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STUDY PLAN

THE OPERATIONAL ENVIRONMENTAL RADIOLOGICAL SURVEILLANCE PROGRAM FOR THE KEWAUNEE NUCLEAR POWER PLANT KEWAUNEE, WISCONSIN WISCONSIN PUBLIC SERVICE CORPORATION

SEPTEMBER 1969 TO PRESENT

PREPARED BY
TELEDYNE ISOTOPES MIDWEST LABORATORY
Project No. 8002

Prepared and Approved by: ______________________
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General Manager, TIML

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T.P. Meinz
Director, Environmental Services
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Revision 1, 17 August 1984

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1.0 INTRODUCTION

A nuclear power plant is designed to process radioactive wastes, liquid, and gaseous, before they are released into the environment. These wastes are processed to ensure that the level of radioactivity in the effluent is within the limits established by the U.S. Nuclear Regulatory Commission's Radiation Standards, 10 CFR 20. A program of operational environmental radiological surveillance provides the necessary information to make an assessment of the impact that limited releases of radioactive effluents from a plant will have on the environment.

2.0 PURPOSE AND SCOPE

The purpose of this study plan is to define an Operational Environmental Radiological Surveillance Program for the Kewaunee Nuclear Power Plant of the Wisconsin Public Service Corporation (WPS). The program will provide field and analytical data on the air, aquatic, and terrestrial radioecology of the area near the Kewaunee Nuclear Power Plant so as to:

1. Determine the effects of the operation of the Kewaunee Nuclear Power Plant on the environment;

2. Serve as a gauge of the operating effectiveness of in-plant control of waste discharges; and

3. Provide data on the radiation dose to the public by direct or indirect pathways of exposure.

The program will be reviewed periodically at the request of WPS Corporation so that changes in sampling locations or frequency of sample analyses can be made, if needed.

3.0 PROJECT MANAGEMENT

Teledyne Isotopes Midwest Laboratory (TIML), formerly Hazleton Environmental Sciences, is cognizant of the importance of a sound project management system for all projects, regardless of size. The project management system utilized by TIML integrates input from various sources to assure a cost-effective, quality-controlled product. The TIML Project Manager is responsible not only to the client but also to upper Teledyne Isotopes management.

This project for the Wisconsin Public Service Corporation (WPS) is under the direction and management of Mr. Leonid G. Huebner, Senior Scientist and General Manager of TIML. Mr. Huebner has been employed by Teledyne Isotopes (formerly Nalco and Hazleton Environmental Sciences) for over fifteen (15) years during which time he has been responsible for all technical aspects of projects conducted by the TIML. He has established numerous procedures for analyses of various samples and has become very familiar with all aspects of the instrumentation required for these analyses. Also during this time, Mr. Huebner has developed a working relationship with numerous clients on a technical and personal level.

Because of Mr. Huebner's experience in this field, he is able to provide considerable experience in the day-to-day activities of such a study. In addition, he is familiar with NRC procedures and keeps abreast of government regulations and their impact on the utility industry.

Prior to joining Nalco Environmental Sciences, Mr. Huebner was associated with the Division of Biology and Medicine at Argonne National Laboratory and with the Department of Geophysical Sciences, Tritium Analysis Laboratory of the University of Chicago. During this time, Mr. Huebner was awarded a NASA citation for his role in development of a combustion apparatus for the analysis of tritium and carbon 14 in biological samples. A more detailed resume for Mr. Huebner is contained in Appendix A.

Mr. Huebner will be assisted in the technical completion and management of this project by the TIML staff. The staff has several years experience in both analytical and field sampling phases of monitoring studies at nuclear power generating stations (resumes in Appendix A). The Teledyne Isotopes and Teledyne Isotopes Midwest Laboratory organizational charts are shown in Figures 3.0.1 and 3.0.2.

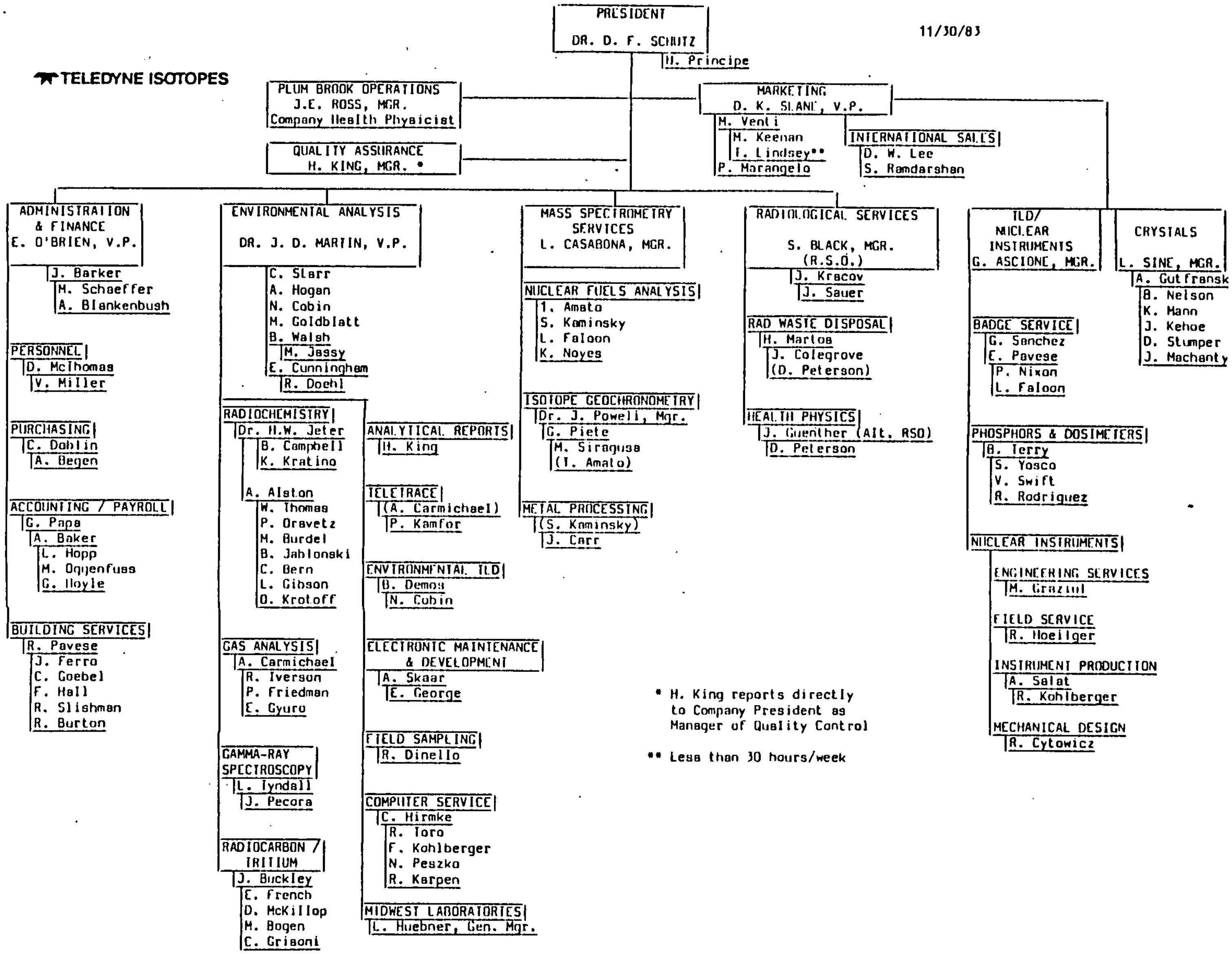

Figure 3.0.1. Teledyne Isotopes Organizational Chart.

