001

MEDIUM OR PATHYWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED		ALL INDICATOR LOCATIONS MEAN (a/b) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Food/Vegetation Grapes	Gamma	2							
(pCi/kg wet)	Be-7	2	109(1/1) -	Sector J			115(1/1) -	115(1/1) -	0
	K-40	2	2290(1/1) -	Sector J			5300(1/1) -	5300(1/1) -	0
	Cs-137	2	-(0/1) -	NA			NA	-(0/1) -	0
Sediment	Gamma	4							
pCi/kg dry)	K-40	4	7515(4/4) (7190-7960)	SL-2	500 ft.	S	7610(2/2) (7260-7960)	-(0/0) -	0
	Cs-137	4	-(0/4) -	NA			NA	-(0/0) -	0
	Ra-226	4	-(0/4) -	NA			NA	-(0/0) -	0
	Th-228	4	89.8(4/4) (82.7-94.5)	SL-3	500 ft.	N	91.3(2/2) (88.1-94.5)	-(0/0) -	0

(a/b) Ratio of samples with detectable activity to total number of samples analyzed.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLER PLANT DOCKET NO. 50-315/50-316
BERRIEN COUNTY JANUARY 1 TO DECEMBER 31, 2001

MEDIUM OR PATHYWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSIS PERFORMED		ALL INDICATOR LOCATIONS MEAN (a/b) RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION			MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
Milk (pCi/L)	Gamma	130							
	Be-7	130	-(0/78) -	NA			NA	-(0/52) -	0
	K-40	130	1414(78/78) (922-2000)	Monroe	5.0 mi.	SE	1604(26/26) (922-2000)	1309(52/52) (1190-1470)	0
	I-131	130	-(0/78) -	NA			NA	-(0/52) -	0
	Cs-137	130	-(0/78) -	NA			NA	-(0/52) -	0

(a/b) Ratio of samples with detectable activity to total number of samples analyzed.

APPENDIX B
DATA TABLES

TABLE B-1
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GROSS BETA EMITTERS IN WEEKLY AIRBORNE PARTICULATES
Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL	Average ± 2 s.d.
JANUARY 2001											
01/03/01	17 ± 2	17 ± 2	17 ± 2	16 ± 2	17 ± 2	15 ± 2	15 ± 2	15 ± 2	16 ± 2	15 ± 2	16 ± 2
01/10/01	19 ± 2	22 ± 2	24 ± 2	22 ± 2	20 ± 2	19 ± 2	22 ± 2	24 ± 2	28 ± 2	22 ± 2	22 ± 5
01/17/01	21 ± 2	22 ± 2	23 ± 2	21 ± 2	19 ± 2	19 ± 2	21 ± 2	21 ± 2	23 ± 2	21 ± 2	21 ± 3
01/24/01	30 ± 3	30 ± 3	31 ± 3	33 ± 3	30 ± 2	28 ± 2	27 ± 3	27 ± 2	31 ± 2	30 ± 3	30 ± 4
01/31/01	16 ± 2	18 ± 2	19 ± 2	16 ± 2	17 ± 2	15 ± 2	17 ± 2	18 ± 2	19 ± 2	14 ± 2	17 ± 3
FEBRUARY											
02/07/01	20 ± 2	25 ± 2	24 ± 2	25 ± 2	21 ± 2	23 ± 2	21 ± 2	21 ± 2	23 ± 2	23 ± 2	23 ± 4
02/14/01	22 ± 2	18 ± 2	18 ± 2	22 ± 2	23 ± 2	19 ± 2	21 ± 2	21 ± 2	22 ± 2	21 ± 2	21 ± 4
02/21/01	31 ± 2	31 ± 2	33 ± 3	31 ± 2	29 ± 2	30 ± 2	30 ± 2	31 ± 3	30 ± 2	33 ± 3	31 ± 3
02/28/01	26 ± 2	18 ± 2	24 ± 2	23 ± 2	24 ± 2	23 ± 2	22 ± 2	24 ± 2	26 ± 2	22 ± 2	23 ± 5
MARCH											
03/07/01	18 ± 2	19 ± 2	18 ± 2	18 ± 2	18 ± 2	15 ± 2	17 ± 2	19 ± 2	20 ± 2	19 ± 2	18 ± 3
03/14/01	15 ± 2	14 ± 2	14 ± 2	13 ± 2	12 ± 2	13 ± 2	11 ± 2	12 ± 2	15 ± 2	14 ± 2	13 ± 3
03/21/01	16 ± 2	17 ± 2	15 ± 2	17 ± 2	17 ± 2	15 ± 2	17 ± 2	18 ± 2	17 ± 2	18 ± 2	17 ± 2
03/28/01	14 ± 2	17 ± 2	12 ± 2	17 ± 2	15 ± 2	16 ± 2	15 ± 2	17 ± 2	15 ± 2	16 ± 2	15 ± 3
Quarter Avg.	**20 ± 11**	**21 ± 10**	**21 ± 13**	**21 ± 12**	**20 ± 10**	**19 ± 11**	**20 ± 10**	**21 ± 10**	**22 ± 11**	**21 ± 12**	**21 ± 11**

(a) Sample not received.

TABLE B-1 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GROSS BETA EMITTERS IN WEEKLY AIRBORNE PARTICULATES
Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL	Average ± 2 s.d.
APRIL											
04/04/01	17 ± 2	16 ± 2	16 ± 2	16 ± 2	16 ± 2	15 ± 2	18 ± 2	17 ± 2	17 ± 2	20 ± 2	17 ± 3
04/11/01	12 ± 2	17 ± 2	11 ± 2	15 ± 2	13 ± 2	13 ± 2	13 ± 2	14 ± 2	14 ± 2	14 ± 2	14 ± 3
04/18/01	15 ± 2	15 ± 2	13 ± 2	13 ± 2	13 ± 2	12 ± 2	12 ± 2	13 ± 2	13 ± 2	14 ± 2	13 ± 2
04/25/01	19 ± 2	21 ± 2	18 ± 2	16 ± 2	19 ± 2	17 ± 2	17 ± 2	17 ± 2	18 ± 2	19 ± 2	18 ± 3
MAY											
05/02/01	18 ± 2	20 ± 2	19 ± 2	22 ± 2	22 ± 2	20 ± 2	21 ± 2	20 ± 2	21 ± 2	20 ± 2	20 ± 3
05/09/01	18 ± 2	18 ± 2	16 ± 2	15 ± 2	20 ± 2	18 ± 2	17 ± 2	21 ± 2	17 ± 2	19 ± 2	18 ± 4
05/16/01	17 ± 2	17 ± 2	14 ± 2	18 ± 2	18 ± 2	15 ± 2	19 ± 2	17 ± 2	17 ± 2	18 ± 2	17 ± 3
05/23/01	12 ± 2	12 ± 2	10 ± 2	11 ± 2	12 ± 2	11 ± 2	13 ± 2	11 ± 2	13 ± 2	13 ± 2	12 ± 2
05/30/01	7.5 ± 1.6	11 ± 2	8.0 ± 1.7	8.2 ± 1.6	9.3 ± 1.5	8.3 ± 1.6	11 ± 2	10 ± 2	9.4 ± 1.6	9.9 ± 1.8	9 ± 2
JUNE											
06/06/01	6.8 ± 1.6	6.7 ± 1.6	6.7 ± 1.7	7.1 ± 1.5	7.3 ± 1.5	5.4 ± 1.4	5.7 ± 1.6	7.4 ± 1.7	6.1 ± 1.5	6.7 ± 1.7	7 ± 1
06/13/01	18 ± 2	16 ± 2	15 ± 2	16 ± 2	12 ± 2	13 ± 3	15 ± 2	15 ± 2	13 ± 2	15 ± 2	15 ± 4
06/20/01	19 ± 2	22 ± 2	18 ± 2	19 ± 2	16 ± 2	15 ± 2	20 ± 2	22 ± 2	20 ± 2	19 ± 2	19 ± 5
06/27/01	15 ± 2	16 ± 2	14 ± 2	13 ± 2	15 ± 2	12 ± 2	15 ± 2	15 ± 2	13 ± 2	14 ± 2	14 ± 2
Quarter Avg.	**15 ± 8.3**	**16 ± 8.4**	**14 ± 7.8**	**15 ± 8.3**	**15 ± 8.5**	**13 ± 7.9**	**15 ± 8.4**	**15 ± 8.6**	**15 ± 8.3**	**16 ± 8.3**	**15 ± 8.3**

(a) Sample not received.

TABLE B-1 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GROSS BETA EMITTERS IN WEEKLY AIRBORNE PARTICULATES
Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL	Average ± 2 s.d.
JULY											
07/04/01	17 ± 2	18 ± 2	17 ± 2	16 ± 2	19 ± 2	16 ± 2	17 ± 2	18 ± 2	17 ± 2	19 ± 2	17 ± 2
07/11/01	18 ± 2	19 ± 2	17 ± 2	17 ± 2	20 ± 2	19 ± 2	18 ± 2	20 ± 2	18 ± 2	19 ± 2	19 ± 2
07/18/01	(a)	16 ± 2	17 ± 2	16 ± 2	17 ± 2	16 ± 2	14 ± 2	13 ± 2	14 ± 2	16 ± 2	15 ± 3
07/25/01	24 ± 2	26 ± 2	27 ± 2	25 ± 2	23 ± 2	24 ± 2	25 ± 2	26 ± 2	23 ± 2	25 ± 2	25 ± 3
AUGUST											
08/01/01	21 ± 2	21 ± 2	24 ± 2	19 ± 2	22 ± 2	20 ± 2	20 ± 2	24 ± 2	22 ± 2	21 ± 2	21 ± 3
08/08/01	23 ± 2	24 ± 2	22 ± 2	23 ± 2	25 ± 2	23 ± 2	22 ± 2	24 ± 2	25 ± 2	22 ± 2	23 ± 2
08/15/01	17 ± 2	17 ± 2	15 ± 2	15 ± 2	16 ± 2	15 ± 2	16 ± 2	16 ± 2	17 ± 2	18 ± 2	16 ± 2
08/22/01	18 ± 2	17 ± 2	16 ± 2	15 ± 2	16 ± 2	17 ± 2	16 ± 2	17 ± 2	17 ± 2	17 ± 2	17 ± 2
08/29/01	23 ± 2	19 ± 2	19 ± 2	19 ± 2	19 ± 2	20 ± 2	21 ± 2	20 ± 2	17 ± 2	18 ± 2	20 ± 3
SEPTEMBER											
09/05/01	17 ± 2	19 ± 2	16 ± 2	16 ± 2	17 ± 2	16 ± 2	18 ± 2	17 ± 2	18 ± 2	16 ± 2	17 ± 2
09/12/01	15 ± 2	17 ± 2	15 ± 2	13 ± 2	16 ± 2	14 ± 2	14 ± 2	15 ± 2	14 ± 2	14 ± 2	15 ± 2
09/19/01	20 ± 2	21 ± 2	16 ± 2	17 ± 2	19 ± 2	18 ± 2	18 ± 2	18 ± 2	19 ± 2	19 ± 2	19 ± 3
09/26/01	17 ± 2	20 ± 2	18 ± 2	18 ± 2	24 ± 5	23 ± 6	19 ± 2	20 ± 2	16 ± 2	17 ± 2	19 ± 5
Quarter Avg.	**19 ± 5.9**	**20 ± 5.8**	**18 ± 7.4**	**18 ± 6.6**	**19 ± 6.3**	**19 ± 6.6**	**18 ± 6.3**	**19 ± 7.6**	**18 ± 6.6**	**19 ± 5.8**	**19 ± 6.3**

(a) Sample not received.

TABLE B-1 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GROSS BETA EMITTERS IN WEEKLY AIRBORNE PARTICULATES
Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL	Average ± 2 s.d.
OCTOBER											
10/03/01	22 ± 2	22 ± 2	20 ± 2	17 ± 2	21 ± 2	21 ± 2	20 ± 2	22 ± 2	20 ± 2	18 ± 2	20 ± 3
10/10/01	20 ± 2	24 ± 2	22 ± 2	21 ± 2	21 ± 2	23 ± 2	23 ± 2	27 ± 2	23 ± 2	19 ± 2	22 ± 5
10/17/01	13 ± 2	12 ± 2	12 ± 2	12 ± 2	13 ± 2	11 ± 2	12 ± 2	9.5 ± 1.6	13 ± 2	12 ± 2	12 ± 2
10/24/01	23 ± 2	24 ± 2	21 ± 2	24 ± 2	21 ± 2	24 ± 2	24 ± 2	24 ± 2	22 ± 2	21 ± 2	23 ± 3
10/31/01	14 ± 2	13 ± 2	13 ± 2	12 ± 2	14 ± 2	14 ± 2	14 ± 2	13 ± 2	11 ± 2	12 ± 2	13 ± 2
NOVEMBER											
11/07/01	18 ± 2	20 ± 2	17 ± 2	17 ± 2	18 ± 2	17 ± 2	18 ± 2	17 ± 2	18 ± 2	18 ± 2	18 ± 2
11/14/01	23 ± 2	27 ± 2	22 ± 2	25 ± 2	26 ± 2	24 ± 2	23 ± 2	24 ± 2	23 ± 2	23 ± 2	24 ± 3
11/21/01	43 ± 3	47 ± 3	43 ± 3	44 ± 3	47 ± 3	48 ± 3	47 ± 3	40 ± 3	45 ± 3	40 ± 3	44 ± 6
11/28/01	25 ± 2	28 ± 2	25 ± 2	26 ± 2	24 ± 2	26 ± 2	29 ± 2	23 ± 2	26 ± 2	24 ± 2	26 ± 4
DECEMBER											
12/05/01	25 ± 2	30 ± 2	28 ± 2	27 ± 2	30 ± 2	31 ± 2	25 ± 2	24 ± 2	28 ± 2	25 ± 2	27 ± 5
12/12/01	30 ± 2	33 ± 3	28 ± 2	31 ± 2	36 ± 3	33 ± 3	32 ± 2	32 ± 2	30 ± 2	27 ± 2	31 ± 5
12/19/01	28 ± 2	30 ± 2	30 ± 2	28 ± 2	33 ± 3	29 ± 2	27 ± 2	31 ± 2	29 ± 2	32 ± 2	30 ± 4
12/26/01	24 ± 2	27 ± 2	23 ± 2	24 ± 2	29 ± 2	23 ± 2	28 ± 2	27 ± 2	25 ± 2	24 ± 2	25 ± 4
01/02/02	18 ± 2	19 ± 2	18 ± 2	21 ± 2	22 ± 2	21 ± 2	22 ± 2	23 ± 2	24 ± 2	19 ± 2	21 ± 4
Quarter Avg.	**23 ± 15**	**25 ± 18**	**23 ± 16**	**24 ± 16**	**25 ± 18**	**25 ± 18**	**25 ± 17**	**24 ± 15**	**24 ± 16**	**22 ± 15**	**24 ± 16**
Annual Avg.	**20 ± 12**	**21 ± 13**	**19 ± 13**	**19 ± 13**	**20 ± 14**	**19 ± 12**	**19 ± 13**	**20 ± 13**	**20 ± 13**	**19 ± 12**	**20 ± 13**

(a) Sample not received.

TABLE B-2

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIRBORNE PARTICULATES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

Stations	Nuclides	First Quarter 12/27/00 - 03/28/01	Second Quarter 03/28/01 - 06/27/01	Third Quarter 06/27/01 - 09/26/01	Fourth Quarter 09/26/01 - 12/26/01	Average ± 2 s.d.
ONS-1	Be-7	82.4 ± 5.7	115 ± 6.2	128 ± 9.6	100 ± 11	106 ± 20
	K-40	< 6	< 4	< 9	< 6	-
	Cs-134	< 0.4	< 0.3	< 0.3	< 0.3	-
	Cs-137	< 0.3	< 0.3	< 0.3	< 0.3	-
	Th-228	< 0.4	< 0.4	< 0.4	< 3	-
ONS-2	Be-7	87.7 ± 5.9	179 ± 11	124 ± 8.7	99.5 ± 9.5	123 ± 41
	K-40	< 5	< 6	< 4	< 5	-
	Cs-134	< 0.3	< 0.5	< 0.2	< 0.3	-
	Cs-137	< 0.3	< 0.4	< 0.3	< 0.3	-
	Th-228	< 0.3	< 0.7	< 0.3	< 3	-
ONS-3	Be-7	100 ± 6.9	115 ± 6.6	118 ± 9.1	85.5 ± 10	105 ± 15
	K-40	< 4	< 5	< 6	< 9	-
	Cs-134	< 0.4	< 0.4	< 0.3	< 0.4	-
	Cs-137	< 0.4	< 0.3	< 0.3	< 0.3	-
	Th-228	< 0.6	< 0.5	< 0.4	< 3	-
ONS-4	Be-7	93.1 ± 6.4	135 ± 7.3	121 ± 9.7	87.0 ± 8.2	109 ± 23
	K-40	< 3	< 4	< 7	< 5	-
	Cs-134	< 0.4	< 0.3	< 0.3	< 0.4	-
	Cs-137	< 0.4	< 0.2	< 0.4	< 0.3	-
	Th-228	< 0.6	< 0.2	< 0.4	< 3	-
ONS-5	Be-7	83.2 ± 7.1	129 ± 7.7	121 ± 6.6	102 ± 10	109 ± 20
	K-40	< 3	< 3	< 4	< 6	-
	Cs-134	< 0.4	< 0.3	< 0.2	< 0.5	-
	Cs-137	< 0.4	< 0.3	< 0.2	< 0.4	-
	Th-228	< 0.6	< 0.4	0.22 ± 0.10	< 3	0.22 ± 0.10
ONS-6	Be-7	102 ± 7.6	121 ± 7.3	112 ± 7.4	96.0 ± 9.8	108 ± 11
	K-40	< 3	< 3	< 6	< 7	-
	Cs-134	< 0.4	< 0.4	< 0.4	< 0.6	-
	Cs-137	< 0.3	< 0.4	< 0.4	< 0.5	-
	Th-228	< 0.6	< 0.5	< 0.4	< 3	-

TABLE B-2 (cont.)

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIRBORNE PARTICULATES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

Stations	Nuclides	First Quarter 12/27/00 - 03/28/01	Second Quarter 03/28/01 - 06/27/01	Third Quarter 06/27/01 - 09/26/01	Fourth Quarter 09/26/01 - 12/26/01	Average ± 2 s.d.
NBF	Be-7	93.3 ± 6.2	128 ± 6.6	118 ± 7.1	94.1 ± 9.9	108 ± 17
	K-40	< 5	< 3	< 4	< 8	-
	Cs-134	< 0.3	< 0.3	< 0.2	< 0.3	-
	Cs-137	< 0.3	< 0.3	< 0.2	< 0.3	-
	Th-228	< 0.3	0.67 ± 0.19	< 0.3	< 3	0.67 ± 0.19
			0			
SBN	Be-7	97.7 ± 6.5	138 ± 7.4	132 ± 8.0	83.2 ± 9	113 ± 27
	K-40	< 6	< 4	< 5	< 5	-
	Cs-134	< 0.4	< 0.3	< 0.2	< 0.3	-
	Cs-137	< 0.3	< 0.2	< 0.3	< 0.3	-
	Th-228	< 0.3	< 0.4	0.40 ± 0.13	< 2	0.40 ± 0.13
DOW	Be-7	87.3 ± 5.8	126 ± 7.2	119 ± 6.7	102 ± 11	109 ± 17
	K-40	< 5	< 3	< 3	< 5	-
	Cs-134	< 0.4	< 0.3	< 0.2	< 0.3	-
	Cs-137	< 0.3	< 0.2	< 0.2	< 0.3	-
	Th-228	< 0.4	< 0.4	< 0.2	< 2	-
COL	Be-7	131 ± 8.9	134 ± 7.9	115 ± 6.8	89.4 ± 10	117 ± 20
	K-40	< 8	< 7	< 5	< 5	-
	Cs-134	< 0.5	< 0.4	< 0.2	< 0.3	-
	Cs-137	< 0.4	< 0.4	< 0.2	< 0.3	-
	Th-228	< 0.5	< 0.4	< 0.2	< 2	-

TABLE B-3

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF IODINE-131 IN WEEKLY AIR CARTRIDGE SAMPLES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL
JANUARY 2001										
01/03/01	< 10	< 10	< 10	< 10	< 30	< 10	< 20	< 20	< 20	< 20
01/10/01	< 20	< 20	< 10	< 30	< 20	< 10	< 20	< 20	< 20	< 10
01/17/01	< 6	< 9	< 9	< 9	< 9	< 5	< 10	< 10	< 10	< 10
01/24/01	< 10	< 10	< 10	< 20	< 20	< 20	< 20	< 20	< 20	< 20
01/31/01	< 30	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 20	< 30
FEBRUARY										
02/07/01	< 20	< 20	< 30	< 20	< 30	< 30	< 40	< 40	< 30	< 20
02/14/01	< 20	< 20	< 20	< 30	< 30	< 20	< 20	< 20	< 20	< 30
02/21/01	< 30	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 20	< 30
02/28/01	< 20	< 20	< 30	< 20	< 20	< 20	< 20	< 30	< 20	< 20
MARCH										
03/07/01	< 30	< 40	< 20	< 10	< 10	< 20	< 20	< 50	< 40	< 30
03/14/01	< 30	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 10	< 30
03/21/01	< 10	< 10	< 10	< 10	< 10	< 10	< 8	< 10	< 9	< 10
03/28/01	< 8	< 9	< 10	< 10	< 10	< 10	< 10	< 20	< 10	< 20
APRIL										
04/04/01	< 30	< 20	< 20	< 20	< 20	< 20	< 40	< 40	< 30	< 40
04/11/01	< 10	< 30	< 20	< 10	< 20	< 20	< 20	< 20	< 20	< 20
04/18/01	< 30	< 30	< 20	< 10	< 20	< 10	< 40	< 40	< 10	< 20
04/25/01	< 3	< 3	< 2	< 3	< 4	< 4	< 5	< 5	< 4	< 5
MAY										
05/02/01	< 10	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 30	< 30
05/09/01	< 10	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 30	< 30
05/16/01	< 20	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 30	< 30
05/23/01	< 10	< 10	< 10	< 20	< 10	< 10	< 20	< 20	< 20	< 20
05/30/01	< 20	< 3	< 10	< 20	< 20	< 20	< 30	< 30	< 30	< 30
June										
06/06/01	< 20	< 10	< 10	< 10	< 10	< 10	< 20	< 20	< 10	< 20
06/13/01	< 20	< 20	< 20	< 20	< 30	< 30	< 30	< 30	< 30	< 30
06/20/01	< 20	< 20	< 20	< 20	< 20	< 20	< 30	< 30	< 10	< 20
06/27/01	< 20	< 20	< 40	< 40	< 20	< 40	< 30	< 30	< 30	< 30

(a) Sample not received.

TABLE B-3 (cont.)

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF IODINE-131 IN WEEKLY AIR CARTRIDGE SAMPLES

Results in Units of 10^{-3} pCi/m^3 ± 2 sigma

COLLECTION DATES	ONS-1	ONS-2	ONS-3	ONS-4	ONS-5	ONS-6	NBF	SBN	DOW	COL
July										
07/04/01	< 20	< 20	< 30	< 20	< 20	< 20	< 30	< 40	< 30	< 40
07/11/01	< 50	< 30	< 40	< 20	< 30	< 30	< 30	< 40	< 20	< 50
07/18/01	(a)	< 10	< 20	< 10	< 10	< 10	< 20	< 20	< 10	< 10
07/25/01	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30
August										
08/01/01	< 40	< 40	< 40	< 40	< 60	< 60	< 50	< 50	< 50	< 50
08/08/01	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
08/15/01	< 30	< 30	< 30	< 30	< 40	< 40	< 20	< 20	< 20	< 20
08/22/01	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 20	< 30
08/29/01	< 20	< 20	< 10	< 20	< 10	< 20	< 20	< 20	< 20	< 20
September										
09/05/01	< 20	< 20	< 20	< 30	< 30	< 30	< 20	< 20	< 20	< 20
09/12/01	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
09/19/01	< 10	< 10	< 10	< 10	< 10	< 20	< 10	< 10	< 10	< 10
09/26/01	< 10	< 10	< 10	< 10	< 40	< 30	< 20	< 20	< 20	< 20
October										
10/03/01	< 10	< 10	< 9	< 10	< 10	< 10	< 20	< 20	< 20	< 20
10/10/01	< 20	< 20	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 20
10/17/01	< 30	< 30	< 30	< 20	< 20	< 20	< 20	< 20	< 20	< 30
10/24/01	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
10/31/01	< 60	< 60	< 60	< 60	< 40	< 40	< 50	< 40	< 50	< 50
November										
11/07/01	< 20	< 30	< 30	< 30	< 30	< 20	< 30	< 30	< 30	< 30
11/14/01	< 20	< 30	< 30	< 20	< 30	< 20	< 30	< 30	< 30	< 30
11/21/01	< 20	< 50	< 50	< 50	< 60	< 40	< 30	< 30	< 30	< 30
11/28/01	< 20	< 10	< 10	< 8	< 10	< 10	< 20	< 10	< 20	< 20
December										
12/05/01	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
12/12/01	< 30	< 30	< 30	< 30	< 20	< 20	< 20	< 20	< 20	< 20
12/19/01	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 30
12/26/01	< 50	< 50	< 50	< 50	< 30	< 30	< 40	< 40	< 30	< 40
01/02/02	< 20	< 20	< 20	< 30	< 30	< 30	< 20	< 20	< 20	< 20

(a) Sample not received.

