

R3D3-41 release

OCT 19 1989

Docket No: 70-36
License No. SNM-33

Combustion Engineering, Inc.
ATTN: Mr. J. A. Rode, Plant Manager
Hematite Fuel Manufacturing
1000 Prospect Hill Road
Windsor, CT 06095-0500

Gentlemen:

Enclosed please find a copy of the results of the confirmatory survey performed by NRC's contractor, Oak Ridge Associated Universities (ORAU), for your Phase 2 construction. Based on the survey results, residual contamination is greater than the Option 1 limit of 30 pCi/gm for enriched uranium as stated in the Branch Technical Position. Therefore, the staff has determined that additional decontamination is warranted. Please provide this office with the soil survey results of this additional effort.

Also enclosed is a copy of an ORAU report addressing the contaminated slab and associated soil in former Building 251. Please note that the staff expects Combustion Engineering to decontaminate and submit soil survey results for this area.

If there are any questions regarding these matters, please contact Merri Horn of my staff at (301) 492-0606.

Sincerely,

Original Signed By
George H. Bidinger, Section Leader
Uranium Fuel Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

Enclosures:

- 1. ORAU Report dtd 9/21/89
- 2. ORAU Report dtd 9/18/89

Distribution w/encls.

Docket 70-36	PDR	NRC File Center	NMSS R/F
IMUF R/F	IMSB R/F	VLTharpe(2)	DAMcCaughey
Region III	GFrance, RIII	MHorn	GHBidinger

R-27
NOV 2 1989

OFC:IMUF:	IMUF: <i>VL</i>	IMUF: <i>MH</i>	IMUF: <i>GHB</i>
NAME: DAMcCaughey:mh:	VLTharpe:	MHorn:	GHBidinger:
DATE: 10/17/89	10/17/89	10/18/89	10/19/89



Oak Ridge
Associated Universities Post Office Box 117
Oak Ridge, Tennessee 37831-0117

September 21, 1989

Mr. George France
Region III
Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: SURVEY RESULTS FOR PHASE 2 CONSTRUCTION:
COMBUSTION ENGINEERING

Dear Mr. France:

The results of the recent survey performed on Phase 2 of construction at Combustion Engineering (CE) in Hematite, Missouri, are provided in the enclosed letter report. The results of laboratory analyses indicate 10 soil samples exceed established NRC guidelines for residual enriched uranium. CE plant officials were informed of preliminary data results through telephone communications; at that time four locations were identified as definitely exceeding guidelines. A map of our sample locations was provided to CE as a result of the telephone communication.

Questions or additional information should be referred to me at FTS 626-3355.

Sincerely,

A handwritten signature in cursive script that reads "Phyllis R. Cotten".

Phyllis R. Cotten
Health Physics Team Leader
Environmental Survey and
Site Assessment Program

PRC:fls

cc: L. Rouse, NRC/6H3
D. Tiktinsky, NRC/6A4
G. LaRoche, NRC/6H3

RADIOLOGICAL SURVEY OF PHASE 2 CONSTRUCTION SITE
COMBUSTION ENGINEERING, INC.
HEMATITE, MISSOURI

Prepared by:
P. R. Cotten

INTRODUCTION

The Combustion Engineering, Inc. facility in Hematite, Missouri, (CE) manufactures nuclear fuels under Nuclear Regulatory Commission (NRC) special nuclear materials license SNM-33. CE is in the process of constructing additional manufacturing and warehouse space and a new utility area to increase production capacity. This new construction is located between Buildings 240 and 255 (Figure 1). Construction of the new facility is to be completed in two phases. Phase 1 began in January of 1989 and extends from Building 255 to the utility area. Phase 2 construction, which began in June of this year, encloses the present utility over and connects the Phase 1 construction with Building 240. The utilities area includes the boiler room, maintenance office, recycle recovery vent room, and an asphalt driveway.

