COPIES: S. Giotto
R. Polczynski
D. Petrarca
L. Pacchioni

CHESTER ENVIRONMENTAL

April 5, 1994

Ref. No. 2735-28

Mr. Carl Spadaro
Facilities Engineer
PA Department of Environmental Resources
Waste Management Division
400 Waterfront Drive
Pittsburgh, Pennsylvania 15222-4745

Dear Mr. Spadaro:

Re: Kiski Valley Water Pollution Control Authority
Incinerator Ash Lagoon
Radionuclide Sampling and Analysis

Two samples of the Kiski ash were submitted for radionuclide analysis. Results of the analyses are discussed in a memorandum included as Attachment 1 to this letter.

To summarize, the Kiski results were compared to limits established by the NMSS for sites with unrestricted access. All results are below the regulatory limits except for the uranium concentration in sample #02 which is slightly above the limit. However in a letter issued to Kiski in 1987, the NRC determined that a significant proportion of uranium in samples from the Kiski plant and surrounding area was the result of natural processes. Chester believes that the data supports the beneficial use of the ash as requested by Mill Service.

If you have any questions or require additional information, I can be reached at 412/269-5887.

Sincerely,

Mary M. Washko, Chester Env.
Project Scientist

RECEIVED
APR 06 1994
K.V.W.P.C.A.

MMW:ml-1151

Attachment

cc: R. Laskey
T. Donohue

Post Office Box 15851
Pittsburgh, Pennsylvania 15244
412-269-5700; Fax 412-269-5749

CHESTER
ENVIRONMENTAL

Memorandum

TO: Bob Laskey

REF. NO.: 2735-28

FROM: Mary Washko MW

cc: Tom Donohue

DATE: April 5, 1994

SUBJECT: Kiski Valley Water Pollution Control Authority
Incinerator Ash Lagoon
Radionuclide Analytical Results

ETS collected two samples of incinerator ash from the Kiski Valley Water Pollution Control Authority's (KVWPCA) incinerator ash lagoon on February 25, 1994. Samples were collected from the approximate mid-point of the lagoon at depths ranging from 6 to 8-feet, as indicated in Figure 1. Ash samples were submitted to Controls for Environmental Pollution (CEP), Santa Fe, New Mexico, for analysis. Results of the analyses are summarized in Table 1. A copy of the analytical report is included as Attachment 1.

There are no NRC or other agency regulations that specify allowable quantities of radioactive materials in solids. However, the NRC's office of Nuclear Material Safety and Safeguards (NMSS) published guidelines for acceptable concentrations for various radionuclides in areas of unrestricted access. These values are identified in Column 1 of Table 1 and are compared to the measured concentrations in the Kiski ash samples.

A review of the data indicate that the measured concentrations are below the specified limits for cobalt-60, plutonium, and thorium in both samples. Uranium concentrations are below the specified limit in Sample #01, and are slightly higher than the limit in Sample #02.

Uranium is a naturally occurring element and is expected to be present in the samples analyzed regardless of the source of the influent. In their letter of January, 1987 to the KVWPCA (Attachment 2), the Nuclear Regulatory Commission discussed results of a facility investigation of the Babcock and Wilcox (B&W) discharges to the KVWPCA treatment plant. Liquid and solid samples were collected and analyzed. Analytical results for these samples were below the regulatory limit for all samples. Based on the volume of effluent processed annually by the treatment plant and the volume of effluent discharged by B&W to the facility, the NRC determined that only 0.6% of the uranium measured in the samples was the result of discharges from the B&W plant. The remaining uranium (99.4%) resulted from naturally occurring sources. The NRC concluded that the analyses reported are typical of discharges to the treatment plant, and the concentration of radioactive elements in the ash is the result, to some degree, of naturally occurring elements. The NRC concluded that the KVWPCA facility does not pose an undue risk to public health and safety.