TABLE B-4
INDIANA MICHIGFAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
DIRECT RADIATION MEASUREMENTS - QUARTERLY TLD RESULTS
Results in Units of mR/standard month

STATION CODES	FIRST QUARTER 12/28/00 - 03/29/01	SECOND QUARTER 03/29/01 - 06/28/01	THIRD QUARTER 06/28/01 - 09/27/01	FOURTH QUARTER 09/27/01 - 01/02/02	AVERAGE ± 2 s.d.
T-01	2.6 ± 3.5	1.3 ± 1.7	3.9 ± 1.8	3.2 ± 1.6	**2.8 ± 2.2**
T-02	3.4 ± 1.1	2.2 ± 0.7	4.0 ± 0.6	2.9 ± 2.0	**3.1 ± 1.5**
T-03	3.1 ± 0.03	1.1 ± 0.6	2.6 ± 0.5	3.3 ± 0.8	**2.5 ± 2.0**
T-04	3.8 ± 0.6	2.8 ± 3.7	3.3 ± 0.2	4.0 ± 2.4	**3.5 ± 1.1**
T-05	3.6 ± 0.2	1.9 ± 3.0	2.9 ± 0.9	3.8 ± 1.3	**3.1 ± 1.7**
T-06	3.3 ± 0.3	2.8 ± 1.1	2.6 ± 0.8	3.1 ± 0.4	**3.0 ± 0.6**
T-07	3.4 ± 0.2	2.1 ± 0.2	3.1 ± 0.1	3.2 ± 1.1	**3.0 ± 1.2**
T-08	3.1 ± 0.1	2.4 ± 0.8	2.9 ± 0.9	3.1 ± 0.1	**2.9 ± 0.7**
T-09	3.1 ± 0.2	2.6 ± 2.1	3.4 ± 0.8	3.5 ± 0.4	**3.2 ± 0.8**
T-10	3.4 ± 0.6	2.8 ± 1.9	2.9 ± 0.6	4.0 ± 1.8	**3.3 ± 1.1**
T-11	2.9 ± 0.5	1.9 ± 1.7	2.8 ± 0.2	3.6 ± 1.1	**2.8 ± 1.4**
T-12	2.8 ± 0.1	1.7 ± 0.1	3.6 ± 0.07	2.9 ± 1.1	**2.8 ± 1.6**
OFT-1	3.3 ± 0.03	2.1 ± 1.4	3.3 ± 1.3	3.8 ± 0.2	**3.1 ± 1.4**
OFT-2	2.2 ± 0.3	2.3 ± 2.1	2.9 ± 0.5	3.2 ± 0.5	**2.7 ± 1.0**
OFT-3	3.5 ± 0.1	2.3 ± 1.0	3.2 ± 0.1	3.5 ± 0.03	**3.1 ± 1.1**
OFT-4	3.5 ± 0.2	3.3 ± 0.3	3.0 ± 1.4	3.7 ± 1.2	**3.4 ± 0.6**
OFT-5	3.6 ± 0.2	1.4 ± 0.4	3.8 ± 0.7	3.2 ± 1.6	**3.0 ± 2.2**
OFT-6	3.9 ± 0.8	2.3 ± 0.5	5.9 ± 1.2	4.4 ± 0.5	**4.1 ± 3.0**
OFT-7	3.1 ± 0.3	1.7 ± 0.1	4.0 ± 0.1	3.0 ± 1.6	**3.0 ± 1.9**
OFT-8	3.2 ± 0.1	2.9 ± 0.8	4.4 ± 1.1	3.7 ± 0.3	**3.6 ± 1.3**
OFT-9	3.8 ± 0.4	4.5 ± 2.7	4.9 ± 0.5	4.1 ± 0.8	**4.3 ± 1.0**
OFT-10	3.4 ± 0.2	2.4 ± 0.8	2.9 ± 0.5	(a)	**2.9 ± 1.0**
OFT-11	4.6 ± 0.5	3.5 ± 3.8	4.1 ± 0.9	3.9 ± 0.8	**4.0 ± 0.9**
NBF	2.9 ± 0.1	1.9 ± 1.9	3.7 ± 0.3	3.7 ± 1.2	**3.1 ± 1.7**
SBN	3.6 ± 0.0	2.8 ± 2.3	5.3 ± 1.7	4.1 ± 0.1	**4.0 ± 2.1**
DOW	3.2 ± 0.4	2.0 ± 0.6	2.3 ± 0.7	3.6 ± 1.2	**2.8 ± 1.5**
COL	4.0 ± 1.3	1.0 ± 0.2	3.0 ± 1.9	3.0 ± 0.8	**2.8 ± 2.5**
Average ± 2 s.d.	**3.3 ± 0.5**	**2.3 ± 0.8**	**3.5 ± 0.9**	**3.5 ± 0.4**	**3.2 ± 0.8**

(a) TLD was missing during collection. See Appendix E.

TABLE B-5

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF IODINE, TRITIUM AND GAMMA EMITTERS* IN SURFACE WATER

Results in Units of pCi/liter ± 2 sigma

Station	Collection Date	I-131 **	K-40	Tritium
SWL-1	01/31/01	< 20	< 90	< 100
(Condenser Circ.)	02/28/01	< 250	< 60	
	03/31/01	< 50	< 80	
	04/30/01	< 5	< 50	< 100
	05/31/01	< 20	< 50	
	06/30/01	< 30	< 50	
	07/31/01	< 50	< 80	160 ± 60
	08/31/01	< 30	< 70	
	09/30/01	< 6	< 70	
	10/31/01	< 6	< 60	< 100
	11/30/01	< 20	< 120	
	12/31/01	< 10	< 50	
SWL-2	01/31/01	(a)	(a)	< 100
(South Comp)	02/28/01	(a)	(a)	
	03/31/01	< 60	< 110	
	04/30/01	< 10	< 90	< 100
	05/31/01	< 30	< 60	
	06/30/01	< 30	< 50	
	07/31/01	< 60	< 90	150 ± 50
	08/31/01	< 20	< 80	
	09/30/01	< 6	< 80	
	10/31/01	< 7	< 70	350 ± 70
	11/30/01	< 20	< 50	
	12/31/01	< 10	< 50	
SWL-3	01/31/01	(a)	(a)	< 100
(North Comp)	02/28/01	(a)	(a)	
	03/31/01	< 40	< 70	
	04/30/01	< 10	< 80	< 100
	05/31/01	< 30	< 70	
	06/30/01	< 30	< 50	
	07/31/01	< 40	< 60	120 ± 60
	08/31/01	< 20	476 ± 44	
	09/30/01	< 5	< 70	
	10/31/01	< 8	< 90	< 100
	11/30/01	< 20	< 80	
	12/31/01	< 10	< 80	

(a) Sample not collected.

* Typical LLDs are found in Table B-12.

** I-131 is not a required isotope for analysis of surface water samples.

TABLE B-6

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF TRITIUM AND GAMMA EMITTERS* IN GROUND WATER

Results in Units of pCi/liter ± 2 sigma

Station	Collection Date	K-40	Co-60	Cs-137	Th-228	Tritium
Well W-1	01/25/01	< 50	< 3	< 4	3.91 ± 3.63	< 100
	04/26/01	77.2 ± 35.8	< 4	< 4	5	< 100
	07/27/01	< 50	< 2	< 3	4	< 100
	10/25/01	< 60	< 3	< 3	14.2 ± 2.7	< 100
Well W-2	01/25/01	< 80	< 4	< 4	10.9 ± 3.5	< 100
	04/26/01	< 70	< 4	< 4	< 6	< 100
	07/27/01	< 60	< 3	< 3	< 5	< 100
	10/26/01	< 70	< 5	< 5	< 10	< 100
Well W-3	01/25/01	< 90	< 4	< 4	< 7	< 100
	04/26/01	< 130	< 5	< 5	< 6	< 100
	07/26/01	< 100	< 3	< 3	< 8	< 100
	10/25/01	< 80	< 5	< 6	< 7	< 100
Well W-4	01/29/01	< 100	< 6	< 7	14.3 ± 5.3	540 ± 90
	04/27/01	< 60	< 5	< 4	< 5	480 ± 80
	07/31/01	< 50	< 4	< 4	< 4	460 ± 80
	10/25/01	< 100	< 6	< 7	< 10	460 ± 70
Well W-5	01/29/01	369 ± 45	< 5	< 6	< 8	300 ± 110
	04/27/01	< 70	< 4	< 4	< 6	320 ± 90
	07/31/01	150 ± 36	< 2	< 3	< 6	220 ± 90
	10/26/01	< 80	< 5	< 6	< 6	350 ± 80
Well W-6	01/29/01	< 80	< 5	< 6	< 9	1700 ± 100
	04/27/01	188 ± 49	< 4	< 4	< 5	1600 ± 100
	07/31/01	69.6 ± 37.8	< 3	< 5	< 4	1000 ± 100
	10/25/01	< 60	< 4	< 5	< 4	420 ± 70
Well W-7	01/25/01	< 80	< 5	< 6	< 9	< 100
	04/26/01	274 ± 26	< 3	< 3	< 5	< 100
	07/27/01	< 50	< 2	< 2	< 3	< 100
	10/26/01	< 70	< 5	< 5	< 10	< 100

* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-6 (Cont.)

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF TRITIUM AND GAMMA EMITTERS* IN GROUND WATER

Results in Units of pCi/liter ± 2 sigma

Station	Collection Date	K-40	Co-60	Cs-137	Th-228	Tritium
Well W-8	01/25/01	< 120	< 7	< 7	< 10	< 100
	04/26/01	< 80	< 4	< 4	< 7	< 100
	07/27/01	< 60	< 2	< 2	< 4	< 100
	10/25/01	< 80	< 5	< 6	< 10	< 100
Well W-9	01/26/01	< 80	< 5	< 6	< 9	< 100
	04/26/01	< 80	< 5	< 6	< 10	< 100
	07/27/01	< 50	< 3	< 4	22.7 ± 6.5	< 100
	10/26/01	< 120	< 6	< 7	< 10	< 100
Well W-10	01/26/01	< 70	< 4	< 4	< 7	< 100
	04/26/01	< 70	< 5	< 5	< 8	< 100
	07/26/01	< 60	< 3	< 4	< 6	< 100
	10/26/01	< 70	< 5	< 5	< 5	< 100
Well W-11	01/25/01	< 110	< 7	< 8	29.1 ± 9.0	< 100
	04/26/01	< 70	< 5	< 5	< 10	< 100
	07/26/01	< 50	< 3	< 3	< 4	< 100
	10/26/01	< 70	< 5	< 6	< 10	< 100
Well W-12	01/25/01	< 90	< 6	< 6	< 9	< 100
	04/27/01	< 100	< 6	< 6	< 10	< 100
	07/27/01	< 90	< 4	< 5	< 10	< 100
	10/26/01	< 80	< 5	< 5	< 6	< 100
Well W-13	01/25/01	< 90	< 4	< 4	11.3 ± 3.6	< 100
	04/26/01	< 70	< 4	< 7	< 10	< 100
	07/27/01	< 60	< 3	< 4	< 7	< 100
	10/26/01	< 80	< 4	< 4	< 5	< 100
Well W-14	01/25/01	< 90	< 4	< 5	< 7	180 ± 80
	04/26/01	< 80	< 5	< 5	< 10	250 ± 70
	07/26/01	< 60	< 4	< 4	< 5	230 ± 70
	10/26/01	< 70	< 4	< 4	< 5	260 ± 70
Average ± 2 s.d.		**188 ± 233**			**15.2 ± 17**	**548 ± 944**

* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-7

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF GROSS BETA, IODINE, TRITIUM AND GAMMA EMITTERS* IN DRINKING WATER

Results in Units of pCi/liter ± 2 sigma

COLLECTION DATE	Gross Beta	Gamma Spec	Iodine I-131	Tritium
LTW				
01/10/01	< 4	< LLD	< 5 (a)	190 ± 70
01/24/01	3.4 ± 2.0	< LLD	< 2 (a)	190 ± 70
02/07/01	< 2	< LLD	< 1	190 ± 70
02/21/01	< 3	< LLD	< 1	190 ± 70
03/07/01	3.5 ± 1.1	< LLD	< 2 (a)	190 ± 70
03/21/01	< 3	192 ± 29 K-40	< 1	190 ± 70
04/04/01	4.5 ± 2.2	< LLD	< 0.6	160 ± 70
04/18/01	2.3 ± 0.9	< LLD	< 0.7	160 ± 70
05/02/01	3.0 ± 0.9	< LLD	< 0.8	160 ± 70
05/16/01	< 2	< LLD	< 1	160 ± 70
05/30/01	1.9 ± 0.9	< LLD	< 0.5	160 ± 70
06/13/01	2.0 ± 0.9	< LLD	< 0.5	160 ± 70
06/27/01	2.3 ± 0.9	< LLD	< 0.4	160 ± 70
07/11/01	1.7 ± 1.0	< LLD	< 0.7	92 ± 59
07/25/01	2.0 ± 0.9	< LLD	0.93 ± 0.55	92 ± 59
08/08/01	< 2	< LLD	< 0.5	92 ± 59
08/22/01	< 2	< LLD	< 1	92 ± 59
09/05/01	3.0 ± 0.8	< LLD	< 0.7	92 ± 59
09/19/01	2.1 ± 1.1	< LLD	< 0.4	92 ± 59
10/03/01	2.7 ± 0.9	< LLD	< 1	170 ± 60
10/17/01	2.5 ± 0.9	< LLD	< 0.7	170 ± 60
10/31/01	2.7 ± 0.9	< LLD	< 1	170 ± 60
11/14/01	2.0 ± 0.9	< LLD	< 0.3	170 ± 60
11/28/01	3.2 ± 0.9	< LLD	< 0.4	170 ± 60
12/12/01	2.1 ± 0.9	< LLD	< 1	170 ± 60
12/26/01	2.4 ± 0.9	< LLD	< 1	170 ± 60
Average ± 2 s.d.	**2.6 ± 1.4**	**192 ± 29 K-40**	**0.93 ± 0.55**	**153 ± 85**

(a) Due to delay in analysis and interfering radioactivity, LLDs were not met.

* Typical LLDs are found in Table B-12.

TABLE B-7 (Cont.)

INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT

CONCENTRATIONS OF GROSS BETA, IODINE, TRITIUM AND GAMMA EMITTERS* IN DRINKING WATER

Results in Units of pCi/liter ± 2 sigma

COLLECTION DATE	Gross Beta	Gamma Spec	Iodine I-131	Tritium
STJ				
01/10/01	< 4	< LLD	< 5 (a)	180 ± 70
01/24/01	< 3	< LLD	< 2 (a)	180 ± 70
02/07/01	2.4 ± 1.1	< LLD	< 1	180 ± 70
02/21/01	4.0 ± 2.1	< LLD	< 1	180 ± 70
03/07/01	2.8 ± 1.2	< LLD	< 1	180 ± 70
03/21/01	3.6 ± 2.1	< LLD	< 1	180 ± 70
04/04/01	3.4 ± 2.2	< LLD	< 0.5	140 ± 70
04/18/01	2.4 ± 1.0	< LLD	0.96 ± 0.32	140 ± 70
05/02/01	2.5 ± 0.9	< LLD	< 0.7	140 ± 70
05/16/01	2.1 ± 1.1	< LLD	< 1	140 ± 70
05/30/01	2.9 ± 1.0	< LLD	< 0.9	140 ± 70
06/13/01	2.3 ± 0.9	< LLD	< 0.4	140 ± 70
06/27/01	2.5 ± 0.9	< LLD	< 0.4	140 ± 70
07/11/01	2.4 ± 1.0	< LLD	< 0.8	93 ± 57
07/25/01	3.4 ± 1.0	< LLD	< 1	93 ± 57
08/08/01	3.5 ± 1.3	375 ± 37 K-40	< 0.5	93 ± 57
08/22/01	2.9 ± 1.1	< LLD	< 1	93 ± 57
09/05/01	2.9 ± 0.9	< LLD	< 0.7	93 ± 57
09/19/01	2.5 ± 1.1	< LLD	< 0.4	93 ± 57
10/03/01	3.1 ± 0.9	< LLD	< 1	140 ± 60
10/17/01	3.3 ± 0.9	< LLD	< 0.8	140 ± 60
10/31/01	2.4 ± 0.9	< LLD	< 0.5	140 ± 60
11/14/01	2.7 ± 0.9	< LLD	< 0.3	140 ± 60
11/28/01	2.7 ± 0.9	< LLD	< 0.7	140 ± 60
12/12/01	2.5 ± 0.9	< LLD	< 0.6	140 ± 60
12/26/01	2.8 ± 0.9	< LLD	< 1	140 ± 60
Average ± 2 s.d.	**2.8 ± 1.0**	**375 ± 37 K-40**	**0.96 ± 0.32**	**138 ± 71**

(a) Due to delay in analysis and interfering radioactivity, LLDs were not met.

* Typical LLDs are found in Table B-12.

TABLE B-8
INDIANA MICHIGAN COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GAMMA EMITTERS* IN SEDIMENT
Results in Units of pCi/kg (dry) ± 2 sigma

Station	Collection Date	Be-7	K-40	Cs-137	Ra-226	Th-228
SL-2	04/12/01	< 100	7960 ± 325	< 10	< 200	94.0 ± 7.9
SL-3	04/12/01	< 100	7190 ± 257	< 20	< 300	88.1 ± 6.8
SL-2	10/11/01	< 200	7260 ± 374	< 20	< 400	82.7 ± 10.3
SL-3	10/11/01	< 100	7650 ± 301	< 20	< 500	94.5 ± 8.6
Average ± 2 s.d.			**7515 ± 718**			**89.8 ± 11.1**

* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-9
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF IODINE AND GAMMA* EMITTERS IN MILK
Results in Units of pCi/liter ± 2 sigma

		STATION CODES				
COLLECTION DATES	**Station**	**Be-7**	**K-40**	**I-131**	**Cs-137**	**Ba-140**
01/03/01	Glen Troy Farm	< 40	1400 ± 79	< 3 (a)	< 4	< 40
	Monroe Rsid	< 50	1700 ± 94	< 4 (a)	< 5	< 40
	Shuler Farm	< 50	1410 ± 92	< 4 (a)	< 5	< 40
	Living House Farm	< 40	1370 ± 73	< 4 (a)	< 3	< 30
	Wyant Farm	< 40	1280 ± 82	< 6 (a)	< 4	< 40
01/17/01	Glen Troy Farm	< 50	1300 ± 84	< 0.8	< 6	< 30
	Monroe Rsid	< 60	1490 ± 92	< 0.7	< 7	< 30
	Shuler Farm	< 40	1430 ± 81	< 0.6	< 5	< 20
	Living House Farm	< 50	1270 ± 85	< 0.8	< 7	< 30
	Wyant Farm	< 50	1250 ± 77	< 0.6	< 6	< 30
01/31/01	Glen Troy Farm	< 30	1470 ± 86	< 0.6	< 4	< 20
	Monroe Rsid	< 30	1600 ± 92	< 0.6	< 4	< 20
	Shuler Farm	< 50	1510 ± 121	< 0.6	< 6	< 30
	Living House Farm	< 30	1280 ± 76	< 0.9	< 4	< 20
	Wyant Farm	< 40	1310 ± 83	< 0.5	< 4	< 20
02/14/01	Glen Troy Farm	< 50	1640 ± 79	< 0.3	< 6	< 30
	Monroe Rsid	< 50	1520 ± 83	< 0.3	< 6	< 30
	Shuler Farm	< 60	1250 ± 93	< 0.4	< 7	< 40
	Living House Farm	< 40	1470 ± 86	< 0.4	< 4	< 20
	Wyant Farm	< 40	1200 ± 83	< 0.4	< 4	< 20
02/28/01	Glen Troy Farm	< 30	1370 ± 85	< 0.3	< 4	< 20
	Monroe Rsid	< 30	1660 ± 97	< 0.2	< 5	< 20
	Shuler Farm	< 50	1420 ± 124	< 0.2	< 6	< 20
	Living House Farm	< 30	1420 ± 84	< 0.3	< 6	< 20
	Wyant Farm	< 40	1310 ± 85	< 0.3	< 4	< 20
03/14/01	Glen Troy Farm	< 30	1300 ± 83	< 0.3	< 4	< 20
	Monroe Rsid	< 30	1700 ± 92	< 0.4	< 4	< 20
	Shuler Farm	< 50	1470 ± 118	< 0.6	< 6	< 30
	Living House Farm	< 30	1290 ± 77	< 0.3	< 4	< 20
	Wyant Farm	< 40	1250 ± 80	< 0.3	< 4	< 20
03/28/01	Glen Troy Farm	< 50	1240 ± 77	< 0.4	< 6	< 30
	Monroe Rsid	< 30	922 ± 52	< 0.5	< 4	< 20
	Shuler Farm	< 50	1200 ± 79	< 0.6	< 6	< 30
	Living House Farm	< 60	1260 ± 97	< 0.3	< 7	< 30
	Wyant Farm	< 40	1260 ± 71	< 0.3	< 7	< 20

(a) Due to delay in counting, the LLD was missed. See Appendix E.
* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-9 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF IODINE AND GAMMA* EMITTERS IN MILK
Results in Units of pCi/liter ± 2 sigma

COLLECTION DATES	STATION CODES Station	Be-7	K-40	I-131	Cs-137	Ba-140
04/11/01	Glen Troy Farm	< 50	1230 ± 77	< 0.3	< 6	< 20
	Monroe Rsid	< 40	1430 ± 83	< 0.4	< 5	< 8
	Shuler Farm	< 60	1210 ± 97	< 0.3	< 7	< 30
	Living House Farm	< 40	1320 ± 75	< 0.3	< 6	< 20
	Wyant Farm	< 50	1250 ± 81	< 0.4	< 6	< 20
04/25/01	Glen Troy Farm	< 40	1350 ± 82	< 0.6	4.50 ± 1.77	< 20
	Monroe Rsid	< 30	1600 ± 92	< 0.3	< 4	< 20
	Shuler Farm	< 50	1240 ± 110	< 0.3	< 6	< 30
	Living House Farm	< 30	1300 ± 76	< 0.4	< 5	< 20
	Wyant Farm	< 40	1380 ± 82	< 0.3	< 4	< 20
05/09/01	Glen Troy Farm	< 40	1370 ± 70	< 0.4	< 5	< 20
	Monroe Rsid	< 50	1560 ± 85	< 0.6	< 6	< 30
	Shuler Farm	< 50	1270 ± 80	< 0.3	< 6	< 30
	Living House Farm	< 30	1370 ± 79	< 0.3	< 5	< 20
	Wyant Farm	< 30	1260 ± 78	< 0.3	< 4	< 20
05/23/01	Glen Troy Farm	< 30	1310 ± 78	< 0.2	< 4	< 20
	Monroe Rsid	< 30	1620 ± 90	< 0.4	< 4	< 20
	Shuler Farm	< 50	1290 ± 106	< 0.3	< 6	< 30
	Living House Farm	< 30	1340 ± 76	< 0.3	< 5	< 20
	Wyant Farm	< 30	1450 ± 81	< 0.2	< 4	< 20
06/06/01	Glen Troy Farm	< 70	1230 ± 101	< 0.4	< 8	< 40
	Monroe Rsid	< 50	1710 ± 86	< 0.3	< 6	< 30
	Shuler Farm	< 50	1220 ± 81	< 0.3	< 6	< 30
	Living House Farm	< 50	1430 ± 88	< 0.2	< 6	< 30
	Wyant Farm	< 50	1310 ± 80	< 0.3	< 6	< 30
06/20/01	Glen Troy Farm	< 50	1230 ± 81	< 0.2	< 6	< 30
	Monroe Rsid	< 60	1570 ± 95	< 0.4	< 7	< 30
	Shuler Farm	< 50	1320 ± 77	< 0.3	< 6	< 20
	Living House Farm	< 50	1270 ± 77	< 0.3	< 5	< 30
	Wyant Farm	< 30	1280 ± 68	< 0.3	< 2	< 10
07/04/01	Glen Troy Farm	< 30	1420 ± 85	< 0.3	< 4	< 20
	Monroe Rsid	< 30	1440 ± 88	< 0.4	< 4	< 20
	Shuler Farm	< 30	1180 ± 72	< 0.4	< 6	< 20
	Living House Farm	< 40	1340 ± 90	< 0.4	< 6	< 20
	Wyant Farm	< 30	1280 ± 73	< 0.3	< 3	< 20

(a) Due to delay in counting, the LLD was missed. See Appendix E.
* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-9 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF IODINE AND GAMMA* EMITTERS IN MILK
Results in Units of pCi/liter ± 2 sigma

COLLECTION DATES	STATION CODES Station	Be-7	K-40	I-131	Cs-137	Ba-140
07/18/01	Glen Troy Farm	< 40	1230 ± 74	< 0.4	< 5	< 20
	Monroe Rsid	< 50	1510 ± 85	< 0.2	< 6	< 20
	Shuler Farm	< 50	1210 ± 81	< 0.3	< 6	< 20
	Living House Farm	< 60	1320 ± 98	< 0.4	< 8	< 30
	Wyant Farm	< 50	1260 ± 76	< 0.4	< 7	< 20
08/01/01	Glen Troy Farm	< 30	1340 ± 78	< 0.3	< 5	< 20
	Monroe Rsid	< 40	1670 ± 91	< 0.4	< 4	< 20
	Shuler Farm	< 40	1250 ± 89	< 0.3	< 6	< 20
	Living House Farm	< 30	1350 ± 69	< 0.3	< 3	< 20
	Wyant Farm	< 30	1320 ± 81	< 0.3	< 4	< 20
08/15/01	Glen Troy Farm	< 50	1300 ± 77	< 0.4	< 6	< 30
	Monroe Rsid	< 50	1500 ± 83	< 0.4	< 6	< 30
	Shuler Farm	< 40	1280 ± 78	< 0.4	< 6	< 30
	Living House Farm	< 50	1270 ± 74	< 0.4	< 7	< 30
	Wyant Farm	< 50	1350 ± 77	< 0.4	< 6	< 30
08/29/01	Glen Troy Farm	< 40	1430 ± 74	< 0.4	< 5	< 20
	Monroe Rsid	< 50	1910 ± 97	< 0.4	< 6	< 30
	Shuler Farm	< 50	1220 ± 76	< 0.4	< 6	< 30
	Living House Farm	< 60	1340 ± 99	< 0.3	< 8	< 40
	Wyant Farm	< 50	1200 ± 73	< 0.5	< 7	< 20
09/12/01	Glen Troy Farm	< 40	1350 ± 73	< 0.2	< 5	< 20
	Monroe Rsid	< 40	1650 ± 81	< 0.3	< 5	< 20
	Shuler Farm	< 60	1090 ± 84	< 0.2	< 7	< 30
	Living House Farm	< 40	1330 ± 67	< 0.2	< 5	< 20
	Wyant Farm	< 40	1190 ± 69	< 0.2	< 5	< 20
09/26/01	Glen Troy Farm	< 30	1320 ± 79	< 0.4	< 3	< 20
	Monroe Rsid	< 30	1640 ± 91	< 0.4	< 5	< 20
	Shuler Farm	< 50	1360 ± 112	< 0.4	< 6	< 30
	Living House Farm	< 30	1290 ± 73	< 0.4	< 4	< 20
	Wyant Farm	< 40	1190 ± 75	< 0.4	< 4	< 20
10/10/01	Glen Troy Farm	< 30	1320 ± 78	< 0.3	< 4	< 20
	Monroe Rsid	< 50	1880 ± 122	< 0.3	< 6	< 30
	Shuler Farm	< 30	1390 ± 77	< 0.4	< 4	< 20
	Living House Farm	< 40	1300 ± 77	< 0.4	< 4	< 20
	Wyant Farm	< 40	1280 ± 89	< 0.3	< 6	< 20

(a) Due to delay in counting, the LLD was missed. See Appendix E.
* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-9 (Cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF IODINE AND GAMMA* EMITTERS IN MILK
Results in Units of pCi/liter ± 2 sigma

COLLECTION DATES	STATION CODES Station	Be-7	K-40	I-131	Cs-137	Ba-140
10/24/01	Glen Troy Farm	< 20	1460 ± 55	< 0.4	< 3	< 10
	Monroe Rsid	< 30	1770 ± 64	< 0.6	< 3	< 20
	Shuler Farm	< 30	1340 ± 55	< 0.6	< 3	< 20
	Living House Farm	< 40	1330 ± 66	< 0.5	< 4	< 20
	Wyant Farm	< 30	1300 ± 52	< 0.5	< 5	< 20
11/07/01	Glen Troy Farm	< 40	1320 ± 81	< 0.2	< 4	< 20
	Monroe Rsid	< 50	2000 ± 125	< 0.2	< 6	< 20
	Shuler Farm	< 30	1370 ± 75	< 0.3	< 4	< 20
	Living House Farm	< 40	1310 ± 77	< 0.3	< 5	< 20
	Wyant Farm	< 40	1360 ± 90	< 0.3	< 5	< 20
11/21/01	Glen Troy Farm	< 30	1300 ± 60	< 1	< 5	< 20
	Monroe Rsid	< 20	985 ± 44.9	< 1	< 3	< 10
	Shuler Farm	< 40	1310 ± 72	< 1	< 5	< 20
	Living House Farm	< 40	1290 ± 66	< 0.9	< 4	< 20
	Wyant Farm	< 20	1280 ± 63	< 1	< 4	< 10
12/05/01	Glen Troy Farm	< 60	1210 ± 88	< 0.3	< 7	< 30
	Monroe Rsid	< 50	1720 ± 81	< 0.2	< 6	< 30
	Shuler Farm	< 40	1320 ± 81	< 0.2	< 4	< 20
	Living House Farm	< 50	1450 ± 104	< 0.2	< 5	< 30
	Wyant Farm	< 30	1330 ± 71	< 0.2	< 4	< 20
12/19/01	Glen Troy Farm	< 50	1320 ± 76	< 0.6	< 6	< 30
	Monroe Rsid	< 50	1950 ± 91	< 0.3	< 7	< 30
	Shuler Farm	< 50	1250 ± 103	< 1	< 5	< 30
	Living House Farm	< 30	1310 ± 71	< 0.4	< 3	< 20
	Wyant Farm	< 40	1300 ± 76	< 0.4	< 4	< 20
	Average ± 2 s.d.		**1372 ± 349**			

(a) Due to delay in counting, the LLD was missed. See Appendix E.
* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-10
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GAMMA EMITTERS* IN FOOD/VEGETATION
Results in Units of pCi/kg (wet) ± 2 sigma

COLLECTION DATE	Station	Description	Be-7	K-40	I-131	Cs-137
09/12/2001	Sector-J	Grapes	115 ± 39	5300 ± 239	< 10	< 8
09/12/2001	Sector-D	Grapes	109 ± 20	2290 ± 114	< 8	< 5
09/12/2001	Sector-J	Broadleaf	1040 ± 79	4000 ± 224	< 20	< 10
09/12/2001	Sector-D	Broadleaf	7240 ± 367	5240 ± 332	< 30	< 20
09/19/2001	ONS-V	Broadleaf	2800 ± 189	4490 ± 339	< 40	< 20
Average ± 2 s.d.			**2261 ± 5984**	**4264 ± 2458**		

* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-11
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
CONCENTRATIONS OF GAMMA EMITTERS* IN FISH
Results in Units of pCi/kg (wet) ± 2 sigma

Collection Date	Station	Description	Be-7	K-40	Co-60	Cs-137	Ra-226	Th-228
06/08/2001	OFS-N	Lake Michigan	< 60	2900 ± 119	< 6	32.3 ± 3.25	< 100	< 10
06/08/2001	ONS-N	Lake Michigan	< 80	2680 ± 188	< 8	13.5 ± 2.73	< 100	< 10
06/08/2001	ONS-S	Lake Michigan	< 100	2880 ± 144	< 9	11.7 ± 3.14	< 200	< 10
06/08/2001	OFS-S	Lake Michigan	< 80	2390 ± 122	< 7	< 8	< 100	< 10
10/02/2001	OFS-N	Lake Michigan	< 100	3920 ± 254	< 20	< 20	< 400	< 20
10/02/2001	ONS-N	Lake Michigan	< 100	2880 ± 276	< 20	37.6 ± 7.39	< 500	< 20
10/02/2001	ONS-S	Lake Michigan	< 100	3130 ± 266	< 10	< 20	< 500	< 20
10/02/2001	OFS-S	Lake Michigan	< 100	3370 ± 262	< 20	55 ± 9.81	< 500	< 20
Average ± 2 s.d.				**3019 ± 929**		**30.0 ± 36.0**		

* Typical LLDs are found in Table B-12. All other gamma emitters were <LLD.

