

3M New Brighton Plant
TCAAP 590
New Brighton, MN 55112-5796
612/736 8300

*Bldg.
675*

January 27, 1992



Darrell G. Wiedeman
Nuclear Regulatory Commission, Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Wiedeman:

Enclosed is data associated with the draft report of June 6, 1991. The data has been condensed and information necessary to determine minimum detectable activity has been included. This data is provided to allow unrestricted release of Building 113 by your organization.

Sincerely,

M.R. Peters

M.R. Peters
Project Manager

kkp

Enclosure

same as bldg. 675 according to Fred Entwistle on 9/4/92 Telecon.

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Summary of ORAU Recommendations

The following recommendations were made by the Oak Ridge Associated University (ORAU) survey team during the August 1991 confirmatory survey of 3M Building 675.

- Summarize 3M data by area in tabular form
- provide additional information on instruments used in obtaining data
- perform additional surveying and decontamination as necessary to areas of elevated readings identified by ORAU
- perform U-235 specific analysis on soil samples
- perform exposure rate measurements in the building

Work has been completed and results are as follows.

3M FINAL MONITORING DATA

Data given in appendix N and V of the original draft report dated June 6, 1991, has been condensed and results are shown in attached Table 1. Figure 1 shows the areas of the building corresponding to the data in Table 1. Instrument efficiencies, background and other information necessary to determine minimum detectable activity are given in the footnotes of Table 1.

ADDITIONAL MONITORING AND DECONTAMINATION WORK

Areas monitored were the footings of the wall and ceilings and columns as shown in Figure 2. Monitoring was performed for total alpha and beta/gamma with the same instrumentation as noted in Table 1 notes C and D. One area of about 500 cm² on the footing was found to show approximately 100 dpm/100 cm² of alpha contamination. Extensive sections of ceiling where the walls had abutted showed alpha contamination of several hundred dpm/100 cm². All areas were decontaminated and monitored resulting in <70 dpm/100 cm² of alpha. No beta/gamma contamination was found.

These areas are in addition to several areas of contamination identified by ORAU during their confirmatory survey and decontaminated by 3M prior to the completion of the survey.

A scan of the entire floor surface of the building was made using a 2"x 2" NaI detector and Ludlum Model 18 ratemeter. The instrument showed a response of 11,000 cpm at 3 inches from a 0.5 uCi Cs-137 standard. Figure 5 shows the ratemeter cpm readings for each area of the building. No areas of contamination were located. An overall increase

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was noted from south to north, presumably associated with building materials used in the north end of the building.

Two locations in the building were recently identified to 3M by ORAU as meeting the release criteria limits for U-235 but not if the beta component were assumed to be Sr-90. These locations were a 1500 cm² area on the basement floor near the corner of the chimney and a ceiling penetration 1.5 meters south east of column D-2. 3M data indicates these areas had been decontaminated to non detectable levels during the ORAU visit in August. On 22 January 1992 a resurvey of these areas was performed by 3M Health Physics Services and no readings above background obtained. Instruments used were an Eberline E-120 ratemeter with an HP-260 probe for beta/gamma measurement, and a Ludlum Model 3 ratemeter with a Model 43-5 alpha scintillation probe for alpha measurement. The E-120 has an efficiency of 28.4% for Cs-137, a background of 50 cpm and a probe face of 20 cm² for a lower limit of detection of <800 dpm/100cm². The alpha instrument has a 4 pi efficiency of 24% for Pu-239, a background of less than 10cpm and a probe face of 81 cm² for a lower limit of detection of <100dpm

EXPOSURE RATE MEASUREMENTS

Exposure rate measurements in microroentgens/hour were made using a Victoreen 450P pressurized ion chamber. The unit was calibrated using a Cs-137 source with an exposure rate measured by NBS as 13.3 milliroentgens at one meter on September 10, 1981. The Victoreen 450P was operated in the integrate mode and exposures made at various distances to give calculated exposure rates from 10.5 mr/hr. to 47 ur/hr. Instrument response varied from 1.09 to 1.14 of the calculated exposure rate over this range. The correction factor of 1.14 was used for actual measurements as it was obtained at the dose rate closest to that being measured. Background measurements of 6.5 ur/hr. and 14.5 ur/hr were obtained outdoors and in nearby TCAAP Building 105. No building was found on the TCAAP site with identical construction to Building 675 which has concrete pillars supporting a concrete slab roof.

