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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUL 16 1982

FCUP:RMW
70-55
SNM-59

NOTE TO: Files

The General Electric Company site at Warren Township, Michigan was inspected by M. J. Oestmann on June 8 and 16, 1982 and found to be free of contamination. See the inspection report of June 29, 1982 discussing the survey conducted at this site (copy enclosed).

William T. Crow, Section Leader
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

Enclosure: Inspection Report
No. 70-55/82-01 (DEPOS)

FILE COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-55/82-01(DEPOS)

Docket No. 70-55 License No. SNM-59 (Expired December 1, 1961)

Licensee: General Electric
Carboloy Systems Department
11177 E. Eight Mile Road
Warren, MI 48089

Inspection At: Warren, Michigan

Inspection Conducted: June 8 and 16, 1982

Inspector: M. J. Oestmann 6/28/82

Approved By: M. C. Schumacher, Chief 6/29/82
Independent Measurements and
Environmental Protection Section

Inspection Summary:

Inspection on June 8, 1982 (Report No. 70-55/82-01(DEPOS))
Areas Inspected: A special announced closeout inspection was conducted to determine the status of the expired License No. SNM-59 and to independently survey physical facilities used during the time the license was in effect prior to its termination in March 1958. The inspection involved five inspector-hours onsite by one NRC inspector.
Results: The licensee stated that all special nuclear material was transferred to the General Electric Atomic Power Equipment Department (APED) in San Jose, California, an authorized recipient with NRC Licenses No. SNM-1270, No. SNM-1265 and No. SNM-1281, prior to expiration of License No. SNM-59 at Warren, Michigan, on December 1, 1961. Direct radiation readings taken during this inspection, indicated only background radiation of 3-6 microroentgens per hour in the areas surveyed. No residual contamination above NRC guidelines was identified in the areas surveyed.

## DETAILS

1. Persons Contacted

*Mr. W. A. Reich, Manager - Technical Resources, Carboloy Systems Department, General Electric Company (GE)
**Mr. V. Z. Jakubowski, Manager - Safety and Environmental Engineering, Carboloy Systems Department, GE
*Mr. R. Hurst, Foreman, Carboloy Systems Department, GE
Mr. T. E. Hale, Manager, Materials Research, Carboloy Systems Department, GE
Mr. D. Graham, Research Engineer, Carboloy Systems Department, GE
Dr. J. Ohno, Research Engineer, Carboloy Systems Department, GE
Mr. J. Kilgallon, Processing Technician, Carboloy Systems Department, GE

*Denotes those present at the exit interview on June 8, 1982.
**Denotes the licensee representative present during a telephone conversation on June 16, 1982.

2. Sources of Information

Messrs. Reich and Hurst were employed by GE at the time License No. SNM-59 was in effect in the 1950s and were familiar with the activities performed in the GE Metallurgical Products Department in existence at that time. The former licensee had available most of the files developed during the time the license was in effect in the 1950s.

3. General

Licensee representatives stated that the Metallurgical Products Department of the GE Carboloy Systems Department in Warren, Michigan, purchased 18,000 lbs of enriched (up to 2.3 w/o U-235) uranium dioxide as pellets from Mallinckrodt Chemical Company for hot pressing into different solid shapes of fuel elements in the 1950s. The fuel elements were then shipped to the GE Atomic Power Equipment Department (APED) in San Jose, California, for research and use in the GE boiling water reactor (BWR) program in Vallecitos, California.

Production of the $UO_2$ fuel elements in the Metallurgical Products Department was limited to pilot plant scale operation located in the furnace and press rooms in Building 1 of the GE plant facilities in Warren, Michigan. (See attached Figures 1 and 2 showing the location of these rooms). A change room, including washer and dryer, lavatory, showers and lockers, was used by the employees working in the furnace and press rooms. Licensee representatives stated that all equipment used for the nuclear development work were disposed of and shipped to the GE APED prior to termination of the license in March, 1958. This included removal and dismantling of retention tanks located in the furnace room which discharged to an underground settling pond. This pond discharged to the sanitary sewer; the pond is no longer used and is now covered by an electric substation. Routine sampling and analysis of the water in the tanks and pond was conducted during plant operation to assure discharges were within acceptable levels. All ventilation filters and equipment were also disposed and shipped to APED. A 100 ft