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MIDWEST LABORATORY

- GENERAL MANAGER
  L. G. Huebner
  - Secretary
  - LAB SUPERVISOR
    L. G. Huebner
    (Acting)
    - C. Carlson, Lab Technician
    - T. Coorlim, Lab Technician
    - H. Furlone, Recording Clerk
    - T. Gordon, Lab Assistant
    - B. Grob, Research Assistant
    - L. Schimmerpfennig, Lab Technician
    - M. Kaplan, Lab Technician
    - J. Karnazes, Lab Tech Assistant
    - L. Kulig, Lab Technician (PT-20 hrs.)
    - R. Lesko, Data Clerk
    - T. Patton-Baker, Lab Technician
    - D. Reiter, Lab Technician (PT-30 hrs.)
    - G. Wilton, Research Assistant
    - J. Woods, Lab Technician
    - M. Wyco, Lab Technician

Figure 3.0.2 TIML Organizational Chart

4.0 WORK SCOPE-OPERATIONAL ENVIRONMENTAL RADIOLOGICAL SURVEILLANCE PROGRAM

Technical specifications for the KNPP are presented in Table 4.0-1. All sampling locations are described in Table 4.0-2. The type and frequency of collection are provided in Table 4.0-3. Table 4.0-4 identifies the codes used in Table 6.0-3 describe types of samples collected and analyzed. Sampling locations are shown in Figure 4.0-1.

The following is a brief description of the sampling program.

4.1 Airborne Particulates

Airborne particulates are collected at six locations (K-1f, K-2, K-7, K-8, K-15, K-16) on a continuous basis on a 47 mm diameter membrane filter of 0.8 micron porosity at a volumetric rate of approximately one cubic foot per minute (CFM). The filters are changed weekly, placed in glassine protective envelopes, and dispatched by U.S. Mail to TIML for radiometric analysis. Filter samples are analyzed weekly for gross alpha and gross beta activities after sufficient time (usually 3 to 5 days) has elapsed to allow decay of radon and thoron daughters. Samples which have high beta activity (greater than 10 pCi/m^3) will be analyzed by gamma spectroscopy (Germanium detector) to identify and quantify gamma emitting nuclides. Quarterly composites from each location are gamma scanned using the Germanium detector. All identifiable gamma-emitters are quantified. Reporting units are pCi/m^3.

4.2 Airborne Iodine

All air samplers are equipped with charcoal traps installed behind the particulate filters for collection of airborne I-131. The traps are changed bi-weekly. Iodine I-131 is measured by gamma spectral analysis.

4.3 Ambient Radiation

Two packets of thermoluminescent dosimeters (CaF_2:Mn bulbs) are placed at ten locations, six air sampling locations and four milk sampling locations (K-3, K-4, K-5, and K-6). One packet is changed quarterly and one annually. To insure the precision of the measurement, each packet will contain five bulbs. For protection against moisture each set of bulbs is sealed in a plastic bag and placed in a plastic containers.

Each bulb is protected by a case with an energy compensating shield and is individually calibrated for self-dose and light response. Fading is guarantied by the manufacturer (Harshaw Chemical Co.) not to exceed 5% in one year. The minimum detectable level is 1 mR ± 1 mR at one standard deviation. The accuracy of dosimeters exposed to a Co-60 or Cs-137 source is within ±20% of the true roentgen.

Reporting units for TLDs are mR/91 days for quarterly TLDs and mR/364 days for annual TLDs.

Table 4.0-1. Specifications of an Operational Environmental Radiological Surveillance Program for the Wisconsin Public Service Corporation's Kewaunee Nuclear Power Plant, Revised Minimum Levels of Detection, August, 1984.

Types of Samples	Location	Sampling Frequency	Type of Analysis	Frequency of Analysis	Reporting Units	Approximate Lower Level of Detection[a]	No. of Analyses per 2 years	Comments
A. Airborne Particulates	K-1f K-2 K-7 K-8 K-15 K-16	Weekly	Gross alpha Gross beta Gamma scan	Weekly Weekly Quarterly	pCi/m^3 pCi/m^3 pCi/m^3	$5x10^{-3}$ pCi/m^3 $1x10^{-2}$ pCi/m^3 $1x10^{-2}$ pCi/m^3 (Cs-137)	624 624 48	On all samples On all samples Quarterly composite for each location
B. Airborne Iodine	Same as A	Bi-weekly	I-131	Bi-weekly	pCi/m^3	$3x10^{-2}$ pCi/m^3	312	On all samples
C. TLD (5 bulbs in each packet)	K-1f K-2 K-3 K-4 K-5 K-6 K-7 K-8 K-15 K-16	Quarterly Annually	Gamma Gamma	Quarterly Annually	mR/Q mR/A	1 mR 1 mR	80 20	On all samples On all samples
D. Well Water	K-1h K-1g	Monthly	Gross alpha (TR)[a] Gross beta (TR) K-40 Tritium Sr-89 Sr-90 Radium-226 Gamma Scan	Monthly Monthly Monthly Quarterly Quarterly Quarterly - -	pCi/l pCi/l pCi/l pCi/l pCi/l pCi/l pCi/l pCi/l	3.0 pCi/l 4.0 pCi/l 3.4 pCi/l 330 pCi/l 10.0 pCi/l 2.0 pCi/l 1.0 pCi/l 10.0 pCi/l (Cs-137)	48 48 48 8 8 8 - -	On all samples On all samples On all samples Quarterly composite on one well Quarterly composite on one well Quarterly composite on one well Only on samples when alpha is >3 pCi/l Only on samples when beta is >30 pCi/l
	K-10 K-11 K-12 K-13	Quarterly	Gross alpha (TR) Gross beta (TR) K-40 Sr-89 Sr-90 Radium-226 Gamma Scan	Quarterly	pCi/l pCi/l pCi/l pCi/l pCi/l pCi/l pCi/l	3.0 pCi/l 4.0 pCi/l 3.4 pCi/l 10.0 pCi/l 2.0 pCi/l 1.0 pCi/l 10.0 pCi/l (Cs-137)	32 32 32 - - -	On all samples On all samples On all samples Only on samples when beta is >10 pCi/l Only on samples when alpha is >3 pCi/l Only on samples when beta is >30 pCi/l
E. Precipitation	K-11	Monthly	Tritium	Monthly	pCi/l	330 pCi/l	24	On all samples

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Table 4.0-1. (continued)

