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 AUTH. NAME AUTHOR AFFILIATION
 PATZPATRICK, E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
 RECIP. NAME RECIPIENT AFFILIATION
 MURLEY, T.E. Document Control Branch (Document Control Desk)

SUBJECT: Re-transmits Attachment 5 to 911009 submittal, which
 requested NRC approval per 10CFR20.302 of onsite disposal of
 turbine room sump absorption pond sludge at plant. Original
 submittal missing gamma spectrum analyses.

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AEP:NRC:1154B

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
APPLICATION FOR ALTERNATIVE DISPOSAL;
TURBINE ROOM SUMP ABSORPTION POND SLUDGE;
RE-TRANSMITTAL OF ATTACHMENT 5, GAMMA SPECTRUM ANALYSIS

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Attn: T. E. Murley

September 3, 1993

Dear Dr. Murley:

This letter re-transmits Attachment 5 to our October 9, 1991 submittal (AEP:NRC:1154), which requested NRC approval per 10 CFR 20.302 of onsite disposal of turbine room sump absorption pond sludge at the Cook Nuclear Plant. The original attachment 5 was missing the gamma spectrum analyses from the submittal copies received by your staff from the Public Document Room. We apologize for any inconvenience this may have caused.

Sincerely,

A handwritten signature in cursive script, appearing to read 'E. E. Fitzpatrick for'.

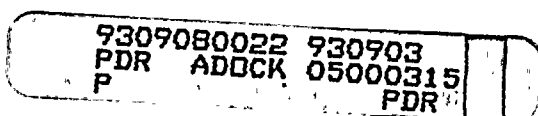
E. E. Fitzpatrick
Vice President

dr

Attachment

cc: A. A. Blind - Bridgman
G. Charnoff
J. B. Martin - Region III
J. R. Padgett
NFEM Section Chief
NRC Resident Inspector - Bridgman

070035



ADD1

ATTACHMENT 1 TO AEP:NRC:1154B

RE-TRANSMITTAL OF ATTACHMENT 5 (GAMMA SPECTRUM ANALYSIS)

TO AEP:NRC:1154

..9309080022

0 0 1 0 0 4 4 0 0 0 0

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 14:43:00

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1696

Measured by: J. BUNDICK

Sample Description: #1SOIL SAMPLE FROM T

Geometry Description: MARINELLI SOLID

Sample Size: $2.1900\text{E}+03$ GM / Conversion Factor: $1.0000\text{E}+00$

Standard Size: $1.5000\text{E}+03$ GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 14:07:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 20.1167 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.66	74.87	1.2	211.	94.	18.8	
2C	154.21	77.15	1.2	181.	107.	17.9	
3	477.01	238.64	1.1	123.	293.	8.0	PB-212
4	590.24	295.29	0.9	59.	51.	24.7	PB-214
5	703.48	351.93	1.6	26.	169.	8.9	PB-214
6	1165.68	583.12	1.4	16.	87.	12.6	TL-208
7	1218.27	609.42	1.4	28.	92.	13.4	BI-214
8	1454.66	727.64	1.2	11.	23.	29.2	BI-212
9	1822.03	911.34	0.7	15.	44.	19.6	AC-228
10	1936.59	968.62	2.3	19.	28.	29.7	RU-105
11	2240.12	1120.37	0.9	11.	26.	27.8	BI-214, SC-46, TA-182
12	2921.53	1460.99	1.9	6.	430.	4.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

C - Multiplet Analysis converged normally

Sample: #1SOIL SAMPLE FROM T

Data collected on 08-JUL-91 at 14:07:00

Decayed to 2. days, 20.1167 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.27E-06 +- 4.07E-07		7.27E-06 +- 4.07E-07	
Total	7.27E-06 +- 4.07E-07		7.27E-06 +- 4.07E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1696

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 3

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
149.66	74.87	94.	18.8	3.03E+00
154.21	77.15	107.	17.9	3.34E+00
177.01	238.64	293.	8.0	8.48E+00
590.24	295.29	51.	24.7	1.83E+00
703.48	351.93	169.	8.9	7.01E+00
1165.68	583.12	87.	12.6	5.67E+00
1218.27	609.42	92.	13.4	6.22E+00
1454.66	727.64	23.	29.2	1.83E+00
1822.03	911.34	44.	19.6	4.32E+00
1936.59	968.62	28.	29.7	2.86E+00
2240.12	1120.37	26.	27.8	3.04E+00

0

0 0 1 0 0 4 4 0 0 4

GAMMA SPECTRUM ANALYSIS

ENBERRA SPECTRAN-AT V4.2

EC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 12:29:28

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1677

Measured by: J. BUNDICK

Sample Description: #2, SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.9550E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 11:54:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 17.9000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	371.91	186.06	1.5	73.	57.	25.0	U-235
2	476.85	238.56	1.3	73.	142.	11.7	PB-212
3	589.98	295.16	1.5	38.	68.	17.6	PB-214
4	676.49	338.44	1.2	26.	37.	25.9	AC-228
5	703.47	351.93	1.1	43.	88.	15.2	PB-214
6	1165.72	583.14	1.7	21.	59.	17.6	TL-208
7	1218.05	609.31	1.6	18.	58.	16.7	BI-214
8	1589.06	794.85	0.8	6.	20.	29.4	CS-134
9	1821.82	911.24	1.0	15.	27.	27.9	AC-228
10	2921.29	1460.87	1.8	8.	245.	6.7	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: #2 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 11:54:00

Decayed to 2. days, 17.9000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	4.63E-06 +- 3.33E-07		4.63E-06 +- 3.33E-07	
Total	4.63E-06 +- 3.33E-07		4.63E-06 +- 3.33E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1677

PEAKS NOT USED IN ANALYSIS! 0 0 4 4 0 0 5 7

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
371.91	186.06	57.	25.0	1.38E+00
476.85	238.56	142.	11.7	4.11E+00
589.98	295.16	68.	17.6	2.42E+00
676.49	338.44	37.	25.9	1.49E+00
703.47	351.93	88.	15.2	3.66E+00
1165.72	583.14	59.	17.6	3.82E+00
1218.05	609.31	58.	16.7	3.92E+00
1589.06	794.85	20.	29.4	1.70E+00
1821.82	911.24	27.	27.9	2.66E+00

0

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 * G A M M A S P E C T R U M A N A L Y S I S *
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IBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 13:11:57

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 142
 Spectrum Size: 4096 channels.
 First channel for Search: 0
 Order of Smoothing Function: 5
 Number of Background Channels: 4 on each side of peak.
 Peak Confidence Factor: 95.0%
 Multiplet Sensitivity: 3
 Identification Energy Window: +- 1.00 keV.
 Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1679

