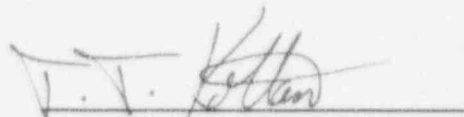


U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No: 070-1100/97-01  
License No: SNM-1067  
Licensee: ABB Combustion Engineering Incorporated  
2000 Day Hill Road  
Windsor, Connecticut 06095-0500  
Facility: Nuclear Fuel Facility  
Inspection At: Windsor, Connecticut  
Inspection Dates: April 14-17, 1997

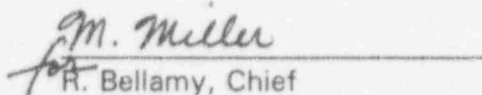
Inspector:



J. Kottan, Health Physics Manager  
Decommissioning and Laboratory Branch

6-10-97  
Date

APPROVED BY:



R. Bellamy, Chief  
Decommissioning and Laboratory Branch

6-10-97  
Date

Areas Inspected: Announced inspection of the activities associated with the decontamination and decommissioning of the former nuclear fuel manufacturing facility and other activities associated with license SNM-1067. Areas reviewed were those related to a confirmatory survey of Building 21 which included: fixed contamination surveys, removable contamination surveys, and direct radiation measurements inside Building 21; fixed contamination surveys, removable contamination surveys, and direct radiation measurements on the paved areas outside of Building 21; and soil samples and direct radiation measurements around the perimeter of Building 21.

Inspection Summary: No radioactive contamination or radiation levels above background were measured. No safety concerns or violations of regulatory requirements were observed.

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## DETAILS

### **1.0 INDIVIDUALS CONTACTED**

#### Principal Licensee Employees

- N. Azzam, Site Remediation Services
- J. Blute, Site Remediation Services
- \* J. Conant, Site Remediation Services
- \* J. Limbert, Site Remediation Services
- \* S. Masciulli, Radiological Services
- \* R. Scheeran, Site Remediation Services
- \* S. Sorensen, Field Services
- D. Waters, Site Remediation Services

#### State of Connecticut Personnel

- G. McCahill, Department of Environmental Protection
- D. Wozniak, Department of Environmental Protection

- \* Denotes those present at the exit meeting on April 17, 1997.

The inspector also interviewed other licensee personnel including members of the licensee's Site Remediation Services staff.

### **2.0 PURPOSE**

The purpose of this inspection was to perform a confirmatory survey of Building 21, which was used a warehouse and storage area to support fuel manufacturing in Building 17.

### **3.0 CONFIRMATORY SURVEY**

#### **3.1 Fixed Survey**

A radiation survey for fixed contamination was performed on the floor and lower walls of the interior of Building 21. A radiation survey for fixed contamination was also performed on the exterior lower walls of the building as well as on the paved surfaces surrounding the building. The survey locations were chosen based on two criteria: first the locations which exhibited questionable negative values in the licensee's Final Status Survey Report, that is those locations with negative results which were greater than twice the uncertainty of the result, and secondly 10% to 15% of licensee survey locations chosen on a random basis.

The fixed survey was performed with a Berthold/EG&G LB122 survey meter (NRC Tag No. 057021) utilizing a proportional detector filled with butane/propane counting gas. The efficiency of the detector was determined with NIST traceable alpha and beta standards. A check source was counted periodically during the survey in order to assess instrument performance and ensure proper operation. The

survey was performed with the LB122 operating on the beta plateau in order to detect both alpha and beta emissions from Uranium and its progeny. Several gross measurements were also made on the alpha plateau at selected locations.

The results of the fixed survey indicated that no areas were found which were in excess of background. The data are presented in Table I and Table II.

### 3.2 Wipe Survey

Wipes were taken of the interior floor and lower walls and the exterior lower walls of Building 21 in order to measure any loose removable radioactive contamination. Wipes were also taken of the paved surfaces surrounding Building 21. The wipes were taken at the same locations at which the fixed surveys were made. Each wipe covered approximately 100 square centimeters.