Measurement locations in Building 675 were chosen randomly in the main open area, with additional areas in the front office, basement, and warehouse picked to characterize those areas as shown in Figure 3. Readings were taken one meter above ground with integration times of approximately one hour. The results are as follows:

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Summary of ORAU Recommendations
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Location	Reading (ur/hr)	Location	Reading
1	17.0	2	15.8
3	15.3	4	17.3
5	16.5	6	17.0
7	18.1	8	17.5
9	15.8	10	16.8
Basement (A)	17.3	Office (B)	20.3
Warehouse (C)	16.4		

U-235 SOIL ANALYSIS

Composited soil samples were taken from the three areas shown in Figure 4 and sent to a commercial laboratory for analysis. Samples were specifically analyzed for isotopes of Uranium as well as a Gamma Spectral analysis and an Alpha Spec Scan. The sample from area 2 was also analyzed specifically for Po-210 shown in Table 2.

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TABLE I

SUMMARY OF FINAL BUILDING SURFACE ACTIVITY MEASUREMENTS
BUILDING 675, NEW BRIGHTON

(A) AREA	NUMBER OF MEASUREMENTS	* TOTAL CONTAMINATION (dpm/100cm ²)								* REMOVABLE CONTAMINATION (dpm/100cm ²)					
		* (b)		* (c)		* (d)		* (e)		* (f)		* (g)		* (h)	
		* U-235 MAX	AVG	ALPHA MAX	AVG	BETA/GAMMA MAX	AVG	I-125 MAX	AVG	* GROSS ALPHA MAX	AVG	GROSS BETA MAX	AVG	I-125 MAX	AVG
1															
Floor	38	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	224	47	Not Measured	Not Measured
Ceiling	38	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Roof	38	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Interior Walls	60	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* 7	<4	<40	<40	Not Measured	Not Measured
Exterior Walls	18	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
2															
Floor	9	* <3400	<3400	<70	<70	<800	<800	<1300	<1300	* 87	<50	<500	<500	<50	<50
Ceiling	9	* <3400	<3400	<70	<70	<800	<800	<1300	<1300	* <4	<4	<40	<40	<4	<4
Roof	9	* <3400	<3400	<70	<70	<800	<800	<1300	<1300	* <4	<4	<40	<40	<4	<4
Interior Walls	3	* <3400	<3400	<70	<70	<800	<800	<1300	<1300	* <4	<4	<40	<40	<4	<4
Exterior Walls	4	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
3															
Floor	59	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* 50	<50	597	<500	Not Measured	Not Measured
Ceiling	57	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Roof	55	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Interior Walls	16	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Exterior Walls	18	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
4															
Floor	22	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* 50	<50	870	<500	Not Measured	Not Measured
Ceiling	21	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* 10	<4	<40	<40	Not Measured	Not Measured
Roof	23	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Interior Walls	9	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured
Exterior Walls	15	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<40	<40	Not Measured	Not Measured

Floor	20	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<30	<30	Not Measured	Not Measured
Ceiling	20	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<30	<30	Not Measured	Not Measured
Roof	24	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<30	<30	Not Measured	Not Measured
Interior Walls	9	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<30	<30	Not Measured	Not Measured
Exterior Walls	23	* <3400	<3400	<70	<70	<800	<800	Not Measured	Not Measured	* <4	<4	<30	<30	Not Measured	Not Measured

