

**CONFIRMATORY SURVEY PROCEDURES AND RESULTS FOR THE
MAIN PROCESSING BUILDING AND ADJACENT EXTERIOR AREA
CABOT CORPORATION
READING, PENNSYLVANIA**

PROCEDURES

SURVEY PROCEDURES: INTERIOR

Reference Grid

The reference grid established by the decommissioning contractor in the affected areas was used by ESSAP to reference measurement locations. Measurements performed in ungridded areas (unaffected areas) were recorded on a site drawing.

Surface Scans

Surface scans for alpha, beta, and gamma activity were performed on the floor using large area gas proportional detectors and NaI scintillation detectors coupled to ratemeters or ratemeter-scalers with audible indicators (Figure 1). Scan coverage was approximately 50 to 60% in unaffected areas and 100% in affected area. Locations of elevated activity were marked for further investigation.

Surface Activity Measurements

Measurements for total beta surface activity were performed at 127 locations, including locations of elevated activity identified by surface scans. A smear sample for determining removable activity was obtained from each direct measurement location on concrete, asphalt or other solid surface (smears were not performed on gravel or soil surfaces).

9702180284 950207
PDR ADOCK 04009027
C PDR

SURVEY PROCEDURES: EXTERIOR

Reference Grid

The reference grid established by the decommissioning contractor was used by ESSAP for referencing measurement and sampling locations.

Surface Scans

Gamma surface scans were performed over approximately 75% of the unaffected areas and over 100% of the affected areas. Locations of elevated surface activity were marked for further investigation.

Surface Activity Measurements

Measurements for total beta activity were performed at 20 locations on the paved surfaces.

Soil Sampling

A total of 10 surface (0-15 cm) soil samples was collected from the areas adjacent to the Main Processing Building (Figure 2).

FINDINGS AND RESULTS

SURVEY RESULTS

Surface Scans

Surface scans identified several locations of elevated activity on the floor of the Main Processing Building and on the exterior paved area.

Surface Activity Measurements

Surface activity measurements for total and removable beta activity are summarized in Table 1. Direct measurements were performed at all locations of elevated surface activity identified by scans. Total beta activity for all measurement locations, prior to remediation, ranged from <200 to 9,500 dpm/100 cm². Total beta activity for all locations, after the locations exceeding the maximum guideline value were remediated by the decommissioning contractor, ranged from <200 to 2,500 dpm/100 cm².

All removable activity was less than the minimum detectable activity of the procedure, which is 12 dpm/100 cm² for alpha and 16 dpm/100 cm² for beta.

Radionuclide Concentrations in Soil Samples

Concentrations of Th-232 and U-238 in soil samples collected from the exterior area of the site range from 0.4 to 4.6 pCi/g and from <1.4 to 2.8 pCi/g, respectively. Results are summarized in Table 2.

COMPARISON OF RESULTS WITH GUIDELINES

The NRC residual surface activity guidelines for thorium are 1,000 dpm/100 cm² total activity over 1 m², 3,000 dpm/100 cm² maximum total activity applied to an area of not more than 100 cm², and 200 dpm/100 cm² for removable activity. The NRC soil guideline for natural thorium and natural uranium with daughters present and in equilibrium is 10 pCi/g. Since a mixture of radionuclides is present at the site, the sum of the ratios of the soil concentration of each radionuclide to the guideline for that radionuclide must not exceed unity. That is,

$$\frac{\text{Conc Th}}{10} + \frac{\text{Conc U}}{10} \leq 1$$

Surface scans identified numerous locations of elevated activity at the site which were marked for further investigation. Direct measurements were performed at each of these locations which

resulted in 12 of the locations exceeding the maximum guideline value. An additional 19 locations were between the average and the maximum guideline values.

The decommissioning contractor performed remedial activities on the 12 locations which exceeded the maximum guideline. ESSAP performed post-remediation measurements at these locations and the resulting surface activity levels at all locations were below 3,000 dpm/100 cm². The area of the locations of direct radiation that exceeded 1,000 dpm/100 cm² averaged less than 100 cm² and surface scans indicated no significant activity on the surrounding surface, therefore measurements to determine 1 m² averages were not performed.

Concentrations of thorium and uranium in all soil samples meet the established guideline of 10 pCi/g above background, as demonstrated by the "sum of the ratios" rule.