The wipes were analyzed on a low background gas flow proportional counter located in the NRC Region I office. The counter was calibrated with NIST traceable alpha and beta standards. Gross alpha and gross beta analyses were performed on the wipes.

The results of the wipe analyses indicated no positive sample results. (That is no positive alpha plus beta result.) The data are presented in Table I and Table II.

### 3.3 Direct Radiation Measurements

Direct radiation measurements were made at various locations both inside and outside of the building using a Ludlum Model 19 Micro R meter (NRC Tag No. 15521). Direct radiation measurements were also made at each soil sampling location. All readings were within the range of ambient background. The data are presented in Table I, Table II and Table III.

### 3.4 Soil Samples

Soil samples to a depth of 15 cm were taken at random locations within and beyond the fence surrounding Building 21 but no further than one meter beyond the fence. The licensee had defined the Building 21 area to be released as Building 21 plus the area around Building out to one meter beyond the fence. The licensee had marked this area, one meter beyond the fence, so that it can be identified even if the fence is removed.

The soil samples were analyzed for U-238 (Pa-234m progeny) and U-235 on a gamma spectrometry system located in the Region I office. The gamma spectrometry system is calibrated with NIST traceable standards.

The uranium concentration in the soil was within the range of naturally occurring uranium in soil. The data are presented in Table III. See Attachment 1 for the location of the soil samples.

### 3.5 Background Measurement

Background measurements were made at various locations on and offsite. These locations were chosen because they duplicated the concrete and asphalt of Building 21 as reasonably as possible with respect to the type of materials used in construction and the age of the materials. The background data are presented in Table IV.

### 3.6 Other Tables

The NRC release criteria and the detection limits for the various surveys and analyses are presented in Table V and Table VI.

### 4.0 EXIT MEETING

The inspector met with the licensee representatives denoted in Section 1.0 of this report at the conclusion of the inspection on April 17, 1997. The inspector summarized the purpose, scope and findings of the inspection. The inspector stated that the NRC confirmatory survey indicated that Building 21 met the NRC criteria for release from licensing restrictions and after NRC approval could be released for unrestricted use. The licensee acknowledged the inspection findings.

TABLE I  
BUILDING INTERIOR SURVEY RESULTS

Location	Description	Alpha + Beta DPM/100 cm <sup>2</sup> Fixed Survey (Net)	Direct Radiation $\mu$ R/hr (Gross)	Alpha DPM/100 cm <sup>2</sup> Fixed Survey (Gross)	Alpha DPM/100 cm <sup>2</sup> Removable (Net)	Beta DPM/100 cm <sup>2</sup> Removable (Net)
C-3	Floor	0 $\pm$ 30	7.0	NP	-0.5 $\pm$ 0.8	6 $\pm$ 3
J-9	Floor	-70 $\pm$ 30	7.5	NP	-0.5 $\pm$ 0.8	3 $\pm$ 2
K-16	Floor	-60 $\pm$ 30	7.0	NP	1.4 $\pm$ 1.2	8 $\pm$ 3
U-16	Floor	10 $\pm$ 30	7.0	NP	0.5 $\pm$ 1.0	2 $\pm$ 2
H-1	Floor	-10 $\pm$ 30	7.9	NP	0.5 $\pm$ 1.0	6 $\pm$ 3
X-14	Floor	-60 $\pm$ 30	6.5	NP	0.0 $\pm$ 0.9	1 $\pm$ 2
O-1	Floor	-40 $\pm$ 30	7.0	NP	0.5 $\pm$ 1.0	3 $\pm$ 3
W-1	Floor	30 $\pm$ 30	7.5	NP	-0.5 $\pm$ 0.8	2 $\pm$ 2
W-3	Floor	40 $\pm$ 30	6.5	NP	0.9 $\pm$ 1.1	0 $\pm$ 2
Q-5	Floor	-20 $\pm$ 30	7.1	NP	-0.5 $\pm$ 0.8	2 $\pm$ 2
W-7	Floor	-40 $\pm$ 30	6.9	NP	0.0 $\pm$ 0.9	1 $\pm$ 2
S-7	Floor	-80 $\pm$ 30	7.0	NP	0.0 $\pm$ 0.9	1 $\pm$ 2
O-9	Floor	-60 $\pm$ 30	7.1	NP	-0.5 $\pm$ 0.8	5 $\pm$ 3
S-11	Floor	-40 $\pm$ 30	6.8	NP	1.4 $\pm$ 1.2	3 $\pm$ 2
M-20	Floor	-40 $\pm$ 30	7.2	NP	0.5 $\pm$ 1.2	11 $\pm$ 3
F-26	Floor	-40 $\pm$ 30	7.0	NP	-0.5 $\pm$ 0.8	1 $\pm$ 2