Measured by: J. BUNDICK

Sample Description: #3 SOIL SAMPLE FROM:

Geometry Description: MARINELLI SOLID

Sample Size: 1.9900E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 12:36:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 18.6000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	476.85	238.56	1.4	100.	84.	20.1	PB-212
2	590.34	295.34	1.2	24.	53.	18.4	PB-214
3	703.80	352.09	1.6	21.	73.	15.0	PB-214
4	1021.29	510.90	2.7	11.	27.	25.9	TL-208,NA-22, ANN-RD
5	1165.84	583.20	1.8	13.	54.	16.6	TL-208
6	1218.05	609.31	0.7	19.	46.	20.3	BI-214
7	1640.21	820.42	0.8	9.	10.	54.0	
8	1822.14	911.40	1.1	5.	30.	21.1	AC-228
9	1937.47	969.06	1.5	7.	23.	26.4	RU-105
10	2921.18	1460.81	1.8	4.	334.	5.5	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Sample: #3 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 12:36:00

Decayed to 2. days, 18.6000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	6.21E-06 +- 3.82E-07		6.21E-06 +- 3.82E-07	
Total	6.21E-06 +- 3.82E-07		6.21E-06 +- 3.82E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1679

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 0 1

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.85	238.56	84.	20.1	2.43E+00
90.34	295.34	53.	18.4	1.89E+00
103.80	352.09	73.	15.0	3.01E+00
1021.29	510.90	27.	25.9	1.56E+00
1165.84	583.20	54.	16.6	3.51E+00
1218.05	609.31	46.	20.3	3.13E+00
1640.21	820.42	10.	54.0	8.85E-01
1822.14	911.40	30.	21.1	2.92E+00
1937.47	969.06	23.	26.4	2.39E+00

0

*
* GAMMA SPECTRUM ANALYSIS *

CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 17:29:46

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1704

Measured by: J. BUNDICK

Sample Description: #4 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 2.1850E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 16:54:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 22.9000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.52	74.80	0.8	123.	89.	14.5	
2C	154.09	77.09	0.8	118.	134.	13.5	
3	371.58	185.90	1.5	103.	56.	28.9	U-235
4	476.96	238.62	1.0	114.	261.	8.3	PB-212
5	590.03	295.18	0.9	55.	91.	15.9	PB-214
6	676.24	338.31	0.8	49.	59.	21.2	AC-228
7	703.56	351.97	1.2	44.	144.	10.6	PB-214
8	972.59	486.54	1.6	13.	20.	34.2	LA-140, TE-129
9	1021.19	510.85	1.8	28.	45.	22.8	TL-208, NA-22, ANN-RD
10	1165.77	583.16	1.7	17.	91.	12.4	TL-208
11	1218.34	609.46	1.6	25.	115.	11.4	BI-214
12	1588.58	794.61	0.7	12.	19.	36.0	
13	1792.89	896.77	1.5	11.	11.	55.4	
14	1821.92	911.29	0.9	18.	44.	21.1	AC-228
15	2921.27	1460.86	1.5	4.	443.	4.8	K-40

Error Quotation at 1.00 sigma

Peak Confidence Level at 95.0%

1 Multiplets processed.

1 Multiplet Analysis converged normally

Sample: #4 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 16:54:00

Decayed to 2. days, 22.9000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.51E-06 +- 4.13E-07		7.51E-06 +- 4.13E-07	
Total	7.51E-06 +- 4.13E-07		7.51E-06 +- 4.13E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1704

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 5

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
149.52	74.80	89.	14.5	2.86E+00
154.09	77.09	134.	13.5	4.19E+00
171.58	185.90	56.	28.9	1.36E+00
476.96	238.62	261.	8.3	7.55E+00
590.03	295.18	91.	15.9	3.24E+00
676.24	338.31	59.	21.2	2.36E+00
703.56	351.97	144.	10.6	5.97E+00
972.59	486.54	20.	34.2	1.13E+00
1021.19	510.85	45.	22.8	2.59E+00
1165.77	583.16	91.	12.4	5.92E+00
1218.34	609.46	115.	11.4	7.78E+00
1588.58	794.61	19.	36.0	1.60E+00
1792.89	896.77	11.	55.4	1.05E+00
1821.92	911.29	44.	21.1	4.29E+00

0

0 0 ! 0 0 4 4 0 0 6

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 13:58:41

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1694

Measured by: J. BUNDICK

Sample Description: #5 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.8600E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 13:23:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 19.3833 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.36	74.72	1.1	136.	94.	13.6	
2C	154.00	77.04	1.1	134.	157.	12.6	
3C	477.14	238.71	1.1	69.	259.	8.9	PB-212
4C	484.24	242.26	1.1	47.	35.	16.7	
5	589.99	295.16	1.1	31.	83.	14.3	PB-214
6*	703.21	351.80	1.2	31.	89.	18.4	PB-214
7*	1021.60	511.05	1.2	17.	27.	31.0	TL-208, NA-22, ANN-RD
8	1165.94	583.25	1.3	9.	88.	11.8	TL-208
9	1218.31	609.44	1.2	16.	75.	13.8	BI-214
10	1589.06	794.85	2.1	10.	11.	51.4	CS-134
11	1821.62	911.13	1.6	14.	46.	19.0	AC-228
12	2240.16	1120.40	1.5	21.	16.	51.7	BI-214, SC-46, TA-182
13	2921.25	1460.85	1.9	5.	386.	5.2	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

4 Multiplets processed.

Multiplet Analysis converged normally
\$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

Sample: #5 SOIL SAMPLE FROM
Data collected on 08-JUL-91 at 13:23:00
Decayed to 2. days, 19.3833 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.68E-06 +- 4.47E-07		7.68E-06 +- 4.47E-07	
Total	7.68E-06 +- 4.47E-07		7.68E-06 +- 4.47E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1694

PEAKS NOT USED IN ANALYSIS! 0 0 4 4 0 0 , 9

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
149.36	74.72	94.	13.6	3.04E+00
254.00	77.04	157.	12.6	4.91E+00
277.14	238.71	259.	8.9	7.49E+00
484.24	242.26	35.	16.7	1.03E+00
589.99	295.16	83.	14.3	2.98E+00
703.21	351.80	89.	18.4	3.69E+00
1021.60	511.05	27.	31.0	1.54E+00
1165.94	583.25	88.	11.8	5.72E+00
1218.31	609.44	75.	13.8	5.07E+00
1589.06	794.85	11.	51.4	9.79E-01
1821.62	911.13	46.	19.0	4.50E+00
2240.16	1120.40	16.	51.7	1.87E+00