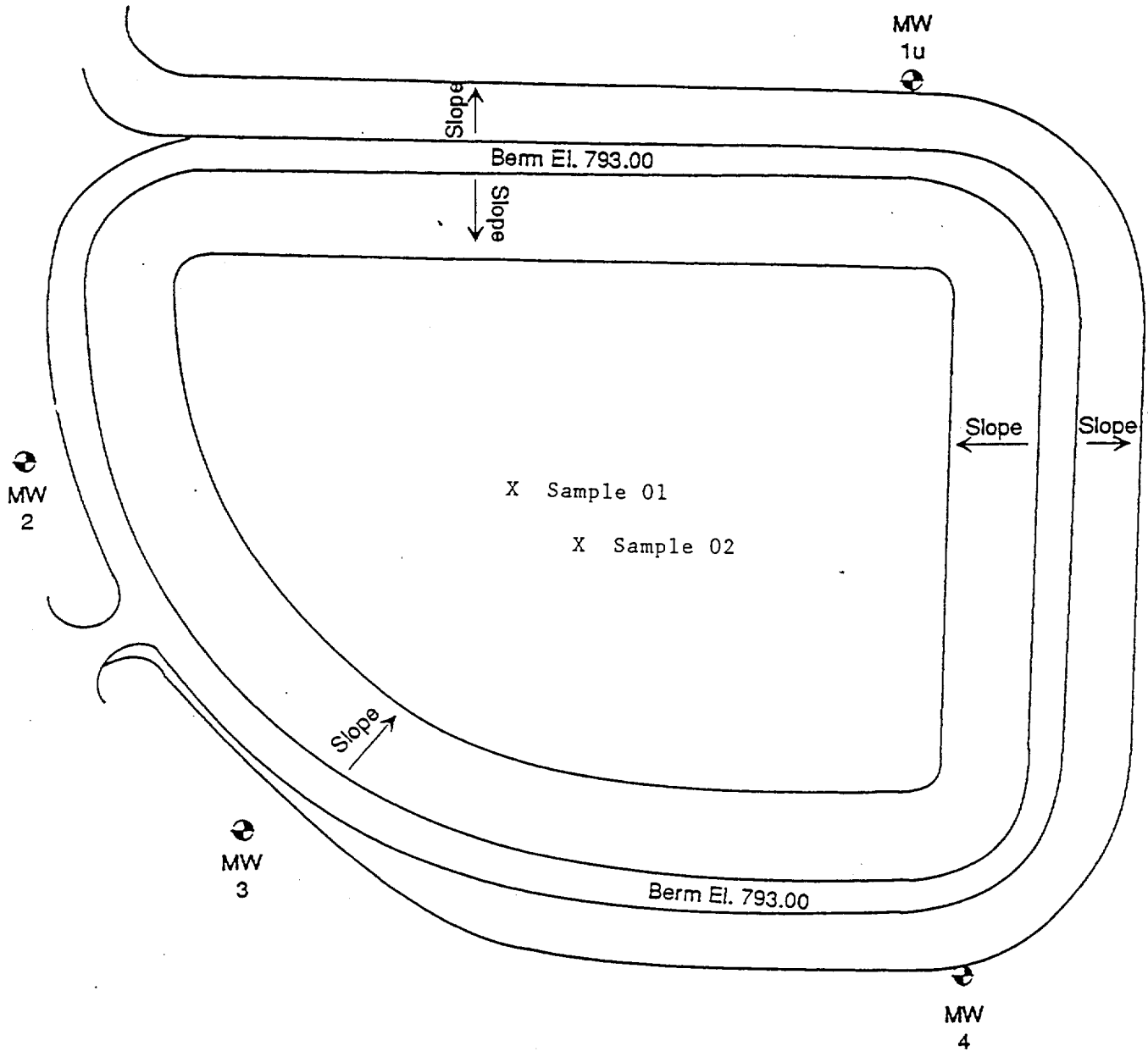
Chester believes the data from the February sampling event supports the planned use of the ash as benefical material by Mill Service.