Types of Samples	Location	Sampling Frequency	Type of Analysis	Frequency of Analysis	Reporting Units	Approximate Lower Level of Detection[a]	No. of Analyses per 2 years	Comments
F. Milk	K-3	Weekly	I-131	Weekly*	pCi/l	0.5 pCi/l	384	On all samples
	K-4							
	K-5	Monthly	Gamma scan	Monthly	pCi/l	10.0 pCi/l (Cs-137)	144	Monthly composite
	K-6		Sr-89	Monthly	pCi/l	10.0 pCi/l	144	Monthly composite
	K-12		Sr-90	Monthly	pCi/l	2.0 pCi/l	144	Monthly composite
	K-19		Stable Potassium	Monthly	g/l	0.04 g/l	144	Monthly composite
			Stable Calcium	Monthly	g/l	0.01 g/l	144	Monthly composite
* Weekly during grazing season - monthly at other times.								
G. Grass	K-1b	3 times per year	Gross alpha	3/year	pCi/g	0.2 pCi/g wet wt.	48	2nd, 3rd, and 4th quarters
	K-1f		Gross beta	3/year	pCi/g	0.1 pCi/g wet wt.	48	2nd, 3rd, and 4th quarters
	K-3		Sr-89	3/year	pCi/g	0.06 pCi/g wet wt.	48	2nd, 3rd, and 4th quarters
	K-4		Sr-90	3/year	pCi/g	0.01 pCi/g wet wt.	48	2nd, 3rd, and 4th quarters
	K-5		Gamma scan	3/year	pCi/g	0.06 pCi/g wet wt. (Cs-137)	48	2nd, 3rd, and 4th quarters
	K-6							
	K-12							
	K-19							
H. Cattlefeed	K-3	Once a year	Gross alpha	Once a year	pCi/g	Same as grass	24	1st quarter only
	K-4		Gross beta	Once a year	pCi/g		24	1st quarter only
	K-5		Sr-89	Once a year	pCi/g		24	1st quarter only
	K-6		Sr-90	Once a year	pCi/g		24	1st quarter only
	K-12		Gamma scan	Once a year	pCi/g		24	1st quarter only
	K-19							
I. 1. Vegetables (at least 5 varieties)	K-26 and/or K-17	Annually	Gross alpha	Annually	pCi/g	Same as grass	14	At the end of growing season, on all samples
			Gross beta	Annually	pCi/g		14	
			Sr-89	Annually	pCi/g		14	
			Sr-90	Annually	pCi/g		14	
2. Grain (Oats and buckwheat)	K-23		Gamma scan	Annually	pCi/g		14	
J. Eggs	K-27	Quarterly	Gross alpha	Quarterly	pCi/g	0.02 pCi/g wet wt.	8	On all samples
			Gross beta	Quarterly	pCi/g	0.01 pCi/g wet wt.	8	On all samples
			Sr-89	Quarterly	pCi/g	0.06 pCi/g wet wt.	8	On all samples
			Sr-90	Quarterly	pCi/g	0.01 pCi/g wet wt .	8	On all samples
			Gamma scan	Quarterly	pCi/g	0.06 pCi/g wet wt. (Cs-137)	8	On all samples
K. Soil	K-1f	Semi-annually	Gross alpha	Semi-annually	pCi/g	4.0 pCi/g dry wt.	28	2nd and 3rd quarters
	K-3		Gross beta	Semi-annually	pCi/g	2.0 pCi/g dry wt.	28	2nd and 3rd quarters
	K-4		Sr-89	Semi-annually	pCi/g	0.75 pCi/g dry wt.	28	2nd and 3rd quarters
	K-5		Sr-90	Semi-annually	pCi/g	0.15 pCi/g dry wt.	28	2nd and 3rd quarters
	K-6		Gamma scan	Semi-annually	pCi/g	0.15 pCi/g dry wt. (Cs-137)	28	2nd and 3rd quarters
	K-12							
	K-19							

Table 4.0-1. (continued)

Types of Samples	Location	Sampling Frequency	Type of Analysis	Frequency of Analysis	Reporting Units	Approximate Lower Level of Detection[a]	No. of Analyses per 2 years	Comments
L. Surface water	K-1a K-1b	Monthly	Gross alpha (SS,DS)[b]	Monthly	pCi/l	3.0 pCi/l	288	On all samples
	K-1d K-1e		Gross beta (SS,DS)[b]	Monthly	pCi/l	4.0 pCi/l	288	On all samples
	K-9		K-40	Monthly	pCi/l	3.4 pCi/l	144	On all samples
	K-14		Tritium	Monthly	pCi/l	330 pCi/l	72	On K-1d, K-9 and K-14 only
			Sr-89	Quarterly	pCi/l	10.0 pCi/l	24	On quarterly composite from K-1d, K-9 and K-14
			Sr-90	Quarterly	pCi/l	2.0 pCi/l	24	On quarterly composite from K-1d, K-9 and K-14 only
			Radium-226	-	pCi/l	1.0 pCi/l	-	Only on samples when alpha is >3 pCi/l in dissolved solids on K-1d, K-9 and K-14 only
			Gamma scan	-	pCi/l	10.0 pCi/l (Cs-137)	-	Only on samples when beta is >30 pCi/l in dissolved solids on K-1d, K-9 and K-14 only
M. Bottom sediments	K-1e[a]	4 times per year	Gross alpha	4/year	pCi/g	Same as soil	40	May, July, Sept., Nov.
	K-1d		Gross beta	4/year	pCi/g		40	May, July, Sept., Nov.
	K-1j[b]		Sr-89	4/year	pCi/g		40	May, July, Sept., Nov.
	K-9		Sr-90	4/year	pCi/g		40	May, July, Sept., Nov.
	K-14		Gamma scan	4/year	pCi/g		40	May, July, Sept., Nov.
N. Periphyton (slime) or Aquatic plants	K-1a K-1b	Semi-annually	Gross alpha	Semi-annually	pCi/g	0.2 pCi/g wet wt.	24	2nd and 3rd quarters if available in sufficient quant[illegible]
	K-1d K-1e		Gross beta	Semi-annually	pCi/g	0.1 pCi/g wet wt.	24	2nd and 3rd quarters if available in sufficient quantity
	K-9 K-14		Sr-89	Semi-annually	pCi/g	0.06 pCi/g wet wt.	24	2nd and 3rd quarters if available in sufficient quantity
			Sr-90	Semi-annually	pCi/g	0.01 pCi/g wet wt.	24	2nd and 3rd quarters if available in sufficient quantity
			Gamma scan	Semi-annually	pCi/g	0.06 pCi/g wet wt. (Cs-137)	24	2nd and 3rd quarters if available in sufficient quantity

[a] 500' North of discharge (on the beach)

[b] 500' South of discharge (on the beach)

Table 4.0-1. (continued)

Types of Samples	Location	Sampling Frequency	Type of Analysis	Frequency of Analysis	Reporting Units	Approximate Lower Level of Detection[a]	No. of Analyses per 2 years	Comments
O. Fish	K-1d	3 times per year	Gross alpha	3/year	pCi/g	1.6 (0.04) pCi/g wet wt.	12	Bones and (flesh) 2nd, 3rd and 4th quarters
			Gross beta	3/year	pCi/g	1.4 (0.03) pCi/g wet wt.	12	Bones and (flesh, 2nd, 3rd and 4th quarters
			Sr-89	3/year	pCi/g	0.5 pCi/g dry wt.	6	Bones only, 2nd, 3rd and 4th quarters
			Sr-90	3/year	pCi/g	0.1 pCi/g dry wt.	6	Bones only, 2nd, 3rd and 4th quarters
			Gamma-scan	3/year	pCi/g	0.13 pCi/g wet wt. (Cs-137)	6	Flesh only, 2nd, 3rd and 4th quarters
P. Domestic Meat	K-17 K-20 K-22 K-24	Annually	Gross alpha	Annually	pCi/g	Same as fish	8	Flesh only, 3rd quarter
			Gross beta	Annually	pCi/g		8	Flesh only, 3rd quarter
			Gamma scan	Annually	pCi/g		8	Flesh only, 3rd quarter

[a] TR = Total Residue
[b] SS = Suspended Solids
[c] DS = Dissolved Solids

Table 7-1. (continued)

TABLE NOTATIONS

[a] The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radio chemical separation:

$$LLD = \frac{4.66 \ s_b}{E \times V \times 2.22 \times Y \times \exp(-\lambda \Delta t)}$$

where

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume).

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute).

E is the counting efficiency as counts per disintegration.

V is the sample size in units of volume or mass.