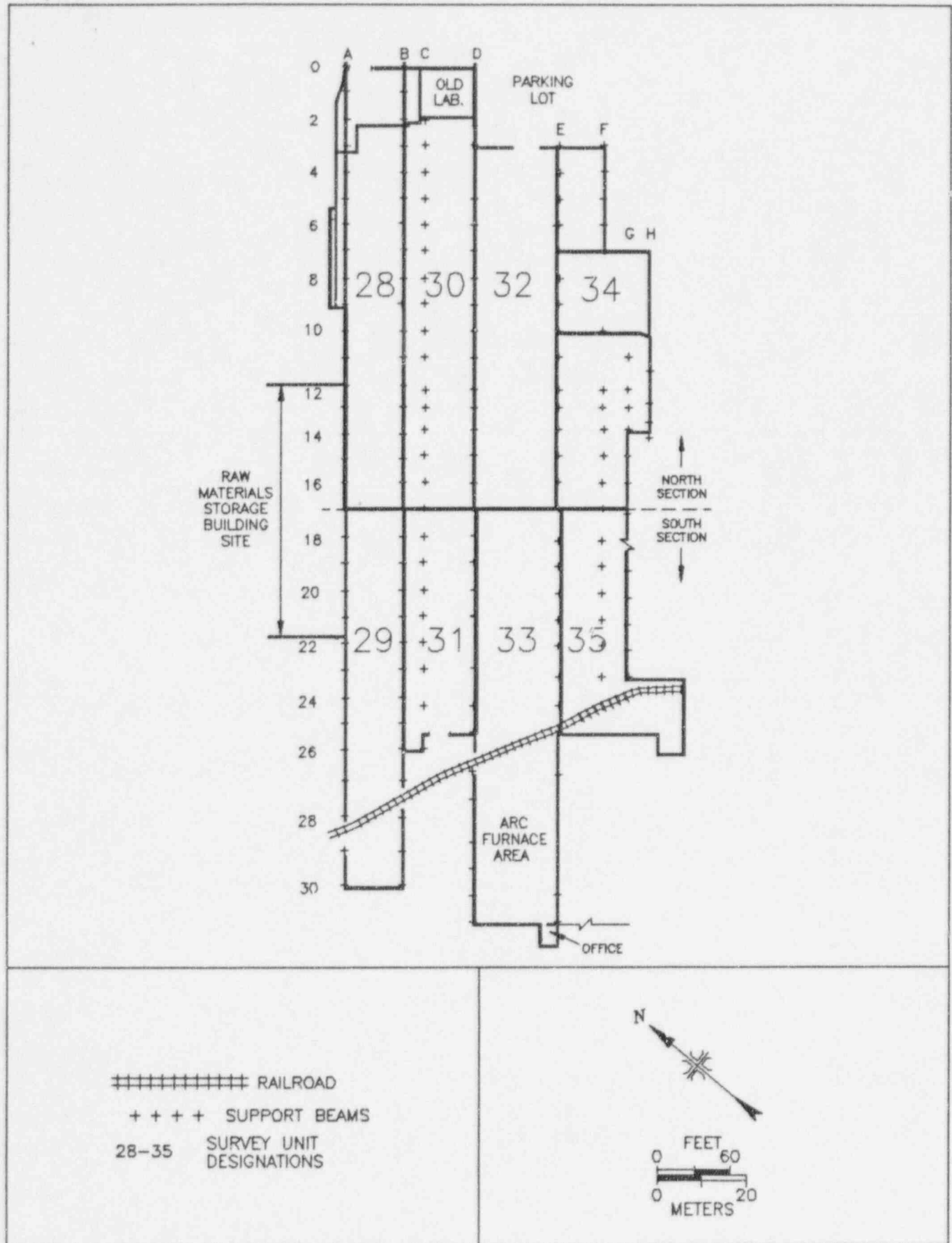


FIGURE 1: Cabot Corporation Facility – Main Processing Building Survey Unit Designations

