

**HEALTH AND SAFETY RESEARCH DIVISION**

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**RADIOLOGICAL SURVEY RESULTS FOR THE  
PEEK STREET SITE PROPERTIES,  
SCHENECTADY, NEW YORK**

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[Site Codes: 425 Peek St. (SY001); 413 Peek St., (SY003); 417 Peek St. (SY004)]

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## EXECUTIVE SUMMARY

The Peek Street Industrial Facility, located at 425 Peek Street, Schenectady, New York, was operated by the General Electric Company for the Atomic Energy Commission (AEC) between 1947 and 1955. A variety of operations using radioactive materials were conducted at the site, but the main activities were to design an intermediate breeder reactor and to develop a chemical process for the recovery of uranium and plutonium from spent reactor fuel. Nonradioactive beryllium metal was machined on the site for breeder reactor application. The 4.5-acre site was decommissioned and released in October 1955.

It is the policy of the U.S. Department of Energy (DOE) to verify that conditions at such sites or facilities comply with current federal guidelines. At the request of the Office of Naval Reactors through the Office of Remedial Action and Waste Technology, a radiological survey was conducted by Oak Ridge National Laboratory in November 1989. This survey was a follow-up to an earlier, limited investigation of the Peek Street facility and the state-owned bike path adjacent to the facility. It included a small, formerly inaccessible portion of the state-owned property, the two residential properties west of the facility, and the commercially owned property to the north of the site as well as the previously surveyed properties.

The survey included scan and grid point measurements of direct radiation levels outdoors on the five properties and inside the factory building, and radionuclide analysis of samples collected from each property. Radionuclide concentrations were determined in outdoor surface and subsurface soil samples from each property and in dust, debris, and structural materials from inside the factory building. Auger holes were logged to assess location and extent of possible subsurface residual soil radioactivity. Radionuclide concentrations were determined in both indoor and outdoor water samples and in selected samples of vegetation. The presence of fixed and transferable surface residual radioactivity was investigated inside the factory building and on discarded materials outdoors on the property. High-volume air samples as well as additional selected indoor and outdoor soil samples were analyzed to determine levels of elemental beryllium.

The majority of the measurements taken and samples analyzed indicate results that are within DOE guidelines. These conservative guidelines, based on possible exposure through inhalation, ingestion, or direct contact, are derived to ensure that unrestricted use (including residential and industrial use) will not result in any significant exposure to individuals who may frequent the site, the general public, or the environment.

Concentrations of residual radioactive material that exceeded the DOE guidelines were found in small isolated areas totaling approximately 0.2 m<sup>2</sup> of floor area and approximately 3 m<sup>2</sup> of wall area inside the factory building and at two small areas totaling approximately 5 m<sup>2</sup> outside



the building. A small section, ~2 m<sup>2</sup>, of one of these areas extended beyond the fence at the east side of the industrial property onto the state-owned property. No residual radioactive material or elevated radiation levels were detected on any portion of the paved section of the state-owned bike path.

Because the elevated radioactivity is localized and limited in extent, any credible use scenario including current use conditions, indicates that no significant radiation exposures would accrue to individuals frequenting the area. Conservative dose estimates indicate that, under any industrial use scenario, the potential radiation exposure due to the residual radioactivity outside the building would be minimal, approximately 3 mrem per year. This is about 1% of the dose due to natural background (~300 mrem per year) radiation sources.

Elevated levels of fixed, nonradioactive beryllium concentrations were located on a small section of the interior side of the east wall of the industrial facility. Samples were taken from the concrete floor surface (8) and from the surface of the concrete block walls (15). Beryllium concentrations generally ranged from <1 to 6.1 µg/g, with the exception of one sample that had a concentration of 330 µg/g. Those samples taken for beryllium analysis in the vicinity of the radiologically elevated area of the wall had slightly elevated levels of beryllium when compared with samples taken in other areas of the building. However, with one exception (330 µg/g) all were within the range of background concentrations of beryllium found in soil. Beryllium on the wall appears to be fixed and is not available as an inhalant and under present use conditions does not present a health risk. Beryllium was also found in dust on overhead beams in concentrations ranging from 5 µg/ft<sup>2</sup> to 3000 µg/ft<sup>2</sup>. No explicit Occupational Safety and Health Administration standards exist for allowed areal concentrations of beryllium; however, industrial hygiene guidance in effect at the Oak Ridge National Laboratory specifies a limit of 4 µg/ft<sup>2</sup> for removable beryllium surface contamination for transferring materials to uncontrolled areas. An areal concentration of less than 25 µg/ft<sup>2</sup> of beryllium can usually be obtained by ordinary cleaning methods and has been used as an "index of cleanliness." Although the measured areal concentrations exceed these levels, air sample analysis demonstrates that the beryllium in this dust is not becoming airborne and under present use conditions is not an inhalation risk to employees working in the building.

# **RADIOLOGICAL SURVEY RESULTS FOR THE PEEK STREET SITE PROPERTIES SCHENECTADY, NEW YORK\***

## **INTRODUCTION**

The Peek Street Industrial Facility, located at 425 Peek Street, Schenectady, New York (Fig. 1), was operated by the General Electric Company for the Atomic Energy Commission (AEC) between 1947 and 1955. An aerial view of the site as it appeared in approximately 1947 is reproduced in Fig. 2. A variety of operations using radioactive materials were conducted at the site, but the main activities were to design an intermediate breeder reactor and to develop a chemical process for the recovery of uranium and plutonium from spent reactor fuel. Nonradioactive beryllium metal was machined on the site for breeder reactor application. The 4.5-acre site was decommissioned and released in October 1955.

It is the policy of the U.S. Department of Energy (DOE) to verify that radiological conditions at such formerly used sites or facilities comply with current DOE guidelines. If they are found to exceed those guidelines, remedial action may be implemented (where DOE has the authority to do so) to correct the condition. DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) as part of that effort to confirm the closeout status of facilities under contract to agencies preceding DOE during early nuclear energy development. Furthermore, guidelines for release and use of such sites have become more stringent since many of these sites were decommissioned, surveyed, and released.

At the request of the Office of Naval Reactors through the Office of Remedial Action and Waste Technology, a site visit and preliminary scoping survey of the Peek Street facility was conducted by Oak Ridge National Laboratory (ORNL) in July 1988 and included the participation of representatives from New York state agencies.<sup>1</sup> The major portion of the state-owned bike path received a preliminary survey in November 1988. The results of these surveys indicated no health risk to people frequenting or working on the site. Small amounts of residual radioactivity derived from former operations were identified in only two localized spots outdoors, and indoors only in a crack in the old vault area. The areas did not, however, pose a health risk nor was posting required. A comprehensive survey was then performed between August and November, 1989, to definitively characterize current radiological conditions at the site. This second survey included a small, formerly inaccessible portion of the state-owned property, the two vicinity properties southwest of the facility at 413 and 417 Peek Street, and the commercially owned property to the north of the site as well as the industrial property. The results of the comprehensive second survey led to an additional sampling trip in July, 1990. The layout and locations of the surveyed properties are shown in Fig. 3.

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\*The survey was performed by the Measurement Applications and Development Group of the Health and Safety Division of Oak Ridge National Laboratory under DOE contract DE-AC05-84OR2100.

At the time of this survey, the owner of the industrial property operated a carpentry and steel fabricating business in the large, L-shaped factory building and rented additional space to other businesses. Outdoor views of the factory building are shown in Figs. 4 and 5. Figure 6 is a diagram showing the locations of the wood shop in the south part of the building, the metal shop in the north end, and the print shop occupying offices along the northwest side of the building. Photographs of the wood shop and metal shop areas are reproduced in Figs. 7 and 8.

## SCOPE OF THE SURVEY

The outdoor survey of the 4.5-acre industrial property included:

- A gamma scan at the ground surface over the entire property.
- Measurements of gamma exposure rates at 1 m above the ground surface and at the ground surface at grid line intersections.
- Collection and analysis of systematic and biased surface and subsurface soil samples.
- Sampling of soil and water from auger holes and pits.
- Gamma logging of auger holes.
- Collection and analysis of vegetation samples.
- Determination of radioactivity on the surface of discarded materials.

The indoor survey of the factory building included the following:

- Measurements of ranges and average gamma exposure rates from scanning interior surfaces.
- Measurements of gamma radiation levels at grid points and along overhead beams.
- Sampling and radionuclide analysis of indoor dust, debris, and structural materials, and dry and wet samples from indoor drains.
- Measurements of direct and transferable alpha and beta-gamma radioactivity levels on selected surfaces.
- Radiological and chemical (Be) analysis of air samples.

In addition to the radiological analyses, selected indoor and outdoor samples were analyzed for elemental beryllium. Figure 9 (Plate 1, enclosure) is a composite of individual sample location diagrams that appear in appropriate sections of this report. The drawing includes the soil samples taken on the property during the preliminary survey.

Surface scanning was performed over the bike path, the commercially owned property to the north of the site, and the two vicinity properties west of the site to determine ranges of gamma exposure rates. Systematic and biased samples were also collected from surface and subsurface soil on these properties.

## SURVEY METHODS

A comprehensive description of the survey methods and instrumentation used in this survey is given in *Procedures Manual for the ORNL Radiological Survey Activities (RASA) Program*, Oak Ridge National Laboratory, ORNL/TM-8600 (April 1987).<sup>2</sup>

## OUTDOOR SURVEY METHODS

A 50- by 50-ft grid was established over the industrial property to facilitate locating measurements and data (Fig. 10). Because the bike path was surveyed at a different time, and because of the configuration of the respective properties' boundaries, the bike path was assigned a separate grid using the fences as east and west boundaries (see "State Property Survey Results" section, p. 12). The area between the fences was divided into 100-ft increments from south to north with the center of the bike path designated as the baseline. Grid line 0+00 was assigned to an imaginary line extending east from the south end of the building crossing perpendicular to the bike path. In this report, the term "bike path" refers strictly to the paved area while "state-owned property" alludes to the tracts east and west between the bike path and the fences. The railroad property was surveyed from the northwest boundary of the industrial facility to the former track bed. Little evidence of the steel rails and wooden ties that comprised the original tracks remained at the time of the survey.

Using a portable gamma scintillation meter, a gamma scan was performed in these gridded areas. For the industrial property, ranges and average measurements were tabulated, and gamma levels were determined at the ground surface and at 1 m above the surface at grid points. The state-owned property was scanned at the ground surface and exposure rates recorded for the surface and for 1 m above the surface at grid points. Soil samples were collected from all properties at increments between the surface and 15 cm (surface samples) at systematically chosen locations. At some of the systematic locations, the soil was also sampled at 15-cm increments below the surface layers. Systematic samples were taken from the industrial property as close as possible to the center of each block without regard to radiation levels. Surface soil sampling was also performed in all outdoor areas of elevated gamma radiation. Such samples are referred to as biased samples and are more likely to contain elevated concentrations of radionuclides than are systematically chosen samples. In certain areas, biased samples were also taken from 15-30 or 30-45 cm to determine subsurface concentrations. Prior to sampling, a range of numbers was assigned to multiple survey teams for the identification and labeling of soil samples; thus, sample numbers reported here are not always consecutive. The sample identification numbers continue from the last sample number used for the preliminary survey previously conducted and separately reported. Directly measured and transferable radiation levels were determined on some discarded materials outdoors east of the factory building.

To define the extent of possible subsurface soil radioactivity, auger holes were drilled to depths ranging from <1 to 3 m. A plastic pipe was placed in each hole, and a NaI scintillation probe was lowered inside the pipe. The probe was encased in a lead shield with a horizontal row of collimating slits on the side. This collimation allows measurement of gamma radiation intensities resulting from radioactivity within small fractions of the hole depth. If the gamma readings in the hole were elevated, a soil sample was scraped from the wall of the auger hole at the point showing the highest gamma radiation level. The auger hole loggings were used to select locations where further soil sampling would be useful. A split-spoon sampler was used to collect subsurface samples at known depths. In some auger holes, a combination of split-spoon sampling and side-wall scraping was used to collect samples. Water was collected from several of the holes and submitted for radionuclide analysis.

## INDOOR SURVEY METHOD<sup>c</sup>

A survey was conducted inside the factory building on the industrial property. Locations of measurements and samples are identified by relating their positions to overhead beam number or to room number or name. Open areas are those east or north of the designated beam. Gamma scan ranges and average measurements were tabulated for surfaces of floors and walls throughout open areas and offices and along all overhead beams. Gamma exposure rates were also recorded as close as possible to center points in each area between beams and in each office. Center point measurements were taken at 1 m above the surface in the metal shop and in the wood shop. Alpha radioactivity levels and beta-gamma dose rates near floor, wall, and overhead beam surfaces were determined by direct measurement where original construction materials were exposed. The possibility of surface radioactivity on indoor heating equipment where residues might have collected was also investigated. No alpha measurements were taken over the carpeted floors in the wood shop offices nor in any area where surfaces were recently painted. Transferable radioactivity levels were assessed by analysis of smears taken on unaltered original floor, wall, and beam surfaces. The lower shelves of cabinets against walls in the vault were removed to obtain access for measurements on all floor areas. The survey included collection of both wet and dry samples from indoor drains and samples of dust and other materials from indoor surfaces. Radionuclide analysis was performed on all samples. Nonradioactive beryllium concentrations were determined in selected samples.

## INDUSTRIAL PROPERTY SURVEY RESULTS

Applicable DOE guidelines are summarized in Table 1 (ref. 3). Average background radiation levels for the Schenectady, New York, area and average concentrations of some radionuclides in the Glenville, New York, area are presented in Table 2 (refs. 4-6). All direct measurement results presented in this report are gross readings; background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations measured in environmental samples. Very low values preceded by a "<" indicate levels less than minimum detectable activity (MDA) and were not used in the discussion of results.

### OUTDOOR RADIOLOGICAL RESULTS

#### Gamma Measurements

Scanning disclosed a range of gamma exposure rates as shown in Table 3. Average levels for individual blocks were 7 to 17  $\mu\text{R/h}$ . At grid intersection points, measurements ranged from 5 to 15  $\mu\text{R/h}$  at 1 m from the surface and 4 to 16  $\mu\text{R/h}$  at the ground surface. Normal background levels range from 5 to 14  $\mu\text{R/h}$  in the Schenectady area (Table 2). Two separate regions of elevated exposure rates were detected as shown on Fig. 11. The maximum exposure rate, 61  $\mu\text{R/h}$ , was found at 3+06, 111R. At that location,  $\sim 0.1 \text{ m}^2$  in size, exposure rates increased to 140  $\mu\text{R/h}$  at 5 cm below the surface, dropping to 24  $\mu\text{R/h}$  at 15 cm depth. A second area of

elevated exposure rates ranging from 20 to 41  $\mu\text{R}/\text{h}$  at the surface was  $\sim 5 \text{ m}^2$  in size and was located east of the building in the region roughly defined by the coordinates 3+30 to 3+50 and 105R to 115R. Gamma exposure rates on discarded equipment in this area of the site ranged from 12 to 19  $\mu\text{R}/\text{h}$ . It was not possible to access a portion of the industrial property at the west boundary because it was covered with debris (Fig. 12). Gamma measurements and analysis results of soil samples taken near the perimeter of the debris pile were in the range of background.

Figure 13 shows the elevated regions as viewed from the state-owned property during the winter season. Samples of metal were cut from the ventilation exhaust pipes to allow access (Figs. 14 and 15).

### Surface Soil Samples

**Systematic samples.** Radionuclide analysis was performed on systematic samples collected at the locations indicated on Fig. 16. Samples were taken from various depths. Results of analysis are listed in Table 4. Concentrations of  $^{238}\text{U}$ ,  $^{232}\text{Th}$ , and  $^{226}\text{Ra}$  are less than DOE guidelines (Table 1).

Cesium-137 was found at concentrations of 0.009 to 9.9 pCi/g at the surface and 0.05 to 0.42 pCi/g in subsurface samples. Concentrations of  $^{137}\text{Cs}$  at this site were generally 1.0 pCi/g or less. Some higher values (maximum of 9.9 pCi/g) were found in samples taken from areas where rainwater would be expected to collect. Concentrations of  $^{137}\text{Cs}$  measured in soil samples from three background areas in nearby Glenville, New York, ranged from 0.76 to 1.2 pCi/g (Table 2). Concentrations as high as 15 pCi/g have been measured in areas receiving runoff from roofs or large paved areas in other regions of the eastern United States. These  $^{137}\text{Cs}$  concentrations are below the limit of 80 pCi/g previously applied by DOE at other sites (Table 1).

Table 5 details additional analyses of several systematic samples, as well as indoor dust and drainwater samples, for  $^{210}\text{Po}$ ,  $^{210}\text{Pb}$ ,  $^{90}\text{Sr}$ , and plutonium isotopes. Strontium-90 concentrations in four systematic samples were less than the MDA (0.5 pCi/g). No elevated concentrations of  $^{210}\text{Po}$ ,  $^{210}\text{Pb}$ , or plutonium isotopes were revealed in these samples.

**Biased samples.** Biased surface soil samples were taken from locations of elevated gamma exposure rates (Fig. 16). Results are detailed in Table 4. Except for  $^{238}\text{U}$ , all concentrations of radionuclides were below guidelines (Table 1). Sample B55B, containing 1900 pCi/g  $^{238}\text{U}$ , was collected at the location showing the maximum gamma level found during the survey. The highest concentration of  $^{137}\text{Cs}$  in soil from the site (16 pCi/g) was found in sample B59A taken in a low-lying area beneath the dripline of the building.

As shown in Table 5, slightly elevated levels of  $^{210}\text{Po}$  were found in sample B59A (6.9 pCi/g). That sample, which also had elevated concentrations of  $^{137}\text{Cs}$ , was collected from

beneath the dripline at the south end of the factory building. Further investigation of sample B59A revealed the presence of the parent of  $^{210}\text{Po}$  ( $^{210}\text{Pb}$ ) at a concentration of 13 pCi/g, but the concentration is insufficient to pose any significant health risk. Of 5 soil samples analyzed for  $^{90}\text{Sr}$ , three contained  $^{90}\text{Sr}$  in concentrations (0.77 to 3.0 pCi/g) slightly above the MDA (0.5 pCi/g) but well below concentrations that would cause concern. Measurable concentrations of  $^{238}\text{Pu}$  and  $^{239/240}\text{Pu}$  in biased soil samples were 0.042 to 0.06 pCi/g and 0.16 pCi/g, respectively. The concentrations of  $^{210}\text{Po}$ ,  $^{210}\text{Pb}$ ,  $^{90}\text{Sr}$ ,  $^{238}\text{Pu}$ , and  $^{239/240}\text{Pu}$  in these soil samples are also below levels that would constitute any significant health risk.

### **Auger Hole Soil Samples and Gamma Logging of Auger Holes**

Samples were collected from auger holes drilled at the locations shown on Fig. 17. Results of analysis are listed in Table 4. The samples were taken at 15-cm increments between 0 and 300 cm. In some samples, concentrations of  $^{238}\text{U}$  and  $^{226}\text{Ra}$  were present in approximately equal amounts, indicating a natural origin. However, many samples contained  $^{238}\text{U}$  in a concentration from 1 to more than 10 times the concentration of  $^{226}\text{Ra}$  found in the same sample, as would be the case if the material originated from uranium processing activities. The maximum concentration of  $^{238}\text{U}$  found in an auger hole sample (A42A, 100 pCi/g) exceeds the site-specific guideline value (35 pCi/g) suggested for this site.<sup>7</sup> Sample A42A was collected from the surface soil in the larger of the two regions of elevated gamma levels. All other radionuclides in all other auger hole samples are below applicable guidelines (Table 1).

Gamma logging was performed in each of 48 auger holes (A1-A20, A22, A23, A25, A26-A28, A31-A53) to characterize and further define the extent of possible subsurface radioactivity. The logging technique used here is not radionuclide specific. However, logging data, in conjunction with soil analyses data, may be used to estimate regions of elevated radionuclide concentrations in auger holes when compared with background levels for the area. Following a comparison of these data, it appears that any shielded scintillator readings of 1000 to 1500 counts per minute (cpm) or greater generally indicate the presence of elevated concentrations of gamma emitters. Analysis results of soil samples taken from auger holes with slightly elevated gamma radiation levels show concentrations of uranium and radium to be low and in equilibrium, indicating naturally occurring radioactive materials not connected to Peek Street operations. Data from the gamma profiles of the logged auger holes are graphically represented in Appendix A, Figs. A.1 through A.48. The maximum gamma level measured was ~1400 cpm in hole A10. The areas of highest gamma readings approximately correspond to the greatest concentrations of radionuclides shown in Table 4.

### **Vegetation Samples**

Because miscellaneous vegetation had to be cleared in order to ascertain direct radiation levels at the ground surface over some portions of the site, five samples of these materials were collected and subjected to radionuclide analysis. Three of the foliage samples were taken from vegetation within or near the area of elevated radiation levels shown on Fig. 13. The fourth sample was collected from living material ~25 to 30 ft south of that area. The fifth sample was taken from vegetation on the state-owned property, in an area of background radiation levels

(Table 2) and may be used as the basis for comparing other sample results (Table 6). Concentrations of  $^{238}\text{U}$  ranged from 0.012 to 0.17 pCi/g. Cesium-137 concentrations ranged from 0.04 to 0.11 pCi/g. The maximum  $^{238}\text{U}$  concentration in vegetation (0.17 pCi/g) was found in the sample (V3) taken from the area having elevated  $^{238}\text{U}$  in soil. Since this concentration is ~20% of the concentrations found in soil background samples, brush removal required no special handling procedures.

### Water Samples

The locations of water samples taken from six auger holes and two drains are shown on Fig. 17. Two water samples (W52 and W53) were also collected from the concrete pits on the south wall. Analyses were performed on the filtrates from each sample to determine the total uranium concentration. Results of analyses are listed in Table 7. Concentrations of total uranium in outdoor water samples ranged from 0.0006 to 0.002 pCi/mL. These concentrations are below the DOE standard for uranium concentrations in effluents from sites intended for unrestricted use (40 pCi/mL).<sup>8</sup>

### Surface Radioactivity

Directly measured alpha levels were above background on four pieces of discarded equipment near the exit on the east side of the building (Fig. 18). One 24-in. pipe, two 8-in. metal pipes, and an automobile starter had alpha radioactivity levels of 100 to 1100 dpm/100 cm<sup>2</sup>. The 8-in. pipe shown on the right side in Fig. 19 displayed the maximum alpha measurement. It lay in the larger of the two regions of elevated radiation levels. Directly measured alpha radioactivity levels on the metal samples cut from the ventilation exhaust stacks (Figs. 14 and 15) were 200 to 800 dpm/100 cm<sup>2</sup>. Smear analysis showed removable alpha radioactivity ranging from <MDA\* (i.e., 10 dpm/100 cm<sup>2</sup>) to 50 dpm/100 cm<sup>2</sup>. All results are below the respective DOE guidelines of 5000 dpm/100 cm<sup>2</sup> and 1000 dpm/100 cm<sup>2</sup> for directly measured and removable alpha emissions from uranium residuals. Results of smear analysis demonstrated transferable alpha and beta-gamma levels below their respective MDAs\* (10 and 200 dpm/100 cm<sup>2</sup>).

## INDOOR RADIOLOGICAL RESULTS

### Wood Shop

**Gamma measurements.** Directly measured radiation levels determined in the wood shop are listed in Tables 8 and 9. Gamma scanning revealed exposure rates ranging from 7 to 15  $\mu\text{R/h}$ , averaging 8 to 14  $\mu\text{R/h}$  in individual rooms and column-defined blocks. Normal background levels range from 5 to 14  $\mu\text{R/h}$  in the Schenectady area. Overhead on beams 1 through 21, gamma levels were 4 to 8  $\mu\text{R/h}$  (Table 9). All exposure rates are below the DOE indoor guideline of 20  $\mu\text{R/h}$  above background (Table 1).

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\*The instrument-specific minimum detectable activities (MDAs) for directly measured and transferable alpha radiation levels are 25 and 10 dpm/100 cm<sup>2</sup>, respectively. For transferable beta-gamma radiation the MDA is 200 dpm/100 cm<sup>2</sup>.



**Fixed alpha radioactivity levels and beta-gamma dose rates.** Surface measurements taken in the wood shop showed alpha levels ranging from <25 to 60 dpm/100 cm<sup>2</sup> and beta-gamma dose rates of 0.01 to 0.05 mrad/h (Table 8). Alpha radioactivity levels on wood shop beams (2-21) were <25 to 36 dpm/100 cm<sup>2</sup>, with beta-gamma dose rates ranging from 0.01 to 0.03 mrad/h (Table 9). All measurements are below the applicable DOE guidelines listed in Table 1.

**Smear and sample analyses.** Results of all smear analyses for the wood shop, including those taken on the overhead beams, were less than the MDAs. Six samples of dust (M14-M19) were collected from six overhead beams. Locations of the samples are indicated on Fig. 20. Results are detailed in Table 10. The maximum concentration of <sup>238</sup>U found in the samples (6 pCi/g) converts to a removable surface radioactivity level of 32 dpm/100 cm<sup>2</sup>. This value is well below the limit for removable surface contamination (1000 dpm/100 cm<sup>2</sup>) shown in Table 1. Because concentrations of <sup>232</sup>Th, <sup>226</sup>Ra, and <sup>137</sup>Cs in wood shop beam dust samples were 1.1 pCi/g or less, surface radioactivity levels were all well below the DOE guideline.

### Print Shop

**Gamma measurements.** Exposure rates ranged from 7 to 14 μR/h during the scan of the print shop, with an average of 10 μR/h on both walls and floors (Table 11). Center point measurements were also 10 μR/h. All gamma levels are consistent with normal Schenectady background levels and are below the applicable DOE guideline.

**Fixed alpha radioactivity levels and beta-gamma dose rates.** Because surfaces were of recent construction, no direct measurements were taken to determine total alpha radioactivity levels. Beta-gamma dose rates were 0.02 mrad/h at 1 cm from floor and wall surfaces (Table 11). These values are below the DOE limit of 0.2 mrad/h averaged over an area not more than 1 m<sup>2</sup> (Table 1).

**Smear analysis.** No determination of transferable surface radioactivity levels was made because of the new carpeting and walls in these offices. Gamma measurements were near the 5 to 14 μR/h values found in the Schenectady area. Furthermore, beta-gamma dose rates were not significantly different from background.

### Vault Area

**Gamma measurements.** Directly measured radiation levels in the vault and in storage room MS-7 are shown on Fig. 21 and listed in Table 11. Gamma levels over floors, walls, and areas above the ceiling ranged from 8 to 19 μR/h, averaging 12 μR/h. Exposure rates near the surface were 20 μR/h in room MS-7 in a floor crack immediately adjacent to the wall shared with the vault. Gamma levels of up to 14 μR/h were measured on contact with a restroom toilet facility. This value is consistent with levels commonly found in ceramics containing naturally occurring radioactive materials. No measurements exceed the guideline of 20 μR/h above background (Table 1).

**Fixed alpha radioactivity levels and beta-gamma dose rates.** Directly measured alpha levels were <25 to 110 dpm/100 cm<sup>2</sup>, with the maximum measurement taken at the northeast corner of the vault in the crack between floor and wall. Beta-gamma dose rates ranged from 0.01 to 1.0 mrad/h on floors and walls, with the elevated readings measured in cracks between walls and floors in the northeast corner of the room. The total area was ~0.1 m<sup>2</sup>; thus the guideline of 0.2 mrad/h over 1 m<sup>2</sup> or less is exceeded (Table 1). No personnel exposure concern exists since this location is isolated and normally unoccupied. Beta-gamma dose rates were also elevated (0.33 mrad/h) in room MS-7 in the crack at the base of the wall shared with the vault but again, no personnel exposure concern exists. Alpha radioactivity levels in MS-7 were <25 to 130 dpm/100 cm<sup>2</sup>. Fixed alpha levels in both the vault and office MS-7 were within applicable guidelines as shown in Table 1.

**Smear analyses.** Results of analyses of smears from the cracks in the vault and in room MS-7 demonstrated no transferable alpha or beta-gamma radioactivity levels above the respective MDAs.

### **Metal Shop**

**Gamma measurements.** Gamma exposure rates in the metal shop generally ranged from 7 to 15  $\mu$ R/h during direct scanning, with three isolated spots of higher measurements (Table 11). A gamma level of 20  $\mu$ R/h in room MS-7 has previously been discussed. All other exposure rates with the exception of those measured at two isolated areas (A and B, Fig. 22) were below the DOE indoor guideline (Table 1) and were comparable to area background levels. Maximum gamma levels were 41  $\mu$ R/h in those two isolated areas. No personnel exposure concern exists since this location is isolated and normally unoccupied. Average measurements taken in individual blocks ranged from 8 to 12  $\mu$ R/h, as did discrete measurements taken at 1 m from the floor surfaces at or close to the centers of blocks and rooms. Exposure rates on overhead beams 22-43 ranged from 5 to 8  $\mu$ R/h (Table 9).

**Fixed alpha radioactivity levels and beta-gamma dose rates.** Total alpha radioactivity levels in the metal shop ranged from <25 to 130 dpm/100 cm<sup>2</sup> (Table 11), values below the DOE guideline of 5000 dpm/100 cm<sup>2</sup> (Table 1). Beta-gamma dose rates exceeded guidelines in some areas and ranged from 0.02 to 5.0 mrad/h at 1 cm from surfaces in five areas between beams 25 and 29 (A-E, Fig. 22). The maximum beta-gamma dose rate (5.0 mrad/h, sample M21) found on the east wall near beam 27 at a spot inside Area B, exceeded the guideline of 1.0 mrad/h over an area 100 cm<sup>2</sup>. Beta-gamma dose rates also exceeded the guideline (0.2 mrad/h over an area not more than 1 m<sup>2</sup>) over the entire wall area that measured ~3 m<sup>2</sup> (32 ft<sup>2</sup>). After the wall was chipped away to a depth of ~1/8 in. at the spot having the highest beta-gamma measurement, the dose rate was reduced to 0.04 mrad/h, however, the wall area still exceeded the beta-gamma guideline. The wall area had a directly measured alpha radioactivity level of <25 dpm/100 cm<sup>2</sup>. Elevated alpha levels would not be anticipated, however, since the wall had at least one coat of relatively recently applied paint. Each of three spots found on the floor between beams 25 and 29 as shown on Fig. 22 (A and the two spots near the crane rails) was ~100 cm<sup>2</sup> (0.1 ft<sup>2</sup>) in size. Area A had beta-gamma dose rates of 1.0 mrad/h, the maximum allowable dose rate over an area

of that size. The two spots near the crane rails directly in front of Area B read 1.8 and 2 mrad/h, respectively, exceeding the DOE guideline. Areas C and D had beta-gamma dose rates of 0.3 and 0.7 mrad/h. These values are all below the 1.0 mrad/h guideline for beta-gamma over 100 cm<sup>2</sup>. Area E showed a directly measured beta-gamma dose rate of 0.6 mrad/h before a sample of compacted debris was removed. The removal of biased sample B14 effectively remediated the spot, lowering the dose rate to 0.02 mrad/h.

All directly measured radiation levels on beams were below their respective DOE guidelines (Table 1). Total alpha levels on overhead beams were <25 to 182 dpm/100 cm<sup>2</sup> and beta-gamma dose rates were 0.01 to 0.05 mrad/h (Table 9).

**Smear and sample analyses.** Results of analysis of smears taken on surfaces throughout the metal shop showed all transferable alpha and beta-gamma radioactivity levels below the respective MDAs with the exception of Smear 114 taken at Area D (Fig. 22). At that spot, the removable alpha radioactivity level was 14 dpm/100 cm<sup>2</sup>, a value above MDA but below applicable guidelines (Table 1).

Samples of dust from overhead beams and other surfaces, and samples of wall chips and floor debris were collected and analyzed for radionuclide content. Locations of samples are shown on Fig. 20 and radionuclide concentrations are listed in Table 10.

Analysis results for the 14 dust samples (M1-M13, M32) show radionuclide concentrations within DOE guidelines. Uranium-238 was found at a maximum concentration of 48 pCi/g in sample M4. That concentration converts to a removable surface radioactivity level of 106 dpm/100 cm<sup>2</sup>, a level that is well below the surface contamination guideline of 1000 dpm/100 cm<sup>2</sup> (Table 1). The concentration of <sup>238</sup>U was 1800 pCi/g in sample M21 (wall chips) removed from the spot of maximum beta-gamma dose rates. The sample of compacted debris from the floor in area E, block 28 (B14), contained 880 pCi/g of <sup>238</sup>U. Samples M2, M3, and M27 were analyzed for concentrations of <sup>90</sup>Sr (Table 5). The maximum concentration, 3.8 pCi/g in sample M3, is equivalent to 40 dpm/100 cm<sup>2</sup>, or 20% of the criterion for removable surface contamination (200 dpm/100 cm<sup>2</sup>, Table 1).

### **Air Samples**

Thirty-two air samples, denoted Z1-Z32 and ranging in volume from 7.5 to 13 m<sup>3</sup>, were collected at the locations shown on Fig. 20. Radiological analysis of the samples revealed gross alpha and beta-gamma radioactivity levels below the respective MDAs\*.

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\*The minimum detectable activities (MDAs) for counting instruments correspond to approximately 1% of the maximum permissible concentration of <sup>238</sup>U in air.

## Drainwater Samples

Samples of water were collected from the seven floor drains located throughout the open areas of the building (Fig. 20). Results of drainwater sample analyses are given in Table 7. Total uranium concentrations in the filtrate and precipitate fractions, respectively, ranged from 0.00087 to 0.028 pCi/mL and 0.67 to 3.8 pCi/g in all samples. These concentrations are below the NRC standard for uranium concentration in effluents from sites intended for unrestricted use (40 pCi/mL).<sup>8</sup>

## BERYLLIUM SURVEY RESULTS

Table 12 lists results of analysis for nonradioactive elemental beryllium in selected outdoor soil samples. Sample locations are shown on Fig. 9. Concentrations of beryllium in systematic soil samples were 0.56 to 340  $\mu\text{g/g}$  and ranged from 2.6 to 130  $\mu\text{g/g}$  in radioactively biased samples. The elevated beryllium concentrations, ranging from 13 to 340  $\mu\text{g/g}$  in samples S161A, B55B, and S170B, were all collected from near the 5 m<sup>2</sup> area of elevated <sup>238</sup>U concentrations (near the Roto Clone). (Sample B59A, containing 51  $\mu\text{g/g}$  beryllium, also contained the elevated <sup>137</sup>Cs). Several geochemical surveys of soil have reported natural beryllium concentrations averaging 0.6 to 6.0  $\mu\text{g/g}$ . Average crustal rock contains about 2.8  $\mu\text{g/g}$  with granites enriched by 15 to 20  $\mu\text{g/g}$ .<sup>9</sup> Natural beryllium concentrations in coal ash of 5.0 to 15.3  $\mu\text{g/g}$  have been reported. All soil samples taken in areas remote from radiologically elevated areas and analyzed for beryllium contained beryllium consistent with natural background levels.

Table 13 lists the results of analysis for elemental beryllium in selected dust from overhead beams inside the factory building. Locations of the samples are shown on Fig. 20. The results for indoor dust samples show concentrations of beryllium ranging from 5 to ~3000  $\mu\text{g/ft}^2$ . To determine whether the beryllium was present in indoor air and, therefore, a potential health hazard, the air samples collected at the locations shown on Fig. 20 (Z1-Z32) were analyzed for concentrations of beryllium. The 32 air samples contained  $<6.0 \times 10^{-4}$   $\mu\text{g/m}^3$  (0.0006  $\mu\text{g/m}^3$ ) beryllium. The Occupational Safety and Health Administration (OSHA) exposure limit is 2  $\mu\text{g/m}^3$  (ref. 10). Thus, the beryllium found in the indoor dust is not, under current use conditions, becoming airborne and poses no health risk to employees. Sample M21, consisting of chips from the wall area having elevated beta-gamma radiation levels as indicated in Fig. 22 (area B), contained a concentration of 330  $\mu\text{g/g}$  of fixed beryllium. This finding led to a supplementary sampling expedition (July 28-29, 1990) and the collection of 23 additional floor and wall samples for beryllium analysis (Table 14). Eight of these samples were chipped from the poured concrete floor and 15 were chipped from the surface of the hollow-core precast concrete block wall. Each sample was taken from a depth of ~1/8 in. over an area ~100 cm<sup>2</sup>. Beryllium concentrations in floor samples ranged from <1 to 4.2  $\mu\text{g/g}$ . With one exception (330  $\mu\text{g/g}$  in sample M21), samples taken from the radiologically elevated area of the wall (Fig. 23) ranged from 2.2 to 6.1  $\mu\text{g/g}$ , values only slightly elevated in beryllium when compared with similar samples taken from other sections of the building. Even though these samples were slightly elevated in beryllium, they were all within the range of reported average background concentrations found in soil. Based on these sample results, the beryllium is fixed within the structural materials and is therefore not available as an inhalant. Furthermore, it is probably limited to a small section of the ~3 m<sup>2</sup> wall area.

It is estimated that only 0.1 m<sup>2</sup> or less of the floor area depicted in Fig. 23 may approach radiation guidelines. The remainder is only barely distinguishable from background. The boundary line, encompassing radiation levels only slightly elevated above background, was used to investigate the possible relationship of beryllium concentrations to the radiation levels. With the exception of three samples collected from the area having radiologically elevated levels, no significant difference was observed in beta-gamma measurements taken before and after scabbling material for the samples. In those three samples, beta-gamma cpm\* declined after sample collection as follows: M21 - 10,500 cpm to 150 cpm; M34 - 330 cpm to 77 cpm; and M36 - 710 cpm to 69 cpm (Table 14). Due to these observed reductions in the beta-gamma cpm before and after wall sampling in the area, it appears that most of the radioactivity, and probably the beryllium, is in the top 0.5 cm layer of the concrete block.

The highest concentrations of beryllium both inside and outside the building were associated with elevated concentrations of radionuclides.

## STATE PROPERTY SURVEY RESULTS

### GAMMA MEASUREMENTS

Gamma exposure rates measured over the bike path and adjacent unpaved areas are shown on Fig. 24 and listed in Table 15. Levels generally ranged from 5 to 17  $\mu\text{R/h}$ , comparable to background levels in the Schenectady area of 5 to 14  $\mu\text{R/h}$ . Exposure rates at 1 m above the paved surfaces were slightly higher than those directly on the pavement. Two isolated measurements, 24 and 26  $\mu\text{R/h}$ , were higher than others, with the maximum level found left of the path between grid lines 300 and 400 ft within the region of elevated radioactivity that extends through the fence from the industrial property. Approximately 2 m<sup>2</sup> extends onto the unpaved area west of the bike path. The measurement of 24  $\mu\text{R/h}$  was found in association with coal ashes at soil sample B11. Coal contains naturally occurring radioactive substances which become concentrated in the ashes resulting from combustion. Coal ashes were observed at many sampling locations at the Peek Street properties.

### SOIL SAMPLES

Locations of samples collected from the region between the fences on the state property are shown on Fig. 24. Both surface and subsurface samples were collected. Results of analyses for radionuclide concentrations in systematic, biased, and auger hole samples are listed in Table 16.

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\*Radioactivity in cpm is used here to show a relative change in directly measured surface radioactivity level before and after scabbling and is not used for indicating exposure.

### **Systematic Samples**

In systematic samples,  $^{238}\text{U}$  was found in concentrations of 0.63 to 4.4 pCi/g,  $^{232}\text{Th}$  concentrations ranged from 0.45 to 3.6 pCi/g, and  $^{226}\text{Ra}$  concentrations were 0.45 to 3.6 pCi/g. Cesium-137 concentrations were 0.02 to 0.93 pCi/g. All results are below DOE criteria and guidelines.

### **Biased Samples**

Concentrations of  $^{238}\text{U}$  in biased soil samples ranged from 2.6 to 230 pCi/g (Table 16). Except for three samples (B10A, B54A, and B65A) results are within DOE guidelines. The elevated samples were collected from surface soil within the area of elevated radiation levels extending onto the state property from the industrial property (Figs. 9 and 24). Concentrations of  $^{238}\text{U}$  in those three samples exceeds the 35 pCi/g guideline proposed by DOE for this site (Table 1).

Thorium-232 concentrations in biased samples at 1.1 to 4.7 pCi/g,  $^{226}\text{Ra}$  at 1.1 to 4.6 pCi/g, and  $^{137}\text{Cs}$  at 0.11 to 1.2 pCi/g were within the DOE guidelines.

### **Auger Hole Samples**

With the exception of sample A38A that was collected from 0-15 cm and contained 18 pCi/g  $^{238}\text{U}$ , auger hole samples were collected only from the layers of soil below 15 cm in depth. They were collected at and below the depth of maximum gamma exposure rate detected during gamma hole logging. As shown in Table 16, concentrations of  $^{238}\text{U}$  were 0.46 to 3.3 pCi/g in the auger hole soil samples that were collected from depths of 15 to 775 cm. Radium-226 and  $^{232}\text{Th}$  concentrations ranged from 0.33 to 2.2 pCi/g and 0.43 to 2.2 pCi/g, respectively. Concentrations of 0.01 to 1.0 pCi/g  $^{137}\text{Cs}$  were found in these samples. All results are below DOE criteria and guidelines.

## **VICINITY PROPERTY SURVEY RESULTS**

### **GAMMA MEASUREMENTS**

Two residential properties adjoin the west side of the Peck Street property. Figure 25 shows the layout of the vicinity properties at 413 and 417 Peck Street as well as the results of a gamma scan performed over the ground surface. Exposure rates ranged from 7 to 15  $\mu\text{R}/\text{h}$ . Background gamma radiation levels in the Schenectady area generally range from 5 to 14  $\mu\text{R}/\text{h}$ .

## SOIL SAMPLES

Four systematic surface soil samples (S) were collected from two different locations and two different depths at 417 Peek Street and at two different locations on the property at 413 Peek Street (Fig. 25). Three biased samples (B) were collected from one location at 417 Peek Street at three depths between 0 and 30 cm. The slightly elevated gamma level at that spot was associated with visible coal ash (see discussion of gamma measurements, State Property Survey Results, p. 12). Results of soil sample analysis (Table 17) show that all radionuclide concentrations are below DOE criteria. Based on the gamma survey and results of soil sample analysis, both of which had values in the range of background, it was deemed unnecessary to conduct an indoor survey of these two properties.

## RAILROAD PROPERTY SURVEY RESULTS

### GAMMA MEASUREMENTS

Consistent with natural background levels, gamma exposure rates were 8 to 14  $\mu\text{R/h}$  over the gridded portion of the Delaware and Hudson Railroad property (Fig. 9) with the exception of three isolated areas. Gamma levels at one small, low-lying area next to the former track bed at grid location 6+50 were 14 to 17  $\mu\text{R/h}$ , and two small spots in grid block 2+50, 200L were 19  $\mu\text{R/h}$  and 31  $\mu\text{R/h}$ . The elevated gamma levels at these spots are associated with visible coal ash.

### SOIL SAMPLES

Concentrations of  $^{238}\text{U}$  and  $^{232}\text{Th}$  in systematic soil samples from the railroad property ranged from 0.3 to 3.5 pCi/g and 0.089 to 2.3 pCi/g, respectively (Table 18). Radium-226 and  $^{137}\text{Cs}$  concentrations were 0.10 to 2.2 pCi/g and 0.016 to 1.9 pCi/g, respectively. In the 5 biased samples collected from 3 locations on this property,  $^{238}\text{U}$ ,  $^{232}\text{Th}$ ,  $^{226}\text{Ra}$ , and  $^{137}\text{Cs}$  concentrations ranged from 1.3 to 4.4 pCi/g, 1.1 to 3.9 pCi/g, 1.1 to 3.6 pCi/g, and 0.01 to 0.94 pCi/g, respectively. Respective concentrations for  $^{238}\text{U}$ ,  $^{232}\text{Th}$ ,  $^{226}\text{Ra}$ , and  $^{137}\text{Cs}$  in auger hole samples from 8 locations ranged from 0.69 to 2.0 pCi/g, 0.42 to 1.6 pCi/g, 0.56 to 1.7 pCi/g, and 0.01 to 0.31 pCi/g. All biased samples and several of the systematic samples contained coal ash. Values for all soil samples are less than DOE guidelines (Table 1).

## SIGNIFICANCE OF FINDINGS

Results of the radiological characterization of the Peek Street properties demonstrate that these properties generally meet the criteria established to ensure that unrestricted use will not result in any significant exposures to the public or in any detrimental effect to the environment. However, there are some isolated areas of low-level residuals resulting in elevated radiation

levels and radionuclide concentrations in soil above DOE guidelines. The following text summarizes these isolated areas at various locations on the site. These areas are also depicted in Appendix B.

## • INDUSTRIAL PROPERTY

**Radiological Results.** Gamma levels outdoors on the industrial property generally ranged from 4 to 19  $\mu\text{R}/\text{h}$  with elevated exposure rates of 20 to 61  $\mu\text{R}/\text{h}$  in two distinct but limited regions east of the building near the Roto Clone exhaust stack. Average gamma exposure rates in the Schenectady area range from 5 to 14  $\mu\text{R}/\text{h}$  (Table 2). The maximum exposure rate (61  $\mu\text{R}/\text{h}$ ) was measured in a small, isolated spot ( $\sim 0.1 \text{ m}^2$ ). Gamma levels were 20 to 41  $\mu\text{R}/\text{h}$  in the second region,  $\sim 5 \text{ m}^2$  in size, that extends onto the state-owned property. Concentrations of  $^{238}\text{U}$  in surface soil were elevated in these regions above DOE guidelines with maxima of 1900 and 1100 pCi/g at the spot and area, respectively. The  $^{238}\text{U}$  concentrations in subsurface soil also exceeded DOE guidelines with a maximum value of 62 pCi/g (B56C) in the second region. The maximum concentration found in all other subsurface samples was 8.8 pCi/g (sample A42B). Radium-226 and  $^{232}\text{Th}$  concentrations in surface soil approximate average background (Table 2) and are below applicable guidelines (Table 1). Cesium-137 concentrations were generally similar to those found in background (i.e., relatively undisturbed) areas of Glenville, New York, with a few exceptions ( $\sim 20$ ). Higher concentrations (16 pCi/g maximum) were found in samples taken from locations such as driplines and low-lying areas impacted by runoff where fallout residues would be expected to accumulate from rainwater. These concentrations are below the 80-pCi/g criterion previously used elsewhere (Table 1).

Radionuclide analysis of vegetation samples indicated no bioaccumulation of  $^{238}\text{U}$ . Discarded equipment near and in the area of elevated radioactivity depicted in Fig. 19 was free of significant radiological contaminants. Concentrations of total uranium in water samples from auger holes, drains, and outdoor pits were well below applicable NRC criteria for unrestricted release.

All radiation levels and measurements in both the wood shop and the print shop were below DOE criteria (Table 1). However, elevated gamma levels and beta-gamma dose rates were measured in several small, isolated spots on floors and walls in the vault, in room MS-7, and at the east side of the building in the open area of the metal shop. Additionally, samples of structural materials and debris from these areas contained concentrations of  $^{238}\text{U}$  exceeding DOE guidelines. Gamma exposure rates were elevated at two areas inside the metal shop exceeding the DOE guideline of 20  $\mu\text{R}/\text{h}$  above background for indoor habitable structures. One of these (41  $\mu\text{R}/\text{h}$ ) was on the floor near the crane rails between beams 25 and 26. The beta-gamma dose rate for this same spot (1 mrad/h) was equal to the guideline of 1 mrad/h over  $100 \text{ cm}^2$ . The other was an area on the wall ( $\sim 3 \text{ m}^2$ ) between beams 26 and 27. This area had a maximum gamma exposure rate of 41  $\mu\text{R}/\text{h}$  and a maximum beta-gamma dose rate of 5 mrad/h. This maximum value was limited to  $\sim 0.1 \text{ m}^2$ . Two small spots, each measuring  $\sim 100 \text{ cm}^2$ , on the floor near the crane rails had beta-gamma dose rates (1.8 and 2.0 mrad/h) exceeding the guideline. The maximum concentration of  $^{238}\text{U}$  in the samples of chips taken from the wall was 1800 pCi/g. The spot on the floor having the maximum concentration of  $^{238}\text{U}$  (880 pCi/g) was effectively



remediated by taking the sample. All beam dust samples had levels of surface radioactivity within DOE recommended limits. The gamma exposure rate guideline was also exceeded in some cracks and floor seams in the vault/MS-7 area. Because the radioactivity is localized, remote from accidental encounter, and at low levels, any credible use scenario, including current use conditions, indicates that no significant radiation exposures would accrue to employees or persons frequenting the facility. Concentrations of total uranium in solid and liquid fractions from drainwater samples were well below maximum allowable concentrations.

**Beryllium Analyses Results.** Elevated levels of fixed, nonradioactive beryllium were located on a small section of the interior side of the east wall of the industrial facility (see Appendix B). Samples were taken from the concrete floor surface (8) and from the surface of the concrete block walls (16). The beryllium concentrations generally ranged from <1 to 6.1  $\mu\text{g/g}$  with the exception of one sample which had a concentration of 330  $\mu\text{g/g}$ . Those samples taken for beryllium analysis in the vicinity of the radiologically elevated area of the wall had slightly elevated levels of beryllium when compared with samples taken in other areas of the building. However, with the exception of sample M21 that contained 330  $\mu\text{g/g}$  beryllium, all were within the range of average background concentrations of beryllium found in soil. Based on sample results, beryllium found in wall samples does not present a health risk under present use conditions because it is fixed within structural materials and is, therefore, not available as an inhalant. Beryllium was also found in dust on overhead beams in concentrations ranging from 5  $\mu\text{g}/\text{ft}^2$  to  $\sim 3000$   $\mu\text{g}/\text{ft}^2$ . No explicit OSHA standards exist for allowed areal concentrations of beryllium; however, industrial hygiene guidance in effect at the Oak Ridge National Laboratory specifies a limit of 4  $\mu\text{g}/\text{ft}^2$  for removable beryllium surface contamination for transferring materials to uncontrolled areas. An areal concentration of less than 25  $\mu\text{g}/\text{ft}^2$  of beryllium can usually be gained by ordinary cleaning methods and has been used as an "index of cleanliness."<sup>11</sup> Although the measured areal concentrations exceed these levels, air samples taken demonstrate that the beryllium in this dust is not present in ambient air in concentrations sufficient to present an inhalation risk to individuals employed in the building under present usage conditions. However, if conditions should change, such as the introduction of high velocity air-moving equipment or any mechanical disturbance that could cause resuspension of the dust, a re-evaluation is recommended. Beryllium concentrations were elevated only in soil samples collected from outside the building on the industrial property which either contained elevated concentrations of radionuclides or were collected from a location very near to or within a radiologically elevated region.