*
* GAMMA SPECTRUM ANALYSIS *
*

CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 14:00:17

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1695

Measured by: J. BUNDICK

Sample Description: #6 SOIL SAMPLE SAMPL

Geometry Description: MARINELLI SOLID

Sample Size: 2.1150E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 13:25:00

COLLECT Live Time: 2000. seconds *
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 19.4167 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91

Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	476.72	238.49	1.1	77.	271.	8.8	PB-212
2C	483.09	241.67	1.1	76.	42.	21.1	
3C	589.91	295.10	1.2	52.	87.	19.3	PB-214
4	676.05	338.20	1.3	40.	40.	27.0	AC-228
5	703.04	351.69	1.3	37.	129.	11.0	PB-214
6	1020.65	510.55	1.1	28.	45.	22.3	TL-208, NA-22, ANN-RD
7	1165.67	583.07	1.4	19.	83.	13.4	TL-208
8	1217.84	609.16	1.2	18.	87.	12.9	BI-214
9	1822.00	911.25	1.3	21.	56.	18.2	AC-228
10	2921.21	1460.68	2.1	5.	438.	4.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

C - Multiplet Analysis converged normally

Sample: #6 SOIL SAMPLE SAMPL

Data collected on 08-JUL-91 at 13:25:00

Decayed to 2. days, 19.4167 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	6.91E-06 +- 3.83E-07		6.91E-06 +- 3.83E-07	
	-----		-----	
Total	6.91E-06 +- 3.83E-07		6.91E-06 +- 3.83E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1695

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 0

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.72	238.49	271.	8.8	7.15E+00
533.09	241.67	42.	21.1	1.12E+00
639.91	295.10	87.	19.3	2.81E+00
676.03	338.20	40.	27.0	1.45E+00
703.04	351.69	129.	11.0	4.86E+00
1020.65	510.55	45.	22.3	2.36E+00
1165.67	583.07	83.	13.4	4.90E+00
1217.84	609.16	87.	12.9	5.35E+00
1822.00	911.25	56.	18.2	4.97E+00

0

Sample: #6 SOIL SAMPLE SAMPL

Data collected on 08-JUL-91 at 13:25:00

Decayed to 2. days, 19.4167 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	6.91E-06 +- 3.83E-07		6.91E-06 +- 3.83E-07	
Total	6.91E-06 +- 3.83E-07		6.91E-06 +- 3.83E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1695

PEAKS NOT USED IN ANALYSIS U U 4 4 U U . U

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
476.72	238.49	271.	8.8	7.15E+00
483.09	241.67	42.	21.1	1.12E+00
489.91	295.10	87.	19.3	2.81E+00
676.05	338.20	40.	27.0	1.45E+00
703.04	351.69	129.	11.0	4.86E+00
1020.65	510.55	45.	22.3	2.36E+00
1165.67	583.07	83.	13.4	4.90E+00
1217.84	609.16	87.	12.9	5.35E+00
1822.00	911.25	56.	18.2	4.97E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 17:31:20

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +/- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1705

Measured by: J. BUNDICK

Sample Description: #7 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.8050E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANLQ01

COLLECT started on 08-JUL-91 at 16:56:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 22.9333 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91

Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	476.62	238.44	0.9	42.	183.	10.6	PB-212
2	675.72	338.03	1.2	21.	30.	27.8	AC-228
3	703.11	351.73	1.6	22.	93.	12.6	PB-214
4N	957.48	478.95	0.7	16.	17.	41.3	W-187
5C	1020.81	510.63	1.0	11.	38.	22.9	TL-208,NA-22, ANN-RD
6	1165.92	583.20	1.4	16.	51.	17.9	TL-208
7	1217.89	609.18	1.5	12.	48.	18.0	BI-214
8	1821.88	911.19	1.1	16.	37.	23.4	AC-228
9	2921.55	1460.84	1.9	4.	400.	5.1	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

C - Multiplet Analysis converged normally
N - Multiplet Analysis did NOT converge

Sample: 47 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 16:56:00

Decayed to 2. days, 22.9333 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.39E-06 +- 4.24E-07		7.39E-06 +- 4.24E-07	
Total	7.39E-06 +- 4.24E-07		7.39E-06 +- 4.24E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1705



PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 1 1

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
476.62	238.44	183.	10.6	4.85E+00
475.72	338.03	30.	27.3	1.09E+00
503.11	351.73	93.	12.6	3.50E+00
957.48	478.95	17.	41.3	8.55E-01
1020.81	510.63	38.	22.9	1.98E+00
1165.92	583.20	51.	17.9	3.02E+00
1217.89	609.18	48.	18.0	2.98E+00
1821.88	911.19	37.	23.4	3.31E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA. 08-JUL-91 13:14:00

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD1680
Measured by: J. BUNDICK

Sample Description: #8 SOIL SAMPLE FROM
Geometry Description: MARINELLI SOLID
Sample Size: 1.7650E+03 GM / Conversion Factor: 1.0000E+00
Standard Size: 1.5000E+03 GM
Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 12:38:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 18.6333 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91
Efficiency Calibration performed 27-FEB-91

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.26	74.67	0.9	197.	144.	13.2	
2C	153.65	76.87	0.9	179.	231.	10.8	
3	185.37	92.74	1.5	194.	71.	28.6	
4	371.35	185.78	1.1	71.	93.	15.5	U-235
5	476.55	238.40	1.1	169.	343.	7.6	PB-212
6	589.88	295.09	1.1	60.	82.	17.3	PB-214
7	675.79	338.06	1.3	44.	73.	17.4	AC-228
8*	703.26	351.80	1.0	31.	169.	12.2	PB-214
9	1165.47	582.97	1.5	32.	125.	11.2	TL-208
10	1217.89	609.18	1.3	21.	128.	10.4	BI-214
11C	1821.69	911.09	2.2	27.	66.	17.5	AC-228
12	1847.36	923.93	1.7	12.	19.	36.8	
13	1937.32	968.90	1.4	43.	28.	41.1	RU-105
14	2240.32	1120.37	1.0	21.	27.	34.1	BI-214, SC-46, TA-182
15	2921.42	1460.78	2.1	5.	552.	4.3	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

01: Multiplet Analysis converged normally

\$ - Multiplet Analysis Terminated because of no CHI-SQ improvement



Sample: #8 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 12:38:00

Decayed to 2. days, 18.6333 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	1.04E-05 +- 5.29E-07		1.04E-05 +- 5.29E-07	
	-----		-----	
Total	1.04E-05 +- 5.29E-07		1.04E-05 +- 5.29E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1680