stack was also dismantled and removed. The areas used were cleaned up and decontaminated. A survey of the areas used for nuclear fuel operation was performed by a Safety Engineer from APED in January, 1958. The Safety Engineer proposed three recommendations from this survey. One recommendation concerned the floor tile. Licensee representatives stated that the floor tile in the areas used have since been replaced several times over the years. The second recommendation concerned a deparaffinizing furnace which has since been disposed of. The third recommendation involved a recheck of the areas containing material prepared for shipment to APED. Licensee representatives also stated that the State of Michigan Department of Public Health (DPH) performed a final survey after everything had been removed, but no report was available for review during this inspection. A licensee representative called the inspector on June 16, 1982, informing her that he has now obtained a copy of this report and will forward a copy to NRC Region III.

The furnace room is presently used for preparing silicon carbide and oxide ceramic materials for cutting purposes from a powder operation. Part of the furnace room is now used as storage space. The press room is now used primarily as a laboratory including new furnaces for heating various carbide materials. The change room has been converted to an office area. The licensee has no plans to reactivate any nuclear fuel development work at the Warren, Michigan, plant site.

4. Status of Facility Contamination

The NRC inspector was accompanied by Messrs. Reich, Jakubowski and Hurst who pointed out the location and areas where the former fuel element development program was conducted. The inspector's survey of these areas included visual inspection, direct radiation field measurements, and smears for transferrable contamination, and discussion with responsible licensee representatives.

The survey confirmed that all nuclear fuel materials, equipment and facilities previously used, had been removed and disposed of. The floor tile had been replaced and the retention tanks removed and disposed of. The furnace room had been equipped with new muffler furnaces and other heating equipment which replaced previous equipment.

Direct measurements taken with portable instruments (Table 1) were essentically at background levels. Results of the direct gamma radiation survey are shown in Figure 2. Readings taken with the tissue equivalent HPI 1010(ionization) survey meter were about 75% of those taken with the Eberline PRM-7 (scintillator) micro R meter.

Sixteen smears collected at various locations on floors, bench tops, table and desk tops in the furnace room, press room and laboratory-office area were counted on June 9-10, 1982 in the Region III laboratory using the Canberra Low-Level Alpha/Beta Counting System. Results (Table 2) indicated no removable contamination above NRC guidelines for release as an unrestricted area was present.

5. Conclusions

Based on visual inspection, direct radiation field measurements, evaluations of smears, and discussion with responsible licensee representatives, all licensed material appears to have been disposed of in an authorized manner. Direct radiation readings were at background levels and no removable contamination was detected above NRC guidelines. See attached survey results and NRC guidelines.

6. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of this special inspection on June 8, 1982. The inspector summarized the scope and preliminary findings of the inspection. The inspector also informed the licensee by telephone on June 16, 1982, the counting results of the smears taken on June 8, 1982, and the conclusion reached to recommend retiring AEC License No. SNM-59 to the NRC Office of Nuclear Materials Safety and Safeguards in Washington, D.C.

Attachments:

Enclosure 2 - NRC "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use"

Figure 1 - Layout of Buildings of GE Carboloy Systems Department in Warren, Michigan

Figure 2 - Nuclear Fuel Area and Survey Results

Table 1 - Nuclear Instruments Used in Survey (June 1982)

Table 2 - Results of Smear Survey (June 1982)

# GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle and Material Safety
Washington, D. C. 20555

June 1980

The instructions in this guide in conjunction with Table 1 specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control are considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Chief, Material Licensing Branch, Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, and also the Director of the Regional Office of the Office of Inspection and Enforcement, USNRC, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

   Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

| NUCLIDES[a] | AVERAGE[b c f] | MAXIMUM[b d f] | REMOVABLE[b e f] |
|---|---|---|---|
| U-nat, U-235, U-238, and associated decay products | 5,000 dpm α/100 cm² | 15,000 dpm α/100 cm² | 1,000 dpm α/100 cm² |
| Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129 | 100 dpm/100 cm² | 300 dpm/100 cm² | 20 dpm/100 cm² |
| Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133 | 1000 dpm/100 cm² | 3000 dpm/100 cm² | 200 dpm/100 cm² |
| Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above. | 5000 dpm βγ/100 cm² | 15,000 dpm βγ/100 cm² | 1000 dpm βγ/100 cm² |