Table 1

Kiski Valley Water Pollution Control Authority
Incinerator Ash Lagoon
Results of Radionuclide Analysis

Parameter	NRC/NMSS Guidelines for Unrestricted Use (1) (uCi/gm)	Sample 01		Sample 02	
		Concentration (uCi/gm)	Range (uCi/gm)	Concentration (uCi/gm)	Range (uCi/gm)
Radium, total	--	0.6E-06	(0.5 - 0.7)E-06	0.3E-06	(0.2 - 0.4)E-06
Cobalt-60	10E-06	0.38E-06	(0.33 - 0.43)E-06	0.58E-06	(0.46 - 0.70)E-06
Plutonium, total	30E-06	0.22E-06	(0.16 - 0.28)E-06	0.29E-06	(0.21 - 0.37)E-06
Thorium, total	5E-06	0.61E-06	(0.5 - 0.72)E-06	0.35E-06	(0.19 - 0.51)E-06
Uranium, total	30E-06	14.3E-06	(14.0 - 14.6)E-06	57E-06	(56.4 - 57.6)E-06

(1)Federal Register, V 46, No. 205, page 52061, October 23, 1981, "Disposal or Onsite Storage of Thorium or Uranium Waste from Past operations."



The Chester Engineers			PROJECT NO.: 2735-23	Kiski Valley Water Pollution Control Authority
DWN BY: JS	APPR BY:	SCALE None	DWG. NO.: Figure 1	Sample Locations
CHK'D BY: MW	DATE 7/2/92	FILE NAME 1/kiskimw		

Attachment 1

Analytical Results

Controls for Environmental Pollution, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 87501
OUT OF STATE 800/545-2188 • FAX - 505-982-928

Controls for Environmental
Pollution, Inc.
P. O. Box 5351
Santa Fe, NM 87502

Phone: (505) 982-9841/(800) 545-2188

Chester Environmental Lab
P. O. Box 15777
Pittsburgh, PA 15244

Attn: Mary Washco
Invoice Number:

Order #: 94-03-129
Date: 03/31/94 13:01
Work ID: Ash (NR)
Date Received: 03/08/94
Date Completed: 03/31/94
Client Code: CHESTER_ENV

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	Site #1 Ash Lagoon
02	Site #2 Ash Lagoon

Remainder of sample(s) for routine analysis will be disposed of three weeks from final report date. Sample(s) for bacteria analysis only, will be disposed of immediately after analysis. This is not applicable if other arrangements have been made.

Certified By

Controls for Environmental P[illegible]tion, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 875[illegible]
[illegible] 505/[illegible]
OUT OF STATE 800/545-2188 • FAX - 505-982-92[illegible]

Order # 94-03-129
03/31/94 13:01

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample: 01A Site #1 Ash Lagoon Collected: 02/23/94 11:00

Test Description	Result	D.L.	Units	Analyzed	By
Total Radium	0.6+/-0.1		pCi/gram	03/21/94	LJ

Sample: 02A Site #2 Ash Lagoon Collected: 02/23/94 12:30

Test Description	Result	D.L.	Units	Analyzed	By
Total Radium	0.3+/-0.1		pCi/gram	03/21/94	LJ

Controls for Environmental P tion, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 87502 OUT OF STATE 800/545-2188 • FAX · 505-982-9289

Order # 94-03-129
03/31/94 13:01

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample Description: Site #1 Ash Lagoon
Test Description: Cobalt-60
Collected: 02/23/94 11:00

Lab No: 01A
Method:
Category: ASH

Test Code: C060_5

Type of Analysis	Detection Limit	RESULT
Cobalt-60		0.38+/-0.05

All results reported in:

UNITS pCi/gram
Analyzed 03/21/94
By LJ

Sample Description: Site #1 Ash Lagoon
Test Description: Plutonium-(Total)
Collected: 02/23/94 11:00

Lab No: 01A
Method:
Category: ASH

Test Code: PU_5

Type of Analysis	Detection Limit	RESULT
Plutonium-(Total)		0.22+/-0.06

All results reported in:

UNITS pCi/gram
Analyzed 03/17/94
By LJ

Controls for Environmental P tion, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 87
OUT OF STATE 800/545-2188 • FAX - 505-982-92

Order # 94-03-129
03/31/94 13:01

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample Description: Site #1 Ash Lagoon
Test Description: Thorium (total)
Collected: 02/23/94 11:00

Lab No: 01A
Method:
Category: ASH

Test Code: TH_TP5

Type of Analysis	Detection Limit	RESULT
Total Thorium	____	0.61+/-0.11

All results reported in:

UNITS pCi/gram
Analyzed 03/21/94
By LJ

Sample Description: Site #1 Ash Lagoon
Test Description: Total Uranium
Collected: 02/23/94 11:00

Lab No: 01A
Method:
Category: ASH

Test Code: FU_5

Type of Analysis	Detection Limit	RESULT
Total Uranium	____	14.3+/-0.3

All results reported in:

UNITS pCi/gram
Analyzed 03/17/94
By MM

Controls for Environmental P ition, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 875 IN STATE 505/982-92
OUT OF STATE 800/545-2188 • FAX - 505-982-92

Order # 94-03-129
03/31/94 13:01

Controls for Environmental
TEST RESULTS BY SAMPLE

Sample Description: Site #2 Ash Lagoon
Test Description: Cobalt-60
Collected: 02/23/94 12:30

Lab No: 02A
Method:
Category: ASH

Test Code: C060_5

Type of Analysis	Detection Limit	RESULT
Cobalt-60		0.58+/-0.12

All results reported in:

UNITS pCi/gram
Analyzed 03/21/94
By LJ

Sample Description: Site #2 Ash Lagoon
Test Description: Plutonium-(Total)
Collected: 02/23/94 12:30

Lab No: 02A
Method:
Category: ASH

Test Code: PU_5

Type of Analysis	Detection Limit	RESULT
Plutonium-(Total)		0.29+/-0.08

All results reported in:

UNITS pCi/gram
Analyzed 03/21/94
By LJ

Controls for Environmental Pollution, Inc.
P.O. BOX 5351 • Santa Fe, New Mexico 87502 OUT OF STATE 800/545-2188 • FAX - 505-982-9289

Sample Description: Site #2 Ash Lagoon Lab No: 02A
Test Description: Thorium (total) Method: Test Code: TH_TP5
Collected: 02/23/94 12:30 Category: ASH

Type of Analysis	Detection Limit	RESULT
Total Thorium	_____	0.35+/-0.16

All results reported in:

UNITS pCi/gram
Analyzed 03/21/94
By LJ

Sample Description: Site #2 Ash Lagoon Lab No: 02A
Test Description: Total Uranium Method: Test Code: FU_5
Collected: 02/23/94 12:30 Category: ASH

Type of Analysis	Detection Limit	RESULT
Total Uranium	_____	57.0+/-0.6

All results reported in:

UNITS pCi/gram
Analyzed 03/17/94
By MM

94-03124

CHAIN OF CUSTODY RECORD

PLANT CODE	PROJECT NAME
2735-28	KISKI VALLEY WATER POLLUTION CONTROL AUTH.

SAMPLERS (Signature): Mark Zaleski, Russel Small

STA. NO.	DATE	TIME	COMP.	GRAB	WELL	STATION LOCATION	NUMBER OF CONTAINERS	TOTAL URANIUM	TOTAL THORIUM	TOTAL RADIUM	TOTAL PLUTONIUM	COBALT 60				CONDUCTIVITY	pH	REMARKS OR OBSERVATIONS
SITE #1	2/23	1100h		X		ASH LAGOON	1	✓	✓	✓	✓	✓						
SITE #2	2/23	1330h		X		ASH LAGOON	1	✓	✓	✓	✓	✓						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Mark Zaleski	2/25/94	3:30pm	Barry Noble
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Barry Noble	2/25/94	8:50AM	
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)
			Kathy Kirby

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received by: (Signature)

Date	Time	Ice Chest Temp	Ice Chest	Chain of Custody
3/8/94	11:00	11 °C	#	Tag #

DISTRIBUTION: Original accompanies shipment; Copy to Coordinator Field Files.