PEAKS NOT USED IN ANALYSIS ! 0 0 4 4 0 0 3 1

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
149.26	74.67	144.	13.2	3.97E+00
153.65	76.87	231.	10.8	6.18E+00
155.37	92.74	71.	28.6	1.64E+00
1371.35	185.78	93.	15.5	2.08E+00
476.55	238.40	343.	7.6	9.06E+00
589.88	295.09	82.	17.3	2.65E+00
675.79	338.06	73.	17.4	2.65E+00
703.26	351.80	169.	12.2	6.38E+00
1165.47	582.97	125.	11.2	7.42E+00
1217.89	609.18	128.	10.4	7.86E+00
1821.69	911.09	66.	17.5	5.82E+00
1847.36	923.93	19.	36.8	1.70E+00
1937.32	968.90	28.	41.1	2.65E+00
2240.32	1120.37	27.	34.1	2.85E+00

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0 0 1 0 0 4 4 0 0 1 2

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 12:31:04

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1678

Measured by: J. BUNDICK

Sample Description: #9 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.8400E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 11:55:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 17.9167 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91
Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	148.95	74.51	0.9	171.	111.	14.5	
2C	153.57	76.83	0.9	164.	238.	10.6	
3	371.47	185.84	1.3	77.	77.	19.0	U-235
4	476.68	238.47	1.0	124.	294.	7.9	PB-212
5	590.04	295.17	1.1	39.	88.	14.5	PB-214
6	675.88	338.11	0.8	57.	35.	34.9	AC-228
7C	703.13	351.74	1.2	35.	155.	11.8	PB-214
8*	1021.16	510.80	1.3	18.	58.	18.7	TL-208, NA-23, ANN-RD
9	1165.82	583.15	1.3	13.	128.	9.8	TL-208
10	1218.03	609.26	1.7	21.	110.	11.4	BI-214
11	1420.81	710.66	1.2	12.	13.	49.4	
12	1491.15	745.83	1.5	13.	12.	51.3	
13	1821.35	910.92	1.9	14.	62.	15.6	AC-228
14	1929.07	964.78	0.8	20.	20.	38.7	
15	2921.46	1460.80	2.1	4.	426.	4.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

3 Multiplets processed.

0 - Multiplet Analysis converged normally

\$ - Multiplet Analysis Terminated because of no CHI-SQ improvement



Sample: #9 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 11:55:00

Decayed to 2. days, 17.9167 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.73E-06 +- 4.32E-07		7.73E-06 +- 4.32E-07	
Total	7.73E-06 +- 4.32E-07		7.73E-06 +- 4.32E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1678

PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
148.95	74.51	111.	14.5	3.07E+00
153.57	76.83	238.	10.6	6.38E+00
171.47	185.84	77.	19.0	1.71E+00
176.68	238.47	294.	7.9	7.77E+00
190.04	295.17	88.	14.5	2.83E+00
275.88	338.11	35.	34.9	1.27E+00
303.13	351.74	155.	11.8	5.85E+00
1021.16	510.80	58.	13.7	3.06E+00
1165.82	583.15	128.	9.8	7.60E+00
1218.03	609.26	110.	11.4	6.75E+00
1420.81	710.66	13.	49.4	8.92E-01
1491.15	745.83	12.	51.3	9.22E-01
1821.35	910.92	62.	15.6	5.49E+00
1929.07	964.78	20.	38.7	1.35E+00

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* GAMMA SPECTRUM ANALYSIS *
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SERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 18:07:40

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +/- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1706

Measured by: J. BUNDICK

1
Sample Description: #10 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.9550E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 17:32:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 23.5333 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

PEAK ANALYSIS

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.69	74.88	1.0	152.	68.	23.9	
2C	153.30	76.94	1.0	153.	143.	16.8	
3	371.86	186.04	1.2	115.	66.	26.1	U-235
4C	477.03	238.65	1.1	80.	311.	7.8	PB-212
5C	483.33	241.80	1.1	73.	62.	10.7	
6\$	590.14	295.24	1.2	47.	84.	18.8	PB-214
7\$	599.14	299.74	1.2	36.	26.	29.3	PB-212
8	676.56	338.47	1.2	28.	62.	17.5	AC-228
9	703.47	351.93	1.2	37.	113.	12.1	PB-214
10	1020.75	510.63	1.1	25.	32.	28.6	TL-208, NA-22, ANN-RD
11	1137.98	569.27	2.1	11.	10.	59.5	CS-134, BI-207
12	1165.86	583.21	1.6	17.	82.	13.2	TL-208
13	1218.09	609.33	1.2	19.	90.	12.8	BI-214
14	1454.43	727.52	1.3	8.	28.	23.8	BI-212
15	1535.47	768.05	1.1	8.	25.	25.8	
16	1821.76	911.21	1.0	11.	43.	19.1	AC-228
17\$	1937.58	969.12	1.5	11.	20.	40.1	RU-105
18\$	2279.13	1139.88	1.6	3.	11.	34.5	SB-122
19\$	2283.32	1141.97	1.6	1.	13.	31.4	
20	2921.07	1460.76	1.8	2.	435.	4.8	K-40

For Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

5 Multiplets processed.

C. - Multiplet Analysis converged normally

\$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
149.69	74.88	68.	23.9	2.17E+00
153.80	76.94	143.	16.8	4.48E+00
171.86	186.04	66.	26.1	1.60E+00
477.03	238.65	311.	7.8	8.99E+00
483.33	241.80	62.	10.7	1.81E+00
590.14	295.24	84.	18.8	2.98E+00
599.14	299.74	26.	29.3	9.43E-01
676.56	338.47	62.	17.5	2.48E+00
703.47	351.93	113.	12.1	4.68E+00
1020.75	510.63	32.	28.6	1.86E+00
1137.98	569.27	10.	59.5	6.20E-01
1165.86	583.21	82.	13.2	5.34E+00
1218.09	609.33	90.	12.8	6.10E+00
1454.43	727.52	28.	23.8	2.23E+00
1535.47	768.05	25.	25.8	2.10E+00
1821.76	911.21	43.	19.1	4.16E+00
1937.58	969.12	20.	40.1	2.01E+00
2279.13	1139.88	11.	34.5	1.25E+00
2283.32	1141.97	13.	31.4	1.54E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 15:29:34

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1698

Measured by: J. BUNDICK

Sample Description: #11 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: $1.8950\text{E}+03$ GM / Conversion Factor: $1.0000\text{E}+00$ Standard Size: $1.5000\text{E}+03$ GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 14:54:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 20.9000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1\$	476.96	238.62	1.2	41.	177.	10.5	PB-212
2\$	483.57	241.92	1.2	41.	39.	22.4	
3	589.85	295.09	2.2	24.	54.	18.7	PB-214
4\$	703.69	352.04	1.2	23.	68.	19.8	PB-214
5	1020.31	510.41	2.3	15.	36.	22.6	TL-208, NA-22, ANN-RD
6	1165.89	583.22	1.7	14.	52.	17.5	TL-208
7	1217.99	609.28	1.6	16.	45.	19.6	BI-214
8	1821.45	911.05	1.0	13.	26.	28.0	AC-228
9	2921.09	1460.77	1.7	3.	378.	5.2	K-40
10	3529.62	1764.87	0.9	0.	11.	30.2	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

. 2 Multiplets processed.