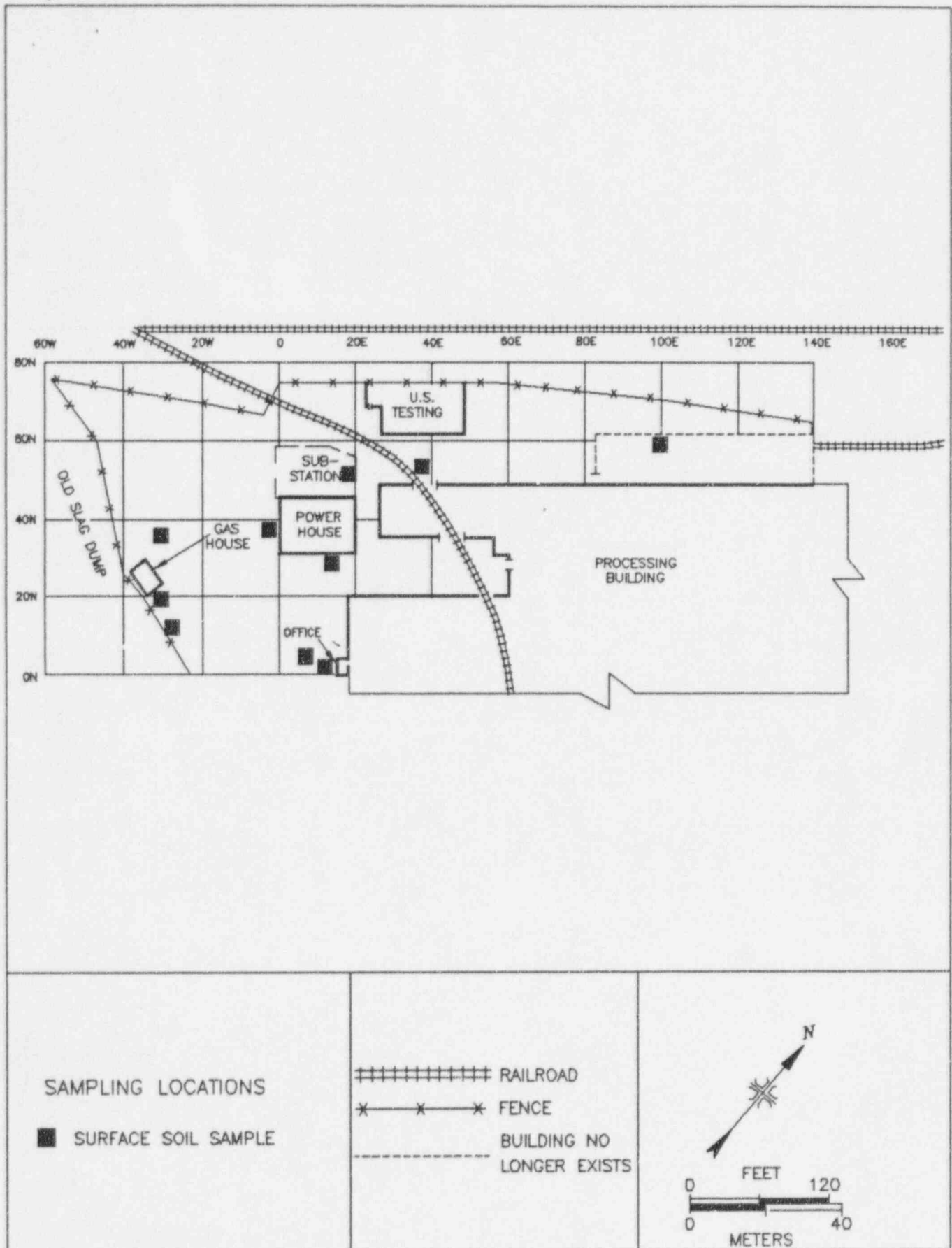


FIGURE 2: Cabot Corporation Facility – Exterior Sampling Locations

TABLE 1

**SUMMARY OF SURFACE ACTIVITY
FOR THE MAIN PROCESSING BUILDING AND EXTERIOR AREA
CABOT CORPORATION
READING, PENNSYLVANIA**

Floor Survey Unit # ^a	Number of Direct Measurement Locations		Range of Total Beta Activity (dpm/100 cm ²) Pre-remediation	Range of Total Beta Activity (dpm/100 cm ²) Post-remediation	Range of Removable Activity (dpm/100 cm ²)	
	Total	Exceeding Maximum Criteria ^b			Alpha	Beta
28	13	0	< 240-570	N/A	< 12	< 16
29	15	0	< 240-990	N/A	< 12	< 16
30	16	0	< 200-610	N/A	< 12	< 16
31	20	3	< 200-4,900	< 200-1,100	< 12	< 16
32	10	0	400-740	N/A	< 12	< 16
33	34	8	270-9,500	270-2,500	< 12	< 16
34	10	1	370-3,300	370-800	< 12	< 16
35	9	0	390-1,100	N/A	< 12	< 16
Exterior Paved Area	20	0	270-1,600	N/A	< 12	< 16

^aBased on the decommissioning contractor's area designations (Figure 1).

^bThe maximum criteria for thorium is 3,000 dpm/100 cm².

TABLE 2

**RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
FROM THE EXTERIOR AREA OF THE MAIN PROCESSING BUILDING
CABOT CORPORATION
READING, PENNSYLVANIA**

Location ^a	Radionuclide Concentrations (pCi/g)	
	Th-232	U-238
2N, 17E	2.4 ± 0.5^a	< 2.7
4N, 14E	4.0 ± 0.6	2.2 ± 1.7
10N, 30W	1.2 ± 0.3	1.1 ± 1.2
20N, 35W	0.6 ± 0.2	0.9 ± 0.8
38N, 30W	0.4 ± 0.3	< 1.4
39N, 0E	1.2 ± 0.3	1.0 ± 1.5
50N, 20E	2.3 ± 0.5	2.8 ± 1.9
50N, 38E	4.6 ± 0.6	2.0 ± 1.4
60N, 100E	0.9 ± 0.5	1.2 ± 1.5
28N, 16E	0.5 ± 0.2	0.8 ± 0.9

^aRefer to Figure 2.

^bUncertainties represent the 95% confidence level based only on counting statistics.