ChesterLab - Monroeville
3000 Tech Center Drive
Monr[illegible]e PA 15146

PAGE 1 OF 1

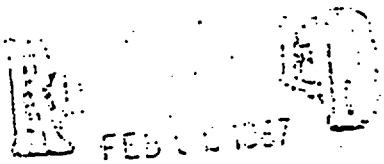
Attachment 2

NRC Letter to KVWPCA

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

JAN 29 1987

Kiski Valley Water Pollution Control Authority
ATTN: Mr. Samuel F. Intrieri
Chairman
1200 Pine Run Road
Leechburg, Pennsylvania 15656



Dear Mr. Intrieri:

I apologize for the delay in responding to your letter of December 16, 1985 and to Mr. S. Giotto's letter of February 20, 1986 to Mr. J. Roth and to Dr. J. Jang, respectively, of my staff. Your letter forwarded a letter received by the Kiski Valley Water Pollution Control Authority (KVWPCA) from a local citizen, Ms. Fran Munko, relative to alleged illegal discharges by Babcock and Wilcox (B&W) into the sanitary sewage system operated by the Authority. Mr. Giotto's letter requested the analytical radioactivity results from liquid and solid samples of waste taken at your plant on December 12, 1985 by the NRC.

With respect to Ms. Munko's concern, NRC regulations (10 CFR Part 20, "Standards for Protection Against Radiation") require that, prior to discharge of effluents to a sanitary sewer system from areas where radioactive materials are handled, the effluents be analyzed to assure that any radioactive material in the effluent does not exceed specified concentrations. Those concentrations have been set at conservative levels to assure that public health and safety are protected. We have not identified any instances where B&W has not complied with the concentrations specified in 10 CFR Part 20, nor do we have any evidence that B&W has made illegal discharges into the KVWPCA sanitary sewer. Relative to Ms. Munko's assertion that B&W is "not putting just sanitary wastes into the sewers", at one time, the Apollo plant laundry was connected to the KVWPCA sanitary sewer system. That discharge was monitored by B&W and, periodically, by the NRC. We found that discharges were maintained within the specified limits of NRC's regulations in 10 CFR Part 20. The laundry operations have been terminated, and discharges from the Apollo and the Parks Township plants to the sewer system now consist only of sanitary wastes and waste water from sinks and showers. As was previously done with all but sanitary waste water discharges to the KVWPCA sewer systems, waste water from sinks and showers continue to be collected in holding tanks at both facilities for sampling and analysis for radioactivity. If found acceptable, the waste water is discharged into the sanitary sewer system. Records of these analyses are maintained for periodic review by NRC inspectors as evidence that any radioactivity in the waste water did not exceed the limits of 10 CFR Part 20 for such releases.

As noted in Mr. Giotto's letter, on December 12, 1985, two NRC Region I inspectors visited the KVWPCA treatment plant in order to take samples from various stages in the sewage treatment process, including influent, in-process and effluent streams. In addition, samples were taken at the holding tanks from

the Apollo and Parks Township plants. Analysis of the samples has been completed and the data requested by Mr. Giotto are presented in Tables 1 and 2 enclosed with this letter.

The samples were analyzed for the NRC by the Department of Energy's Radiological Environmental Science Laboratory (RESL) for a variety of radioisotopes. Since a number of these radioisotopes exist in our environment naturally and/or as a result of previous atmospheric nuclear weapons tests, it is important to determine the quantities of the various radionuclides which are attributable to the B & W facilities and which were present in the environment from other sources. For this reason, in addition to the samples discussed above, the results of "background" samples taken in the past at various locations were also included for comparison purposes.

Table 1 presents the results of analysis of the liquid samples. In most cases, none of the radioisotopes, for which analysis was performed, was present in sufficient concentration to detect. These are indicated as <MDL (less than analytical minimum detectable limit) in Tables 1 and 2. In other instances, no analysis (N/A in Tables 1 and 2) was performed because the results of other analyses negated the need for that analysis. In summary, the following can be said for the radioisotopes that were present in the liquid samples.

Plutonium - None was detected in either the KVWPCA influent or effluent samples. The concentration detected in the discharge from the Parks Township Plant to the KVWPCA sewer was less than 1% of the NRC limit for such discharges.