\$ - Multiplet Analysis Terminated because of no CHI-SQ improvement

Sample: #11 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 14:54:00

Decayed to 2. days, 20.9000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.38E-06 +- 4.31E-07		7.38E-06 +- 4.31E-07	
	-----		-----	
Total	7.38E-06 +- 4.31E-07		7.38E-06 +- 4.31E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1698

PEAKS NOT USED IN ANALYSIS: 0 0 4 4 0 0 9 3

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.96	238.62	177.	10.5	5.11E+00
583.57	241.92	39.	22.4	1.13E+00
589.85	295.09	54.	18.7	1.92E+00
703.69	352.04	68.	19.8	2.83E+00
1020.31	510.41	36.	22.6	2.10E+00
1165.89	583.22	52.	17.5	3.40E+00
1217.99	609.28	45.	19.6	3.06E+00
1821.45	911.05	26.	28.0	2.58E+00
3529.62	1764.87	11.	30.2	1.88E+00

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*
* GAMMA SPECTRUM ANALYSIS *
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BERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 16:52:01

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1702

Measured by: J. BUNDICK

Sample Description: #12 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 2.0100E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 16:16:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 22.2667 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	477.11	238.69	1.2	72.	207.	10.5	PB-212.
2C	485.42	241.85	1.2	58.	48.	18.5	
3	589.74	295.04	1.2	62.	49.	26.8	PB-214
4	703.56	351.97	1.7	40.	119.	12.0	PB-214
5	997.13	498.82	1.8	13.	11.	55.3	
6	1166.16	583.36	1.2	13.	68.	14.4	TL-208
7	1217.97	609.27	1.0	24.	79.	14.5	BI-214
8	1821.90	911.28	1.5	12.	41.	20.6	AC-228
9C	1937.38	969.02	1.2	10.	22.	30.6	RU-105
10	2239.94	1120.28	0.8	7.	24.	25.6	BI-214, SC-46, TA-182
11C	2921.51	1460.98	2.0	2.	453.	4.7	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

C - Multiplet Analysis converged normally



Sample: #12 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 16:16:00

Decayed to 2. days, 22.2667 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	8.34E-06 +- 4.53E-07		8.34E-06 +- 4.53E-07	
	-----		-----	
Total	8.34E-06 +- 4.53E-07		8.34E-06 +- 4.53E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1702

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 0 7

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
477.11	238.69	207.	10.5	5.98E+00
583.42	241.85	48.	18.5	1.39E+00
589.74	295.04	49.	26.8	1.75E+00
703.56	351.97	119.	12.0	4.95E+00
997.13	498.82	11.	55.3	6.21E-01
1166.16	583.36	68.	14.4	4.45E+00
1217.97	609.27	79.	14.5	5.36E+00
1821.90	911.28	41.	20.6	3.95E+00
1937.38	969.02	22.	30.6	2.30E+00
2239.94	1120.28	24.	25.6	2.83E+00

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 * GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 16:12:09

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 1.0
 Detector Number: 1 / Geometry Number: 142
 Spectrum Size: 4096 channels.
 First channel for Search: 0
 Order of Smoothing Function: 5
 Number of Background Channels: 4 on each side of peak.
 Peak Confidence Factor: 95.0%
 Multiplet Sensitivity: 3
 Identification Energy Window: ± 1.00 keV.
 Error Quotation: 1.00 sigma uncertainty..

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1700

Measured by: J. BUNDICK

Sample Description: #13 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.5900E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 15:36:00

COLLECT Live Time: 2000. seconds %
 Real Time: 2000. seconds
 Dead Time: 00.00 %

Decayed to 2. days, 21.6000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	476.93	238.60	1.1	94.	219.	9.1	PB-212
2	589.96	295.15	1.5	46.	79.	16.4	PB-214
3	676.55	338.46	1.2	32.	46.	22.6	AC-228
4	703.77	352.08	1.3	38.	100.	13.5	PB-214
5	1165.72	583.14	1.6	21.	75.	14.7	TL-208
6	1218.19	609.38	1.7	16.	83.	12.9	BI-214
7	1821.46	911.06	1.3	14.	46.	19.0	AC-228
8	1937.45	969.05	1.6	17.	20.	37.7	RU-105
9	2921.13	1460.79	1.8	5.	373.	5.3	K-40
10	3529.40	1764.77	1.5	1.	9.	38.3	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%



Sample: #13 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 15:36:00

Decayed to 2. days, 21.6000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	8.68E-06 +- 5.13E-07		8.68E-06 +- 5.13E-07	
	-----		-----	
Total	8.68E-06 +- 5.13E-07		8.68E-06 +- 5.13E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1700

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 1 0 1

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.93	238.60	219.	9.1	6.34E+00
589.96	295.15	79.	16.4	2.80E+00
76.55	338.46	46.	22.6	1.83E+00
703.77	352.08	100.	13.5	4.13E+00
1165.72	583.14	75.	14.7	4.85E+00
1218.19	609.38	83.	12.9	5.61E+00
1821.46	911.06	46.	19.0	4.50E+00
1937.45	969.05	20.	37.7	2.11E+00
3529.40	1764.77	9.	38.3	1.62E+00

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 * GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 21:02:34

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
 Detector Number: 2 / Geometry Number: 242
 Spectrum Size: 4096 channels.
 First channel for Search: 0
 Order of Smoothing Function: 5
 Number of Background Channels: 4 on each side of peak.
 Peak Confidence Factor: 95.0%
 Multiplet Sensitivity: 3
 Identification Energy Window: ± 1.00 keV.
 Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1710

Measured by: J.J. RAMBO

Sample Description: #14 SOIL SAMPLE

Analysis Library file: ANL001

```
COLLECT Live Time: 2000. seconds
        Real Time: 2000. seconds
        Dead Time: 00.00 %
```