TABLE I

NOTES

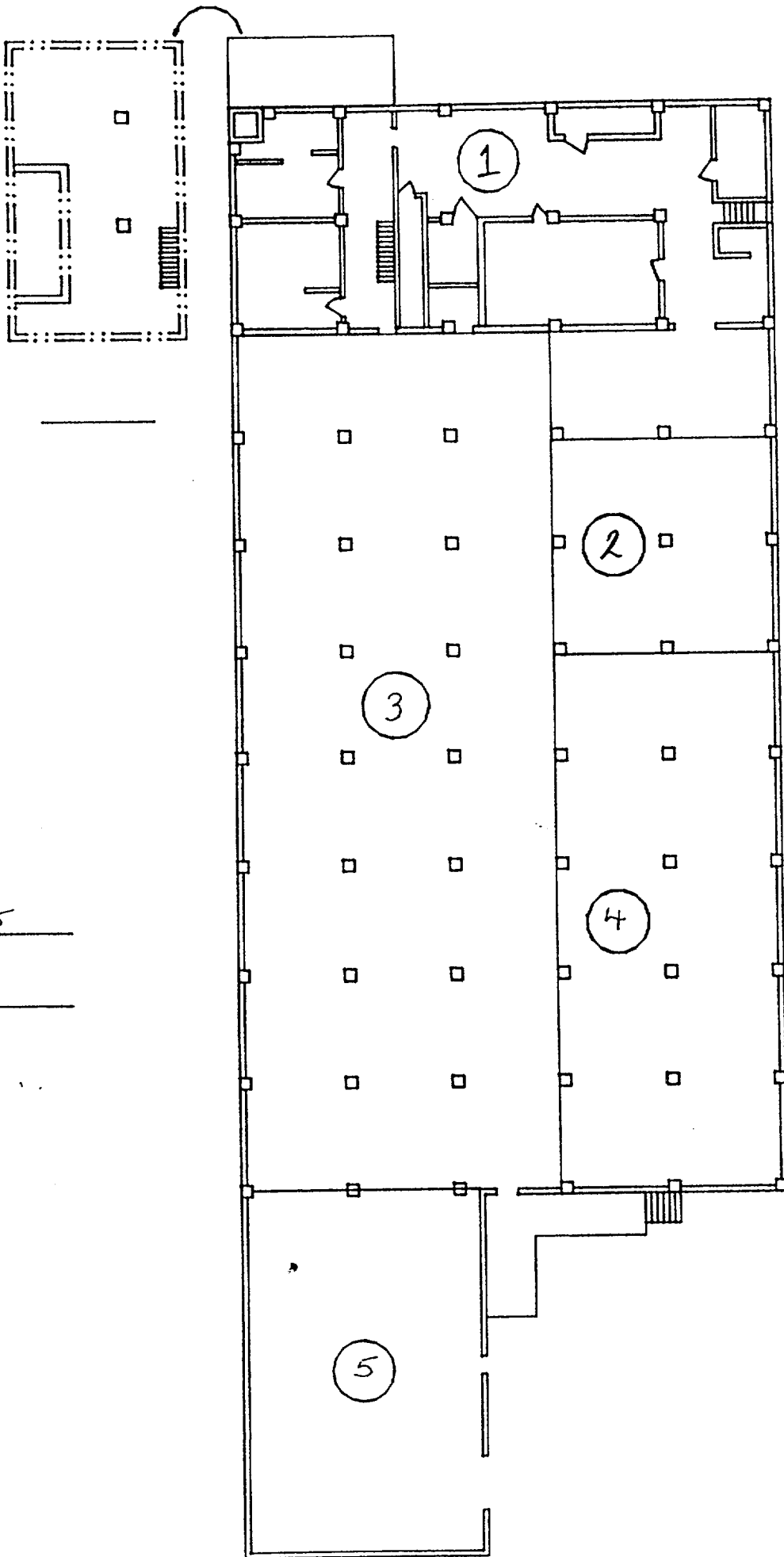
- a) See figure 1 for the location of areas in building 675.
- b) U-235 measurements made with Bicon G5 Fidler probe and Ludlum Model 18 ratemeter. System calibrated with 35,800 dpm U-235 source. Instrument response 2100 ncpm. Operating background 100 cpm, probe face area 19.6 cm².
- c) Total alpha measurements made with Eberline AC-23 gas proportional probe and Eberline RM-19 ratemeter. System calibrated with 148,000 cpm (2 pi) Pu-239 source. Instrument response 130,000 cpm. Operating background 50 cpm. Probe face area 350 cm².
- d) Total beta/gamma measurements made with Eberline AC-23 gas proportional probe and Eberline RM-19 ratemeter. System calibrated with Cs-137 0.062 uCi source. Instrument response 32,000 cpm. Operating background 700 cpm. Probe face area 350 cm².
- e) Total I-125 measurements made with Bicon G5 Fidler probe and Ludlum Model 18 ratemeter. System calibrated with a 0.114 uCi I-125 standard. The instrument response was 95,000 ncpm. Operating background 200 cpm. Probe face area 19.6 cm².
- f) Wipe tests assayed using a Tennelec L/B 5100 planchet counter. One minute count times were used. Instrument efficiencies (4 pi) for alpha emitters and Pm-147 were 27.4% and 22.8% respectively. Instrument background was 0 cpm for both alpha and beta/gamma channels.
- g) Wipe tests were assayed using a Packard Liquid Scintillation Analyzer Tri Carb 1900 CA. 10 minute count times were used with a background count rate of 3.6cpm in the I-125 channels. The instrument was found to have a 36% efficiency for I-125 using sample assayed by the coincidence peak method.