Y is the fractional radiochemical yield,when applicable, 2.22 is the number of disintegrations per minute per picocurie.

λ is the radioactive decay constant for the particular radionuclide.

Δt for environmental samples is the elapsed time between sample collection, or end of the sample collection period and time of counting.

The value of s_b used in the calculation of the LLD for a detection system will be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background will include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples).

Analyses shall be performed in such a manner that the stated LLDs will be achieve under the routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the Monthly Progress Reports.

Table 4.0-2. Sampling locations, Kewaunee Nuclear Power Plant.

Code	Type[a]	Distance (miles)[b] and Sector	Location
K-1			Onsite
1a	I	0.62 N	North Creek
1b	I	0.12 N	Middle Creek
1c	I	0.10 N	500' north of condenser discharge
1d	I	0.10 E	Condenser discharge
1e	I	0.12 S	South Creek
1f	I	0.12 S	Meteorological tower
1g	I	0.06 W	South Well
1h	I	0.12 NW	North Well
1j	I	0.10 S	500' south of condenser discharge
K-2	C	9.5 NNE	WPS Operations building in Kewaunee
K-3	C	6.0 N	Lyle and John Siegmund farm, Route 1, Kewaunee
K-4	I	3.0 N	Dan Stangel farm, Route 1, Kewaunee
K-5	I	3.5 NNW	Ed Paplham farm, Route 1, Kewaunee
K-6[c]	C	6.5 WSW	Leonard Berres farm, Route 1, Denmark
K-7	I	2.75 SSW	Earl Bruemmer farm, Route 3, Two Rivers
K-8	C	5.0 WSW	Saint Mary's Church, Tisch Mills
K-9	C	11.5 NNE	Rostok Water Intake for Green Bay, Wisconsin two miles north of Kewaunee
K-10	I	1.5 NNE	Turner farm, Kewaunee site
K-11	I	1.0 NW	Harlan Ihlenfeld farm
K-12	I	1.5 WSW	Lecaptain farm, one mile west of site
K-13	C	3.0 SSW	Rand's general store
K-14	I	2.5 S	Two Creeks Park, 2.5 miles south of site
K-15	C	9.25 NW	Gas Substation, 1.5 miles north of Stangelville
K-16	C	26 NW	WPS Division Office Building, Green Bay, Wisconsin
K-17	I	4.25 W	Jansky farm, Route 1, Kewaunee
K-18	C	7.0 SSW	Schmidt's Food Stand, Route 163 (3.5 miles south of "BB")
K-19	I	1.75 NNE	Wayne Paral farm, Route 1, Kewaunee
K-20	I	2.5 N	Carl Struck farm, Route 1, Kewaunee
K-23	I	0.5 W	0.5 miles west of plant, Kewaunee Site
K-24	I	5.45 N	Fectum farm, Route 1, Kewaunee
K-25	C	2.75 WSW	Wotachek farm, Route 1, Denmark
K-26[d]	C	10.7 SSW	Bertler's Fruit Stand (8.0 miles south of "BB")
K-27	I	1.5 NW	Schlies Farm, 0.5 miles west of K-11

[a] I = indicator; C = control

[b] Distances are measured from reactor stack.

[c] The K-6 sampling location was changed on October 17, 1980 because the operator of Berres Farm retired. Berres Farm has been replaced by Novitski Farm, located 0.2 miles West of Berres Farm.

[d] Location K-18 was changed because the Schmidts Food Stand went out of business and was replaced by Bertler's Fruit Stand (K-26).

Table 4.0-3. Type and frequency of collection.

Location	Frequency					
	Weekly	Bi-weekly	Monthly	Quarterly	Semi-Annually	Annually
K-1						
K-1a			SW		SL	
K-1b			SW	GR[a]	SL	
K-1c				BS[b]		
K-1d			SW	BS[b] FI[a]	SL	
K-1e			SW		SL	
K-1f	AP	AI		GR[a] TLD	SO	TLD
K-1g			WW			
K-1h			WW			
K-1j				BS[b]		
K-2	AP	AI		TLD		TLD
K-3			MI[c]	GR[a] TLD CF[d]	SO	TLD
K-4			MI[c]	GR[a] TLD CF[d]	SO	TLD
K-5			MI[c]	GR[a] TLD CF[d]	SO	TLD
K-6			MI[c]	GR[a] TLD CF[d]	SO	TLD
K-7	AP	AI		TLD		TLD
K-8	AP			TLD		TLD
K-9			SW	BS[b]	SL	
K-10				WW		
K-11			PR	WW		
K-12			MI[c]	GR[a] CF[d] WW	SO	
K-13				WW		
K-14			SW	BS[b]	SL	
K-15	AP	AI		TLD		TLD
K-16	AP	AI		TLD		TLD
K-17						VE
K-18[e]						VE
K-19			MI[c]	GR[a] CF[d]	SO	
K-20						DM
K-23						GRN
K-24						DM
K-25						DM
K-26						VE
K-27				EG		DM

[a] Three times a year, 2nd (April, May, June), 3rd (July, Aug., Sept.), and 4th (Oct., Nov., Dec.) quarters.
[b] To be collected in May, July, Sept., Nov.
[c] Monthly from November through April; weekly from May through October.
[d] First (January, February, March) quarter only.
[e] Replaced by K-26 in summer of 1982.

Table 4.0-4. Sample codes used in Table 2.

Code	Description
AP	Airborne Particulate
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
PR	Precipitation
MI	Milk
WW	Well Water
DM	Domestic Meat
EG	Eggs
VE	Vegetables
GRN	Grain
GR	Grass
CF	Cattlefeed
SO	Soil
SW	Surface Water
FI	Fish
SL	Slime
BS	Bottom Sediments