Energy Calibration performed 17-JAN-91
Efficiency Calibration performed 27-FEB-91

08-JUL-91 21:02:34

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1#	476.70	238.48	1.0	66.	243.	9.5	PB-212
2#	482.93	241.59	1.0	61.	32.	24.1	
3C	590.04	295.17	1.0	28.	90.	17.9	PB-214
4	676.05	338.19	0.7	29.	68.	16.2	AC-228
5	702.98	351.66	1.1	32.	116.	11.6	PB-214
6	902.19	451.30	1.2	13.	18.	35.1	
7	1165.61	583.04	2.0	22.	83.	13.9	TL-208
8	1217.72	609.10	1.4	22.	91.	13.0	BI-214
9	1571.13	785.82	2.9	10.	15.	39.4	BI-212, PA234M
10	1821.54	911.02	2.5	7.	49.	16.5	AC-228
11#	1937.48	968.98	1.5	30.	24.	41.5	RU-105
12#	2239.99	1120.21	1.8	20.	27.	34.5	BI-214, SC-46
13C	2921.44	1460.79	1.9	7.	461.	4.8	K-40

2 Multiplets processed.

```
C - Multiplet Analysis converged normally
$ - Multiplet Analysis Terminated because of no CHI-SQ improvement
```

Cook Nuclear Plant Series 95 MCA.

08-JUL-91 21:02:34

Sample: #14 SOIL SAMPLE

Data collected on 08-JUL-91 at 20:27:00

Decayed to 3. days, 2.4500 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.12E-06 +- 3.89E-07		7.12E-06 +- 3.89E-07	
	-----		-----	
Total	7.12E-06 +- 3.89E-07		7.12E-06 +- 3.89E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1710



PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.70	238.48	243.	9.5	6.42E+00
482.93	241.59	32.	24.1	8.63E-01
590.04	295.17	90.	17.9	2.91E+00
676.05	338.19	68.	16.2	2.48E+00
702.98	351.66	116.	11.6	4.37E+00
902.19	451.30	18.	35.1	8.69E-01
1165.61	583.04	83.	13.9	4.94E+00
1217.72	609.10	91.	13.0	5.63E+00
1571.13	785.82	15.	39.4	1.16E+00
1821.54	911.02	49.	16.5	4.36E+00
1937.48	968.98	24.	41.5	2.23E+00
2239.99	1120.21	27.	34.5	2.85E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 18:09:26

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: ± 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1707

Measured by: J. BUNDICK

Sample Description: #15 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: $2.0350\text{E}+03$ GM / Conversion Factor: $1.0000\text{E}+00$ Standard Size: $1.5000\text{E}+03$ GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 17:34:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 23.5667 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91

Efficiency Calibration performed 27-FEB-91



P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	476.59	238.42	1.1	48.	155.	12.8	PB-212
2C	483.22	241.74	1.1	53.	28.	32.1	
3	589.74	295.02	1.7	40.	64.	18.5	PB-214
4	676.17	338.25	1.2	18.	51.	17.8	AC-228
5	703.42	351.88	1.4	34.	86.	14.4	PB-214
6	856.76	428.58	1.7	20.	12.	60.1	SB-125
7	1021.09	510.77	2.1	21.	32.	28.1	TL-208, NA-22, ANN-RD
8	1165.69	583.08	1.0	17.	46.	19.9	TL-208
9	1218.37	609.43	1.8	13.	58.	15.8	BI-214
10	1821.71	911.10	0.9	19.	21.	39.0	AC-228
11	1937.59	969.03	1.9	15.	21.	36.2	RU-105
12	2921.57	1460.85	1.8	6.	430.	4.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

C - Multiplet Analysis converged normally

Sample: #15 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 17:34:00

Decayed to 2. days, 23.5667 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.05E-06 +- 3.95E-07		7.05E-06 +- 3.95E-07	
	-----		-----	
Total	7.05E-06 +- 3.95E-07		7.05E-06 +- 3.95E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1707

PEAKS NOT USED IN ANALYSIS 0 0 4 4 0 1 0 9

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.59	238.42	155.	12.8	4.11E+00
583.22	241.74	28.	32.1	7.56E-01
589.74	295.02	64.	18.5	2.06E+00
676.17	338.25	51.	17.8	1.86E+00
703.42	351.88	86.	14.4	3.24E+00
856.76	428.58	12.	60.1	5.38E-01
1021.09	510.77	32.	28.1	1.67E+00
1165.69	583.08	46.	19.9	2.75E+00
1218.37	609.43	58.	15.8	3.57E+00
1821.71	911.10	21.	39.0	1.90E+00
1937.59	969.03	21.	36.2	1.99E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 16:53:32

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / AEC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1703

Measured by: J. BUNDICK

Sample Description: #16 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.9650E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 16:18:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 22.3000 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91

Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.04	74.56	0.9	225.	152.	10.6	
2C	153.53	76.81	0.9	208.	225.	10.1	
3	476.63	238.44	1.0	181.	379.	7.2	PB-212
4	589.95	295.12	1.3	53.	119.	12.5	PB-214
5	675.69	338.02	0.9	52.	58.	21.4	AC-228
6	703.18	351.76	1.3	63.	161.	10.7	PB-214
7	1020.48	510.46	1.2	34.	34.	30.1	TL-208, NA-22, ANN-RD
8	1165.83	583.15	1.3	28.	131.	10.5	TL-208
9	1217.84	609.16	1.6	30.	118.	11.5	BI-214
10	1453.84	727.17	0.9	33.	27.	38.0	BI-212
11	1561.20	780.86	1.5	10.	12.	45.4	
12	1821.48	910.99	1.9	18.	82.	13.4	AC-228
13C	1937.51	969.00	1.4	16.	42.	26.8	RU-105
14	2921.39	1460.76	2.1	6.	528.	4.4	K-40
15	3528.17	1763.95	1.7	0.	27.	19.2	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

1 Multiplet Analysis converged normally



Sample: #16 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 16:18:00

Decayed to 2. days, 22.3000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	8.97E-06 +- 4.64E-07		8.97E-06 +- 4.64E-07	
	-----		-----	
Total	8.97E-06 +- 4.64E-07		8.97E-06 +- 4.64E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1703