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TABLE 2 SOIL SAMPLE RESULTS BUILDING 675

ANALYSIS	AREA Results in pCi/gram	1	2	3
ALPHA SPEC SCAN	All <0.1	All <0.1	All <0.1	All <0.1
GAMMA SPECTRAL ANALYSIS				
Cs-137	1.88+/-0.07			No man-made nuclides detected.
Ce-141	0.32+/-0.07	0.10+/-0.03		
PO-210		<0.1		
ISOTOPIIC URANIUM				
U-234	5.68+/-0.45	2.06+/-0.12	1.76+/-0.13	
U-235	0.25+/-0.04	0.07+/-0.02	0.09+/-0.03	
U-238	0.44+/-0.08	0.13+/-0.03	0.16+/-0.04	



Bldg 675

Fig. 1

20'

FIG 2

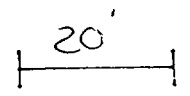
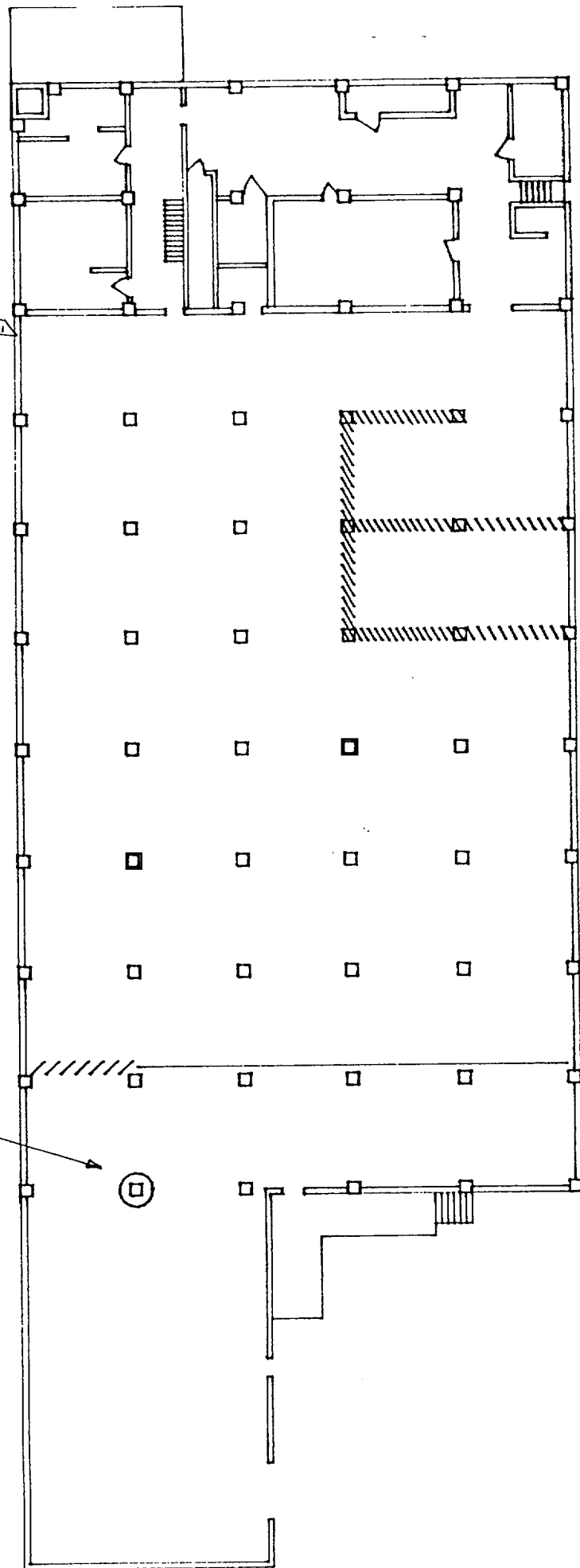
BLDG 675