TABLE B-12
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
GAMMA SPECTROMETRY LOWER LIMITS OF DETECTION AND REPORTING LEVELS

Isotope	TI LLD	ODCM LLD	Rept Level	TI LLD	ODCM LLD	Rept Level
		Vegetation - pCi/kg-wet			Water - pCi/liter	
Cerium-144	60	N/A	N/A	30	N/A	N/A
Barium/La-140	10	N/A	N/A	50/10	60/15	200
Cesium-134	10	60	1000	7	15	30
Ru,Rh-106	80	N/A	N/A	50	N/A	N/A
Cesium-137	10	60	2000	6	18	50
Zr,Nb-95	10	N/A	N/A	10/15	30/15	400
Manganese-54	10	N/A	N/A	5	15	1000
Iron-59	15	N/A	N/A	15	30	400
Zinc-65	20	N/A	N/A	10	30	300
Colbalt-60	10	N/A	N/A	5	15	300
Cobalt-58	10	N/A	N/A	5	15	1000
Iodine-131	20	60	100	10	1	2
Iodine-131 (a)				1	1	
		Milk - pCi/liter			Air Filter - pCi/m^3	
Cerium-144	30	N/A	N/A	0.007	N/A	N/A
Barium/La-140	50/10	60/15	300	0.005	N/A	N/A
Cesium-134	7	15	60	0.002	0.06	10
Ru,Rh-106	50	N/A	N/A	0.010	N/A	N/A
Cesium-137	6	18	70	0.002	0.06	20
Zr,Nb-95	20	N/A	N/A	0.002	N/A	N/A
Manganese-54	5	N/A	N/A	0.002	N/A	N/A
Iron-59	15	N/A	N/A	0.002	N/A	N/A
Zinc-65	10	N/A	N/A	0.002	N/A	N/A
Colbalt-60	5	N/A	N/A	0.002	N/A	N/A
Cobalt-58	5	N/A	N/A	0.002	N/A	N/A
Iodine-131	10	1	3	0.040	0.07	0.9
Iodine-131 (a)	1	1				

(a) Analysis by radiochemistry and based on the assumptions in Procedure PRO-032-11.
(b) Based on the assumptions in PRO-042-5.

TABLE B-12 (cont.)
INDIANA MICHIGAN POWER COMPANY - DONALD C. COOK NUCLEAR PLANT
GAMMA SPECTROMETRY LOWER LIMITS OF DETECTION AND REPORTING LEVELS

Isotope	TI LLD	ODCM LLD	Rept Level	TI LLD	ODCM LLD	Rept Level
		Fish-pCi/kg - wet (b)			Sediment/Soil - pCi/kg-dry	
Cerium-144	200	N/A	N/A	150	N/A	N/A
Barium/La-140	200	N/A	N/A	5	N/A	N/A
Cesium-134	20	130	1000	30	150	N/A
Ru,Rh-106	200	N/A	N/A	200	N/A	N/A
Cesium-137	20	150	2000	30	180	N/A
Zr,Nb-95	40	N/A	N/A	40	N/A	N/A
Manganese-54	20	130	30000	9	N/A	N/A
Iron-59	40	260	10000	50	N/A	N/A
Zinc-65	40	260	20000	60	N/A	N/A
Colbalt-60	20	130	10000	20	N/A	N/A
Cobalt-58	20	130	30000	20	N/A	N/A
Iodine-131	100	N/A	N/A	30	N/A	N/A

Gross Beta/Tritium LLDs and Reporting Levels

		Gross Beta	
Air Particulates	0.01 pCi/m^3	0.01 pCi/m^3	N/A
Drinking Water	2.0 pCi/L	4.0 pCi/L	N/A
		Tritium - pCi/L	
Surface Water	200	2000	20000
Ground Water	200	2000	20000
Drinking Water	200	2000	20000

(a) Analysis by radiochemistry and based on the assumptions in Procedure PRO-032-11.
(b) Based on the assumptions in PRO-042-5.

APPENDIX C
ANALYTICAL PROCEDURES SYNOPSIS

ANALYTICAL PROCEDURES SYNOPSIS

Appendix C is a synopsis of the analytical procedures performed during 2001 on samples collected for the Donald C. Cook Nuclear Plant's Radiological Environmental Monitoring Program. All analyses have been mutually agreed upon by American Electric Power and Teledyne Brown Engineering and include those recommended by the USNRC Branch Technical Position, Rev. 1, November 1979.

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GROSS BETA ANALYSIS OF SAMPLES

Air Particulates

After a delay of five or more days, allowing for the radon-222 and radon-220 (thoron) daughter products to decay, the filters are counted in a gas-flow proportional counter. An unused air particulate filter, supplied by the customer, is counted as the blank.

Calculations of the results, the two sigma error and the lower limit of detection (LLD):

RESULT (pCi/m^3) = $((S/T) - (B/t))/(2.22\ V\ E)$

TWO SIGMA ERROR (pCi/m^3) = $2((S/T^2) + (B/t^2))^{1/2}/(2.22\ V\ E)$

LLD (pCi/m^3) = $4.66\ (B^{1/2})/(2.22\ V\ E\ t)$

where:

S	=	Gross counts of sample including blank
B	=	Counts of blank
E	=	Counting efficiency
T	=	Number of minutes sample was counted
t	=	Number of minutes blank was counted
V	=	Sample aliquot size (cubic meters)

DETERMINATION OF GROSS BETA ACTIVITY IN WATER SAMPLES

Introduction

The procedures described in this section are used to measure the overall radioactivity of water samples without identifying the radioactive species present. No chemical separation techniques are involved.

One liter of the sample is evaporated on a hot plate. A smaller volume may be used if the sample has a significant salt content as measured by a conductivity meter.

After evaporating to a small volume in a beaker, the sample is rinsed into a 2-inch diameter stainless steel planchette which is stamped with a concentric ring pattern to distribute residue evenly. Final evaporation to dryness takes place under heat lamps.

Residue mass is determined by weighing the planchette before and after mounting the sample. The planchette is counted for beta activity on an automatic proportional counter. Results are calculated using empirical self-absorption curves which allow for the change in effective counting efficiency caused by the residue mass.

Detection Capability

Detection capability depends upon the sample volume actually represented on the planchette, the background and the efficiency of the counting instrument, and upon self-absorption of beta particles by the mounted sample. Because the radioactive species are not identified, no decay corrections are made and the reported activity refers to the counting time.

The minimum detectable level (MDL) for water samples is nominally 1.6 picoCuries per liter for gross beta at the 4.66 sigma level (1.0 pCi/l at the 2.83 sigma level), assuming that 1 liter of sample is used and that ½ gram of sample residue is mounted on the planchette. These figures are based upon a counting time of 50 minutes and upon representative values of counting efficiency and background of 0.2 and 1.2 cpm, respectively.

The MDL becomes significantly lower as the mount weight decreases because of reduced self-absorption. At a zero mount weight, the 4.66 sigma MDL for gross beta is 0.9 picoCuries per liter. These values reflect a beta counting efficiency of 0.38.

ANALYSIS OF SAMPLES FOR TRITIUM

(Liquid Scintillation)

Water

Ten milliliters of water are mixed with 10 ml of a liquid scintillation "cocktail" and then the mixture is counted in an automatic liquid scintillator.

Calculation of the results, the two sigma error and the lower limit detection (LLD) in pCi/l:

RESULT = $(N-B)/(2.22\ V\ E)$

TWO SIGMA ERROR = $2((N + B)/\Delta t)^{1/2}/(2.22\ V\ E)$

LLD = $4.66\ (B/\Delta t)^{1/2}/(2.22\ V\ E)$

where:

N	=	the gross cpm of the sample
B	=	the background of the detector in cpm
2.22	=	conversion factor changing dpm to pCi
V	=	volume of the sample in ml
E	=	efficiency of the detector
Δt	=	counting time for the sample

ANALYSIS OF SAMPLES FOR IODINE-131

Milk or Water

Two liters of sample are first equilibrated with stable iodide carrier. A batch treatment with anion exchange resin is used to remove iodine from the sample. The iodine is then stripped from the resin with sodium hypochlorite solution, is reduced with hydroxylamine hydrochloride and is extracted into carbon tetrachloride as free iodine. It is then back-extracted as iodide into sodium bisulfite solution and is precipitated as palladium iodide. The sodium bisulfite solution and is precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchette for low level beta counting. The chemical yield is corrected by measuring the stable iodide content of the milk or the water with a specific ion electrode.

Calculations of results, two sigma error and the lower limit of detection (LLD) in pCi/l:

RESULT		=	$(N/\Delta t - B)/(2.22\ E\ V\ Y\ DF)$
TWO SIGMA ERROR		=	$2((N/\Delta t + B)/\Delta t)^{1/2}/(2.22\ E\ V\ Y\ DF)$
LLD		=	$4.66(B/\Delta t)^{1/2}/(2.22\ E\ V\ Y\ DF)$
where:	N	=	total counts from sample (counts)
	Δt	=	counting time for sample (min)
	B	=	background rate of counter (cpm)
	2.22	=	dpm/pCi
	V	=	volume or weight of sample analyzed
	Y	=	chemical yield of the mount or sample counted
	DF	=	decay factor from the collection to the counting date
	E	=	efficiency of the counter for I-131, corrected for self absorption effects by the formula
	E	=	$E_s(\exp -0.0061M)/(\exp -0.0061Ms)$
	E_s	=	efficiency of the counter determined from an I-131 standard mount
	Ms	=	mass of Pd12 on the standard mount, mg
	M	=	mass of PDI2 on the sample mount, mg

GAMMA SPECTROMETRY OF SAMPLES

Milk and Water

A 1.0 liter Marinelli beaker is filled with a representative aliquot of the sample. The sample is then counted for approximately 1000 minutes with a shielded high purity germanium (HPGe) detector coupled to a personal computer (PC)-based data acquisition system which performs pulse height analysis.

Dried Solids Other Than Soils and Sediments

A large quantity of the sample is dried at a low temperature, less than 100°C. As much as possible (up to the total sample) is loaded into a tared 1-liter Marinelli and weighed. The sample is then counted for approximately 1000 minutes with a shielded HPGe detector coupled to a PC-based data acquisition system which performs pulse height analysis.

Fish

As much as possible (up to the total sample) of the edible portion of the sample is loaded into a tared Marinelli and weighed. The sample is then counted for approximately 1000 minutes with a shielded HPGe detector coupled to a PC-based data acquisition system which performs pulse height analysis.

Soils and Sediments

Soils and sediments are dried at a low temperature, less than 100°C. The soil or sediment is loaded fully into a tared, standard 300 cc container and weighed. The sample is then counted for approximately six hours with a shielded HPGe detector coupled to a PC-based data acquisition system which performs pulse height and analysis.

Charcoal Cartridges (Air Iodine)

Charcoal cartridges are counted up to five at a time, with one positioned on the face of a HPGe detector and up to four on the side of the HPGe detector. Each HPGe detector is calibrated for both positions. The detection limit for I-131 of each charcoal cartridge can be determined (assuming no positive I-131) uniquely from the volume of air which passed through it. In the event I-131 is observed in the initial counting of a set, each charcoal cartridge is then counted separately, positioned on the face of the detector.

Air Particulate

The thirteen airborne particulate filters for a quarterly composite for each field station are aligned one in front of another and then counted for at least six hours with a shielded HPGe detector coupled to a PC-based data acquisition system which performs pulse height analysis.

A PC software program defines peaks by certain changes in the slope of the spectrum. The program also compares the energy of each peak with a library of peaks for isotope identification and then performs the radioactivity calculation using the appropriate fractional gamma ray abundance, half-life, detector efficiency, and net counts in the peak region. The calculation of results, two sigma error and the lower limit of detection (LLD) in pCi/volume of pCi/mass:

RESULT		=	(S-B)/(2.22 t E V F DF)
TWO SIGMA ERROR		=	$2(S+B)^{1/2}/(2.22\ t\ E\ V\ F\ DF)$
LLD		=	$4.66(B)^{1/2}/(2.22\ t\ E\ V\ F\ DF)$
where:	S	=	Area, in counts, of sample peak and background (region of spectrum of interest)
	B	=	Background area, in counts, under sample peak, determined by a linear interpolation of the representative backgrounds on either side of the peak
	t	=	length of time in minutes the sample was counted
	2.22	=	dpm/pCi
	E	=	detector efficiency for energy of interest and geometry of sample
	V	=	sample aliquot size (liters, cubic meters, kilograms, or grams)
	F	=	fractional gamma abundance (specific for each emitted gamma)
	DF	=	decay factor from the mid-collection date to the counting date

Environmental Dosimetry

Teledyne Brown Engineering out-sources its environmental Dosimetry services to Proxtronics Dosimetry LLC, a Wholly Owned Subsidiary of Proxtronics, Inc.

Proxtronics uses a thermoluminescent dosimeter (TLD) manufactured by Panasonic, Inc. Panasonic identifies it as an UD-814 TLD. The TLD has four elements, numbered 1-4. Elements and their filtration are composed of:

ELEMENT	MATERIAL	FILTRATION
1	$^{n}Li_2{}^{n}B_4O_7$-Cu	Thin plastic
2	$CaSo_4$-Tm	Plastic
3	$CaSo_4$-Tm/Pb	Lead
4	$CaSo_4$-Tm/Pb	Lead

This material has a high light output, negligible thermally induced signal loss (fading) and negligible self-dosing. The energy response curve (as well as other features) satisfies NRC Regulatory Guide 4.13. Transit doses are accounted for by use of separate TLDs.

Prior to being sent to Teledyne brown, the Proxtronics badges are exposed to Cs-137, to a known dose and read in the Panasonic UD-710ARreader, with reference badges to establish an element response level for each badge. Badges are then re-annealed for assignment and distribution to Teledyne Brown.

Following the field exposure the badges are returned to Proxtronics for processing in a Panasonic UD-710 Reader. Each element is heated and the measured light emission is recorded. The transit controls are read in the same manner.

Transit Controls are calculated using the following equation:

$$\text{TRANSDOSE} = \left[\frac{(E3_1 + E4_1 + E3_2 + E4_2)}{4}\right] - \left[\frac{(E3_{trans} + Ee4_{trans})}{2}\right]$$

All dose is reported as "mR/standard month" using the following equation to calculate:

Net Exposure ÷ 90 Days X 30.44 Days + $^{\text{Net Exposure}}/_{\text{Standard Month}}$

APPENDIX D

SUMMARY OF INTERLABORATORY COMPARISONS

EPA Interlaboratory Comparison Program

The US Environmental Protection Agency (EPA) discontinued their Interlaboratory Comparison Program in December 1998. However, on May 1, 2001, accreditation was granted to Environmental Resource Associates' RadCheM Proficiency Testing Program to complete the process of replacing the USEPA EMSL-LV Nuclear Radiation Assessment Division program.

Teledyne Brown Engineering participates in the Analytics, Inc. and Environmental Resource Associates (ERA) programs to the fullest extent possible. That is, we participate in the program for all radioactive isotopes prepared and at the maximum frequency of availability.

The National Institute of Standards and Technology (NIST) is the approval authority for laboratory providers participating in Intercomparison Study Programs, however, at this time, there are no approved laboratories for environmental and/or radiochemical isotope analyses.

All DOE/EML total uranium analyzed in air filter, water, and soil failed their criteria. The total uranium results were reported in incorrect units. When converted to the correct units, the results were in agreement and acceptable.

Trending graphs are provided in this section for Analytics and ERA when there were at least two data points to plot.

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE QC SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value	Known Value	Ratio TBE/Analytics	Evaluation
March, 2001	E2584-93	Milk	I-131	pCi/L	75	77	0.97	A
			Ce-141		166	162	1.03	A
			Cr-51		433	418	1.04	A
			Cs-134		212	223	0.95	A
			Cs-137		165	176	0.94	A
			Co-58		81	82	0.99	A
			Mn-54		172	175	0.98	A
			Fe-59		151	146	1.03	A
			Zn-65		314	322	0.98	A
			Co-60		254	254	1	A
June, 2001	2707	Charcoal	I-131	pCi	104.5	81	1.29	W
	2708	Charcoal	I-131	pCi	84.8	72	1.18	A
	2709	Charcoal	I-131	pCi	99.6	92	1.08	A
August, 2001	E2755-396	Milk	Mn-54	pCi/L	131	124	1.06	A
			Co-58	pCi/L	68	68	1.00	A
			Fe-59	pCi/L	53	50	1.06	A
			Co-60	pCi/L	134	132	1.02	A
			Zn-65	pCi/L	172	162	1.06	A
			I-131	pCi/L	76	86	0.88	A
			Cs-134	pCi/L	141	128	1.10	A
			Cs-137	pCi/L	126	120	1.05	A
			Ce-141	pCi/L	72	76	0.95	A
August, 2001	E2757-396	AP Filter	Ce-141	pCi	79	74	1.07	A
			Cr-51	pCi	100	90	1.11	A
			Cs-34	pCi	109	125	0.87	A
			Cs-137	pCi	140	116	1.21	W
			Co-58	pCi	72	66	1.09	A
			Mn-54	pCi	161	134	1.20	A
			Fe-59	pCi	51	49	1.04	A
			Zn-65	pCi	200	158	1.27	W
			Co-60	pCi	148	128	1.16	A
August, 2001	E2756A-396	Charcoal	I-131	pCi	87	93	0.94	A
September, 2001	A14734-148	Liquid	Sr-89	Total uCi	1.30E-03	1.55E-03	0.84	A
			Sr-90	Total uCi	1.00E-04	1.12E-04	0.89	A
September, 2001	A14735-148	Gas	Xe-133	Total uCi	0.606	0.585	1.04	A
			Kr-85	Total uCi	8.53	8.42	1.01	A

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE QC SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

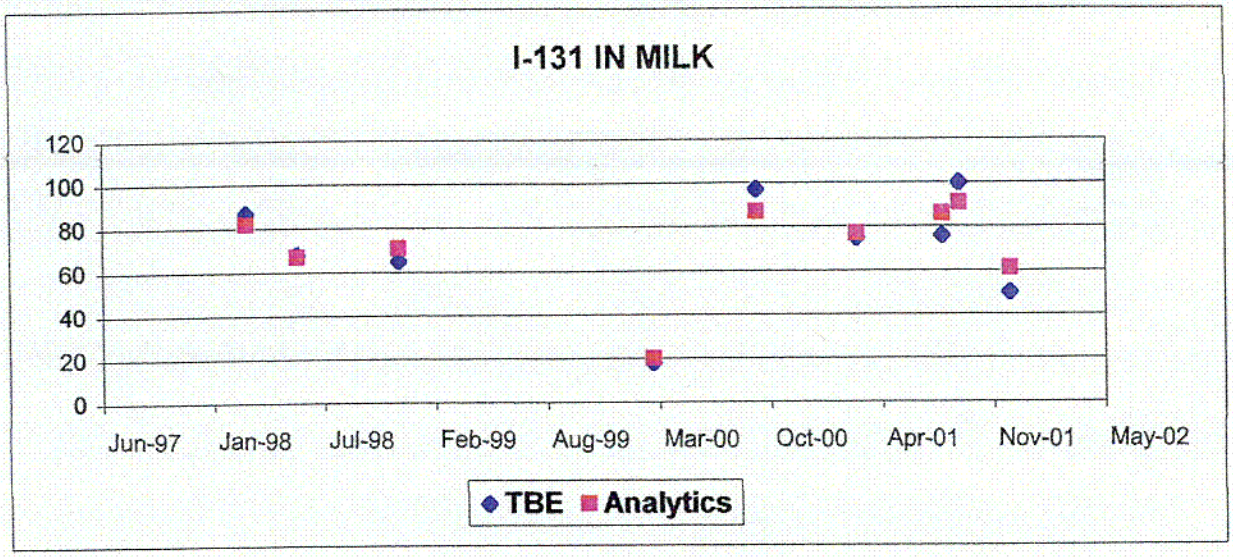
Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value	Known Value	Ratio TBE/Analytics	Evaluation
September, 2001	A14736-148	Charcoal	I-131	Total uCi	0.483	0.495	0.98	A
September, 2001	A14737-148	Air Filter	Ce-141	Total uCi	4.99E-02	5.25E-02	0.95	A
			Cr-51	Total uCi	1.68E-01	1.85E-01	0.91	A
			Cs-134	Total uCi	2.47E-02	2.97E-02	0.83	A
			Cs-137	Total uCi	5.18E-02	5.73E-02	0.90	A
			Co-58	Total uCi	4.60E-02	4.75E-02	0.97	A
			Mn-54	Total uCi	3.96E-02	4.02E-02	0.99	A
			Fe-59	Total uCi	2.99E-02	2.92E-02	1.02	A
			Zn-65	Total uCi	5.22E-02	5.12E-02	1.02	A
			Co-60	Total uCi	4.71E-02	4.83E-02	0.98	A
September, 2001	A14738-148	Liquid	Gr-Alpha	Total uCi	5.80E-04	4.67E-04	1.24	A
September, 2001	A14286-148	Liquid	Gr-Alpha	uCi/cc	1.70E-04	1.45E-04	1.17	A
			H-3	uCi/cc	2.92E-03	1.77E-03	1.65	A
September, 2001	E2772-396	Milk	I-131	pCi/L	100	91	1.10	A
			Ce-141	pCi/L	126	121	1.04	A
			Cr-51	pCi/L	349	366	0.95	A
			Cs-134	pCi/L	147	160	0.92	A
			Cs-137	pCi/L	321	319	1.01	A
			Co-58	pCi/L	190	177	1.07	A
			Mn-54	pCi/L	205	205	1.00	A
			Fe-59	pCi/L	85	86	0.99	A
			Zn-65	pCi/L	246	254	0.98	A
			Co-60	pCi/L	261	266	0.98	A
September, 2001	E2773-396	Charcoal	I-131	pCi	68.6	67	1.02	A

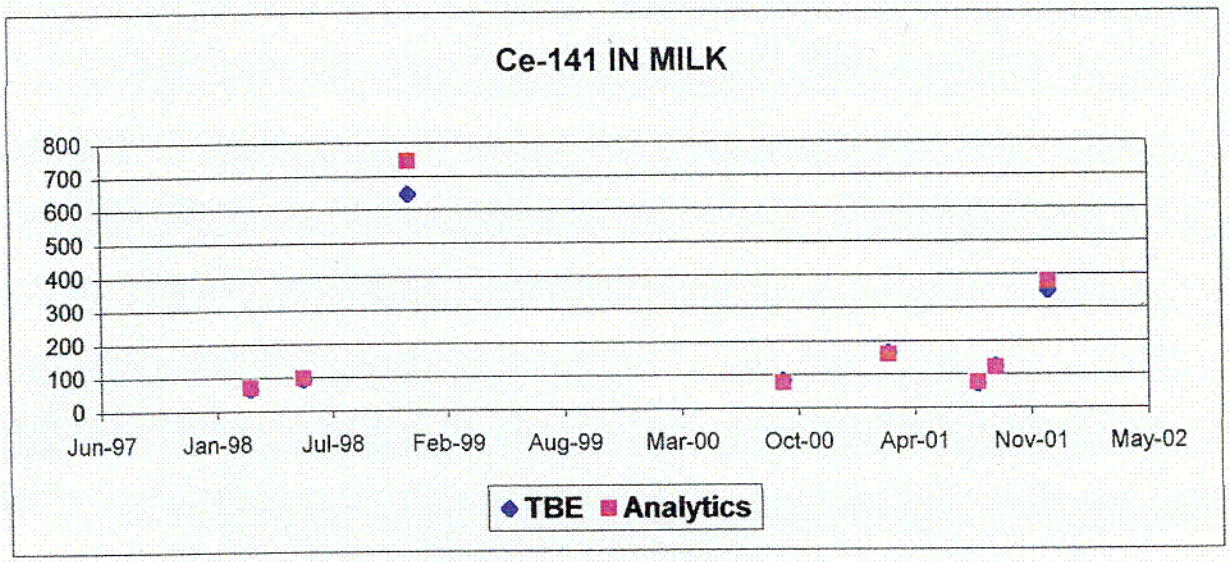
ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE QC SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