TABLE I  
BUILDING INTERIOR SURVEY RESULTS

Location	Description	Alpha + Beta DPM/100 cm <sup>2</sup> Fixed Survey (Net)	Direct Radiation $\mu$ R/hr (Gross)	Alpha DPM/100 cm <sup>2</sup> Fixed Survey (Gross)	Alpha DPM/100 cm <sup>2</sup> Removable (Net)	Beta DPM/100 cm <sup>2</sup> Removable (Net)
S-24	Floor	10 $\pm$ 30	7.0	NP	0.9 $\pm$ 1.1	1 $\pm$ 2
C-32	Floor	-10 $\pm$ 30	7.4	NP	0.0 $\pm$ 0.9	4 $\pm$ 3
I-35	Floor	-10 $\pm$ 30	7.0	NP	1.4 $\pm$ 1.2	2 $\pm$ 2
W-35	Floor	-30 $\pm$ 30	6.8	NP	0.0 $\pm$ 0.9	1 $\pm$ 2
SQA	Wall (wood)	-100 $\pm$ 20	NP	NP	0.0 $\pm$ 0.9	-2 $\pm$ 2
SFAA	Wall (insulation)	524 $\pm$ 16 (gross)	NP	NP	-0.5 $\pm$ 0.8	1 $\pm$ 2
W26A	Wall (wood)	-80 $\pm$ 20	NP	NP	0.9 $\pm$ 1.1	0 $\pm$ 2
NQA	Wall (wood)	-55 $\pm$ 20	NP	NP	0.0 $\pm$ 0.9	0 $\pm$ 2
E11A	Wall (insulation)	515 $\pm$ 15 (gross)	NP	NP	0.0 $\pm$ 0.9	-1 $\pm$ 2
NMAA	Wall (insulation)	515 $\pm$ 15 (gross)	NP	NP	0.5 $\pm$ 1.0	-1 $\pm$ 2
I-5	Floor	0 $\pm$ 30	NP	11 $\pm$ 3 (gross)	NP	NP

TABLE I  
BUILDING INTERIOR SURVEY RESULTS

Location	Description	Alpha + Beta DPM/100 cm <sup>2</sup> Fixed Survey (Net)	Direct Radiation $\mu$ R/hr (Gross)	Alpha DPM/100 cm <sup>2</sup> Fixed Survey (Gross)	Alpha DPM/100 cm <sup>2</sup> Removable (Net)	Beta DPM/100 cm <sup>2</sup> Removable (Net)
P-5	Floor	-30 $\pm$ 30	NP	9 $\pm$ 3 (gross)	NP	NP
H-15	Floor	-60 $\pm$ 30	NP	9 $\pm$ 3 (gross)	NP	NP
L-25	Floor	-40 $\pm$ 30	NP	5 $\pm$ 2 (gross)	NP	NP
R-25	Floor	10 $\pm$ 30	NP	5 $\pm$ 2 (gross)	NP	NP

NOTES: NP = not performed at that location. Note that some measurements are gross measurements. Reported uncertainties are  $\pm 1$  sigma (1s) counting uncertainty. Direct radiation measurements were made at a height of 1 meter above the floor.