PEAKS NOT USED IN ANALYSIS: C C 4 4 C 1 1 3

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
149.04	74.56	152.	10.6	4.18E+00
253.53	76.81	225.	10.1	6.03E+00
76.63	238.44	379.	7.2	1.00E+01
589.95	295.12	119.	12.5	3.83E+00
675.69	338.02	58.	21.4	2.13E+00
703.18	351.76	161.	10.7	6.06E+00
1020.48	510.46	34.	30.1	1.80E+00
1165.83	583.15	131.	10.5	7.74E+00
1217.84	609.16	118.	11.5	7.26E+00
1453.84	727.17	27.	38.0	1.95E+00
1561.20	780.86	12.	45.4	9.61E-01
1821.48	910.99	82.	13.4	7.23E+00
1937.51	969.00	42.	26.8	3.91E+00
3528.17	1763.95	27.	19.2	4.15E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 16:13:40

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1701

Measured by: J. BUNDICK

Sample Description: #17 SOIL SAMPLE FROM
Geometry Description: MARINELLI SOLID
Sample Size: 2.1950E+03 GM / Conversion Factor: 1.0000E+00
Standard Size: 1.5000E+03 GM
Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 15:38:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 21.6333 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91
Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	476.71	238.48	1.1	83.	336.	8.0	PB-212
2C	482.19	241.22	1.1	78.	55.	23.5	
3	589.94	295.12	1.1	65.	82.	17.8	PB-214
4	675.81	338.07	0.8	33.	73.	16.2	AC-228
5	703.32	351.84	1.1	45.	155.	10.1	PB-214
6	1165.59	583.03	1.7	22.	116.	11.1	TL-208
7	1203.40	601.94	2.2	15.	17.	40.1	SB-124
8	1218.25	609.37	1.3	16.	108.	11.1	BI-214
9	1588.83	794.67	0.7	12.	21.	33.2	
10	1720.24	860.37	1.5	12.	17.	38.6	
11	1821.73	911.11	1.9	15.	42.	21.1	AC-228
12	1937.62	969.05	1.7	15.	38.	22.7	RU-105
13	2088.64	1044.55	1.7	12.	12.	55.1	BR-82, SB-124
14C	2921.49	1460.82	2.2	8.	461.	4.8	K-40
15	3242.05	1621.00	1.8	2.	8.	43.8	BI-212
16	3528.74	1764.24	2.8	0.	13.	27.7	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

0 Multiplet Analysis converged normally



Sample: #17 SOIL SAMPLE FROM

Data collected on 08-JUL-91 at 15:38:00

Decayed to 2. days, 21.6333 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.01E-06 +- 3.84E-07		7.01E-06 +- 3.84E-07	
Total	7.01E-06 +- 3.84E-07		7.01E-06 +- 3.84E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1701



PEAKS NOT USED IN ANALYSIS 3 0 4 4 0 1 1 7

Centroid Channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.71	238.48	336.	8.0	8.88E+00
482.19	241.22	55.	23.5	1.47E+00
489.94	295.12	82.	17.8	2.65E+00
675.81	338.07	73.	16.2	2.65E+00
703.32	351.84	155.	10.1	5.84E+00
1165.59	583.03	116.	11.1	6.89E+00
1203.40	601.94	17.	40.1	1.06E+00
1218.25	609.37	108.	11.1	6.63E+00
1588.83	794.67	21.	33.2	1.61E+00
1720.24	860.37	17.	38.6	1.47E+00
1821.73	911.11	42.	21.1	3.69E+00
1937.62	969.05	38.	22.7	3.52E+00
2088.64	1044.55	12.	55.1	1.16E+00
3242.05	1621.00	8.	43.8	1.19E+00
3528.74	1764.24	13.	27.7	2.00E+00

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA. 08-JUL-91 15:31:03

ANALYSIS PARAMETERS

MCA Unit Number: 2 / ADC Unit Number: 2.0
Detector Number: 2 / Geometry Number: 242
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +/- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.
Analysis of Spectrum saved in Disk File SD1699
Measured by: J. BUNDICK

Sample Description: #18 SOIL SAMPLE FROM
Geometry Description: MARINELLI SOLID
Sample Size: 2.2400E+03 GM / Conversion Factor: 1.0000E+00
Standard Size: 1.5000E+03 GM
Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 14:56:00

COLLECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 2. days, 20.9333 hours BEFORE the start of COLLECT

Energy Calibration performed 17-JAN-91
Efficiency Calibration performed 27-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1C	149.03	74.56	0.9	193.	127.	18.9	
2C	153.53	76.81	0.9	184.	167.	16.2	
3*	476.72	238.49	0.9	87.	288.	9.1	PB-212
4*	482.49	241.38	0.9	76.	49.	22.6	
5	589.54	294.92	1.1	56.	79.	17.5	PB-214
6	675.3	338.03	0.9	43.	79.	16.3	AC-228
7	703.20	351.77	1.4	38.	178.	9.1	PB-214
8	1165.87	583.17	1.2	26.	112.	11.5	TL-208
9C	1217.97	609.22	1.8	32.	80.	15.4	BI-214
10	1821.54	911.02	1.3	12.	66.	14.6	AC-228
11	1995.14	997.81	0.8	6.	8.	60.3	
12	2921.49	1460.81	2.0	16.	479.	4.8	K-40
13	3529.68	1764.70	1.6	0.	19.	22.9	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

2 Multiplets processed.

C - Multiplet Analysis converged normally

* Multiplet Analysis Terminated because of no CHI-SQ improvement



Sample: #18 SOIL SAMPLE FROM

Date collected on 08-JUL-91 at 14:56:00

Decayed to 2. days, 20.9333 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.13E-06 +- 3.90E-07		7.13E-06 +- 3.90E-07	
	-----		-----	
Total	7.13E-06 +- 3.90E-07		7.13E-06 +- 3.90E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1699

PEAKS NOT USED IN ANALYSIS 1 0 0 4 4 0 1 2 1

Centroid channel	Energy keV	Net Area counts	Error %	Gamma/sec
149.03	74.56	127.	18.9	3.50E+00
153.53	76.81	167.	16.2	4.48E+00
176.72	238.49	288.	9.1	7.60E+00
482.49	241.38	49.	22.6	1.30E+00
589.54	294.92	79.	17.5	2.55E+00
675.73	338.03	79.	16.3	2.87E+00
703.20	351.77	178.	9.1	6.69E+00
1165.87	583.17	112.	11.5	6.63E+00
1217.97	609.22	80.	15.4	4.95E+00
1821.54	911.02	66.	14.6	5.86E+00
1995.14	997.81	8.	60.3	7.40E-01
3529.68	1764.70	19.	22.9	2.92E+00

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Ca

40

De

Ан

Ag
Me

Sample Size: 2.1100E+03 GM 0 0 / Conversion Factor: 1.0000E+00
Standard Size: 1.5000E+03 GM
Analysis Library file: ANLC01