#### • STATE PROPERTY

Gamma measurements taken on the state property were generally 5 to 17  $\mu\text{R}/\text{h}$ , values near the range of background for the Schenectady area (5 to 14  $\mu\text{R}/\text{h}$ , Table 2). Two spots of slightly higher gamma exposure rates were measured. The maximum gamma level, 26  $\mu\text{R}/\text{h}$ , was found in the area of slightly elevated exposure rates that extends through the fence from the industrial property. An exposure rate of 24  $\mu\text{R}/\text{h}$  was associated with coal ashes containing small amounts of naturally radioactive substances. No residual radioactivity or elevated radiation levels above background were found on any part of the paved, bike path section of the property.

Concentrations of  $^{238}\text{U}$  in excess of criteria proposed by DOE (Table 1) were found in three bike path soil samples that were taken from the area of elevated radioactive residuals shared with the industrial property. All other analyses are below DOE criteria and guidelines.

- **VICINITY PROPERTIES**

Gamma levels at the surface of the residential properties ranged from 7 to 15  $\mu\text{R/h}$ , values near the average range of background for the Schenectady area (Table 2). Concentrations of  $^{232}\text{Th}$  and  $^{226}\text{Ra}$  approximated background, and all  $^{137}\text{Cs}$  data were less than 1.0 pCi/g. Uranium-238 concentrations were slightly elevated above background but below DOE soil criteria. These slightly higher concentrations were frequently found on this site in association with coal ash. Concentrations of naturally occurring radionuclides present in coal become enhanced in ashes when the coal is burned.

- **RAILROAD PROPERTY**

Gamma exposure rates on the Delaware and Hudson Railroad property were generally 8 to 17  $\mu\text{R/h}$  with the exception of two slightly elevated spots of gamma radiation levels having 19 and 31  $\mu\text{R/h}$  that were associated with coal ash. Concentrations of all radionuclides were below the DOE guidelines (Table 1).

## **SUMMARY**

The majority of the measurements taken and samples analyzed indicate results that are within DOE guidelines. These conservative guidelines based on possible exposure through inhalation, ingestion, or direct contact are derived to ensure that unrestricted use (including residential and industrial use) will not result in significant exposures to any individuals who may frequent the site including the general public, or in any way be detrimental to the environment.

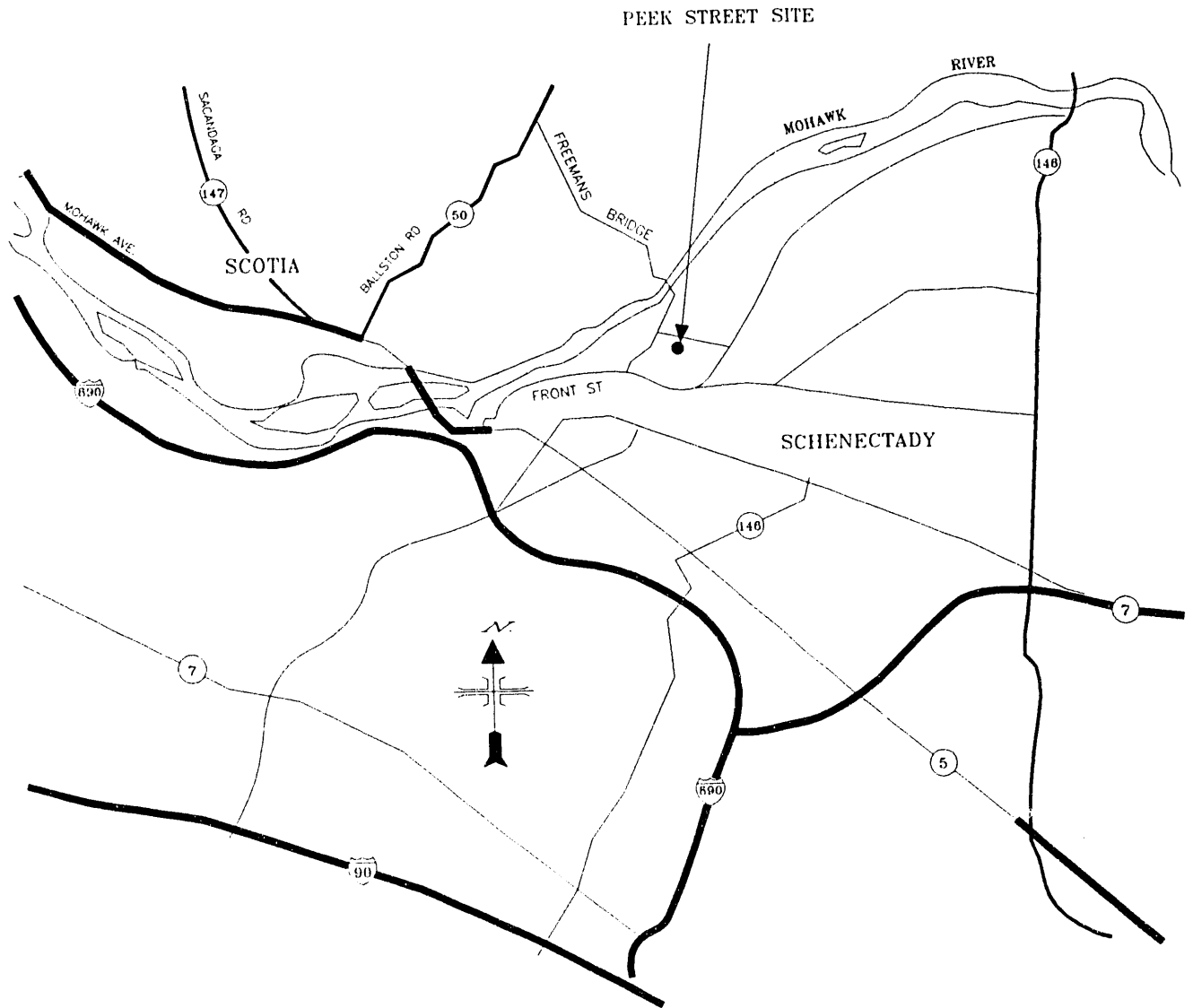
Concentrations of residual radioactive material that exceeded the DOE guidelines were found in small isolated areas totaling approximately 0.2 m<sup>2</sup> of floor area and approximately 3 m<sup>2</sup> of wall area inside the factory building and at two small areas totaling approximately 5 m<sup>2</sup> outside the building. A small section, ~2 m<sup>2</sup>, of one of these areas extended beyond the fence at the east side of the industrial property onto the state-owned property. No residual radioactive material or elevated radiation levels were detected on any portion of the paved section of the state-owned bike path. Because the elevated radioactivity is localized and limited in extent, any credible use scenario, including current use conditions, indicates that no significant radiation exposures would accrue to individuals frequenting the area. Conservative dose estimates indicate that the potential radiation exposure due to the residual activity outside the building would be minimal, approximately 3 mrem/yr.<sup>7</sup> This is about 1% of the dose due to natural background (~300 mrem per year) radiation sources.

Analysis of selected samples collected from a small, radiologically elevated section of the interior east wall of the industrial building revealed elevated levels of fixed, nonradioactive beryllium. With one exception, all samples taken from near that area of the wall contained

beryllium within the range of average background concentrations found in soil. Based on these results, beryllium found in wall samples does not present a health risk under present use conditions because it is fixed within structural materials and is, therefore, not available as an inhalant. Beryllium was also found in dust on overhead beams in concentrations from 5 to 3000  $\mu\text{g}/\text{ft}^2$ . No explicit OSHA standards exist for allowed areal concentrations of beryllium; however, industrial hygiene guidance in effect at the Oak Ridge National Laboratory specifies a limit of 4  $\mu\text{g}/\text{ft}^2$  for removable beryllium surface contamination for transferring materials to uncontrolled areas. An areal concentration of less than 25  $\mu\text{g}/\text{ft}^2$  of beryllium can usually be obtained by ordinary cleaning methods and has been used as an "index of cleanliness."<sup>13</sup> Although the measured areal concentrations exceed these levels, air sample analysis demonstrates that the beryllium is not, under present usage conditions, being redistributed in ambient air in concentrations sufficient to present an inhalation risk to individuals employed in the building. However, if conditions should change, such as the introduction of high velocity air-moving equipment or any mechanical and/or impact disturbance that could cause resuspension of the dust, a re-evaluation is recommended.

## REFERENCES

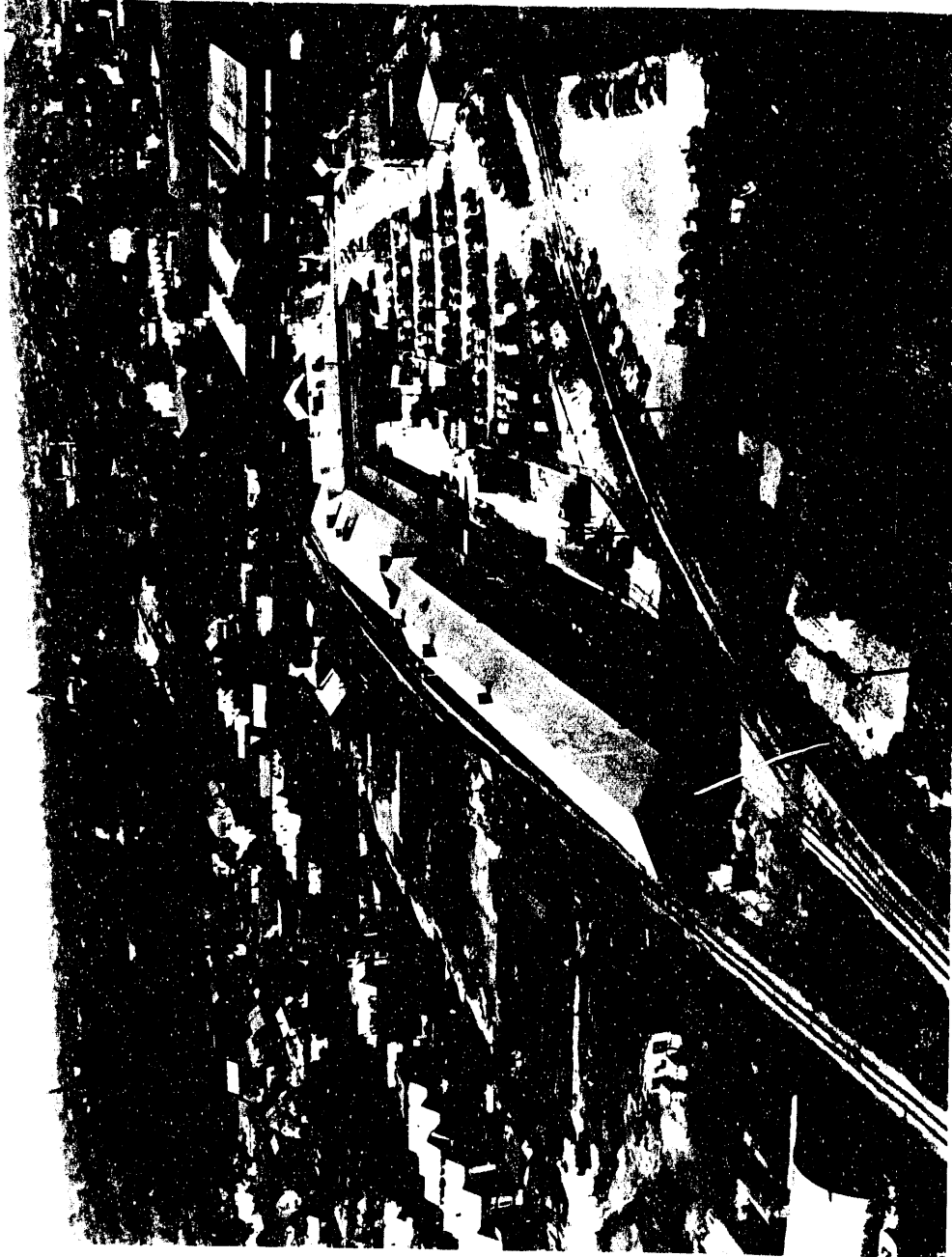
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Fig. 1. Diagram showing the general location of the Peek Street site.

ORNL-PHOTO 7518-90



**Fig. 2.** Aerial view of the Peek Street site, circa 1947. *Source:* A. R. Seepo, Department of Energy, Office of Naval Reactors.

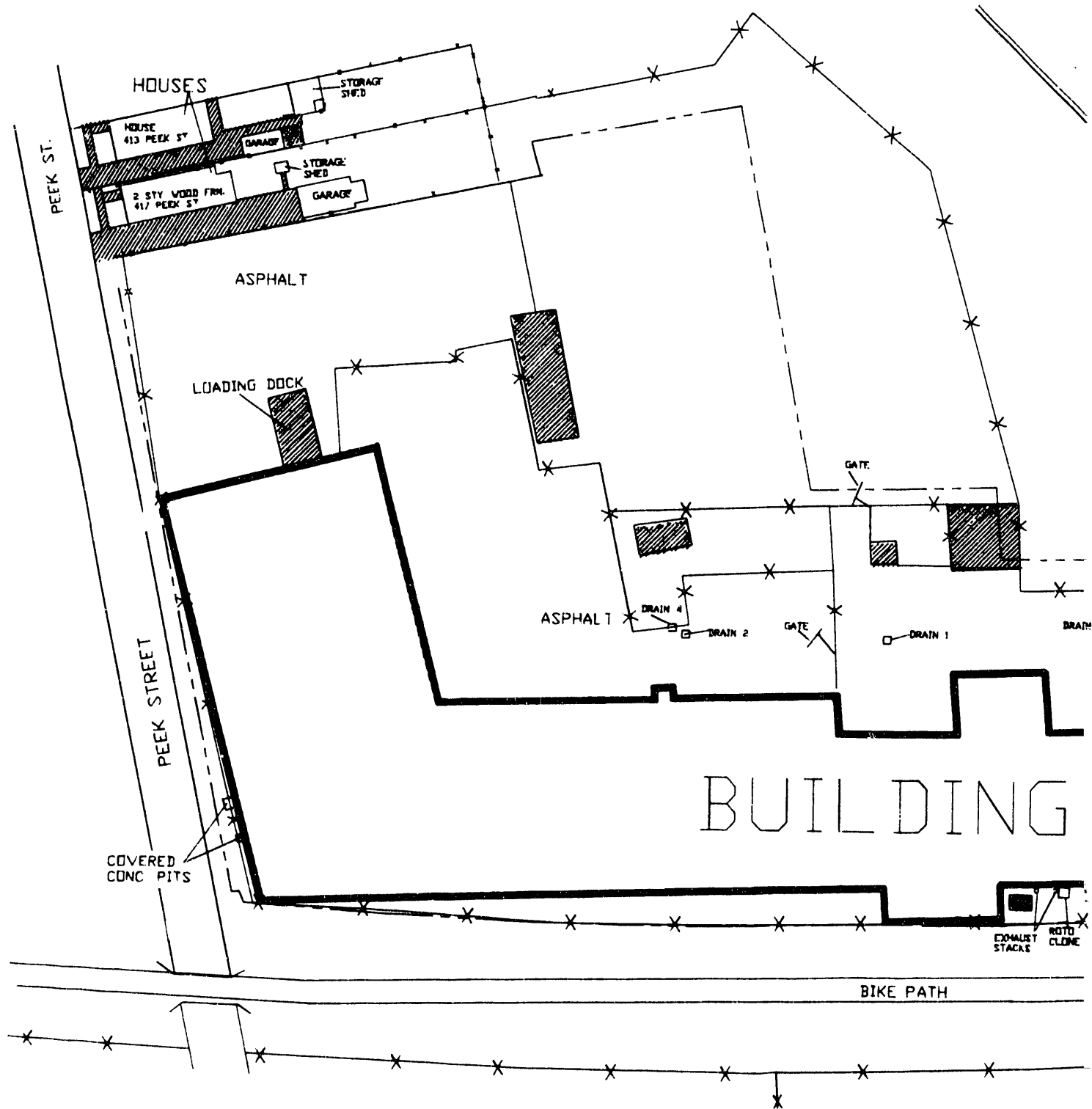
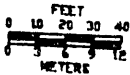
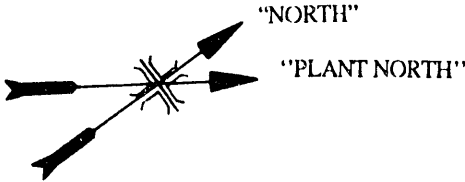
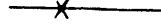




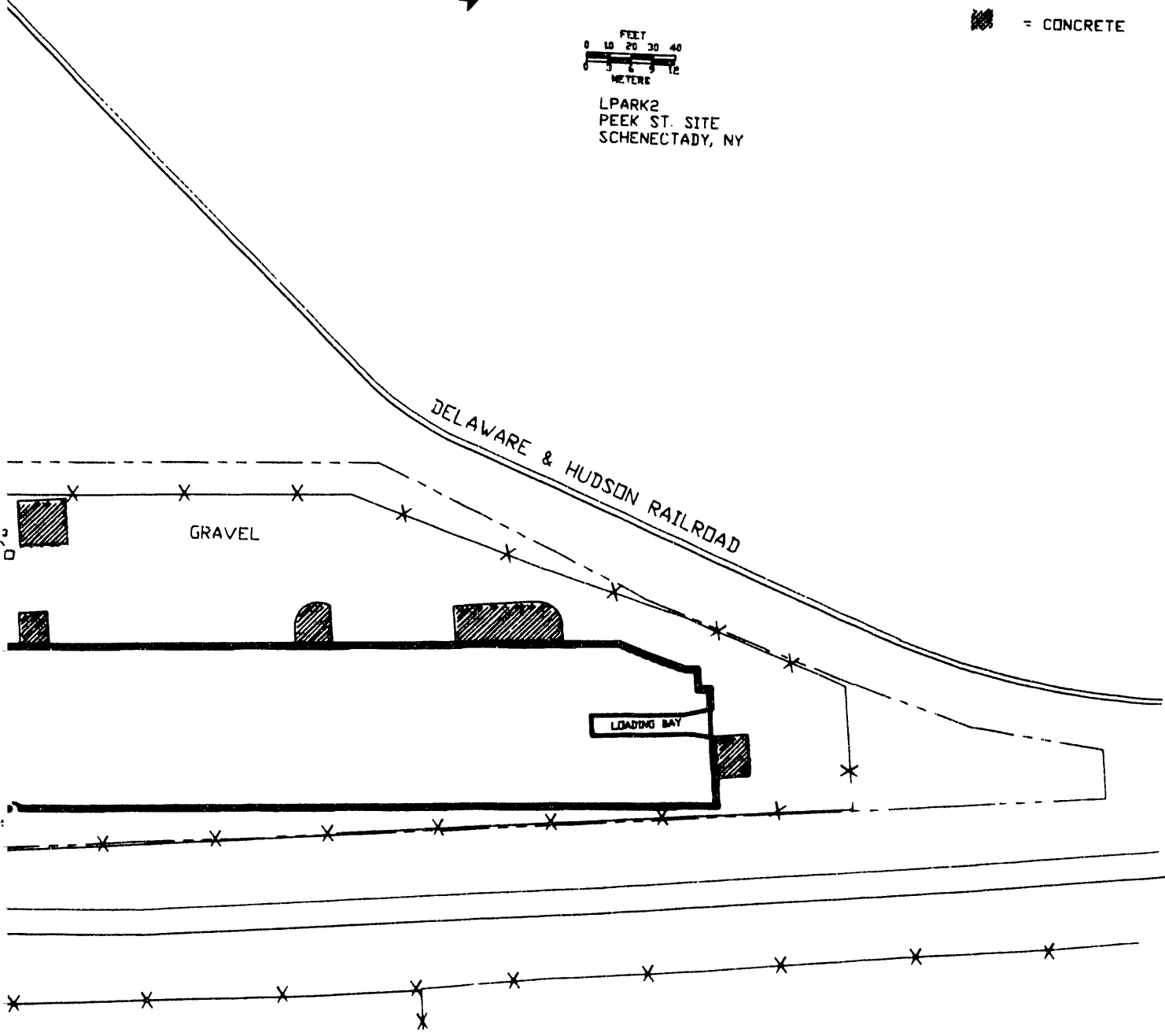
Fig. 3. Diagram showing layout of the Peek Street property

ORNL DWG 90-8682



LPARK2  
PEEK ST. SITE  
SCHENECTADY, NY

-  = FENCE
-  = PROPERTY LINE
-  = CONCRETE





ORNL-PHOTO 2577-90



**Fig. 4. Outdoor view of the west end of the factory building on the industrial property at Peek Street.**

ORNL-PHOTO 2576-90



**Fig. 5. View looking east toward the factory building on the industrial property at Peek Street.**

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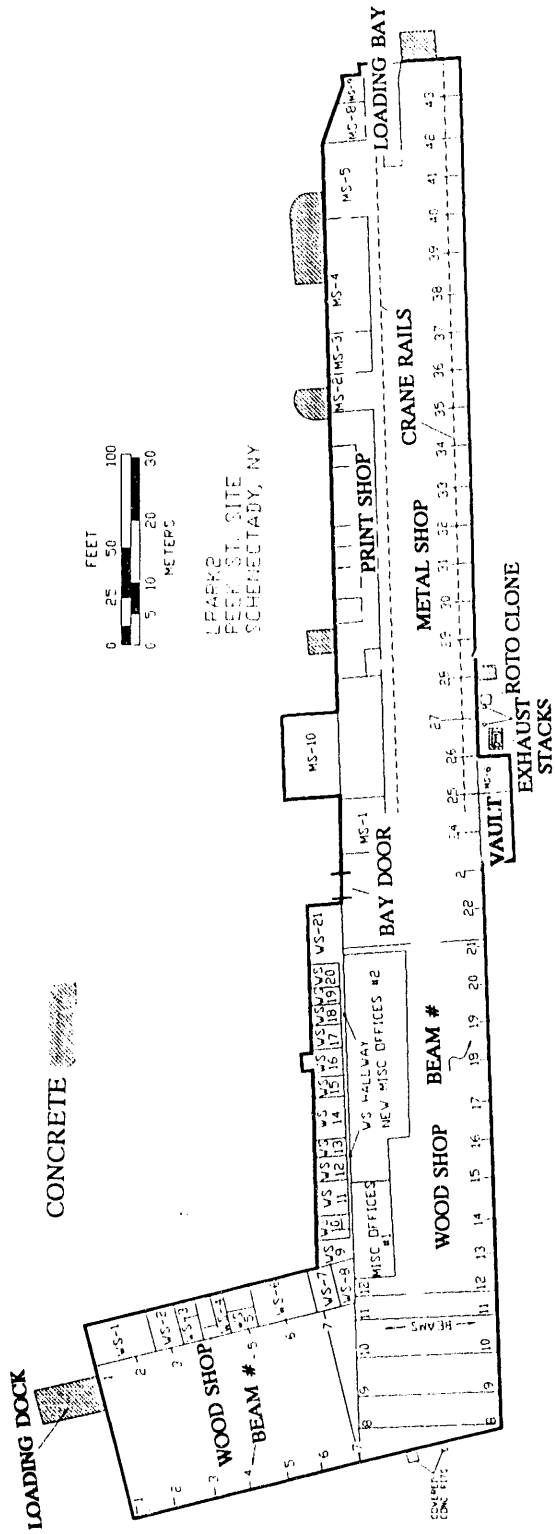
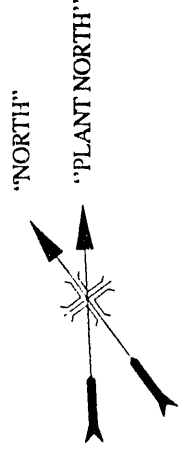
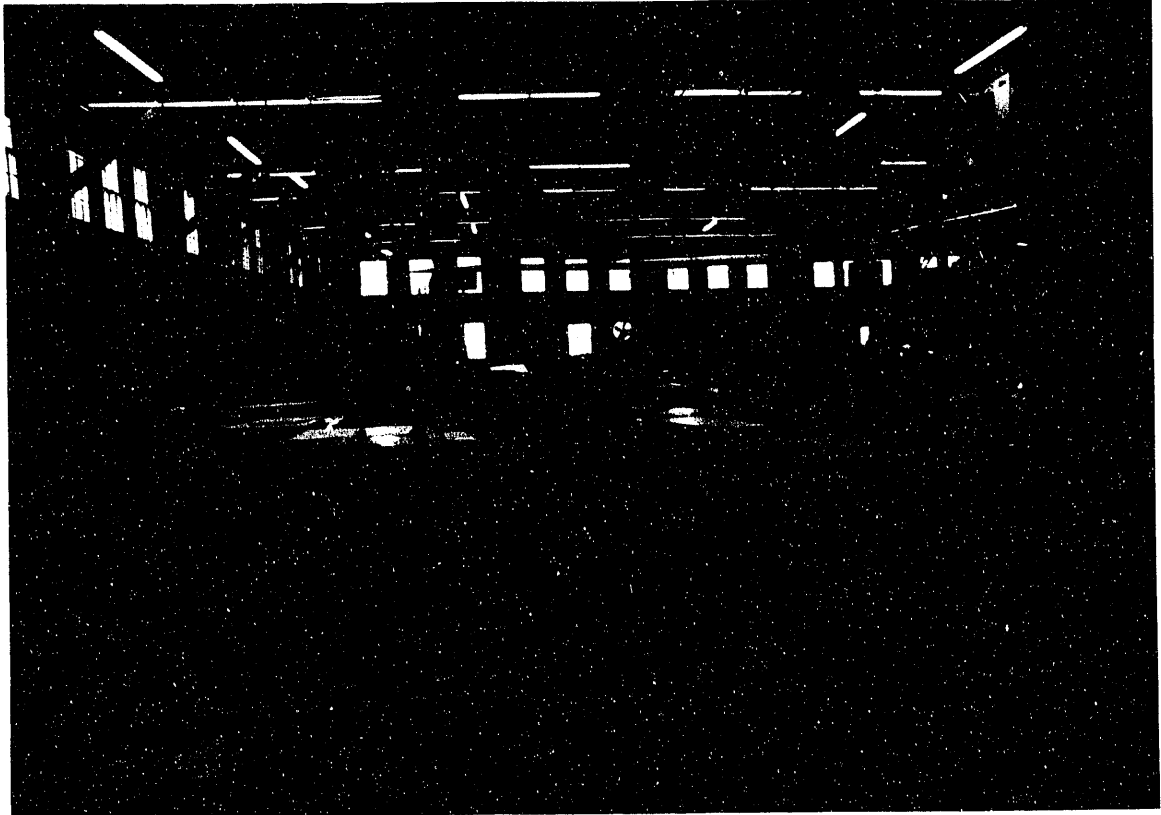


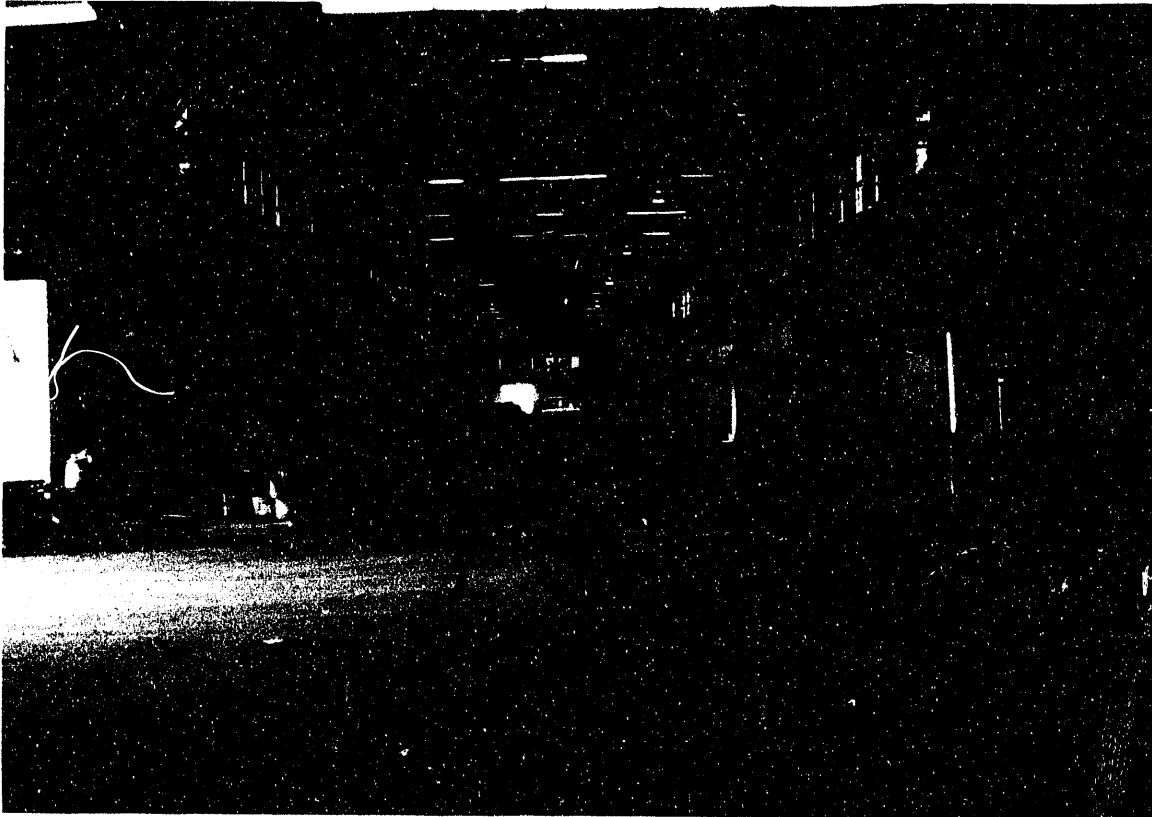
Fig. 6. Diagram showing layout of the factory building on the industrial property at Peek Street.

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**Fig. 7. Photograph looking into the southwest end of the wood shop on the industrial property at Peek Street.**

ORNL-PHOTO 2573-90



**Fig. 8. Photograph looking north from the southeast end of the factory building on the industrial property at Peek Street.**

For Fig. 9, see enclosure, Plate 1. Composite diagram of individual property drawings showing all outdoor sample locations and sample locations inside the factory building at Peck Street.

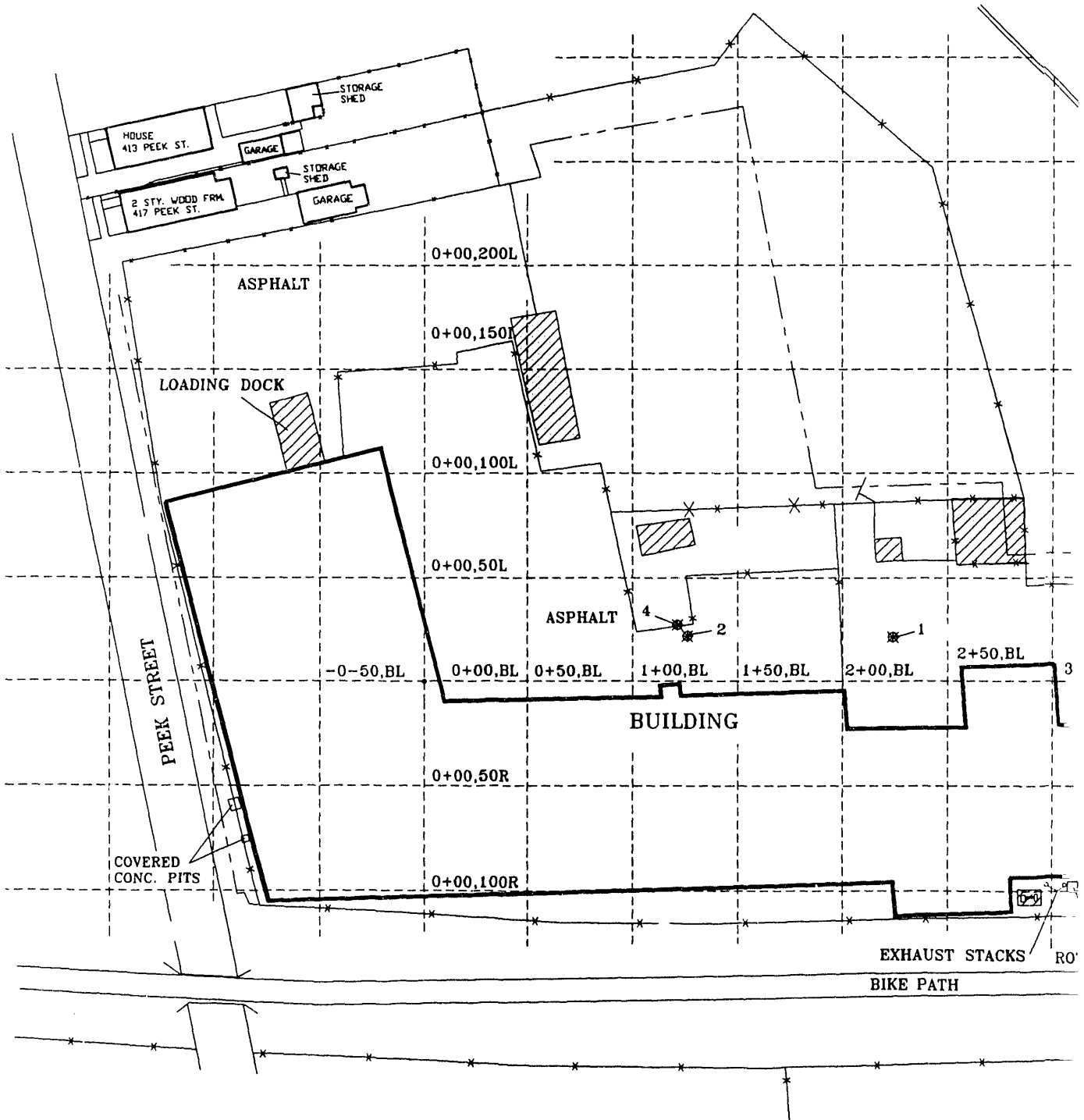
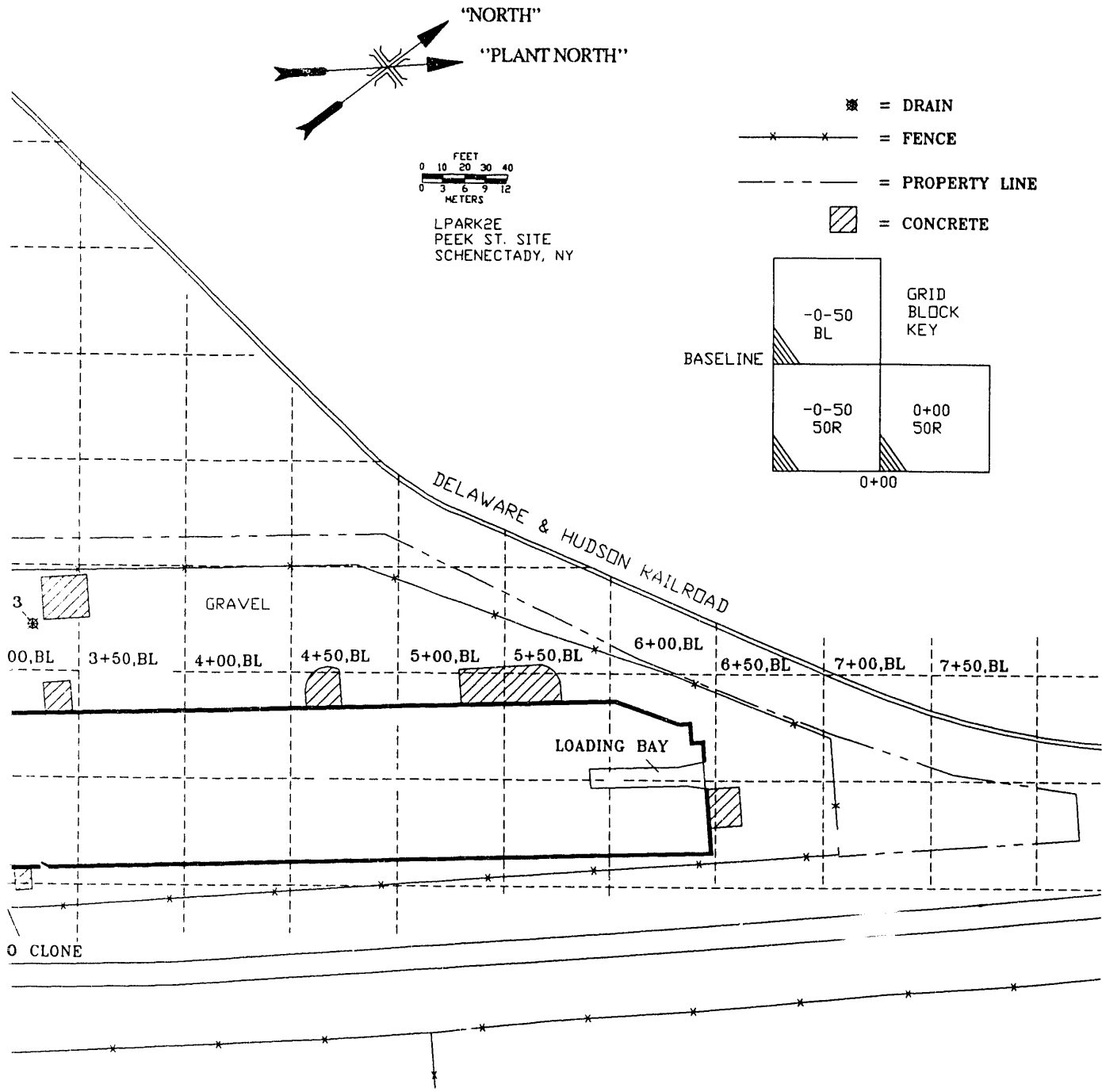


Fig. 10. Diagram of the industrial property

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at Peek Street showing grid overlay.



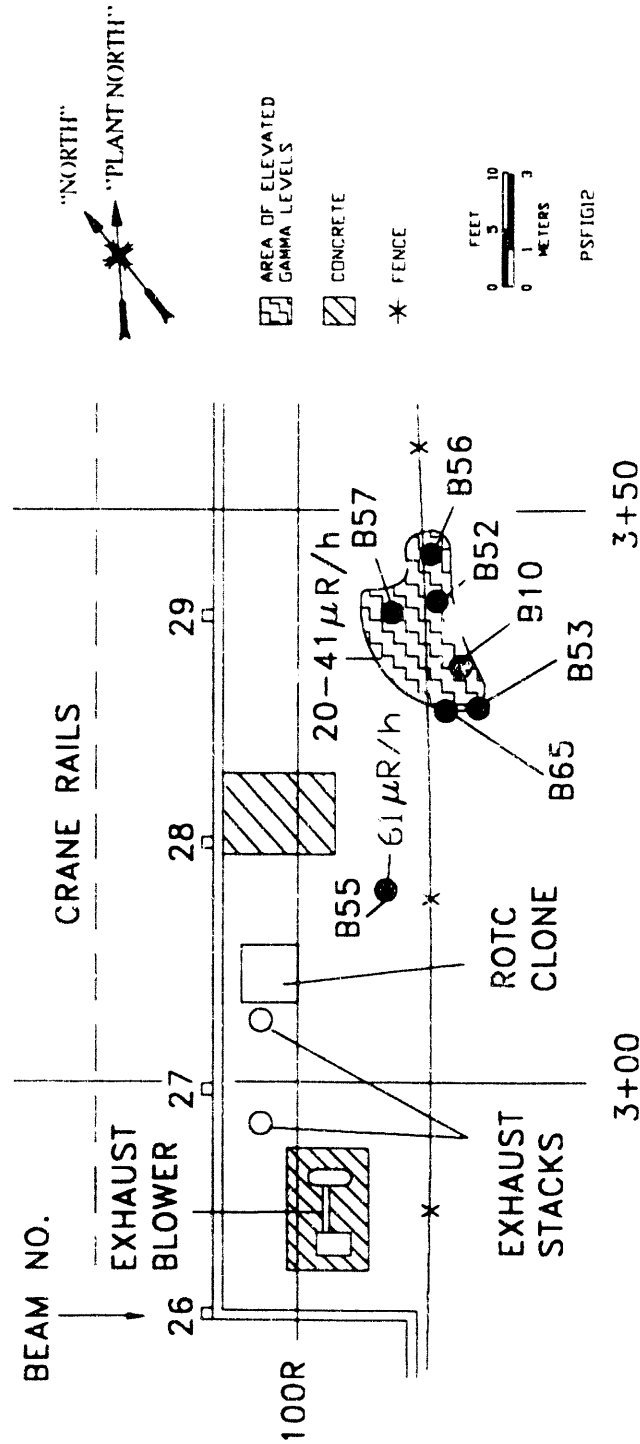


Fig. 11. Regions of elevated gamma levels and locations of soil samples from those regions outdoors at Peek Street.

ORNL-PHOTO 2575-90



**Fig. 12. View of the debris west of the factory building on the industrial property at Peek Street.**

ORNL-PHOTO 2568-90



**Fig. 13. View of the exhaust stack and Roto Clone on the east side of the factory building. See Fig. 11 for location of contaminated area extending east of the fence in front of the Roto Clone as seen in this photograph.**

ORNL-PHOTO 2570-90



**Fig. 14. Photograph of Roto Clone exhaust stack on the east side of the factory building at Peek Street showing segment removed for survey access.**

ORNL-PHOTO 2571-90



**Fig. 15. Photograph of exhaust stack on the east side of the factory building at Peek Street.**

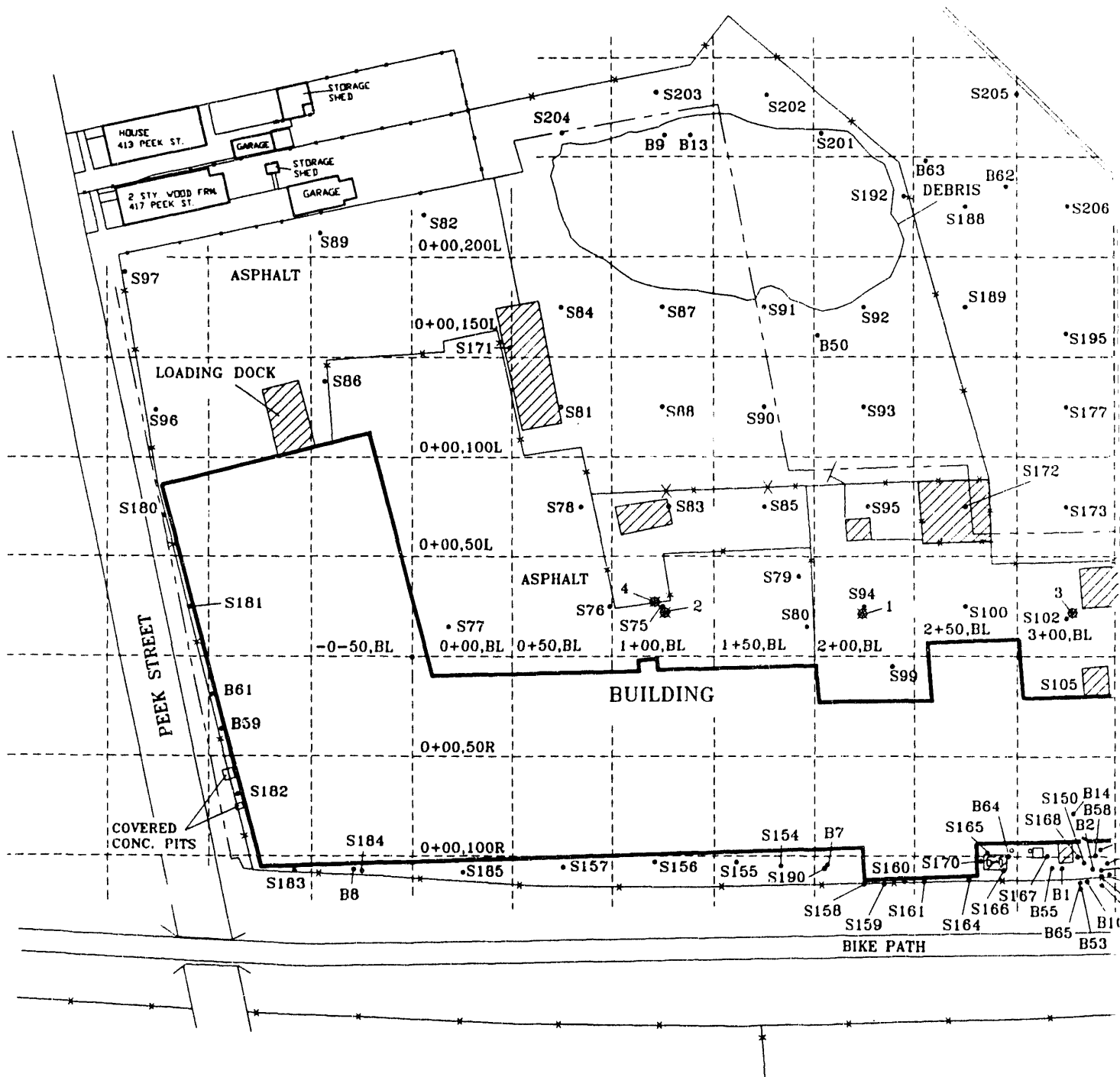
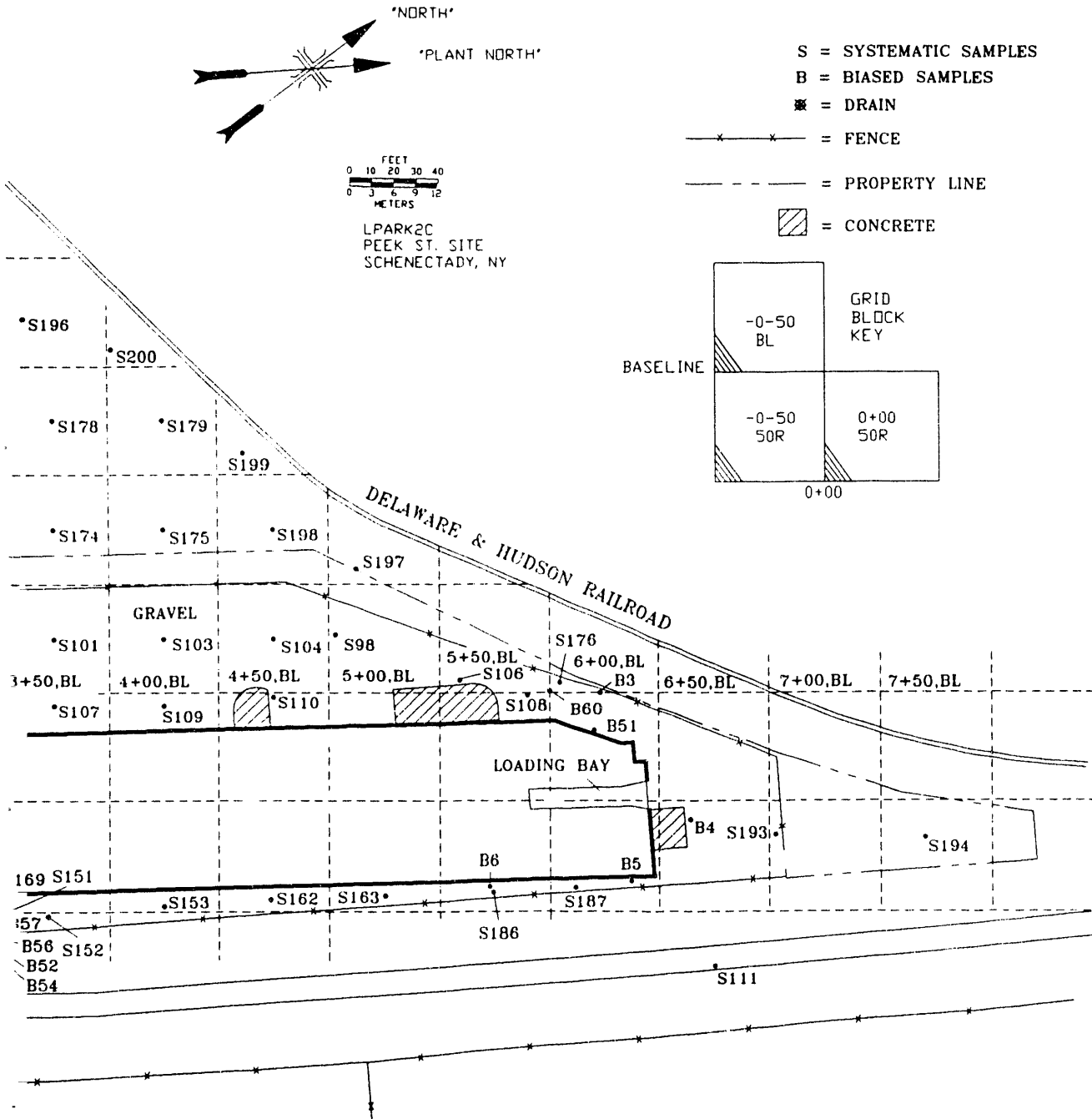


Fig. 16. Locations of systematic (S) and biased (B) soil s

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mples on the industrial property at the Peek Street site.