TABLE II  
BUILDING EXTERIOR SURVEY RESULTS

Location	Description	Fixed Survey DPM/100 cm <sup>2</sup> (Net)	Gross Direct Radiation $\mu$ R/hr	Net alpha DPM/100 cm <sup>2</sup> removable	Net beta DPM/100 cm <sup>2</sup> removable
1	Pavement (concrete)	50 $\pm$ 30	8.5	0.0 $\pm$ 0.9	0 $\pm$ 2
6	Pavement (asphalt)	70 $\pm$ 30	7.5	0.0 $\pm$ 0.9	-3 $\pm$ 2
9	Pavement (asphalt)	120 $\pm$ 30	7.5	0.9 $\pm$ 1.1	1 $\pm$ 2
13	Pavement (asphalt)	30 $\pm$ 30	7.8	-0.5 $\pm$ 0.8	3 $\pm$ 2
17	Pavement (asphalt)	9 $\pm$ 30	6.9	0.0 $\pm$ 0.9	1 $\pm$ 2
19	Pavement (asphalt)	-20 $\pm$ 30	6.6	-0.5 $\pm$ 0.8	-1 $\pm$ 2
21	Pavement (concrete)	110 $\pm$ 30	7.1	1.8 $\pm$ 1.3	3 $\pm$ 2
23	Pavement (asphalt)	40 $\pm$ 30	7.0	-0.9 $\pm$ 0.6	3 $\pm$ 2
24	Pavement (asphalt)	40 $\pm$ 30	7.1	0.5 $\pm$ 1.0	1 $\pm$ 2
27	Pavement (asphalt)	30 $\pm$ 30	7.5	0.0 $\pm$ 0.9	0 $\pm$ 2



TABLE II  
BUILDING EXTERIOR SURVEY RESULTS

Location	Description	Fixed Survey DPM/100 cm <sup>2</sup> (Net)	Gross Direct Radiation $\mu$ R/hr	Net alpha DPM/100 cm <sup>2</sup> removable	Net beta DPM/100 cm <sup>2</sup> removable
30	Pavement (concrete)	60 $\pm$ 30	7.0	-0.5 $\pm$ 0.8	3 $\pm$ 2
1	South wall	-30 $\pm$ 20	NP	0.5 $\pm$ 1.0	5 $\pm$ 3
6	South wall	0 $\pm$ 20	NP	-0.9 $\pm$ 0.6	-1 $\pm$ 2
13	South wall	-30 $\pm$ 20	NP	0.5 $\pm$ 1.0	0 $\pm$ 2
19	East wall	-40 $\pm$ 20	NP	-0.9 $\pm$ 0.6	1 $\pm$ 2
23	East wall	9 $\pm$ 20	NP	1.4 $\pm$ 1.2	1 $\pm$ 2
Center	North wall	30 $\pm$ 20	NP	1.8 $\pm$ 1.3	2 $\pm$ 2
Center	West wall	0 $\pm$ 20	NP	1.4 $\pm$ 1.2	0 $\pm$ 2

NOTES: NP=not performed at that location. Note that some measurements are gross measurements. Reported uncertainties are  $\pm$  1 sigma (1s) counting uncertainty. Direct radiation measurements were made 1 meter above the ground.

TABLE III  
SOIL SAMPLE RESULTS

Sample Number	U-235 (pCi/g)	U-238 (pCi/g)	$\mu$ R/hr @ 1 meter
1	$0.06 \pm 0.02$	$0.5 \pm 0.5$	9.1
2	$0.09 \pm 0.03$	$< 0.9$	10.0
3	$0.08 \pm 0.03$	$< 2$	10.1
4	$0.16 \pm 0.02$	$0.9 \pm 0.6$	10.0
5	$0.10 \pm 0.03$	$1.4 \pm 0.8$	10.1
6	$0.10 \pm 0.02$	$2.3 \pm 0.8$	10.7
7	$0.05 \pm 0.02$	$1.5 \pm 0.6$	11.2
8	$0.06 \pm 0.02$	$0.6 \pm 0.6$	10.4
9	$0.04 \pm 0.02$	$1.3 \pm 0.9$	9.9
Background (opposite Bldg. 8A)	$0.05 \pm 0.03$	$< 0.9$	10.2
Background (opposite fossile unit)	$0.06 \pm 0.03$	$1.5 \pm 0.8$	11.1