The potential for radiological contamination in the phase 2 area was considered to be low based on information describing the previous use history. The major surface area in Phase 2 consisted of a paved asphalt driveway. CE initiated a survey and soil sampling program prior to construction to determine if the area complied with the 30 pCi/g of total enriched uranium. The results of which indicated that soil concentrations exceeded the guideline level. Contamination in the Phase 2 area probably resulted from activities conducted in Building 240.

Prepared by the Energy/Environment Systems Division of Oak Ridge Associated Universities, Oak Ridge, Tennessee, under interagency agreement, (NRC Fin. No. A-9076) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy.

September 21, 1989

CE's remediation efforts included excavating large quantities of contaminated soil which were packaged and shipped for offsite burial.

At the request of the NRC, the Environmental Survey and Site Assessment Program (ESSAP) of Oak Ridge Associated Universities (ORAU) conducted an independent radiological survey of the Phase 2 construction site on August 10, 1989. Procedures and results of that survey are presented in this report.

SURVEY PROCEDURES

At the time of the survey, the walls and a roof of the new utilities facility had been erected. All of the footings and foundation for the building had been poured; excavated areas were still accessible.

1. A 10 m x 10 m reference grid system was established in the Phase 2 construction area; the grid origin was located in the southwest corner of the new structure. This grid is shown on Figure 2.
2. Beta-gamma and gamma scans were conducted over soil surfaces within the gridded portion of the construction site. Thin-window GM and NaI(Tl) gamma scintillation detectors with audible indicating scaler/ratemeters were used to perform scanning surveys. Locations of elevated radiation levels were identified and the licensee informed of the findings.
3. Surface soil samples were obtained at sixteen locations (Figure 2). Six of these samples were from locations of elevated direct radiation. Samples were analyzed by gamma spectrometry at the laboratory facility in Oak Ridge, Tennessee.
4. Exposure rate measurements were performed at the surface and 1 m above the surface at each of the sampling locations, using a gamma scintillation detector, cross calibrated for enriched uranium with a pressurized ionization chamber.

RESULTS

A visual inspection of the Phase 2 construction site identified deep excavation adjacent to Building 240, extending 10 m from the building foundation (Figure 2). CE personnel stated that contaminated soil also extended underneath the building foundation. Surface gamma and beta-gamma scans confirmed CE's findings.

In addition, surface scans identified a small area with elevated direct radiation levels on a concrete footing adjacent to the boiler room. The approximate grid location was 13N, 14.5E. CE personnel were informed of the findings and removed the material. A follow-up scan indicated that removing this material significantly reduced direct radiation levels.

In the construction area, exposure rates measured at sampling locations ranged from 6 to 17 $\mu\text{R}/\text{h}$ at both surface contact and at 1 m above the surface (Table 1). For comparison, the background exposure levels in the area of this facility were in the range of 6 to 10 $\mu\text{R}/\text{h}$; this range is typical of normal background radiation in this region of Missouri. Higher levels were near the western portion of the construction site and can be attributable to remaining contaminated soil under the foundation of Building 240.

Concentrations of uranium in soil are presented in Table 2. Levels of U-238 ranged from <2.8 to 48.5 pCi/g; U-235 levels ranged from <0.3 to 23.4 pCi/g. The highest concentrations of both uranium isotopes were observed in sample 4 from the grid coordinate 30N, 0E, having a U-235 concentration of 23.4 pCi/g and U-238 concentration of 48.5 pCi/g. An isotopic ratio of 26 for U-234 to U-235 activity was used to determine the total uranium concentration in these samples; this ratio was previously determined for Phase 1 construction activities. Based on this isotopic ratio, 10 of the 16 samples exceed the 30 pCi/g guideline for total uranium. Soil samples 5 and 11 have associated statistical uncertainty levels which make them borderline with respect to the guideline.