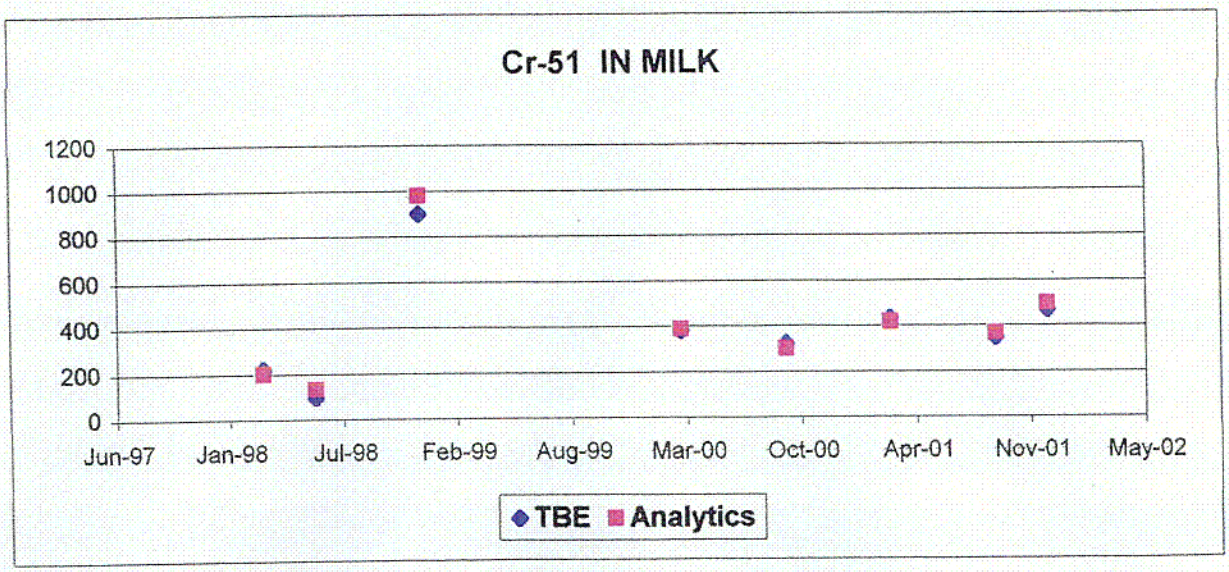
Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value	Known Value	Ratio TBE/Analytics	Evaluation
September, 2001	E2774-396	Air Filter	Ce-141	pCi	118	116	1.02	A
			Cr-51	pCi	362	351	1.03	A
			Cs-134	pCi	135	153	0.88	A
			Cs-137	pCi	350	307	1.14	A
			Co-58	pCi	184	170	1.08	A
			Mn-54	pCi	230	197	1.17	A
			Fe-59	pCi	100	82	1.22	W
			Zn-65	pCi	305	244	1.25	W
			Co-60	pCi	267	255	1.05	A
December, 2001	E2980-396	Milk	Sr-89	pCi/L	75	85	0.96	A
			Sr-90	pCi/L	44	59	1.27	W
			Fe-55	pCi/L	108	99	1.09	A
December, 2001	E-2981-396	Milk	I-131	pCi/L	50	61	0.82	A
			Ce-141	pCi/L	352	379	0.93	A
			Cr-51	pCi/L	468	497	0.94	A
			Cs-134	pCi/L	173	199	0.87	A
			Cs-137	pCi/L	312	318	0.98	A
			Co-58	pCi/L	92	90	1.02	A
			Mn-54	pCi/L	148	149	0.99	A
			Fe-59	pCi/L	101	102	0.99	A
			Zn-65	pCi/L	192	206	0.93	A
			Co-60	pCi/L	322	353	0.93	A
December, 2001	E-2983-396	Air Filter	Ce-141	pCi	185	181	1.02	A
			Cr-51	pCi	190	237	0.80	A
			Cs-134	pCi	74	95	0.78	W
			Cs-137	pCi	163	152	1.07	A
			Co-58	pCi	46	43	1.07	A
			Mn-54	pCi	80	71	1.13	A
			Fe-59	pCi	57	49	1.16	A
			Zn-65	pCi	119	99	1.2	A
			Co-60	pCi	165	169	0.98	A
December, 2001	E-2982-396	Charcoal	I-131	pCi	89	92	0.93	A

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE QC SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 1 OF 1)

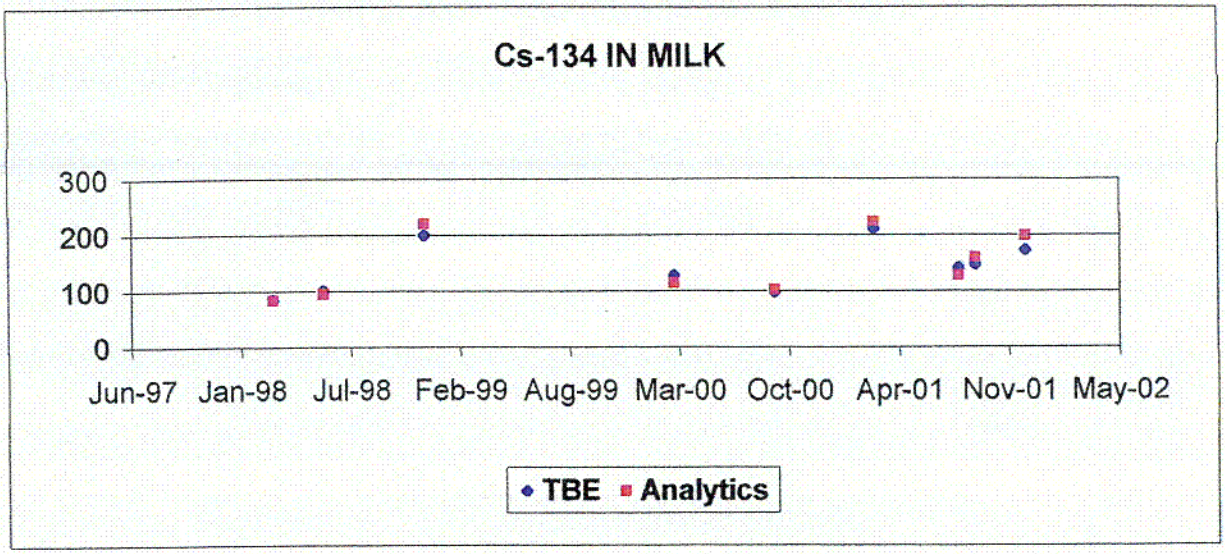
Month/Year	Identification Number	Media	Nuclide	Units	Reported Value	Known Value	Ratio TBE/EML	Evaluation
February, 2001	Rad-29	Liquid	Co-60	pCi/L	95.5	91.1	1.05	A
			Cs-134	pCi/L	60.5	59.8	1.01	A
			Cs-137	pCi/L	48	45	1.07	A
September, 2001	Rad-38	Liquid	Ba-133	pCi/L	35.5	36	0.99	A
			Co-60	pCi/L	47.6	46.8	1.02	A
			Cs-134	pCi/L	15.5	15.9	0.97	A
			Cs-137	pCi/L	206	197	1.05	A
			Zn-65	pCi/L	35.4	36.2	0.98	A
August, 2001	Rad-39	Liquid	Total U	pCi/L	60.3	52.9	1.14	A
			Ra-226	pCi/L	14.7	15.4	0.95	A
September, 2001	Rad-40	Liquid	Sr-89	pCi/L	26.4	31.2	0.85	A
			Sr-90	pCi/L	28.2	25.9	1.09	A
August, 2001	Rad-41	Liquid	Gr-Alpha	pCi/L	15.2	17.8	0.85	A
			Gr-Beta	pCi/L	52.0	53.0	0.98	A
September, 2001	Rad-42	Liquid	H-3	pCi/L	2370	2730	0.87	A
December, 2001	12130109	Liquid	I-131	pCi/L	3.77	4.38	0.86	A

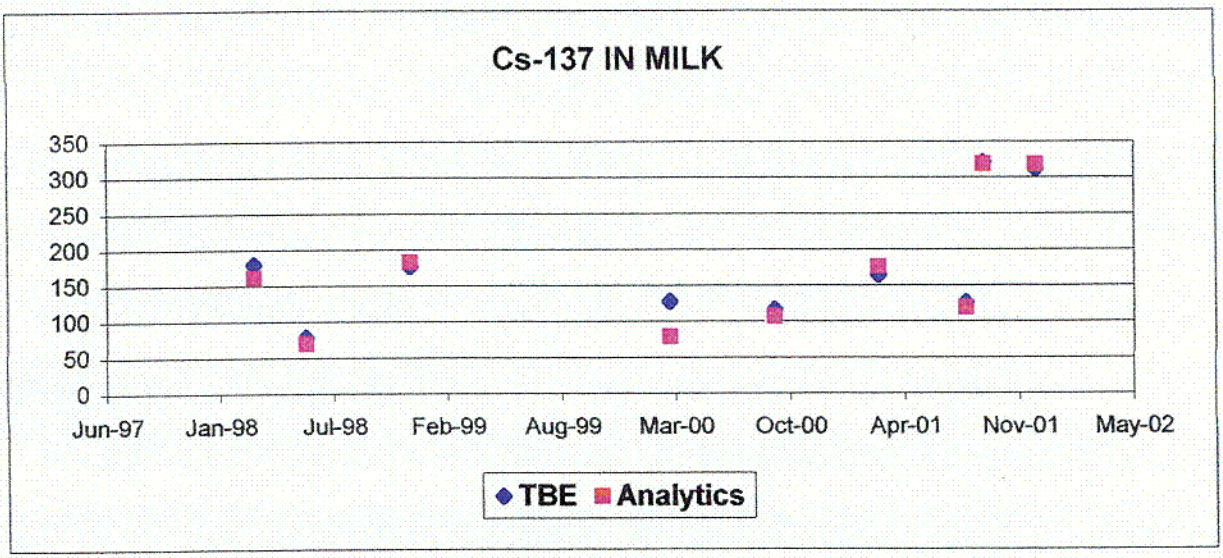

I-131 IN MILK
120
100
80
60
40
20
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

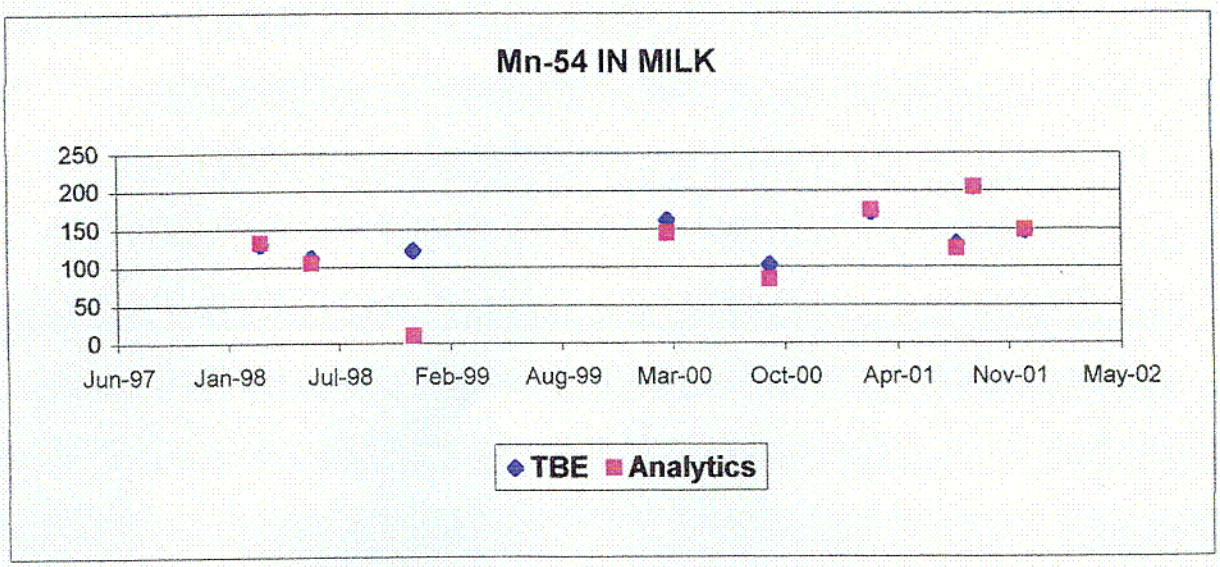

Ce-141 IN MILK
800
700
600
500
400
300
200
100
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Cr-51 IN MILK
1200
1000
800
600
400
200
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

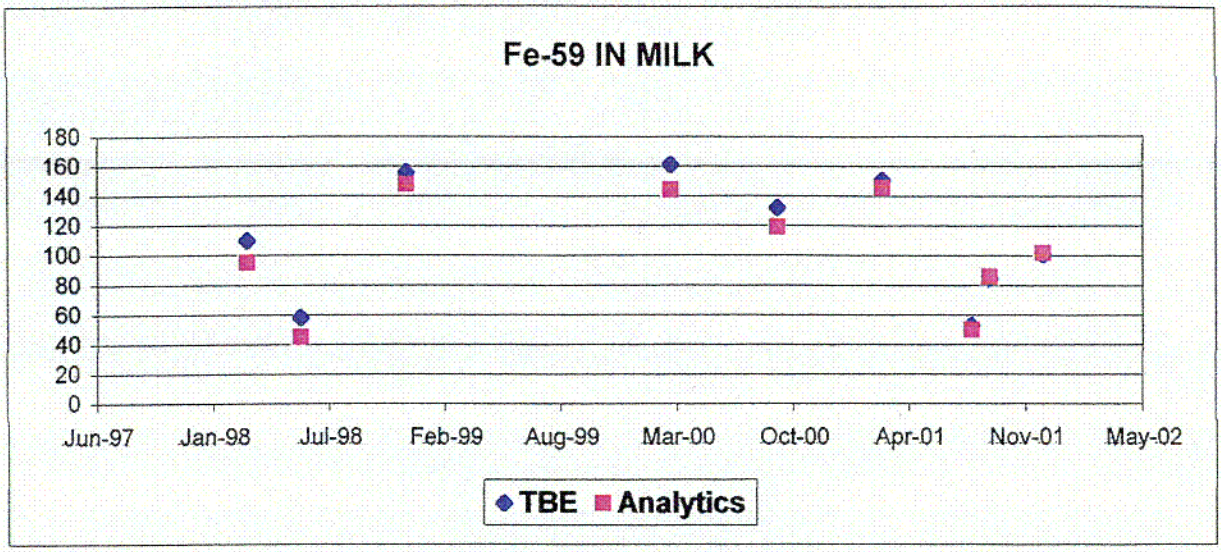
C-07

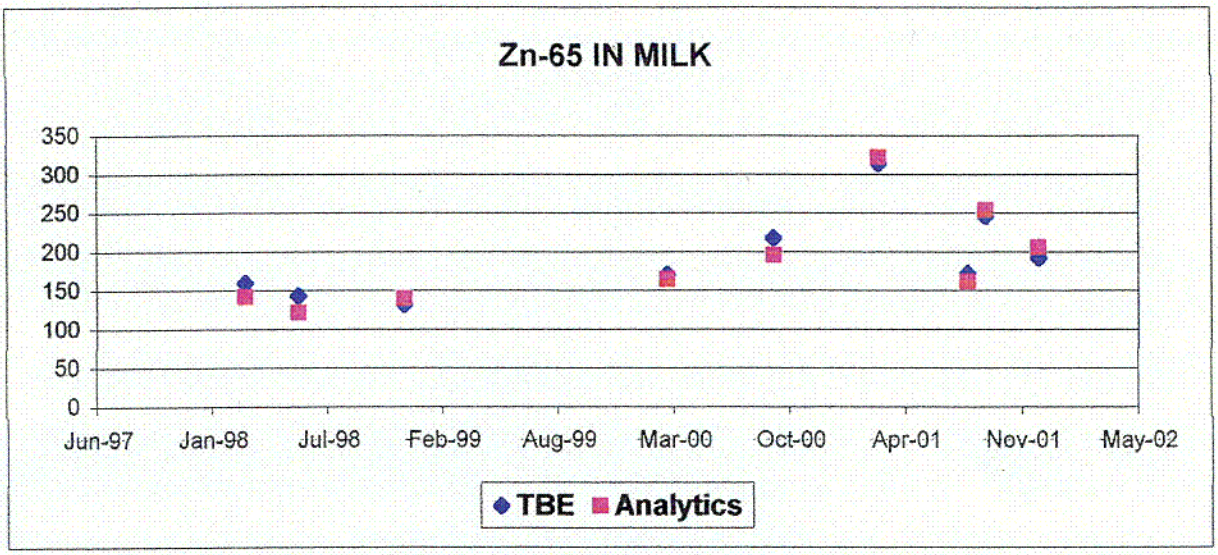

Cs-134 IN MILK
300
200
100
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

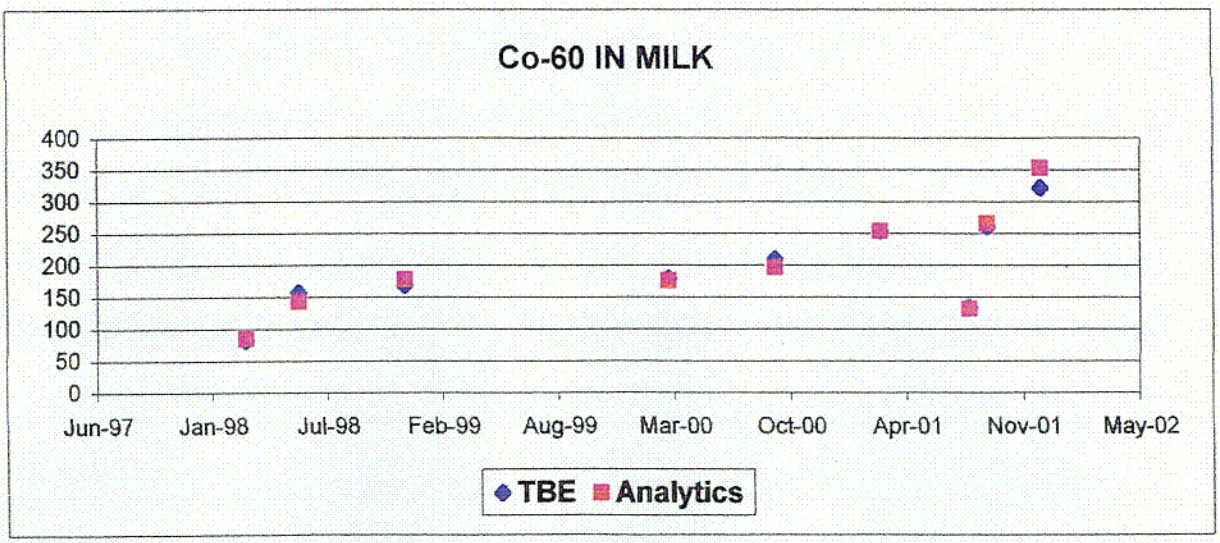

Cs-137 IN MILK
350
300
250
200
150
100
50
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Mn-54 IN MILK
250
200
150
100
50
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

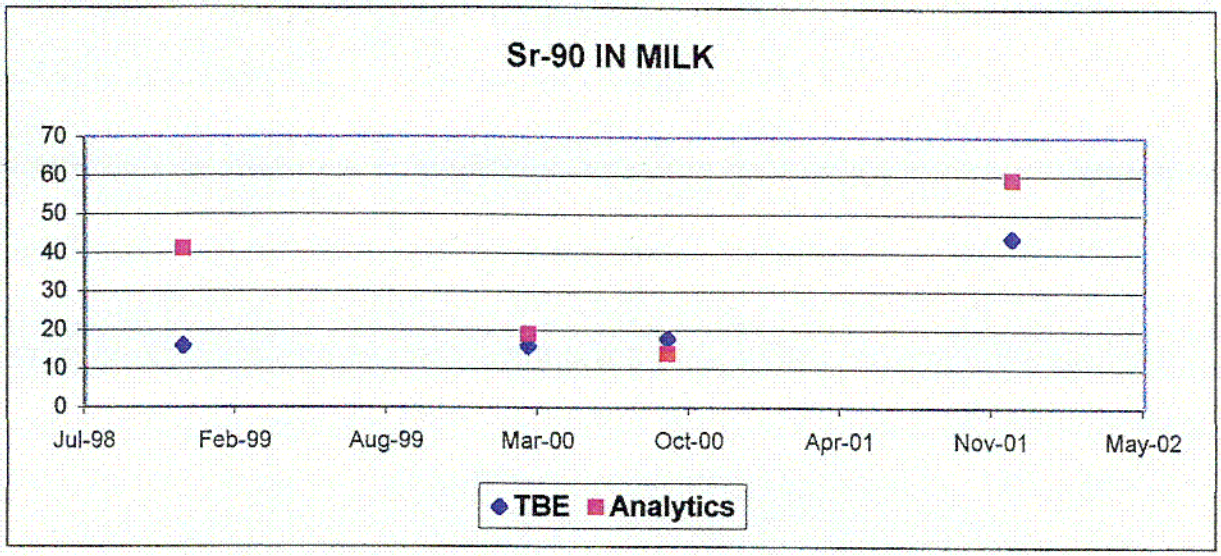
C-08

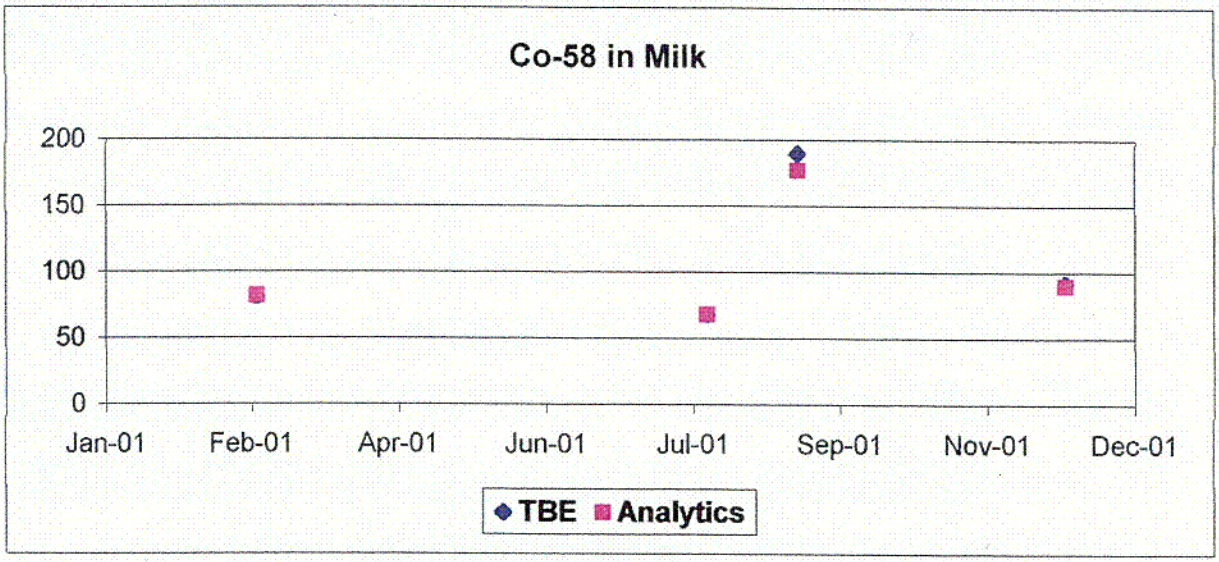

Fe-59 IN MILK
180
160
140
120
100
80
60
40
20
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

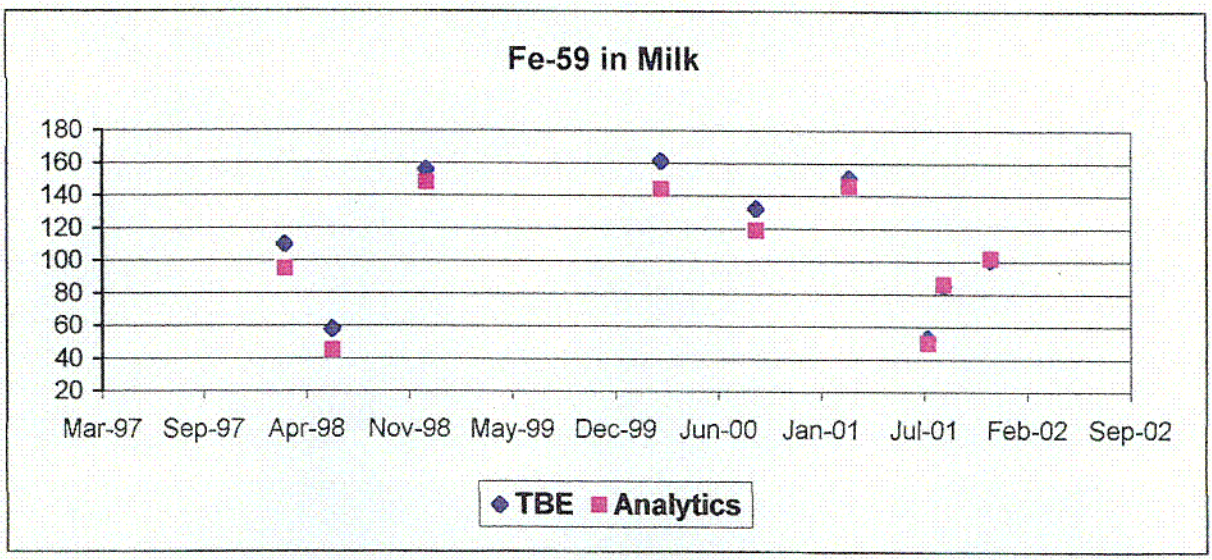

Zn-65 IN MILK
350
300
250
200
150
100
50
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Co-60 IN MILK
400
350
300
250
200
150
100
50
0
Jun-97
Jan-98
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