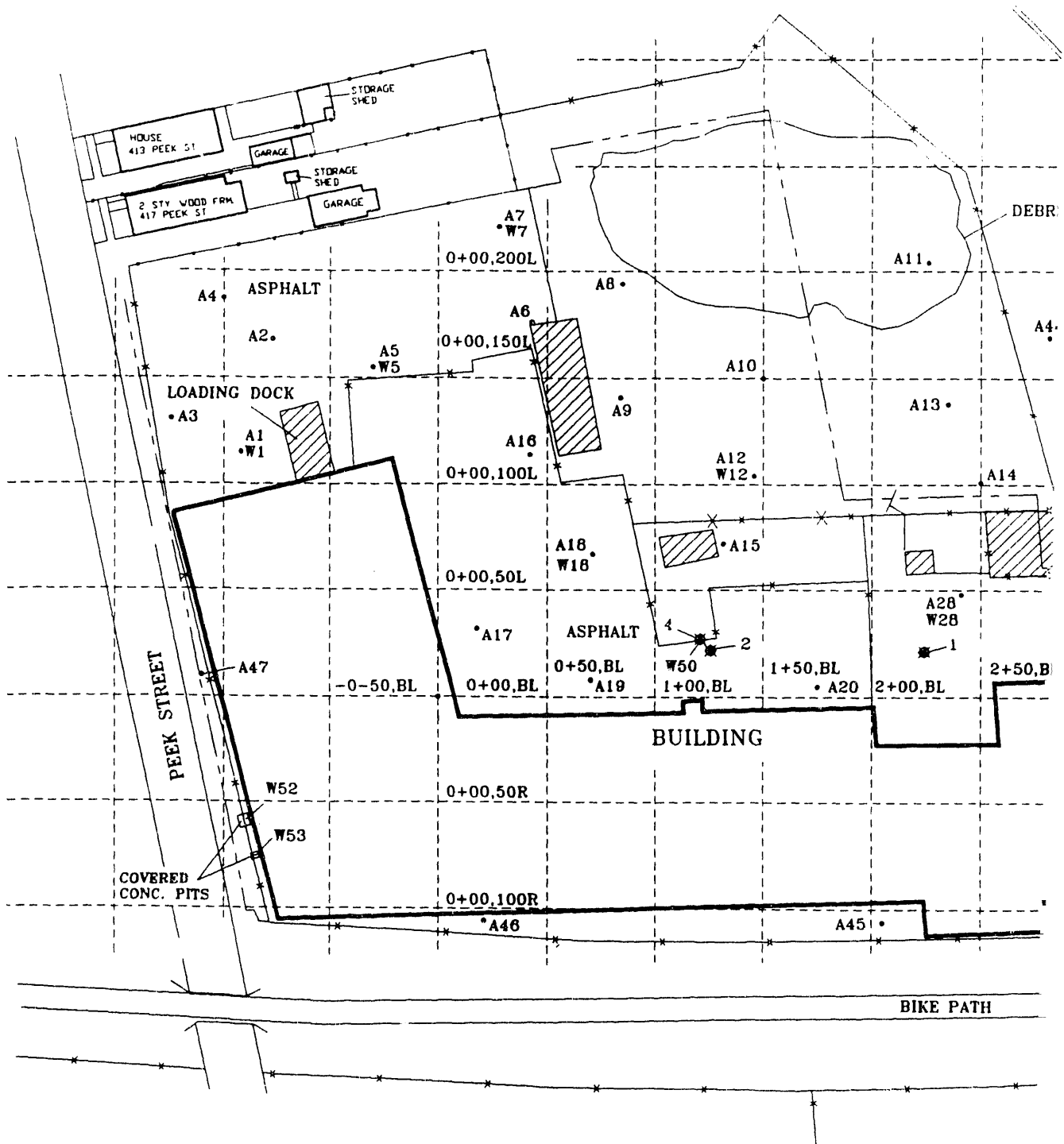
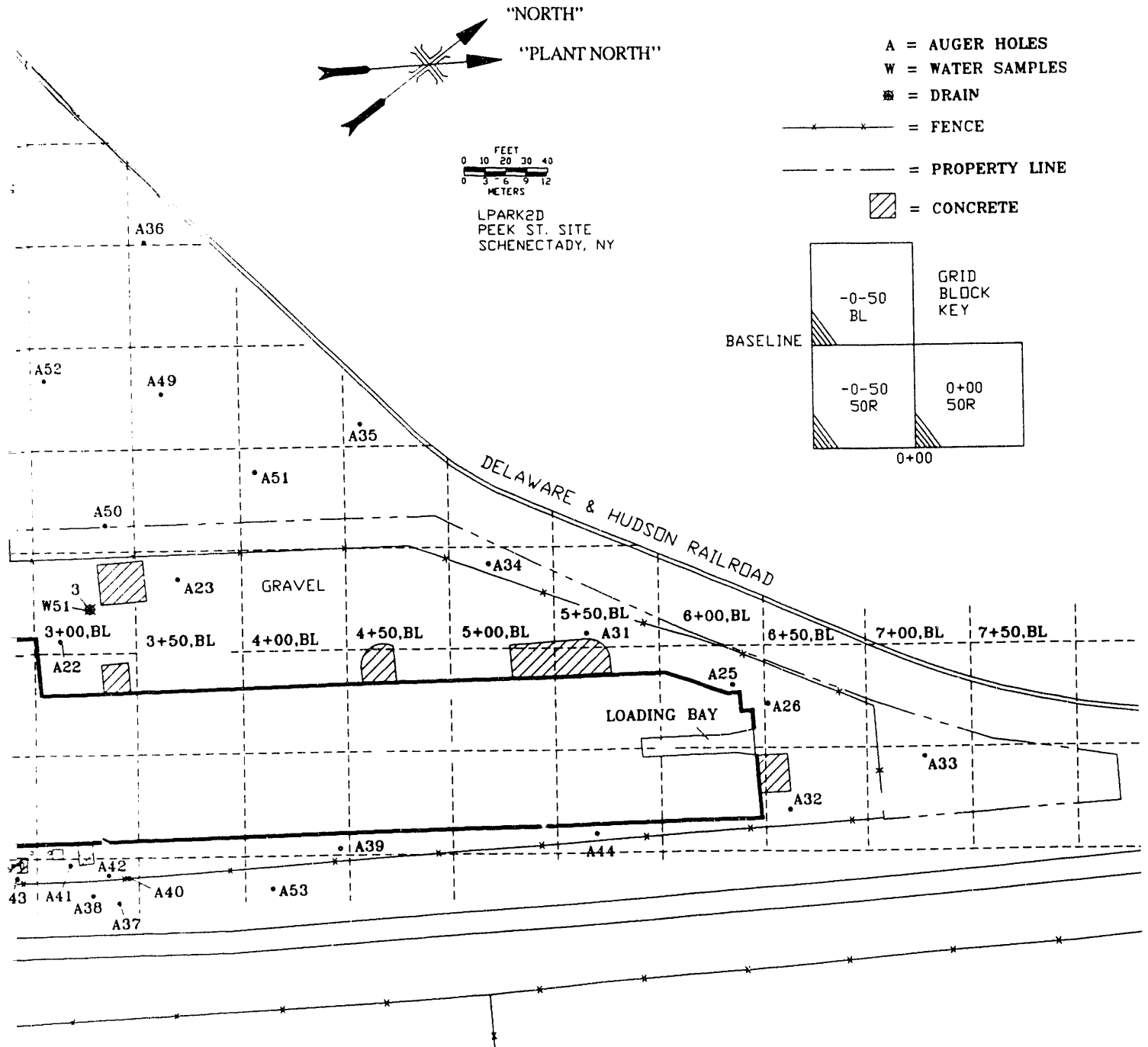


Fig. 17. Locations of auger holes (A) and water points (W)





ter samples (W) on the industrial property at the Peek Street site.

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**Fig. 18. Cluttered area near the Roto Clone east of the factory building at Peek Street.**

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**Fig. 19. View of east side of the factory building showing 8-in. discarded metal pipe having slightly elevated alpha radiation levels.**

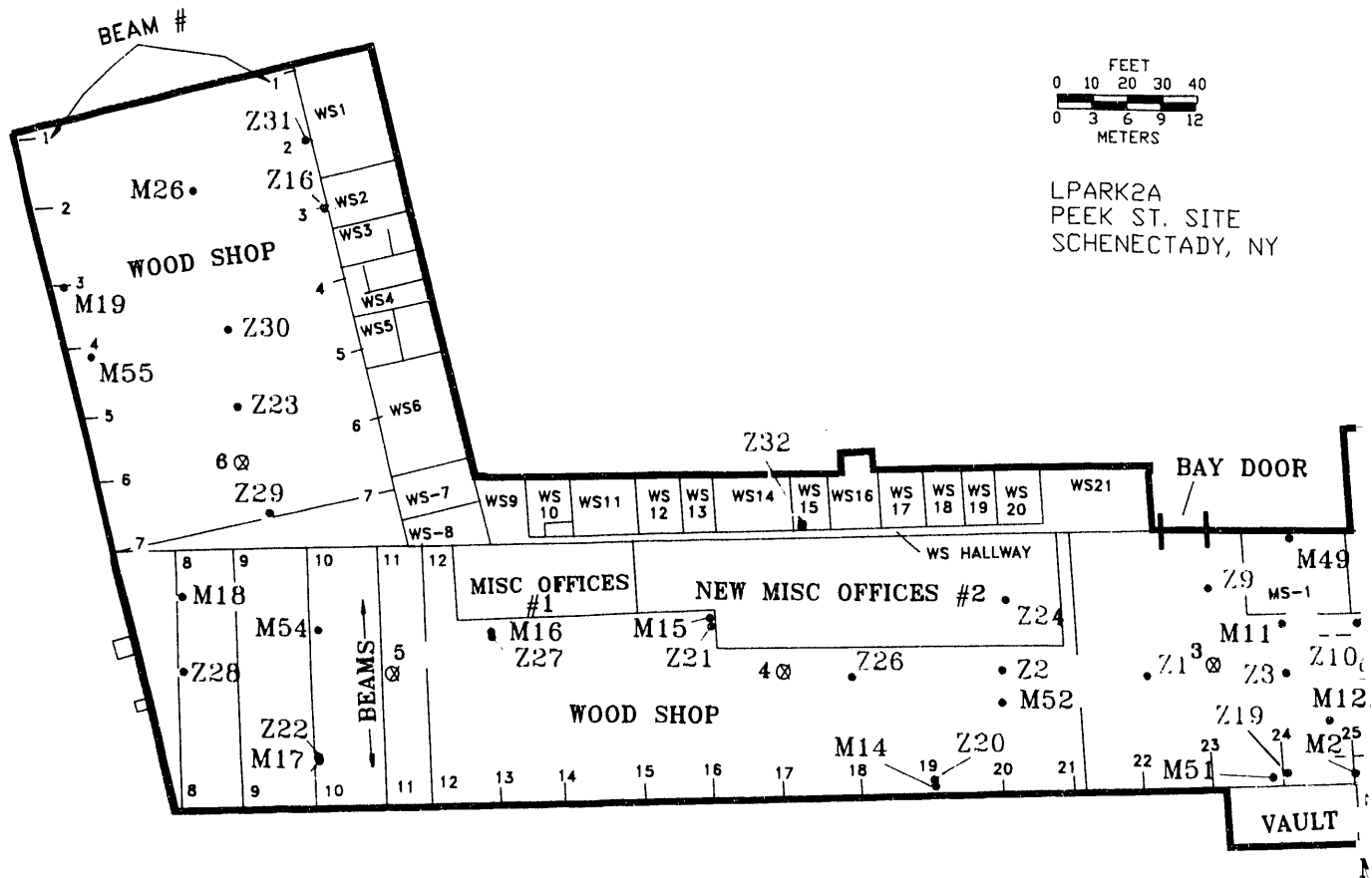
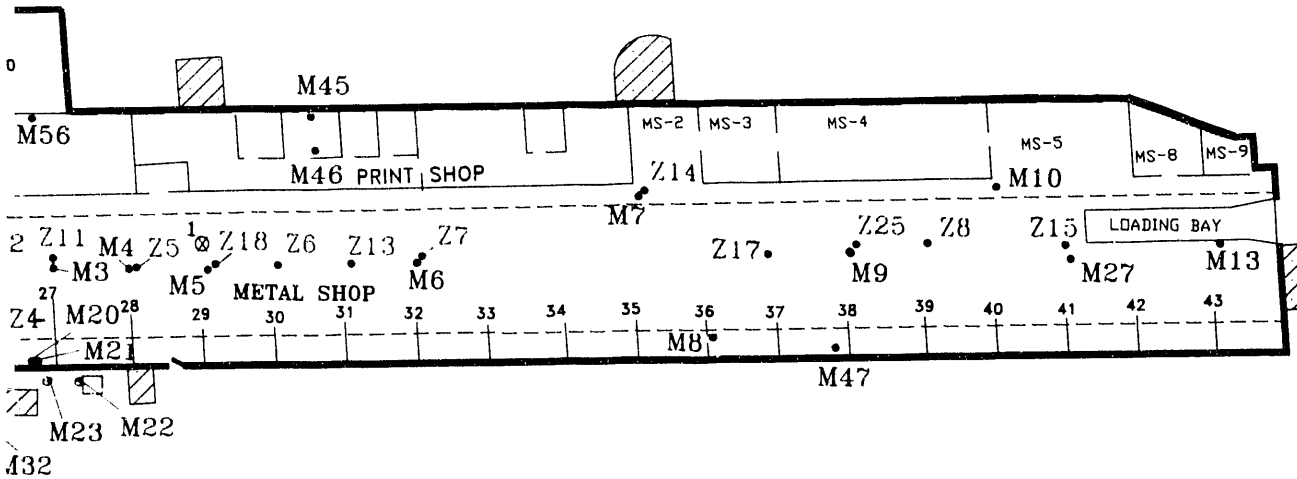
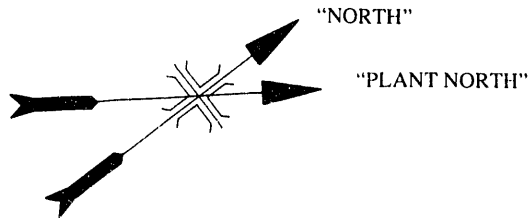
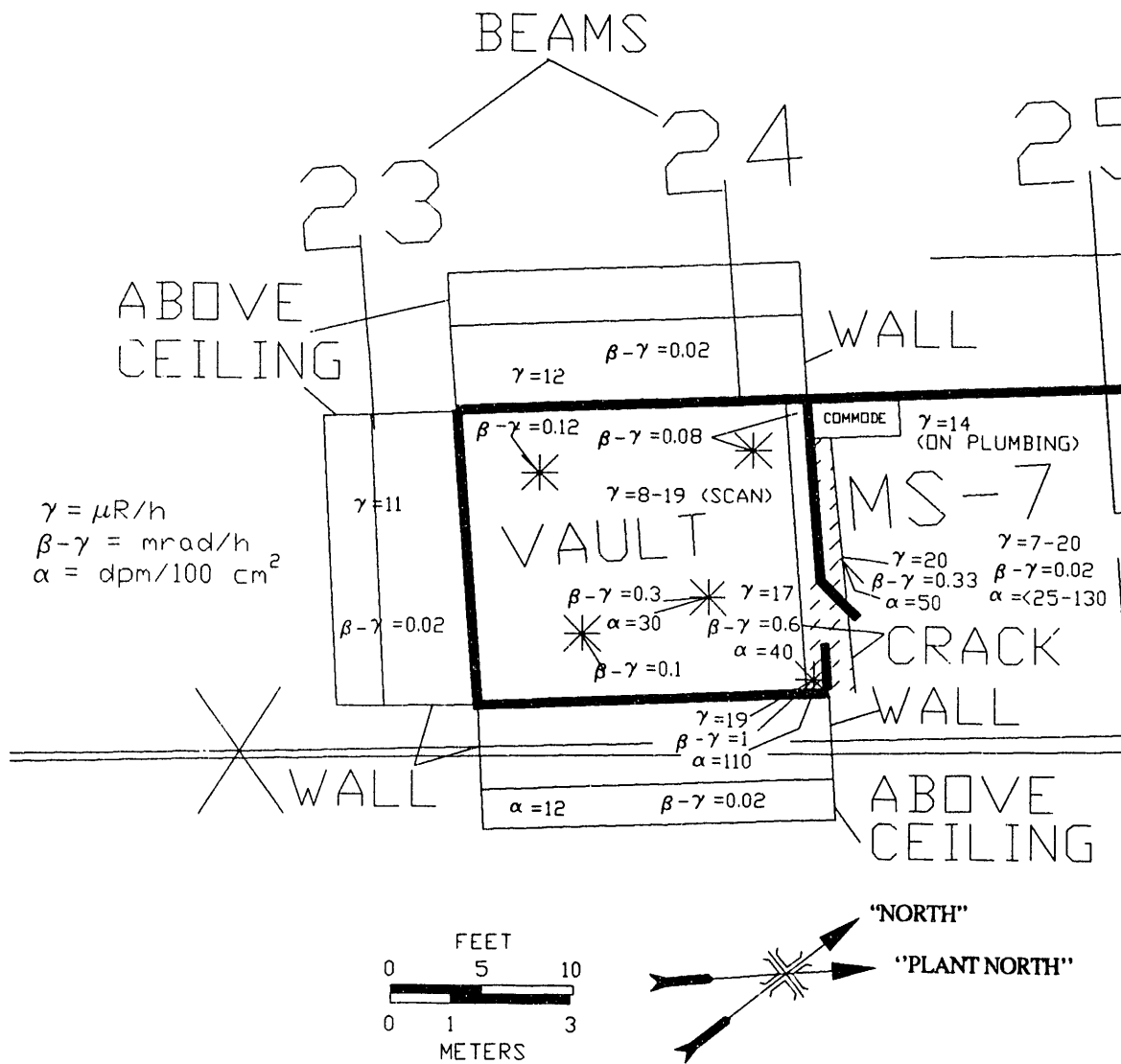


Fig. 20. Locations of indoor material (M) and air (Z) sampling

Z = AIR SAMPLE  
 M = DUST/WALL/PAINT SAMPLE  
 ∅ = DRAIN  
 --- = CRANE RAIL



m the industrial property at Peek Street.



**Fig. 21. Radiation levels measured in the vault and in room MS-7 at Peek Street.**

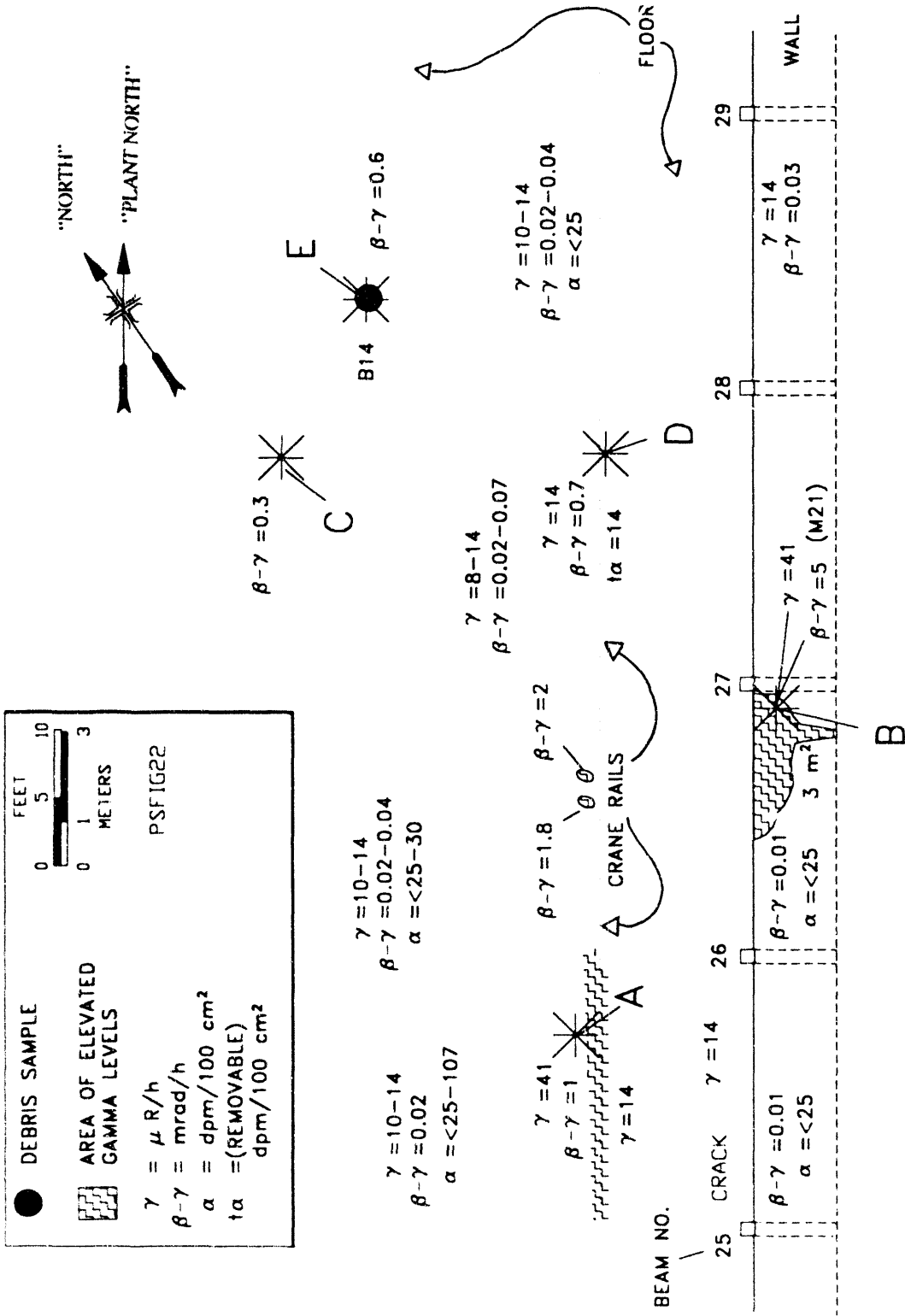
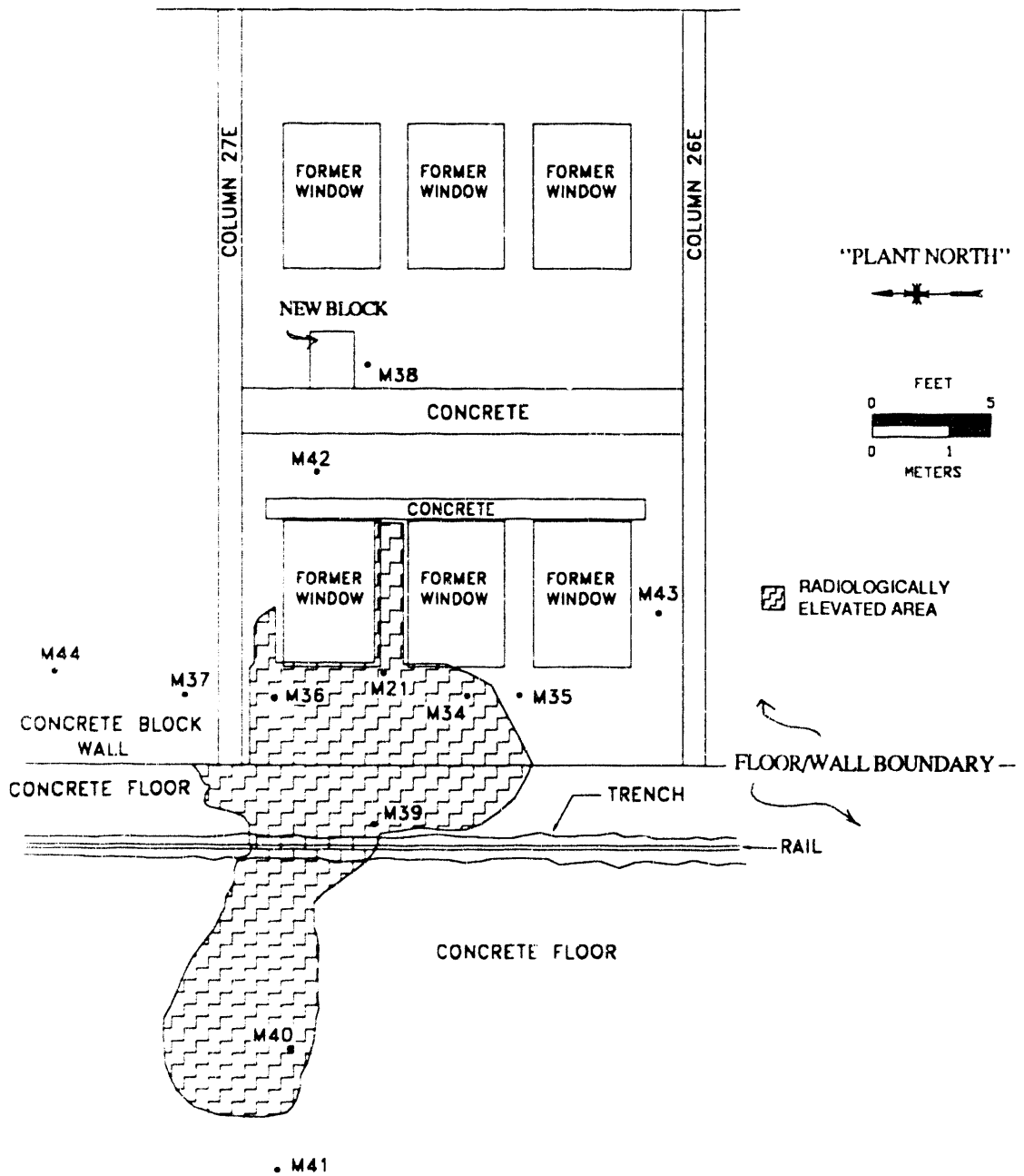
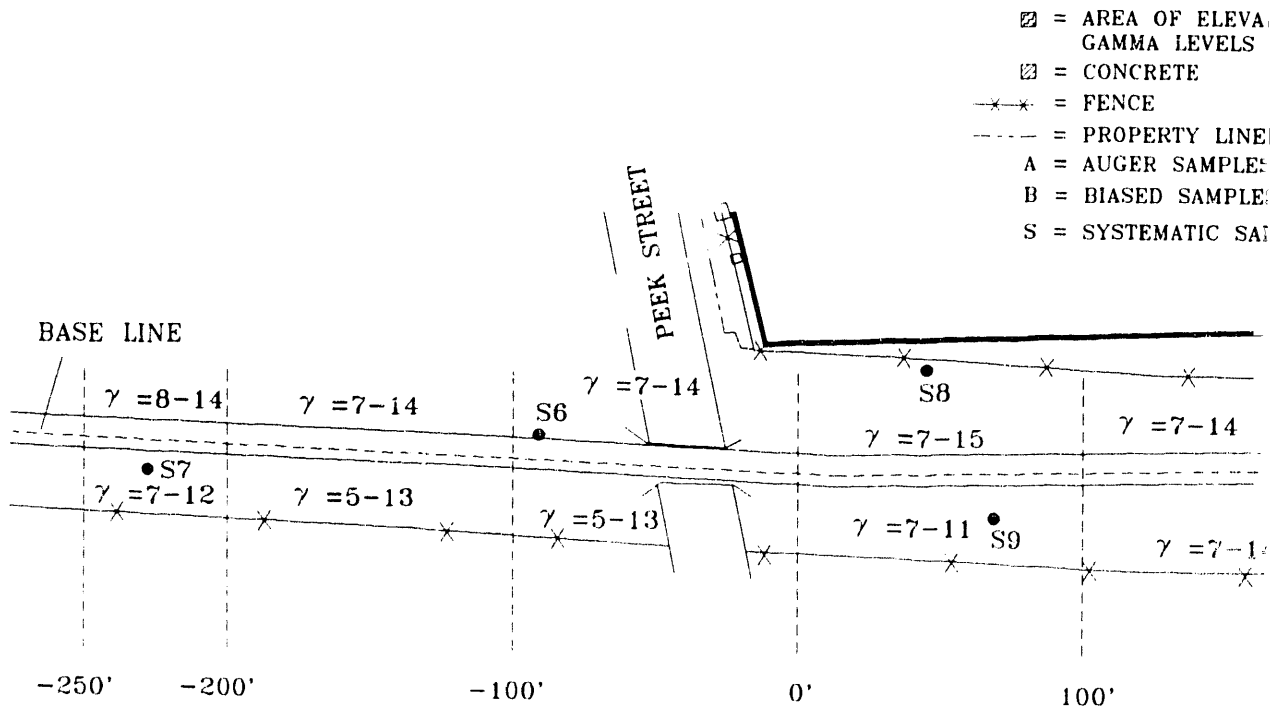


Fig. 22. Regions of elevated radiation levels in the metal shop at Peek Street.



**Fig. 23. Diagram of radioactively elevated area in the factory building showing locations of samples collected for beryllium analysis. (Wall and floor are drawn as if they were on the same plane.)**

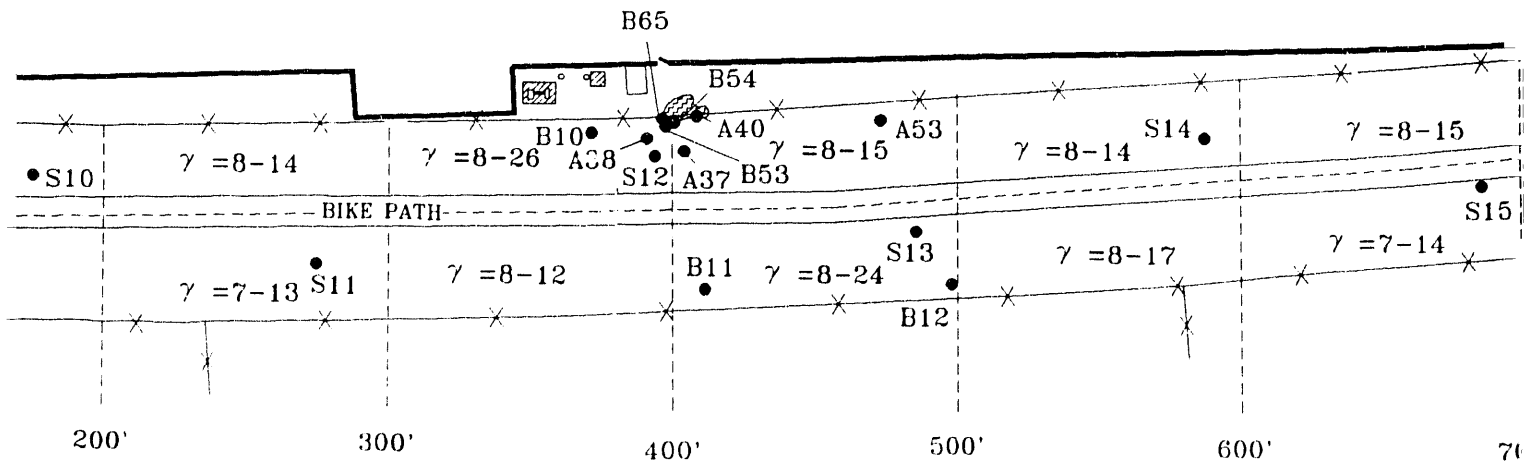
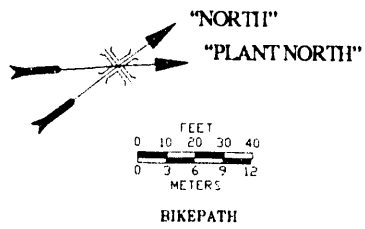




Fig

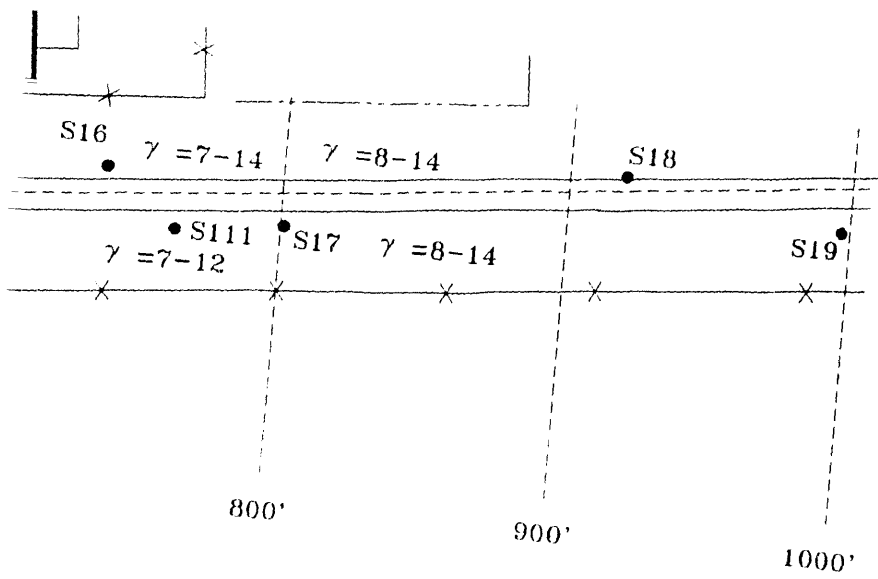
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24. Gamma exposure rates ( $\mu\text{R}/\text{h}$ ) and soil sample locations on the bike path at Peek Street.

ORNL-DWG 91-11095



**Table 1. Applicable guidelines for protection against radiation<sup>a</sup>**  
(Limits for uncontrolled areas)

Mode of exposure	Exposure conditions	Guideline value
Gamma radiation	Indoor gamma radiation level (above background)	20 $\mu\text{R}/\text{h}^b$
Total residual surface contamination <sup>c</sup>	<sup>238</sup> U, U-natural (alpha emitters)	
	Maximum	15,000 dpm/100 cm <sup>2</sup>
	Average	5,000 dpm/100 cm <sup>2</sup>
	Removable	1,000 dpm/100 cm <sup>2</sup>
	Beta-gamma emitters <sup>d</sup>	
	Maximum	15,000 dpm/100 cm <sup>2</sup>
	Average	5,000 dpm/100 cm <sup>2</sup>
	Removable	1,000 dpm/100 cm <sup>2</sup>
	<sup>232</sup> Th, Th-natural, <sup>90</sup> Sr	
	Maximum	3,000 dpm/100 cm <sup>2</sup>
	Average	1,000 dpm/100 cm <sup>2</sup>
	Removable	200 dpm/100 cm <sup>2</sup>
	<sup>226</sup> Ra, transuranics	
Maximum	300 dpm/100 cm <sup>2</sup>	
Average	100 dpm/100 cm <sup>2</sup>	
Removable	20 dpm/100 cm <sup>2</sup>	
Beta-gamma dose rates <sup>d</sup>	Surface dose rate averaged over not more than 1 m <sup>2</sup>	0.20 mrad/h
	Maximum dose rate in any 100-cm <sup>2</sup> area	1.0 mrad/h
Radionuclide concentrations in soil (generic)	Maximum permissible concentration of the following radionuclides in soil above background levels averaged over 100-m <sup>2</sup> area <sup>232</sup> Th <sup>230</sup> Th <sup>228</sup> Ra <sup>226</sup> Ra	5 pCi/g averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over 15-cm-thick soil layers more than 15 cm below the surface
Derived concentrations	<sup>238</sup> U <sup>137</sup> Cs	site specific <sup>e</sup>

<sup>a</sup> U.S. Department of Energy, *Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Revision 2, March 1987); Ibid, DOE Order 5400.5 (April 1990).

<sup>b</sup> The 20  $\mu\text{R}/\text{h}$  level shall comply with the basic dose limit (100 mrem/yr) when an appropriate-use scenario is considered.

<sup>c</sup> DOE surface contamination guidelines are consistent with *NRC Guidelines for Decontamination at Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product, Source, or Special Nuclear Material* (May 1987).

<sup>d</sup> Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except <sup>90</sup>Sr, <sup>228</sup>Ra, <sup>223</sup>Ra, <sup>227</sup>Ac, <sup>133</sup>I, <sup>131</sup>I, <sup>129</sup>I, <sup>126</sup>I, <sup>125</sup>I.

<sup>e</sup> Site-specific guidelines of 35-40 pCi/g for <sup>238</sup>U and 80 pCi/g for <sup>137</sup>Cs have been applied at other FUSRAP sites.

**Table 2. Background radiation levels and concentrations of selected radionuclides in soil samples taken in Schenectady and Glenville, New York**

Type of radiation measurement or sample	Radiation level or radionuclide concentration	
	Range	Average
Gamma exposure rate at 1 m above ground surface ( $\mu\text{R/h}$ ) <sup>a</sup>	5-14	9.5
Concentration of radionuclides in soil (pCi/g dry wt) <sup>b</sup>		
<sup>238</sup> U	0.94-1.3	1.2
<sup>226</sup> Ra	0.83-0.98	0.93
<sup>232</sup> Th	0.81-0.95	0.89
<sup>137</sup> Cs	0.76-1.2	0.93

<sup>a</sup>Background at Schenectady determined in 1982 by EG&G over 260 km<sup>2</sup> area.<sup>5</sup>

<sup>b</sup>Soil samples (SY002S75-SY002S77) obtained from three locations in Glenville, New York.

**Table 3. Outdoor gamma exposure rate measurements at the Peek Street industrial property**

Grid location <sup>a</sup>	Grid point measurements <sup>b</sup> ( $\mu\text{R/h}$ )		Range of gamma exposure rates from scan of grid block ( $\mu\text{R/h}$ )	Average gamma exposure rate at surface <sup>c</sup> ( $\mu\text{R/h}$ )
	Gamma exposure rate at 1 m	Gamma exposure rate at the surface		
0+00, BL	<i>d</i>	<i>d</i>	7-12	10
0+50, BL	10	9	8-14	10
1+00, BL	10	10	8-15	<i>d</i>
1+50, BL	<i>d</i>	<i>d</i>	8-14	<i>d</i>
2+00, BL	11	12	8-14	<i>d</i>
2+50, BL	10	12	7-12	8
3+00, BL	11	11	8-14	<i>d</i>
3+50, BL	9	9	7-11	7
4+00, BL	7	7	7-14	8
4+50, BL	10	10	7-14	10
5+00, BL	10	10	7-14	10
5+50, BL	8	9	7-13	10
6+00, BL	<i>d</i>	<i>d</i>	12-20	15
0+00, 50L	8	10	7-12	10
0+50, 50L	9	7	6-14	10
1+00, 50L	11	11	8-17	<i>d</i>
1+50, 50L	11	11	8-17	<i>d</i>
2+00, 50L	9	9	7-15	8
2+50, 50L	<i>d</i>	<i>d</i>	8-15	12
3+00, 50L	<i>d</i>	<i>d</i>	8-15	12
3+50, 50L	<i>d</i>	<i>d</i>	11-15	13
4+00, 50L	<i>d</i>	<i>d</i>	10-17	14
4+50, 50L	12	13	10-15	<i>d</i>
5+00, 50L	12	14	12-17	<i>d</i>
0+00, 100L	7	8	7-11	10
0+50, 100L	9	10	9-14	11
1+00, 100L	12	14	8-15	<i>d</i>
1+50, 100L	8	11	7-12	10
2+00, 100L	9	11	7-12	8
3+00, 100L	10	11	10-16	<i>d</i>
3+50, 100L	13	16	12-16	<i>d</i>
4+00, 100L	12	14	10-15	<i>d</i>
4+50, 100L	13	15	12-17	<i>d</i>
0+00, 150L	7	7	7-16	12
0+50, 150L	11	12	7-14	12
1+00, 150L	11	12	8-14	10
1+50, 150L	11	11	7-14	<i>d</i>
2+00, 150L	12	11	7-15	<i>d</i>
2+50, 150L	8	8	7-17	<i>d</i>

Table 3 (continued)

Grid location <sup>a</sup>	Grid point measurements <sup>b</sup> ( $\mu\text{R/h}$ )		Range of gamma exposure rates from scan of grid block ( $\mu\text{R/h}$ )	Average gamma exposure rate at surface <sup>c</sup> ( $\mu\text{R/h}$ )
	Gamma exposure rate at 1 m	Gamma exposure rate at the surface		
3+00, 150L	15	15	14-20	<i>d</i>
3+50, 150L	14	15	10-19	<i>d</i>
4+00, 150L	14	14	14-18	<i>d</i>
0+00, 200L	7	8	7-14	9
0+50, 200L	<i>d</i>	<i>d</i>	7-10	<i>d</i>
1+00, 200L	<i>d</i>	<i>d</i>	7-26	<i>d</i>
1+50, 200L	<i>d</i>	<i>d</i>	7-19	<i>d</i>
2+00, 200L	5	4	10-26	<i>d</i>
2+50, 200L	7	7	7-26	12
3+00, 200L	12	12	8-14	<i>d</i>
2+00, 250L	5	4	14-16	<i>d</i>
2+50, 250L	<i>d</i>	<i>d</i>	8-15	<i>d</i>
0+00, 50R	<i>d</i>	<i>d</i>	8-14	<i>d</i>
0+50, 50R	<i>d</i>	<i>d</i>	10-13	<i>d</i>
1+00, 50R	<i>d</i>	<i>d</i>	10-14	<i>d</i>
1+50, 50R	<i>d</i>	<i>d</i>	8-14	<i>d</i>
2+00, 50R	<i>d</i>	<i>d</i>	7-14	<i>d</i>
3+00, 50R	11	12	8-12	10
3+50, 50R	11	12	8-14	13
4+00, 50R	11	11	8-12	10
4+50, 50R	11	12	8-14	11
5+00, 50R	10	11	7-13	10
5+50, 50R	7	8	7-11	9
6+00, 50R	12	12	10-19	12
6+50, 50R	9	10	7-17	11
0+50, 100R	<i>d</i>	<i>d</i>	13-17	14
2+50, 100R	<i>d</i>	<i>d</i>	10-15	13
3+00, 100R	<i>d</i>	<i>d</i>	12-61	16
4+50, 100R	14	16	15-19	17
5+00, 100R	14	16	14-19	17
5+50, 100R	<i>d</i>	<i>d</i>	12-16	<i>d</i>
6+00, 100R	<i>d</i>	<i>d</i>	13-20	<i>d</i>
6+50, 100R	13	15	10-21	14
7+00, 100R	<i>d</i>	<i>d</i>	10-15	<i>d</i>
7+50, 100R	<i>d</i>	<i>d</i>	10-13	<i>d</i>

Table 3 (continued)

Grid location <sup>a</sup>	Grid point measurements <sup>b</sup> ( $\mu\text{R/h}$ )		Range of gamma exposure rates from scan of grid block ( $\mu\text{R/h}$ )	Average gamma exposure rate at surface <sup>c</sup> ( $\mu\text{R/h}$ )
	Gamma exposure rate at 1 m	Gamma exposure rate at the surface		
0+00, 150R	<i>d</i>	<i>d</i>	10-19	<i>d</i>
2+00, 150R	<i>d</i>	<i>d</i>	10-19	<i>d</i>
3+00, 150R	<i>d</i>	<i>d</i>	10-19	<i>d</i>
-1-50, BL	<i>d</i>	<i>d</i>	13-20	<i>d</i>
-1-50, 50L	<i>d</i>	<i>d</i>	14-20	<i>d</i>
-0-50, 100L	8	9	8-15	12
-1-00, 100L	8	8	7-12	10
-1-50, 100L	9	8	7-11	9
-0-50, 150L	7	7	7-12	10
-1-00, 150L	8	9	7-12	10
-1-50, 150L	8	9	7-12	9
-0-50, 200L	8	8	7-14	10
-1-50, 200L	7	7	7-12	9
-1-50, 50R	<i>d</i>	<i>d</i>	12-20	<i>d</i>
-1-00, 100R	<i>d</i>	<i>d</i>	7-19	<i>d</i>
-0-50, 150R	<i>d</i>	<i>d</i>	10-19	<i>d</i>
-1-00, 150R	<i>d</i>	<i>d</i>	11-17	<i>d</i>

<sup>a</sup>Locations shown on Fig. 9.

<sup>b</sup>Grid point measurements are taken at intersections of grid lines.

<sup>c</sup>Average gamma exposure rates are obtained by scanning the entire block.

<sup>d</sup>No measurement made.



**Table 4. Radionuclide concentrations in soil samples collected from the industrial property at Peek Street**

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
<i>Systematic samples<sup>c</sup></i>						
S75A	1+25, 25L	0-5	0.93 ± 0.69	0.62 ± 0.03	0.61 ± 0.02	0.26 ± 0.01
S75B	1+25, 25L	5-15	0.71 ± 0.35	0.59 ± 0.02	0.62 ± 0.01	0.29 ± 0.01
S75C	1+25, 25L	15-30	0.54 ± 0.71	0.65 ± 0.03	0.70 ± 0.02	0.42 ± 0.02
S75D	1+25, 25L	30-45	1.5 ± 0.87	1.0 ± 0.04	1.0 ± 0.02	0.09 ± 0.01
S76A	0+99, 25L	0-5	1.1 ± 0.42	0.63 ± 0.02	0.63 ± 0.01	0.25 ± 0.01
S76B	0+99, 25L	5-15	1.8 ± 0.91	0.63 ± 0.03	0.63 ± 0.02	0.23 ± 0.02
S77A	0+18, 15L	0-5	0.96 ± 0.68	0.77 ± 0.04	0.76 ± 0.02	0.27 ± 0.02
S77B	0+18, 15L	5-15	1.8 ± 0.94	0.85 ± 0.04	0.93 ± 0.02	0.50 ± 0.02
S78A	0+85, 75L	0-5	1.5 ± 0.86	0.93 ± 0.04	0.90 ± 0.02	0.40 ± 0.02
S78B	0+85, 75L	5-15	1.8 ± 0.82	0.95 ± 0.03	0.98 ± 0.02	0.36 ± 0.02
S78C	0+85, 75L	15-31	0.79 ± 0.35	1.1 ± 0.03	1.1 ± 0.02	0.20 ± 0.01
S78D	0+85, 75L	30-45	2.1 ± 1.2	1.1 ± 0.06	1.1 ± 0.04	0.07 ± 0.02
S78E	0+85, 75L	45-60	1.6 ± 0.65	0.91 ± 0.04	0.98 ± 0.02	0.05 ± 0.01
S79A	1+92, 40L	0-5	1.4 ± 0.35	0.36 ± 0.02	0.51 ± 0.01	0.17 ± 0.01
S79B	1+92, 40L	5-15	1.9 ± 0.95	1.1 ± 0.04	1.1 ± 0.02	0.01 ± 0.01
S80	1+96, 15R	0-5	0.43 ± 0.62	0.25 ± 0.03	0.53 ± 0.02	0.21 ± 0.01
S81A	0+75, 125L	0-5	1.1 ± 0.76	0.32 ± 0.02	0.54 ± 0.02	0.21 ± 0.01
S81B	0+75, 125L	5-15	1.6 ± 0.47	1.1 ± 0.03	1.0 ± 0.02	0.20 ± 0.01
S82A	0+06, 221L	0-5	1.7 ± 0.68	0.99 ± 0.04	1.0 ± 0.02	0.60 ± 0.02
S82B	0+06, 221L	5-15	1.6 ± 0.53	1.2 ± 0.03	1.3 ± 0.02	0.38 ± 0.01
S83A	1+28, 75L	0-5	1.1 ± 0.85	1.0 ± 0.05	0.99 ± 0.03	1.0 ± 0.03
S83B	1+28, 75L	5-15	1.1 ± 0.36	0.86 ± 0.03	0.89 ± 0.02	0.56 ± 0.01
S84A	0+75, 175L	0-5	1.6 ± 0.79	1.3 ± 0.04	1.2 ± 0.02	0.08 ± 0.01
S84B	0+75, 175L	5-15	1.6 ± 0.40	1.3 ± 0.03	1.2 ± 0.02	<0.01
S85A	1+75, 75L	0-5	3.0 ± 1.0	1.0 ± 0.06	1.1 ± 0.03	0.82 ± 0.03
S85B	1+75, 75L	5-15	2.0 ± 0.83	1.1 ± 0.04	1.1 ± 0.03	0.40 ± 0.02
S86A	-0-43, 138L	0-5	1.1 ± 0.51	0.67 ± 0.04	0.82 ± 0.02	7.3 ± 0.05
S86B	-0-43, 138L	5-15	<1.9	0.70 ± 0.05	0.84 ± 0.03	8.8 ± 0.08
S87A	1+25, 175L	0-5	1.4 ± 0.67	0.83 ± 0.03	0.86 ± 0.02	0.12 ± 0.01
S87B	1+25, 175L	5-15	1.5 ± 0.75	1.1 ± 0.04	1.1 ± 0.02	0.07 ± 0.02
S88A	1+25, 125L	0-5	0.58 ± 0.32	0.25 ± 0.02	0.48 ± 0.01	0.09 ± 0.01
S88B	1+25, 125L	5-15	1.2 ± 0.39	0.75 ± 0.02	0.94 ± 0.02	0.28 ± 0.01
S89A	-0-45, 212L	0-5	2.5 ± 1.0	1.2 ± 0.05	1.2 ± 0.02	0.61 ± 0.02
S89B	-0-45, 212L	5-15	2.1 ± 0.7	1.1 ± 0.03	1.1 ± 0.02	0.39 ± 0.009
S90A	1+75, 125L	0-5	2.2 ± 1.1	0.27 ± 0.02	0.47 ± 0.02	0.046 ± 0.009
S90B	1+75, 125L	5-15	0.22 ± 0.6	0.54 ± 0.02	0.71 ± 0.02	0.091 ± 0.008
S91A	1+75, 175L	0-5	<1.0	0.35 ± 0.03	0.53 ± 0.03	0.07 ± 0.01
S91B	1+75, 175L	5-15	1.0 ± 0.38	0.76 ± 0.02	0.79 ± 0.02	0.13 ± 0.01
S92A	2+25, 175L	0-5	1.3 ± 0.5	0.26 ± 0.01	0.38 ± 0.01	0.086 ± 0.005
S92B	2+25, 175L	5-15	1.1 ± 1.0	1.0 ± 0.04	1.0 ± 0.02	0.37 ± 0.02
S94A	2+25, 25L	0-5	0.8 ± 0.4	0.29 ± 0.01	0.45 ± 0.01	0.095 ± 0.005
S94B	2+25, 25L	5-15	<1.0	0.33 ± 0.02	0.50 ± 0.01	0.065 ± 0.007
S95A	2+25, 75L	0-5	<0.6	1.1 ± 0.03	1.3 ± 0.02	0.53 ± 0.01
S95B	2+25, 75L	5-15	1.7 ± 0.56	0.99 ± 0.03	1.1 ± 0.02	0.19 ± 0.01