AREAS DECONTAMINATED

FOLLOWING ORAU
CONFIRMATORY
SURVEY

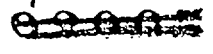
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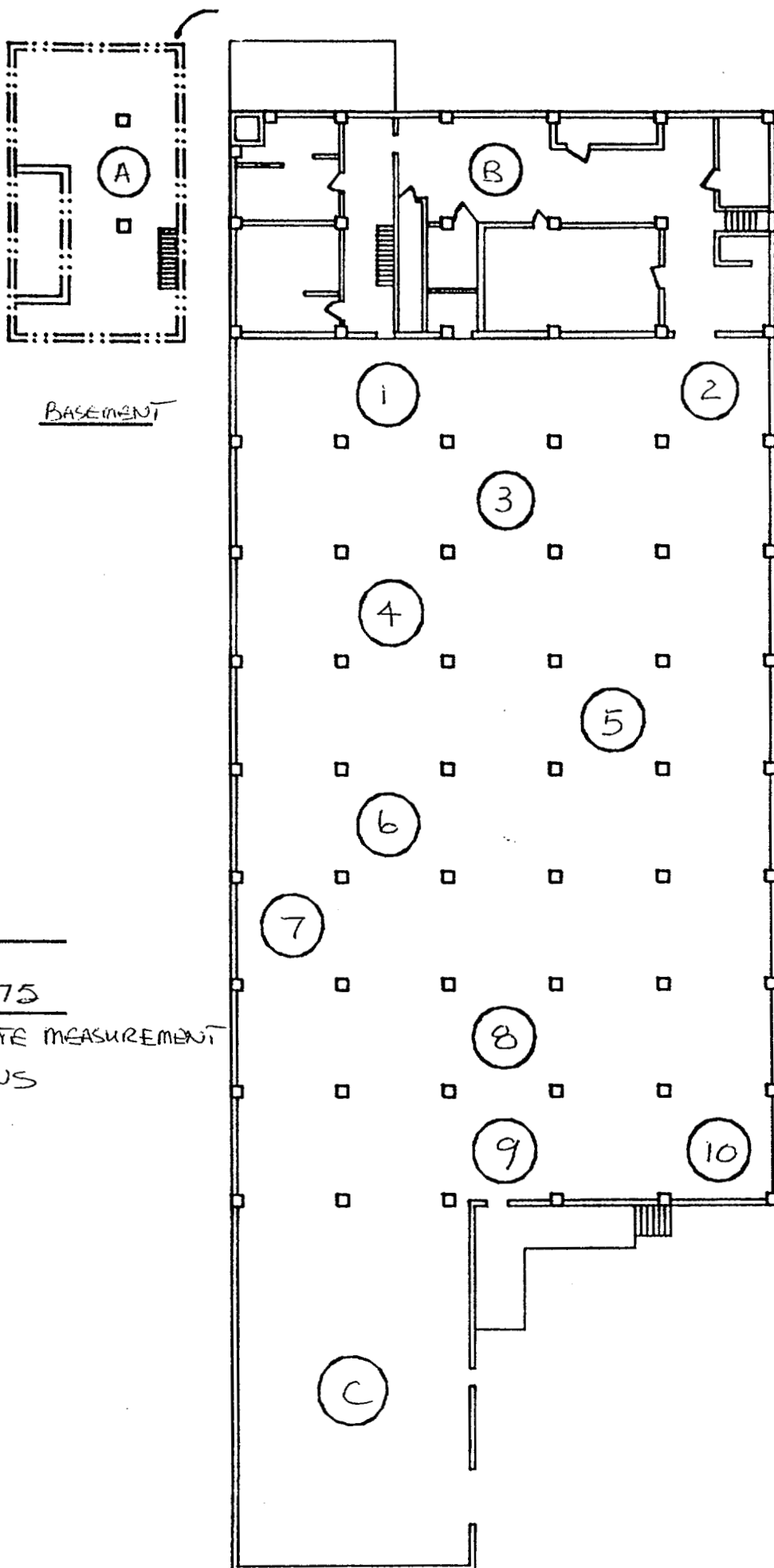
2'x2' CONCRETE PILLAR