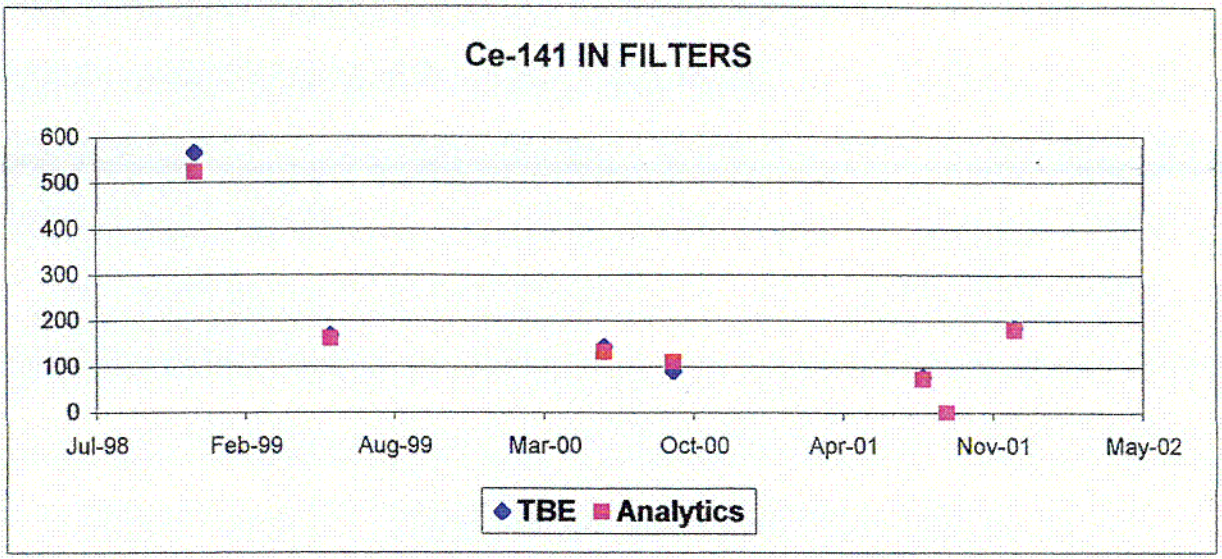
C-09

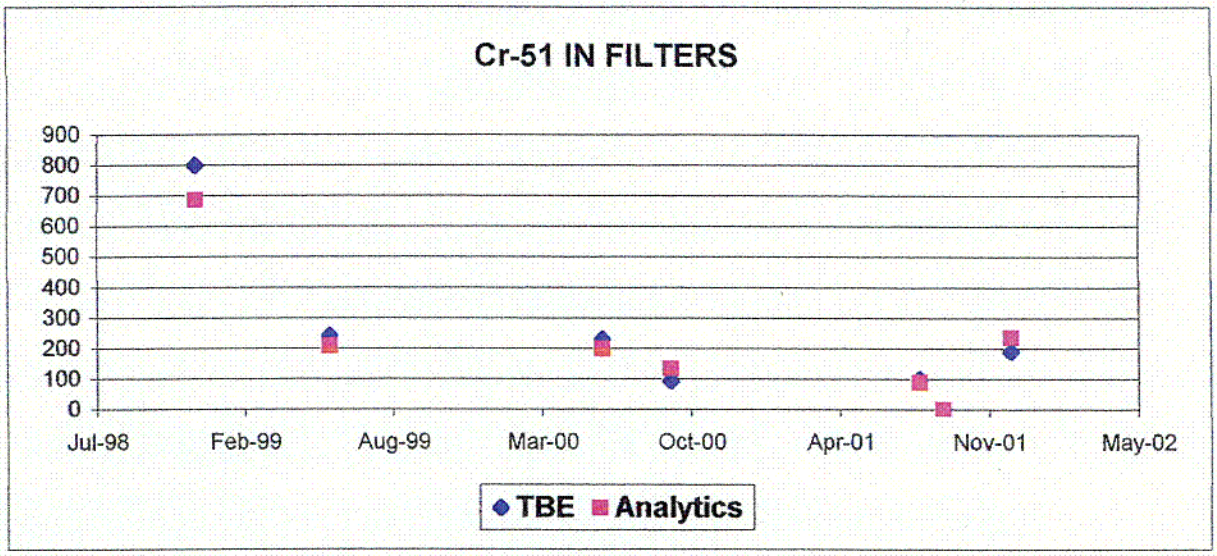

Sr-90 IN MILK
70
60
50
40
30
20
10
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

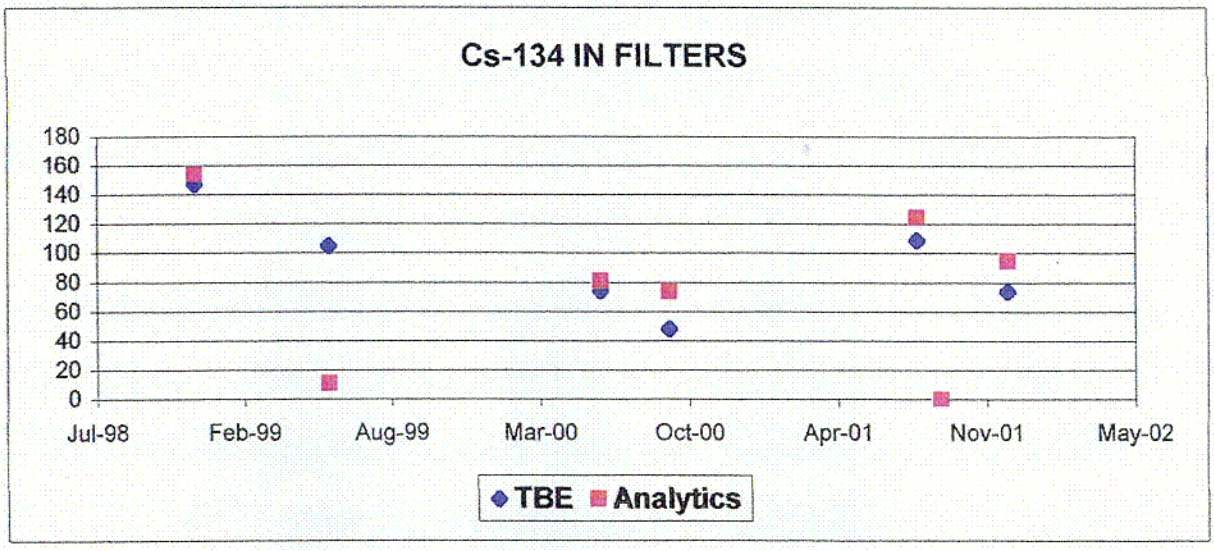

Co-58 in Milk
200
150
100
50
0
Jan-01
Feb-01
Apr-01
Jun-01
Jul-01
Sep-01
Nov-01
Dec-01
TBE
Analytics


Fe-59 in Milk
180
160
140
120
100
80
60
40
20
Mar-97
Sep-97
Apr-98
Nov-98
May-99
Dec-99
Jun-00
Jan-01
Jul-01
Feb-02
Sep-02
TBE
Analytics

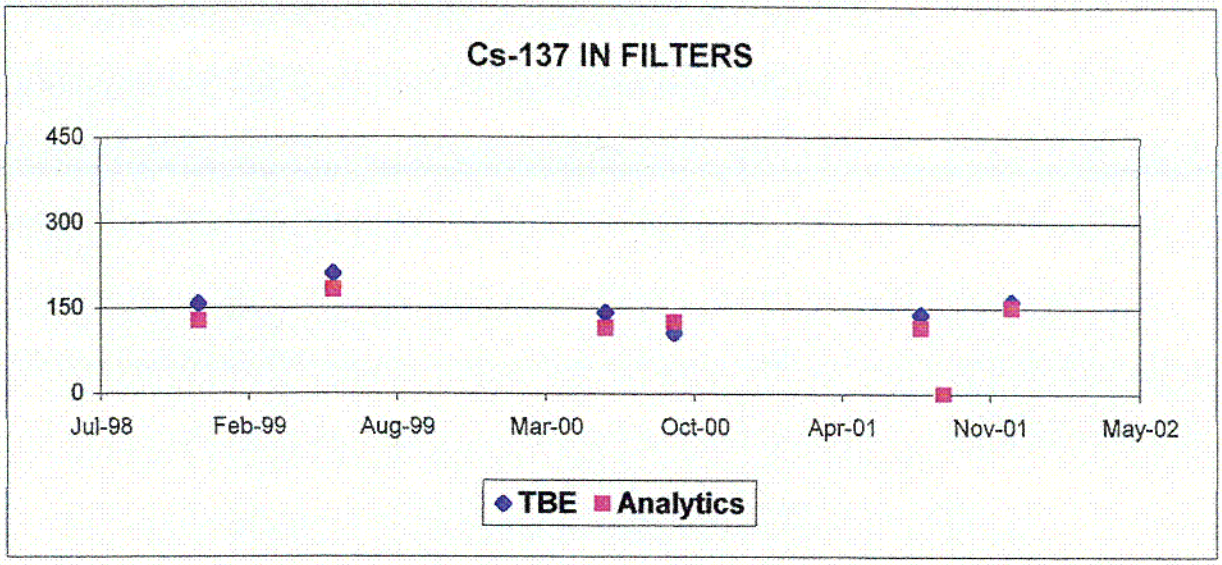
C-10

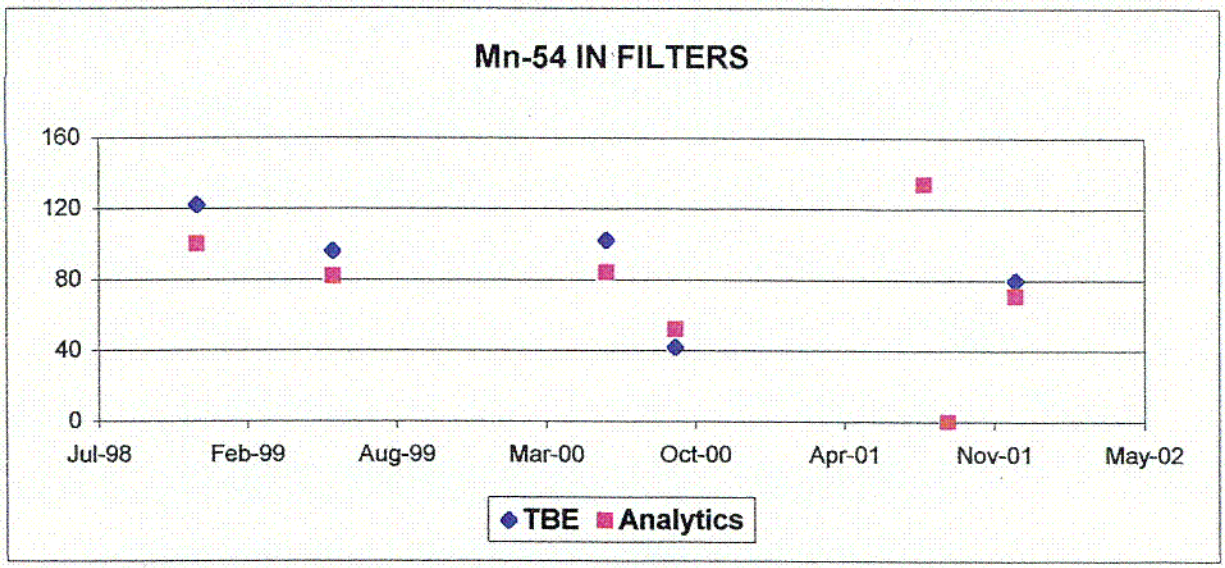

Ce-141 IN FILTERS
600
500
400
300
200
100
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

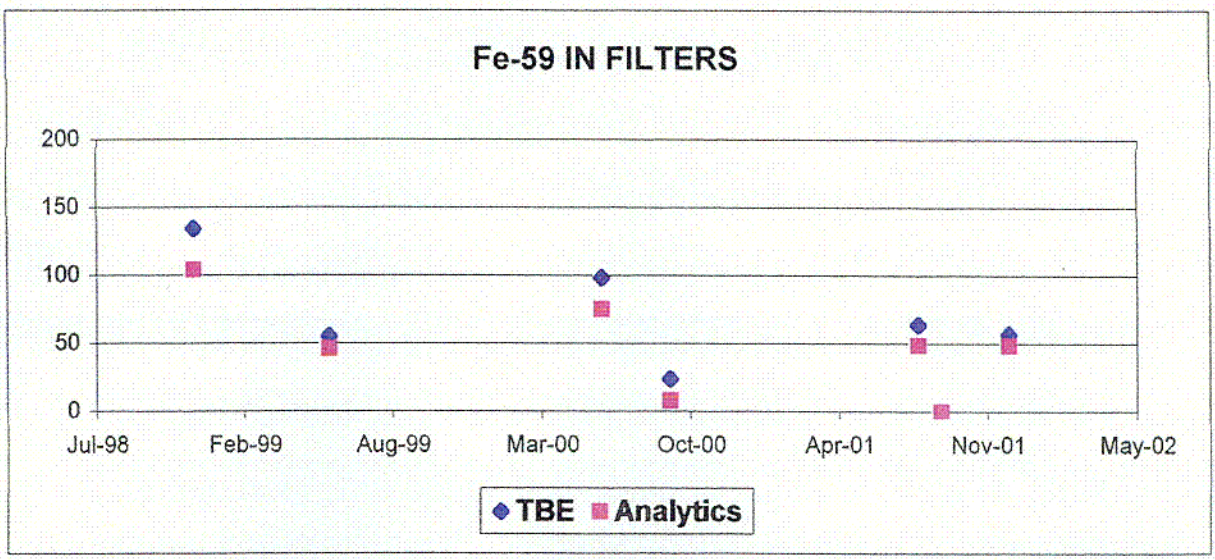

Cr-51 IN FILTERS
900
800
700
600
500
400
300
200
100
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Cs-134 IN FILTERS
180
160
140
120
100
80
60
40
20
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

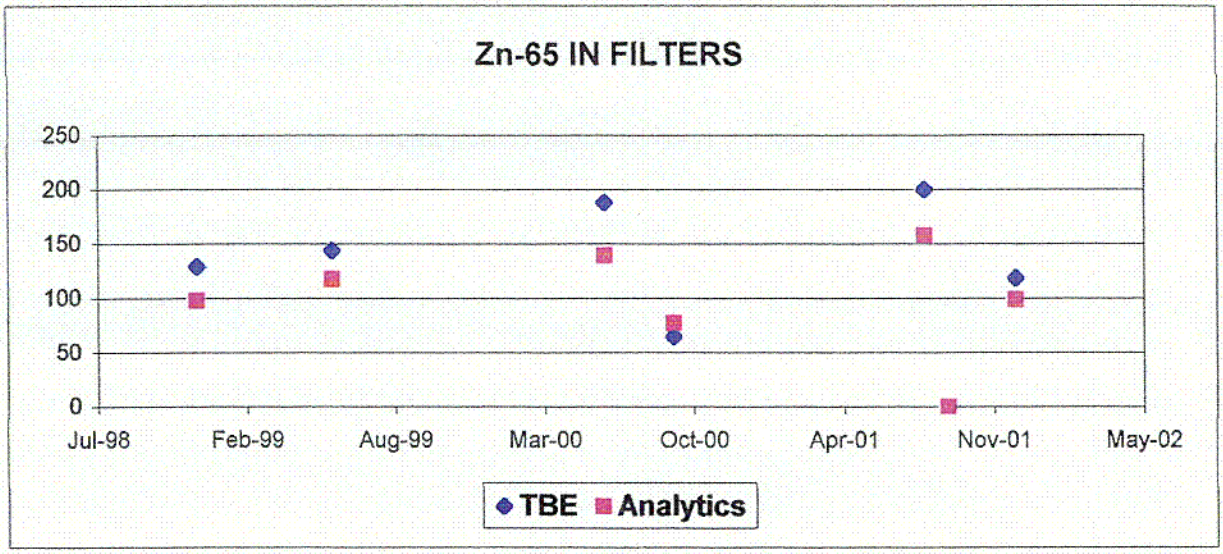
C-11

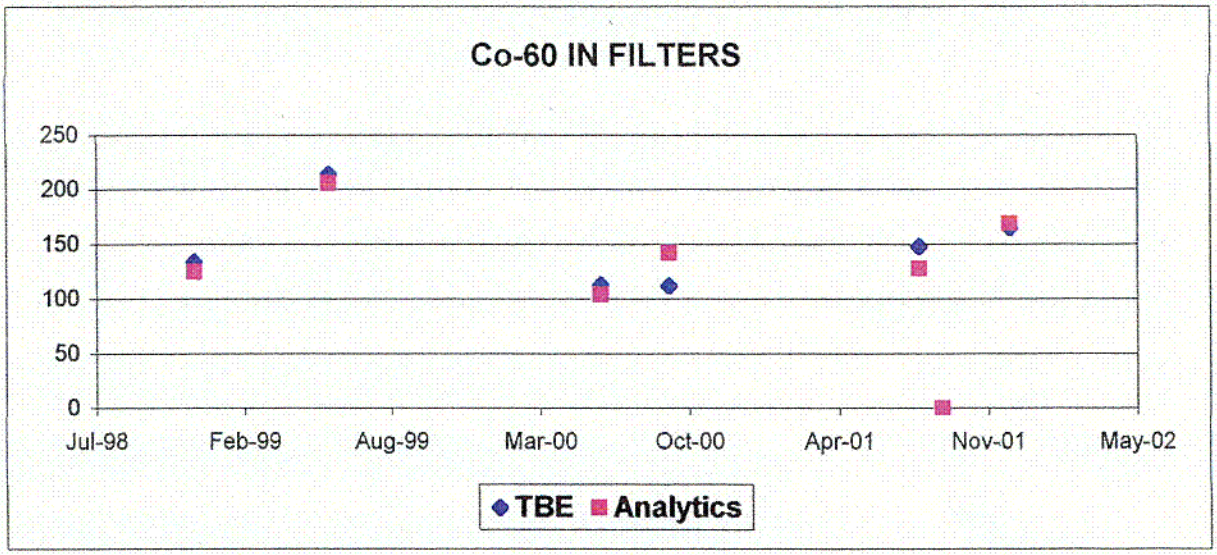

Cs-137 IN FILTERS
450
300
150
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

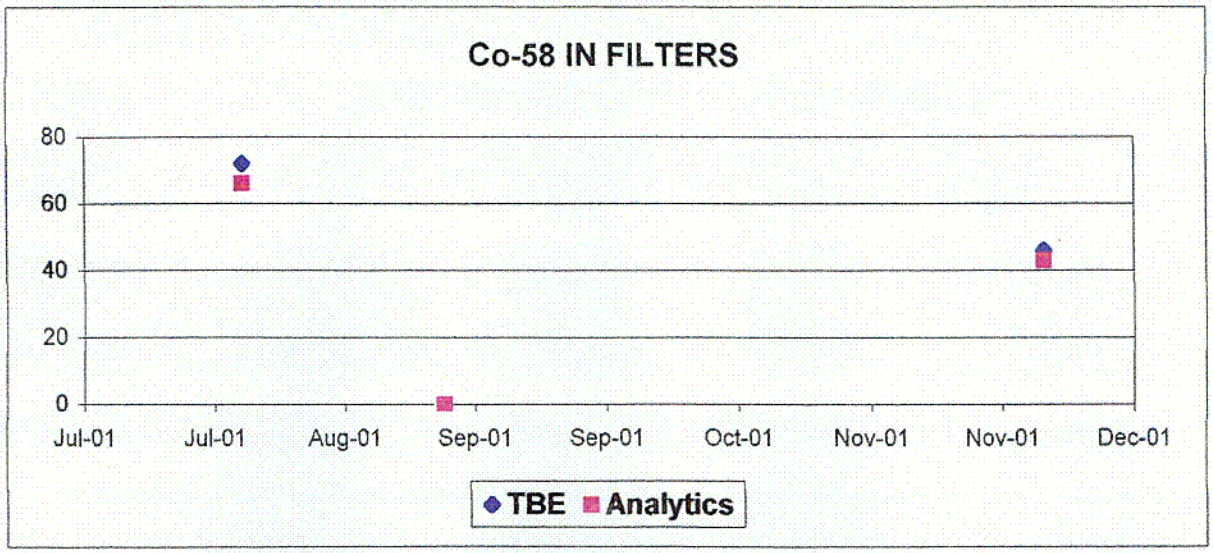

Mn-54 IN FILTERS
160
120
80
40
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Fe-59 IN FILTERS
200
150
100
50
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

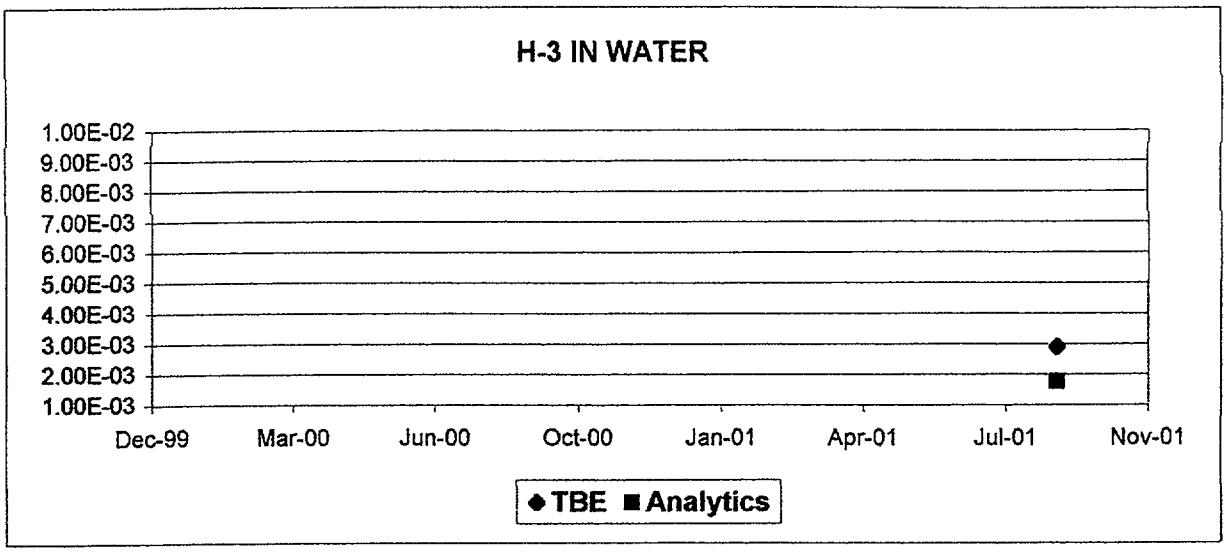
C-12

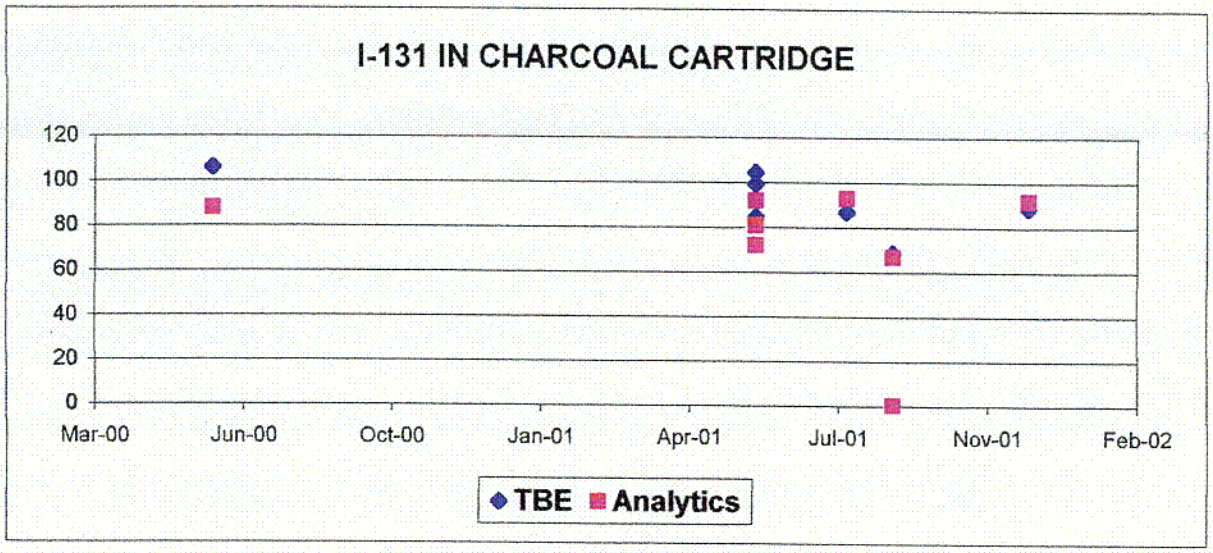

Zn-65 IN FILTERS
250
200
150
100
50
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics


Co-60 IN FILTERS
250
200
150
100
50
0
Jul-98
Feb-99
Aug-99
Mar-00
Oct-00
Apr-01
Nov-01
May-02
TBE
Analytics

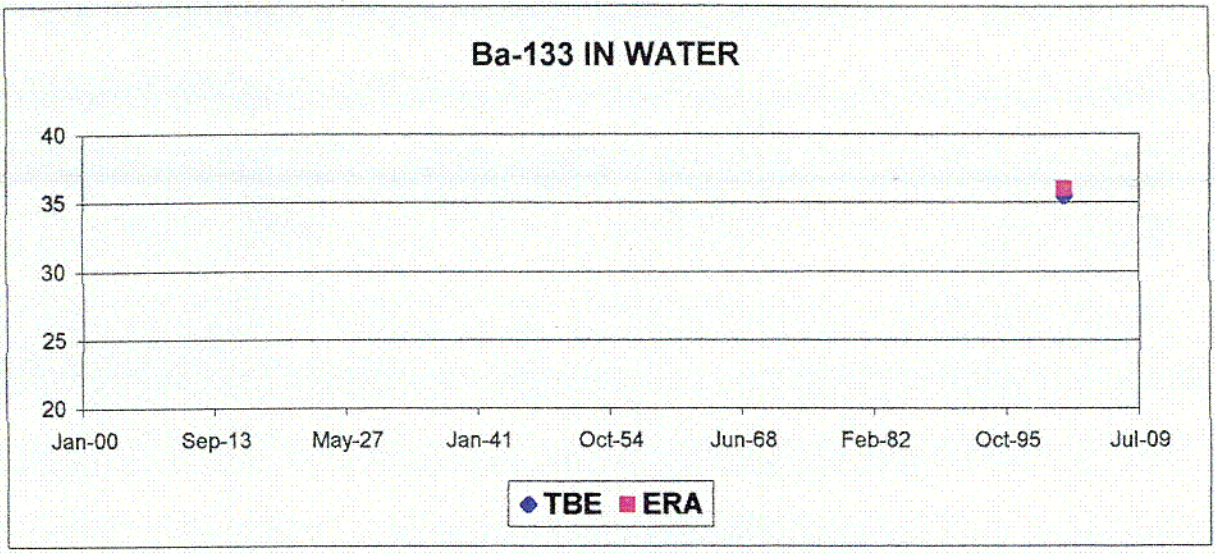

Co-58 IN FILTERS
80
60
40
20
0
Jul-01
Jul-01
Aug-01
Sep-01
Sep-01
Oct-01
Nov-01
Nov-01
Dec-01
TBE
Analytics