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
S96A	-1-26, 124L	0-5	<2.0	0.40 ± 0.02	0.30 ± 0.01	0.87 ± 0.01
S96B	-1-26, 124L	5-15	<2.0	0.55 ± 0.02	0.63 ± 0.01	1.2 ± 0.01
S97A	-1-41, 193L	0-5	<2.0	0.62 ± 0.01	0.79 ± 0.02	0.56 ± 0.01
S97B	-1-41, 193L	5-15	1.1 ± 0.5	0.76 ± 0.02	0.79 ± 0.02	0.52 ± 0.01
S98A	5+03, 27L	0-5	1.2 ± 0.5	0.81 ± 0.02	0.82 ± 0.02	0.65 ± 0.01
S98B	5+03, 27L	5-15	1.6 ± 0.74	0.85 ± 0.02	0.96 ± 0.04	0.18 ± 0.09
S99A	2+39, 5R	0-5	<1.0	0.43 ± 0.02	0.51 ± 0.01	1.0 ± 0.01
S99B	2+39, 5R	5-15	1.0 ± 0.70	0.75 ± 0.02	0.92 ± 0.02	0.62 ± 0.01
S100A	2+75, 25L	0-5	<2.0	0.23 ± 0.02	0.46 ± 0.01	<0.1
S100B	2+75, 25L	5-15	<1.0	0.36 ± 0.03	0.58 ± 0.06	0.064 ± 0.006
S101A	3+75, 25L	0-5	<2.0	0.20 ± 0.01	0.50 ± 0.02	<0.1
S101B	3+75, 25L	5-15	<2.0	0.32 ± 0.02	0.42 ± 0.02	0.15 ± 0.01
S102A	3+25, 19L	0-5	<2.0	0.26 ± 0.02	0.33 ± 0.01	<0.1
S102B	3+25, 19L	5-15	0.69 ± 0.63	0.35 ± 0.01	0.48 ± 0.02	0.45 ± 0.01
S103A	4+25, 25L	0-5	0.62 ± 0.56	0.28 ± 0.02	0.55 ± 0.01	0.04 ± 0.01
S103B	4+25, 25L	5-15	0.36 ± 0.22	0.51 ± 0.03	0.61 ± 0.02	0.16 ± 0.01
S104A	4+75, 25L	0-5	<1.0	0.33 ± 0.02	0.55 ± 0.01	0.078 ± 0.007
S104B	4+75, 25L	5-15	<0.4	0.36 ± 0.02	0.53 ± 0.01	0.18 ± 0.007
S105A	3+25, 20R	0-5	0.84 ± 0.38	0.29 ± 0.02	0.50 ± 0.01	0.02 ± 0.01
S105B	3+25, 20R	5-10	0.68 ± 0.31	0.37 ± 0.02	0.51 ± 0.01	0.16 ± 0.01
S106A	5+59, 6L	0-5	<1.0	0.29 ± 0.04	0.51 ± 0.03	0.009 ± 0.007
S106B	5+59, 6L	5-15	1.6 ± 0.6	0.31 ± 0.02	0.57 ± 0.01	0.045 ± 0.005
S107A	3+75, 6R	0-5	1.1 ± 0.41	0.48 ± 0.03	0.57 ± 0.02	0.17 ± 0.01
S107B	3+75, 6R	5-15	1.5 ± 0.5	0.77 ± 0.02	0.88 ± 0.02	0.61 ± 0.01
S108A	5+90, 1R	0-5	<2.0	0.36 ± 0.03	0.48 ± 0.02	0.14 ± 0.01
S108B	5+90, 1R	5-15	0.97 ± 0.3	0.27 ± 0.01	0.47 ± 0.004	0.073 ± 0.004
S109A	4+25, 6R	0-5	<0.5	0.25 ± 0.03	0.54 ± 0.03	0.074 ± 0.009
S109B	4+25, 6R	5-15	1.3 ± 0.87	0.58 ± 0.03	0.76 ± 0.02	0.23 ± 0.01
S110A	4+75, 2R	0-5	1.1 ± 0.07	0.29 ± 0.02	0.49 ± 0.02	0.081 ± 0.006
S110B	4+75, 2R	5-15	<1.0	0.19 ± 0.01	0.47 ± 0.01	0.10 ± 0.005
S111A	6+75, 75R	0-5	4.4 ± 0.80	3.6 ± 0.07	3.6 ± 0.04	0.17 ± 0.01
S111B	6+75, 75R	5-15	3.2 ± 1.8	3.1 ± 0.07	2.9 ± 0.05	0.42 ± 0.03
S150A	3+34, 103R	0-5	8.6 ± 0.52	1.1 ± 0.04	1.1 ± 0.02	1.3 ± 0.02
S150B	3+34, 103R	5-15	4.2 ± 1.1	0.99 ± 0.04	0.98 ± 0.02	0.27 ± 0.02
S151A	3+46, 103R	0-5	11 ± 1.5	2.0 ± 0.05	2.0 ± 0.03	1.6 ± 0.03
S151B	3+46, 103R	5-15	6.4 ± 0.51	1.4 ± 0.04	1.4 ± 0.02	0.26 ± 0.01
S152A	3+72, 102R	0-5	3.4 ± 0.85	1.9 ± 0.07	1.8 ± 0.04	1.1 ± 0.03
S152B	3+72, 102R	5-15	3.3 ± 0.50	1.7 ± 0.04	1.7 ± 0.02	0.25 ± 0.01
S153A	4+25, 101R	0-5	2.6 ± 0.74	1.9 ± 0.05	1.8 ± 0.03	1.5 ± 0.03
S153B	4+25, 101R	5-15	4.0 ± 1.3	2.0 ± 0.05	2.0 ± 0.03	0.50 ± 0.02
S153C	4+25, 101R	15-30	2.3 ± 0.7	1.2 ± 0.03	1.2 ± 0.02	0.17 ± 0.009
S154A	1+83, 105R	0-5	1.1 ± 0.92	0.85 ± 0.05	0.84 ± 0.02	1.1 ± 0.03
S154B	1+83, 105R	5-15	1.1 ± 0.5	0.99 ± 0.02	1.1 ± 0.02	0.44 ± 0.008
S155A	1+61, 103R	0-5	1.1 ± 0.54	0.95 ± 0.03	0.90 ± 0.02	0.89 ± 0.02
S155B	1+61, 103R	5-15	2.0 ± 1.2	1.0 ± 0.03	1.0 ± 0.02	0.32 ± 0.02
S156A	1+21, 103R	0-5	<2.0	0.94 ± 0.04	0.93 ± 0.03	0.94 ± 0.03

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
S156B	1+21, 103R	5-15	<2.0	0.87 ± 0.02	0.80 ± 0.02	0.52 ± 0.009
S157A	0+75, 102R	0-5	1.1 ± 0.54	1.1 ± 0.03	1.1 ± 0.02	1.4 ± 0.02
S157B	0+75, 102R	5-15	<0.6	1.2 ± 0.03	1.2 ± 0.02	0.42 ± 0.01
S158A	2+25, 114R	0-5	2.7 ± 1.2	1.3 ± 0.06	0.91 ± 0.03	7.7 ± 0.08
S158B	2+25, 114R	5-15	2.8 ± 1.3	1.7 ± 0.09	1.6 ± 0.05	9.2 ± 0.11
S159A	2+35, 114R	0-5	3.5 ± 1.7	1.5 ± 0.09	0.98 ± 0.05	5.2 ± 0.10
S159B	2+35, 114R	5-15	4.3 ± 0.7	1.7 ± 0.03	1.6 ± 0.02	3.4 ± 0.02
S160A	2+45, 114R	0-5	3.0 ± 1.1	1.0 ± 0.04	0.81 ± 0.03	5.1 ± 0.06
S160B	2+45, 114R	5-15	2.7 ± 0.9	1.4 ± 0.03	1.4 ± 0.03	3.4 ± 0.02
S161A	2+55, 114R	0-5	3.6 ± 0.65	1.3 ± 0.03	0.92 ± 0.02	7.0 ± 0.05
S161B	2+55, 114R	5-15	2.9 ± 1.7	1.9 ± 0.08	1.6 ± 0.04	4.2 ± 0.07
S162A	4+75, 100R	0-5	<2.0	1.4 ± 0.05	1.4 ± 0.03	2.6 ± 0.03
S162B	4+75, 100R	5-15	2.0 ± 0.7	1.1 ± 0.03	1.1 ± 0.02	0.86 ± 0.01
S163A	5+25, 100R	0-5	2.0 ± 0.50	1.6 ± 0.04	1.6 ± 0.02	2.8 ± 0.04
S163B	5+25, 100R	5-15	2.5 ± 0.7	1.7 ± 0.03	1.8 ± 0.03	0.62 ± 0.01
S164A	2+76, 121R	0-5	2.9 ± 0.79	0.92 ± 0.02	1.1 ± 0.05	1.8 ± 0.02
S164B	2+76, 121R	5-15	3.6 ± 0.7	1.4 ± 0.03	1.4 ± 0.02	0.54 ± 0.01
S165A	2+87, 100R	0-5	1.8 ± 0.67	0.97 ± 0.02	1.0 ± 0.02	1.4 ± 0.02
S165B	2+87, 100R	5-15	3.1 ± 0.9	1.3 ± 0.03	1.3 ± 0.02	0.69 ± 0.01
S166A	2+94, 106R	0-5	9.4 ± 0.82	1.3 ± 0.03	1.3 ± 0.02	1.4 ± 0.01
S166B	2+94, 106R	5-15	6.7 ± 1.8	1.1 ± 0.08	1.1 ± 0.05	0.31 ± 0.04
S167A	3+04, 102R	0-5	9.4 ± 0.76	0.95 ± 0.02	0.85 ± 0.02	0.67 ± 0.01
S167B	3+04, 102R	5-15	5.8 ± 1.7	0.90 ± 0.11	1.0 ± 0.07	0.32 ± 0.06
S168A	3+19, 103R	0-5	8.3 ± 0.46	0.32 ± 0.02	0.87 ± 0.02	<0.1
S168B	3+19, 103R	5-15	4.6 ± 0.45	0.99 ± 0.03	1.0 ± 0.02	0.28 ± 0.01
S169A	3+24, 102R	0-5	16 ± 0.82	1.1 ± 0.02	1.1 ± 0.02	1.3 ± 0.01
S169B	3+24, 102R	5-15	8.1 ± 1.3	0.91 ± 0.07	1.0 ± 0.04	0.38 ± 0.03
S170A	2+68, 106R	0-5	5.2 ± 0.78	0.82 ± 0.03	0.57 ± 0.02	8.3 ± 0.04
S170B	2+68, 106R	5-15	6.4 ± 2.3	1.1 ± 0.09	1.1 ± 0.05	1.4 ± 0.06
S171A	0+49, 155L	0-5	<2.0	0.82 ± 0.02	0.72 ± 0.04	1.3 ± 0.02
S171B	0+49, 155L	5-15	1.5 ± 0.78	1.2 ± 0.04	1.2 ± 0.02	0.40 ± 0.02
S171C	0+49, 155L	15-30	1.2 ± 0.67	1.0 ± 0.04	1.1 ± 0.02	0.15 ± 0.01
S171D	0+49, 155L	30-45	1.9 ± 1.4	1.6 ± 0.06	1.6 ± 0.04	0.08 ± 0.02
S171E	0+49, 155L	45-60	1.9 ± 0.86	1.8 ± 0.05	1.7 ± 0.03	0.06 ± 0.01
S172A	2+75, 75L	0-5	1.2 ± 0.51	0.90 ± 0.02	0.86 ± 0.02	0.86 ± 0.01
S172B	2+75, 75L	5-15	0.97 ± 0.91	1.1 ± 0.04	1.1 ± 0.02	0.33 ± 0.02
S176A	6+05, 5L	0-5	1.4 ± 0.47	1.5 ± 0.03	1.2 ± 0.02	0.63 ± 0.02
S180A	-1-22, 71L	0-5	1.7 ± 0.79	1.3 ± 0.04	1.5 ± 0.02	8.9 ± 0.06
S180B	-1-22, 71L	5-15	1.3 ± 1.1	1.7 ± 0.05	1.7 ± 0.03	3.8 ± 0.05
S181A	-1-15, 25L	0-5	1.8 ± 1.1	1.1 ± 0.04	1.3 ± 0.03	2.0 ± 0.04
S181B	-1-15, 25L	5-15	1.3 ± 0.72	0.88 ± 0.03	0.95 ± 0.02	0.91 ± 0.02
S182A	-0-80, 75R	0-5	1.7 ± 0.99	1.3 ± 0.06	1.4 ± 0.03	0.63 ± 0.03
S182B	-0-80, 75R	5-15	1.8 ± 0.74	1.2 ± 0.04	1.2 ± 0.03	0.24 ± 0.02
S183A	0-58, 103R	0-5	1.7 ± 1.1	1.1 ± 0.08	1.0 ± 0.04	7.0 ± 0.11
S183B	0-58, 103R	5-15	1.7 ± 0.82	1.1 ± 0.04	1.3 ± 0.02	3.9 ± 0.04
S184A	0-25, 104R	0-5	1.5 ± 0.61	1.5 ± 0.04	1.5 ± 0.03	7.5 ± 0.06
S184B	0-25, 104R	5-15	1.4 ± 0.52	1.5 ± 0.03	1.5 ± 0.02	1.4 ± 0.02
S185A	0+25, 104R	0-5	1.6 ± 0.49	1.2 ± 0.04	1.1 ± 0.02	4.4 ± 0.04

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
S185B	0+25, 104R	5-15	1.6 ± 0.83	1.1 ± 0.04	1.0 ± 0.03	3.1 ± 0.04
S186A	5+74, 93R	0-5	2.1 ± 1.4	1.6 ± 0.07	1.6 ± 0.06	5.0 ± 0.09
S186B	5+74, 93R	5-15	1.7 ± 1.0	1.5 ± 0.05	1.4 ± 0.03	0.71 ± 0.02
S187A	6+12, 92R	0-5	2.0 ± 0.77	1.3 ± 0.05	1.4 ± 0.03	9.9 ± 0.06
S187B	6+12, 92R	5-15	3.2 ± 1.8	2.8 ± 0.12	2.5 ± 0.07	1.8 ± 0.07
S190A	2+05, 106R	0-5	1.3 ± 0.63	0.93 ± 0.03	0.94 ± 0.02	0.79 ± 0.02
S190B	2+05, 106R	5-15	1.3 ± 0.84	1.1 ± 0.04	1.1 ± 0.02	0.38 ± 0.02
S193A	7+03, 65R	0-5	1.5 ± 0.98	1.2 ± 0.05	1.2 ± 0.02	0.79 ± 0.02
S193B	7+03, 65R	5-15	1.5 ± 0.96	1.3 ± 0.04	1.3 ± 0.03	0.54 ± 0.02
S194A	7+70, 90R	0-5	1.7 ± 0.80	1.2 ± 0.04	1.4 ± 0.03	0.46 ± 0.02
S194B	7+70, 90R	5-15	1.5 ± 0.56	0.94 ± 0.03	1.0 ± 0.02	0.08 ± 0.01
S197A	5+12, 57L	0-5	1.1 ± 0.43	1.8 ± 0.03	1.1 ± 0.02	0.24 ± 0.01
<i>Biased samples<sup>d</sup></i>						
B13A	1+39, 261L	0-15	5.0 ± 2.2	3.5 ± 0.18	3.5 ± 0.10	<0.07
B13B	1+39, 261L	0-15	3.8 ± 1.1	3.2 ± 0.04	2.9 ± 0.02	0.02 ± 0.02
B51A	6+20, 20R	0-5	3.4 ± 1.3	2.0 ± 0.10	2.0 ± 0.06	1.8 ± 0.07
B51B	6+20, 20R	5-15	3.1 ± 1.1	2.5 ± 0.09	2.4 ± 0.06	0.79 ± 0.04
B51C	6+20, 20R	15-31	3.1 ± 1.7	2.9 ± 0.11	2.7 ± 0.07	0.15 ± 0.03
B52A	3+43, 109R	0-5	110 ± 5.9	1.5 ± 0.13	1.5 ± 0.08	2.1 ± 0.11
B52B	3+43, 109R	5-15	22 ± 0.70	1.2 ± 0.04	1.2 ± 0.02	0.25 ± 0.01
B55A	3+06, 111R	0-5	870 ± 21	1.3 ± 0.43	1.1 ± 0.32	<0.33
B55B	3+06, 111R	5-15	1900 ± 47	1.4 ± 0.55	1.9 ± 0.36	1.5 ± 0.36
B56A	3+34, 110R	0-5	360 ± 14	2.2 ± 0.25	2.3 ± 0.16	0.92 ± 0.14
B56B	3+34, 110R	5-15	150 ± 4.1	1.6 ± 0.12	1.6 ± 0.06	0.47 ± 0.063
B56C	3+34, 110R	15-31	62 ± 2.3	1.3 ± 0.09	1.3 ± 0.05	0.17 ± 0.03
B57A	3+29, 108R	0-5	1100 ± 22	2.5 ± 0.30	2.2 ± 0.18	1.1 ± 0.19
B57B	3+29, 108R	5-15	230 ± 7.0	1.3 ± 0.12	1.4 ± 0.07	0.30 ± 0.07
B58A	3+25, 105R	0-5	44 ± 1.5	1.4 ± 0.07	1.4 ± 0.04	1.2 ± 0.04
B58B	3+25, 105R	5-15	19 ± 2.5	1.2 ± 0.10	1.2 ± 0.06	0.35 ± 0.04
B59A	0-95, 36R	0-5	0.97 ± 0.97	1.0 ± 0.06	1.0 ± 0.04	16 ± 0.11
B59B	0-95, 36R	5-15	1.4 ± 0.87	1.0 ± 0.04	0.99 ± 0.02	3.3 ± 0.05
B59C	0-95, 36R	15-31	1.1 ± 0.71	1.1 ± 0.04	1.1 ± 0.02	1.1 ± 0.03
B60A	6+00, 01L	0-5	2.2 ± 0.87	1.6 ± 0.05	1.4 ± 0.03	1.6 ± 0.03
B60B	6+00, 01L	5-15	0.97 ± 0.58	1.8 ± 0.05	0.98 ± 0.02	0.40 ± 0.02
B61A	-0-98, 19R	0-5	2.5 ± 0.88	1.4 ± 0.06	1.4 ± 0.04	6.5 ± 0.09
B61B	-0-98, 19R	5-15	2.4 ± 1.2	1.2 ± 0.04	1.3 ± 0.03	3.8 ± 0.05
B64A	2+96, 100R	0-15	9.9 ± 1.4	1.1 ± 0.05	1.2 ± 0.03	0.95 ± 0.03
B64B	2+96, 100R	15-31	2.8 ± 1.6	1.0 ± 0.06	1.1 ± 0.04	0.13 ± 0.02
<i>Auger samples<sup>e</sup></i>						
A1	-0-92, 115L	90-110	<1	0.61 ± 0.01	0.67 ± 0.01	<i>f</i>
A2A	-0-77, 168L	0-15	0.48 ± 0.50	0.22 ± 0.02	0.38 ± 0.01	0.06 ± 0.01
A2B	-0-77, 168L	15-30	1.6 ± 0.46	0.96 ± 0.03	0.99 ± 0.02	0.04 ± 0.01
A2C	-0-77, 168L	30-45	2.0 ± 1.0	0.91 ± 0.04	0.90 ± 0.02	<0.01

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
A2D	-0-77, 168L	45-60	0.67 ± 0.41	0.78 ± 0.04	0.84 ± 0.02	<0.01
A2E	-0-77, 168L	60-75	1.5 ± 0.50	0.81 ± 0.03	0.86 ± 0.02	<0.01
A2F	-0-77, 168L	75-90	1.0 ± 0.69	0.79 ± 0.03	0.87 ± 0.02	<0.01
A2G	-0-77, 168L	90-110	1.5 ± 0.80	0.83 ± 0.04	0.85 ± 0.02	<0.01
A2H	-0-77, 168L	110-120	1.1 ± 0.41	0.83 ± 0.03	0.83 ± 0.02	<0.01
A2I	-0-77, 168L	120-140	1.3 ± 0.76	0.87 ± 0.04	0.87 ± 0.02	<0.01
A2J	-0-77, 168L	140-150	1.9 ± 0.97	0.87 ± 0.06	0.87 ± 0.04	<0.02
A2K	-0-77, 168L	180-200	0.84 ± 0.70	0.66 ± 0.03	0.68 ± 0.02	0.01 ± 0.01
A2M	-0-77, 168L	60-270	0.77 ± 0.73	0.77 ± 0.03	0.80 ± 0.02	<0.01
A3	-1-24, 131L	5-20	<1.0	0.64 ± 0.01	0.72 ± 0.01	f
A4	-1-00, 187L	5-20	<1.0	0.63 ± 0.01	0.69 ± 0.01	f
A5	0-30, 155L	5-20	<2.0	0.49 ± 0.02	0.43 ± 0.01	f
A6	0+43, 176L	45-60	<2.0	0.89 ± 0.02	0.93 ± 0.01	f
A7A	0+28, 221L	0-15	<2.0	0.78 ± 0.02	0.73 ± 0.02	f
A7B	0+28, 221L	75-90	0.33 ± 0.48	0.89 ± 0.02	0.93 ± 0.02	f
A8	0+85, 194L	15-30	0.90 ± 0.80	0.85 ± 0.03	0.85 ± 0.02	<0.01
A9	0+84, 141L	60-75	<2.0	0.72 ± 0.02	0.79 ± 0.01	f
A10A	1+50, 150L	0-15	3.0 ± 1.0	0.94 ± 0.03	0.96 ± 0.02	0.20 ± 0.02
A10B	1+50, 150L	15-30	2.2 ± 1.2	1.1 ± 0.05	1.1 ± 0.03	0.09 ± 0.02
A10C	1+50, 150L	30-45	3.4 ± 0.62	1.4 ± 0.02	1.4 ± 0.02	f
A10D	1+50, 150L	45-60	1.8 ± 0.98	1.2 ± 0.03	1.1 ± 0.02	<0.01
A10E	1+50, 150L	90-110	<1.0	0.69 ± 0.01	0.74 ± 0.01	f
A10F	1+50, 150L	110-120	<2.0	0.69 ± 0.02	0.58 ± 0.02	f
A10G	1+50, 150L	180-200	2.6 ± 1.3	0.96 ± 0.05	0.87 ± 0.03	<0.02
A10H	1+50, 150L	200-210	1.7 ± 0.93	0.81 ± 0.05	0.77 ± 0.03	0.02 ± 0.01
A10I	1+50, 150L	210-230	1.0 ± 1.1	0.75 ± 0.05	0.78 ± 0.03	<0.02
A12	1+46, 104L	45-60	<2.0	1.0 ± 0.04	1.0 ± 0.02	f
A15	1+32, 72L	45-60	1.2 ± 0.46	1.3 ± 0.03	1.3 ± 0.02	<0.01
A16A	0+42, 114L	0-15	1.5 ± 0.35	0.94 ± 0.02	0.95 ± 0.01	f
A16B	0+42, 114L	60-75	1.1 ± 0.52	0.80 ± 0.02	0.67 ± 0.02	f
A17	0+18, 32L	30-45	1.6 ± 0.49	0.59 ± 0.02	0.64 ± 0.01	f
A18A	0+71, 67L	10-15	1.2 ± 0.56	0.55 ± 0.04	0.64 ± 0.02	0.09 ± 0.02
A18B	0+71, 67L	15-30	4.5 ± 0.64	0.85 ± 0.02	0.92 ± 0.01	f
A18C	0+71, 67L	30-45	1.1 ± 0.89	0.84 ± 0.03	0.80 ± 0.02	<0.01
A18D	0+71, 67L	45-60	4.5 ± 0.64	0.85 ± 0.02	0.92 ± 0.01	f
A18E	0+71, 67L	60-75	<1.0	0.75 ± 0.01	0.82 ± 0.01	<0.01
A18F	0+71, 67L	75-90	<1.0	0.65 ± 0.01	0.70 ± 0.01	<0.01
A18G	0+71, 67L	90-110	<1.0	0.74 ± 0.02	0.82 ± 0.01	<0.01
A18H	0+71, 67L	120-140	<2.0	0.66 ± 0.02	0.51 ± 0.01	<0.01
A18I	0+71, 67L	140-150	<1.0	0.67 ± 0.01	0.73 ± 0.01	<0.01
A18J	0+71, 67L	150-170	0.74 ± 0.57	0.75 ± 0.03	0.72 ± 0.02	<0.01
A18K	0+71, 67L	170-180	1.2 ± 0.52	0.79 ± 0.03	0.74 ± 0.02	<0.01
A18L	0+71, 67L	180-200	<1.0	0.62 ± 0.01	0.65 ± 0.01	<0.01
A18M	0+71, 67L	200-210	2.4 ± 0.59	0.71 ± 0.02	0.61 ± 0.01	1.0 ± 0.003
A18N	0+71, 67L	210-230	<2.0	0.76 ± 0.02	0.81 ± 0.01	<0.01
A18O	0+71, 67L	230-240	1.0 ± 0.73	0.79 ± 0.03	0.79 ± 0.02	<0.01

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
A19	0+70, 8L	45-60	1.1 ± 0.73	0.70 ± 0.03	0.68 ± 0.02	<0.01
A20	1+75, 05L	140-150	0.87 ± 0.58	0.74 ± 0.02	0.76 ± 0.01	<0.01
A22A	3+13, 6L	0-15	1.5 ± 0.71	0.79 ± 0.04	0.87 ± 0.03	0.01 ± 0.01
A22B	3+13, 6L	140-150	0.74 ± 0.53	0.71 ± 0.02	0.76 ± 0.02	<0.01
A23A	3+70, 36L	0-15	0.97 ± 0.39	0.78 ± 0.02	0.78 ± 0.01	<0.01
A23B	3+70, 36L	180-200	1.4 ± 0.82	0.82 ± 0.03	0.84 ± 0.02	<0.01
A25A	6+28, 32R	0-15	1.1 ± 0.76	0.90 ± 0.04	0.88 ± 0.02	0.09 ± 0.02
A25B	6+28, 32R	120-140	1.4 ± 0.58	0.85 ± 0.02	0.85 ± 0.02	0.01 ± 0.01
A26	6+51, 43R	30-45	2.4 ± 1.6	1.1 ± 0.06	1.1 ± 0.04	<0.02
A28A	2+41, 48L	0-15	1.8 ± 1.6	1.1 ± 0.07	1.2 ± 0.04	0.10 ± 0.02
A28B	2+41, 48L	15-30	1.6 ± 0.35	0.98 ± 0.03	1.0 ± 0.02	<0.01
A28C	2+41, 48L	30-45	1.4 ± 1.0	0.84 ± 0.04	0.85 ± 0.02	<0.02
A28D	2+41, 48L	45-60	1.4 ± 0.52	0.83 ± 0.03	0.79 ± 0.02	<0.01
A28E	2+41, 48L	60-75	<2.0	0.76 ± 0.02	0.84 ± 0.01	0.019 ± 0.005
A28F	2+41, 48L	75-90	<1.0	0.70 ± 0.01	0.73 ± 0.01	<0.01
A28G	2+41, 48L	90-110	0.62 ± 0.47	0.60 ± 0.02	0.60 ± 0.01	<0.01
A28H	2+41, 48L	110-120	<1.0	0.69 ± 0.01	0.67 ± 0.01	<0.01
A28I	2+41, 48L	120-140	<1.0	0.73 ± 0.02	0.76 ± 0.01	<0.01
A28J	2+41, 48L	140-150	1.0 ± 0.62	0.78 ± 0.04	0.78 ± 0.02	<0.01
A28K	2+41, 48L	150-170	<2.0	0.74 ± 0.02	0.77 ± 0.01	<0.01
A28L	2+41, 48L	170-180	<2.0	0.75 ± 0.02	0.66 ± 0.01	<0.01
A28M	2+41, 48L	180-200	<2.0	0.75 ± 0.02	0.67 ± 0.01	<0.01
A28N	2+41, 48L	200-210	<2.0	0.73 ± 0.02	0.62 ± 0.02	<0.01
A28O	2+41, 48L	240-260	1.0 ± 0.32	0.78 ± 0.03	0.79 ± 0.02	<0.01
A31	5+60, 2L	120-140	1.1 ± 0.76	0.77 ± 0.03	0.81 ± 0.02	<0.01
A32A	6+62, 87R	0-15	2.6 ± 0.89	1.9 ± 0.08	1.8 ± 0.05	1.1 ± 0.04
A32B	6+62, 87R	15-30	2.9 ± 1.3	2.5 ± 0.08	2.3 ± 0.05	0.34 ± 0.03
A32D	6+62, 87R	45-60	4.3 ± 1.9	3.3 ± 0.08	3.3 ± 0.06	<0.03
A32E	6+62, 87R	60-75	2.7 ± 1.4	2.2 ± 0.07	2.1 ± 0.05	0.47 ± 0.03
A32F	6+62, 87R	75-90	2.3 ± 0.61	1.8 ± 0.04	1.8 ± 0.03	0.23 ± 0.01
A32G	6+62, 87R	90-110	1.4 ± 0.79	0.74 ± 0.04	0.70 ± 0.03	<0.01
A32H	6+62, 87R	110-120	1.7 ± 0.41	0.98 ± 0.03	0.81 ± 0.02	<0.01
A32I	6+62, 87R	120-140	2.2 ± 0.58	1.5 ± 0.03	1.5 ± 0.02	0.14 ± 0.005
A32K	6+62, 87R	150-170	<2.0	0.91 ± 0.02	0.73 ± 0.02	<0.01
A32L	6+62, 87R	170-180	1.2 ± 0.69	1.0 ± 0.03	0.88 ± 0.02	<0.01
A32M	6+62, 87R	180-200	1.4 ± 0.46	1.2 ± 0.03	1.1 ± 0.02	0.04 ± 0.01
A32N	6+62, 87R	200-210	<2.0	0.81 ± 0.02	0.74 ± 0.02	<0.1
A32O	6+62, 87R	210-230	1.2 ± 0.80	0.85 ± 0.03	0.85 ± 0.02	<0.01
A32P	6+62, 87R	230-240	1.5 ± 0.92	0.87 ± 0.04	0.87 ± 0.02	<0.01
A32Q	6+62, 87R	240-260	1.3 ± 0.36	0.91 ± 0.03	0.93 ± 0.02	<0.01
A32R	6+62, 87R	260-270	1.4 ± 0.84	0.93 ± 0.04	0.94 ± 0.02	<0.01
A32S	6+62, 87R	270-290	4.5 ± 0.64	0.85 ± 0.02	0.92 ± 0.01	<i>f</i>
A32T	6+62, 87R	290-300	<2.0	0.84 ± 0.02	0.79 ± 0.01	<i>f</i>
A33	7+28, 78R	0-15	1.0 ± 0.56	0.93 ± 0.02	1.0 ± 0.02	<i>f</i>
A34A	5+19, 42L	0-15	<2.0	1.1 ± 0.02	0.83 ± 0.02	<i>f</i>
A34B	5+19, 42L	15-30	1.3 ± 0.84	1.4 ± 0.04	1.1 ± 0.02	0.06 ± 0.01
A34C	5+19, 42L	30-45	3.0 ± 1.2	2.2 ± 0.06	1.9 ± 0.04	0.06 ± 0.01
A34D	5+19, 42L	45-60	3.5 ± 1.3	2.7 ± 0.06	2.4 ± 0.04	0.04 ± 0.01

Table 4 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
AA34E	5+19, 42L	60-75	1.7 ± 1.0	1.4 ± 0.05	1.2 ± 0.03	0.14 ± 0.02
A34F	5+19, 42L	75-90	2.9 ± 1.4	2.6 ± 0.06	2.4 ± 0.04	<0.02
A34G	5+19, 42L	90-110	4.5 ± 1.3	3.3 ± 0.07	3.0 ± 0.04	<0.02
A34H	5+19, 42L	110-120	3.8 ± 0.71	2.5 ± 0.03	2.6 ± 0.03	<0.1
A34I	5+19, 42L	120-140	1.7 ± 1.3	2.5 ± 0.07	1.2 ± 0.03	0.08 ± 0.03
A34J	5+19, 42L	140-150	2.3 ± 1.5	2.0 ± 0.06	1.7 ± 0.04	0.03 ± 0.01
A39	4+45, 101R	80-115	0.47 ± 0.48	0.85 ± 0.02	0.89 ± 0.01	<0.1
A41	3+21, 102R	0-15	3.9 ± 0.65	0.94 ± 0.02	0.86 ± 0.02	<0.1
A42A	3+30, 109R	0-15	100 ± 9.4	2.2 ± 0.24	2.3 ± 0.16	0.94 ± 0.15
A42B	3+30, 109R	15-30	8.8 ± 1.9	1.0 ± 0.06	1.0 ± 0.04	<0.03
A42C	3+30, 109R	30-45	3.9 ± 0.52	0.92 ± 0.03	0.94 ± 0.02	<0.01
A42D	3+30, 109R	45-60	5.2 ± 1.0	1.1 ± 0.04	1.1 ± 0.02	<0.01
A42E	3+30, 109R	60-75	3.1 ± 1.8	1.0 ± 0.07	1.1 ± 0.05	<0.02
A42F	3+30, 109R	75-90	4.7 ± 2.3	1.0 ± 0.08	0.99 ± 0.05	<0.03
A42G	3+30, 109R	120-140	5.4 ± 0.91	0.74 ± 0.03	0.78 ± 0.02	<0.01
A42H	3+30, 109R	140-150	3.2 ± 0.69	0.81 ± 0.03	0.91 ± 0.02	<0.01
A42K	3+30, 109R	180-200	4.0 ± 0.78	0.79 ± 0.03	0.80 ± 0.02	<0.01
A42L	3+30, 109R	200-210	2.5 ± 0.91	1.1 ± 0.04	1.1 ± 0.02	<0.01
A42M	3+30, 109R	210-230	2.2 ± 1.4	1.1 ± 0.05	1.1 ± 0.04	0.01 ± 0.02
A42N	3+30, 109R	230-240	1.6 ± 0.53	1.0 ± 0.03	0.99 ± 0.02	<0.01
A42O	3+30, 109R	240-260	1.4 ± 0.55	0.95 ± 0.03	1.0 ± 0.02	<0.01
A42P	3+30, 109R	260-270	1.3 ± 1.1	0.95 ± 0.04	0.84 ± 0.02	<0.01
A42Q	3+30, 109R	270-290	<2.1	0.93 ± 0.05	0.95 ± 0.03	<0.02
A42R	3+30, 109	290-300	1.3 ± 0.89	0.87 ± 0.05	0.94 ± 0.03	<0.02
A43A	2+88, 103R	0-15	0.82 ± 0.30	0.75 ± 0.02	0.74 ± 0.01	0.40 ± 0.01
A43B	2+88, 103R	15-30	1.2 ± 0.57	1.0 ± 0.03	1.1 ± 0.02	0.10 ± 0.01
A43C	2+88, 103R	30-45	1.3 ± 0.61	0.89 ± 0.03	0.92 ± 0.02	0.04 ± 0.01
A43D	2+88, 103R	45-60	1.4 ± 0.93	1.0 ± 0.06	1.1 ± 0.04	<0.02
A43E	2+88, 103R	75-90	1.7 ± 0.50	1.3 ± 0.03	1.2 ± 0.02	<0.01
A43F	2+88, 103R	90-110	2.2 ± 0.94	1.2 ± 0.05	1.2 ± 0.02	<0.02
A43G	2+88, 103R	110-120	0.80 ± 0.46	0.82 ± 0.03	0.92 ± 0.02	<0.01
A43H	2+88, 103R	120-140	1.2 ± 0.61	0.84 ± 0.03	0.89 ± 0.02	<0.01
A43I	2+88, 103R	140-150	1.3 ± 0.82	0.84 ± 0.05	0.87 ± 0.03	<0.01
A43J	2+88, 103R	150-170	3.5 ± 0.92	0.90 ± 0.03	0.95 ± 0.02	<0.01
A43K	2+88, 103R	170-180	1.9 ± 0.47	0.88 ± 0.03	0.92 ± 0.02	<0.02
A43M	2+88, 103R	230-240	2.1 ± 0.96	0.62 ± 0.03	0.63 ± 0.02	<0.01
A44	5+69, 99R	0-15	3.2 ± 1.3	1.1 ± 0.05	1.0 ± 0.04	0.55 ± 0.03
A45	2+05, 106R	0-15	1.6 ± 1.4	1.0 ± 0.06	1.0 ± 0.03	0.21 ± 0.02
A46	0+21, 101R	0-15	1.2 ± 0.91	1.1 ± 0.04	1.0 ± 0.02	0.14 ± 0.02
A47	-1-10, 10L	0-15	1.6 ± 1.2	1.5 ± 0.08	1.4 ± 0.05	4.0 ± 0.08
A50	3+36, 63L	0-15	1.2 ± 0.64	0.84 ± 0.03	0.92 ± 0.02	0.03 ± 0.01

<sup>a</sup>Locations of soil samples are shown on Figs. 9, 16, and 17.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Systematic samples are taken at selected locations irrespective of gamma exposure rate.

<sup>d</sup>Biased samples are taken from areas shown to have elevated gamma exposure rates.

<sup>e</sup>Auger hole samples are taken from holes drilled to further define the depth and extent of radioactive material. Holes are drilled where the surface measurements may or may not have been elevated.

<sup>f</sup>No analysis performed.

**Table 5. Concentrations of specified radionuclides in selected samples from the Peek Street site**

Sample ID <sup>b</sup>	Radionuclide concentration (pCi/g) <sup>a</sup>				
	<sup>238</sup> Pu	<sup>239/240</sup> Pu	<sup>90</sup> Sr <sup>c</sup>	<sup>210</sup> Pb	<sup>210</sup> Po
S83A	0.079 ± 0.058	<0.030	<MDA	<i>d</i>	0.96 ± 0.35
S103A	0.66 ± 0.055	<0.033	<MDA	<i>d</i>	<0.39
S155A	0.060 ± 0.05	<0.076	<MDA	<i>d</i>	0.73 ± 0.37
S178A	0.072 ± 0.06	<0.036	<MDA	<i>d</i>	0.80 ± 0.35
B13A	<0.08	<0.03	<MDA	3.0 ± 1.0	1.2 ± 0.45
B55A	<i>d</i>	<i>d</i>	<MDA	2.4 ± 1.0	0.38 ± 0.05
B55B	0.042 ± 0.039	<0.02	0.86 ± 0.32	<i>d</i>	<0.31
B57A	<0.02	0.16 ± 0.078	0.77 ± 0.34	<i>d</i>	<2.0
B59A	0.06 ± 0.046	<0.07	3.0 ± 0.5	13 ± 1.9	6.9 ± 0.92
M2	0.098 ± 0.067	0.098 ± 0.067	1.6 ± 0.4	<i>d</i>	<2.4
M3	0.055 ± 0.046	0.16 ± 0.083	3.8 ± 0.5	<i>d</i>	<3.1
M27	0.073 ± 0.061	<0.04	<MDA	<i>d</i>	<0.52
E28 <sup>e</sup>	<0.6	<0.6	0.54 ± 0.21	<i>d</i>	0.42 ± 0.36

<sup>a</sup>Indicated counting error is ± 2σ at the 95% confidence level.

<sup>b</sup>Locations of soil samples are shown on Figs. 9 and 16; indoor samples are depicted on Fig. 20.

<sup>c</sup>The minimum detectable activity (MDA) for <sup>90</sup>Sr is 0.5 pCi/g.

<sup>d</sup>No analysis conducted.

<sup>e</sup>Analysis results are for precipitate from a sample of liquid taken from a storm drain between columns 9 and 10 in the carpenter shop in the industrial building at the Peek Street facility. The concentration of <sup>238</sup>U in the precipitate was 1.1 ± 0.23 pCi/g.



**Table 6. Radionuclide concentrations in vegetation collected from the Peek Street site**

Foliage sample			Radionuclide concentration (pCi/g)	
ID	Type <sup>a</sup>	Location	<sup>238</sup> U <sup>c</sup>	<sup>137</sup> Cs <sup>c</sup>
V1	Dead	<i>b</i>	0.065 ± 0.005	0.040 ± 0.02
V2	Dead & living	<i>b</i>	0.012 ± 0.003	<0.019
V3	Living	<i>b</i>	0.17 ± 0.01	0.07 ± 0.04
V4	Living	~25-30 ft. from <i>b</i>	0.035 ± 0.005	0.11 ± 0.05
V5	Living	~500 ft. S. of 0+00, west of bike path	0.019 ± 0.004	<0.016

<sup>a</sup>Dead foliage was retrieved from the ground surface. Living foliage was stripped from rooted plants.

<sup>b</sup>Samples were taken from the area of elevated radioactivity east of the factory building (Fig. 12).

<sup>c</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

**Table 7. Concentrations of total uranium in water samples from auger holes and drains on the industrial property at Peek Street**

Sample ID	Location <sup>a</sup>	Total uranium/fraction	
		Filtrate (pCi/mL) <sup>b</sup>	Precipitate (pCi/g) <sup>b</sup>
<i>Outdoor samples</i>			
W1	0-92, 115L	0.0008 ± 0.00009	<i>c</i>
W5	0-30, 155L	0.0006 ± 0.00007	<i>c</i>
W7	0+28, 221L	0.002 ± 0.00021	<i>c</i>
W12	1+46, 104L	0.0018 ± 0.00019	<i>c</i>
W18	0+71, 67L	0.0011 ± 0.00012	<i>c</i>
W28	2+41, 48L	0.0014 ± 0.00015	<i>c</i>
W50	Drain #4	<0.0003	<i>c</i>
W51	Drain #3	0.00086 ± 0.00009	<i>c</i>
W52	West pit	<0.0003	<i>c</i>
W53	East pit	<0.0003	<i>c</i>
<i>Indoor samples</i>			
E25	Drain	0.0047 ± 0.00089	0.71 ± 0.38
E26	Drain	0.0013 ± 0.00014	0.67 ± 0.32
E27	Drain	0.0034 ± 0.00036	<1.2
E28 <sup>d</sup>	Drain	0.00087 ± 0.0001	<i>c</i>
E29	Drain	0.028 ± 0.0043	3.8 ± 0.82
E52	Drain	<0.0003	2.4 ± 0.98
E53	Drain	<0.0003	1.3 ± 1.1

<sup>a</sup>Locations are shown on Figs. 9, 17, and 20.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2\sigma$ ).

<sup>c</sup>No analysis was performed.

<sup>d</sup>Sample was retrieved from a manhole for a storm drain located between Beams 9 and 10 in the Wood Shop.

Table 8. Directly measured radiation levels on floor and wall surfaces  
in the wood shop

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )				Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Grid block scan		At center of area/room <sup>b</sup>			
	Range	Average	At 1 m	At surface		
<i>Open areas</i>						
1-2						
Floor	7-11	9	9	c	0.03	<25
Walls	c	c	c	c	0.02-0.03	c
2-3						
Floor	7-10	8	7	7	0.02-0.03	<25-30
Walls	c	c	c	c	0.02-0.03	<25
3-4						
Floor	7-10	8	7	7	0.02-0.03	<25-30
Walls	c	c	c	c	0.02-0.03	30
4-5						
Floor	7-11	8	8	c	0.02-0.03	<25-27
Walls	c	c	c	c	0.02-0.03	<25
5-6						
Floor	7-10	8	7	7	0.02	<25
Walls	c	c	c	c	0.03	<25
6-7						
Floor	7-11	9	8	c	0.02-0.03	<25-27
Walls	7-12	10	c	c	0.03	<25-27
7-7						
Floor	7-10	8	8	c	0.02	45
Walls	8-12	11	c	c	0.02-0.03	36
8-9						
Floor	7-10	8	7	8	0.02-0.04	<25-30
Walls	c	c	c	c	0.02-0.05	<25
9-10						
Floor	7-11	9	8	c	0.02-0.03	<25
Walls	10-12	c	c	c	0.04	<25
10-11						
Floor	7-10	8	8	8	0.02-0.03	<25
Walls	c	c	c	c	0.02	<25
11-12						
Floor	7-10	8	8	8	0.02	<25-60
Walls	c	c	c	c	0.02	<25
12-13						
Floor	7-12	10	9	c	0.02	<25
Walls	c	c	c	c	0.02	<25
13-14						
Floor	7-12	9	8	8	0.02	<25-30
Walls	c	c	c	c	0.02	30

Table 8 (continued)

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )				Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Grid block scan		At center of area/room <sup>b</sup>			
	Range	Average	at 1 m	at surface		
14-15						
Floor	8-12	10	8	<i>c</i>	0.02-0.03	<25-30
Walls	8-10	<i>c</i>	<i>c</i>	<i>c</i>	0.03	30
15-16						
Floor	7-10	8	7	7	0.02	<25-30
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.03	<25
16-17						
Floor	8-13	11	8	<i>c</i>	0.02-0.03	<25
Walls	8-12	<i>c</i>	<i>c</i>	<i>c</i>	0.03	<25
17-18						
Floor	7-10	8	7	8	0.02	<25
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02	40
18-19						
Floor	8-11	10	8	8	0.02	<25-30
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02	<25
19-20						
Floor	7-12	10	7	7	0.02	<25
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.03	<25
20-21						
Floor	7-12	10	9	9	0.02	<25
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02-0.04	<25-60
<i>Offices</i>						
Misc-1						
Floor	7-10	8	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	7-12	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Misc-2						
Floor	7-12	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Hall						
Floor	8-15	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Wall	<i>c</i>	11	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-2						
Floor	10-14	12	11	12	0.02-0.03	<25-30
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02-0.03	<25-30
WS-3						
Floor	10-14	12	10	12	0.02	<25
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02-0.03	<i>c</i>
WS-4						
Floor	10-14	12	10	11	<i>c</i>	<i>c</i>
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02-0.03	<25-40

Table 8 (continued)

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )				Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Grid block scan		At center of area/room <sup>b</sup>			
	Range	Average	at 1 m	at surface		
WS-5						
Floor	10-14	12	11	<i>c</i>	0.02	<25
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02-0.03	<25
WS-6						
Floor	10-14	12	11	14	0.02	<i>c</i>
Walls	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	0.02	<i>c</i>
WS-7						
Floor	10-14	12	<i>c</i>	<i>c</i>	0.01-0.03	36
Walls	10-14	12	<i>c</i>	<i>c</i>	0.01-0.03	<25-36
WS-9						
Floor	8-12	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	7-10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Hallway						
Floor	8-14	11	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Wall	8-14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	
WS-10						
Floor	7-10	8	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	8	<i>c</i>	<i>c</i>	0.01	<i>c</i>
WS-11						
Floor	8-14	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	8-14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-12						
Floor	10-12	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	13-14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-13						
Floor	10-14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-14						
Floor	10-14	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	12	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-15						
Floor	10-12	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	11	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-16						
Floor	10-14	11	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	10	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
WS-17						
Floor	10-14	11	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>
Walls	<i>c</i>	14	<i>c</i>	<i>c</i>	<i>c</i>	<i>c</i>

**Table 8** (continued)

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )				Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Grid block scan		At center of area/room <sup>b</sup>			
	Range	Average	at 1 m	at surface		
WS-18						
Floor	10-13	11	c	c	c	c
Walls	c	13	c	c	c	c
WS-19						
Floor	10-14	11	c	c	c	c
Walls	c	12	c	c	c	c
WS-21						
Floor	10-15	13	c	c	c	c
Walls	c	c	c	c	c	c

<sup>a</sup>Locations shown on Fig. 6.

<sup>b</sup>Discrete measurements were obtained as close to the center of the area or room as possible.

<sup>c</sup>Measurement not made.

**Table 9. Directly measured radiation levels on overhead beams in the factory building at Peek Street**

Beam No. <sup>a</sup>	Gamma exposure rates at surface ( $\mu\text{R/h}$ )	Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
<i>Wood Shop</i>			
2	5-7	0.01-0.02	<25
3	5-7	0.01-0.02	<25
4	5-7	0.01-0.02	<25
5	4-7	0.02	<25
6	5-7	0.01-0.02	<25
7	5-7	0.02	<25
8	7-8	0.02	<25
9	5-8	0.02	<25
10	5-8	0.01-0.02	<25
11	5-7	0.01-0.02	<25
12	5-7	0.02	<25
13	5-7	0.02	<25
14	5-7	0.02	<25-27
15	5-7	0.02	<25
16	5-7	0.01-0.02	<25
17	5-7	0.02	<25
18	5-7	0.01-0.02	<25
19	5-7	0.01	<25
20	5-8	0.02	<25
21	5-7	0.02-0.03	<25-36
<i>Metal Shop</i>			
22	5-8	0.02	<25
23	5-7	0.02	<25-45
24	5-8	0.02-0.03	<25-54
25	5-8	0.02-0.03	<25-45
26	7-8	0.02-0.04	<25-27
27	7-8	0.02-0.03	<25-45
28	7-8	0.02-0.05	<25-182
29	7-8	0.02	<25
30	5-8	0.02	<25
31	5-8	0.02	<25
32	5-8	0.01-0.02	<25
33	5-8	0.01-0.02	<25
34	5-8	0.01-0.02	<25
Exhaust <sup>b</sup>	5	0.01	27

Table 9 (continued)

Beam no. <sup>a</sup>	Gamma exposure rates at surface ( $\mu\text{R/h}$ )	Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
35	5-8	0.01-0.02	<25
36	5-8	0.02	<25-36
37	5-7	0.01-0.02	<25
38	7-8	0.02	<25-45
39	5-8	0.02	<25-27
40	7-8	0.01-0.02	<25
Vent <sup>b</sup>	<i>c</i>	0.02	<25
41	5-7	0.02	<25
42	5-7	0.02	<25
43	7-7	0.02	<25

<sup>a</sup>Locations shown on Figs. 6 and 20.

<sup>b</sup>Measurements taken on air heating equipment.

<sup>c</sup>Measurement not made.