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

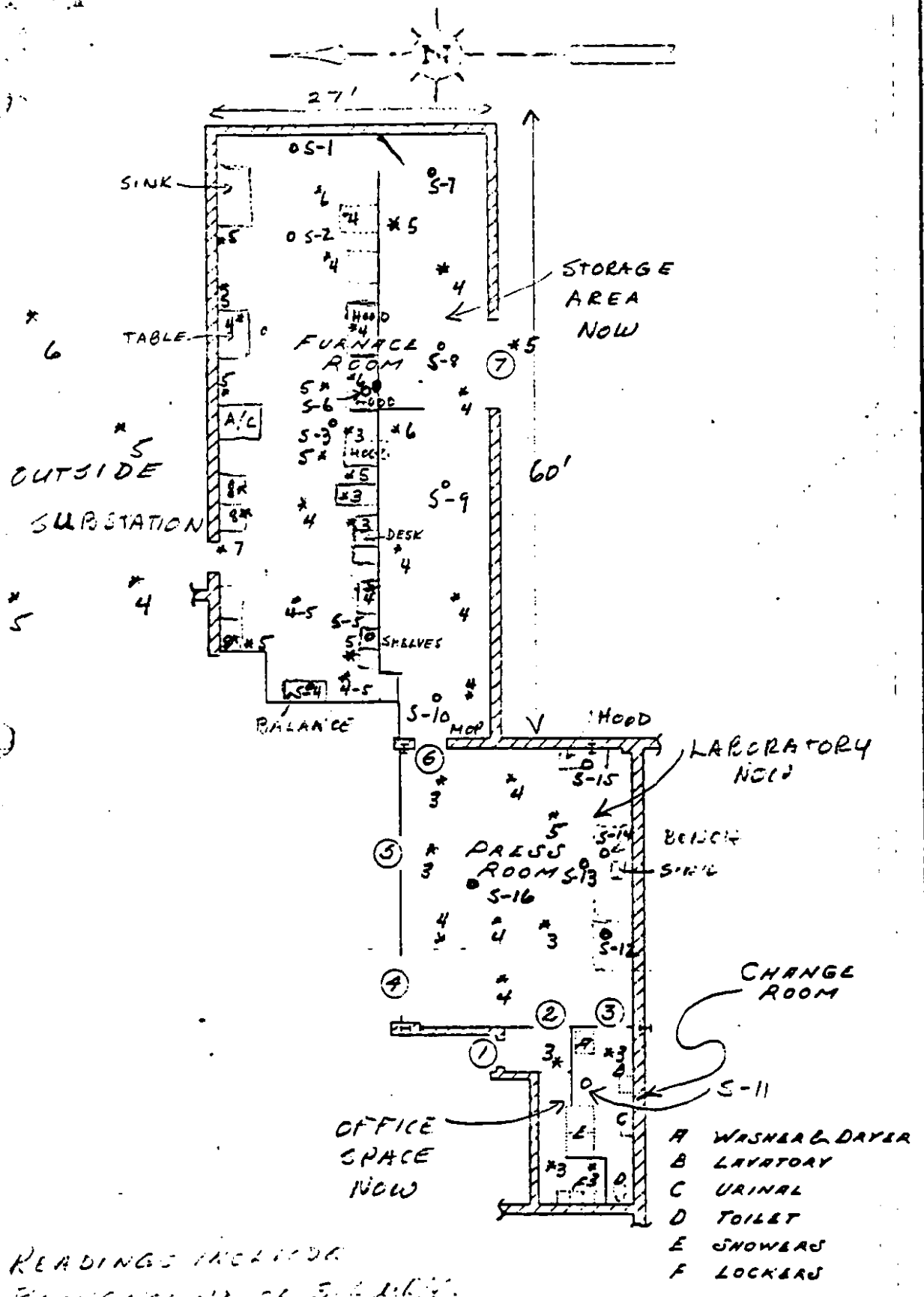
[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm².

[e] The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of tissue absorber.




READINGS INCLUDE BACKGROUND OF 0.4 MR/HR

# NUCLEAR FUEL AREA

FIGURE 2 SURVEY RESULTS

* 4 = 4 MILLIROENTGENS PER HOUR

OS-2 = SHEAR # 2

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
MANUFACTURING ENGINEERING

DRAWING NO. FE 0SK-4-7-1C

REVISION | APPROVED | DATE

DETAIL NAME

SCALE 1/2" = 1'-0"
DATE 7-10-51
DRAWN BY K. GENALIN
CH'K'D BY

JOB TITLE

ASSEMBLY DWG. NO. | FILE NO.