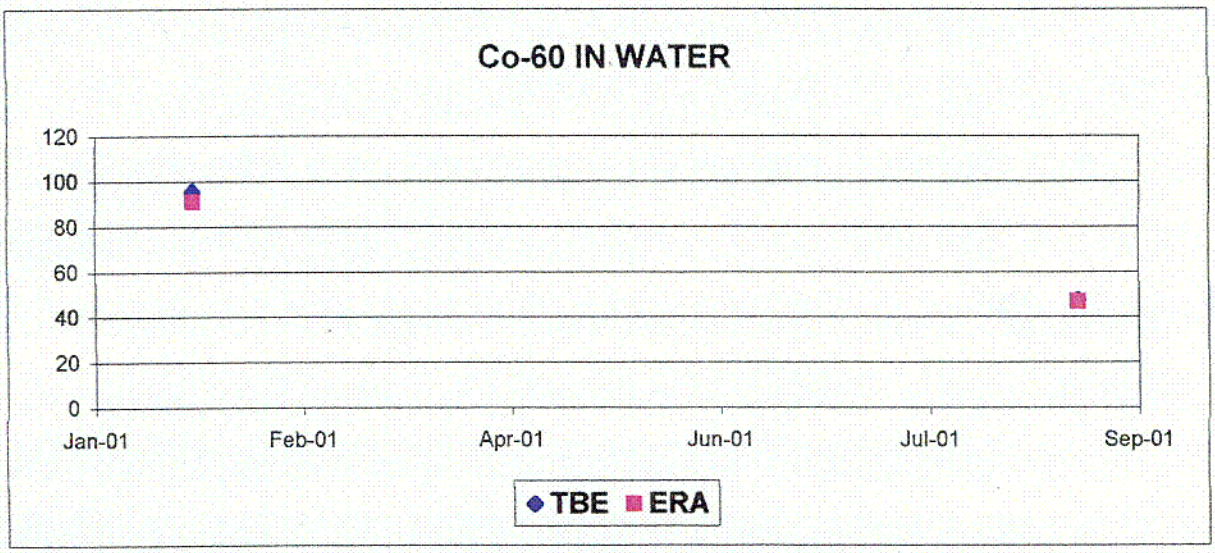
C-13

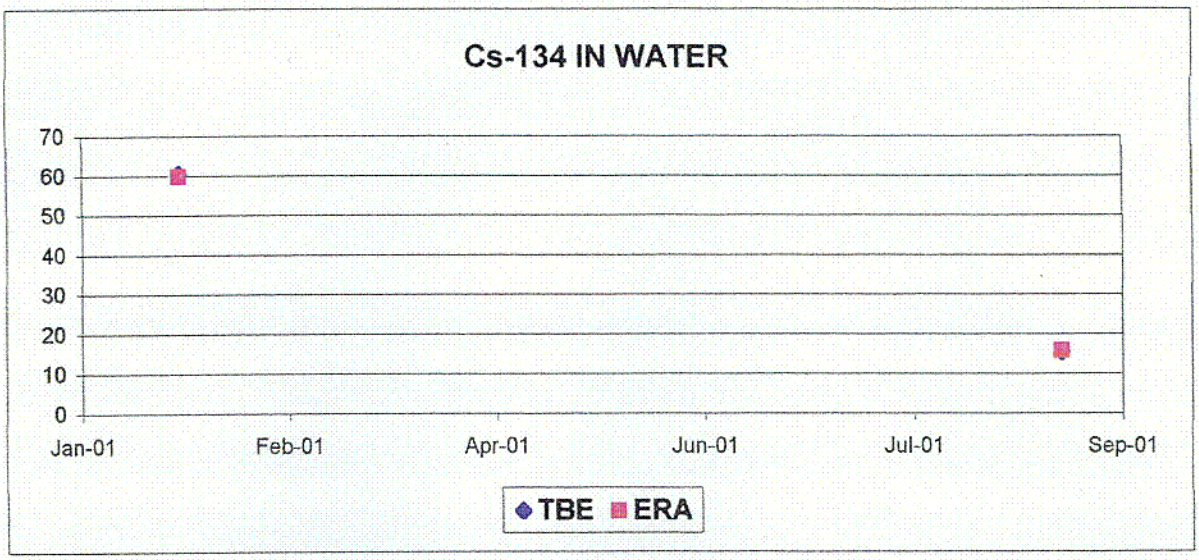

H-3 IN WATER
1.00E-02
9.00E-03
8.00E-03
7.00E-03
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
Dec-99
Mar-00
Jun-00
Oct-00
Jan-01
Apr-01
Jul-01
Nov-01
TBE
Analytics


I-131 IN CHARCOAL CARTRIDGE
120
100
80
60
40
20
0
Mar-00
Jun-00
Oct-00
Jan-01
Apr-01
Jul-01
Nov-01
Feb-02
TBE
Analytics

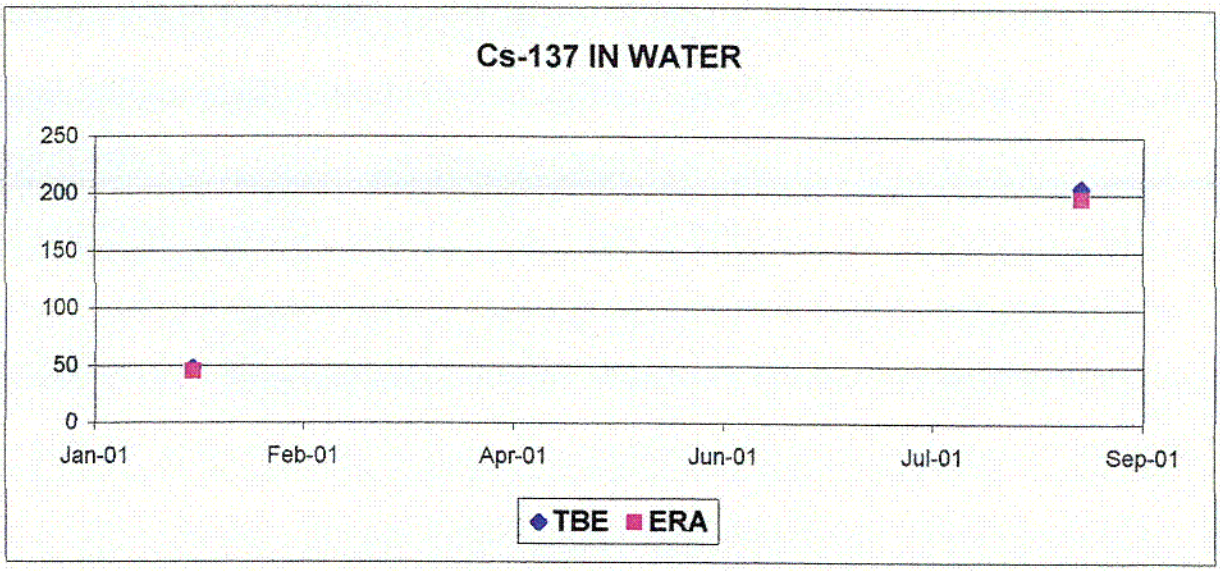
C-14

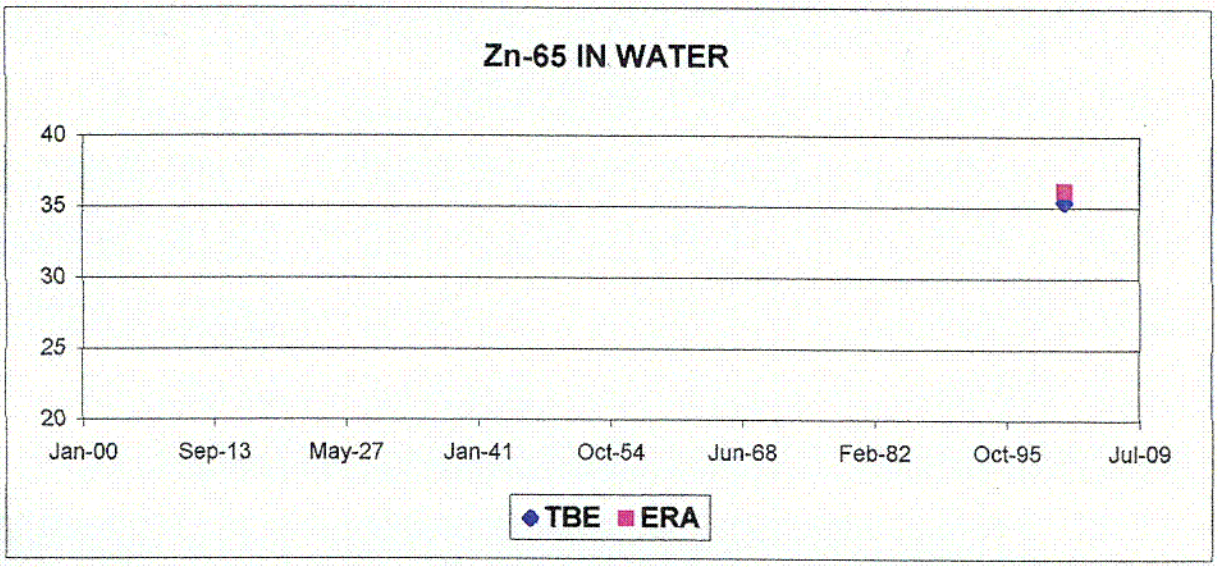

Ba-133 IN WATER
40
35
30
25
20
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA

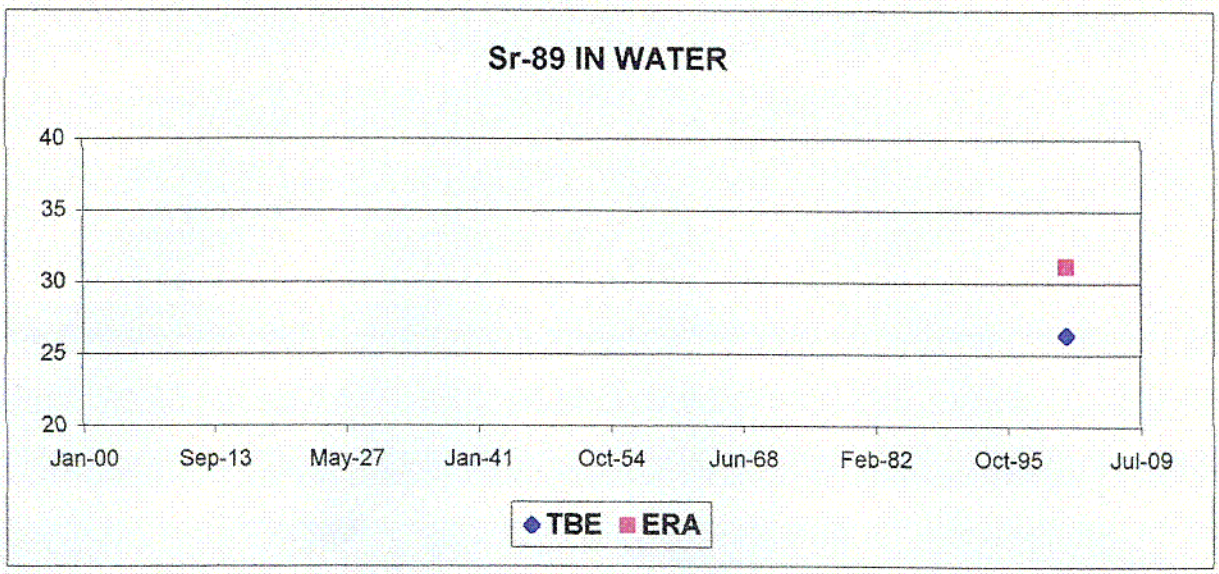

Co-60 IN WATER
120
100
80
60
40
20
0
Jan-01
Feb-01
Apr-01
Jun-01
Jul-01
Sep-01
TBE
ERA


Cs-134 IN WATER
70
60
50
40
30
20
10
0
Jan-01
Feb-01
Apr-01
Jun-01
Jul-01
Sep-01
TBE
ERA

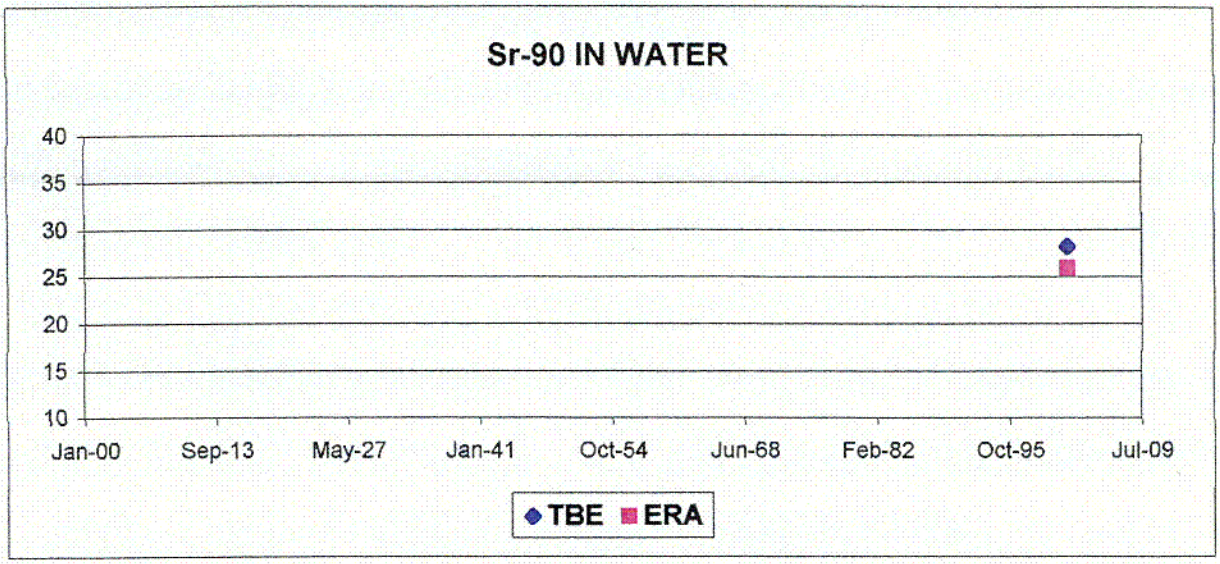
C-15

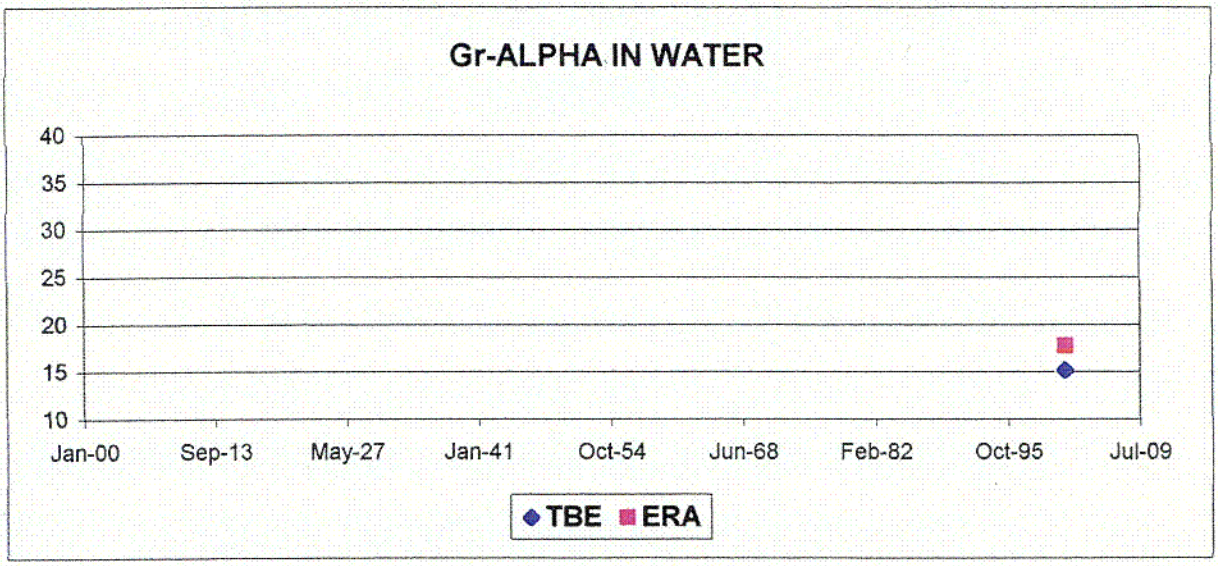

Cs-137 IN WATER
250
200
150
100
50
0
Jan-01
Feb-01
Apr-01
Jun-01
Jul-01
Sep-01
TBE
ERA

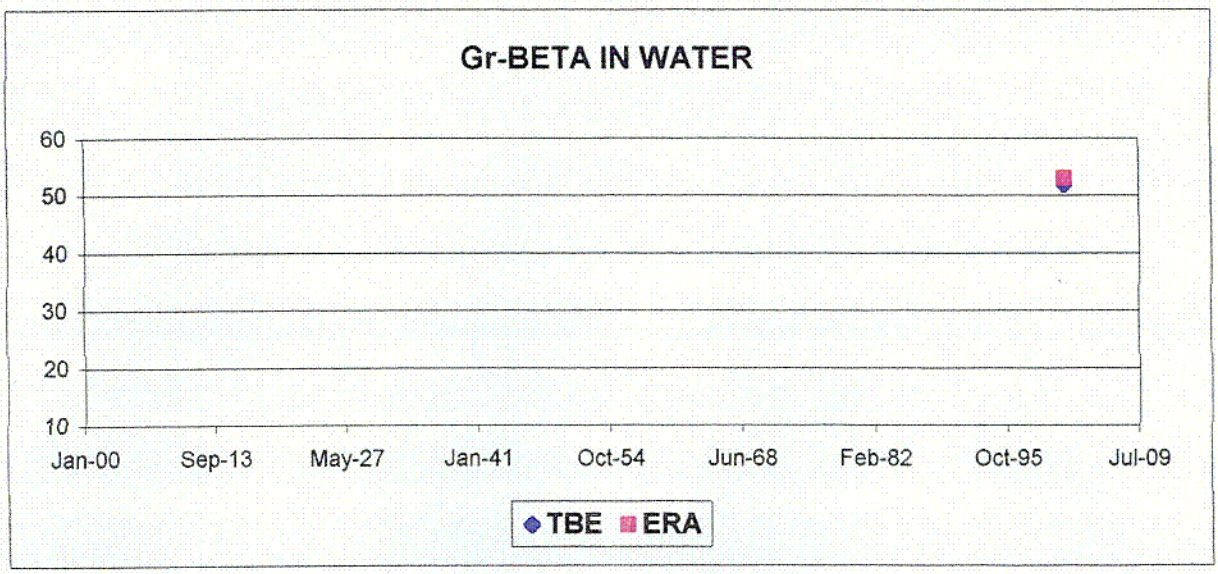

Zn-65 IN WATER
40
35
30
25
20
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA


Sr-89 IN WATER
40
35
30
25
20
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA

C-16


Sr-90 IN WATER
40
35
30
25
20
15
10
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA


Gr-ALPHA IN WATER
40
35
30
25
20
15
10
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA


Gr-BETA IN WATER
60
50
40
30
20
10
Jan-00
Sep-13
May-27
Jan-41
Oct-54
Jun-68
Feb-82
Oct-95
Jul-09
TBE
ERA

C-17

APPENDIX E

REMP SAMPLING AND ANALYTICAL EXCEPTIONS

REMP SAMPLING AND ANALYTICAL EXCEPTIONS

Air Particulates

The majority of air particulate gross beta results exceeded the ODCM LLD of 0.01 pCi/m^3 (sample results which were at or below the LLD values include: ONS-3 for the period of 05/16/01 to 05/23/01; ONS-1, ONS-3, ONS-4, ONS-5, ONS-6, DOW, SBN, and COL for 05/23/01 to 05/30/01; all air sample stations for 11/14/01 to 11/21/01; SBN for 10/10/01 to 10/17/01.) Having the majority of the air sample results greater than the OCDM LLD is consistent with historical data. All of the results were less than the 0.033 pCi/m^3.

Due to an electrical power interruption samples from air stations ONS-1were not continuous from 04/04/01 to 04/11/01. The air sample station was without power for approximately 10 hours (C/R 01109087). Storms caused electrical power interruptions of samples from air stations ONS-5 and ONS-6 for the date for 06/06/01 to 06/13/01, 08/15/01 to 08/22/01, and 09/19/01 to 09/26/01. These power interruptions caused the samples to be of insufficient volume to provide data points. Severe electrical storms occurred in June, August, and September. Where it was possible, samples were collected and analyzed. Corrective actions for these events were captured by the Cook Nuclear Plant corrective actions system in C/R #01165045 and C/R #01235017.

The sample media for ONS-1 (particulate and iodine) for the period of 07/11/01 to 07/18/01 was lost during the shipping process. This condition was captured in C/R #01249063.

Surface Water

Surface water samples were not obtained from beach locations SWL-2 and SWL-3 between 01/01/01 and 03/05/01 then again from 03/07/01 to 03/13/01 due to hazardous environmental conditions (i.e. heavy ice build up).

Due to challenges faced by Teledyne Brown Engineering, LLD's were not met for Ba-140 (60pCi/l) and La-140 (15pCi/l) for SWL-1 for the February monthly composite sample. The LLDs reported by Teledyne was 162 and 53.4, respectively. Required LLDs were missed for SWL-1, SWL-2, and SWL-3 for the samples composited for March. The LLDs for these samples were Ba-140, 68.3, 85, and 61.4 pCi/l and La-140, 22.9,26.4, and 19.5 pCi/l, respectively. This event was captured by the Cook Nuclear Plant corrective actions system under C/R # 01110029.

The March monthly composite sample did not meet the required LLD for La-140 (15 pCi/L) for the SWL-3 location. The LLD reported by Teledyne was 15.3 pCi/l. No NCR or C/R was written due to the closeness of this sample to the limit and the limit being an a priori limit.

The monthly composited surface water samples for the month of July for the locations SWL-1, and SWL-2 did not meet the LLDs for La-140 (15 pCi/l) and Ba-140 (60 pCi/l). The reported LLDs were 22.4 and 25 pCi/l for La-140 and 68.7 and 71.0 pCi/L for Ba-140, respectively.

Thermoluminescent Dosimeters (TLDs)

There was an outstanding issue from the 2000 AREOR concerning the discrepancy between the 4th quarter TLD results and the 3rd quarter TLD results. This issue was captured by the Cook Nuclear Plant corrective actions system under C/R D#01089057. The cause of this condition was the inconsistent use of 'pig' TLDs used to calculate net exposures from gross exposures. Pig TLDs are now used consistently in this process.

The 4th quarter 2001 environmental dosimeter (TLD) at OFT-10 was found to be missing. The ground surrounding the utility pole was searched and the cage was located; however, the TLD could not be found. This condition was documented on condition report C/R #01325021. This TLD is located offsite on the corner of Red Arrow Hwy and Floral Road.

Groundwater

Gross beta result for groundwater wells SG-1, SG-2, SG-4, and SG-5 measured 5.1 pci/l, 5.2 pCi/l, 7.8 pCi/l and 6.9 pCi/l, respectively, for samples drawn on 01/26/01. These results exceeded the ODCM LLD level of 4.0 pCi/l, however this maximum LLD level is applicable to drinking water only. The gross beta and gross alpha levels recorded were consistent with historical data.

Due to challenges faced by Teledyne Brown Engineering, the LLD was not met for La-140 (15 pCi/l) for W-11 for the 1st quarter well samples. The LLD reported by Teledyne was 15.2 pCi/l. The duplicate count for W-1 missed the LLDs for Fe-59 (30 pCi/l), Ba-140 (60 pCi/l), and La-140 (15 pCi/l). The actual LLDs were 33.9, 1110, and 377 pCi/l, respectively. Teledyne documented this condition on NCR #01-31. This condition was also documented on Cook Plant Condition Report #01110029.

The collection of groundwater samples from W-4, W-5, and W-6 were delayed until 01/29/01 from 01/26/01. This was due to training new technicians on the process of collecting groundwater. Extra time was required and the sampling period extended to 95 days which is within the 25% allowable extension period as per the ODCM.

All results for groundwater sampling were less than the required LLD of 2000 pCi/l and far less than the reporting level of 20000 pCi/l. However, W-6 result yielded 1.6 E+03 pCi/l with an actual LLD of 1.0 E+02 pCi/l. This gives a positive indication of tritium in the groundwater at W-6. This is consistent with historical data and the data indicates the tritium level is declining.

Gross beta result for groundwater wells SG-4 and S/G-5 measured 9.0 pCi/l and 5.2 pCi/l, respectively, for samples drawn on 04/27/01. These results exceeded the ODCM LLD level of 4.0 pCi/l, however, this maximum LLD level is applicable to drinking water only. The gross beta and gross alpha levels recorded were consistent with historical data.

The collection of groundwater samples for W-4, W-5, and W-6 were delayed until 07/31/01 from 07/27/01. The sampling period extended to 95 days which is within the 25% allowable extension period as per the ODCM. This was due to high winds during the sampling period.

Drinking Water

Due to challenges faced by Teledyne Brown Engineering, LLDs were not met for Fe-59 (30 pCi/l), Ba-140 (60 pCi/l), and La-140 (15 pCi/l) for the STJ and LTW composite samples for the period of 12/28/00 to 01/10/01. The LLDs reported by Teledyne were, for STJ 30.1, 1300, and 433 pCi/l; for LTW 39.6, 1340, and 454 pCi/l.

The ODCM LLDs were also not met for Ba-140 and La-140 for the STJ and LTW composite samples for the period of 01/25/01 to 02/07/01. The reported LLDs were, for STJ 1030 and 342 pCi/l; for LTW 1020 and 301 pCi/l.

Due to challenges faced by Teledyne Brown Engineering, LLDs were not met for I-131 (1.0 pCi/l) for the STJ and LTW composite samples for the periods of 12/28/00 to 01/10/01 and 01/11/01 to 01/24/01. The LLDs reported by Teledyne were 5.0 pCi/l for the first period for both facilities and 2.0 pCi/l for the second period for both facilities. The LLD was also not met for I-131 (1.0 pCi/l) for the LTW composite sample for the period of 02/22/01 to 03/07/01. The reported LLD for this sample was 2.0 pCi/l.

The ODCM LLD for La-140 (15 pCi/l) was not met for the LTW composite samples for the period of 06/28/01 to 08/08/01. The reported LLDs were 17.0 (06/28/01 to 07/11/01), 15.8 (07/11/01 to 07/25/01), and 15.4 pCi/l (07/25/01 to 08/02/01) during this period.

The above issues were captured by the Cook Nuclear Plant corrective actions system under C/R #01110029 and Teledyne's system under NCR 01-31.

The Lake Township water treatment facility (LTW) gross beta composite sample of the period from 03/22/01 to 04/04/01 was 4.5 pCi/l. This result exceeded the ODCM LLD level of 4.0 pCi/L. This result, however, is consistent with historical data.

Milk Sampling

None of the milk samples collected on 01/03/01 met the ODCM LLD for I-131 (1.0 pCi/l). The sample reported LLDs were Glen Troy 3.0, Monroe 4.0, Livinghouse 4.0, and Wyant 6.0 pCi/l. Teledyne initiated NCR #01-30. Cook Nuclear Plant C/R #01110029 captured this condition.