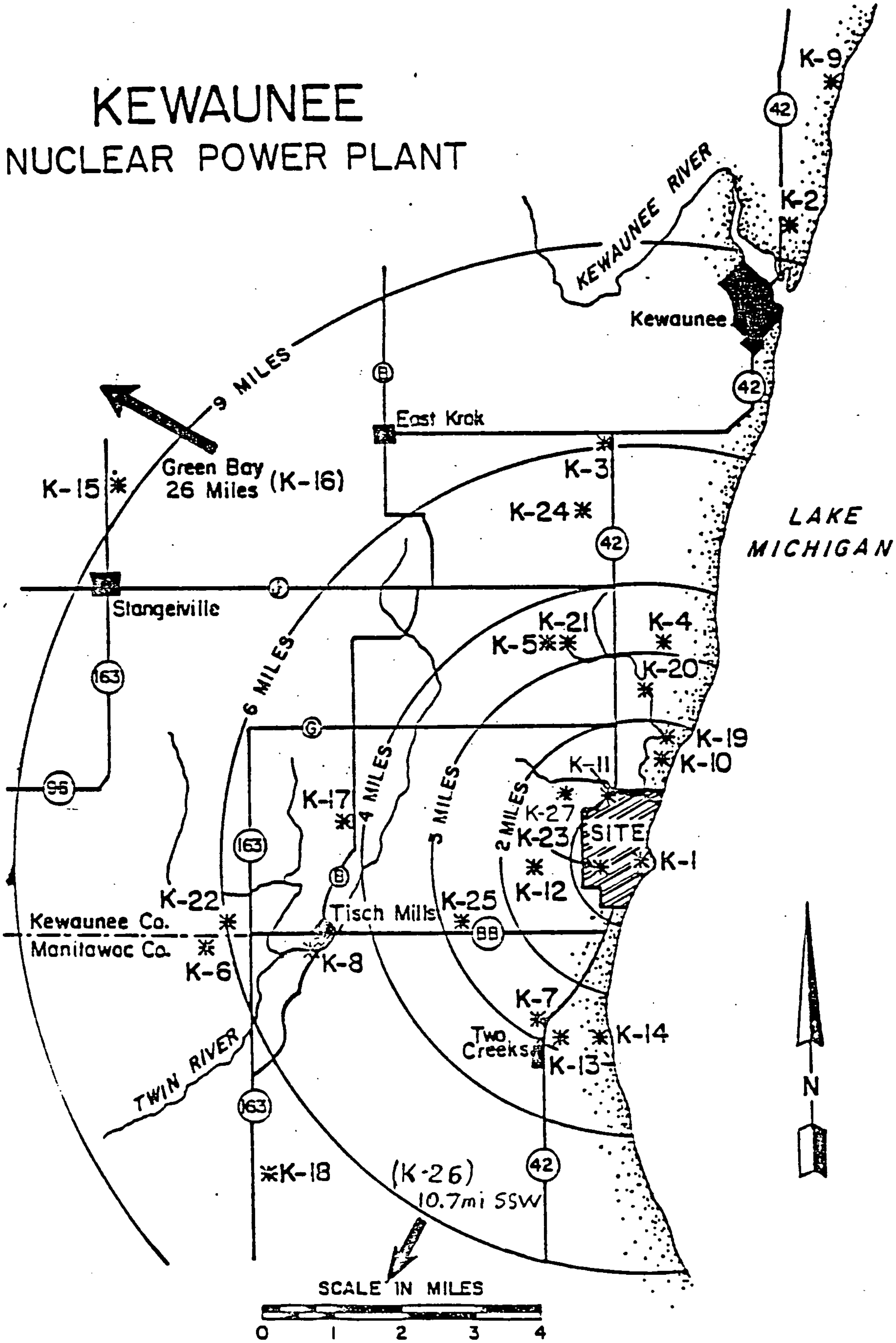

Figure 4.0-1. Sampling locations, Kewaunee Nuclear Power Plant.

4.4 Well Water

One-gallon water samples are taken once every three months from four offsite wells, (K-10, K-11, K-12, K-13). In addition, one-gallon samples of water are taken from the two onsite wells (K-1h and K-1g) once per month. All samples are analyzed for gross alpha and gross beta activities in the total residue, and for K-40. A composite of water samples from one onsite well is analyzed quarterly for Sr-89, Sr-90, and for tritium.

If the gross alpha and gross beta activities exceed 3 pCi/l and 30 pCi/l, respectively, the samples are analyzed for radium-226, and are gamma scanned.

4.5 Precipitation

A monthly cumulative sample of precipitation is taken at Location K-11. This sample is analyzed for tritium.

4.6 Milk

Milk samples are collected from three herds that graze within three miles of the reactor site (K-4, K-12, K-19), and from three herds that graze between 3-7 miles of the reactor site (K-3, K-5, K-6). The samples are collected weekly during the grazing period (May through October) and monthly for the rest of the year. To prevent spoilage the samples are transported to the laboratory on ice. All samples are analyzed for iodine-131 immediately after they are received at the laboratory. To achieve required minimum sensitivity of 0.5 pCi/l, iodine is separated on the ion exchange column, precipitated as palladium iodide and beta counted. Monthly samples and monthly composites of weekly samples are then gamma scanned and analyzed for strontium-89 and -90. Potassium and calcium are determined and the $^{137}Cs/gK$ and $^{90}Sr/gCa$ ratios are calculated. Reporting units are pCi/l except for stable potassium and calcium which are reported in g/l.

4.7 Grass

Grass is collected three times per year (2nd, 3rd, and 4th quarters) from the six dairy farms (K-3, K-4, K-5, K-6, K-12, and K-19) and from two onsite locations (K-1b and K-1f). The samples are analyzed for gross alpha and gross beta activities, for Sr-89 and Sr-90, and are gamma scanned to identify and quantify gamma emitting radionuclides. Reporting units are pCi/g wet weight.

4.8 Cattlefeed

Once per year, during the first quarter when grass is not available, cattlefeed (such as hay or silage) is collected from the six dairy farms. The analyses performed are the same as for grass. Reporting units are pCi/g wet weight.

4.9 Vegetables and Grain

Annually, during the 3rd quarter, five varieties of vegetables normally consumed by man are samples from K-17 and/or K-26, depending upon the availability of samples. In addition, two varieties of grain, if available, is collected annually from the farmland owned by WPS (K-23) and rented to a private individual for growing oats and buchwheat. The analyses performed are the same as for grass. Reporting units are pCi/g wet weight.

4.10 Eggs

Quarterly samples of eggs are taken from K-27. The samples are analyzed for gross alpha and gross beta activities, for Sr-89 and Sr-90, and are gamma scanned to identify and quantify gamma-emitting radionuclides. Reporting units are pCi/g wet weight.

4.11 Soil

Twice during the growing season samples of the top two inches of soil are collected from the six dairy farms and from an onsite location (K-1f). The soil is analyzed for gross alpha and gross beta activities, for Sr-89 and Sr-90, and gamma scanned to identify and quantify gamma-emitting manmade radionuclides. Reporting units are pCi/g dry weight.

4.12 Surface Water

Surface water is sampled monthly from Lake Michigan at the KNPP discharge (K-1d), at the Rostok plant intake near Kewaunee (about 11.5 miles north of the reactor site) (K-9), and at Two Creeks Park, 2.5 miles south of the reactor site (K-14). Monthly samples are also taken, when available, from each of the three creeks (K-1a, K-1b, K-1e) that pass through the reactor site. The samples are taken at a point near the mouth of each creek. The water is analyzed for gross alpha and gross beta activity in:

(a) the total residue;
(b) the dissolved solids; and
(c) the suspended solids.

The samples are also analyzed for K-40. The level of tritium on all lake water smples is determined by direct counting (liquid scintillation method). Quarterly composites of the lake water samples are analyzed for Sr-89 and Sr-90.

If the gross alpha activity in dissolved solids in samples collected at K-1d, K-9, or K-14 exceeds 3 pCi/l, the samples are analyzed for radium-226. If the gross beta activity in dissolved solids in samples from these locations exceeds 30 pCi/l, the samples are gamma scanned. Reporting units are pCi/l.

4.13 Bottom Sediments

Five samples of Lake Michigan bottom sediments, one at the discharge (K-1d), one from 500 feet north of the discharge (K-1c), one from 500 feet south of the discharge (K-1j), one at the Rostok plant (K-9), and one at the Two Creeks Park (K-14), are collected four times per year (May, July, September, and November). The samples are collected at the beach in about 2-3 feet of water. All samples are analyzed for gross alpha and gross beta activities, for Sr-89 and Sr-90 and are gamma scanned. Since it is known that the specific activity of the sediments (i.e., the amount of radioactivity per unit mass of sediment) increases with decreasing particle size, the sampling procedure will assure collection of very fine particles. Reporting units are pCi/g dry weight.

4.14 Periphyton (Slime) or Aquatic Vegetation

Periphyton (slime) or aquatic plant samples are collected at or near the locations used for surface water sampling. They are collected twice during the year (2nd and 3rd quarter), if available. The samples are analyzed for gross alpha and gross beta activity and, if available in sufficient quantity, for Sr-89, Sr-90, and gamma scanned. Reporting units are pCi/g wet weight.