**Table 10. Concentrations of radionuclides in dry indoor samples collected from the industrial property at Peck Street**

Sample ID	Location (beam/room) <sup>a</sup>	Radionuclide concentration (pCi/g) <sup>b</sup>			
		<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
<i>Beam dust samples</i>					
M1	25W	20 ± 6.5	1.5 ± 0.63	1.7 ± 0.37	0.50 ± 0.31
M2 <sup>c</sup>	25E	27 ± 3.6	0.60 ± 0.22	0.95 ± 0.17	0.45 ± 0.11
M3 <sup>c</sup>	27C	26 ± 2.5	0.47 ± 0.17	0.32 ± 0.11	0.21 ± 0.08
M4	28C	48 ± 4.7	<0.45	0.48 ± 0.15	0.37 ± 0.14
M5	29C	5.1 ± 1.8	0.47 ± 0.14	0.63 ± 0.11	0.63 ± 0.11
M6	32C	0.8 ± 0.44	0.07 ± 0.03	0.31 ± 0.02	0.02 ± 0.01
M7	35W	2.8 ± 0.89	0.26 ± 0.11	0.37 ± 0.07	0.24 ± 0.04
M8	36E	5.0 ± 2.8	0.63 ± 0.26	0.67 ± 0.16	0.27 ± 0.14
M9	38C	3.4 ± 2.2	0.36 ± 0.10	0.52 ± 0.07	0.34 ± 0.07
M10	40W	2.4 ± 1.0	0.35 ± 0.13	0.60 ± 0.12	0.26 ± 0.09
M11	24C	37 ± 3.9	0.63 ± 0.11	0.69 ± 0.07	0.67 ± 0.08
M12 <sup>d</sup>	25	32 ± 1.8	0.68 ± 0.13	0.81 ± 0.08	0.14 ± 0.06
M13	43	3.4 ± 2.6	0.32 ± 0.13	0.52 ± 0.08	0.13 ± 0.06
M14	19E	6.0 ± 1.3	0.49 ± 0.11	1.1 ± 0.08	0.62 ± 0.06
M15	16W	4.0 ± 3.2	0.57 ± 0.18	0.76 ± 0.12	0.56 ± 0.11
M16	13W	4.0 ± 1.2	0.52 ± 0.15	0.64 ± 0.11	0.49 ± 0.10
M17	10E	3.2 ± 1.1	0.68 ± 0.12	0.82 ± 0.07	0.37 ± 0.05
M18	8W	2.8 ± 1.6	0.54 ± 0.16	1.0 ± 0.10	0.43 ± 0.11
M19	3S	3.5 ± 1.9	0.64 ± 0.16	0.69 ± 0.14	0.40 ± 0.10
M32	MS-6(beam)	38 ± 1.9	0.48 ± 0.11	0.45 ± 0.09	0.77 ± 0.06
<i>Miscellaneous materials</i>					
M20	<i>e</i>	8.0 ± 2.4	0.39 ± 0.08	0.61 ± 0.06	0.73 ± 0.07
M27 <sup>c</sup>	41(Floor)	1.9 ± 0.39	0.25 ± 0.06	0.31 ± 0.04	0.03 ± 0.03
B14 <sup>f</sup>	Floor	880 ± 21	1.2 ± 0.59	0.75 ± 0.36	<0.33
<i>Structural materials</i>					
M21	<i>e</i>	1800 ± 46	12 ± 1.4	<1.2	<0.61
M33 <sup>g</sup>	Room MS-6	3.8	0.39	<0.14	<0.047
M34	<i>i</i>	33 ± 4.4	0.66 ± 0.08	0.41 ± 0.04	<0.03
M35	<i>h</i>	4.9 ± 2.8	0.64 ± 0.08	0.46 ± 0.05	<0.03
M36	<i>i</i>	78 ± 11	0.68 ± 0.17	0.55 ± 0.11	<0.06
M37	<i>h</i>	3.0 ± 0.83	0.75 ± 0.13	0.71 ± 0.07	<0.06
M38	<i>h</i>	3.4 ± 1.2	0.84 ± 0.18	0.76 ± 0.11	<0.06

**Table 10** (continued)

Sample ID	Location (beam/room) <sup>a</sup>	Radionuclide concentration (pCi/g) <sup>b</sup>			
		<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
M39	<i>i</i>	9.5 ± 1.2	0.65 ± 0.11	0.67 ± 0.06	0.03 ± 0.04
M40	<i>i</i>	5.4 ± 2.7	0.53 ± 0.07	0.54 ± 0.04	<0.03
M44	Wall, beams 27-28E	2.0 ± 0.86	0.58 ± 0.08	0.47 ± 0.05	<0.03
M49	Wall, beams 21-22W	4.4 ± 3.2	0.69 ± 0.12	0.51 ± 0.08	<0.04
M56	Wall, beams 26-27W	1.4 ± 0.44	0.56 ± 0.06	0.37 ± 0.04	<0.02

<sup>a</sup>Locations of samples are shown on Figs. 9, 20, 22, and 23.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Samples M2, M3, and M27 were analyzed for <sup>90</sup>Sr content. Concentrations (pCi/g) were 1.6 ± 0.4 in M2, 3.8 ± 0.5 in M3, and <MDA (0.5) in M27.

<sup>d</sup>Sample M12 was dust from exhaust fan stack at beam 25.

<sup>e</sup>Samples were dust (M20, window ledge) and paint chips (M21), respectively, taken from the area of elevated radiation measurements found in the Metal Shop on the wall between beams 26E and 27E.

<sup>f</sup>Sample B14 consisted of compact debris from Area E, block 28.

<sup>g</sup>Sample M33 consisted of paint chips taken from wall beneath beam.

<sup>h</sup>Samples, M35, M37, and M38 were collected from the wall between beams 26E and 27E where radiation levels were not elevated.

<sup>i</sup>Samples M34, M36, M39, and M40 were collected from the area of elevated radiation measurements on the wall area between beams 26E and 27E.

Table 11. Directly measured radiation levels on floor and wall surfaces in the print shop, vault area, and metal shop

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )		At center of room/area at 1 m <sup>b</sup>	Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Scan of room/area				
	Range	Average			
<b>Print Shop</b>					
Floor	7-14	10	10	0.02	c
Walls	7-14	10	c	0.02	c
<b>Vault</b>					
Floor	8-19	12	c	0.01-1.0	<25-110
Walls	12	c	c	0.02	c
Above ceiling	11	c	c	0.02	c
Roof	10-12	11	c	c	c
<i>Metal Shop Offices</i>					
<b>MS-1</b>					
Floor	12-14	12	9	0.03	c
Walls	c	c	c	c	c
<b>MS-2</b>					
Floor	7-14	10	10	0.02	<25
Walls	7-12	10	c	0.02-0.03	c
<b>MS-3</b>					
Floor	8-11	9	10	0.02	<25
Walls	7-11	8	c	0.02	<25
<b>MS-4</b>					
Floor	8-12	10	10	0.02-0.03	<25-60
Walls	7-12	8	c	0.02	<25
<b>MS-5</b>					
Floor	7-10	c	c	0.02-0.03	<25-40
Walls	8-12	c	c	0.02	<25
<b>MS-6</b>					
Floor	7-12	10	c	0.02	<25
Walls	c	c	c	c	c
<b>MS-7</b>					
Floor	7-20	12	c	0.02-0.33	<25-130
Walls	c	c	c	c	c
<b>MS-8</b>					
Floor	7-10	c	c	0.02	<25
Walls	7-14	c	c	0.02	<25
<b>MS-9</b>					
Floor	10-14	12	c	0.02	50
Walls	12-15	c	c	0.02	60
<b>MS-10</b>					
Floor	10-14	12	11	0.02	c
Walls	c	c	c	c	c

Table 11 (continued)

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )		At center of room/area at 1 m <sup>b</sup>	Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Scan of room/area				
	Range	Average			
Lower level					
Floor	10-14	12	11	0.02	c
MS-11					
Floor	10-14	12	12	c	47
Walls	c	c	c	0.02-0.03	<45
			<i>Metal Shop Open areas</i>		
21-22					
Floor	12-15	c	12	0.02-0.03	<25-30
Walls	c	c	c	0.02	<25
22-23					
Floor	10-14	12	11	0.02-0.04	<25
Walls	c	c		0.02-0.03	<25
23-24					
Floor	10-14	12	12	0.02-0.05	<25-40
Walls	c	c	c	0.02	<25
24-25					
Floor	10-14	c	12	0.03-0.07	<25-50
Walls	c	c	c	0.02-0.03	<25-30
25-26					
Floor	10-41	c	12	0.02-1	<25-107
Walls	c	c	c	0.02	<25
26-27					
Floor	10-14	11	10	0.02-2	<25-30
Walls	7-41	c	c	0.02-5	<25
27-28					
Floor	8-14	12	10	0.02-0.7	<25
Walls	10-14	c	c	0.02	<25
28-29					
Floor	10-14	12	12	0.02-0.6	<25
Walls	10-14	11	c	0.03	<25
Restroom					
Floor	10-14	12	12	0.02	<25
Walls	10-14	11	c	c	c
29-30					
Floor	8-12	10	10	0.02-0.03	<25
Walls	10-14	c	c	0.02	<25
30-31					
Floor	7-12	10	9	0.02-0.03	<25-30
Walls	10-14	c	c	0.02-0.04	<25
31-32					
Floor	10-14	12	11	0.02-0.04	<25-30
Walls	10-14	12	c	0.02	<25-30

Table 11 (continued)

Location <sup>a</sup>	Gamma exposure rates ( $\mu\text{R/h}$ )		At center of room/area at 1 m <sup>b</sup>	Beta-gamma dose rates at 1 cm (mrad/h)	Alpha (dpm/100 cm <sup>2</sup> )
	Scan of room/area				
	Range	Average			
32-33					
Floor	7-14	10	10	0.02-0.03	<25-30
Walls	7-14	c	c	0.02	<25-30
33-34					
Floor	7-12	10	10	0.02-0.04	<25-40
Walls	10-14	12	c	0.02-0.04	<25-30
34-35					
Floor	8-12	9	9	0.02	<25
Walls	7-12	10	c	c	<25-30
35-36					
Floor	8-12	10	10	0.02-0.03	<25-30
Walls	8-12	10	c	0.03	30
36-37					
Floor	7-12	10	9	0.02	<25-30
Walls	8-13	10	c	0.02-0.03	<25-40
37-38					
Floor	7-12	9	10	0.02-0.03	<25-30
Walls	7-11	8	c	0.01-0.03	<25-30
38-39					
Floor	7-14	10	10	0.02-0.03	<25
Walls	8-12	10	c	0.02	<25
39-40					
Floor	7-12	9	8	0.02-0.03	<25
Walls	7-10	9	c	0.01-0.02	30
40-41					
Floor	7-11	8	10	0.02-0.03	<25
Walls	7-11	9	c	0.03	<25
41-42					
Floor	7-11	8	10	0.02-0.03	<25
Walls	8-11	10	c	0.02	<25
42-43					
Floor	5-11	8	c	0.02-0.03	<25-40
Walls	8-11	9	c	0.02	<25-60
43-wall					
Floor	7-14	10	9	0.02-0.03	<25-30
Walls	10-14	c	c	0.02	<25-60

<sup>a</sup>Locations shown on Figs. 6, 21, and 22.

<sup>b</sup>Discrete measurements were taken as close as possible to the center of the room or area at 1 m above the surface.

<sup>c</sup>Measurement not made.

**Table 12. Beryllium concentrations in selected outdoor soil samples from the Peek Street properties**

Sample ID <sup>a</sup>	Grid location <sup>b</sup>	Depth (cm)	Be (µg/g)
A39	4+45, 101R	30-45	1.9
A41	3+21, 102R	0-15	9.8
B13A	1+39, 261L	0-15	4.1
B55B	3+06, 111R	5-15	130
B57A	3+29, 108R	0-5	6.5
B59A	-0-95, 36R	0-5	51
B59B	-0-95, 36R	5-15	2.6
B61A	-1-22, 19R	5-15	3.1
S9A	0'R	0-15	1.5
S10A	100'L	0-15	2.9
S13A	400'R	0-15	1.7
S14A	500'L	0-15	1.8
S77A	0+18, 15L	0-5	1.5
S78A	0+85, 75L	0-5	1.6
S80	1+96, 15R	0-5	0.81
S83A	1+28, 75L	0-5	2.3
S86A	-0-43, 138L	0-5	1.4
S87A	1+25, 175L	0-5	1.5
S89A	1+25, 125L	0-5	2.8
S103A	4+25, 25L	0-5	1.5
S107A	3+75, 6R	0-5	1.0
S108B	5+90, 1R	5-15	0.59
S110B	4+75, 2R	5-15	0.56
S111A	6+75, 125R	0-5	7.4
S154B	1+83, 105R	5-15	2.4
S155A	1+61, 103R	0-5	2.1
S156B	1+21, 103R	5-15	2.0
S158A	2+25, 114R	0-5	4.0
S161A	2+55, 114R	0-5	13
S163A	5+25, 100R	0-5	2.9
S170B	2+68, 106R	5-15	340
S171B	0+49, 155L	5-15	2.1
S173A	3+25, 75L	0-5	3.4
S178A	3+75, 125L	0-5	1.8
S180A	-1-22, 71L	0-5	3.1
S181A	-1-22, 25L	0-5	3.2
S183A	-0-58, 103R	0-5	1.9
S184A	-0-25, 104R	0-5	2.6
S185A	0+25, 104R	0-5	2.3
S188A	2+75, 225L	0-5	2.3
S193A	7+03, 65R	0-5	2.0
S195A	3+25, 162L	0-5	3.2
S198A	4+75, 75L	0-5	1.7

<sup>a</sup>Locations shown on Fig. 9.

<sup>b</sup>Samples prefixed "A" were collected from auger holes, those prefixed "B" samples are radioactively biased samples, and "S" samples were systematically collected. The suffixes "A" and "B" indicate depth of sample collection.

**Table 13. Beryllium concentrations by area and weight in selected indoor dust samples from the industrial property at Peek Street**

Sample I.D. <sup>a</sup>	Total sample			Beryllium	
	Weight (g)	Area (ft <sup>2</sup> )	Dust (g/ft <sup>2</sup> )	(µg/ft <sup>2</sup> )	(µg/g)
M1	5.14	0.63	8.16	150	19
M2	11.62	1.25	9.3	210	23
M3	25.1	0.56	44.8	990	22
M4	11.62	1.25	9.3	220	24
M5	19.7	0.42	46.9	180	3.8
M6	252.29	1.0	252.3	330	1.3
M7	29.93	0.5	59.86	100	1.6
M8	12.11	0.5	24.22	53	2.2
M9	29.37	1.3	22.59	42	1.9
M10	20.23	1.5	13.49	20	1.5
M11	120.62	2.0	60.3	3000	49
M12	31.4	2.1	15	310	21
M13	26.37	1.75	15.07	12	0.8
M14	27.86	1.25	22.3	27	1.2
M15	18.04	1.47	12.27	20	1.6
M16	17.39	0.75	23.2	28	1.2
M17	25.29	0.97	26.07	47	1.8
M18	18.21	2.0	9.11	13	1.4
M19	12.18	0.97	12.56	5	0.42
M20	33.14	1.17	28.32	480	17
M32	24.55	0.66	37	2257	61

<sup>a</sup>Location shown on Fig. 20.

**Table 14. Concentrations of beryllium in floor and wall chips from the factory building at Peek Street including beta-gamma surface measurements before and after sample collection**

Sample I.D.	Location <sup>a</sup>	Beta-gamma (cpm)		Beryllium ( $\mu\text{g/g}$ )
		Prior to collection	After collection	
M21 <sup>b</sup>	Wall	10500	150	330
M34 <sup>b</sup>	Wall	330	77	6.1
M35	Wall	58	61	2.5
M36 <sup>b</sup>	Wall	710	69	2.2
M37	Wall	58	67	3.5
M38	Wall	56	48	1.4
M39 <sup>b</sup>	Floor	81	71	4.2
M40 <sup>b</sup>	Floor	64	60	<1
M41	Floor	73	76	2.3
M42	Wall	56	60	3.3
M43	Wall	57	63	1.4
M44	Wall	47	49	1.5
M45	Wall	47	46	1.1
M46	Floor	66	52	<1
M47	Wall	70	64	1.4
M48	Floor	52	52	<1
M49	Wall	64	60	1.3
M50	Floor	42	56	<1
M51	Wall	57	53	1.1
M52	Floor	65	65	1.0
M53	Wall	42	50	1.2
M54	Floor	43	44	<1
M55	Wall	48	63	1.2
M56	Wall	59	65	1.3

<sup>a</sup>Location shown on Figs. 9, 20, and 23.

<sup>b</sup>Sample collected from within the radiologically elevated area between columns 26E and 27E.



**Table 15. Gamma exposure rate measurements taken on the bike path and surrounding state-owned property**

Grid location <sup>a</sup>	Grid point measurements <sup>b</sup> ( $\mu\text{R/h}$ )		Range of gamma exposure rates from scan of grid block ( $\mu\text{R/h}$ )
	Gamma exposure rate at 1 m	Gamma exposure at the surface	
0+00, BL	9	8	
BL, R	-	-	7-11
BL, L	-	-	7-15
1+00, BL	8	8	
BL, R	-	-	7-14
BL, L	-	-	7-14
1+50, BL	8	8	
2+00, BL	8	8	
BL, R	-	-	7-13
BL, L	-	-	8-14
2+50, BL	8	8	
3+00, BL	9	8	
BL, R	-	-	8-12
BL, L	-	-	8-26
3+50, BL	10	8	
4+00, BL	10	8	
BL, R	-	-	8-24
BL, L	-	-	8-15
4+50, BL	10	9	
5+00, BL	9	8	
BL, R	-	-	8-17
BL, L	-	-	8-14
5+50, BL	10	8	
6+00, BL	10	9	
BL, R	-	-	7-14
BL, L	-	-	8-15
6+50, BL	10	9	
7+00, BL	9	9	
BL, R	-	-	7-12
BL, L	-	-	7-14
7+50, BL	9	8	
8+00, BL	9	8	
BL, R	-	-	8-14
BL, L	-	-	8-14
8+50, BL	8	9	
BL, R	-	-	8-14
BL, L	-	-	8-14

Table 15 (continued)

Grid location <sup>a</sup>	Grid point measurements <sup>b</sup> ( $\mu\text{R/h}$ )		Range of gamma exposure rates from scan of grid block ( $\mu\text{R/h}$ )
	Gamma exposure rate at 1 m	Gamma exposure at the surface	
9+00, BL	8	8	
BL, R	-	-	7-11
BL, L	-	-	7-15
9+50, BL	c	c	
BL, R	-	-	7-11
BL, L	-	-	7-15
-0-50, BL	8	8	
BL, R	-	-	5-8
BL, L	-	-	5-12
-1-00, BL	8	8	
BL, R	-	-	5-13
BL, L	-	-	7-14
-1-50, BL	8	9	
BL, R	-	-	7-12
BL, L	-	-	8-14

<sup>a</sup>Location shown on Fig. 24. Scan measurements were taken to the right (R) or left (L) of the Base Line (BL) as indicated, facing north.

<sup>b</sup>Grid point measurements are discrete measurements taken at intersections of grid lines.

<sup>c</sup>Measurement not made.

**Table 16. Radionuclide concentrations in soil samples collected from the state-owned property at Peek Street**

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>26</sup> Ra	<sup>137</sup> Cs
<i>Systematic samples<sup>c</sup></i>						
S6A	0-50'L	0-15	1.1 ± 0.48	0.83 ± 0.02	0.88 ± 0.02	0.28 ± 0.02
S6B	0-50'L	15-31	1.1 ± 0.64	0.81 ± 0.02	0.82 ± 0.02	0.05 ± 0.02
S7A	0-150'R	0-15	0.80 ± 0.34	0.50 ± 0.02	0.58 ± 0.02	0.32 ± 0.01
S7B	0-150'R	15-31	0.65 ± 0.28	0.52 ± 0.02	0.54 ± 0.02	0.02 ± 0.01
S8A	0'L	0-15	1.4 ± 0.44	0.95 ± 0.08	1.0 ± 0.02	0.59 ± 0.01
S8B	0'L	15-31	<1.3	0.99 ± 0.02	0.99 ± 0.02	0.13 ± 0.02
S9B	0'R	15-31	<1.1	0.63 ± 0.02	0.62 ± 0.02	0.10 ± 0.01
S10A	100'L	0-15	1.6 ± 0.42	0.96 ± 0.02	1.4 ± 0.02	0.24 ± 0.02
S10B	100'L	15-31	<1.3	0.97 ± 0.04	1.1 ± 0.02	0.05 ± 0.01
S11B	200'R	15-31	1.1 ± 0.44	0.63 ± 0.02	0.67 ± 0.02	0.23 ± 0.01
S12A	300'L	0-15	<1.5	1.2 ± 0.04	1.2 ± 0.02	0.14 ± 0.02
S12B	300'L	15-31	<1.2	0.71 ± 0.04	0.76 ± 0.02	0.03 ± 0.01
S13A	400'R	0-15	1.1 ± 0.40	0.81 ± 0.02	0.81 ± 0.02	0.70 ± 0.01
S13B	400'R	15-31	0.96 ± 1.0	0.87 ± 0.06	1.0 ± 0.04	0.25 ± 0.04
S14A	500'L	0-15	1.0 ± 0.48	0.79 ± 0.04	0.87 ± 0.02	0.93 ± 0.01
S14B	500'L	15-31	0.96 ± 0.48	0.85 ± 0.04	0.84 ± 0.02	0.33 ± 0.01
S15A	600'R	0-15	1.2 ± 0.42	0.92 ± 0.06	1.1 ± 0.02	0.11 ± 0.01
S15B	600'R	15-31	<2.5	0.83 ± 0.06	0.91 ± 0.04	0.04 ± 0.02
S16A	700'L	0-15	<0.99	0.62 ± 0.02	0.59 ± 0.02	0.02 ± 0.01
S16B	700'L	15-31	0.63 ± 0.26	0.47 ± 0.02	0.46 ± 0.02	<0.01
S17A	800'R	0-15	0.79 ± 0.42	0.72 ± 0.02	0.75 ± 0.02	0.24 ± 0.01
S17B	800'R	15-31	0.66 ± 0.26	0.45 ± 0.02	0.45 ± 0.02	0.02 ± 0.01
S18A	900'L	0-15	1.3 ± 0.70	1.2 ± 0.04	1.3 ± 0.02	0.09 ± 0.01
S18B	900'L	15-31	<1.9	0.94 ± 0.04	0.94 ± 0.02	<0.02
S19A	900'R	0-15	2.4 ± 0.86	1.3 ± 0.04	1.5 ± 0.02	0.14 ± 0.02
S19B	900'R	15-31	1.5 ± 0.48	1.1 ± 0.04	1.2 ± 0.02	<0.01
<i>Biased samples<sup>d</sup></i>						
B10A	300'L	0-15	71 ± 2.3	1.2 ± 0.08	1.3 ± 0.04	0.80 ± 0.02
B10B	300'L	15-31	9.6 ± 0.62	1.1 ± 0.06	1.1 ± 0.02	0.11 ± 0.01
B11A	400'R	0-15	2.6 ± 0.90	2.2 ± 0.04	2.2 ± 0.02	0.80 ± 0.02
B11B	400'R	15-31	<4.1	3.5 ± 0.10	3.6 ± 0.06	0.17 ± 0.04
B11C	400'R	31-46	8.9 ± 2.9	4.7 ± 0.12	4.6 ± 0.08	<0.04
B12A	400'R	0-15	3.2 ± 1.7	2.0 ± 0.08	2.1 ± 0.06	0.39 ± 0.04
B12B	400'R	15-31	2.9 ± 1.0	2.1 ± 0.16	2.0 ± 0.04	0.26 ± 0.02

Table 16 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
B53A	3+32, 115R	0-5	21 ± 1.5	1.2 ± 0.08	1.2 ± 0.05	1.2 ± 0.05
B53B	3+32, 115R	5-15	11 ± 1.2	1.1 ± 0.04	1.1 ± 0.02	0.3 ± 0.02
B54A	3+43, 113R	0-5	38 ± 2.8	1.3 ± 0.09	1.3 ± 0.05	1.1 ± 0.05
B54B	3+43, 113R	5-15	12 ± 1.1	1.2 ± 0.04	1.3 ± 0.03	0.30 ± 0.02
B65A	3+32, 113R	0-5	230 ± 21	1.9 ± 0.27	1.9 ± 0.16	1.2 ± 0.19
B65B	3+32, 113R	5-15	20 ± 3.7	1.3 ± 0.11	1.4 ± 0.06	0.13 ± 0.03
<i>Auger samples<sup>e</sup></i>						
A37	3+31, 127R	80-115	2.0 ± 0.45	0.62 ± 0.02	0.54 ± 0.01	<i>f</i>
A38A	3+28, 118R	0-15	18 ± 4.3	1.3 ± 0.14	1.4 ± 0.07	1.0 ± 0.09
A38B	3+28, 118R	15-31	3.1 ± 1.7	1.1 ± 0.07	1.1 ± 0.04	0.03 ± 0.03
A38C	3+28, 118R	80-115	1.2 ± 0.50	0.73 ± 0.02	0.69 ± 0.01	<0.1
A38D	3+28, 118R	115-150	3.3 ± 0.66	1.6 ± 0.03	1.6 ± 0.02	<0.1
A38E	3+28, 118R	150-190	2.6 ± 0.78	1.2 ± 0.03	1.2 ± 0.02	<0.1
A38F	3+28, 118R	190-230	1.2 ± 0.60	0.79 ± 0.02	0.79 ± 0.02	<0.004
A38G	3+28, 118R	230-270	1.2 ± 0.48	0.80 ± 0.02	0.83 ± 0.01	<0.1
A38H	3+28, 118R	270-310	3.1 ± 0.70	2.2 ± 0.04	2.2 ± 0.03	<0.006
A38I	3+28, 118R	310-350	<3	1.6 ± 0.03	1.5 ± 0.03	<0.1
A38J	3+28, 118R	350-390	0.46 ± 0.37	0.43 ± 0.01	0.33 ± 0.01	<0.1
A38K	3+28, 118R	390-425	1.0 ± 0.45	0.46 ± 0.01	0.48 ± 0.01	<0.1
A38L	3+28, 118R	425-465	<2	1.2 ± 0.02	0.96 ± 0.02	<0.1
A38M	3+28, 118R	465-540	1.7 ± 0.60	0.99 ± 0.02	0.99 ± 0.02	0.013 ± 0.004
A38N	3+28, 118R	540-580	<2	1.4 ± 0.03	1.3 ± 0.02	<0.1
A38O	3+28, 118R	580-620	<2	1.2 ± 0.02	1.2 ± 0.02	<0.1
A38P	3+28, 118R	620-660	2.3 ± 0.44	1.2 ± 0.02	1.3 ± 0.02	<0.005
A38Q	3+28, 118R	660-700	1.9 ± 0.60	1.2 ± 0.03	1.1 ± 0.02	<0.1
A38R	3+28, 118R	700-740	1.4 ± 0.59	0.92 ± 0.02	1.0 ± 0.02	<0.1
A38S	3+28, 118R	740-775	2.1 ± 0.62	1.1 ± 0.02	0.85 ± 0.01	<0.1
A40	3+40, 114R	115-150	<2	1.5 ± 0.03	1.6 ± 0.02	<i>f</i>
A53	4+13, 116R	110-150	0.85 ± 0.33	0.79 ± 0.03	0.79 ± 0.02	0.01 ± 0.01

<sup>a</sup>Locations of soil samples are shown on Fig. 24.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Systematic samples are taken at selected locations irrespective of gamma exposure rate.

<sup>d</sup>Biased samples are taken from areas shown to have elevated gamma exposure rates.

<sup>e</sup>Auger samples are taken from holes drilled to further define the depth and extent of radioactive material. Holes are drilled where surface measurements may or may not have been elevated.

<sup>f</sup>Not analyzed.

Table 17. Radionuclide concentrations in soil samples collected from the vicinity properties, 413 and 417 Peck Street

Sample <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
		<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
<i>Systematic samples<sup>c</sup></i>					
<b>413 Peck Street</b>					
S1A	0-5	1.1 ± 0.79	0.71 ± 0.03	0.73 ± 0.04	0.52 ± 0.03
S1B	5-15	1.4 ± 0.90	0.88 ± 0.03	0.82 ± 0.04	0.36 ± 0.02
S2A	0-5	1.6 ± 0.83	1.2 ± 0.04	1.2 ± 0.02	0.32 ± 0.02
S2B	5-15	2.2 ± 0.52	2.0 ± 0.03	2.0 ± 0.04	0.13 ± 0.01
<b>417 Peck Street</b>					
S1A	0-5	2.4 ± 0.87	0.75 ± 0.02	0.74 ± 0.01	0.25 ± 0.01
S1B	5-15	1.1 ± 0.46	0.84 ± 0.02	0.76 ± 0.03	0.17 ± 0.01
S2A	0-5	1.0 ± 0.69	0.84 ± 0.02	0.81 ± 0.03	0.34 ± 0.02
S2B	5-15	1.4 ± 0.77	1.0 ± 0.02	0.88 ± 0.03	0.30 ± 0.01
<i>Biased samples<sup>d</sup></i>					
B1A	0-5	2.4 ± 1.7	0.71 ± 0.03	0.73 ± 0.04	0.84 ± 0.04
B1B	5-15	2.2 ± 0.91	0.88 ± 0.03	0.82 ± 0.03	0.25 ± 0.01
B1C	15-30	2.4 ± 1.4	1.5 ± 0.04	1.4 ± 0.03	0.16 ± 0.02

<sup>a</sup>Locations of soil samples are shown on Fig. 25.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Systematic samples are taken at selected locations irrespective of gamma exposure rate.

<sup>d</sup>Biased samples are taken from areas shown to have elevated gamma exposure rates.

**Table 18. Radionuclide concentrations in soil samples collected from the railroad property at Peek Street**

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
<i>Systematic samples<sup>c</sup></i>						
S93A	2+25, 125L	0-5	1.0 ± 0.5	0.27 ± 0.02	0.47 ± 0.02	0.10 ± 0.008
S93B	2+25, 125L	5-15	0.30 ± 0.2	0.089 ± 0.003	0.10 ± 0.002	0.016 ± 0.001
S173A	3+25, 75L	0-5	1.6 ± 0.39	1.3 ± 0.03	1.2 ± 0.02	0.72 ± 0.02
S173B	3+25, 75L	5-15	1.4 ± 0.76	1.1 ± 0.03	1.2 ± 0.02	0.36 ± 0.01
S174A	3+75, 75L	0-5	1.4 ± 0.39	1.3 ± 0.03	1.2 ± 0.02	1.0 ± 0.02
S174B	3+75, 75L	5-15	1.3 ± 0.81	1.3 ± 0.04	1.4 ± 0.03	0.28 ± 0.02
S175A	4+25, 75L	0-5	1.2 ± 0.44	0.72 ± 0.03	0.81 ± 0.02	1.8 ± 0.03
S177A	3+25, 125L	0-5	1.5 ± 0.92	0.95 ± 0.04	0.97 ± 0.02	0.82 ± 0.03
S177B	3+25, 125L	5-15	1.9 ± 0.66	1.1 ± 0.03	1.2 ± 0.02	0.43 ± 0.01
S178A	3+75, 125L	0-5	1.0 ± 0.76	0.86 ± 0.04	0.86 ± 0.02	0.73 ± 0.02
S179A	4+25, 125L	0-5	1.7 ± 0.57	1.6 ± 0.04	1.4 ± 0.02	1.1 ± 0.02
S179B	4+25, 125L	5-15	0.92 ± 0.43	1.2 ± 0.04	1.2 ± 0.02	0.38 ± 0.01
S188A	2+75, 225L	0-5	1.4 ± 0.92	1.1 ± 0.04	1.2 ± 0.02	1.4 ± 0.03
S188B	2+75, 225L	5-15	1.3 ± 0.39	1.0 ± 0.03	1.0 ± 0.02	0.71 ± 0.02
S189A	2+75, 175L	0-5	1.2 ± 0.85	1.3 ± 0.04	1.3 ± 0.03	0.80 ± 0.02
S189B	2+75, 175L	5-15	1.3 ± 0.88	1.6 ± 0.04	1.5 ± 0.02	0.30 ± 0.01
S192A	2+45, 230L	0-5	1.1 ± 0.39	0.99 ± 0.03	1.1 ± 0.02	0.98 ± 0.02
S195A	3+25, 162L	0-5	1.5 ± 0.72	1.7 ± 0.05	1.7 ± 0.03	1.9 ± 0.04
S196A	3+62, 172L	0-5	1.8 ± 0.96	2.3 ± 0.04	2.2 ± 0.03	0.04 ± 0.01
S196B	3+62, 172L	5-15	1.9 ± 0.70	1.3 ± 0.03	1.4 ± 0.02	<0.01
S198A	4+75, 75L	0-5	2.6 ± 1.3	0.88 ± 0.04	1.0 ± 0.03	1.5 ± 0.04
S199A	4+62, 110L	0-5	1.4 ± 0.69	1.8 ± 0.04	1.1 ± 0.02	0.52 ± 0.01
S200A	4+02, 158L	0-5	1.6 ± 0.44	1.7 ± 0.04	1.6 ± 0.02	0.33 ± 0.01
S201A	2+04, 262L	0-5	1.3 ± 0.39	0.89 ± 0.03	0.93 ± 0.02	0.68 ± 0.02
S202A	1+75, 281L	0-5	2.4 ± 0.88	1.1 ± 0.06	1.1 ± 0.03	0.27 ± 0.02
S202B	1+75, 281L	5-15	1.7 ± 0.99	1.1 ± 0.03	1.2 ± 0.02	0.08 ± 0.01
S203A	1+25, 282L	0-5	3.5 ± 1.8	2.0 ± 0.08	1.9 ± 0.05	1.4 ± 0.05
S204A	0+75, 262L	0-5	0.88 ± 0.44	0.43 ± 0.03	0.65 ± 0.02	0.05 ± 0.01
S205A	3+00, 282L	0-5	<1.6	1.3 ± 0.05	1.1 ± 0.03	1.7 ± 0.03
S205B	3+00, 282L	5-15	2.6 ± 1.5	1.7 ± 0.06	1.6 ± 0.04	0.30 ± 0.02
S206A	3+25, 225L	0-5	1.4 ± 0.84	0.78 ± 0.05	0.80 ± 0.03	0.64 ± 0.03
<i>Biased samples<sup>d</sup></i>						
B50	2+02, 161L	0-15	1.3 ± 0.69	1.1 ± 0.05	1.1 ± 0.03	0.01 ± 0.01
B62A	2+95, 235L	0-5	3.1 ± 1.5	2.6 ± 0.06	2.4 ± 0.04	0.94 ± 0.03
B62B	2+95, 235L	5-15	2.0 ± 0.89	1.6 ± 0.04	1.6 ± 0.02	0.45 ± 0.02
B63A	2+56, 248L	0-5	3.5 ± 1.2	3.4 ± 0.06	3.2 ± 0.04	0.86 ± 0.03
B63B	2+56, 248L	5-15	4.4 ± 1.8	3.9 ± 0.14	3.6 ± 0.09	0.86 ± 0.05
<i>Auger hole samples<sup>e</sup></i>						
A11	2+26, 204L	200-210	0.69 ± 0.38	0.74 ± 0.02	0.74 ± 0.01	<0.01
A13	2+35, 138L	0-15	0.84 ± 0.71	0.42 ± 0.02	0.56 ± 0.02	<0.01
A14	2+50, 101L	90-105	<0.5	0.77 ± 0.02	0.95 ± 0.02	<0.004
A35	4+58, 111L	30-45	2.0 ± 1.0	1.6 ± 0.08	1.7 ± 0.05	0.01 ± 0.01

Table 18 (continued)

Sample ID	Grid location <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g) <sup>b</sup>			
			<sup>238</sup> U	<sup>232</sup> Th	<sup>226</sup> Ra	<sup>137</sup> Cs
A36	3+57, 201L	0-15	1.0 ± 0.34	0.82 ± 0.03	0.85 ± 0.02	0.02 ± 0.01
A48	2+82, 169L	0-15	1.8 ± 0.88	1.1 ± 0.03	1.1 ± 0.02	0.05 ± 0.01
A49	3+64, 127L	0-15	1.3 ± 0.74	0.92 ± 0.03	0.99 ± 0.02	0.08 ± 0.01
A51A	4+07, 88L	0-15	1.4 ± 1.1	0.64 ± 0.06	0.95 ± 0.04	0.31 ± 0.04
A51B	4+07, 88L	15-30	1.0 ± 0.36	0.63 ± 0.03	0.90 ± 0.02	0.04 ± 0.01
A51C	4+07, 88L	30-45	1.3 ± 0.86	0.88 ± 0.04	0.90 ± 0.02	<0.01
A51D	4+07, 88L	60-75	1.6 ± 0.82	0.83 ± 0.04	0.91 ± 0.02	<0.01
A51E	4+07, 88L	75-90	1.7 ± 0.87	0.81 ± 0.03	0.88 ± 0.02	<0.01
A51F	4+07, 88L	90-110	1.5 ± 0.73	0.86 ± 0.03	0.88 ± 0.02	<0.01

<sup>a</sup>Locations of soil samples are shown on Figs. 9, 16, and 17.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Systematic samples are taken at selected locations irrespective of gamma exposure rate.

<sup>d</sup>Biased samples are taken from areas shown to have elevated gamma exposure rates.

<sup>e</sup>Auger hole samples are taken from holes drilled to further define the depth and extent of radioactive material. Holes are drilled where the surface measurements may or may not have been elevated.

# **APPENDIX A**

## **GAMMA PROFILE GRAPHS OF AUGER HOLES AT THE PEEK STREET PROPERTIES**



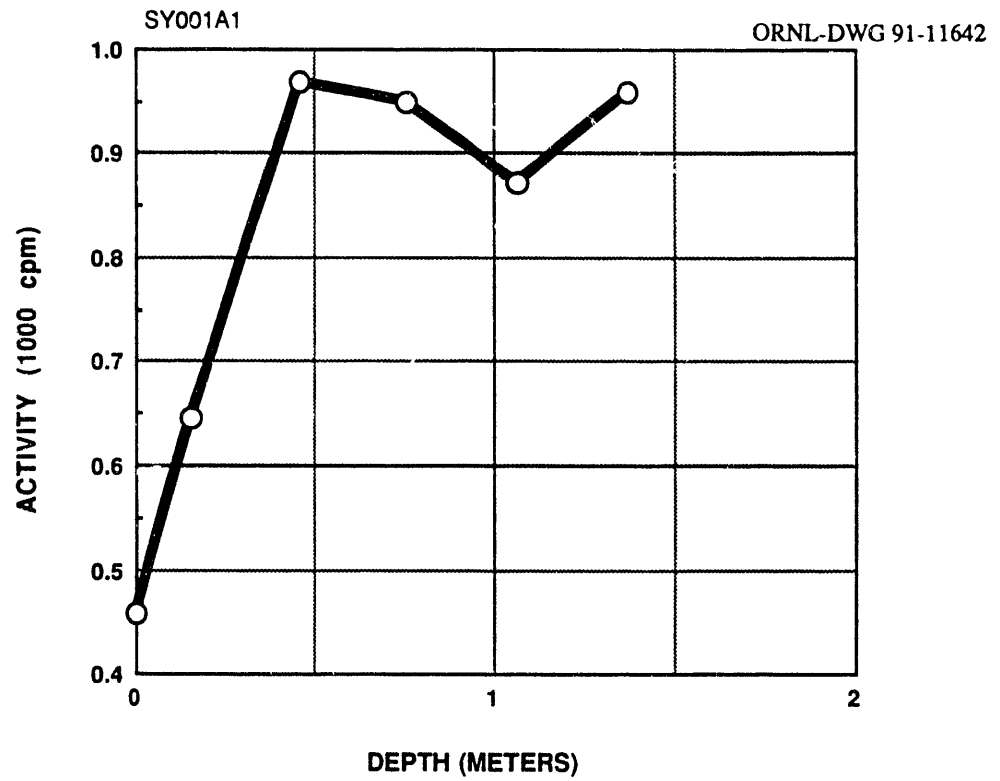


Fig. A.1. Gamma profile of auger hole A001.

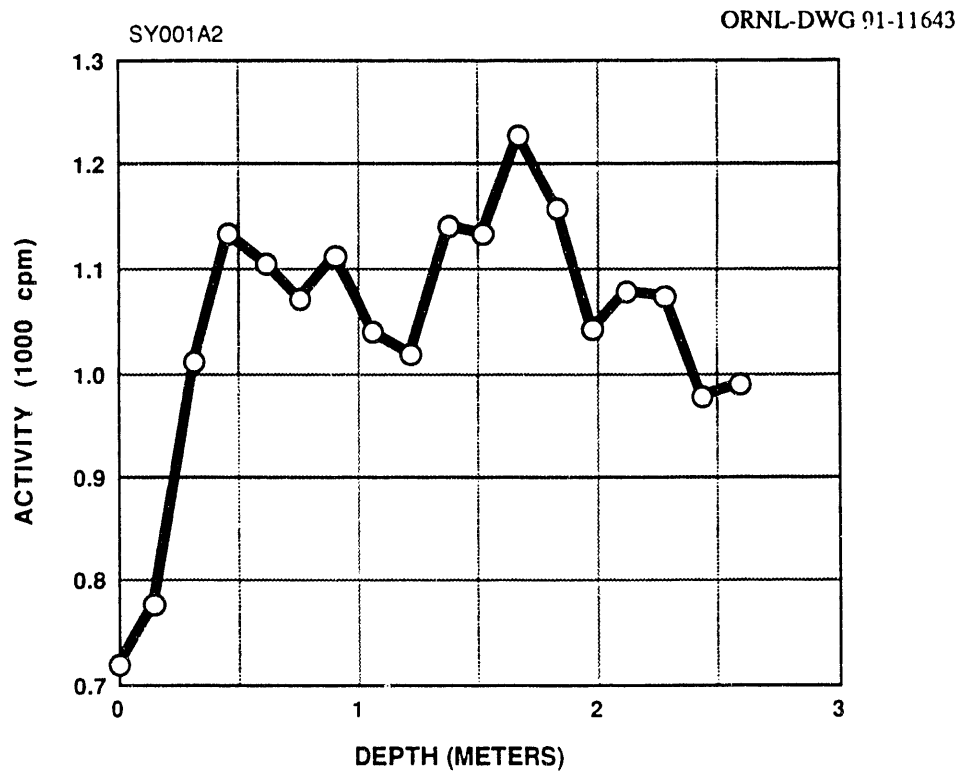


Fig. A.2. Gamma profile of auger hole A002.

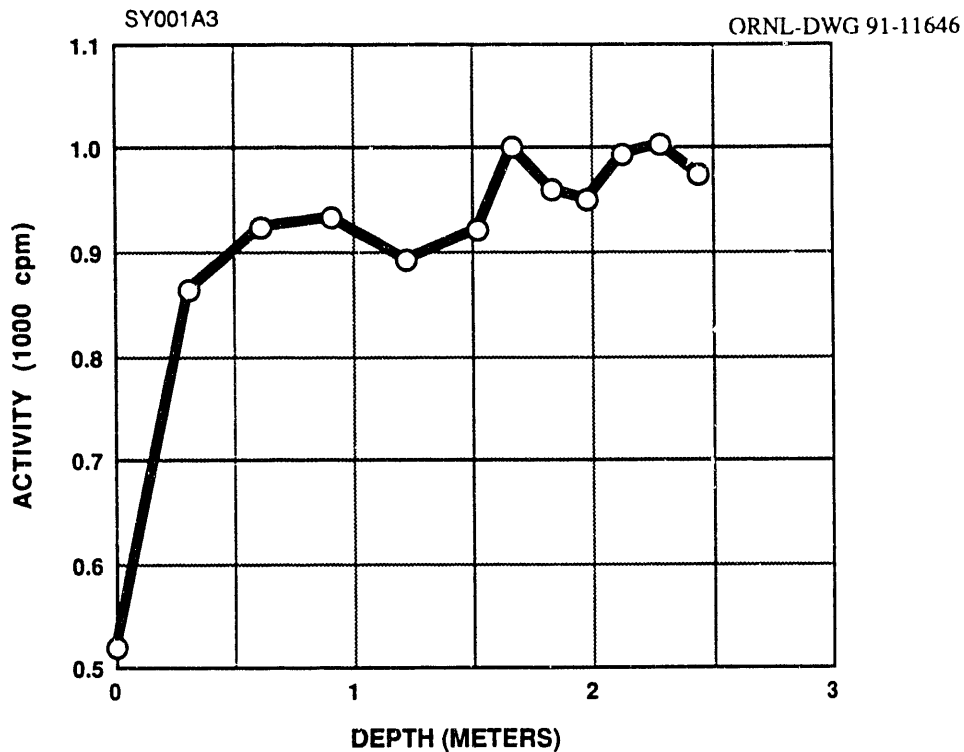


Fig. A.3. Gamma profile of auger hole A003.

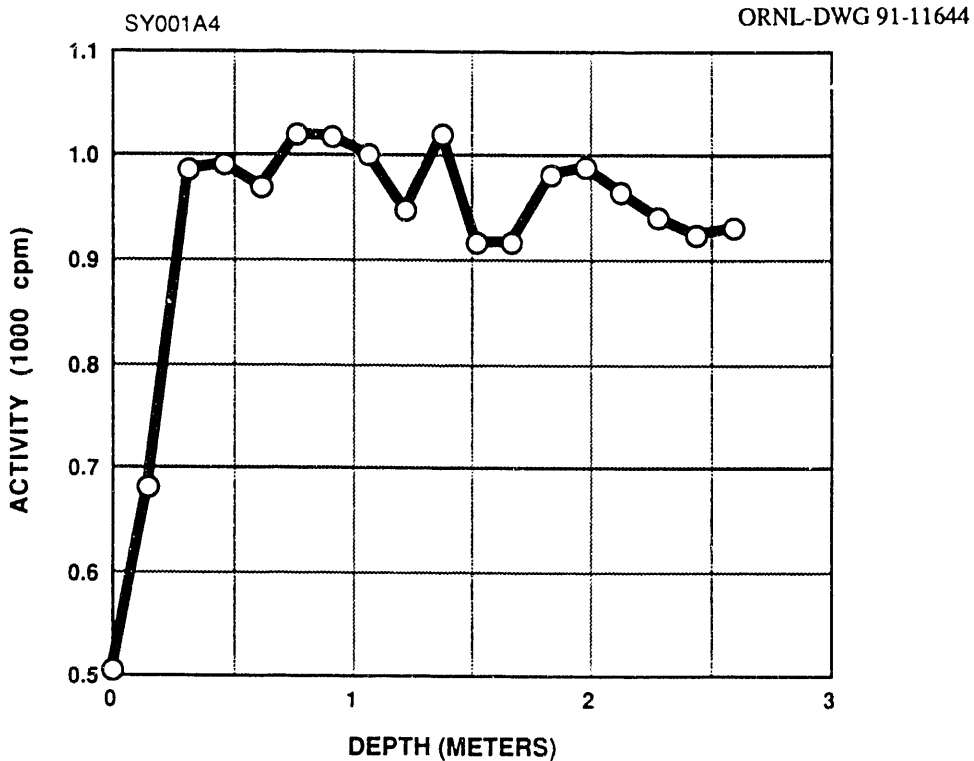


Fig. A.4. Gamma profile of auger hole A004.

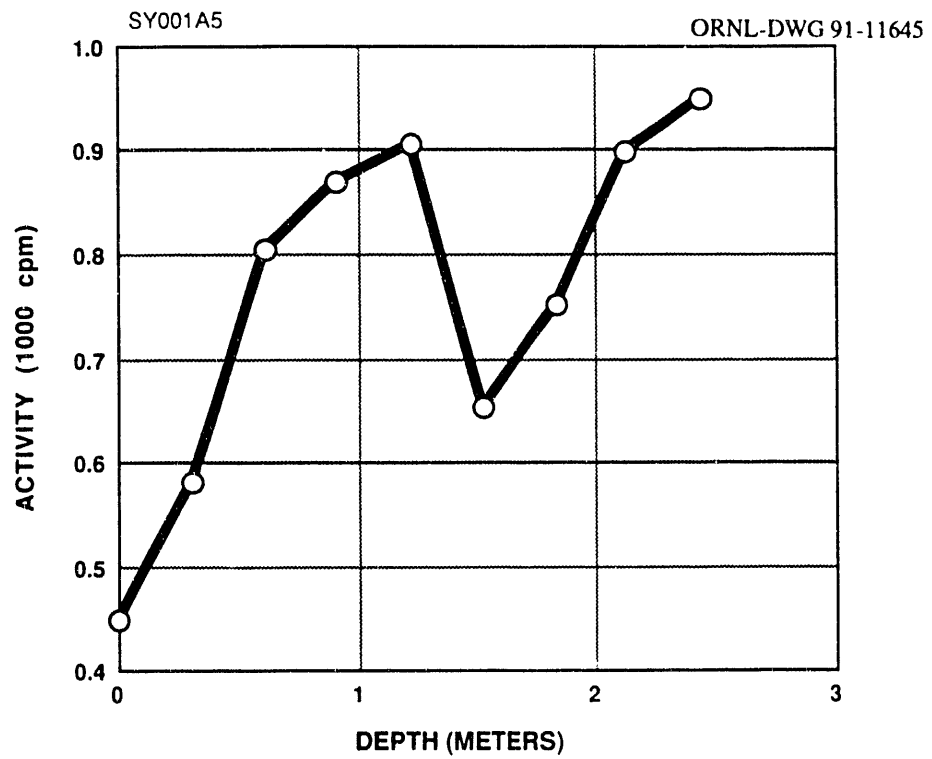


Fig. A.5. Gamma profile of auger hole A005.

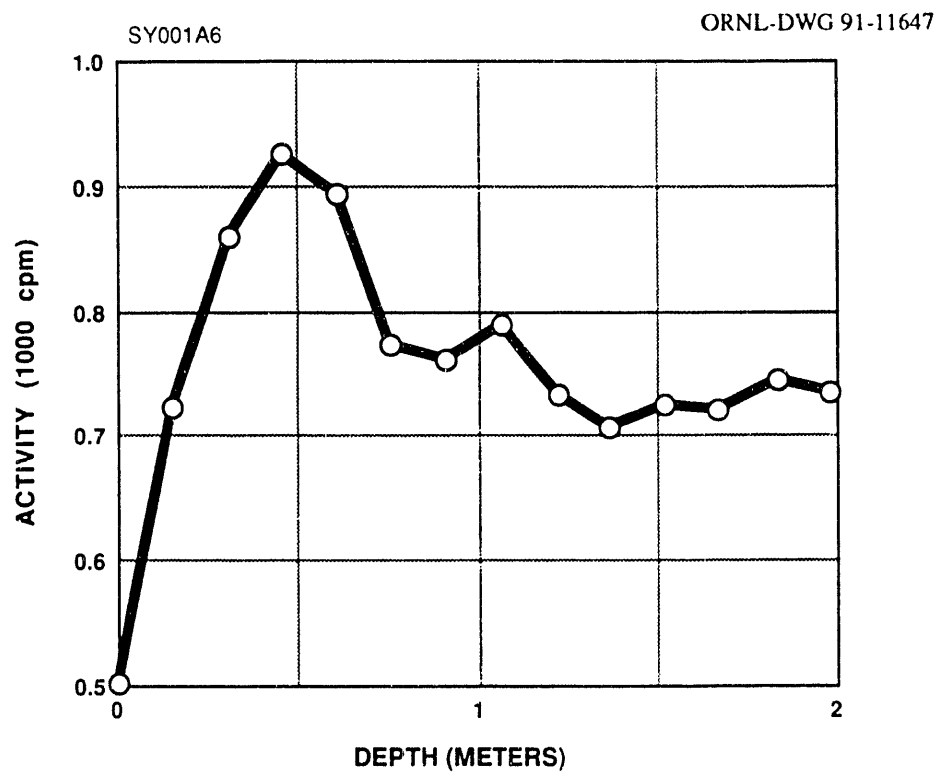


Fig. A.6. Gamma profile of auger hole A005.