NOTE: uranium concentrations were determined on a dry weight basis. Reported uncertainties are  $\pm 1$  sigma (1s) counting uncertainty. Refer to Attachment 1 for sampling locations.

TABLE IV  
BACKGROUND MEASUREMENTS

Direct Radiation Measurements (at one meter)

1. 10.2  $\mu\text{R/hr}$  near Building 8A (soil sample no. 10).
2. 11.1  $\mu\text{R/hr}$  in woods opposite fossile unit ( soil sample no. 11).
3. 10.5  $\mu\text{R/hr}$  on asphalt opposite gate to Building 21.
4. 8.1  $\mu\text{R/hr}$  on asphalt at sewage treatment plant.
5. 7.5  $\mu\text{R/hr}$  on asphalt at Building 4 parking lot opposite Building 7.
6. 8.2  $\mu\text{R/hr}$  on concrete sidewalk near cafeteria building.
7. 8.8  $\mu\text{R/hr}$  on concrete side walk opposite Building 19.
8. 9.5  $\mu\text{R/hr}$  at State boat launch area on Farmington River.

Fixed Survey Measurements

1.  $880 \pm 20$  dpm on asphalt opposite gate to Building 21.
2.  $840 \pm 20$  dpm on asphalt at sewage treatment plant.
3.  $890 \pm 20$  dpm on asphalt at Building 4 parking lot opposite Building 7.
4.  $860 \pm 20$  dpm on concrete sidewalk near cafeteria building.
5.  $960 \pm 20$  dpm on concrete sidewalk opposite Building 19.
6. Concrete floor areas in Building 20:  
791 dpm, 782 dpm, 819 dpm, 810 dpm  
Average =  $800 \pm 20$  dpm.
7. Concrete floor areas in Building 7:  
856 dpm, 764 dpm, 791 dpm, 819 dpm  
Average =  $810 \pm 40$  dpm.
8. Average of dpm values from 6 and 7 above:  $800 \pm 30$  dpm.

TABLE V  
RELEASE CRITERIA

Removable Surface contamination: 1000 dpm/100 cm<sup>2</sup> (above background).

Average Fixed Surface Contamination: 5000 dpm/100 cm<sup>2</sup> (above background).

Maximum Fixed Surface Contamination: 15000 dpm/100 cm<sup>2</sup> (above background).

Exposure Rate at 1 meter above a surface:  $\leq 5 \mu\text{R/hr}$  (above background).