Uranium - Uranium exists in nature. Thus, it is expected to be present in all of the liquid (and solid) samples analyzed. The concentration of uranium present in the Parks Township (PTS) discharge sample was about 0.025% of the NRC limit. The uranium concentration in the KVWPCA plant influent sample was about 0.002% of the NRC limit. In order to put these numbers in perspective, it is useful to determine the quantity of uranium discharged to the KVWPCA system from the B&W PTS facility and the quantity of uranium present in the KVWPCA influent steam, which includes both naturally occurring uranium and any uranium discharged by the PTS plant. Assuming the concentrations measured in the samples to be representative (which we believe them to be), we can use those concentrations, the approximately 106,000 gallons of liquid effluent released annually to the KVWPCA system from the PTS facility, and the approximately 1,400,000,000 gallons of effluent processed annually through the KVWPCA plant, to calculate the total amount of uranium present in the two streams. We find that, on an annual basis, B&W would release about 18 microcuries of uranium, whereas the naturally occurring plus B&W uranium present in the influent steam would total about 3,180 microcuries. Thus, about 99.4% [(3180-18)/3180] of the uranium received at your facility annually comes from naturally occurring sources, and about 0.6% from B&W.

.005 of total effluent

Thorium - Thorium, like uranium, exists in nature and could occur in any of the samples. In addition, B&W did process thorium compounds at the PTS facility. However, no thorium was present in sufficient concentration to be detected in any of the liquid samples.

Cesium-137 (Cs-137) - This isotope is a product of the fission of uranium and may exist either as a result of nuclear weapons tests or of nuclear reactor operation. The PTS facility repairs equipment that has been in nuclear reactors and that may be contaminated with Cs-137 and similar fission products (such as actinium-228, cobalt-60, and strontium-90). The concentration of Cs-137 in the KVWPCA samples was less than the minimum detection limit of the analytical procedure. The Cs-137 concentration in the PTS plant effluent was 0.23% of the applicable NRC limit.

Actinium-228 (Ac-228) - As noted above, this radioisotope is a fission product. In addition, Ac-228 is a decay product of thorium, and therefore, can be expected to be found in nature, or could exist in the PTS effluent as a result of the previous handling of thorium at that facility. As with Cs-137, any Ac-228 in the influent samples taken at your facility was too small to detect. The Ac-228 concentration in the PTS plant effluent sample was 0.1% of the applicable NRC limit.

Lead-214 (Pb-214) - This radioisotope is also a uranium decay product and thus exists in nature, but at concentrations too low to detect in influent samples taken at your facility. The Pb-214 concentration in the PTS plant effluent sample was 2.3% of the applicable NRC limit.

Table 2 presents the results of analysis of solid samples taken at the KVWPCA facility. Keeping in mind that the sewage treatment process is designed to (1) cause some dissolved materials to precipitate out of solution as solids, and (2) concentrate the precipitated and suspended solids, it is expected that both radioactive and non-radioactive solids are effected essentially uniformly. Incineration of the sludge resulting from this process further concentrates materials that do not volatilize during incineration. There are no NRC (or other federal agency) regulations that specify allowable quantities of radioactivity in solids. However, the NRC's Office of Nuclear Material Safety and Safeguards (NMSS) has established guidelines for acceptable concentrations of various radionuclides that may exist in areas to which no access restrictions apply (i.e., unrestricted areas). In summary, the following can be said for the radioisotopes that were present in the solid samples.

Plutonium - None was detected in any of the solid samples taken at your facility.

Thorium - For thorium and uranium, the concentrations of the various radioisotopes of each sample were added and compared with the NRC NMSS guideline. The maximum concentration of thorium detected was in the incinerator ash sample and was approximately 28% of the appropriate guideline.

Uranium - The maximum concentration of uranium detected (in the incinerator ash sample) was 98.7% of the NRC NMSS guideline. Based on the previously discussed liquid sample results, the B&W contribution represents about 0.6% of the NRC NMSS guideline, with naturally occurring uranium representing the remainder.

Actinium-228 (Ac-228) - The maximum concentration of this radioisotope in the solid samples was found in the unconcentrated sludge cake (42.6% of the NRC NMSS guideline). However, the other samples, including the background sample taken in Apollo, all contained comparable amounts (18-20% of the guideline) of this isotope. This, combined with the six hour half-life (the time required for half of a given quantity of an isotope to decay) of Ac-228, suggest that decay of naturally occurring thorium is the source of the majority of this isotope.

Beryllium-7 (Be-7) and Potassium (K-40) - Be-7 and K-40 are naturally occurring radioisotopes. There is no NRC NMSS guideline covering either of these isotopes. The variation in the concentration of these isotopes samples is due to their variation in nature and in the errors in sampling and measuring.