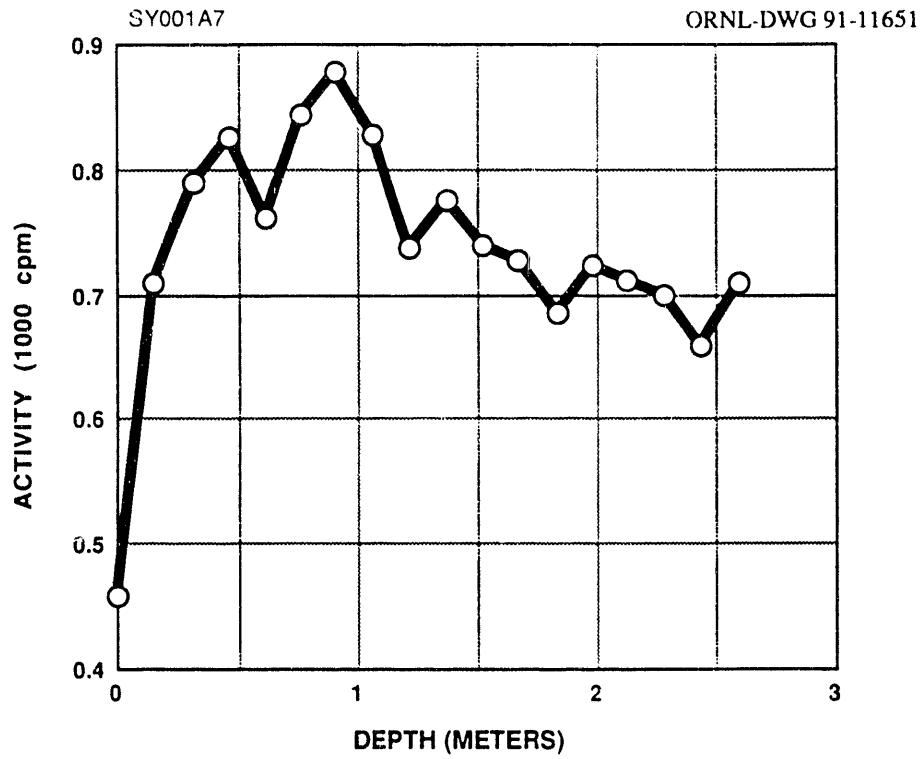


Fig. A.7. Gamma profile of auger hole A007.

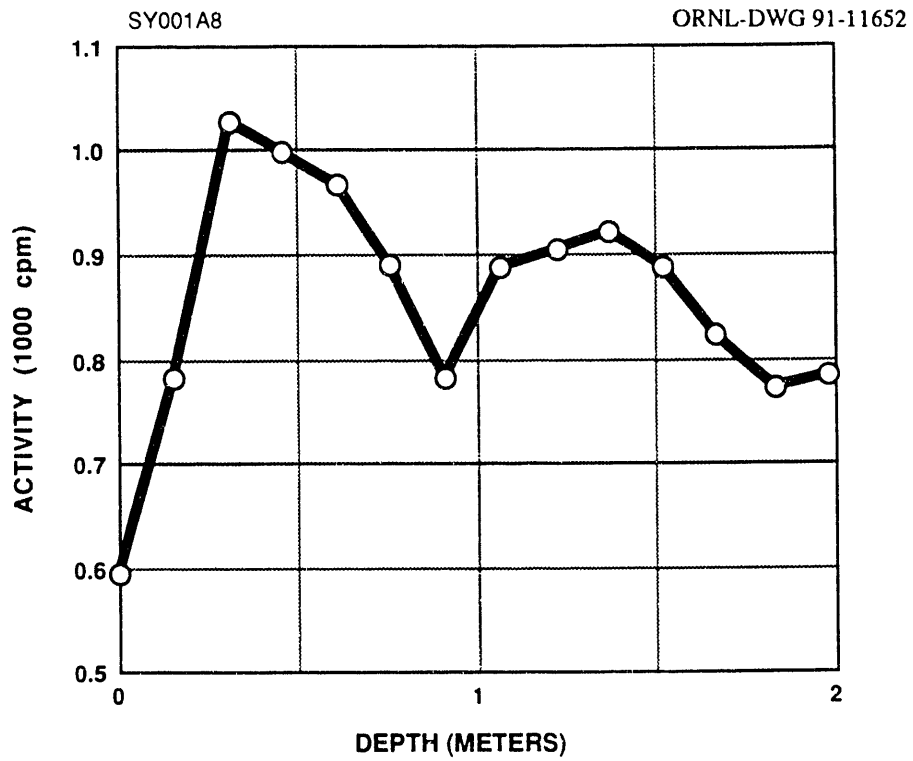


Fig. A.8. Gamma profile of auger hole A008.

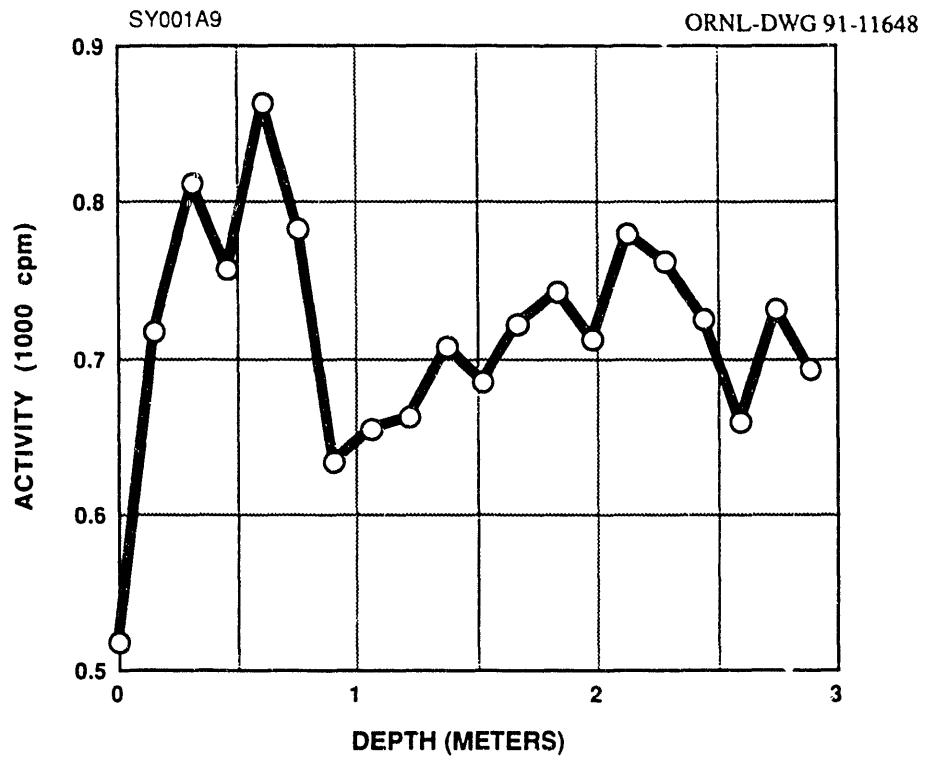


Fig. A.9. Gamma profile of auger hole A009.

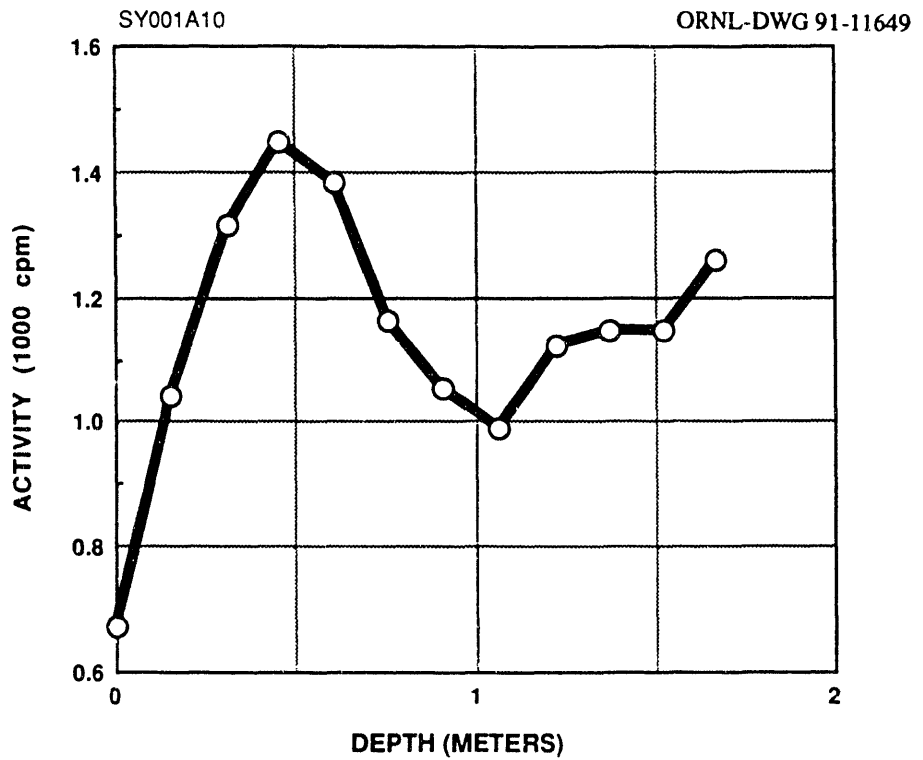


Fig. A.10. Gamma profile of auger hole A010.

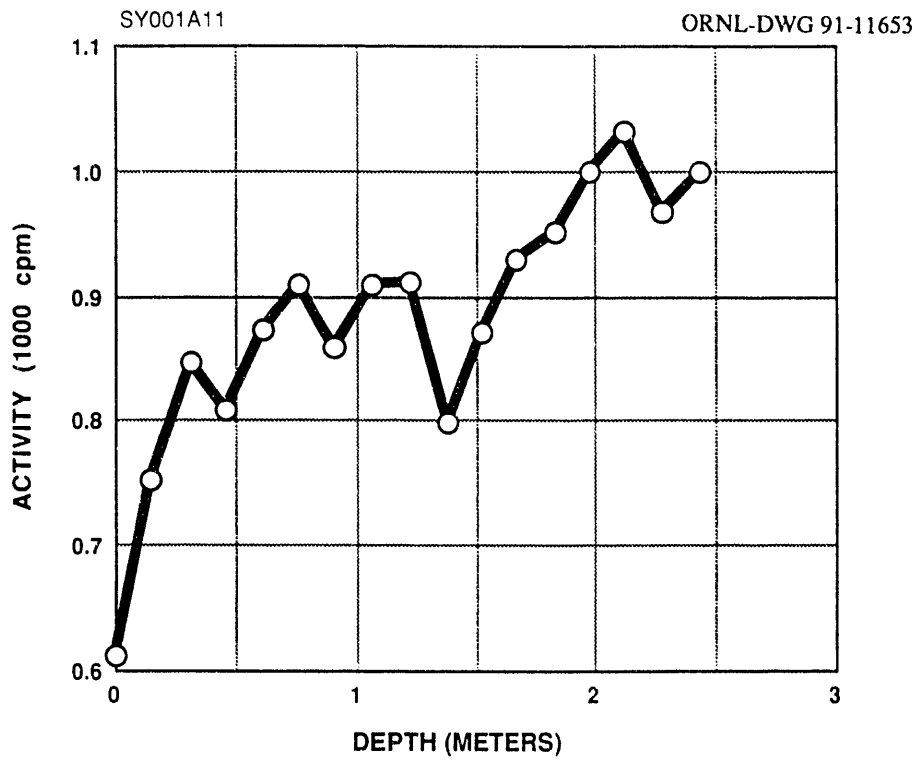


Fig. A.11. Gamma profile of auger hole A011.

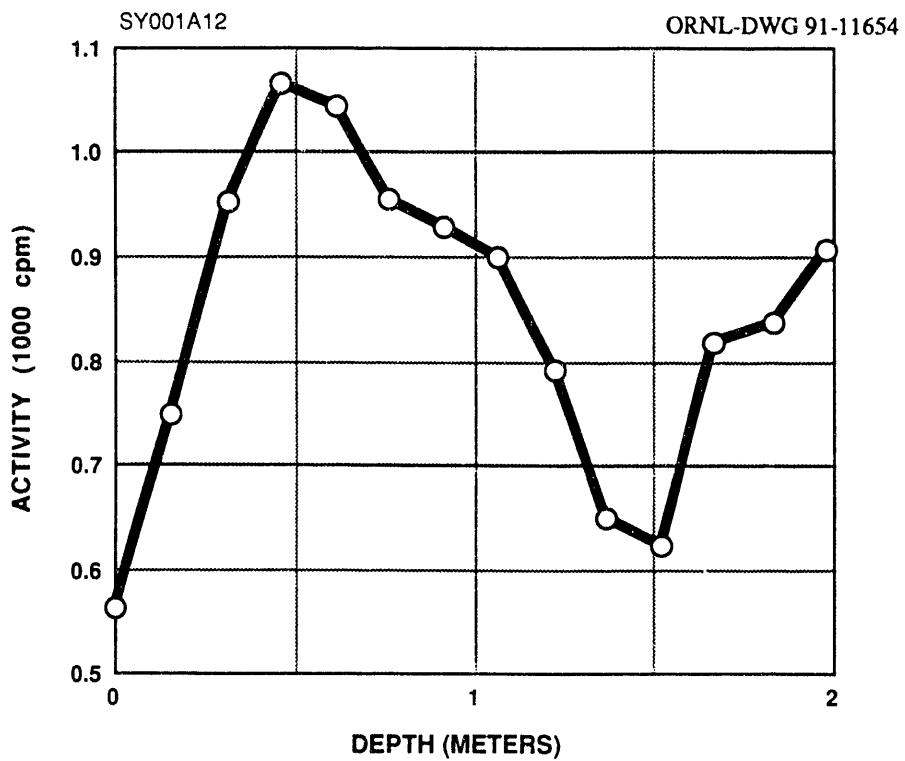


Fig. A.12. Gamma profile of auger hole A012.

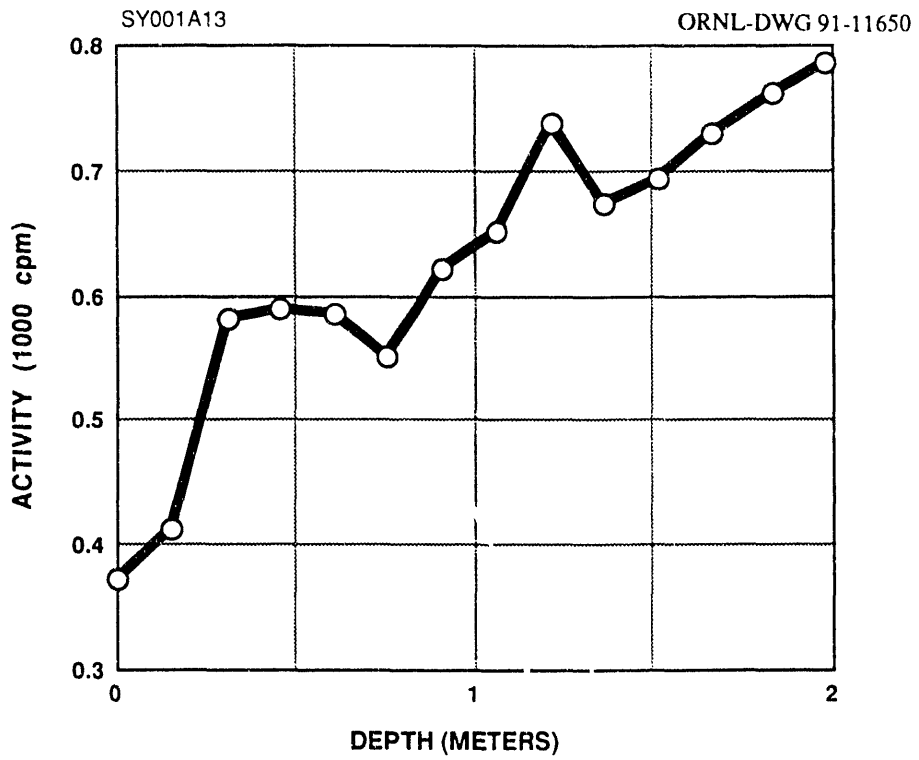


Fig. A.13. Gamma profile of auger hole A013.

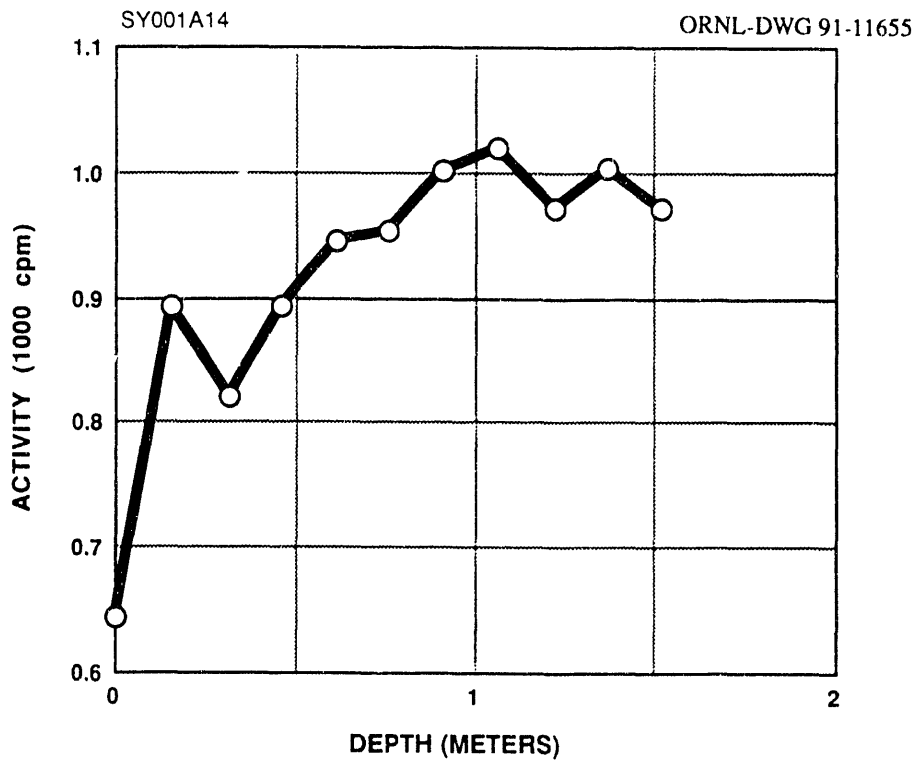


Fig. A.14. Gamma profile of auger hole A014.

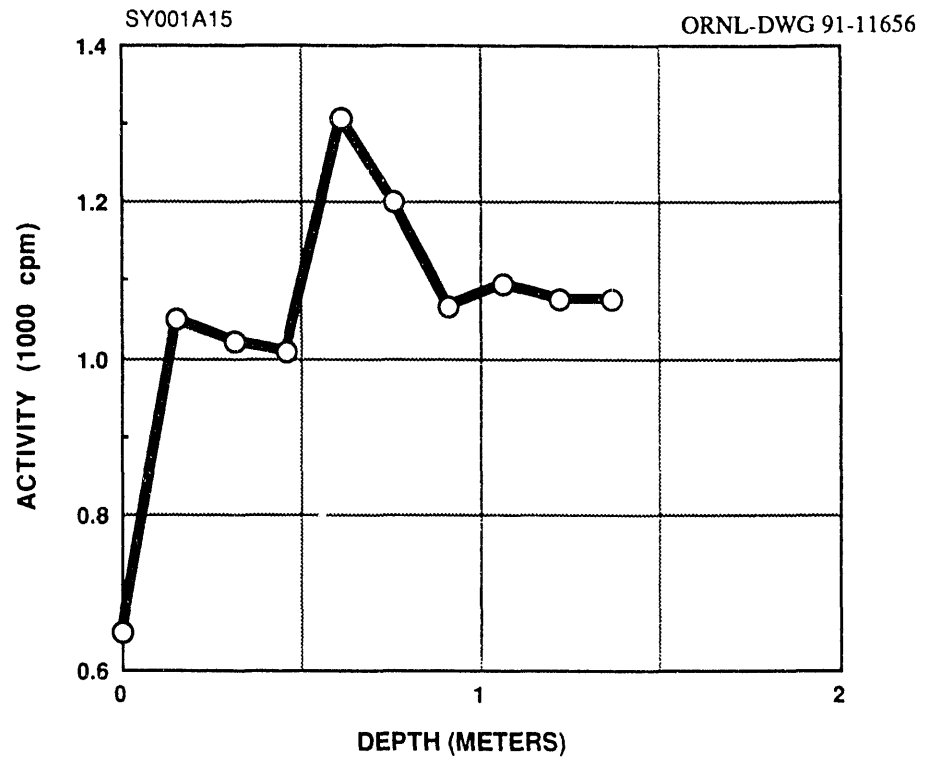


Fig. A.15. Gamma profile of auger hole A015.

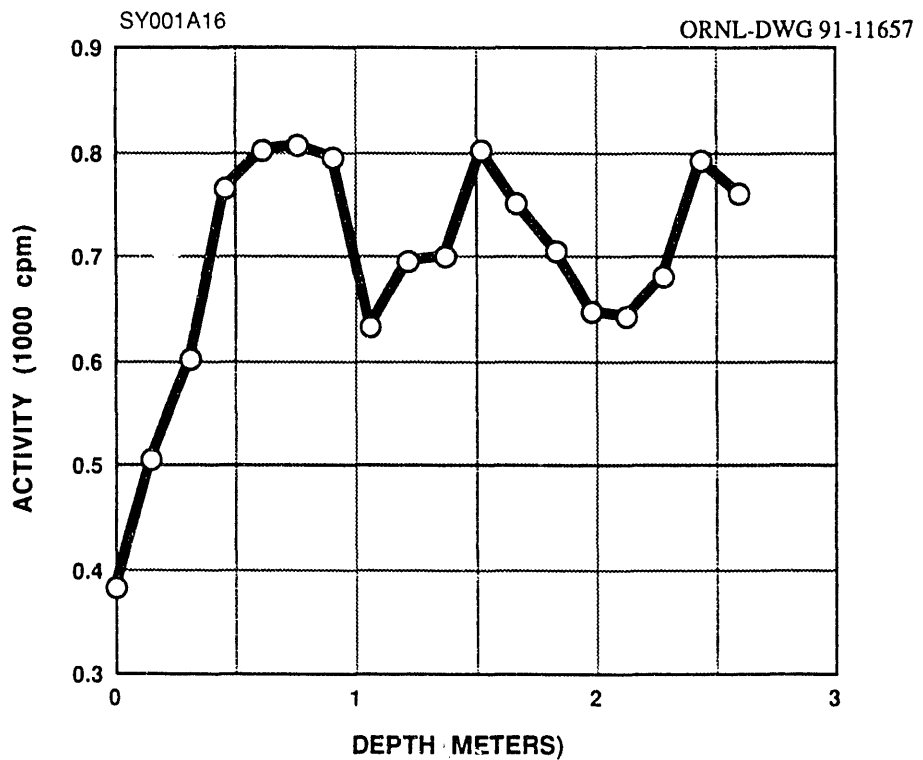


Fig. A.16. Gamma profile of auger hole A016.



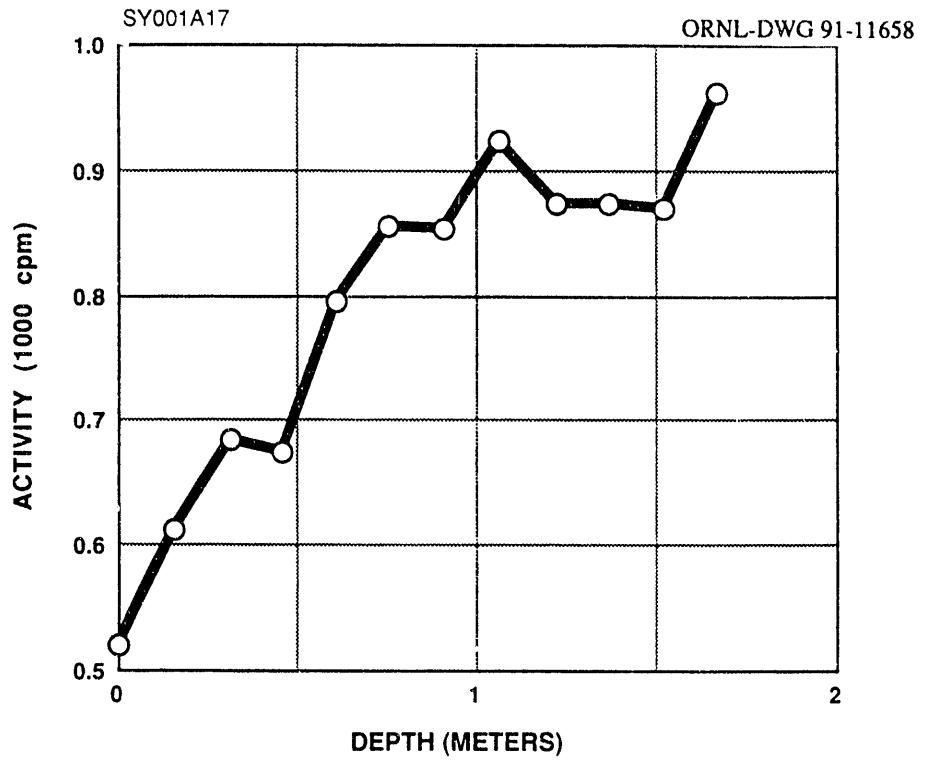


Fig. A.17. Gamma profile of auger hole A017.

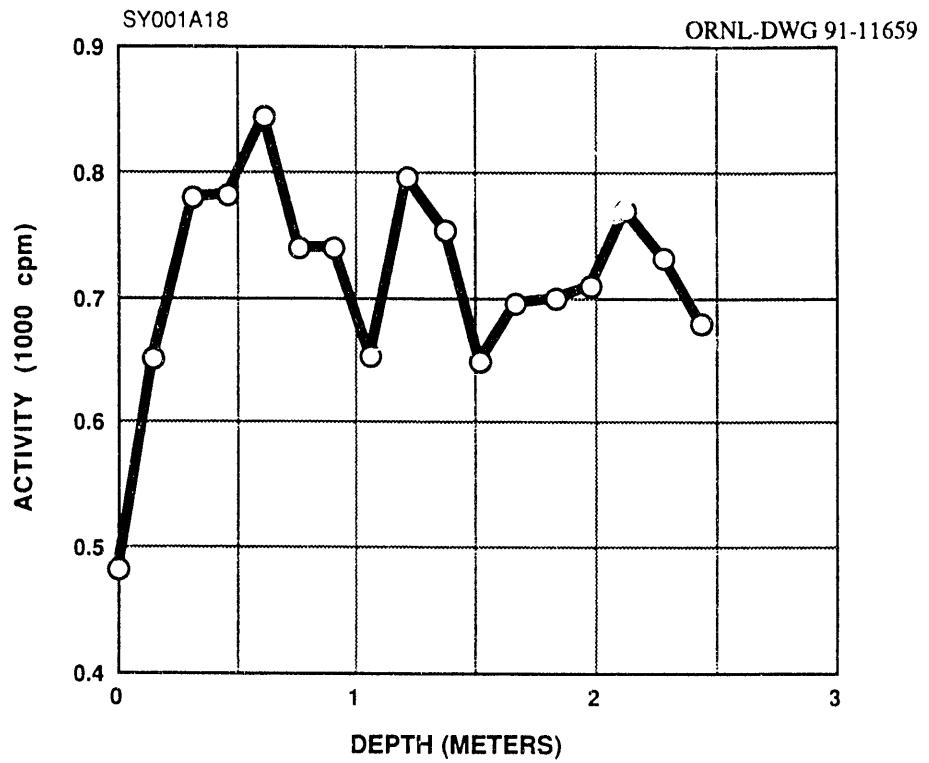


Fig. A.18. Gamma profile of auger hole A018.

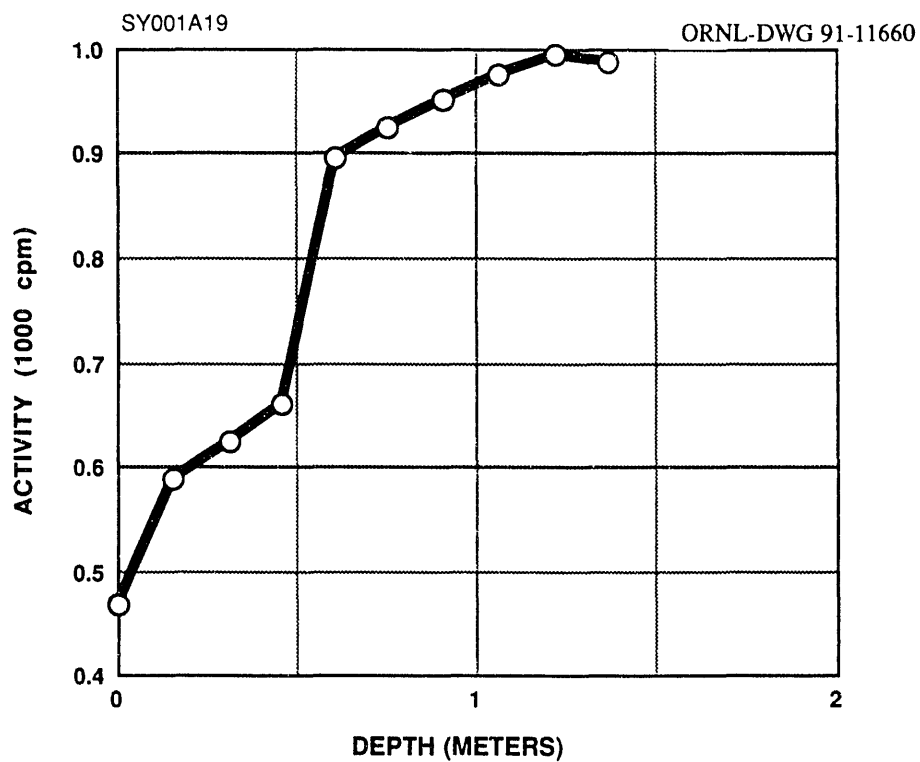


Fig. A.19. Gamma profile of auger hole A019.

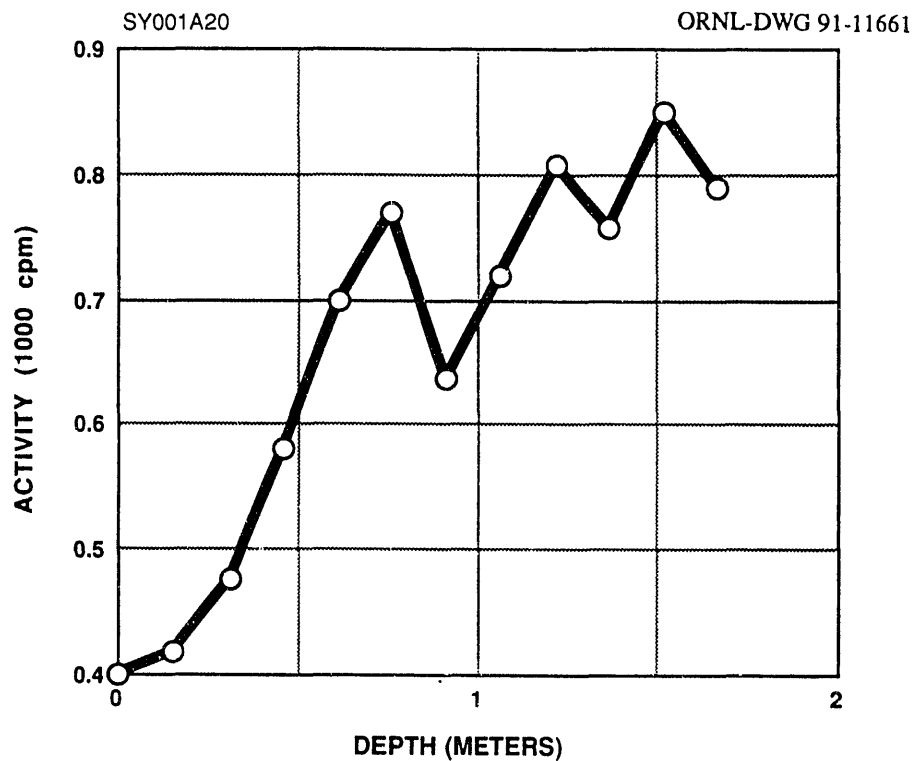


Fig. A.20. Gamma profile of auger hole A020.

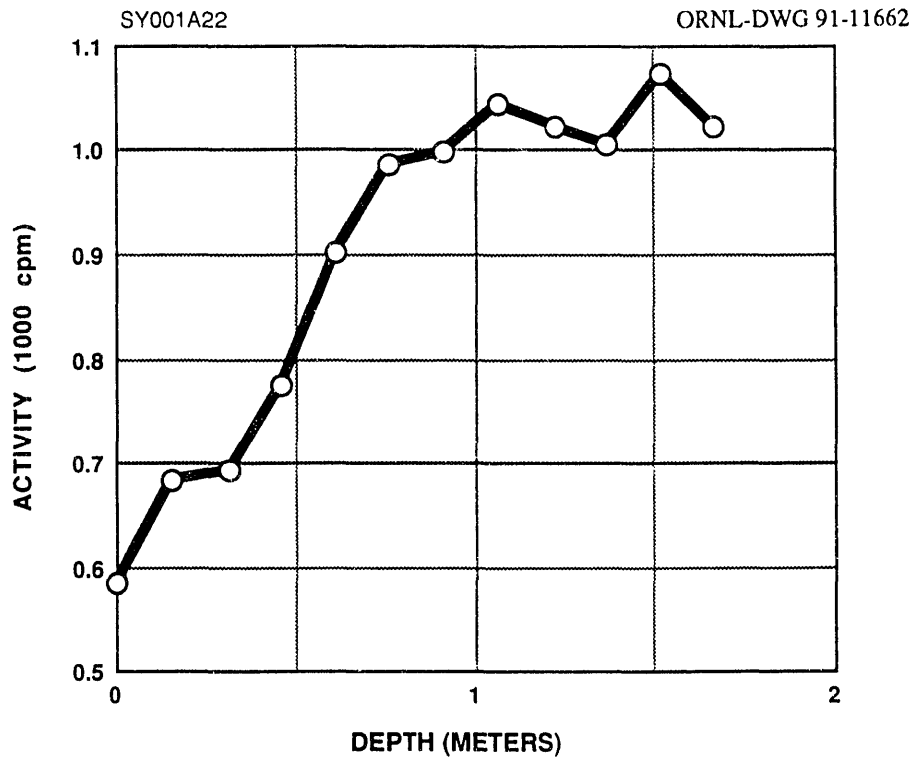


Fig. A.21. Gamma profile of auger hole A022.

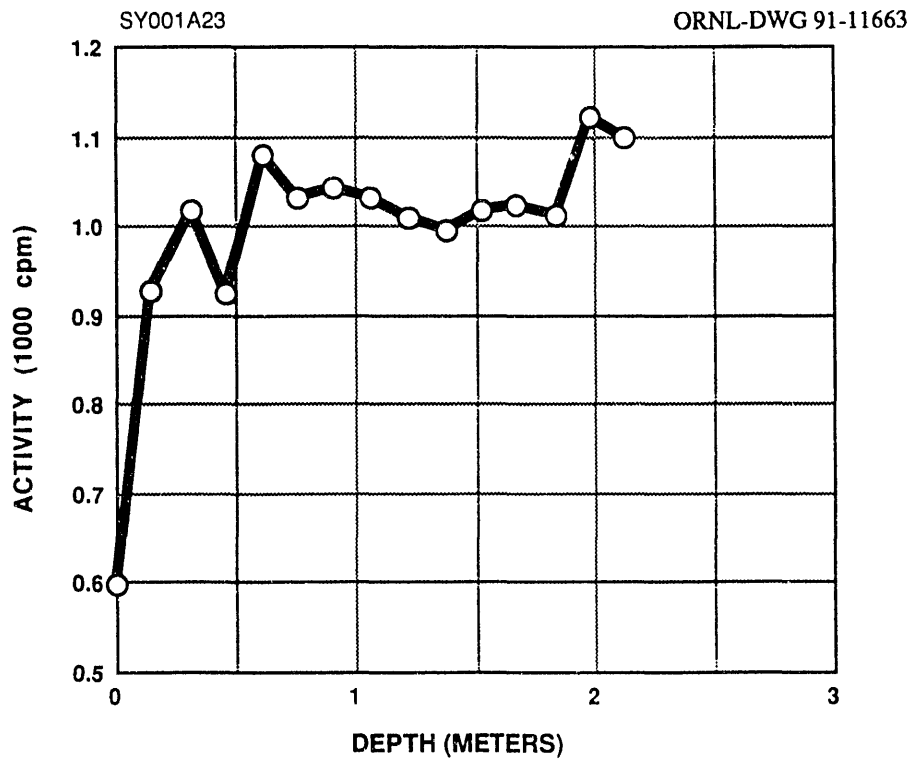


Fig. A.22. Gamma profile of auger hole A023.

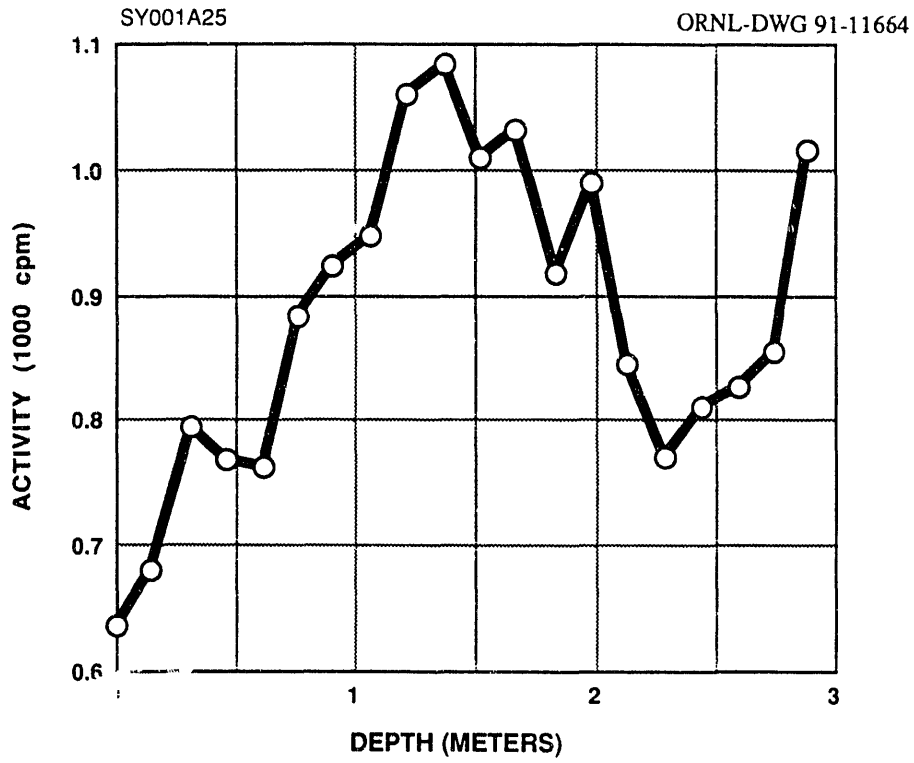


Fig. A.23. Gamma profile of auger hole A025.

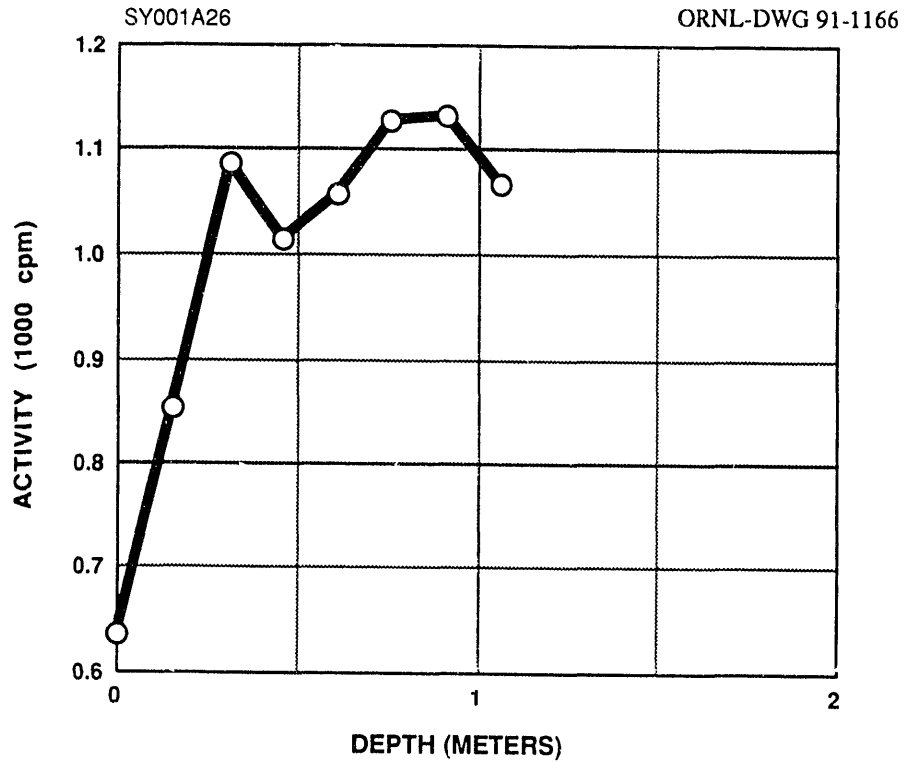


Fig. A.24. Gamma profile of auger hole A026.

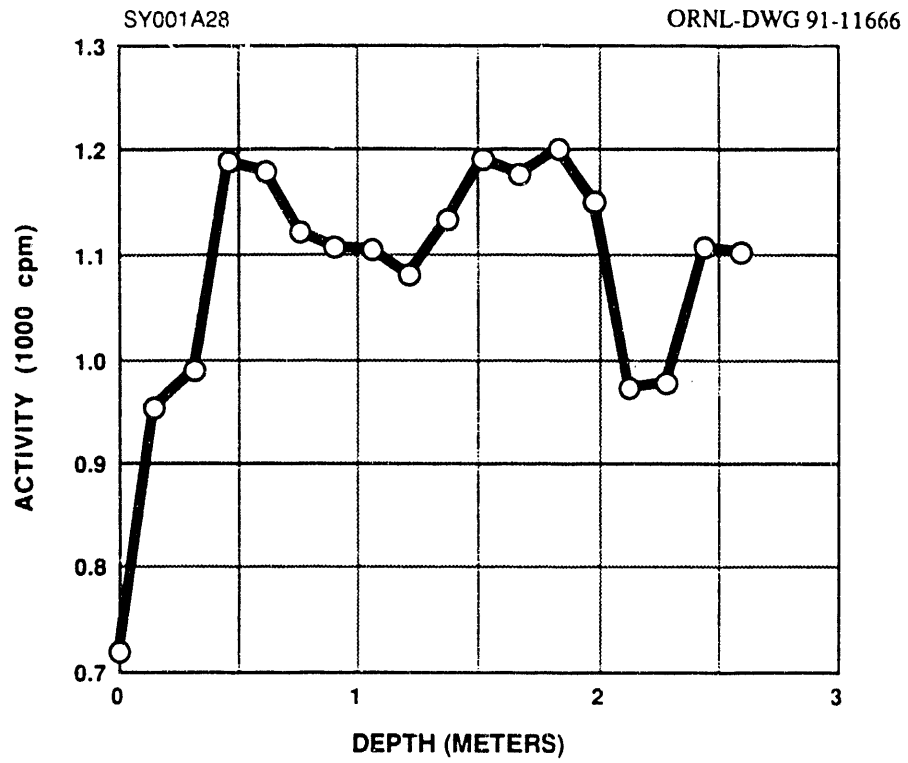


Fig. A.25. Gamma profile of auger hole A028.

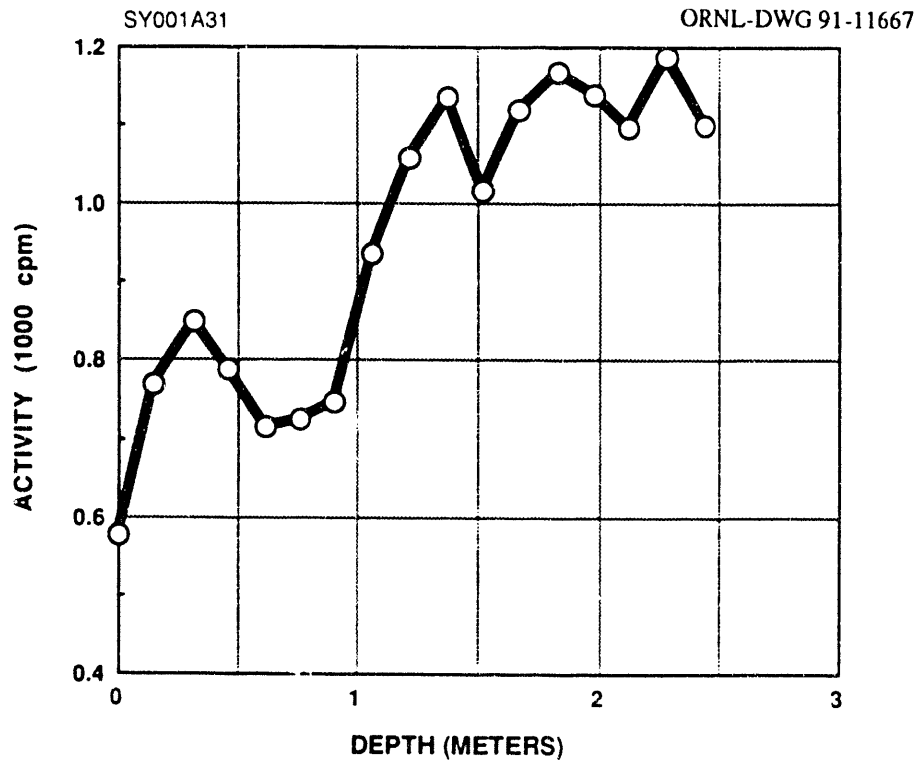


Fig. A.26. Gamma profile of auger hole A031.

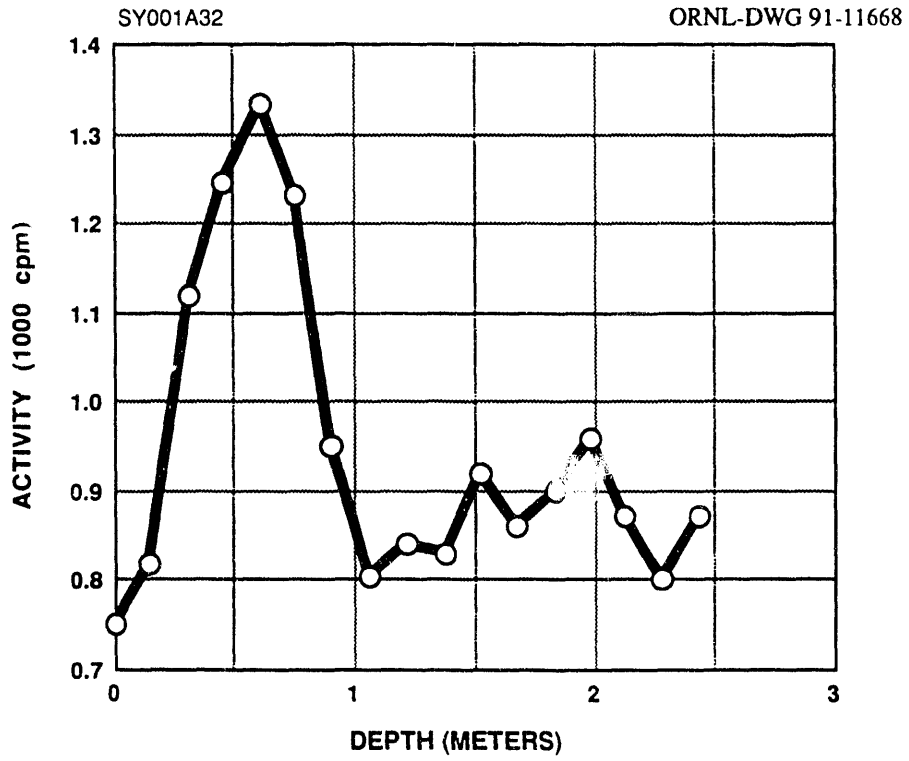


Fig. A.27. Gamma profile of auger hole A032.

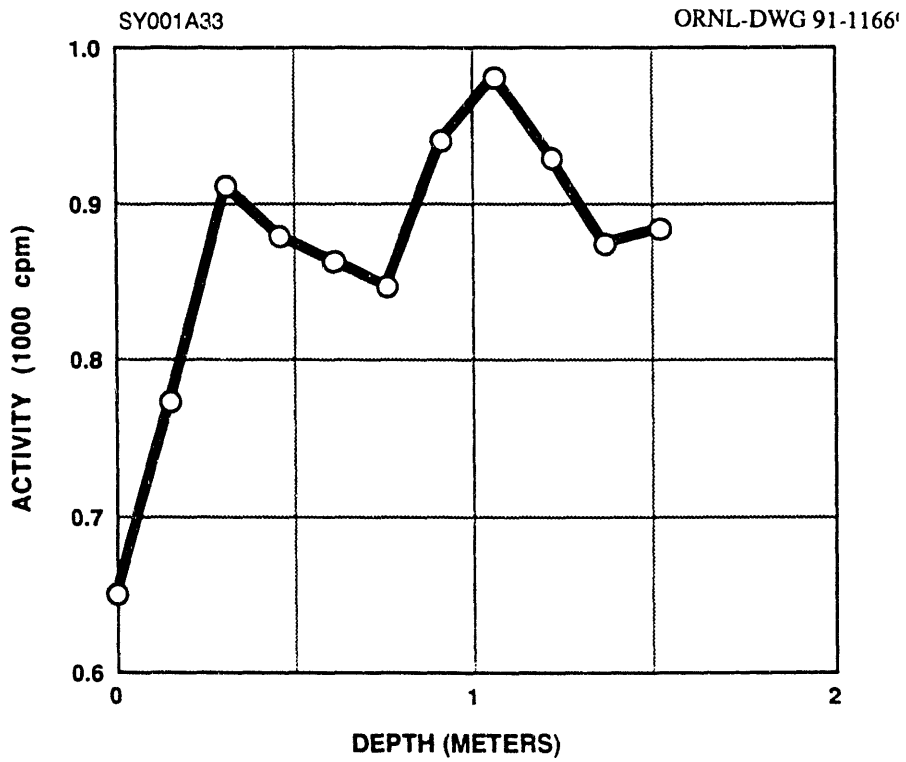


Fig. A.28. Gamma profile of auger hole A033.