4.15 Fish

Fish is collected three times per year (2nd, 3rd, and 4th quarters) near the discharge area (K-1d). Flesh is separated from the bones and analyzed for gross alpha and gross beta activities and gamma scanned. The bones are analyzed for gross alpha and gross beta activities, for Sr-89 and Sr-90. Reporting units are pCi/g wet weight.

4.16 Domestic Meat

Domestic meat (chickens) is collected once a year during the 3rd quarter, at four locations in the vicinity of the plant (K-20, K-24, K-25, K-27). The flesh is analyzed for gross alpha, gross beta, and gamma scanned to identify and quantify gamma-emitting radionuclides. Reporting units are pCi/g wet weight.

5.0 ANALYSES

5.1 Analytical Procedures

Analytical procedures and counting methods employed by TIML will follow those recommended by the U.S. Public Health Service publication, Radioassay Procedures for Environmental Samples, January 1967; and the U.S. Atomic Energy Commission Health and Safety Laboratory, HASL Procedures Manual, (HASL-300), 1972.

TIML will obtain the sensitivities (LLD) listed in Table 4.0-1. TIML procedures contain appropriate administrative controls or alternate methods to assure that this requirement is fulfilled. Detailed information is presented in TIML's Quality Control Manual.

All iodine-131 analyses will be performed as soon as possible after sample collection, preferably within eight days. Air samples will be allowed to decay for 72 hours before gross beta analysis.

Laboratory records provide sufficient raw data and sample process traceability to fully document each sample's results and history, and include as a minimum:

1) Sample site or location number

2) Type of sample (media) and analysis

3) TIML sample number

4) Collection period or date

5) Sample data
   a) Sample size (weight or equivalent volume analyzed)
   b) Chemical yields (if applicable)
   c) Chemical separation date and time (if applicable)
   d) Ash or residue weight (if applicable)
   e) Aliquot size (if different from sample size)

6) Counting data

   a) Count date(s) (Time is also required for samples analyzed for I-131 or radiostrontium)
   b) Sample count(s)
   c) Length of sample counting time
   d) Background (or blank) counts
   e) Length of background counting time
   f) Overall counting efficiency (including geometry, scatter, absorption corrections)

7) Results

   a) Sample activity for each analysis in appropriate units in summary form
   b) Decay corrections (if applicable)
   c) LLD values (when activity is not detectable, see Table 4.0-1)

5.2 Quality Control

To insure the validity of the data, TIML maintains a quality control (QC) program which employs quality control checks, with documentation, of the analytical phase of its environmental monitoring studies. The program is defined in the TIML QC Program Manual, and procedures are presented in the TIML QC Procedures Manual. All data related to quality control will be available for review by WPS upon reasonable prior notification. Proprietary information will be identified so that it may be treated accordingly.

TIML's QC Program includes laboratory procedures designed to prevent cross-contamination and to ensure accuracy and precision of analyses. The quality control checks include blind samples, duplicate samples, and spiked samples as necessary to verify that laboratory analysis activities are being maintained at a high level of accuracy.

The Quality Control Program is in compliance with USNRC Regulatory Guide 4.15 and includes appropriate control charts with specified acceptance levels for instrument source checks, background, efficiency, etc., for counting equipment.

TIML participates in the USEPA Interlaboratory Comparison Program (crosscheck program) by analyzing radioactive samples distributed for that purpose and in International Intercomparisons of Environmental Dosimeters Programs. The results of the crosscheck program are updated every six months and submitted with monthly reports. All raw data are available at the TIML facility in Northbrook for inspection.

5.3 Review of Data by TIML

TIML will promptly notify WPS of any discrepancies, abnormalities or questionable results and will immediately review and evaluate the data. Should WPS note any discrepancies, abnormalities or questionable results, it may notify TIML of such findings. TIML will provide an acceptable response within fourteen (14) days of such notification.

5.4 Retention of Samples and Records

TIML will retain samples and appropriate portions of samples in accordance with procedures identified in Part 10 of the TIML QC Program Manual.

Related records will be kept in accordance with the TIML QA Manual. Disposal of all project materials will be authorized by WPS. If the contract expires, WPS will designate which samples are to be transferred to an approved storage facility. TIML will be responsible for the proper handling, packaging, and shipping of all samples if transfer is required. All samples which are in storage or being transferred will be appropriately labeled and marked so that the source of sample, date of sampling, and other pertinent data can be readily identified. In addition, a list summarizing all samples, types, media, etc., with a cross reference to the sample label number will also be provided.

Records will be maintained so that sample handling and data can be traced from the time of sampling to the final data sheet or report.

5.5 Sensitivity Requirements (LLD)

The LLD values will not exceed those listed in Table 4.0-1. If the specified LLD could not be achieved for reasons beyond TIML control, such as insufficient sample size, delay in transit, etc., it will be noted in the monthly reports.

5.6 Radiation Measurement Instruments

The following presents the specifications of the counting room and counting instruments used by TIML. A complete history file is maintained for each instrument and all calibration records are fully maintained in these files.

Counting Room

The counting room is 20 ft by 33 ft and is equipped with an Environmental Control System (7.5 ton capacity). The temperature is maintained at $72^\circ \pm 2^\circ$F and relative humidity at 45 ± 5 percent.

Counting Instruments

A. Liquid Scintillation Spectrometer (2 Units)

1. Beckman LS-233 spectrometer, temperature controlled, 200 sample capacity, 3 channels, teletype printout.
2. Packard Model No. C2425, temperature controlled, 150 sample capacity, teletype printout

B. Gamma Spectrometer System No. 1 (1 Unit)

Packard Gamma Scintillation Spectrometer Model 5975, 200 sample capacity, 3" NaI(TL) detector with 2 photomultiplier tubes, teletype printout

C. Gamma Spectrometer System No. 2 (1 Unit)

Hewlett-Packard Model 5406B system, consisting of

1. 5416B, 300MHz, 8182 channel ADC
2. 2114B, 16 bit computer
3. Teleprinter
4. Nuclear Diodes closed-end coaxial Ge(Li) detector with relative peak efficiency of 15.0%, and associated electronics

D. Gamma Spectrometer System No. 3 (1 Unit)

1. Ortec Ge(Li) open-end environmental detector with 25% relative efficiency
2. DEC PDP-11/04 computer
3. Decwriter
4. 4 floppy disc drives

E. Gamma Spectrometer System No. 4 (2 Units)

Canberra Model Series 80

1. Main System
   a. Series 80 MCA
   b. PDP-11/23 computer
   c. Hard disc (for software)
   d. Dual floppy disc drive for data storage

2. Subsystem No. 1

   Canberra closed-end coaxial Ge(Li) detector, 15% relative efficiency, and associated electronics

3. Subsystem No. 2

   Canberra intrinsic Germanium detector, 19% relative efficiency, and associated electronics

F. Proportional Counters (4 Units)
Tennelec Model 4000, four manual 1-1/4" detectors, and associated electronics.

G. Proportional Counters (3 Units)

Beckman Widebeta II, 100 sample automatic changer, teletype printout

H. Proportional Counter (1 unit)

Gamma Products, Inc., Model G4000, 40 sample automatic changer, teletype printout.

I. Alpha Scintillation Counters (2 Units)

1. Randam Model No. 918-4
2. Randam Model No. 1200
3. Lucas Scintillation Cells

J. TLD Analyzer

Harshaw 2000 TL Analyzer consisting of

1. 2000B Picoammeter
2. 2000A TL Detector (chips and cards reader)
3. 2000P TL Detector (bulbs reader)

K. Environmental Gamma Detector

Reuter-Stokes, Pressurized Ionization Chamber, Model No. RSS-111, range of 1 μR/hr to 500 μR/hr, resolution of 1 μR.