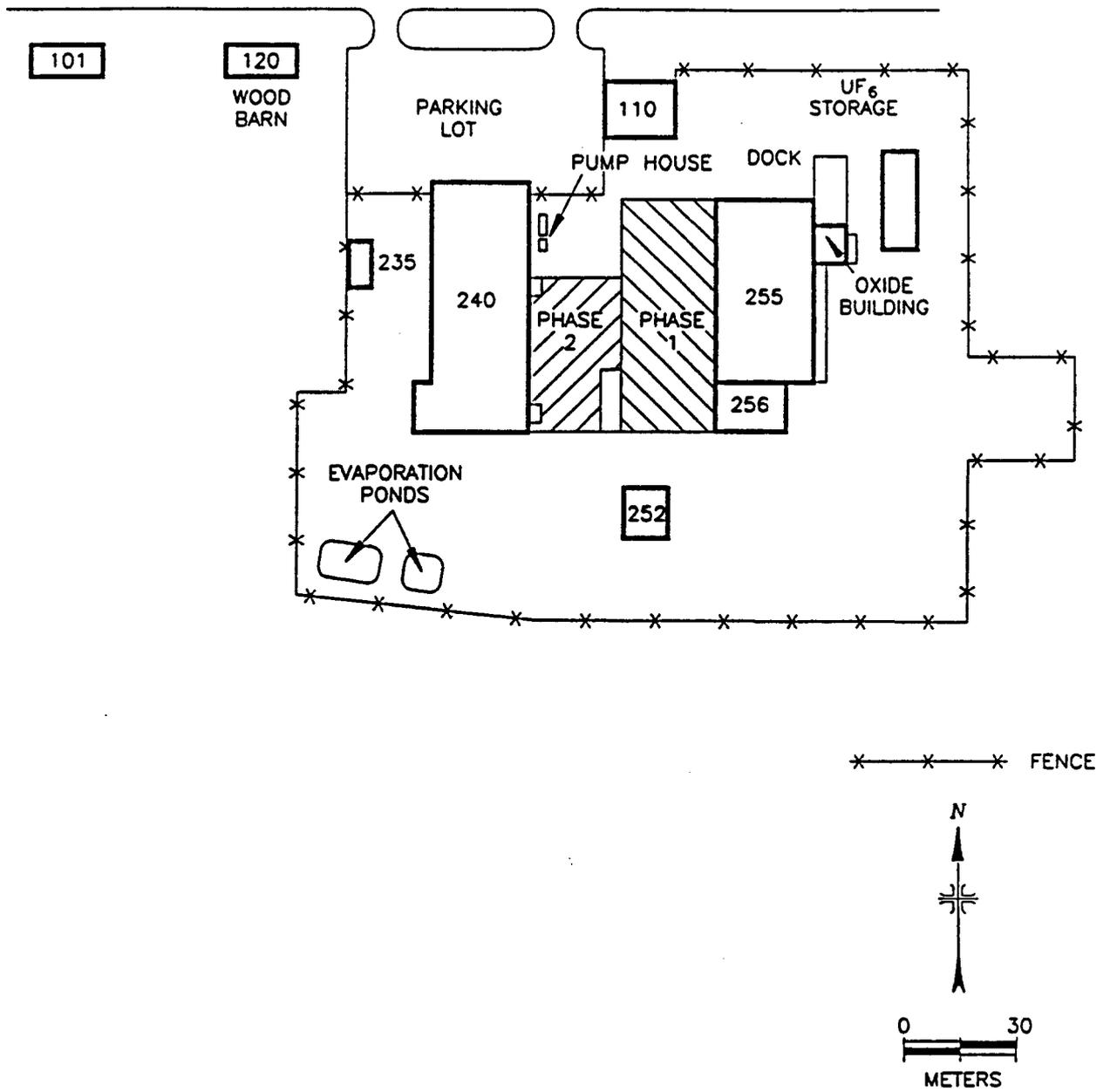


FIGURE 1: Layout of Plant Facility Indicating Phase 2 Construction Area

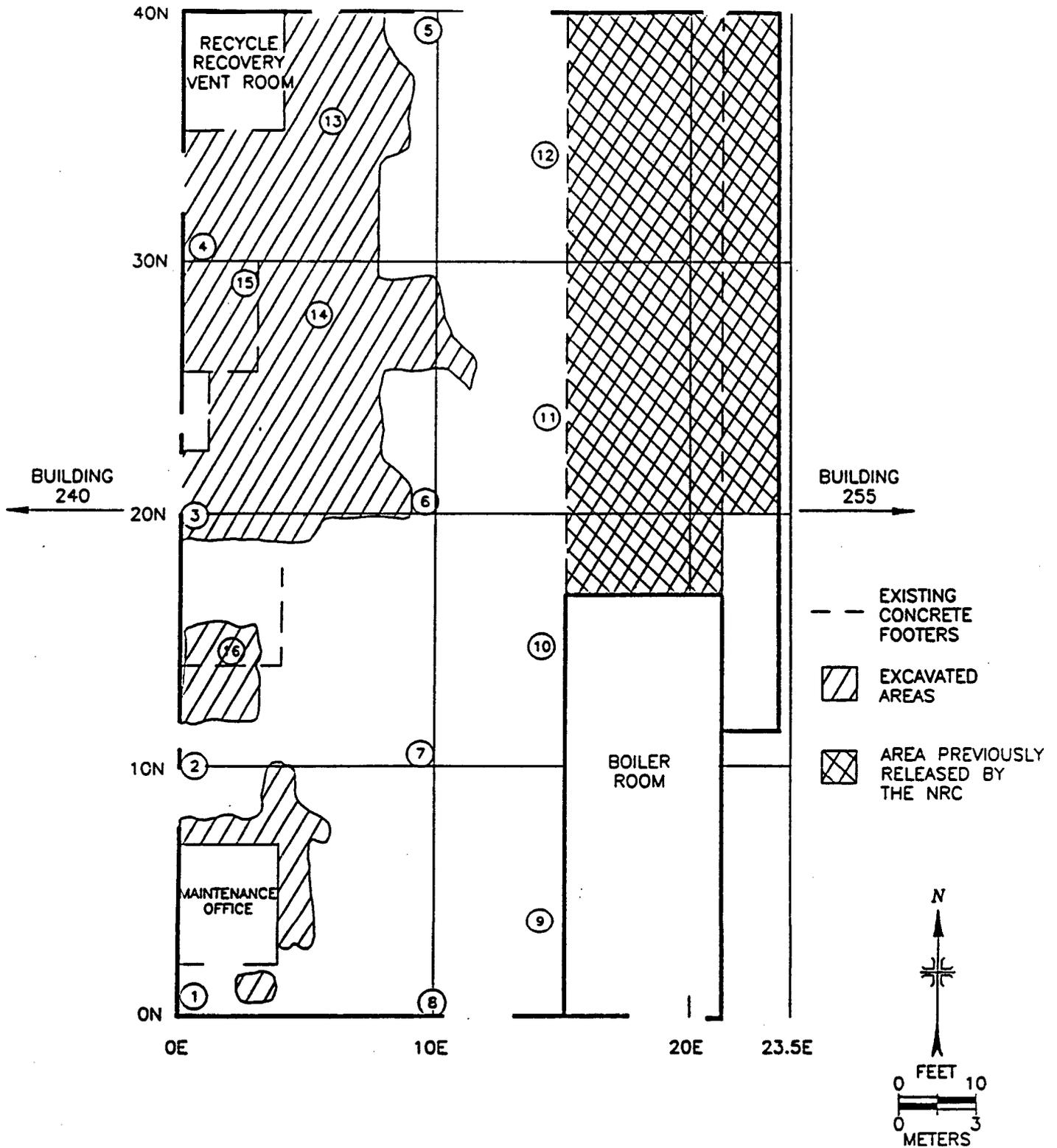


FIGURE 2: Soil Locations in Phase 2 Construction Area

TABLE 1

EXPOSURE RATE MEASUREMENTS
 PHASE 2 CONSTRUCTION
 COMBUSTION ENGINEERING, INC.
 HEMATITIE, MISSOURI

Location ^a	Grid Coordinate		Exposure Rate ($\mu\text{R/h}$)	
	N	E	At 1 m Above Surface	At Surface Contact
	1	0	0	6
2	10	0	9	8
3	20	0	14	17
4	30	0	10	14
5	40	10	6	6
6	20	10	8	8
7	10	10	8	8
8	0	10	6	6
9	4	14	6	9
10	14.5	14	8	8
11	24.5	14	6	6
12	35	14	8	9
13	36	5.5	13	13
14	28	6	11	14
15	28.5	2.5	11	17
16	15	1.5	17	17

^aRefer to Figure 2.