Cobalt-60 (Co-60) and Cesium-137 (Cs-137) - These fission products were present in several solid samples in concentrations up to a maximum of 2.9% of the applicable NRC NMSS guideline.

Protactinium-234 (Pa-234) and Lead-214 (Pb-214) - Pa-234 and Pb-214 are uranium decay products and there is no NRC NMSS guideline covering either of these isotopes. The variation in the concentration of these isotopes in the samples is due to their variation in nature and in the errors in sampling and measuring.

Lead-212 (Pb-212) - Pb-212 is a thorium decay product, otherwise the comments covering Pa-234 and Pb-214 apply.

In summary, while the sample results discussed above represent the situation at a randomly chosen point in time, they are believed to be consistent with expected values. The analyses show that the quantities of radioactive material discharged from B&W's Parks Township facility holding tank were within NRC limits, and do not pose an undue risk on public health and safety. Similarly, the levels of radioactivity found in samples taken at the KVWPCA facility appear, in some cases, to reflect concentration of naturally occurring radioisotopes, but, also do not appear to pose an undue risk on public health and safety.

We have informed members of the Kiski Valley Coalition to Save Our Children on several occasions that we have never identified any instance where the Babcock and Wilcox Company has released liquid effluents to the KVWPCA sewage system which exceeded any of the NRC's radioactive release limits. You can be assured that if we identify any violations of NRC regulations that may affect your plant, you will be notified promptly.

Samuel F. Intrieri

5 JAN 2 9 1987

We trust that we have satisfactorily responded to your concerns. Please let me know if we can be of further assistance to you.

Sincerely,

James T. Joyce for

Thomas T. Martin, Director
Division of Radiation Safety
and Safeguards

Enclosures: Tables 1 and 2

cc:
Ms. Fran Munko
Ms. Cindee Virostek

TABLE 1

Kiski Valley Water Pollution Control Authority Plant

Liquid Samples

Isotope	B&W Apollo(1) Liquid Plant Effluent (to river) uCi/ml (5)	B&W PTS Liquid Plant Effluent (to KVWPCAP) uCi/ml	KVWPCAP Liquid Influent uCi/ml	KVWPCAP Liquid Effluent (to river) uCi/ml	Background(2) Kiskiminetas River (ApolloBridge) uCi/ml	Background(2) Kiskiminetas River (Leechburg Bridge) uCi/ml	NRC Limits(3) 10 CFR 20 Appendix B Table II uCi/ml
Gross alpha	N/A(4)	N/A	<MDL(4)	<MDL	N/A	N/A	3E-8
Gross beta	N/A	N/A	<MDL	<MDL	N/A	N/A	3E-6
Pu 238	<MDL	3.6±0.5E-9	<MDL	<MDL	<MDL	<MDL	5E-6
Pu 239/240	<MDL	3.35±0.15E-8	<MDL	<MDL	<MDL	<MDL	7E-6
Th-228	<MDL	<MDL	<MDL	<MDL	N/A	N/A	7E-6
Th-230	<MDL	<MDL	<MDL	<MDL	N/A	N/A	2E-6
Th-232	<MDL	<MDL	<MDL	<MDL	N/A	N/A	2E-6
U-233/234	5.89±0.15E-7	7.5±0.7E-9	<MDL	6±2E-10	4.7±0.6E-10	7.9±0.7E-10	3E-5
U-235	1.79±0.16E-8	<MDL	7±2E-10	<MDL	1.4±0.4E-10	1.2±0.3E-10	3E-5
U-238	7.3±0.3E-8	<MDL	7±2E-10	<MDL	4.4±1.1E-10	3.8±0.5E-10	4E-5
Ac-228	<MDL	9±2E-8	<MDL	<MDL	N/A	N/A	9E-5
Be-7	<MDL	<MDL	<MDL	<MDL	N/A	N/A	2E-3
Co-60	<MDL	<MDL	<MDL	<MDL	N/A	N/A	3E-5
Cs-137	<MDL	3.6±0.9E-8	<MDL	<MDL	N/A	N/A	2E-5
K-40	<MDL	<MDL	<MDL	<MDL	N/A	N/A	--
Pa-234	<MDL	<MDL	<MDL	<MDL	N/A	N/A	3E-8
Pb-212	<MDL	<MDL	<MDL	<MDL	N/A	N/A	2E-5
Pb-214	<MDL	7±2E-8	<MDL	<MDL	N/A	N/A	3E-6
Sr-90	<MDL	<MDL	N/A	N/A	N/A	N/A	3E-7