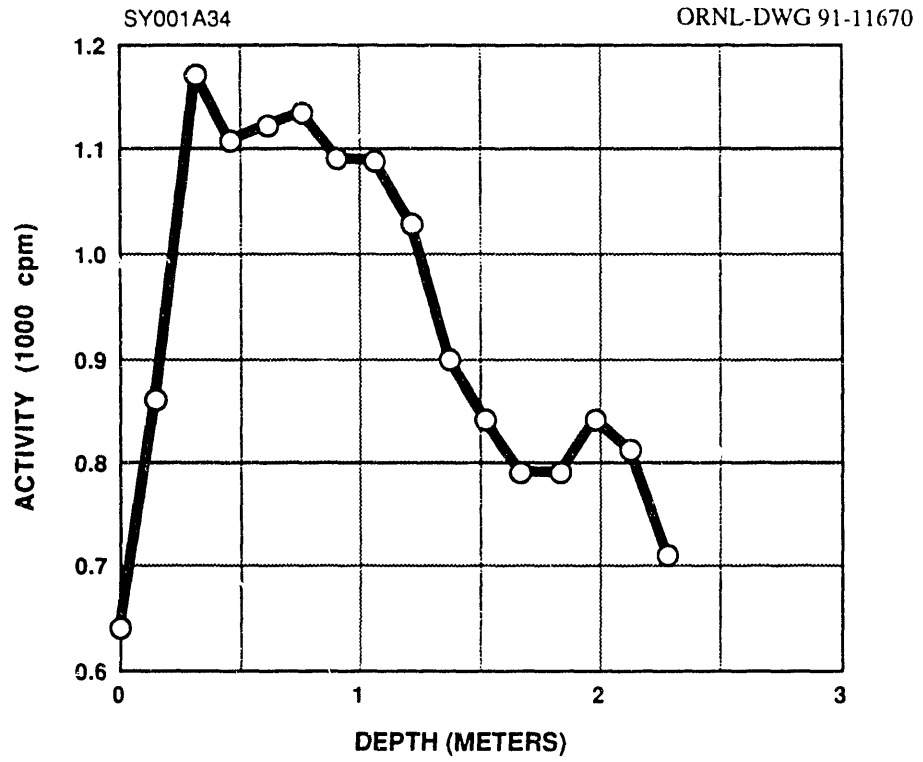


Fig. A.29. Gamma profile of auger hole A034.

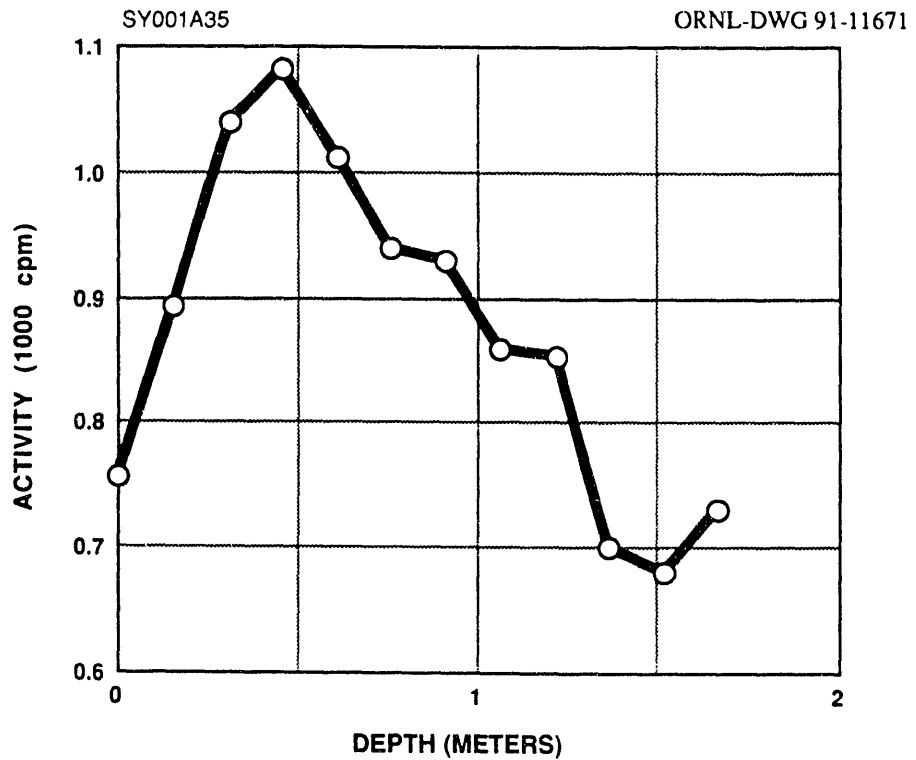


Fig. A.30. Gamma profile of auger hole A035.

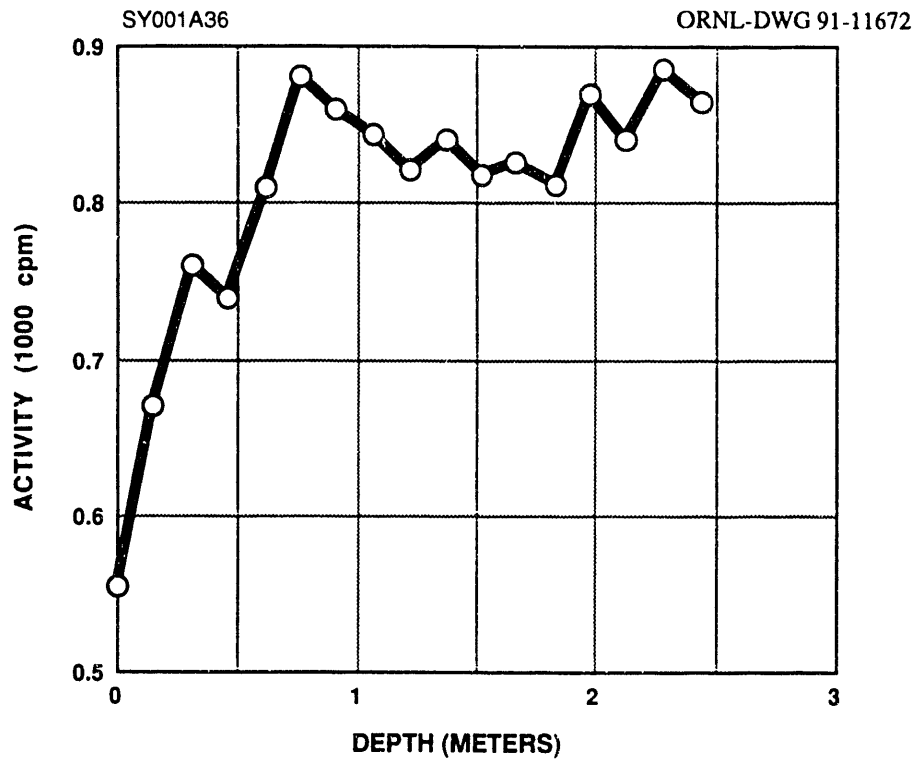


Fig. A.31. Gamma profile of auger hole A036.

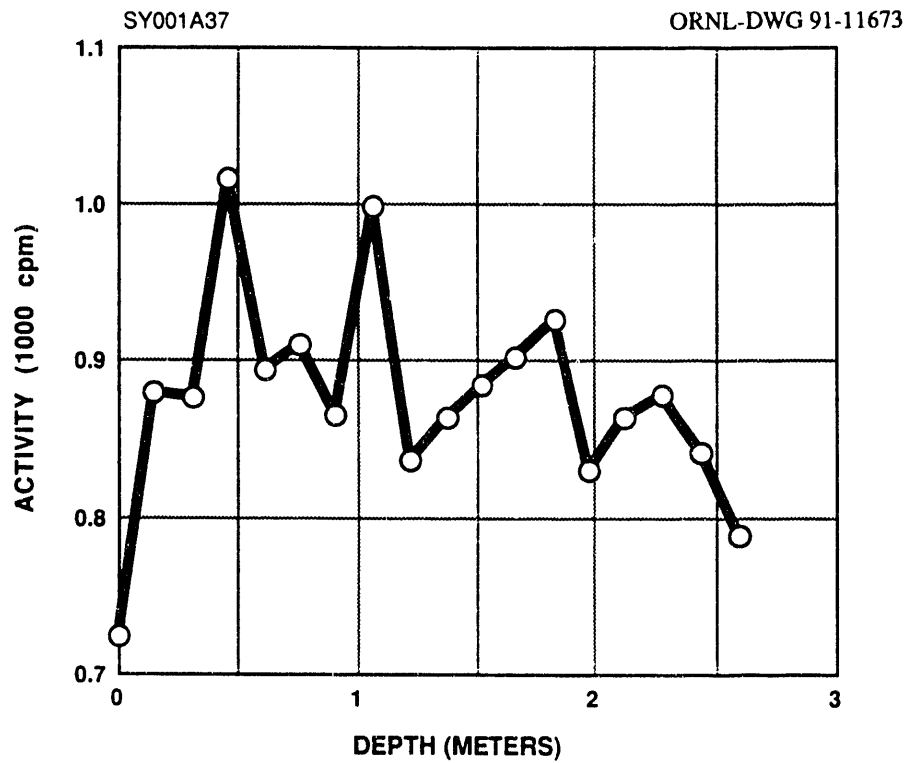


Fig. A.32. Gamma profile of auger hole A037.



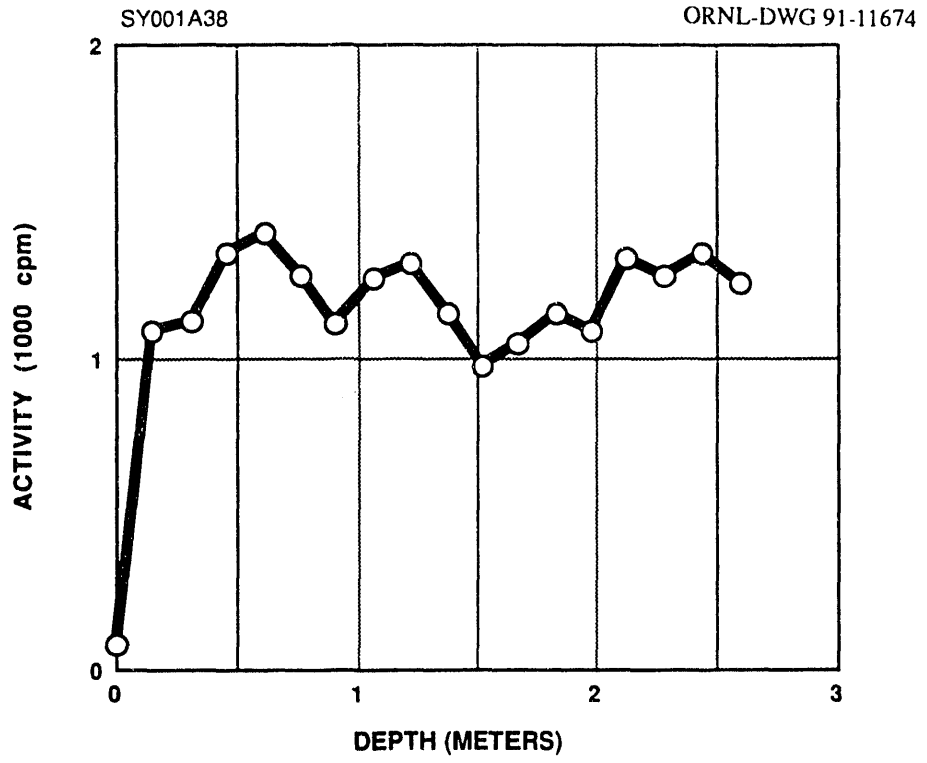


Fig. A.33. Gamma profile of auger hole A038.

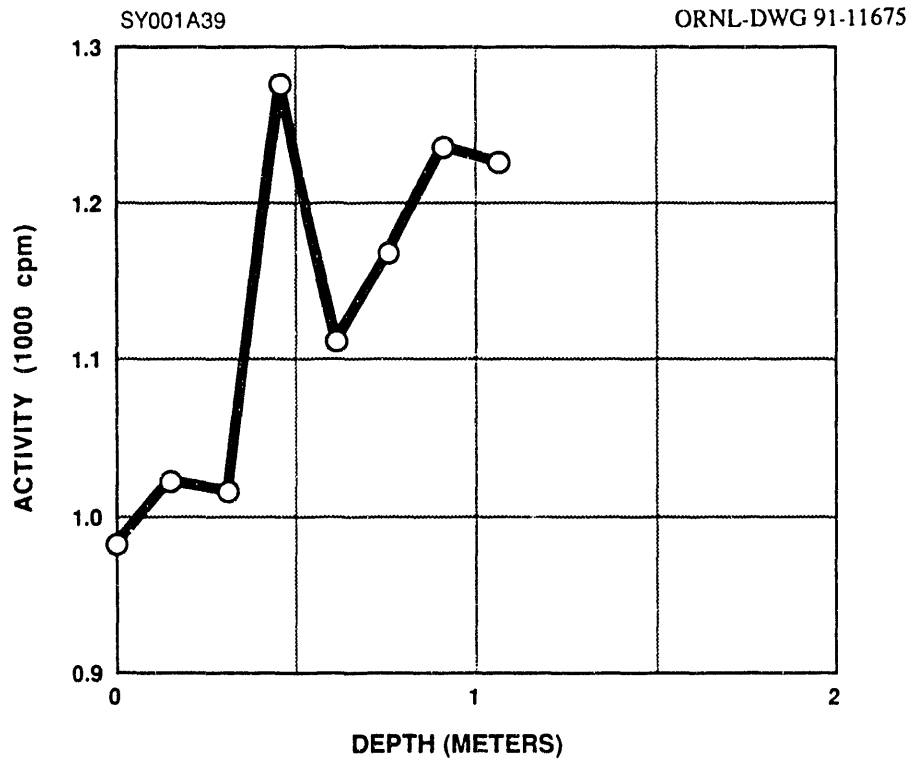


Fig. A.34. Gamma profile of auger hole A039.

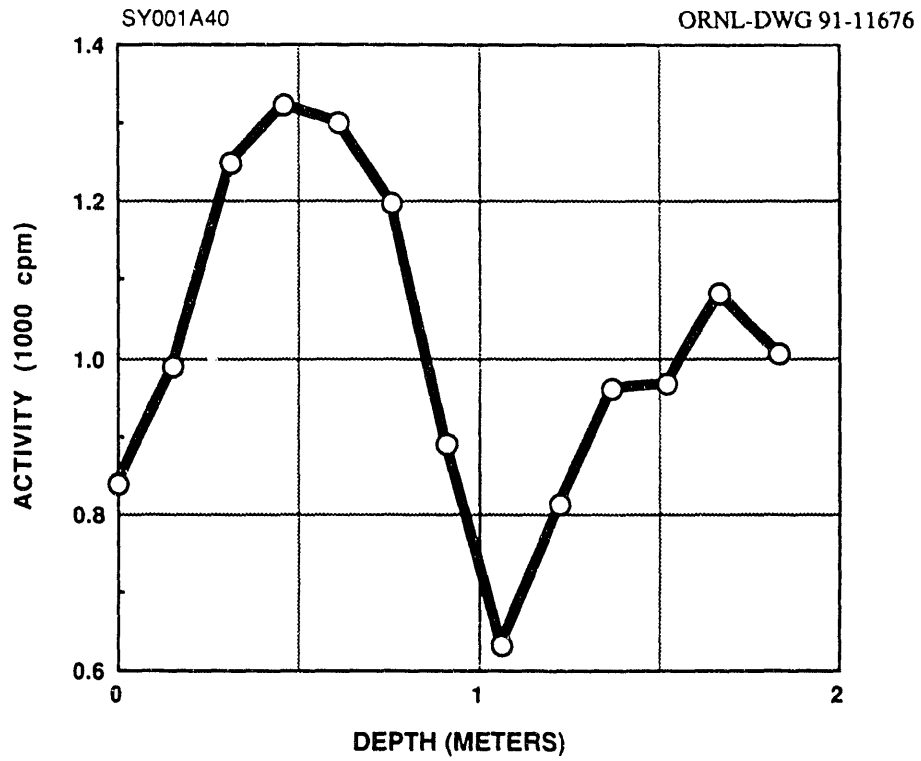


Fig. A.35. Gamma profile of auger hole A040.

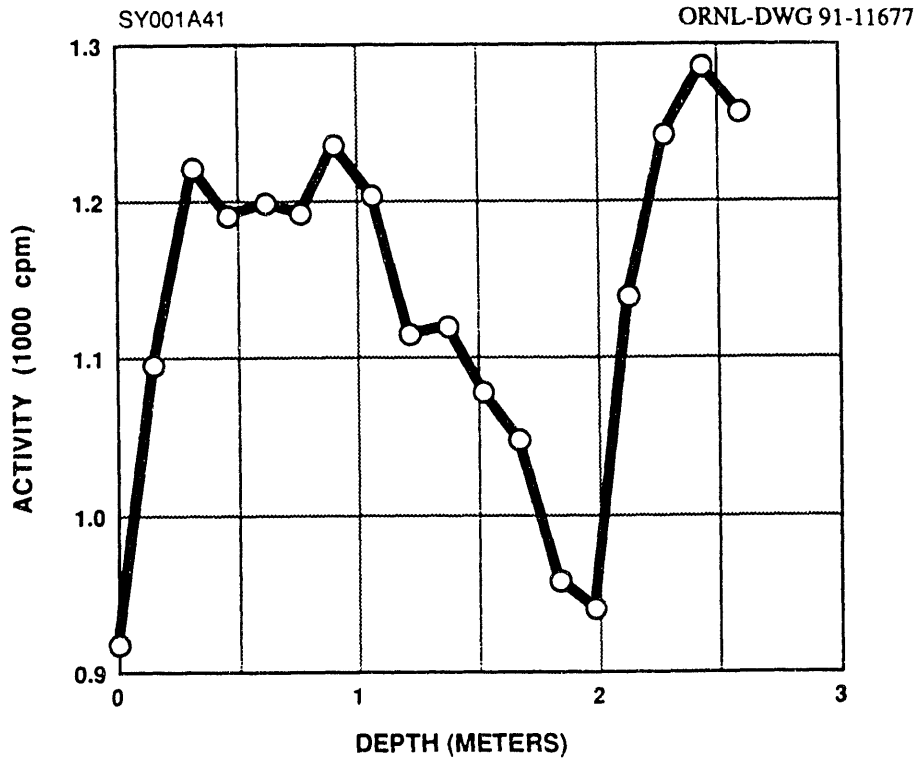


Fig. A.36. Gamma profile of auger hole A041.

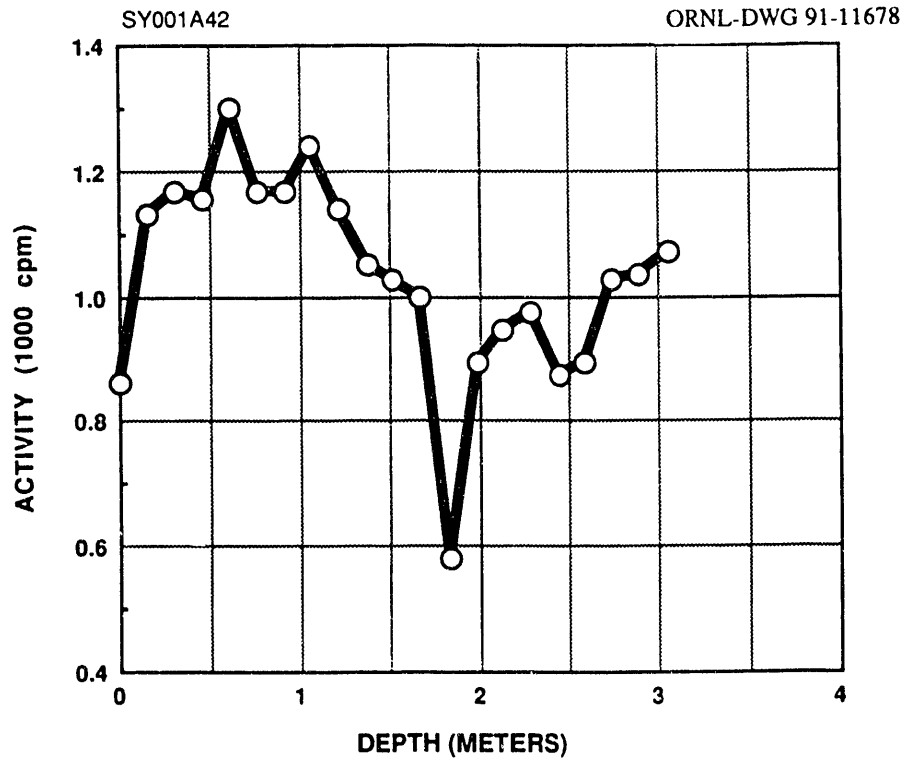


Fig. A.37. Gamma profile of auger hole A042.

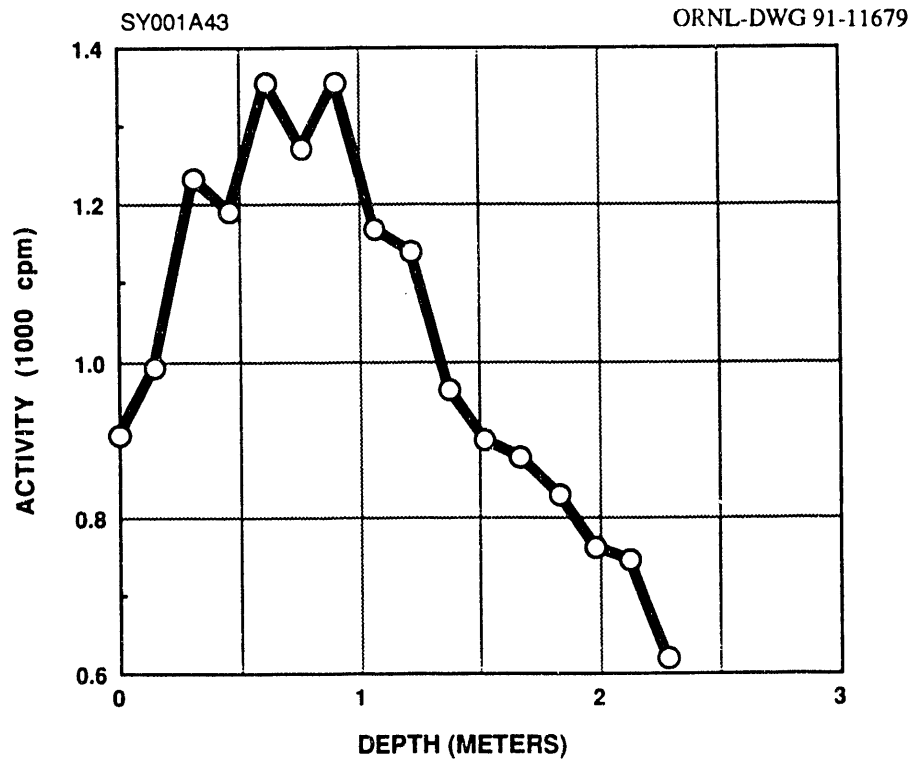


Fig. A.38. Gamma profile of auger hole A043.

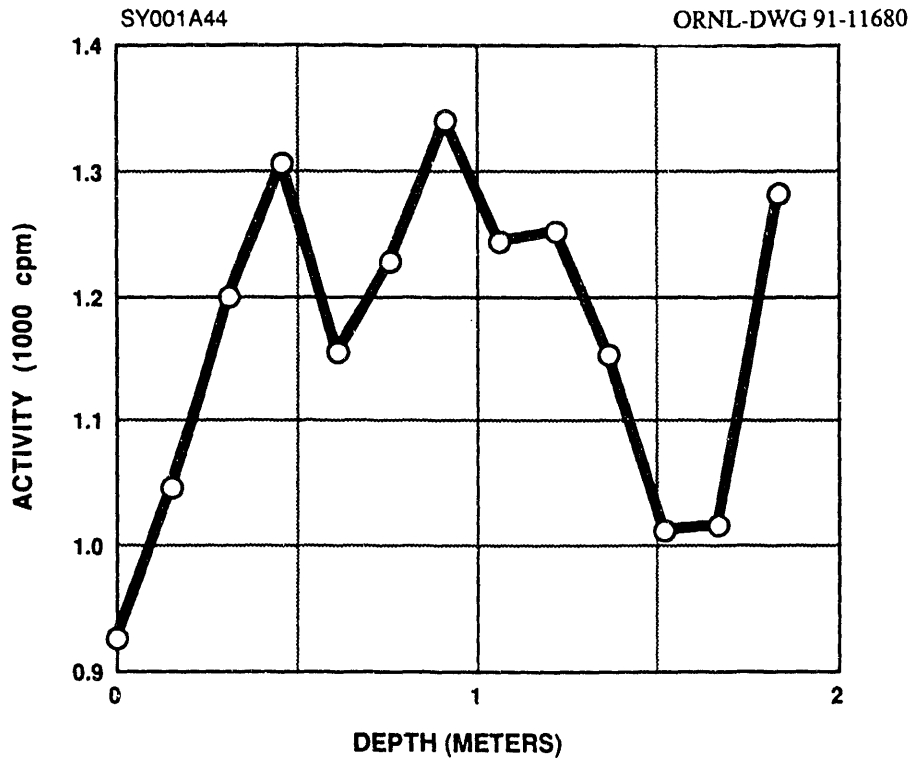


Fig. A.39. Gamma profile of auger hole A044

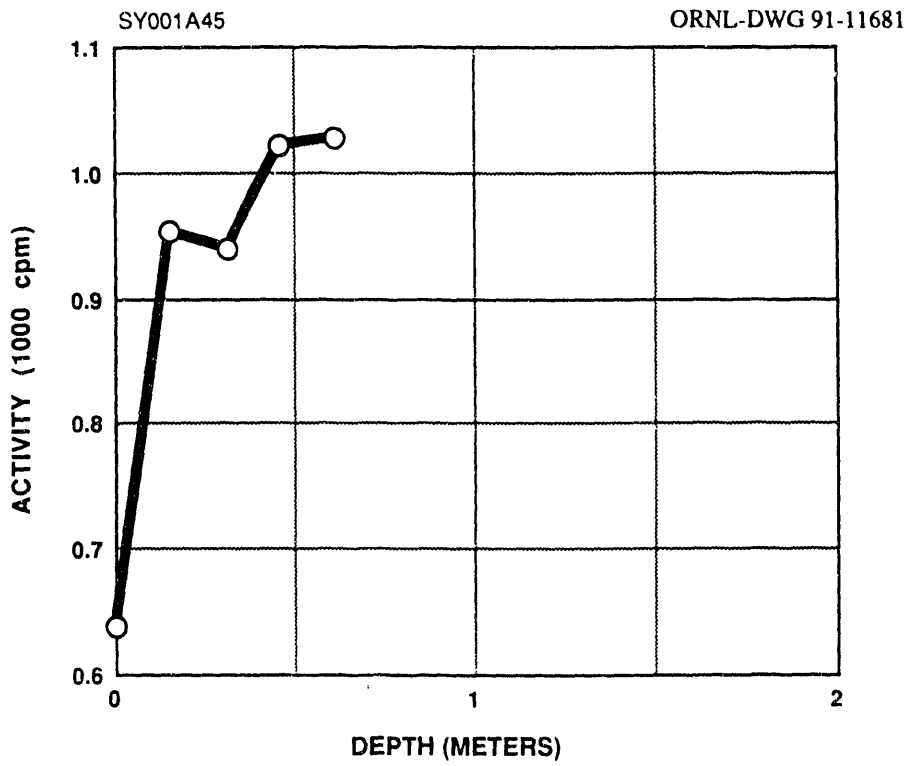


Fig. A.40. Gamma profile of auger hole A045.

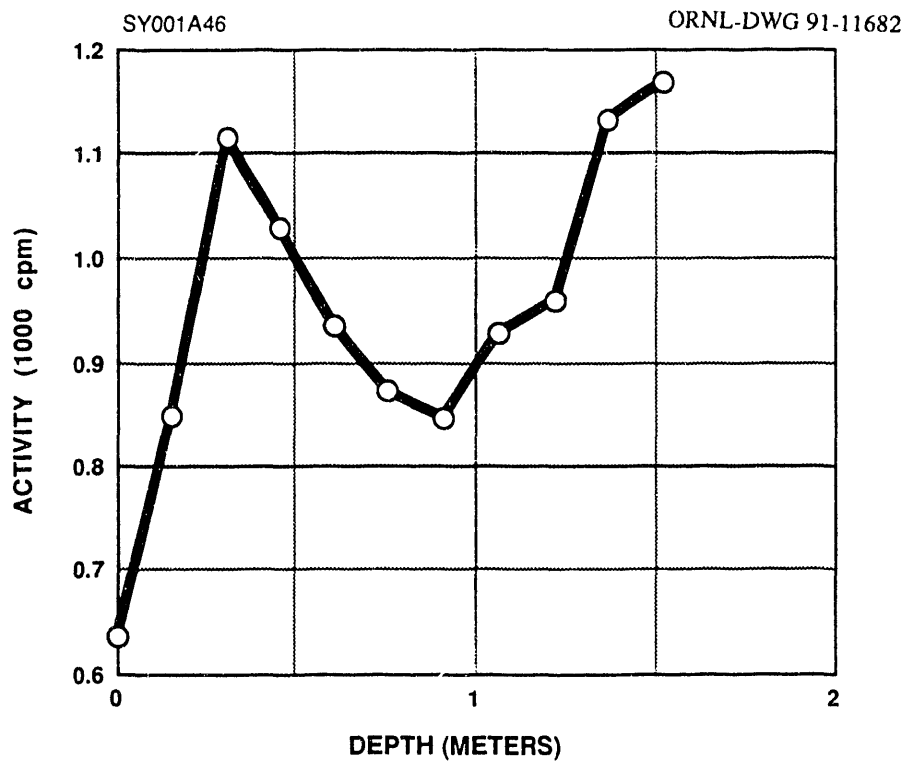


Fig. A.41. Gamma profile of auger hole A046.

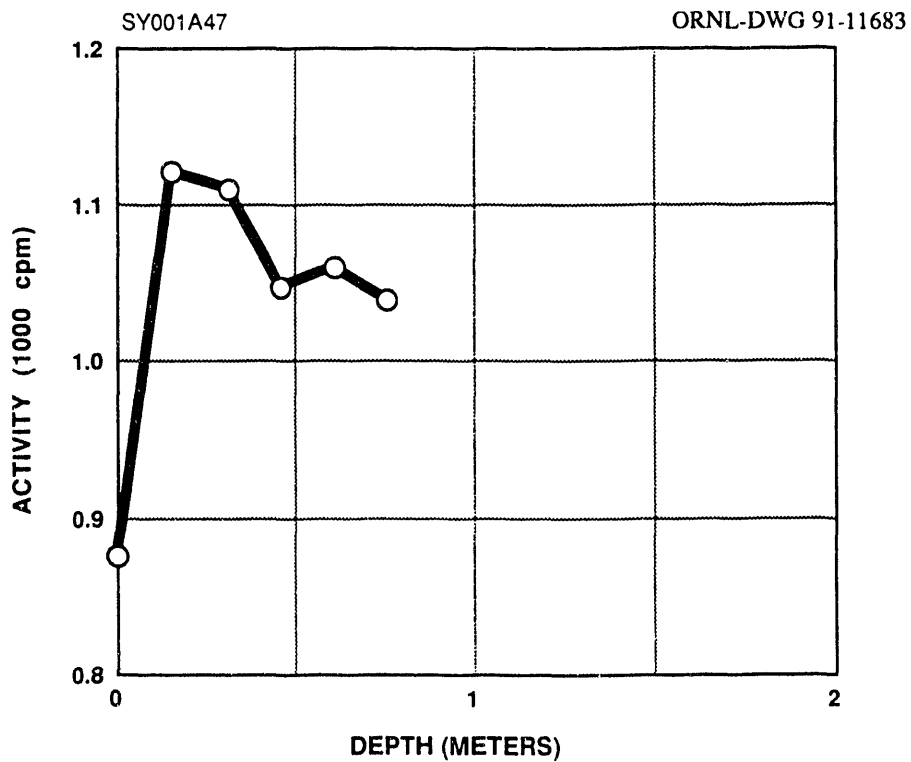


Fig. A.42. Gamma profile of auger hole A047.

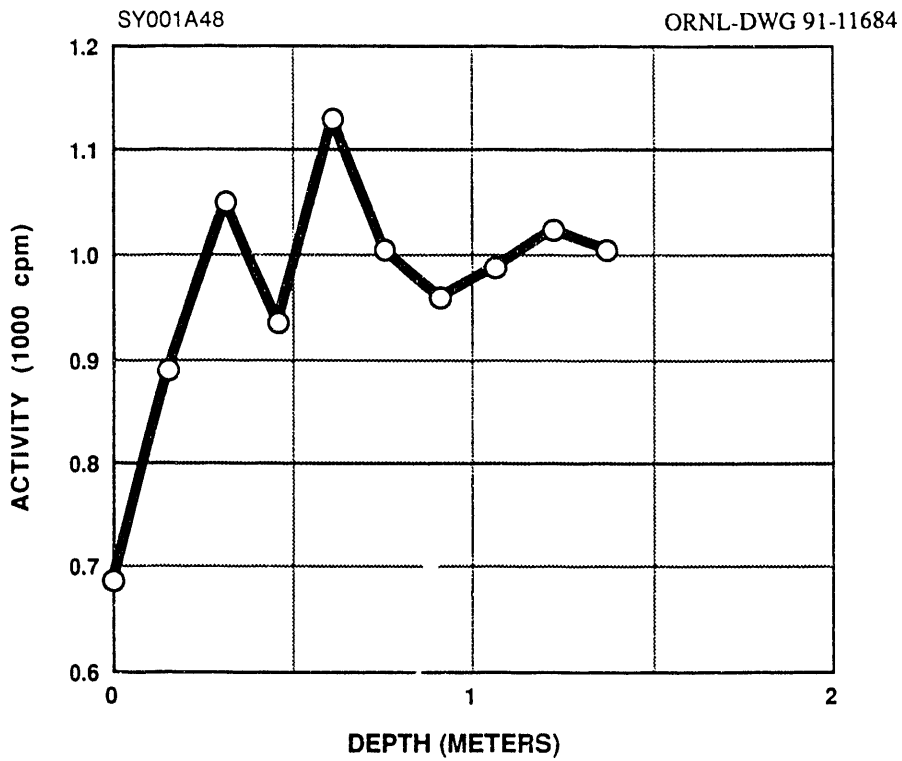


Fig. A.43. Gamma profile of auger hole A048.

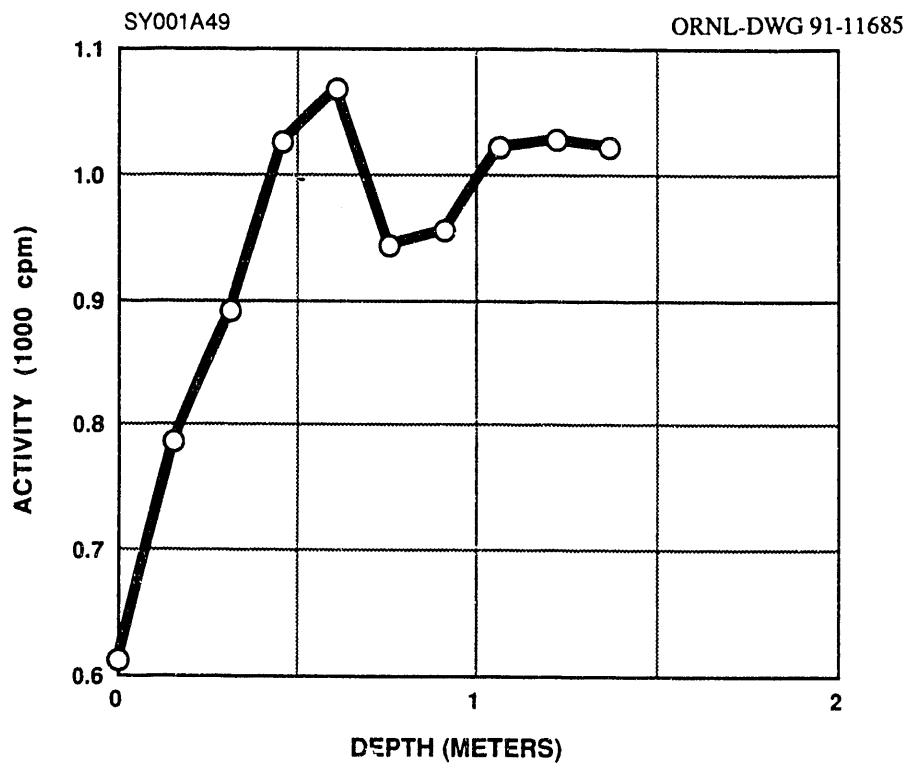


Fig. A.44. Gamma profile of auger hole A049.

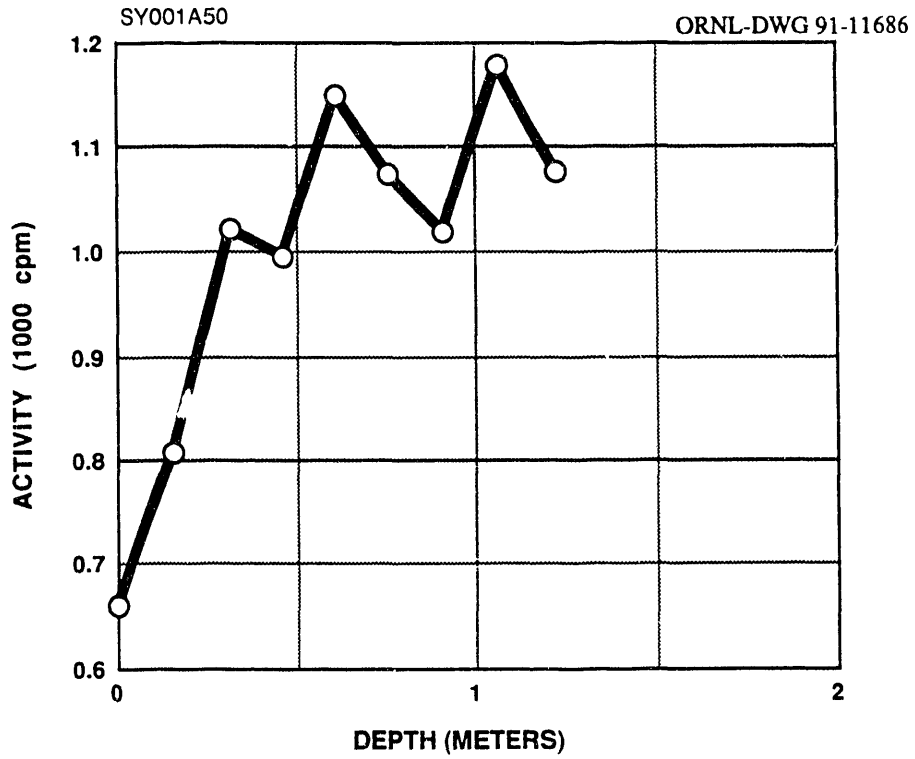


Fig. A.45. Gamma profile of auger hole A050.

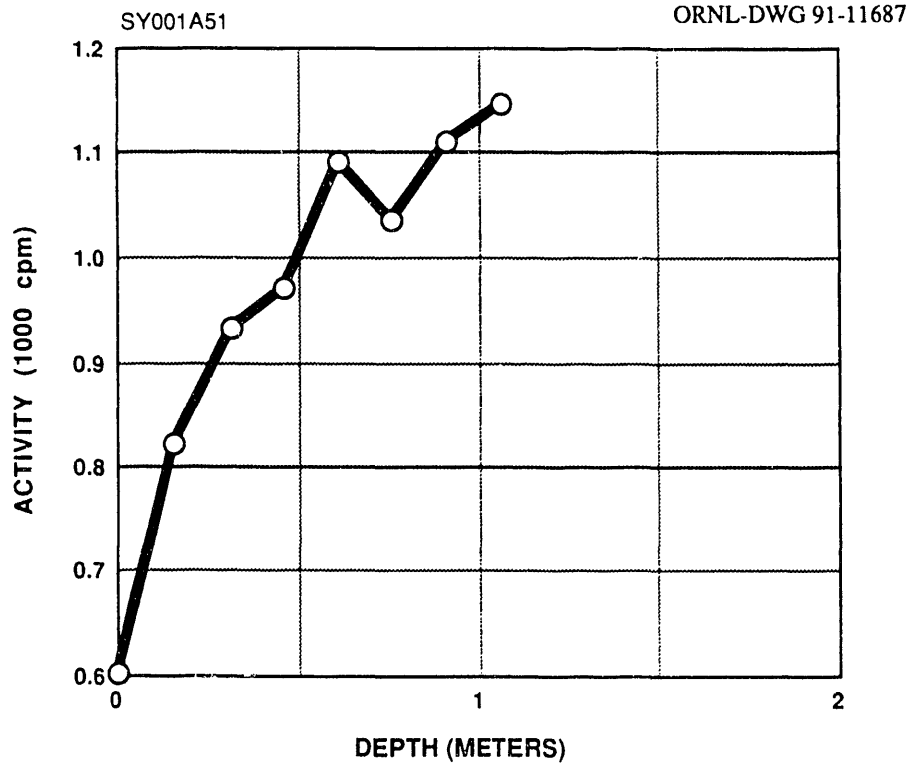


Fig. A.46. Gamma profile of auger hole A051.

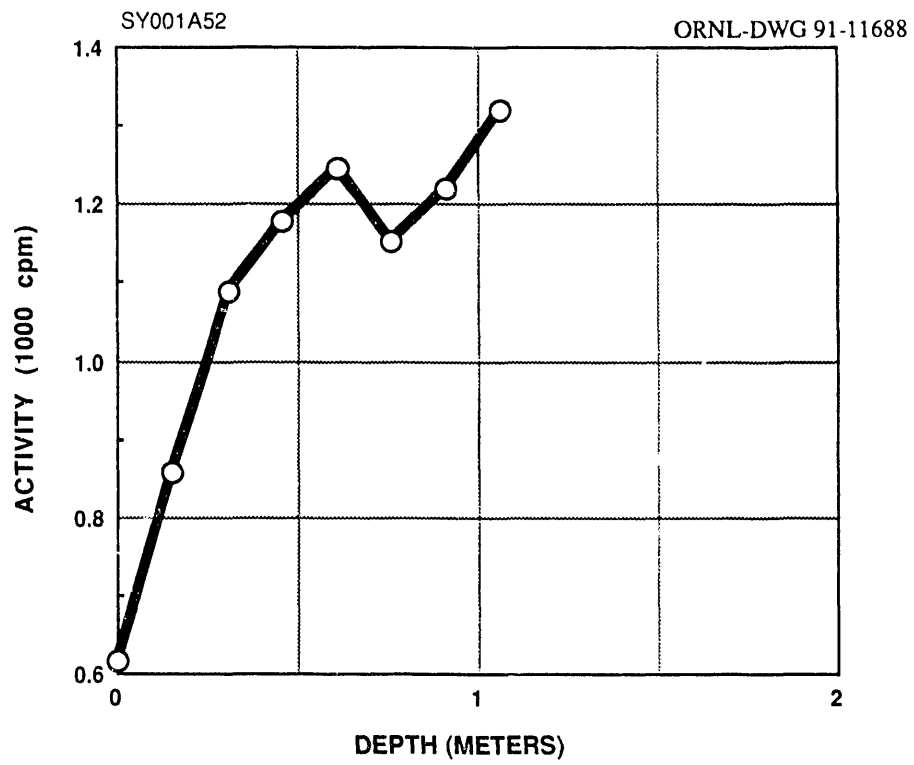


Fig. A.47. Gamma profile of auger hole A052.

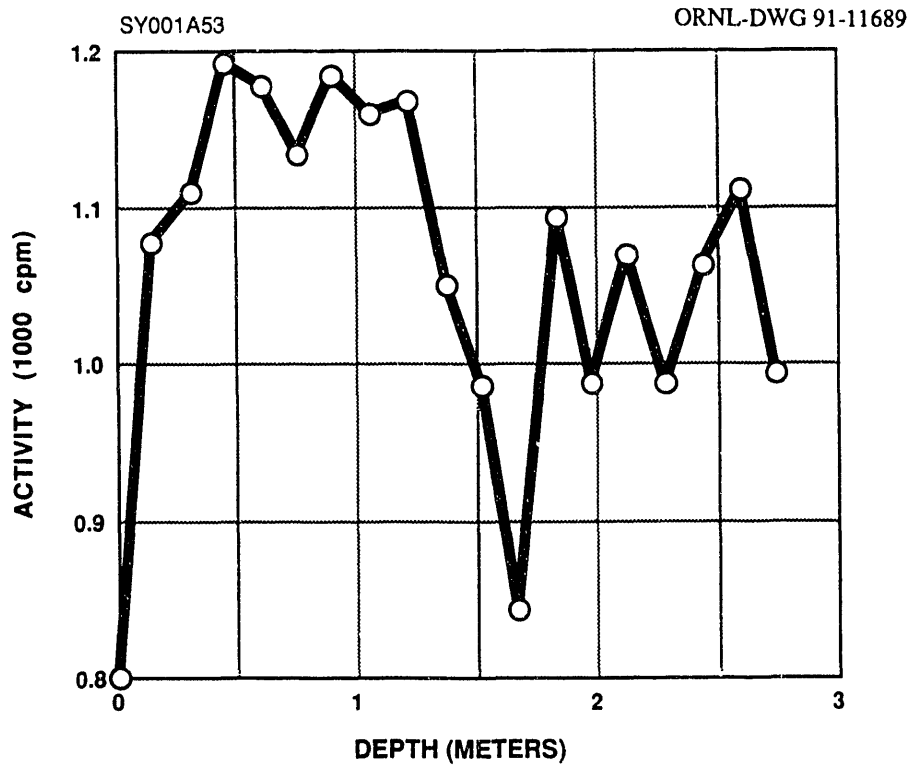


Fig. A.48. Gamma profile of auger hole A053.



**APPENDIX B**

**AREAS ABOVE DOE GUIDELINES**

**AT PEEK STREET**

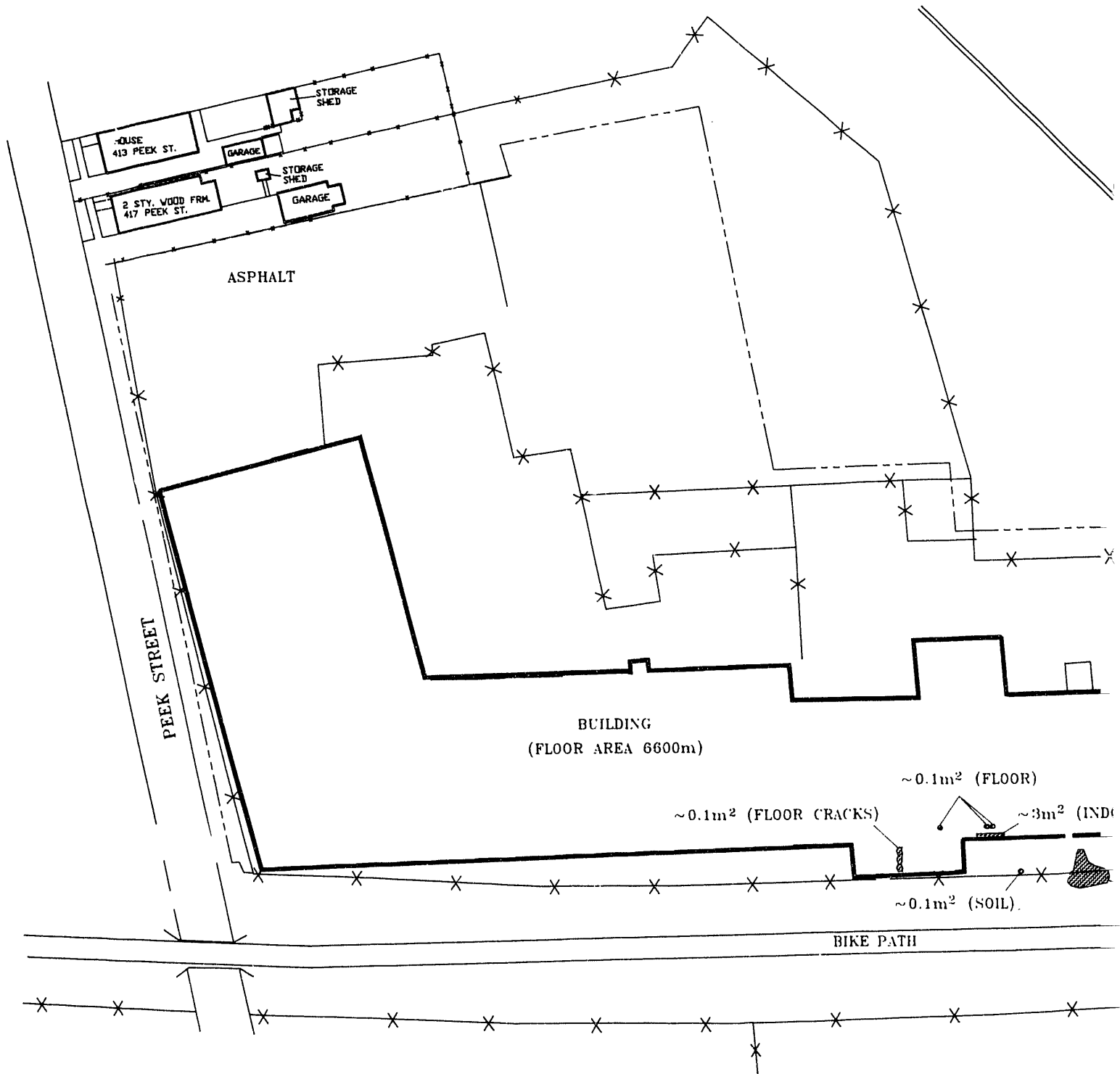
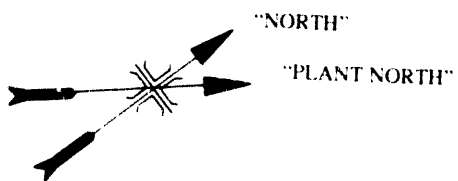
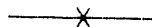


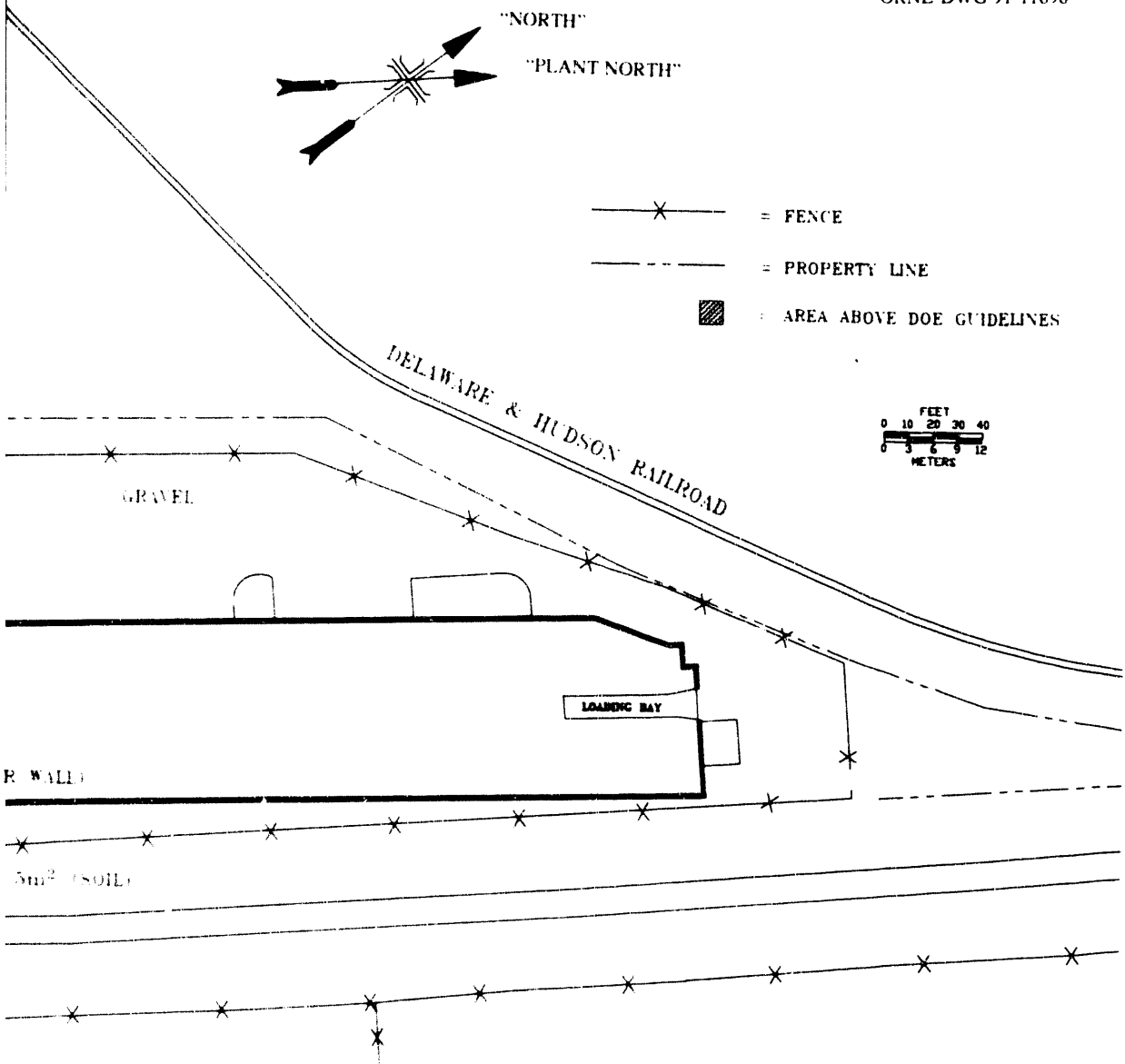
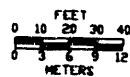


Fig. B.1. Diagram showing areas above DOE guidelines at Peek Street (si

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-  = FENCE
-  = PROPERTY LINE
-  = AREA ABOVE DOE GUIDELINES



area = ~18,000 m<sup>2</sup>.