TABLE 2

URANIUM CONCENTRATIONS IN SOIL
 PHASE 2 CONSTRUCTION
 COMBUSTION ENGINEERING, INC.
 HEMATITE, MISSOURI

Sample ^a	Grid Coordinate		Uranium Concentration (pCi/g)		
	N	E	U-235	U-238	Total U ^c
1	0	0	0.2 ± 0.2 ^b	0.8 ± 0.5	6.2
2	10	0	0.3 ± 0.3	1.6 ± 0.5	9.7
3	20	0	3.9 ± 0.8	17.1 ± 2.5	122.4 ^d
4	30	0	23.4 ± 1.5	48.5 ± 1.6	680 ^d
5	40	10	0.6 ± 0.3	1.7 ± 0.7	17.9
6	20	10	0.7 ± 0.3	2.7 ± 0.9	21.6 ^e
7	10	10	1.1 ± 0.4	6.3 ± 1.2	36.0 ^d
8	0	10	<0.3	0.2 ± 0.3	8.3
9	4	14	1.7 ± 0.5	8.0 ± 1.7	53.9 ^d
9Duplicate	4	14	1.3 ± 0.5	5.8 ± 1.1	40.9 ^d
10	14.5	14	3.2 ± 0.4	16.1 ± 0.1	102.5 ^d
11	24.5	14	0.8 ± 0.3	2.2 ± 0.8	23.8 ^e
12	35	14	2.4 ± 0.7	5.7 ± 1.8	70.5 ^d
13	36	5.5	4.5 ± 0.8	4.5 ± 1.8	126 ^d
14	28	6	14.9 ± 1.2	21.1 ± 2.2	423.4 ^d
15	28.5	2.5	5.3 ± 1.0	13.3 ± 2.3	156.4 ^d
16	15	1.5	1.9 ± 0.6	<2.8	54.1 ^d

^aRefer to Figure 2.

^bUncertainties represent the 95% confidence level, based only on counting statistics; additional laboratory uncertainties of ± 6 to 10% have not been propagated into these data.

^cCalculated, utilizing U-234/U-235 activity ratio of 26.

^dExceeds guideline level.

^eMay exceed guideline level, based on statistical uncertainties in analytical data.



Oak Ridge
Associated Post Office Box 117
Universities Oak Ridge, Tennessee 37831-0117

Energy/
Environment
Systems Division

September 18, 1989

Mr. George France
Region III
Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: CONTAMINATION ON CONCRETE SLAB - COMBUSTION ENGINEERING,
HEMATITE, MO

Dear Mr. France:

On August 10, 1989, a survey team from ORAU's Environmental Survey and Site Assessment Program (ESSAP) performed a walkover gamma survey of the entire enclosed area of Phase 2 construction at the Combustion Engineering (CE) site in Hematite, Missouri. Elevated residual contamination in approximately a 1 m² area was detected on a concrete slab which had been the floor of building 251. ORAU informed CE of the findings to which CE replied that the area had been released by the NRC in a previous survey. Alpha and beta-gamma scans were conducted to outline the area exceeding surface contamination release guidelines; most of the contamination appeared to be confined to the floor/wall interface. Detailed measurements were not performed, because the area had previously been released by the NRC.

CE performed cleanup of this area by removing a portion of the concrete; however, further monitoring by ORAU indicated that the soil beneath the slab was also contaminated. Decontamination of this area was not completed prior to ORAU's departure. The enclosed map indicates the approximate location.