Notes:

(1) B&W Apollo sample included for comparison purposes only (released to the river)

(2) Background River sample results above the Apollo plant and below the Parks Township plant included for comparison purposes (water samples taken by Commonwealth of Pennsylvania)

(3) NRC limits included for comparison purposes.

(4) N/A - Not analyzed; <MDL - less than analytical minimum detectable limit

(5) uCi = 0.000001 Curies

TABLE 2

Kiski Valley Water Pollution Control Authority Plant

Solid Samples

Isotope	KVWPCAP Unconcentrated Sludge Cake (8% solids) uCi/gm-dry(6)	KVWPCAP Feed to Incinerator (70% solids) uCi/gm-dry	KVWPCAP Incinerator Ash uCi/gm-dry	Background(1) Soil Sample Apollo uCi/gm-dry	NRC/NMSS Guidelines (7) for Unrestricted Use uCi/gm-dry
Gross alpha	N/A(5)	4.0±0.7E-5	N/A	N/A	---
Gross alpha	N/A	<MDL (5)	N/A	N/A	---
Pu-238	0	0	<MDL	<MDL	3E-5
Pu-239/240	<MDL	<MDL	<MDL	1.7±0.2E-8	
Th-228	7.4±0.6E-7	7.6±0.7E-7	1.39±0.11E-6	<MDL	5E-6
Th-230	6.9±0.6E-7	5.9±0.6E-7	1.16±0.10E-6	<MDL	5E-6
Th-232	7.9±0.6E-7	6.2±0.6E-7	1.15±0.09E-6	<MDL	5E-6
U-233/234	1.07±0.03E-5	9.4±0.3E-6	2.17±0.06E-5	4.23±0.11E-6	3E-5
U-235	4.6±0.4E-7	4.1±0.4E-7	1.0±0.09E-6	1.90±0.09E-7	
U-238	3.22±0.12E-6	2.99±0.11E-6	6.9±0.3E-6	1.57±0.09E-6	
Ac-228	2.13±0.09E-6	9.7±1.2E-7	1.02±0.11E-6	9.1±0.9E-7	5E-6
Be-7(2)	2.79±0.07E-5	1.14±0.08E-5	1.49±0.07E-5	<MDL	Natural
Co-60	2.2±0.2E-7	1.6±0.4E-7	<MDL	<MDL	1E-5
Cs-137	3.0±0.2E-7	1.7±0.3E-7	1.3±0.4E-7	4.42±0.36E-7	1.5E-5
K-40(2)	1.52±0.65E-5	6 ±1E-6	8.0±0.5E-6	1.11±0.05E-5	Natural
Pa-234(3)	1.0±0.2E-5	1.5±0.4E-5	<MDL	<MDL	from Uranium
Pb-212(4)	1.49±0.06E-6	4.1±1.1E-7	8.6±0.5E-7	1.17±0.05E-6	from Thorium
Pb-214(3)	2.15±0.06E-6	6.1±0.7E-7	5.3±0.6E-7	9.00±0.60E-7	from Uranium
Sr-90	<MDL	N/A	<MDL	N/A	5E-6

Notes:

(1) Background soil sample included for comparison purposes

(2) Be-7 and K-40 ocurr naturally in the environment

(3) Pa-234 and Pb-214 included from decay of uranium

(4) Ac-228 and Pb-212 included from decay of thorium

(5) N/A - not analyzed; <MDL - less than analytical minimum detectable limit

(6) uCi = 0.000001 Curies

(7) Reference: Federal Register, Vol. 46, No. 205, page 52061, dated October 23, 1981 "Disposal or Onsite Storage of Thorium or Uranium Waste from Past Operations".