COLLECT started on 08-JUL-91 at 18:36:00

LECT Live Time: 2000. seconds
Real Time: 2000. seconds
Dead Time: 00.00 %

Decayed to 3. days, 0.6000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91
Efficiency Calibration performed 26-FEB-91

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 19:33:03

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	477.28	238.78	1.6	134.	241.	9.4	PB-212
2	590.25	295.29	1.0	62.	97.	15.6	PB-214
3	676.39	338.38	1.2	55.	38.	32.0	AC-228
4	704.01	352.20	1.7	40.	115.	12.3	PB-214
5	1021.21	510.86	1.2	23.	34.	26.3	TL-208, NA-22, ANN-RD
6	1166.14	583.35	2.1	25.	69.	15.9	TL-208
7	1218.44	609.50	1.8	20.	108.	11.5	BI-214
8	1454.67	727.65	0.9	15.	19.	36.7	BI-212
9	1822.69	911.67	1.7	19.	54.	18.6	AC-228
10	2921.86	1461.15	2.1	7.	455.	4.8	K-40
11	3529.36	1764.74	4.1	4.	11.	41.7	BI-214

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

Cook Nuclear Plant Series 95 MCA.

08-JUL-91 19:33:03

Sample: #19 SOIL SAMPLE

Data collected on 08-JUL-91 at 18:36:00

Decayed to 3. days, 0.6000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	7.98E-06 +- 4.38E-07		7.98E-06 +- 4.38E-07	
	-----		-----	
Total	7.98E-06 +- 4.38E-07		7.98E-06 +- 4.38E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1708

PEAKS NOT USED IN ANALYSIS

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
. 477.28	238.78	241.	9.4	6.97E+00
590.25	295.29	97.	15.6	3.46E+00
676.39	338.38	38.	32.0	1.52E+00
704.01	352.20	115.	12.3	4.79E+00
1021.21	510.86	34.	26.3	1.96E+00
1166.14	583.35	69.	15.9	4.50E+00
1218.44	609.50	108.	11.5	7.31E+00
1454.67	727.65	19.	36.7	1.54E+00
1822.69	911.67	54.	18.6	5.23E+00
3529.36	1764.74	11.	41.7	1.92E+00

0 0 1 0 0 4 4 0 1 2 6

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* GAMMA SPECTRUM ANALYSIS *
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CANBERRA SPECTRAN-AT V4.2

DC Cook Nuclear Plant Series 95 MCA.

08-JUL-91 11:23:50

A N A L Y S I S P A R A M E T E R S

MCA Unit Number: 2 / ADC Unit Number: 1.0
Detector Number: 1 / Geometry Number: 142
Spectrum Size: 4096 channels.
First channel for Search: 0
Order of Smoothing Function: 5
Number of Background Channels: 4 on each side of peak.
Peak Confidence Factor: 95.0%
Multiplet Sensitivity: 3
Identification Energy Window: +- 1.00 keV.
Error Quotation: 1.00 sigma uncertainty.

Multiplet Analysis Performed.

Regular Output.

Analysis of Spectrum saved in Disk File SD1676

Measured by: J. BUNDICK

Sample Description: #20 SOIL SAMPLE FROM

Geometry Description: MARINELLI SOLID

Sample Size: 1.9600E+03 GM / Conversion Factor: 1.0000E+00

Standard Size: 1.5000E+03 GM

Analysis Library file: ANL001

COLLECT started on 08-JUL-91 at 10:48:00

COLLECT Live Time: 2000. seconds

Real Time: 2000. seconds

Dead Time: 00.00 %

Decayed to 2. days, 16.8000 hours BEFORE the start of COLLECT

Energy Calibration performed 03-JUL-91

Efficiency Calibration performed 26-FEB-91

P E A K A N A L Y S I S

PK	Centroid channel	Energy keV	FWHM keV	Backgnd counts	Net Area counts	Error %	Nuclides
1	476.94	238.61	1.2	101.	198.	9.9	PB-212
2	590.23	295.28	0.9	52.	58.	22.3	PB-214
3*	676.76	338.57	0.8	21.	38.	32.1	AC-228
4	703.87	352.13	1.5	33.	134.	10.6	PB-214
5	923.89	462.19	1.3	16.	22.	33.4	CS-138
6C	952.06	476.27	1.1	10.	18.	35.1	
7	1021.95	511.23	3.2	18.	48.	19.1	TL-208, NA-22; ANN-RD
8	1165.98	583.27	1.4	15.	68.	14.6	TL-208
9	1218.16	609.37	1.5	17.	88.	12.6	BI-214
10	1822.33	911.49	1.9	19.	54.	18.6	AC-228
11	1937.23	968.94	1.0	12.	23.	31.9	RU-105
12	2170.43	1085.54	0.9	11.	13.	47.5	
13	2921.41	1460.93	2.1	5.	435.	4.9	K-40

Error Quotation at 1.00 sigma
Peak Confidence Level at 95.0%

1 Multiplets processed.

C Multiplet Analysis converged normally

{ Multiplet Analysis Terminated because of no CHI-SQ improvement

Sample: #20 SOIL SAMPLE FROM

Data collected on 08-JUL-31 at 10:48:00

Decayed to 2. days, 16.8000 hours BEFORE the start of COLLECT.

R A D I O N U C L I D E A N A L Y S I S R E P O R T

Nuclide	Activity Concentration in uCi/GM			
	Measured	Error	Decay corrected	Error
K-40	8.21E-06 +- 4.56E-07		8.21E-06 +- 4.56E-07	
Total	8.21E-06 +- 4.56E-07		8.21E-06 +- 4.56E-07	

Error Quotation at 1.00 Sigma

Results saved in File SD1676

2
4



PEAKS NOT USED IN ANALYSIS: 0 0 4 4 0 1 2 9

Centroid channel	Energy keV	Net Area counts	Error %	Gammas/sec
476.94	238.61	198.	9.9	5.73E+00
590.23	295.28	58.	22.3	2.08E+00
576.76	338.57	38.	32.1	1.53E+00
703.87	352.13	134.	10.6	5.57E+00
923.89	462.19	22.	33.4	1.16E+00
952.06	476.27	18.	35.1	9.68E-01
1021.95	511.23	48.	19.1	2.77E+00
1165.98	583.27	68.	14.6	4.45E+00
1218.16	609.37	88.	12.6	5.95E+00
1822.33	911.42	54.	18.6	5.23E+00
1937.23	968.94	23.	31.9	2.32E+00
2170.43	1085.54	13.	47.5	1.45E+00

0

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000