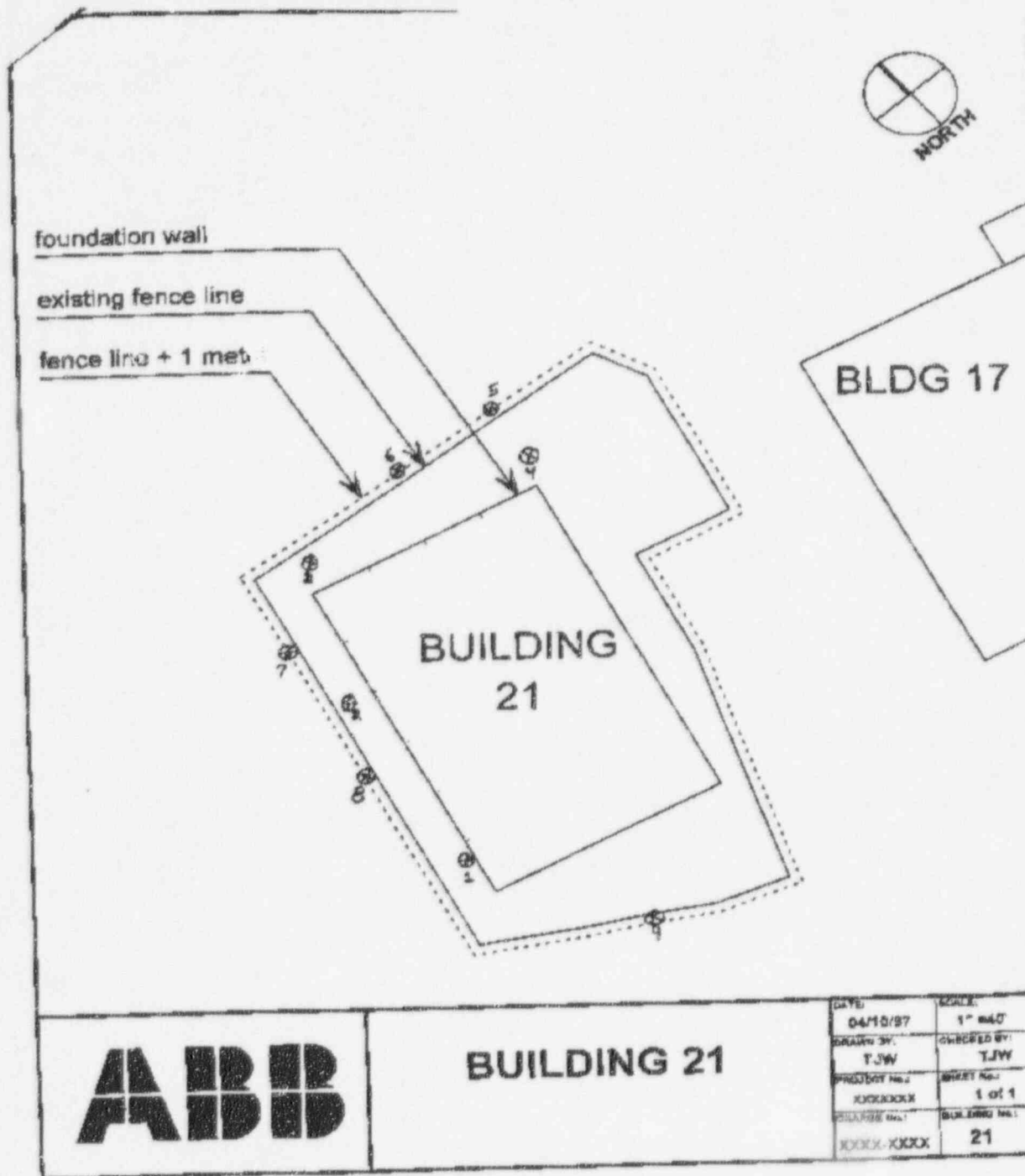
Soil Contamination (Uranium):  $\leq 30 \text{ pCi/g}$  (above background).

TABLE VI  
DETECTION LIMITS

<u>SURVEY TYPE</u>	<u>MDA</u>
Fixed (concrete)	130 dpm/100 cm <sup>2</sup>
Fixed (asphalt)	130 dpm/100 cm <sup>2</sup>
Fixed (wood)	80 dpm/100 cm <sup>2</sup>
Removable-alpha	4 dpm/100 cm <sup>2</sup>
Removable-beta	8 dpm/100 cm <sup>2</sup>
Direct Radiation	approximately 2 uR/hr
Soil	Varies by soil type and interferences present-see Table III.

ATTACHMENT 1 SOIL SAMPLING LOCATIONS

# ATTACHMENT 1 SOIL SAMPLING LOCATIONS



**AAIB**

**BUILDING 21**

DATE	04/10/97	SCALE	1" = 40'
DRAWN BY	TJW	CHECKED BY	TJW
PROJECT No.	XXXXXX	SHEET No.	1 of 1
FOUNDATION No.	XXXX-XXXX	BUILDING No.	21