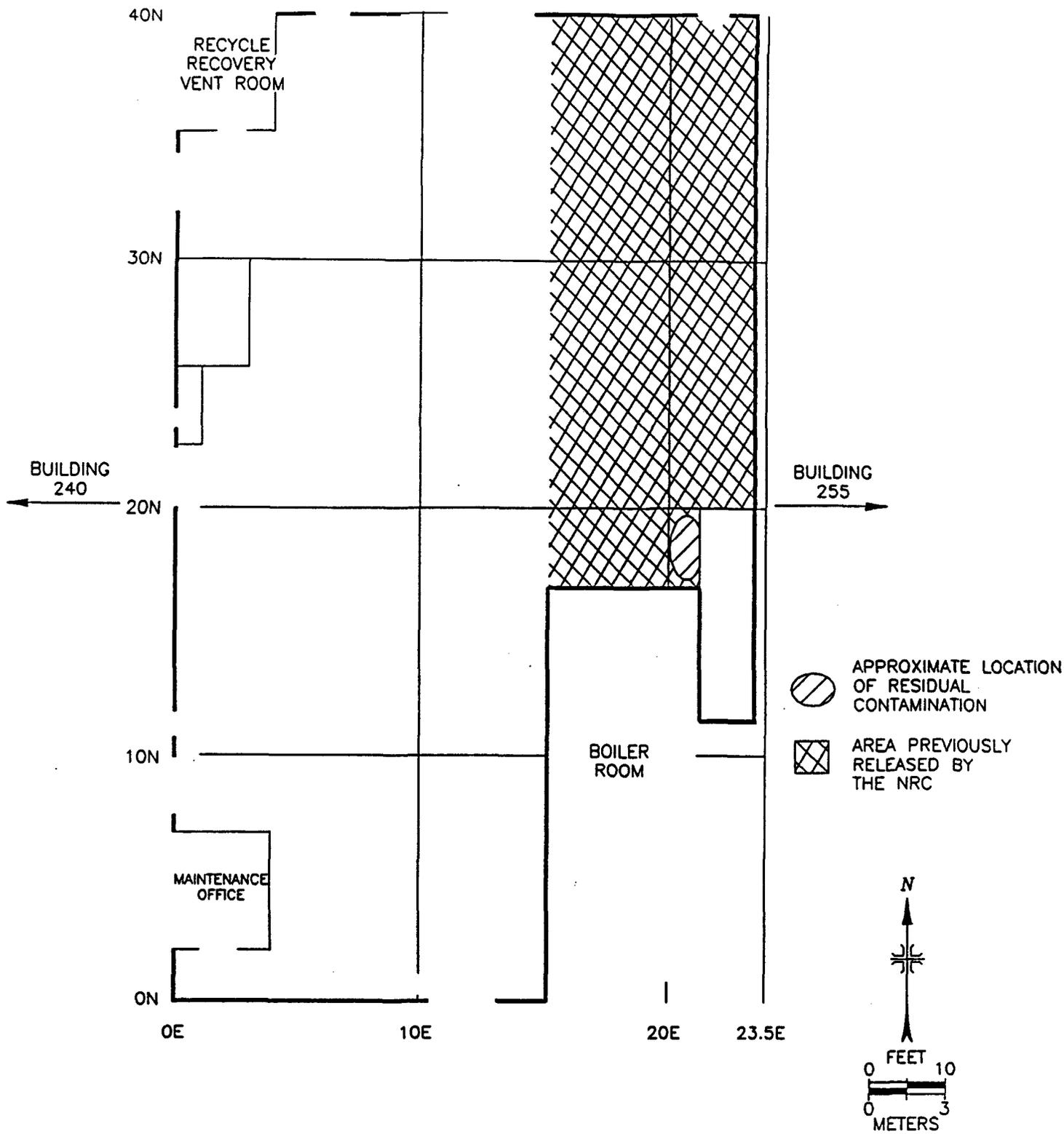
Requests for additional information may be referred to me at FTS 626-3355.

Sincerely,

Phyllis R. Cotten
Health Physics Team Leader
Environmental Survey and
Site Assessment Program

PRC:jls

cc: L. Rouse, (NRC/NMSS, 6H3)
G. LaRoche, (NRC/NMSS, 6H3)
D. Tiktinsky, (NRC/NMSS, 6A4)



Results of Survey of Area Previously Released by the NRC