ORNL-DWG 91-11691

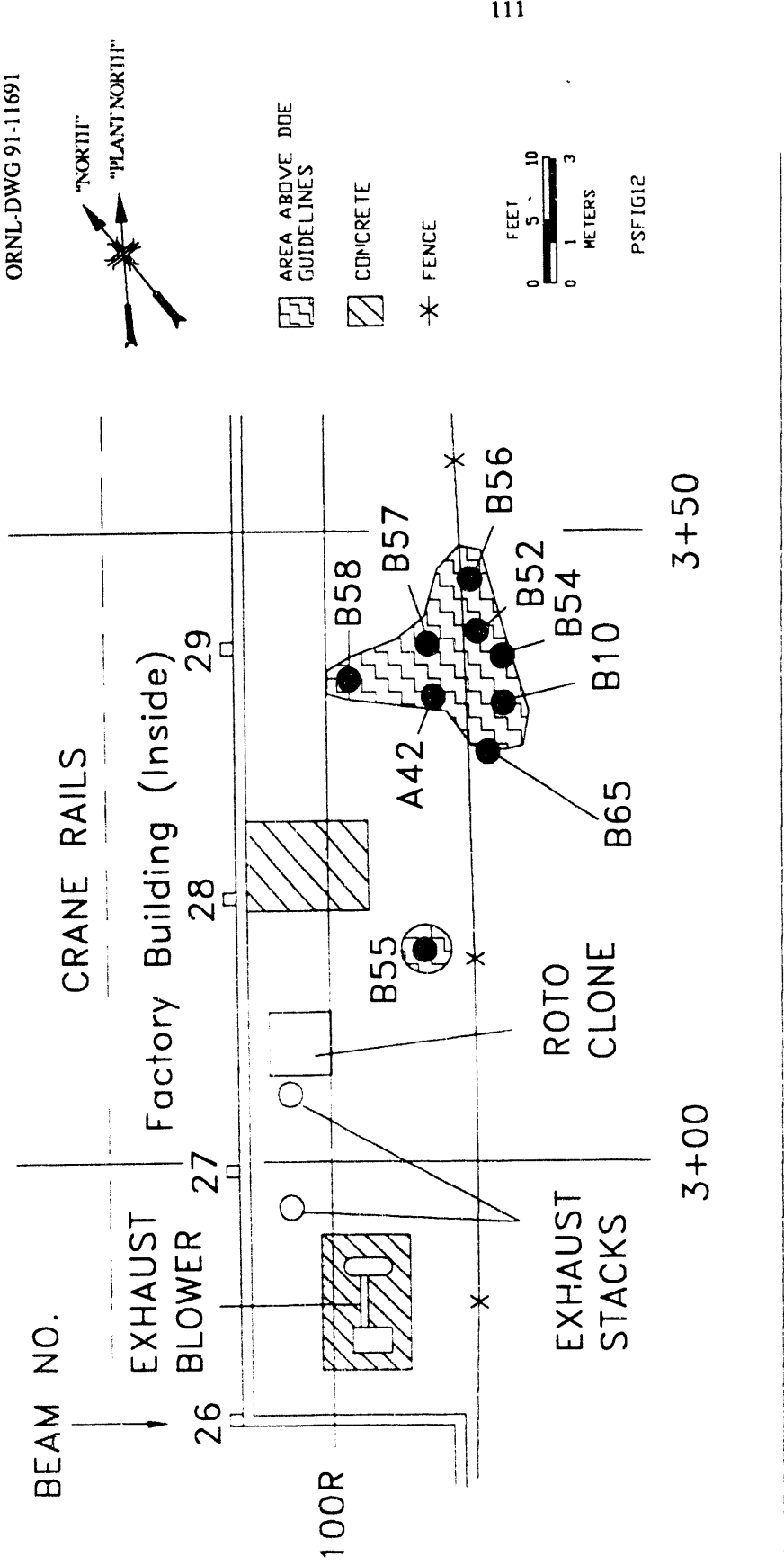
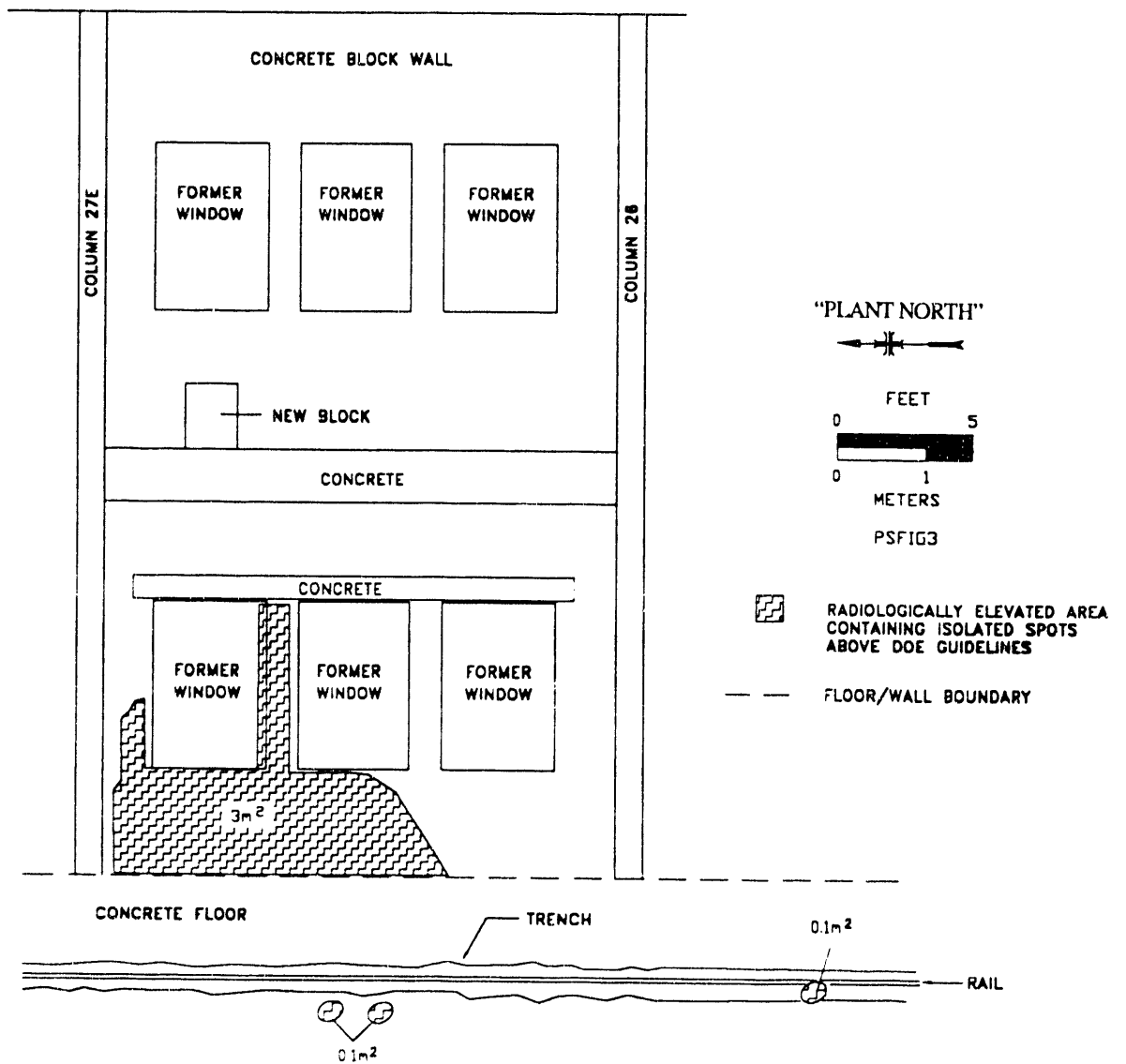


Fig. B.2. Locations of soil samples from those regions above DOE guidelines outdoors at Peek Street.



**Fig. B.3. Diagram of radioactively elevated area containing isolated spots above DOE guidelines in the factory building. (Wall and floor are drawn as if they were on the same plane.)**

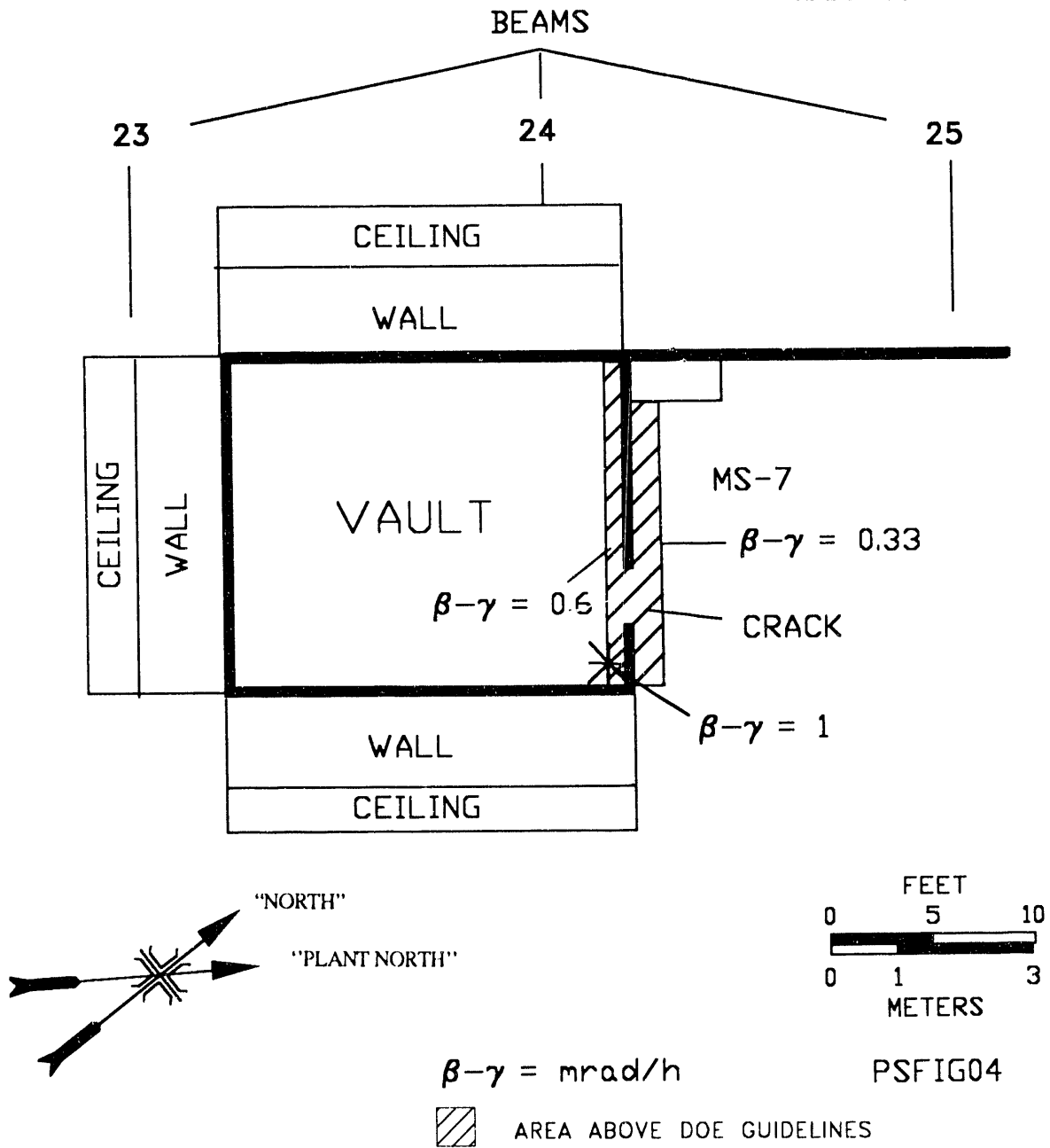


Fig. B.4. Areas above DOE guidelines in the vault and in room MS-7 at Peek Street.

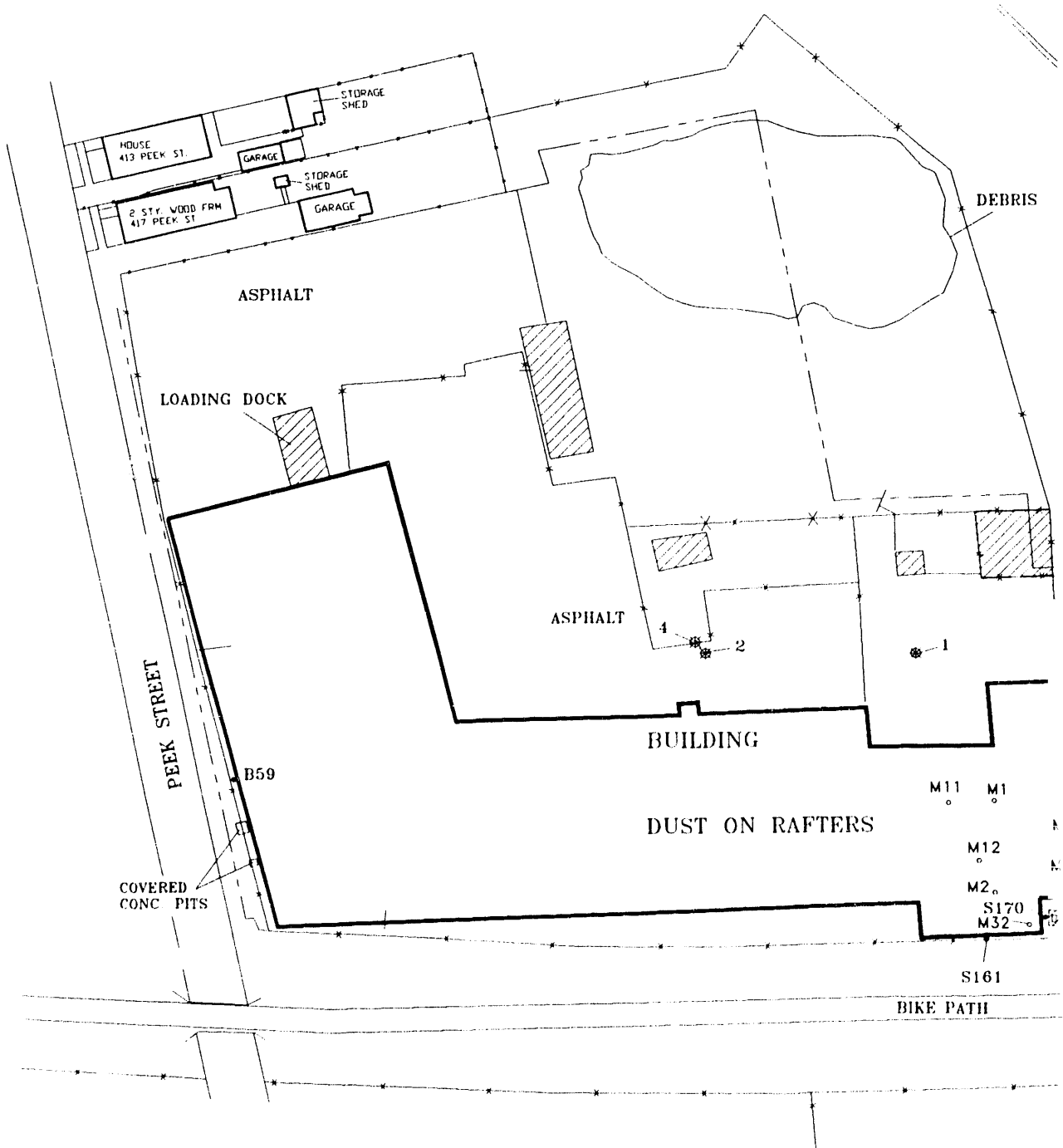
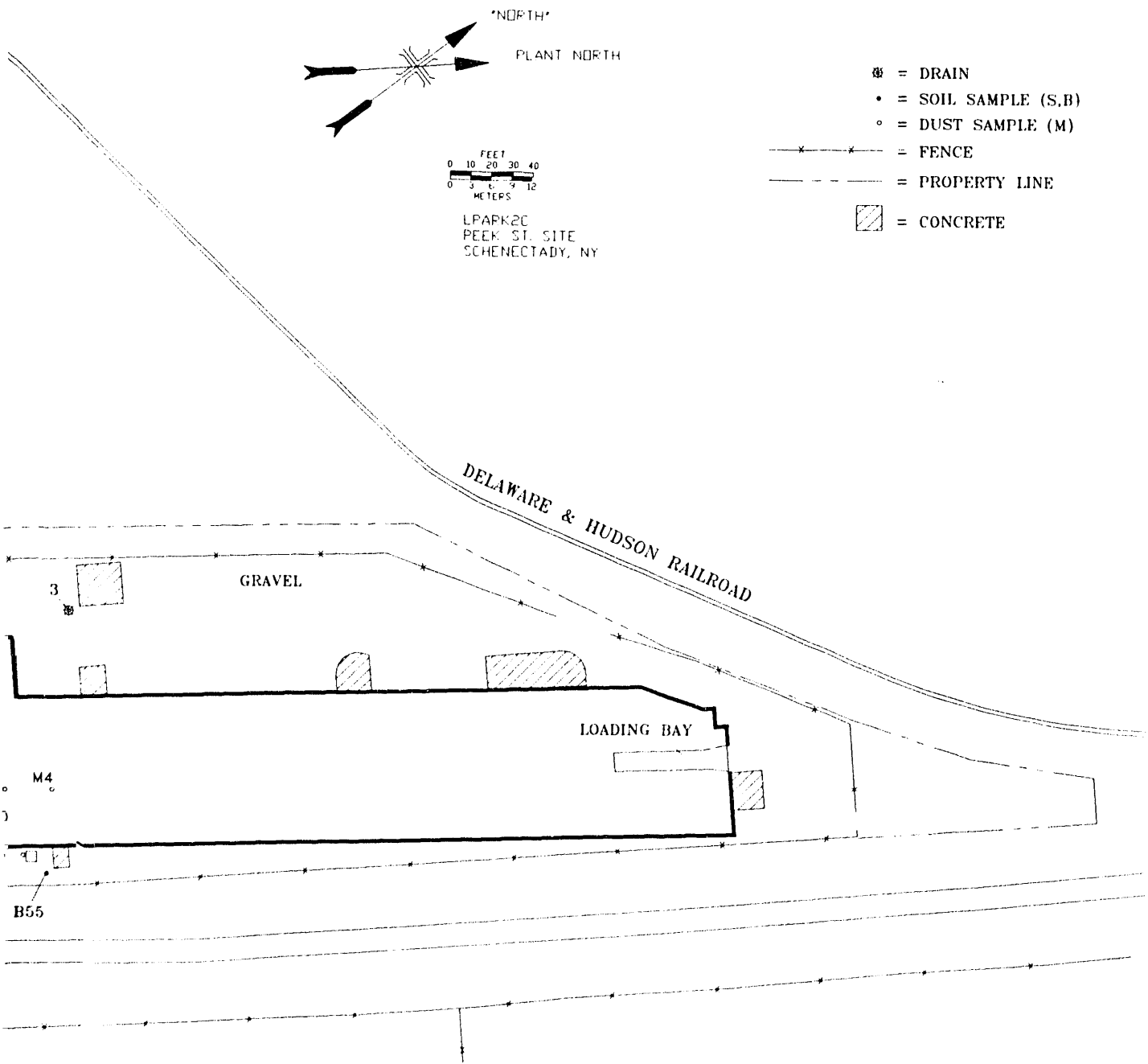


Fig. B.5. Diagram showing locations of residual beryllium in con locations as indicated). Site area = ~18,000 m<sup>2</sup>).




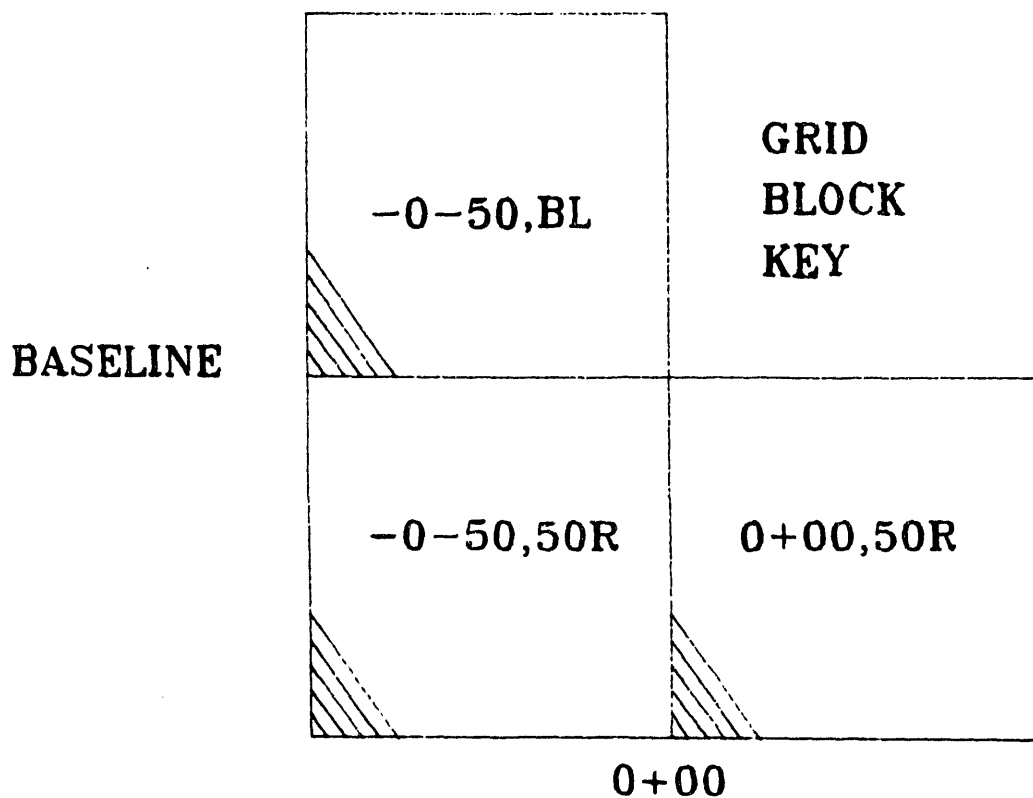
Concentrations greater than 13  $\mu\text{g/g}$  at Peek Street (i.e., at soil and dust sample



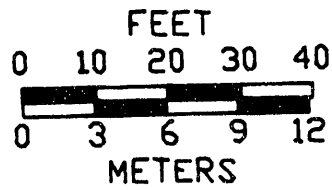
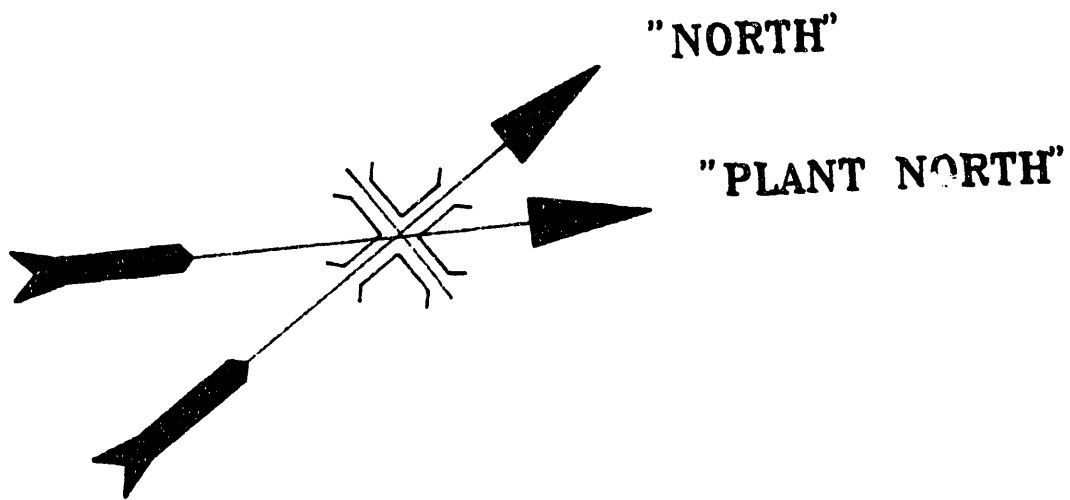
# PLATE 1

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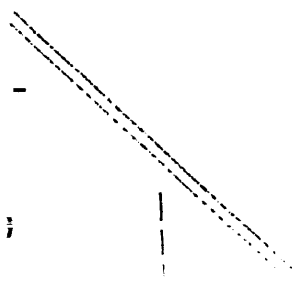
- ..... = CRANE RAILS
- \*-\*-\*-\* = FENCE
- = PROPERTY LINE
-  = CONCRETE

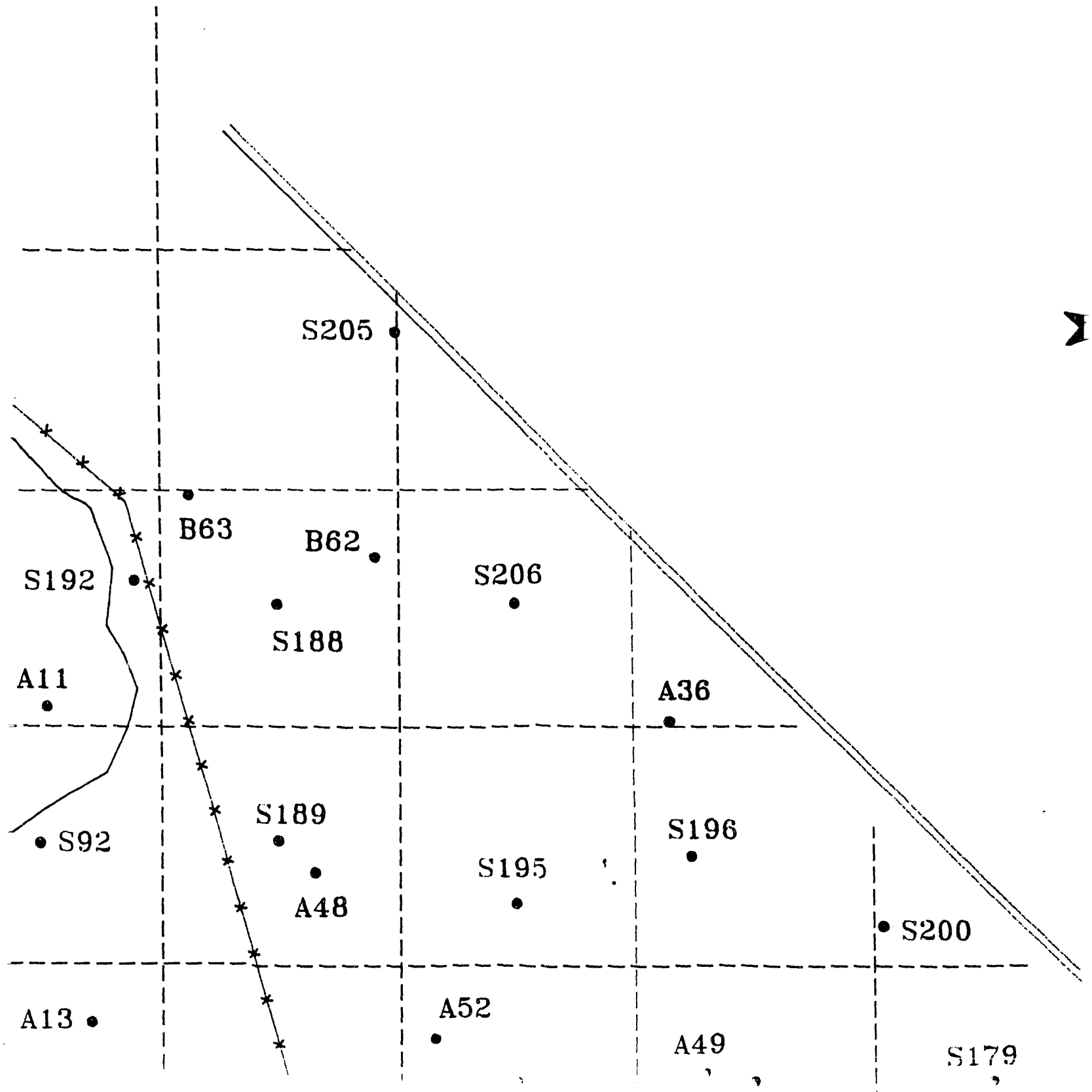


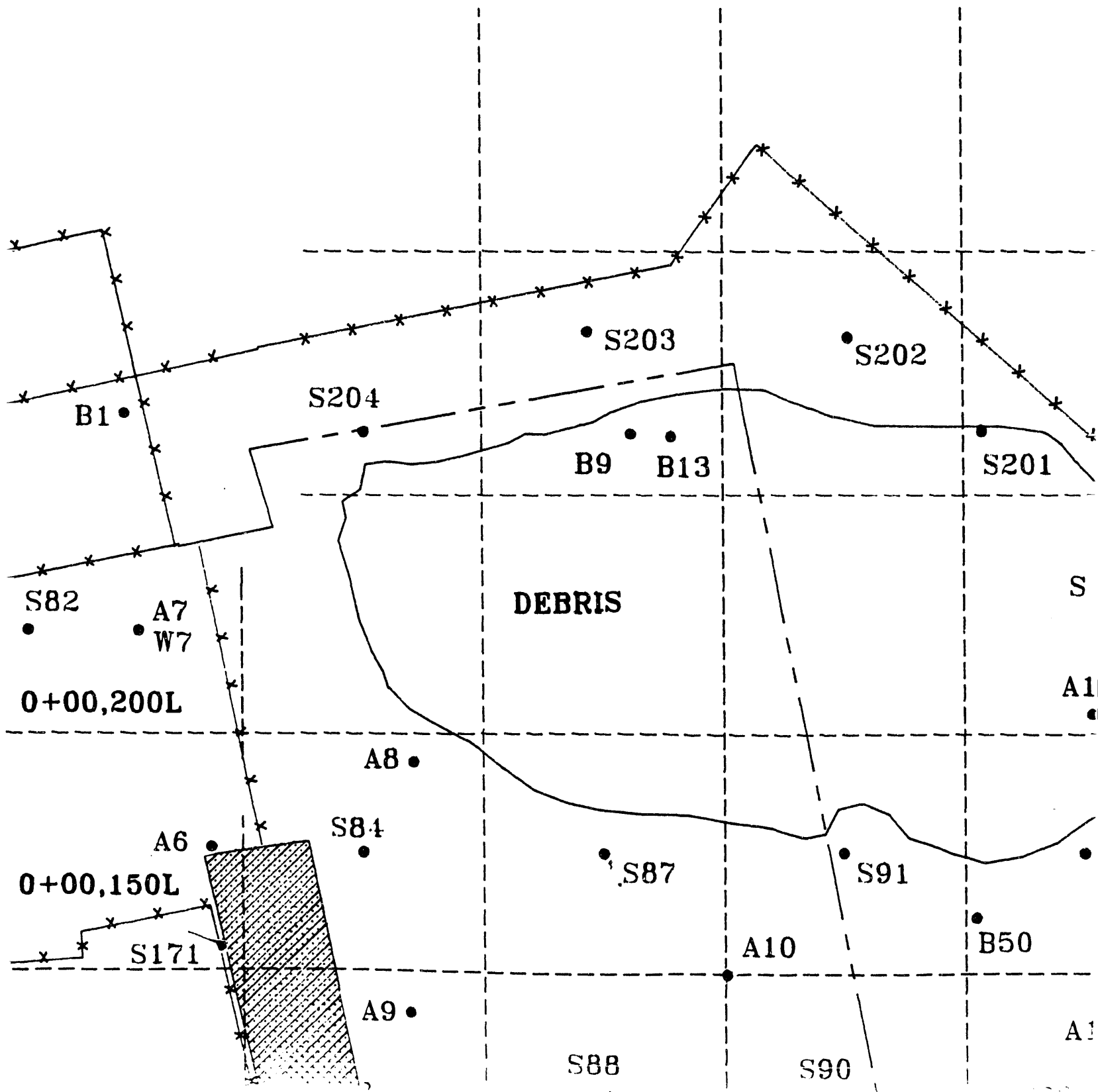
- S = SYSTEMATIC SAMPLES
- B = BIASED SAMPLES
- A = AUGER HOLES
- W = WATER SAMPLES
- Z = AIR SAMPLES

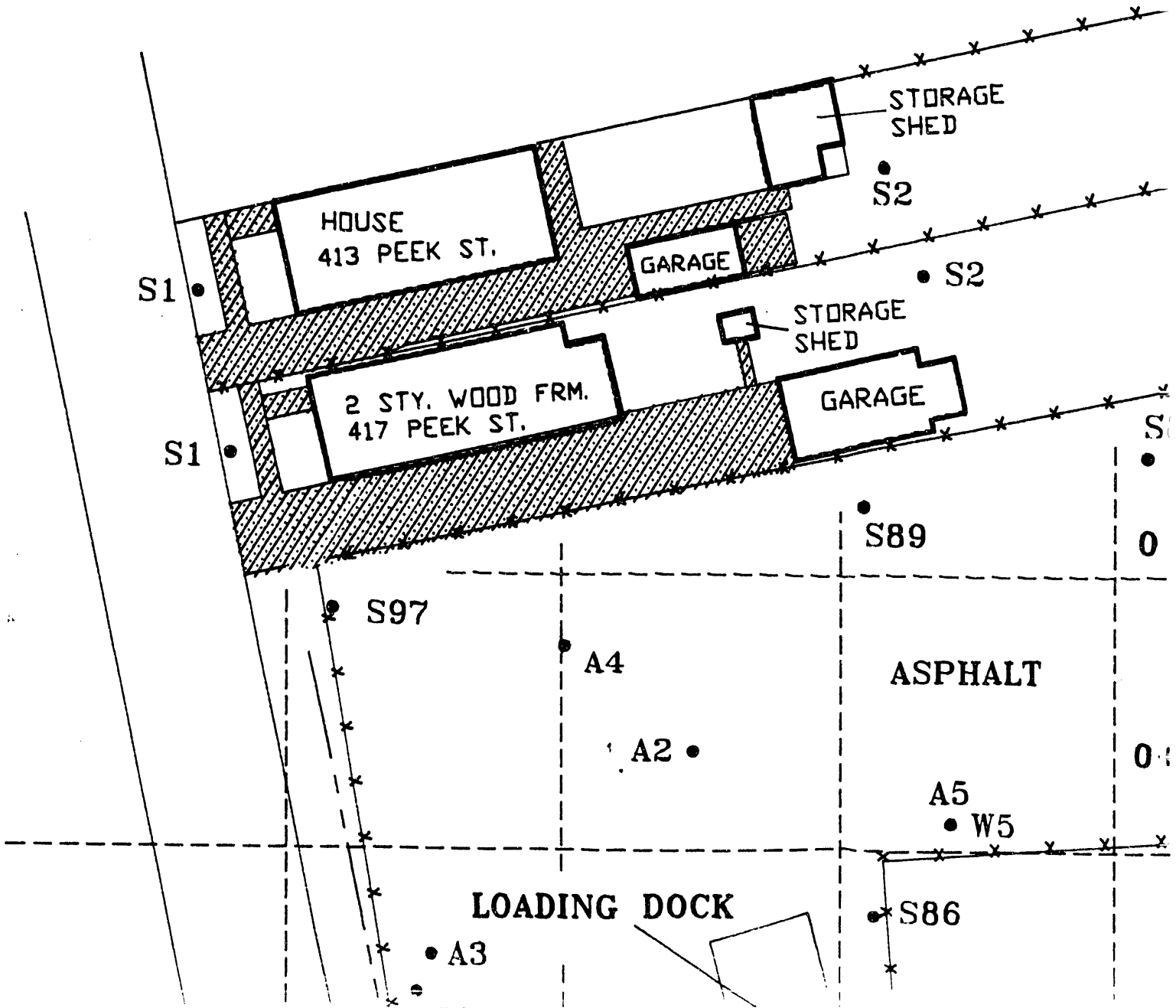


**LPARK2**  
**PEEK ST. SITE**  
**SCHENECTADY, NY**









S1

HOUSE  
413 PEEK ST.

GARAGE

STORAGE  
SHED

S2

2 STY. WOOD FRM.  
417 PEEK ST.

GARAGE

STORAGE  
SHED

S2

S1

S89

S97

A4

ASPHALT

A2

A5

W5

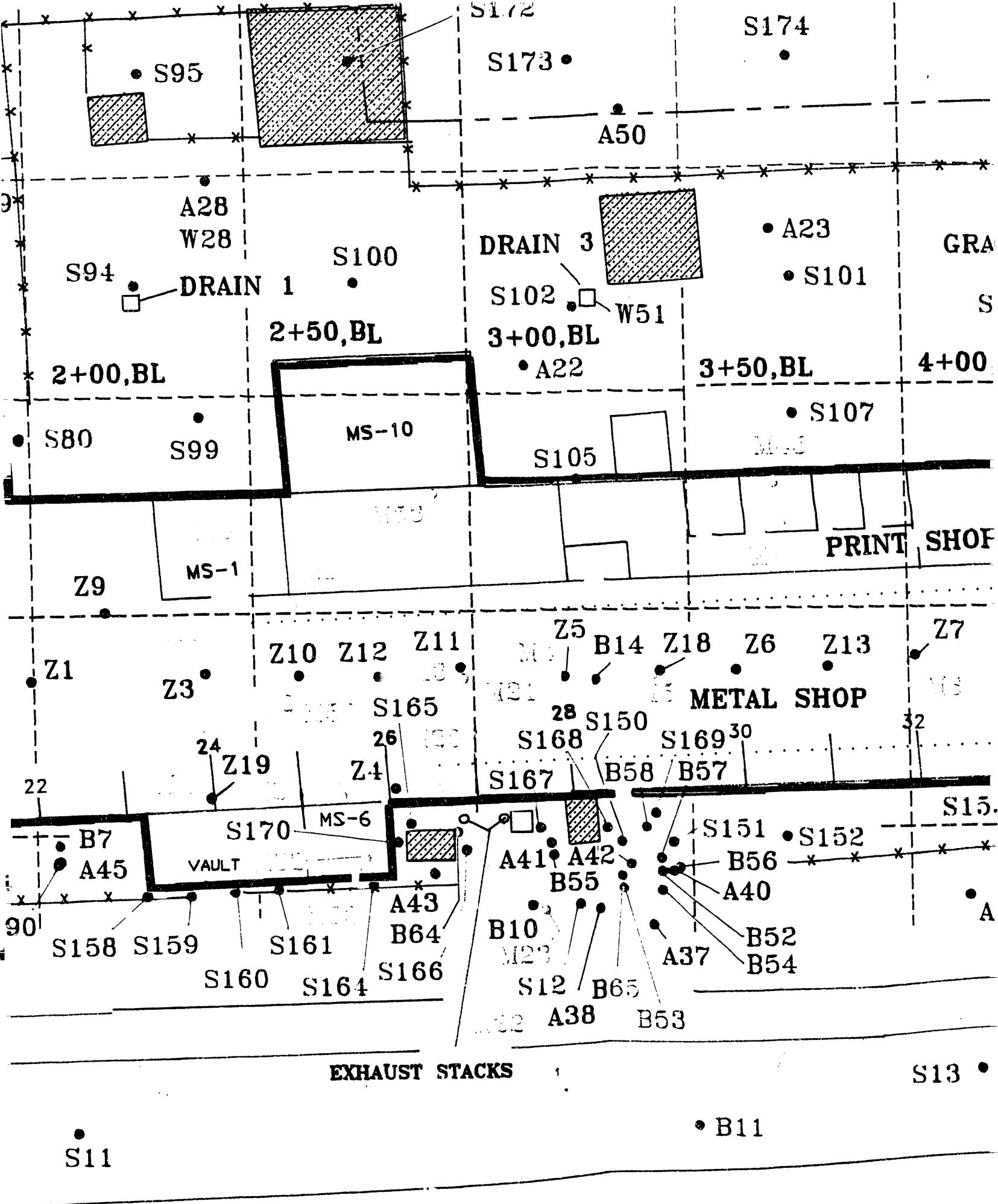
LOADING DOCK

S86

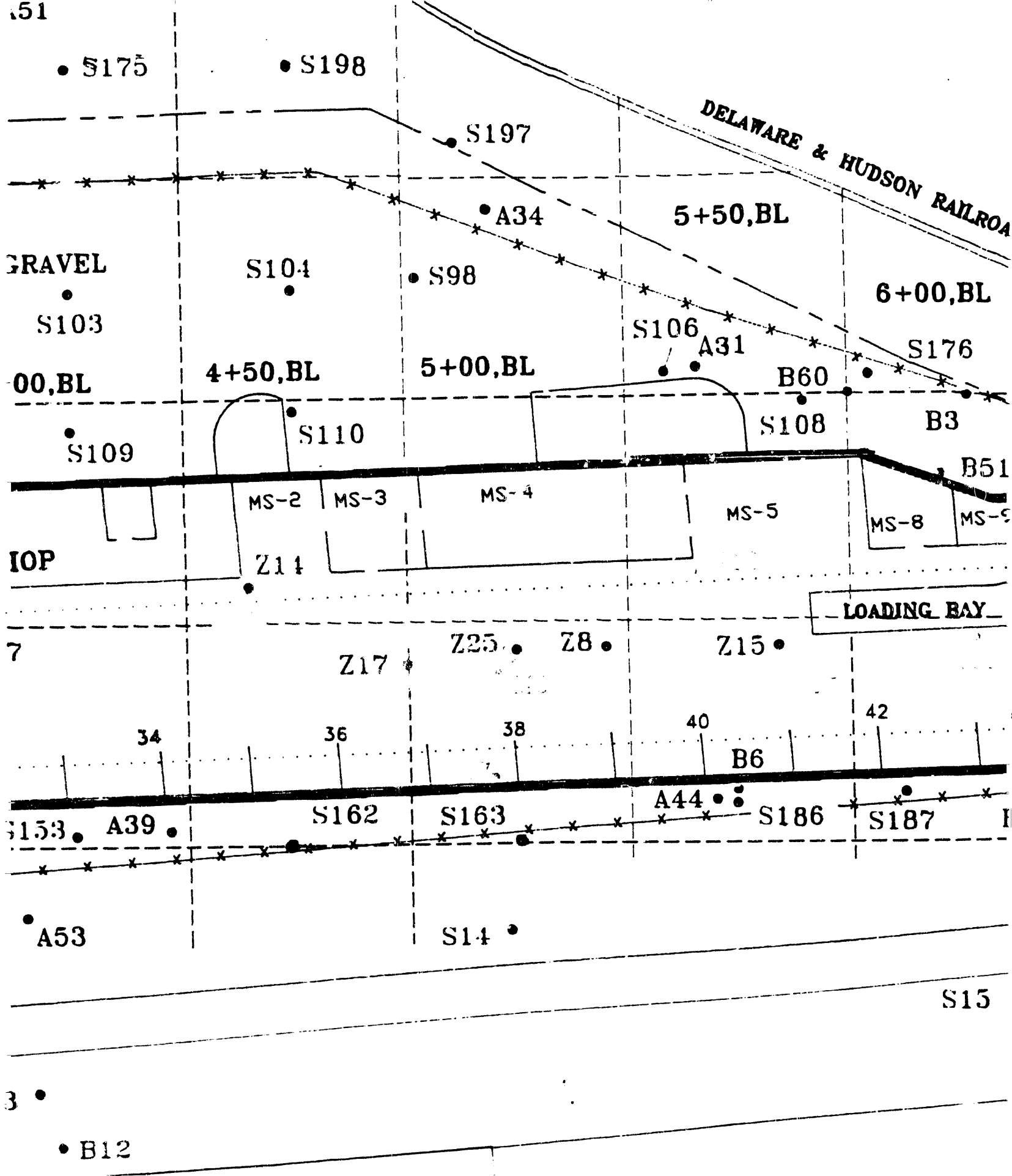
A3



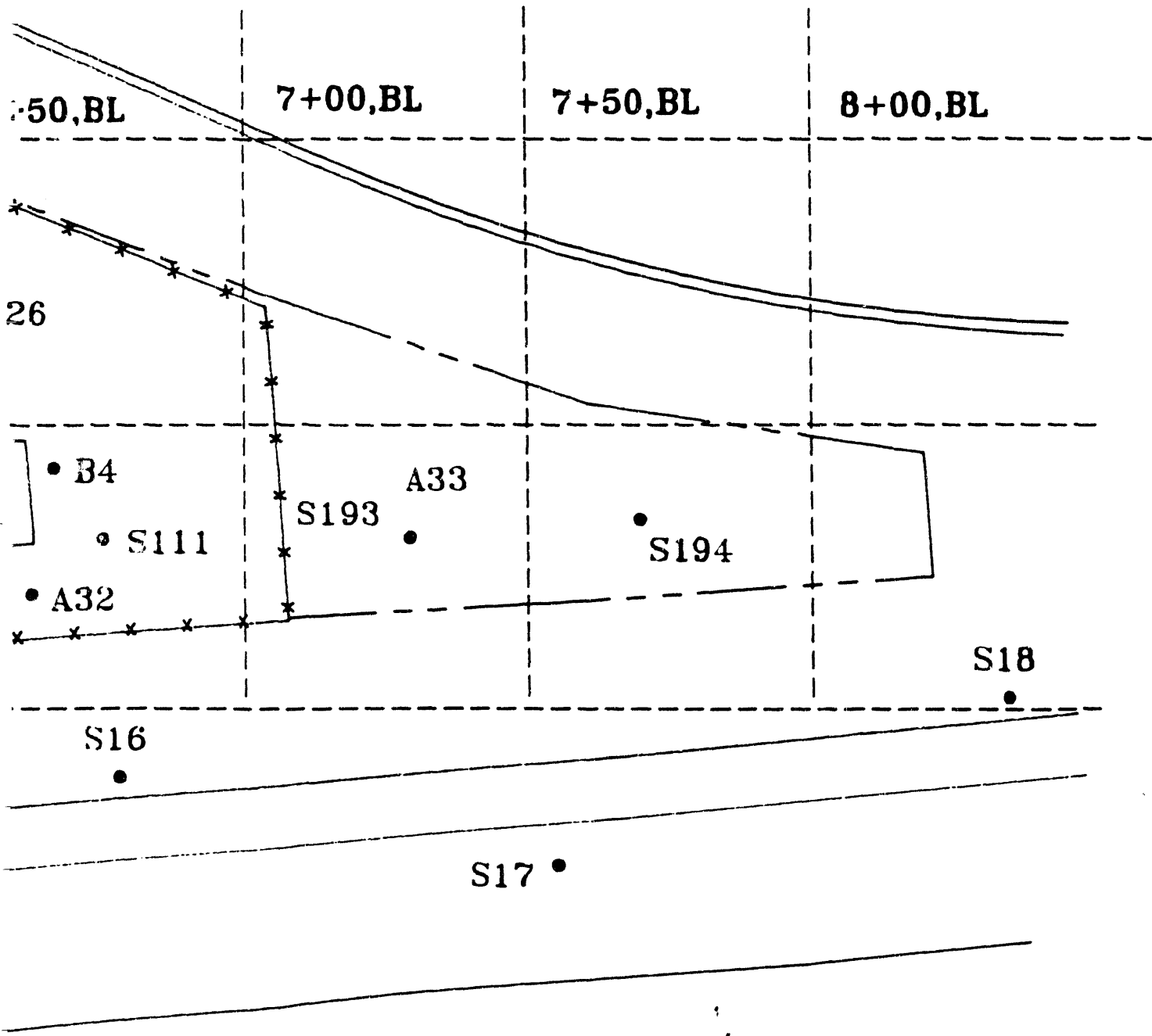








M = DUST/WALL/PAINT SAMPLES



**END**

**DATE  
FILMED**

7 / 1 / 93