L. Miscellaneous Test Instruments, Recorders, Tools, and Computers

In addition to the dedicated Hewlett-Packard 2114B, PDP 11/04 and PDP 11/23 computers TIML has direct access to HP-3000 at Systech, Inc. and to CSC's Univac 1108.

6.0 RESULTS AND INTERPRETATION

The results of the monitoring program will be reported monthly and annually.

6.1 Monthly Progress Reports

Monthly progress reports will include a tabulation of completed analytical data on samples obtained during the previous 30-day period together with graphic presentations where trends are evident, and the status of field collections. Two copies of the reports will be submitted within 30 days of the reporting month.

6.2 Annual Reports

Annual reports will be submitted in two parts. Part I, to be submitted to the NRC, will be prepared in accordance with NRC's Regulatory Guide 4.8. It will contain an introductory statement, a summary of results, description of the program, discussion of the results, and summary table. Part II of the annual report will include tables of analytical data for all samples collected during the reporting period, together with graphic presentation where trends are evident and statistical evaluation of the results. Gamma scan data will be complemented by figures of representative spectra. Draft copies of each annual report will be due 60 days after completion of the annual period. After final review of the draft document, one photoready copy of the revised annual report will be sent to WPS for printing. WPS will arrange and pay for printing.

6.3 Non-Routine Reports

If analyses of any samples collected show abnormally high levels of radioactivity, WPS will be notified by telephone immediately after data becomes available. The action limit levels for various samples and analyses have been mutually agreed upon with Mr. T. Meinz, Environmental Manager, WPS. Action limits are provided in Table 6.3-1.

Table 6.3-1. Action limits for radionuclides.

Medium	Radionuclide	Action Limit
Air	gross alpha	0.1 pCi/m^3
	gross beta	1.0 pCi/m^3
	I-131 (charcoal)	1.0 pCi/m^3
	Cs-137	
Well Water	gross alpha	10.0 pCi/l
	gross beta	30.0 pCi/l
	H-3	10.0 pCi/ml
	Sr-89	10.0 pCi/l
	Sr-90	5.0 pCi/l
Precipitation	H-3	1.0 pCi/ml
Milk	I-131	1.0 pCi/l
	Cs-137	30.0 pCi/l
	Sr-90	20.0 pCi/l
	Sr-89	20.0 pCi/l
Grass, cattle feed vegetables (wet wt)	I-131	0.5 pCi/g
	gross beta	100.0 pCi/g
	Cs-137	1.0 pCi/g
	Sr-90	1.0 pCi/g
Eggs (wet wt)	Cs-137	1.0 pCi/g
	Sr-90	0.5 pCi/g
	gross beta	20.0 pCi/g
Soil (dry wt)	Cs-137	10.0 pCi/g
	Sr-90	2.0 pCi/g
	gross beta	100.0 pCi/g
Surface Water	gross alpha	10.0 pCi/l
	gross beta	20.0 pCi/l
	H-3	10.0 pCi/ml
	Sr-89	10.0 pCi/l
	Sr-90	5.0 pCi/l
Bottom Sediments (dry wt)	Cs-137	10.0 pCi/g
	Sr-90	2.0 pCi/g
	gross beta	100.0 pCi/g
Fish (wet wt)	Cs-137	2.0 pCi/g (flesh)
	Sr-90	3.0 pCi/g (bone)
	gross beta	10.0 pCi/g

7.0 PROJECT RESPONSIBILITIES

TIML personnel is reponsible for monthly, quarterly, semi-annual and annual field sampling. Wisconsin Public Service Corporation personnel is responsible for the sample collections that are scheduled weekly and bi-monthly or at less frequent intervals, except when these periods occur at times when TIML personnel would normally be sampling. The samples will be handled, packaged, stored and shipped so as to prevent corss contamination and loss of sample. TIML will provide all necessary sampling equipment, containers, plastic bags, and any other required sampling materials. TIML will pay all shipping costs.

The program will be reviewed periodically throughout the contract period by representatives of both TIML and Wisconsin Public Service Corporation so that changes in sampling locations and frequency and in sample analyses can be made, if required.

8.0 QUALITY ASSURANCE

The Quality Assurance Manager, under the guidance of the Teledyne Isotopes Quality Assurance Program, has the authority and responsibility to implement the QA Program and verify that the quality assurance work defined in the Quality Assurance Manual is being performed. The Quality Assurance Manager, who is directly responsible to the President of Teledyne Isotopes, has no direct responsibility for the technical aspects of the Operational Environmental Radiological Surveillance Program conducted at the Kewaunee Nuclear Power Plant. The duties of the Quality Assurance Manager include the following:

1. Schedules, plans, conducts follow-up and analyzes Quality Assurance Audits and determines the effectiveness of the program;

2. Verifies, through internal audits, that the prescribed procedure is followed that will assure the correctness of results presented in reports;

3. Verifies, through quality control records and review of calibration procedures, that inspection, measurement, and test equipment are properly controlled, calibrated against certified standards, or adjusted as required by written procedures, and that such equipment is identified with its calibration status;

4. Documents and reviews the results of each audit with management having responsibility in the area audited;

5. Conducts re-audits to verify that a prescribed corrective action has been taken to correct nonconformities; and

6 Maintains a permanent file on all audits, including discrepancies and the resolution thereof.

The Quality Assurance Manager has the organizational freedom to identify quality problems; to initiate, recommend, or provide solutions to quality problems; and to verify implementation of solutions.

The Quality Assurance Manager for Teledyne Isotopes is Ms. Helen King. All questions concerning the QA Program should be directed to Ms. King. She can be reached at (201) 664-7070 (Westwood, New Jersey).

The quality assurance/control elements which are included in the Quality Assurance Program are briefly described below. A complete copy of the Quality Assurance Manual is on file at WPS (Document QAP No. 1).

- DESIGN CONTROL provides for the preparation, approval, periodic review of, and change control to project-specific Study Plans. Study Plans describe the activities and tasks to be accomplished and outline the basic framework for performing the work.

- PROCUREMENT DOCUMENT CONTROL provides for the preparation, review, and approval of procurement documents used to purchase items or services for environmental studies.

- INSTRUCTIONS, PROCEDURES, POLICIES, AND DRAWINGS provides for activities affecting quality to be prescribed by and accomplished according to written work instructions.

- DOCUMENT CONTROL provides for the preparation, review, approval, distribution, and revision of work instructions and provides for the identification of all pertinent documents used for each project or program.

- CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES provides for the selection of procurement sources and the acceptance methods used for control of purchased items and services.

- IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS provides requirements for the identification and control of samples, data, reports, calculations, and purchased items and services for environmental studies.

- CONTROL OF SPECIAL PROCESSES provides that field studies, laboratory analyses, equipment calibration, data reduction and analysis, etc. are accomplished under controlled conditions by trained personnel using approved work instructions and equipment.

- QUALITY VERIFICATION provides for the preparation of quality verification plans, the assignment of technical reviewers, the review of reports, and the control of calculations for each project to insure that Study Plan and quality assurance/control tasks have been performed according to specified requirements.

- TESTS CONTROL provides that test programs be developed and implemented to demonstrate that an instrument or system will perform satisfactorily in service.

- CONTROL OF MEASURING AND TEST EQUIPMENT provides that inspection, measurement, and test equipment be controlled, calibrated, and adjusted at specific periods to maintain accuracy within prescribed limits.

- HANDLING, STORAGE, SHIPPING, AND PRESERVATIONS provides the requirements for the handling, storage, shipping, and preservation of samples, data, and records.