APPENDIX F

2001 LAND USE CENSUS

SUMMARY OF THE 2001 LAND USE CENSUS

The Land Use Census is performed to identify any significant changes in land usage in the area immediately surrounding the plant, which could affect exposure pathways. Any identified changes are evaluated to determine whether modifications should be made to the REMP or other related programs. See the attachments and the table that summarize the census results. The following is a narrative summary of the 2001 census.

Dairy Farm Survey (See attachments 1,2, and 3)

The dairy farm survey was performed to update the list of dairy farms located in the plant area (Berrien County), to identify the nearest animal whose milk is used for human consumption. The milk farm survey for the Cook Plant was conducted on September 20, 24, and 27, 2001.

There were no changes in the dairy farm list from the Michigan Department of Agriculture between July 1, 2000 and July 1, 2001. Two new dairy farms (goats for private milk consumption) were located in the County during this year's door-to-door survey.

At the present time, there are five farm/residence with dairy animals used for milk consumption within eight miles of the plant (Shuler, Monroe, Glen-Troy, Waldo, and Jerry Warmbein). The milk sampling program was restarted on March 29, 2000 and has continued to date. Therefore, the collection of monthly broadleaf samples (in lieu of milk sample) has been discontinued (as per 12-THP-6010-RPP-635).

The closest milk-producing animals (for human consumption) are milk cows at the Shuler & Son Farm located at 2791 Snow Road in Baroda at a distance of 21,648 feet from the plant center line.

Residential Survey (see Attachments 3 and 4)

From June 1, 2000 through June 1, 2001, eight (8) residential building permits were issued for new construction in Lake Township for Sections 5, 6, 7 and 8. These sections border the Cook Plant property. None of the permits change which residence in each sector is closest to the Cook Plant. In addition, none of these permits were issued to the residences, which are the closest in each sector. Therefore, none of the construction permits will affect the Plant's radiological evaluation of residential households.

Grape and Broadleaf Survey

In accordance with the Offsite Dose Calculation Manual PMP-6010-OSD-001 and the grape and broadleaf collection procedure 12-THP-6010-RPP-638, broadleaf vegetation sampling is performed in lieu of a garden census. Broadleaf sampling is performed to monitor for plant impact on the environment. The samples were obtained as close to the site boundary as possible in a land sector, with sample media, with the highest average deposition factor (D/Q). Control samples were also obtained in a less prevalent sector approximately 21 miles from the site boundary. These locations were the B. Kunde vineyard at 3316 Linco road in Stevensville, onsite broadleaves (ONS-V) were collected by Well #W-1 in sector A, and the Eldridge residence at 6156 Fail road in LaPorte, Indiana, respectively. The analytical results for the grape and broadleaf samples obtained on September 12 and 16, 2001 were less than ODCM lower limits of detection (LLDs) (60 Pico-curies/kg for Cs-134, Cs-137 and I-131) specified in Att. 3.20 Maximum Values for LLDs – REMP of the ODCM.

Conclusion

The 2001 REMP Land Use Census verified that no change is required to the Annual Radiological Effluents Release Report or the REMP. This was demonstrated by the performance of the dairy farm survey, the residential survey, and the grape and broadleaf survey. There were no significant changes in the usage of the land immediately surrounding the plant.

2001 Land Use Census – Operating Dairy Farms in Berrien County

Name and Address	Township	Section	Sector/Distance
Andrews University Dairy Road Berrien Springs, 49103	Oronoko	12	E / 10.5 miles (55,440 ft)
Brohman Farm 1637 Mt Tabor Rd. Berrien Ssprings, 49103	Oronoko	29	F / 8.5 miles (44,880 ft)
Glen Troy Farm Mel Freehling 2221 Glendora Rd. Buchanan, 49107	Weesaw	10	H / 7.0 miles (36,960 ft)
Koebel Farm 16318 Avery Rd. Three Oaks, 49128	Three Oaks	36	J / 10.6 miles (55,970 ft)
Dean Lozmack 14843 Cleveland Rd. Galien, 49218	Weesaw	23	H / 9.2 miles (48,580 ft)
Paul Lozmack 4193 Elm Valley Three Oaks, 49128	Weesaw	30	J / 10.3 miles (54,390 ft)
William Nimtz 3445 Park Rd. Eau Claire, 49111	Pipestone	07	D / 13.5 miles (71,280 ft)
Howard Payne RFD 2 Box 148 Three Oaks, 49218	Weesaw	31	J / 10.9 miles (57,552 ft)
Powers Farm 16402 Wells Rd. Buchanan, 49107	Buchanan	31	H / 12.7 miles (67,060 ft)
Shuler Farm 2791 Snow Rd. Baroda, 49101	Lake	28	G & H / 4.1 miles (21,648 ft)
Wagner Farms Carl Wagner, Jr. 8523 Chapel Rd.	Berrien	35	F / 16.5 miles (87,120 ft)
Carl Wagner, Sr. 11215 Pucker St. Niles, 49120	Berrien	26	F / 17.0 miles (89,760 ft)
John Warmbein RFD 2 Box 180 (Old Mill Rd.) Three Oaks, 49128	Weesaw	19	J / 8.5 miles (44,880 ft)
Milton Preston 57643 Indian Lk Rd. Dowagiac, 49047	This dairy farm is not located in Berrien County. It is in Cass County		E / 18.4 miles (97,152 ft)

The above farms are Michigan Department of Agriculture Grade A approved.

2001 Land Use Census – Operating Dairy Farms in Berrien County - Continued

The farms listed below are not MI Department of Agriculture approved Farms.

Name and Address	Township	Section	Sector/Distance
Arvon Arent 463-6546 2300 Angling Rd. Watervliet, MI 49098	Bainbridge	3	C / 19.2 miles (101,380 ft)
Harvey Hoffman 2533 N M-140 Hwy. Watervliet, 49098	Watervielt	35	C / 20.3 miles (107,180 ft)
Jeff Monroe 10627 Miller Rd.. Baroda, 49101	Lake	27	G / 5.0 miles (26,400 ft)
Dr. Ken Siefert Town & Country (Vet Clinic) 3127 N, Fifth St. (M-51). Niles, 49120	Niles	12	F / 19.3 miles (101,900 ft)
Tony Waldo 14255 Minnich Rd. Sawyer, 49125	Chikaming	13	J / 7.8 miles (41,180 ft)
Jerry Warmbein 14143 Mill Road. Three dOaks, 49128	Weesaw	18	J / 7.7 miles (40,660 ft)
Robert Zebell 7819 Kruger Road Three Oaks, 49128	Three Oaks	33 & 34	K / 12.0 miles (63,360 ft)
Zieger Farm 5692 Warren Woods Rd. Three Oaks, 49128	Three Oaks	25	J / 9.4 miles (49,630 ft)

The following farms/residences have steer/cows (Holstein or Jersey)/goats which are not used for milking at this time but should be verified annually.

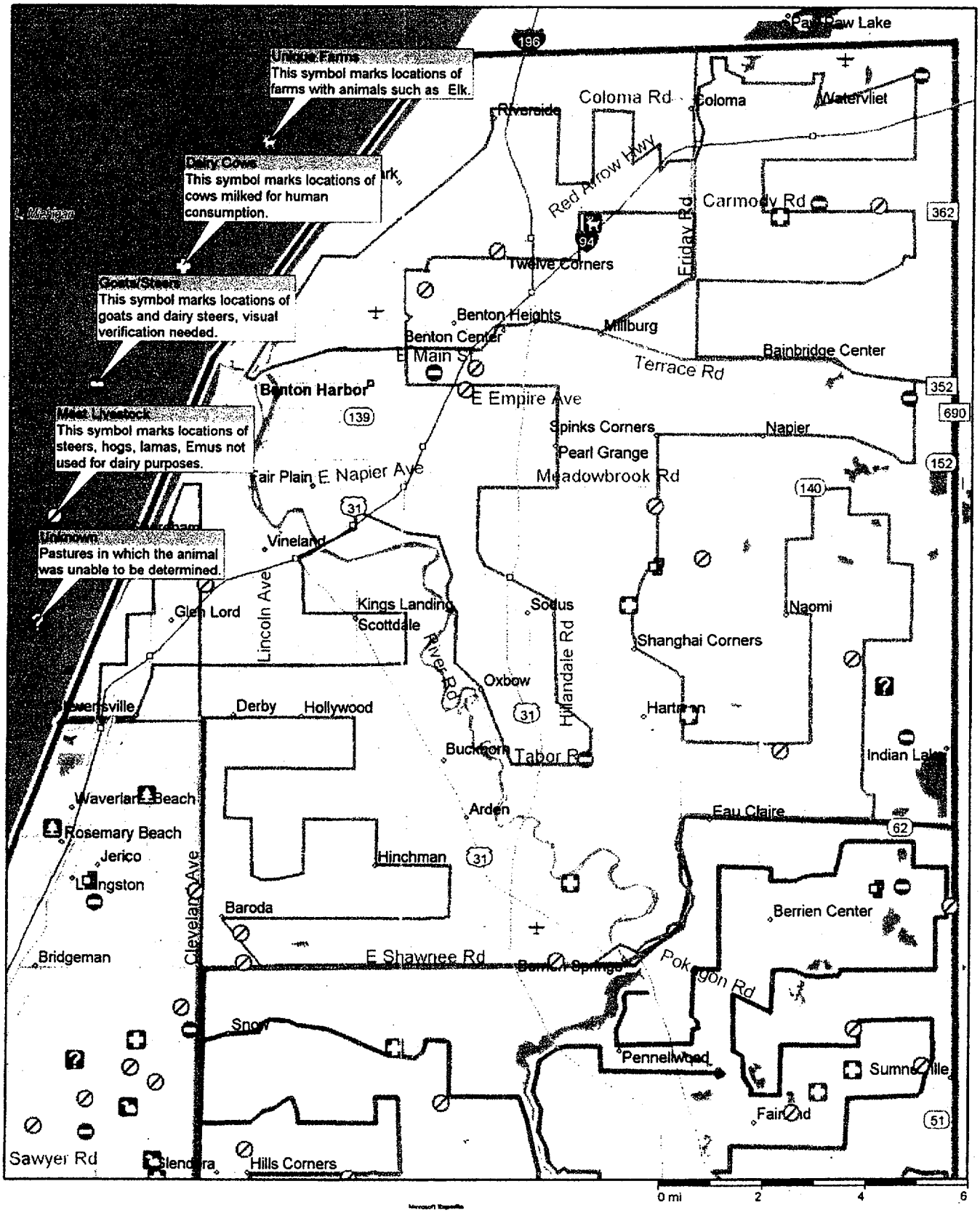
Devrie 1847 Gardner Rd.. Buchanan, 49107	Weesaw	10	G / 7.8 miles (41,180 ft)
William Haase 10276 Miller Rd Baroda, 49101	Lake	27	G / 4.5 miles (23,760 ft)
Richard Leneway 2650 Red Bud Tr. Niles, 49120	Bertrand	14	G / 17.1 miles (90,290 ft)
Patyno 2629 Glendora Rd. Buchanan, 49107	Weesaw	10	H / 7.2 miles (38,020 ft)

2001 Land Use Census – Operating Dairy Farms in Berrien County - Continued

The following farms/residences have steer/cows (Holstein or Jersey)/goats which are not used for milking at this time but should be verified annually.

Name and Address	Township	Section	Sector/Distance
Arthur Phillips 2414 Park Rd. Eau Claire, 49111	Bainbridge	31	D / 14.0 miles (73,920 ft)
Nelson Farm Shawnee Rd. Berrien Springs, 49103	Oronoko	14	F / 10.5 miles (55,440 ft)
Roger Tumbleson 3120 Mayflower Rd. Niles, 49120	Bertrand	19	G / 19.0 miles (100,320 ft)
Chad While 1558 W. Shawnee Rd. Baroda, 49101	Lake	14	F / 4.5 miles (23,760 ft)

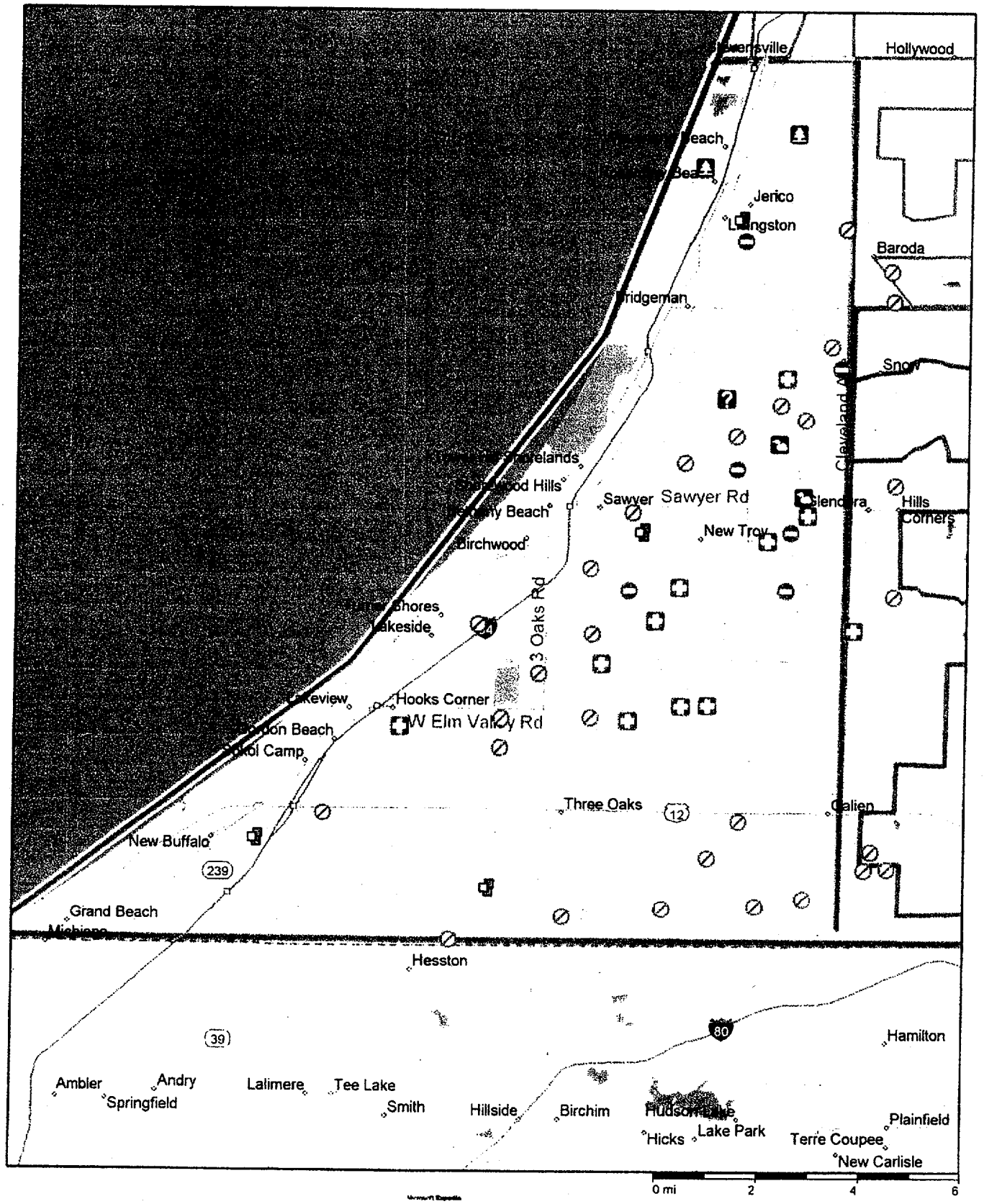
Landuse 2001



Streets98

Attachment 1
Page 1 of 3

Landuse 2001



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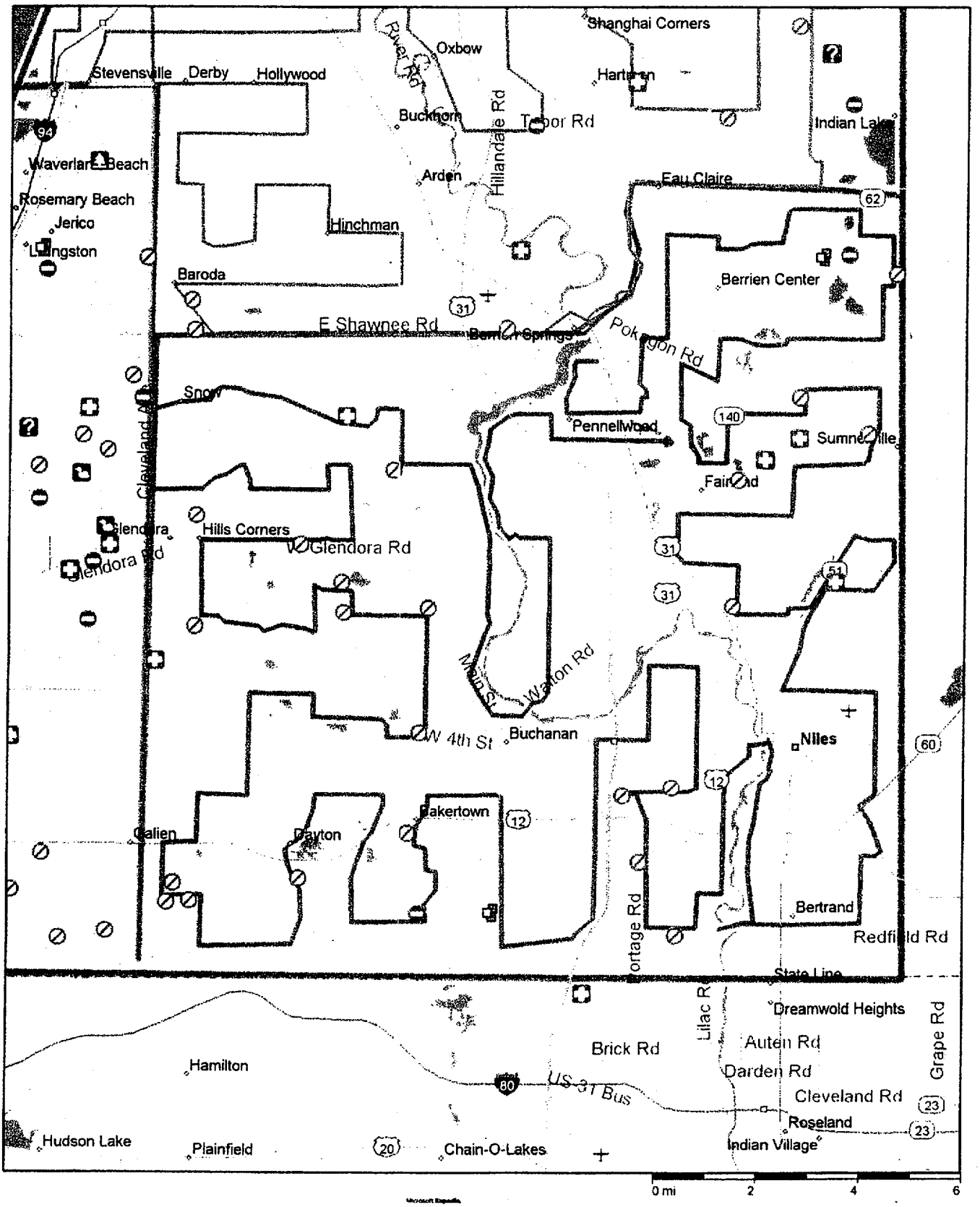
Landuse 2001



Streets98

I. Residential Land Use Data

Sector	House Number	Lot Number	Distance (ft)
A	1. Iler Rd. (Rosemary Beach) Lot #19	11-11-0006-0004-01-7	2161
B	2. Iler Rd. (Rosemary Beach) Lot #18	11-11-0006-0004-09-2	2165
C	3. Lake Rd. (Rosemary Beach) Lot #9	11-11-6800-0028-00-0	3093
D	4. 7500 Thorton Rd.	11-11-0005-0036-01-8	5733
E	5. 7927 Red Arrow Highway	11-11-0008-0009-07-0	5631
F	6. 8197 Red Arrow Highway	11-11-0008-0015-03-1	5392
G	7. 8345 Red Arrow Highway	11-11-0008-0010-03-0	5382
H	8. Lot #6 Wildwood (2352)	11-11-8600-0006-00-4	4650
J	9. Livingston Hills (8493)	11-11-0007-0010-02-3	3366
K	10. Livingston Hills (4781)	11-11-0007-0010-03-1	3090

II Dairy Farm Survey

Additions

Sector	Name & Address	Distance (ft)
J	Tony Waldo 14255 Minnich Rd., Sawyer, 49125	41,200
C	Harvey Hoffman 2533 N. M-140 Hwy., Watervliet 49098	107,200

Deletions

Sector	Name & Address	Distance (ft)
G	Roger Tumbleson 3120 Mayflower Rd., (still have meat goats)	100,320

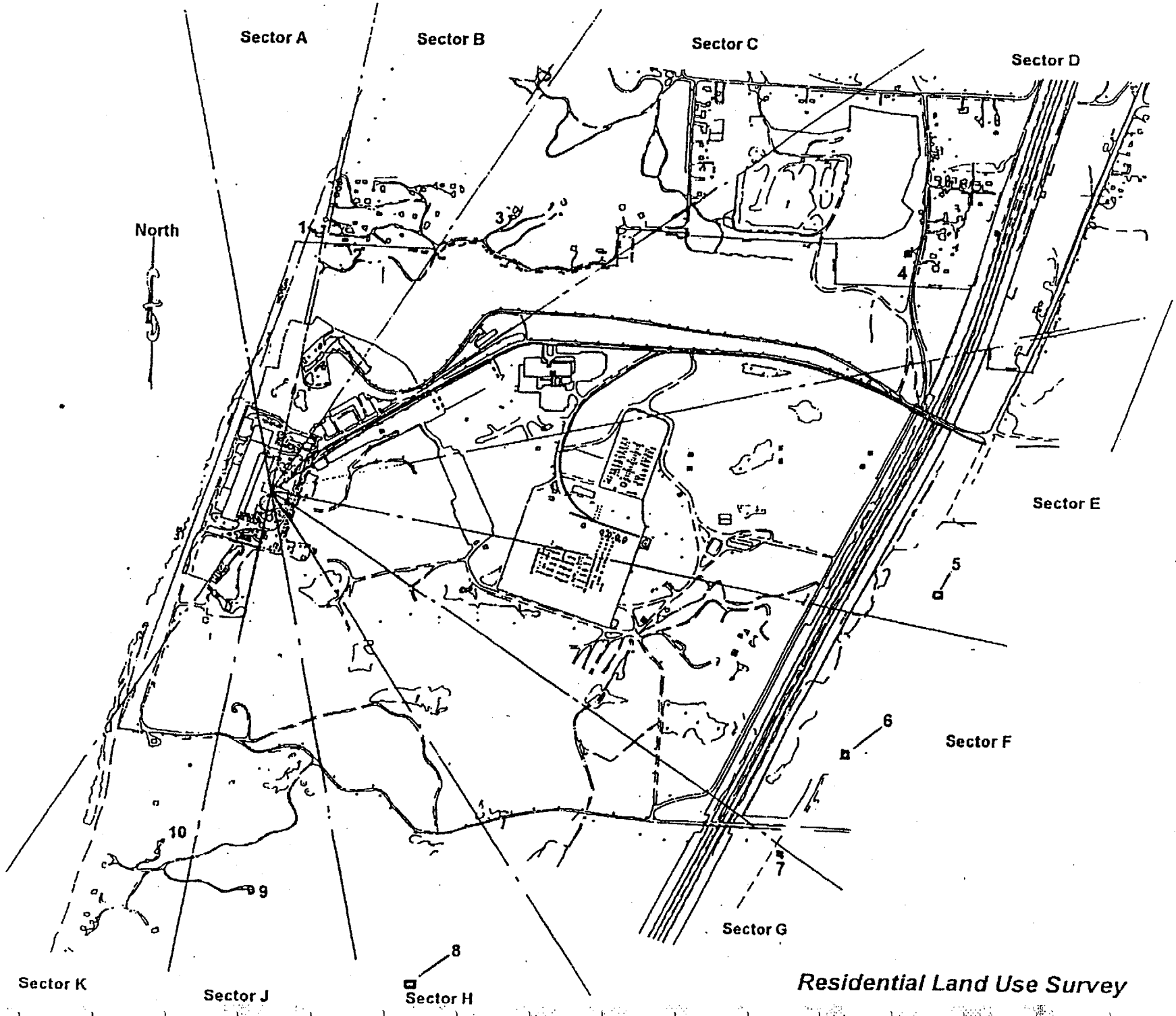
III Closest Milk Producing Animal [Ref.7.2.1b]

Sector	Name & Address	Distance (ft)
F & H	Shuler Farm, 2791 Snow Rd., Baroda 49101	21,648

Performed By: Jan H Hamer Date 09-31-01

Reviewed By: Lisa J Noble Date 10-5-01

Old Form RP-640-01



Attachment 4
Page 1 of 1

APPENDIX G

SUMMARY OF THE PRE-OPERATIONAL RADIOLOGICAL MONITORING PROGRAM

SUMMARY OF THE PREOPERATIONAL RADIOLOGICAL MONITORING PROGRAM

A preoperational radiological environmental monitoring program was performed for the Donald C. Cook Nuclear Plant from August 1971 until the initial criticality of Unit 1 on January 18, 1975. The analyses of samples collected in the vicinity of the Donald C. Cook Nuclear Plant were performed by Eberline Instrument Corporation. The summary of the preoperational program presented in this appendix is based on the seven semi-annual reports covering the period. The purpose of this summary is to provide a comparison of the radioactivity measured in the environs of the Donald C. Cook Nuclear Plant during the pre-start up of Unit 1 and the radioactivity measured in 2001.

As stated in the report for the period of July 1 to December 31, 1971, the purposes of a preoperational radiological monitoring program include:

(a) "To yield average values of radiation levels and concentrations of radioactive material in various media of the environment.

(b) To identify sample locations and/or types of samples that deviate from the averages.

(c) To document seasonal variations that could be erroneously interpreted when the power station is operating.

(d) To indicate the range of values that should be considered "background" for various types of samples.

(e) To "proof test" the environmental monitoring equipment and procedures prior to operation of the nuclear power station.

(h) To provide baseline information that will yield estimates of the dose to man, if any, which will result from plant operation."

The discussion that follows is for the various sample media collected and analyzed in both the preoperational period and during 2001. Analyses performed during the preoperational but not required in 2001, are not discussed.

The gross beta activity in air particulate filters ranged from 0.01 to 0.17 pCi/m^3 from the middle of 1971 to the middle of 1973. In June of 1973 and in June of 1974 the People's Republic of China detonated atmospheric nuclear tests. As a result there were periods during which the gross beta results were elevated to as high as 0.45 pCi/m^3 with no statistically significant differences between indicator and background stations. By the end of the preoperational period the values were approximately 0.06 pCi/m^3.

The gamma ray analyses of composited air particulate filters showed "trace amounts" of fission products, Ce-144, Ru-106, Ru-103, Zr-95, and Nb-95, the results of fallout from previous atmospheric nuclear tests. Cosmogenically produced beryllium-7 was also detected.