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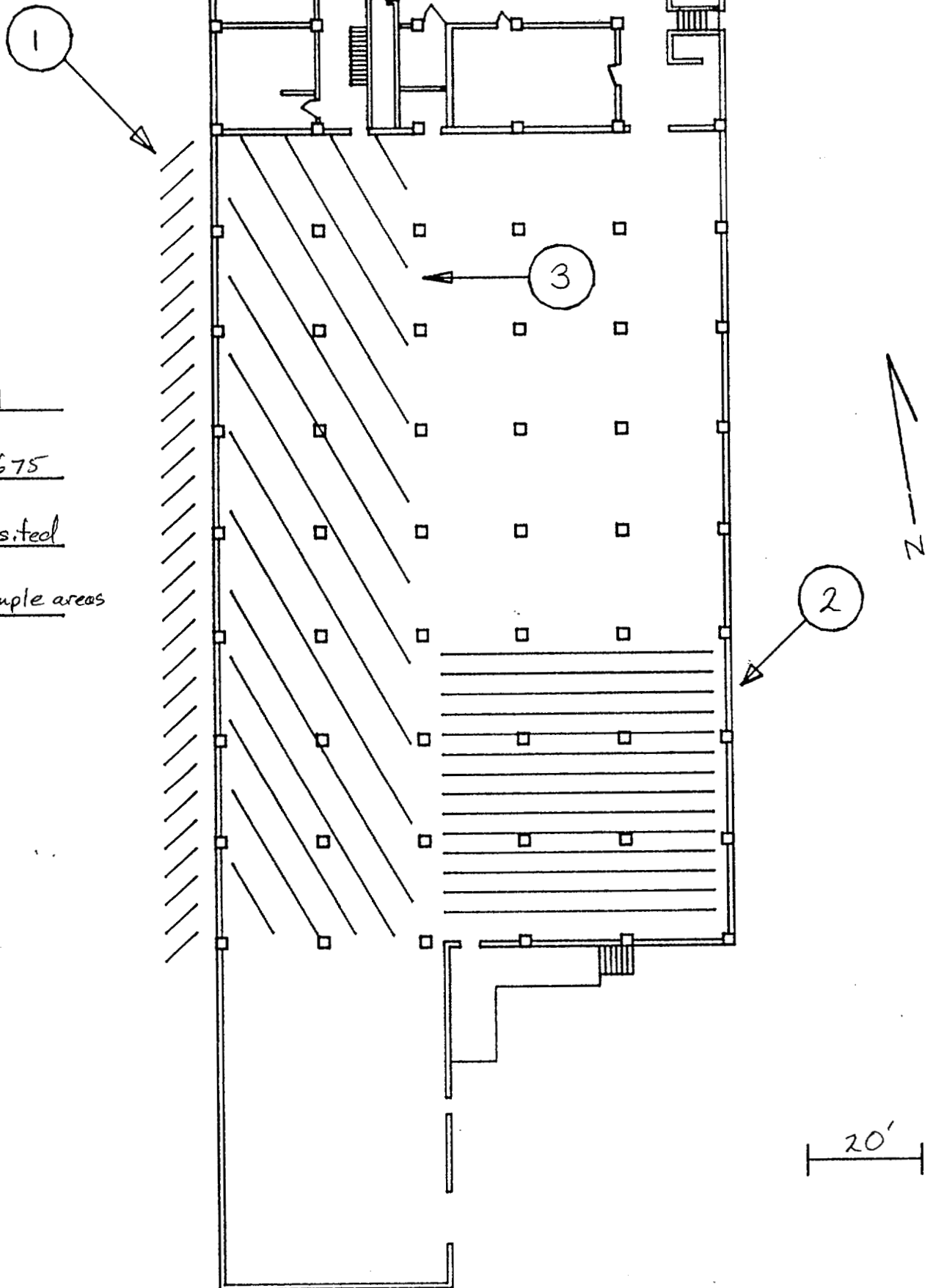
BASEMENT