- INSPECTION, TEST, AND OPERATING STATUS provides for the reporting the status of field programs with respect to field data acquisition and equipment operating condition and maintenance requirements.

- NONCONFORMING ITEMS provides a means for reporting project nonconformances identified through means other than audit.

- CORRECTIVE ACTION provides measures for the prompt correction of nonconformances.

- QUALITY ASSURANCE RECORDS provides that records that furnish evidence of the validity of work are identified, controlled, processed into a quality assurance record file, microfilmed, stored, and dispositioned according to requirements.

- QUALITY ASSURANCE AUDITS provides for a comprehensive system of planned and periodic audits to be conducted by trained auditors to verify compliance with Quality Assurance Program and project requirements.

APPENDIX A

Resumes of Key Personnel

Resume

HELEN G. KING. B.A.

Quality Assurance Manager/
Senior Scientist

Ms. King is the Quality Assurance Manager at Teledyne Isotopes. She is authorized by management to develop and implement quality assurance procedures for the technical operations of the company. In addition, she reviews the results of analysis from the Environmental Analysis Department to insure continuing quality performance. Regular audits are conducted of all departments to assure compliance with the applicable NRC regulations.

Prior to her promotion to Manager of Quality Assurance, Ms. King was a Senior Assistant Scientist in the Radiochemistry Laboratory of the Environmental Analysis Department. She performed radiometric determinations of sample activities using nuclear instrumentation and performed data computations using a calculator programmed for specific radionuclides.

In the fall of 1983 Ms. King completed a college credit course in Auditing Nuclear Quality Assurance Programs and passed an examination as a certified nuclear auditor.

Ms. King has had prior experience in laboratory analysis, first as a research associate at Bell Telephone Laboratories working with relay switching systems for ten years, and then in preparation of tissue sections from test rats in the Toxocology Department at Lever Brothers.

She has also had eight years of teaching experience at Dwight School in Englewood, New Jersey, where she taught 12th grade physics and 7th grade general science.

Ms. King received a B.A. degree in Chemistry from Hunter College She has done graduate work towards an M.A. degree at Fairleigh Dickinson University, including a course in fortran computer programming.

01/84

LEONID G. HUEBNER

GENERAL MANAGER
TELEDYNE ISOTOPES
MIDWEST LABORATORY

DePaul University, Chicago, Illinois; 1952-1953
University of Chicago, Chicago, Illinois; M.S., Physical Chemistry, 1957

Mr. Huebner organized the development of Teledyne Isotopes Midwest Laboratory (formerly Hazleton Environmental Sciences, Nuclear Sciences Department) in September 1969. Under Mr. Huebner's direction the Group has developed considerable capabilities in the field of radiological monitoring and assessment, and health physics.

Mr. Huebner has designed and directed baseline studies that have resulted in the preparation of the radiological section of environmental reports for seven nuclear power plants and is presently conducting radiological studies at twenty others. In addition, Mr. Huebner has coordinated the radiological surveillance and environmental report preparation for a major uranium mill in Colorado and is presently conducting ambient radiation studies at a uranium mines in the State of Washington and Wyoming.

In addition to managerial and technical consultation to personnel of the Midwest Laboratory, Mr. Huebner has developed and implemented quality control procedures to assure high quality performance on all projects under his direction.

Prior to joining Teledyne, Mr. Huebner was a radiochemist at Argonne National Laboratory, Division of Biology and Medicine, Radioisotopes Section, from 1965 to 1969. While at Argonne, Mr. Huebner was responsible for the development of methods for radioisotope analyses of biological samples. This work resulted in the invention of the combustion apparatus for which he was recognized in a citation from NASA (USAEC NASA Technical Brief No. 69-17012, September 1969). Mr. Huebner also developed a procedure for separation of low-energy from high-energy isotopes utilizing Cherenkov radiation and liquid scintillation counting. Mr. Huebner was in charge of the low level tritium analysis laboratory at the University of Chicago from 1957 to 1965 and was a laboratory assistant at the University of Chicago, Department of Chemistry from 1954 to 1957.

Mr. Huebner has nine publications in the fields of atmospheric tritium analysis research, liquid scintillation techniques, and combustion methodology.

American Nuclear Society

BRONISLAWA GROB

RESEARCH ASSISTANT
MIDWEST LABORATORY

In her capacity as a Research Assistant at Teledyne Isotopes' Midwest Laboratory, Ms. Grob's primary responsibilities are radiochemical analysis of water and solid samples for Ra-226 and Ra-228. She does crosscheck analysis of EPA samples for Sr-89 and Sr-90, Ra-226, and Ra-228. Her other duties include special sample analysis for gross alpha and beta radiation, Sr-89 and Sr-90 in water samples and solid samples, Pb-210 in solid samples and tritium in water and urine. She is familiar with the calculation of sample activities and counter efficiences.

Ms. Grob is experienced with radiation detection systems, such as low background gas proportional counters, liquid scintillation and gmma scintillation counters. She is presently working on a new procedure for analysis of the transuranic elements.

Ms. Grob received her M. Sc. degree in chemistry (which include one year of radiochemistry) from the Warsaw University in Warsaw, Poland.

GRANT R. WILTON

RESEARCH ASSISTANT
MIDWEST LABORATORY

Mr. Wilton is currently in charge of the radioisotope counting room at Teledyne Isotopes' Midwest Laboratory. In this capacity he performs analysis on environmental samples for gamma radiation utilizing Ge(Li) and NaI detectors. He calibrates and loads proportional counters for beta analysis and runs performance tests on gamma detection instruments and analyzes EPA cross-check samples.

Additional duties include a monthly trip to Kewaunee Nuclear Power Plant to collect environmental samples. He has been trained in the preparation of smples for Sr-89, and Sr-90 and the calculation of I-131 charcoal.

Mr. Wilton received a B.S. degree in water science at Northern Michigan University in 1981. His educational background includes computer programming and wet chemical analysis.

Attachment 2

Exceptions to NUREG 0472 and Justifications

Direct Radiation

a) 12 sample points used versus 40

Kewaunee has 10 versus 16 22.5° sectors because of Lake Michigan. . Also, a past history has been established for using only a few sample points.

Airborne

a)- X/Q used versus D/Q

No D/Q data presently exists. X/Q tells approximately the same thing.

- Iodine sampling and analysis Semi-monthly versus weekly.

Past history was Semi-Monthly, $T1/2=8$ days & this decay rate may cause some data loss if a puff occurs early in the period, however, this risk is acceptable if consideration is given to in-plant effluent monitors which will alarm and provide coverage.

Waterborne

a) Grab samples versus composite for surface and drinking water

Past history has established grab samples. Composite samples, proportional to stream flows, are impractical to obtain and meaningless when compared to dilution and Kewaunee history of low level releases.

b) I-131 analysis of drinking water deleted

The FES calculates the maximum I-131 dose to a child's thyroid to be 0.13 mR/yr. This is 10 x lower than what 0472 recommends I-131 drinking water analysis (1mR/yr), therefore, there is no basis to expect the analysis should be done routinely as part of the monitoring program.

Ingestion

a)	3 random samplings of commerically and recreationally important species versus 1 sample of each commercially and recreationally important species	Fish sampling vs species caught is not predictable and Kewaunee cannot commit to collecting a sample of each species.
b)	Fish sampling 3 X per year versus seasonally or semi-annually	Easier to do than determining seasonal times for all species.
c)	1 sample of principle food products on irrigated water at harvest has been deleted.	Irrigation not used
d)	X/Q used instead of D/Q	D/Q values not available