The direct radiation background as measured by thermoluminescent dosimeters (TLD) ranged between 1.0 and 2.0 mRem/week during the three and one-half years period.

Milk samples during the preoperational period were analyzed for iodine-131 and by gamma ray spectroscopy (and for strontium-89 and strontium-90). All samples had naturally occurring potassium-40 with values ranging between 520 and 2310 pCi/liter. Cesium-137 was measured in many samples after the two atmospheric nuclear tests mentioned above. The cesium-137 activity ranged from 8 to 33 pCi/liter. Iodine-131 was measured in four milk samples collected July 9, 1974. The values ranged between 0.2 and 0.9 pCi/liter.

Lake water samples were collected and analyzed for tritium and by gamma ray spectroscopy. Tritium activities were below 1000 pCi/liter and typically averaged about 400 pCi/liter. No radionuclides were detected by gamma ray spectroscopy.

Gamma ray spectroscopy analyses of lake sediment detected natural abundances of potassium-40, uranium and thorium daughters, and traces of cesium-137 below 0.1 pCi/g which is attributed to fallout.

Gamma spectroscopy analyses of fish detected natural abundance of potassium-40 and traces of cesium-137; the latter attributed to fallout.

Drinking water analysis was not part of the preoperational program.

APPENDIX H

SUMMARY OF THE REMP QUALITY CONTROL PROGRAM

Teledyne Brown Engineering
Quality Control Summary
2001

The quality assurance program at Teledyne Brown Engineering – Environmental Services (TBE-ES) is designed to serve two overall purposes: 1) Establish a measure of confidence in the measurement process to assure the licensee, regulatory agencies and the public that analytical results are accurate and precise; and 2) Identify deficiencies in the sampling and/or measurement process to those responsible for these operations so that corrective action can be taken. Quality assurance is applied to all steps of the measurement process, including the collection, measurement and reporting of data, as well as the record keeping of the final results. Quality control, as part of the quality assurance program, provides a means to control and measure the characteristics of the measurement equipment and processes, relative to established requirements.

TBE-ES laboratory employs a comprehensive quality assurance program designed to monitor the quality of analytical processing to ensure reliable environmental monitoring data. The program includes the use of controlled procedures for all work activities, a nonconformance and corrective action tracking system, systematic internal audits, audits by external groups, a laboratory quality control program which include regular Quality Control (QC) samples to include blanks, Laboratory Control Samples (LCS) and duplicates, and a staff training program. Monitoring programs also include the Interlaboratory Quality Control Program administered by the Laboratory Quality Assurance Manager (used in conjunction with the National Institute of Standards and Technology's Measurement Assurance Program, NIST MAP) and a third party interlaboratory program administered by Analytics, Inc. and Environmental Resource Associates. Together these programs are targeted to supply QA/QC sources at 5% of the client sample analysis load. In addition the Laboratory Quality Control Audit Committee administers a blind duplicate program conducted through client environmental monitoring programs. The TBE Quality Assurance Program meets or exceeds all requirements specified in Reg. Guide 4.15, Quality Assurance for Radiological Monitoring Programs.

This summary reports QC sample data and interlaboratory known values or interlaboratory results analyzed or received by TBE-ES during the year 2001. Any problems that are identified during the course of these studies are investigated by means of the TBE Corrective Action Process.

Blanks

Laboratory blanks were analyzed on water.

These blanks were analyzed for gross alpha, gross beta, iodine-131, strontium-89, and strontium-90. A total of 351 blanks were analyzed. The analytical are presented in the attached table.

Spikes

Laboratory spikes or laboratory control samples were analyzed for the following matrices: Water, Milk, and Other Liquid. These spikes were analyzed for gross alpha, gross beta, tritium, iodine-131, strontium-89, and strontium-90. A total of 351 spikes were analyzed. The analytical are presented in the attached table.

Duplicates

Duplicate samples were analyzed for the following matrices: Air Particulates, Charcoal Filters, Ground Water, and Milk. These duplicates were analyzed for gross beta, iodine-131, potassium-40, and tritium. A total of 42 duplicate sets were analyzed. The analytical results are presented in the attached table.

Intercomparison Data

The intercomparsion tables and graphs are includes in Appendix D.

GROSS ALPHA, GROSS BETA
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

	Gross Alpha, Total pCi			Gross Beta, Total pCi			
Count date	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	
02/09/2001	< 0.001	9.7	11.2	< 0.002	22.0	22.1	
02/09/2001	< 0.002	9.1	11.2	< 0.002	22.0	22.1	
02/09/2001	< 0.001	9.7	11.2	< 0.002	21.0	22.1	
02/16/2001	< 0.010	1.9	11.2	< 0.020	5.1	22.1	(a)
02/20/2001	< 0.001	0.026	11.2	< 0.002	0.069	22.1	(a)
02/20/2001	< 0.001	0.027	11.2	< 0.002	0.065	22.1	(a)
02/20/2001	< 0.001	0.025	11.2	< 0.002	0.076	22.1	(a)
02/22/2001	< 0.100	10	11.2	< 0.200	21.0	22.1	
02/28/2001	< 0.200	10	11.2	< 0.600	22.0	22.1	
03/02/2001	< 0.090	3.3	11.2	< 0.200	5.7	22.1	(a)
03/02/2001	< 0.090	1.7	11.2	< 0.200	5.4	22.1	(a)
03/02/2001	< 0.300	6.9	11.2	< 0.900	20.0	22.1	(a)
03/06/2001	< 0.300	9.4	11.2	< 0.001	19.0	22.1	
03/08/2001	< 0.500	13	11.2	< 1.000	22.0	22.1	
03/15/2001	< 0.200	7.4	11.2	< 0.700	22.0	22.1	(a)
03/15/2001	< 0.200	11	11.2	< 0.700	22.0	22.1	
03/21/2001	< 0.200	14	11.2	< 0.800	22.0	22.1	(a)
03/22/2001	< 0.500	14	11.2	< 1.000	20.0	22.1	(a)
03/26/2001	< 0.500	13	11.2	< 1.000	20.0	22.1	
03/27/2001	< 0.200	13	11.2	< 0.700	24.0	22.1	
03/27/2001	< 0.200	11	11.2	< 0.700	23.0	22.1	
03/29/2001	< 0.400	12	11.2	< 1.000	23.0	22.1	
04/03/2001	< 0.600	12	11.2	< 1.000	23.0	22.1	
04/12/2001	< 0.400	12	11.2	< 0.700	22.0	22.1	
04/17/2001	< 0.400	10	11.2	< 0.900	20.0	22.1	
04/18/2001	< 0.300	11	11.2	< 0.700	23.0	22.1	
04/26/2001	< 0.600	8.8	11.2	< 0.800	22.0	22.1	(a)
04/30/2001	< 0.600	12	11.2	< 1.000	21.0	22.1	
04/30/2001	< 0.600	11	11.2	< 1.000	21.0	22.1	
04/30/2001	< 0.700	11	11.2	< 1.000	19.0	22.1	

(a) Spike plated out on the side of the container. Retraining was conducted. Client samples were not affected.

GROSS ALPHA, GROSS BETA
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

	Gross Alpha, Total pCi			Gross Beta, Total pCi			
Count date	Blank	Spike Found pCi	Spike In pCi	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	
05/04/2001	< 0.400	11	11.2	< 0.700	22.0	22.1	
05/09/2001	< 0.700	8.2	11.2	< 1.000	22.0	22.1	(a)
05/10/2001	< 0.300	9.9	11.2	< 1.000	22.0	22.1	
05/10/2001	< 0.300	8.9	11.2	< 1.000	22.0	22.1	(a)
05/10/2001	< 0.300	10	11.2	< 1.000	22.0	22.1	
05/17/2001	< 0.001	8.8	11.2	< 0.003	22.0	22.1	(a)
05/17/2001	< 0.001	10	11.2	< 0.003	23.0	22.1	
05/22/2001	< 0.0008	9.8	11.2	< 0.002	22.0	22.1	
05/23/2001	< 0.070	14	11.2	< 0.100	21.0	22.1	(a)
05/23/2001	< 0.001	8.6	11.2	< 0.002	21.0	22.1	(a)
05/30/2001	< 0.300	9.7	11.2	< 0.800	22.0	22.1	
06/07/2001	< 0.400	10	11.2	< 0.700	22.0	22.1	
06/08/2001	< 0.100	< 0.6	11.2	< 0.200	20.0	22.1	(a)
06/15/2001	< 0.300	8.1	11.2	< 0.700	23.0	22.1	(a)
06/19/2001	< 0.600	8.8	11.2	< 0.600	22.0	22.1	(a)
06/22/2001	< 0.400	10	11.2	< 0.700	23.0	22.1	
06/27/2001	< 0.700	12	11.2	< 1.000	22.0	22.1	
07/03/2001	< 0.400	9.7	11.2	< 0.700	23.0	22.1	
07/10/2001	< 0.400	8.7	11.2	< 0.700	22.0	22.1	
07/17/2001	< 0.200	11	11.2	< 0.800	25.0	22.1	
07/20/2001	< 0.500	12	14.7	< 0.800	26.0	25.3	
07/31/2001	< 0.300	12	14.7	< 0.700	26.0	25.3	
07/31/2001	< 0.300	12	14.7	< 0.700	24.0	25.3	
08/06/2001	< 0.001	15	14.7	< 0.001	26.0	25.3	
08/14/2001	< 0.300	13	14.7	< 0.700	26.0	25.3	
08/16/2001	< 0.400	14	14.7	< 0.800	25.0	25.3	
08/16/2001	< 0.400	13	14.7	< 0.800	25.0	23.3	
08/17/2001	< 0.400	11	14.7	< 0.700	26.0	25.3	
08/27/2001	< 0.800	11	14.7	< 1.000	26.0	25.3	
08/28/2001	< 0.600	13	14.7	< 1.000	28.0	25.3	
08/29/2001	< 0.500	12	14.7	< 0.700	24.0	25.3	

(a) Spike plated out on the side of the container. Retraining was conducted.

GROSS ALPHA, GROSS BETA
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

	Gross Alpha, Total pCi			Gross Beta, Total pCi		
Count date	Blank	Spike Found pCi	Spike In pCi	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)
09/10/2001	< 0.700	15	14.7	< 1.000	28.0	25.3
09/12/2001	< 0.200	22	29.3	< 0.600	25.0	25.3
09/19/2001	< 0.300	26	29.3	< 0.800	23.0	25.3
09/19/2001	< 0.300	23	29.3	< 0.800	25.0	25.3
09/24/2001	< 0.600	31	29.3	< 1.000	26.0	25.3
09/27/2001	< 0.300	28	29.35	< 0.700	24.0	25.3
10/01/2001	< 0.300	30	29.3	< 0.800	24.0	25.3
10/02/2001	< 0.400	25	29.4	< 0.700	25.0	25.3
10/04/2001	< 0.600	25	29.3	< 1.000	25.0	25.3
10/05/2001	< 0.400	23	29.3	< 0.700	24.0	25.3
10/09/2001	< 0.300	27	29.3	< 0.700	24.0	25.3
10/10/2001	< 0.700	34	29.3	< 1.000	23.0	25.3
10/11/2001	< 0.400	28	29.3	< 0.800	24.0	25.3
10/11/2001	< 0.300	29	29.3	< 0.700	26.0	25.3
10/12/2001	< 0.500	32	29.3	< 0.700	25.0	25.3
10/12/2001	< 0.500	27	29.3	< 0.700	25.0	25.3
10/16/2001	< 0.400	27	29.3	< 0.700	24.0	25.3
10/19/2001	< 1.000	35	29.3	< 1.000	22.0	25.3
10/23/2001	< 0.300	29	29.3	< 0.700	24.0	25.3
10/26/2001	< 0.400	29	29.3	< 0.600	24.0	25.3
10/26/2001	< 0.400	26	29.3	< 0.600	24.0	25.3
10/31/2001	< 0.900	28	29.3	< 0.800	25.0	25.3
10/31/2001	< 0.500	28	29.3	< 0.700	25.0	25.3
11/07/2001	< 0.300	27	29.3	< 0.900	25.0	25.3
11/09/2001	< 0.500	27	29.3	< 1.000	23.0	25.3
11/12/2001	< 0.400	25	29.3	< 0.800	23.0	25.3
11/14/2001	< 0.300	24	29.3	< 0.700	25.0	25.3
11/16/2001	< 0.700	30	29.3	< 1.000	25.0	25.3
11/20/2001	< 0.400	27	29.3	< 0.700	26.0	25.3
11/21/2001	< 0.800	33	29.3	< 1.000	22.0	25.3
11/21/2001	< 0.700	29	29.3	< 0.700	23.0	25.3

GROSS ALPHA, GROSS BETA
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

	Gross Alpha, Total pCi			Gross Beta, Total pCi		
Count date	Blank	Spike Found pCi	Spike In pCi	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)
12/05/2001	< 0.400	31	29.3	< 0.700	28.0	25.3
12/06/2001	< 0.700	30	29.3	< 1.000	23.0	25.3
12/10/2001	< 0.200	32	29.3	< 0.800	28.0	25.3
12/17/2001	< 0.300	25	29.3	< 0.700	24.0	25.3
12/19/2001	< 0.500	27	29.3	< 0.800	25.0	25.3
12/19/2001	< 0.500	32	29.3	< 0.800	25.0	25.3
12/21/2001	< 0.500	31	29.3	< 0.900	25.0	25.3

H-3
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Count date	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	
01/12/2001	< 2.0	1200	1127	
01/20/2001	< 1.0	1300	1127	
01/22/2001	< 1.0	1300	1127	
01/23/2001	< 1.0	1300	1127	
01/26/2001	< 1.0	1300	1127	
01/27/2001	< 1.0	1300	1127	
01/31/2001	< 1.0	1300	1127	
02/01/2001	< 0.8	2300	1127	(a)
02/06/2001	< 1.0	1300	1127	
02/07/2001	< 1.0	1300	1127	
02/08/2001	< 1.0	1300	1127	
02/09/2001	< 1.0	1400	1127	
03/01/2001	< 0.1	1200	1127	
03/03/2001	< 0.1	1200	1127	
03/06/2001	< 0.2	1300	1127	
03/12/2001	< 0.1	1200	1127	
03/15/2001	< 0.1	1200	1127	
03/20/2001	< 1.0	1400	1127	
03/21/2001	< 1.0	1300	1127	
03/23/2001	< 0.1	1200	1127	
03/24/2001	< 1.0	1300	1127	
03/26/2001	< 0.1	1200	1127	
03/30/2001	< 0.1	1100	1127	
03/31/2001	< 1.0	1300	1127	
04/07/2001	< 0.1	1100	1127	
04/11/2001	< 1.0	1200	1127	
04/11/2001	< 0.1	1100	1127	
04/12/2001	< 0.3	1400	1127	
04/13/2001	< 0.1	1100	1127	
04/14/2001	< 0.3	1300	1127	
04/16/2001	< 1.0	910	1127	
04/17/2001	< 0.9	920	1127	
04/19/2001	< 1.0	1200	1127	
04/22/2001	< 1.0	1300	1127	
04/25/2001	< 0.1	1100	1127	

(a) Sample was double spiked.

H-3
IN-HOUSE BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Count date	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)
05/01/2001	< 0.10	1100	1127
05/04/2001	< 1.00	1200	1127
05/05/2001	< 1.00	1100	1127
05/08/2001	< 1.00	920	1127
05/08/2001	< 1.00	920	1127
06/16/2001	< 0.20	1100	1127
06/18/2001	< 0.10	1100	1127
06/19/2001	< 0.90	910	1127
06/20/2001	< 0.10	1100	1127
06/27/2001	< 1.00	1200	1127
06/29/2001	< 0.10	1100	1127
06/29/2001	< 1.00	1300	1127
07/13/2001	< 0.10	1100	1127
08/01/2001	< 0.10	1100	1127
08/08/2001	< 0.10	1100	1127
08/11/2001	< 1.00	1300	1127
08/11/2001	< 1.00	1300	1127
08/19/2001	< 1.00	1200	1127
08/20/2001	< 0.10	1100	1127
08/25/2001	< 1.00	950	1127
09/01/2001	< 0.09	1100	1127
09/16/2001	< 0.10	1100	1127
10/03/2001	0.55	1100	1127
10/08/2001	< 0.10	1100	1127
10/08/2001	< 0.90	1200	1127
10/25/2001	< 0.09	1100	1127
10/25/2001	< 0.09	1100	1127
10/25/2001	< 1.00	1200	1127
11/02/2001	0.99	1100	1127
11/13/2001	< 0.10	1100	1127
11/13/2001	0.13	1100	1127
11/13/2001	< 1.00	1100	1127
11/16/2001	< 1.00	1100	1127
11/30/2001	< 1.00	1100	1127
12/04/2001	< 1.00	1200	1127
12/08/2001	< 2.00	1100	1127

I-131
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Count date	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	
02/15/2001	< 0.2	27	32.30	
03/09/2001	< 0.4	2.9	4.85	(a)
04/04/2001	< 0.3	0.4	0.52	(a)
05/15/2001	< 0.2	< 0.1		(a)
09/17/2001	< 0.4	17.00	21.00	
09/28/2001	< 1.0	3.5	4.09	

(a) I-131 spike solution was too old. When replaced, the spike results were acceptable.

Sr-89, Sr-90
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Count date	Sr-89 Blank (pCi)	Sr-89 Spike Found (pCi)	Sr-89 Spike In (pCi)	Sr-90 Blank (pCi)	Sr-90 Spike Found (pCi)	Sr-90 Spike In (pCi)	
02/19/2001				< 0.5	15.5	16.09	
02/28/2001				< 0.001	0.074	16.07	
02/23/2001	< 0.05	53	41.59				(a)
03/05/2001	< 0.2	100	121.66	< 0.2	28	30.15	
03/10/2001	< 1	61.7	65.89	< 6.8	30.2	32.07	
03/16/2001				< 2.0	31.1	31.55	
03/20/2001				< 2.0	34.0	31.59	
03/28/2001				< 0.5	137.0	12.77	
04/05/2001	< 2	49.4	47.41	< 1.0	27.5	32.02	
04/12/2001	< 2	33.1	43.07	< 0.8	22.9	32.00	(b)
04/12/2001				< 0.0008	14.6	15.34	
04/13/2001				< 1.0	11.0	16.06	
04/20/2001				< 0.3	15.5	15.99	
04/26/2001	< 8	35	35.55	< 1.0	29.2	31.97	(b)
04/30/2001				< 3.0	17	15.00	
05/17/2001				< 0.8	16	15.53	
05/25/2001	< 3	34.4	34.23	< 1.0	42	44.80	
06/01/2001	< 2	33	30.60	< 1.0	26.4	31.93	
06/01/2001	< 2	34.1	39.30	< 1.0	43.7	41.55	
06/15/2001				< 1.0	13.7	15.48	
06/19/2001	< 2	30.8	36.36	< 2.0	36.4	38.14	
06/27/2001	< 2	21.5	26.08	< 1.0	43.7	50.40	
07/05/2001	< 3	28.3	24.97	< 2.0	35.5	39.05	
07/10/2001				< 0.8	13.6	15.45	
07/17/2001	< 1	24.4	23.45	< 0.6	34.5	46.54	
08/02/2001	< 2	15.0	14.72	< 1.0	37.2	44.95	
08/10/2001	< 1	30.5	33.24	< 0.7	23.6	27.07	
08/23/2001	< 3	11.9	11.681	< 2.0	32.7	40.18	
08/23/2001	< 2	11.9	12.91	< 1.0	38.1	43.05	
08/24/2001	< 1	25.1	27.43	< 1.0	22.7	27.04	

(a) Incorrect reference date was being used. Client samples were not affected.

Sr-89, Sr-90
IN-HOUSE WATER BLANK AND SPIKE PROGRAM
TELEDYNE QC PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

	Sr-89			Sr-90		
Count date	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)	Blank (pCi)	Spike Found (pCi)	Spike In (pCi)
09/06/2001	< 2	13.7	15.6	< 0.3	45.4	51.6
09/06/2001	< 2	12.8	13.7	< 0.9	51.7	58.0
09/12/2001				< 0.6	24.5	24.5
09/20/2001	< 2	8.6	11.5	< 0.9	47.0	49.2
09/26/2001	< 1	33.8	43.6	< 0.6	23.0	27.1
10/03/2001	< 4	11	9.9	< 0.9	50	54.1
10/08/2001	< 2	31	37.0	< 1.0	26	27.1
10/12/2001	< 3	17	17.4	< 0.7	31	35.3
10/23/2001	< 1	54	60.2	< 0.8	24	27.1
10/24/2001	< 2	17	19.5	< 1.0	42	45.6
10/25/2001	< 1	54	60.2	< 0.8	24	27.1
11/13/2001	< 2	20	22.7	< 0.7	41	45.9
12/04/2001	< 2	30	34.4	< 0.7	30	33.6
12/11/2001	< 1	74	76.9	< 0.6	44	54.2
12/19/2001	< 2	26	29.6	< 0.8	35	36.0

Results of Duplicate Analyses for 2001

Sample Type	Analysis	Date	First Analysis	Second Analysis
Air Particulates Results in Units of pCi/m3	Gr-Beta	01/10/01	2.4E-02 ± 2.0E-03	2.6E-02 ± 2.0E-03
	"	01/24/01	3.3E-02 ± 3.0E-03	3.3E-02 ± 3.0E-03
	"	02/07/01	2.1E-02 ± 2.0E-03	2.1E-02 ± 2.0E-03
	"	02/21/01	3.0E-02 ± 2.0E-03	3.0E-02 ± 2.0E-03
	"	03/07/01	1.7E-02 ± 2.0E-03	1.7E-02 ± 2.0E-03
	"	03/21/01	1.8E-02 ± 2.0E-03	1.7E-02 ± 2.0E-03
	"	04/04/01	1.7E-02 ± 2.0E-03	1.4E-02 ± 2.0E-03
	"	04/18/01	1.4E-02 ± 2.0E-03	1.3E-02 ± 2.0E-03
	"	05/02/01	1.8E-02 ± 2.0E-03	1.9E-02 ± 2.0E-03
	"	05/23/01	1.2E-02 ± 2.0E-03	1.2E-02 ± 2.0E-03
	"	06/06/01	6.7E-03 ± 1.7E-03	7.5E-03 ± 1.7E-03
	"	06/20/01	1.9E-02 ± 1.7E-03	1.9E-02 ± 2.0E-03
	"	07/04/01	1.9E-02 ± 1.7E-03	1.9E-02 ± 2.0E-03
	"	07/18/01	1.6E-02 ± 1.7E-03	1.5E-02 ± 2.0E-03
	"	08/08/01	2.4E-02 ± 1.7E-03	2.5E-02 ± 2.0E-03
	"	08/22/01	1.7E-02 ± 1.7E-03	1.9E-02 ± 2.0E-03
	"	09/05/01	1.6E-02 ± 1.7E-03	1.6E-02 ± 2.0E-03
	"	09/19/01	2.0E-02 ± 1.7E-03	2.1E-02 ± 2.0E-03
	"	10/03/02	2.2E-02 ± 1.7E-03	2.3E-02 ± 2.0E-03
	"	10/17/01	1.2E-02 ± 1.7E-03	1.2E-02 ± 2.0E-03
	"	10/31/02	1.3E-02 ± 1.7E-03	1.3E-02 ± 2.0E-03
	"	12/05/02	3.1E-02 ± 3.0E-03	2.8E-02 ± 2.0E-03
Air Particulates/ Charcoal Filters Results in Units of pCi/m3	I-131	01/10/01	< 2.E-02	< 1.E-02
	"	01/24/01	< 2.E-02	< 7.E-03
	"	02/07/01	< 3.E-02	< 2.E-02
	"	02/21/01	< 2.E-02	< 2.E-02
	"	03/21/01	< 1.E-02	< 1.E-02
	"	04/04/01	< 1.E-02	< 1.E-02
	"	04/18/01	< 1.E-02	< 2.E-02
	"	05/02/01	< 1.E-02	< 7.E-03
	"	05/23/01	< 2.E-02	< 2.E-02
	"	06/06/01	< 3.E-02	< 4.E-02
	"	06/20/01	< 2.E-02	< 2.E-02
	"	07/04/01	< 2.E-02	< 3.E-02
	"	07/18/01	< 1.E-02	< 2.E-02
	"	08/08/01	< 1.E-02	< 1.E-02
	"	08/22/01	< 2.E-02	< 3.E-02
	"	09/05/01	< 2.E-02	< 2.E-02
	"	09/19/01	< 1.E-02	< 1.E-02
	"	10/03/01	< 2.E-02	< 1.E-02
	"	10/17/01	< 3.E-02	< 2.E-02
	"	10/31/01	< 3.E-02	< 2.E-02

(a) All other gamma results were less than the detection limits (LLD).

Results of Duplicate Analyses for 2001 (Cont.)

Sample Type	Analysis	First Analysis		Second Analysis	
Ground Water	K-40 (a)	01/25/01	< 5.E+01		< 1.E+02
Results in Units	"	07/27/01	< 6.E+01		< 7.E+01
of pCi/liter					
	H-3	01/25/01	< 1.E+02		< 1.E+02
	"	07/27/01	< 1.E+02		< 1.E+02
Milks	I-131	02/28/01	< 3.E-01		< 4.E-01
Results in Units	"	04/25/01	< 3.E-01		< 3.E-01
of pCi/liter		07/04/01	< 3.E-01		< 4.E-01
	"	09/26/01	< 4.E-01		< 4.E-01
	"	10/24/01	< 6.E-01		< 4.E-01
	K-40 (a)	02/28/01	1.4E+03 ± 8.4E+01		1.3E+03 ± 7.5E+01
	"	04/25/01	1.4E+03 ± 8.2E+01		1.4E+03 ± 8.2E+01
	"	07/04/01	1.4E+03 ± 8.5E+01		1.3E+03 ± 7.3E+01
	"	09/26/01	1.6E+03 ± 9.1E+01		1.6E+03 ± 9.0E+01
	"	10/24/01	1.3E+03 ± 5.5E+01		1.4E+03 ± 5.6E+01

(a) All other gamma results were less than the detection limits (LLD).

APPENDIX I

TLD QUALITY CONTROL PROGRAM

Per Regulatory Guide 4.13, Section C.4 and ANSI N545-1975, thermoluminesent dosimeters (TLDs) are required to undergo performance testing as specified in the ANSI Standard. The results of the sub contractor supplied performance testing are summarized in this section.

Specific testing procedures were followed, and all tests were conducted in the manner requested by the standard.

Sixteen TLD badges were tested for Dependence of Exposure Interpretation on the Length of the Field Cycle, twelve TLD badges were tested for Uniformity, Reproducibility, and Direct Dependence, ten TLD badges were tested for Energy Dependence and Moisture Dependence, eight TLD badges were tested for Light Dependence, and four TLD badges were tested for Self Irradiation.

Panasonic TLD models UD-801 and UD 814AS11 containing CaSO4:Tm phosphors conform to the performance testing requirements for Environmental Dosimetry stated in ANSI Standard N-545-1975. All the tests were adequately completed in compliance with this standard.