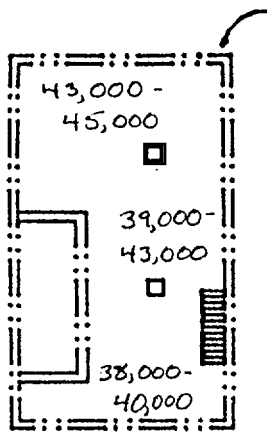
FIG. 3

BLDG 675
DOSE RATE MEASUREMENT
LOCATIONS

20'

Fig 4
Bldg 675
composited
soil sample areas





basement

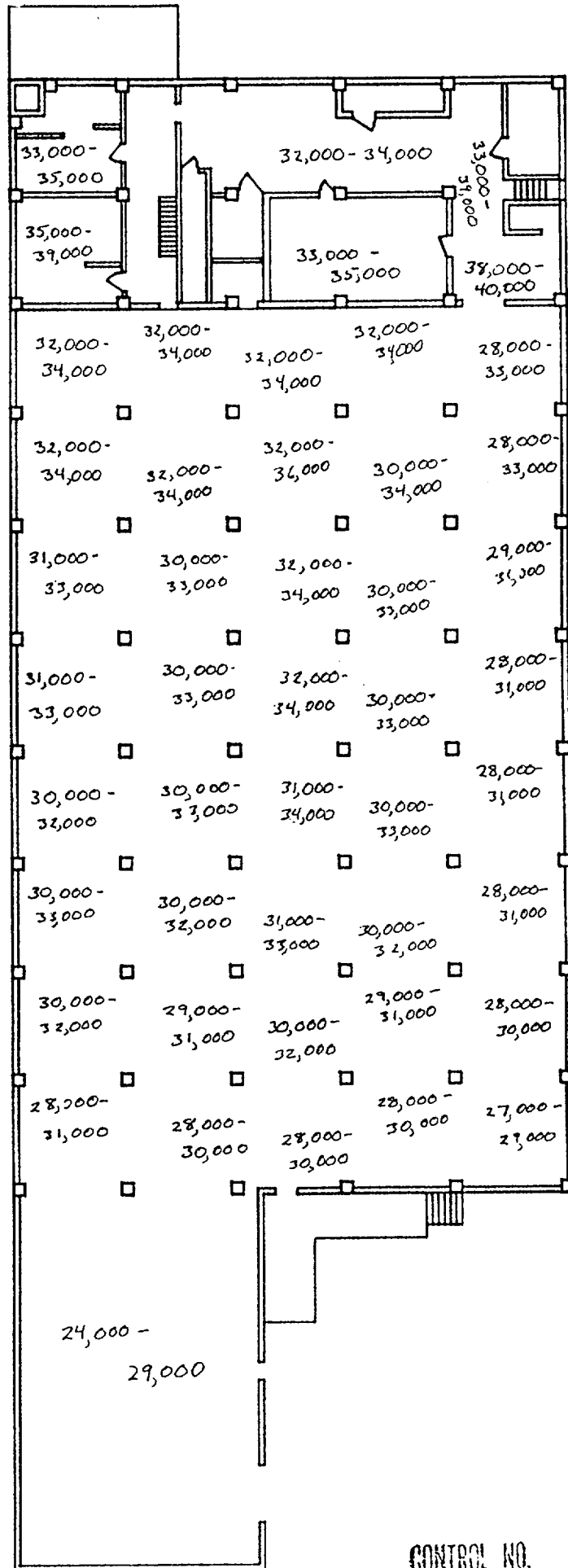


Fig 5

Bldg 675

Gamma scan readings
 with 2x2 NaI detector.
 Readings in cpm.

20'

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