FRACTIONAL DIMENSIONS ±
UNLESS OTHERWISE SPECIFIED

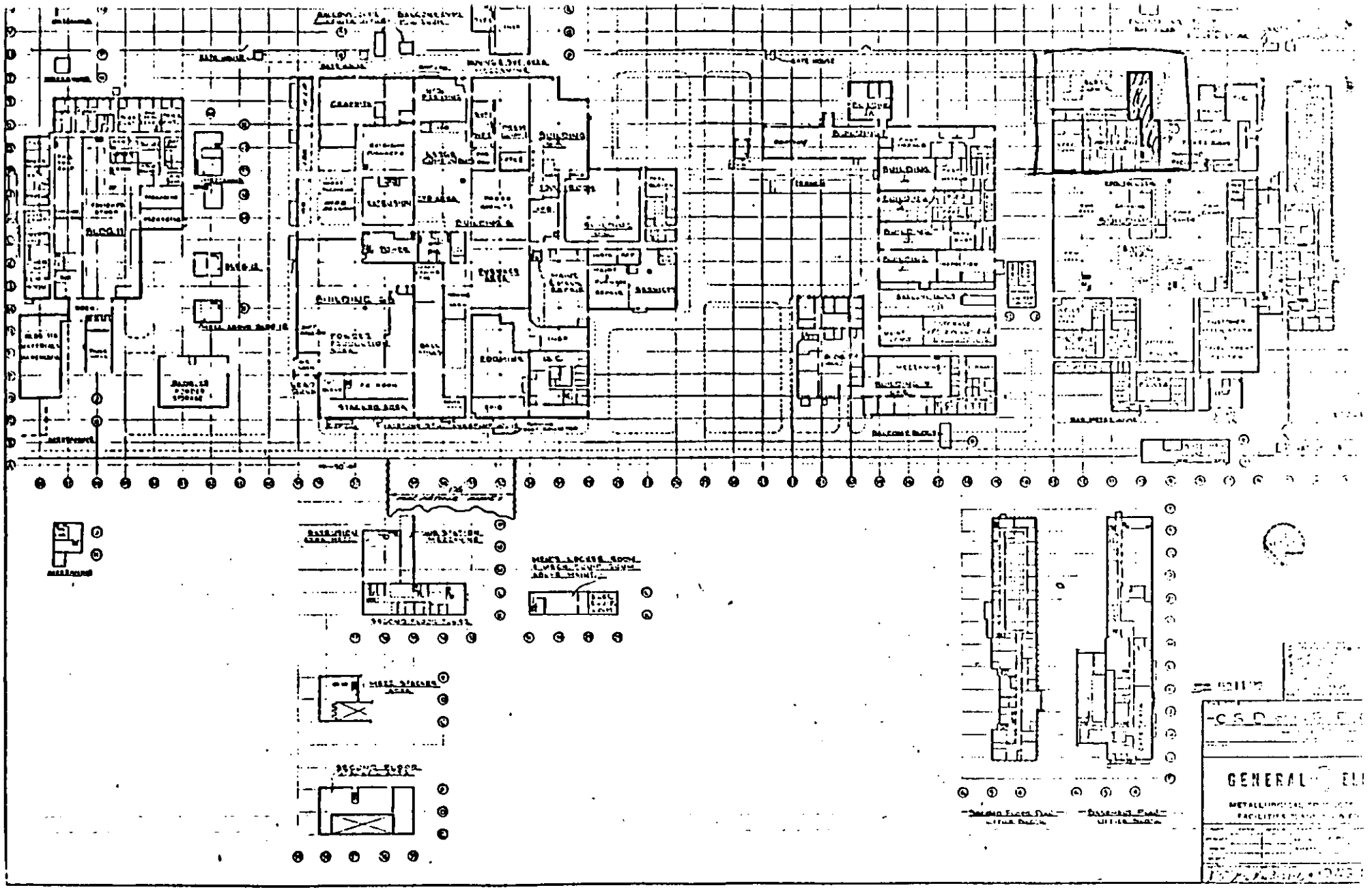


FIGURE 1 LAYOUT OF BUILDINGS OF GENERAL ELECTRIC CARBOLOY SYSTEMS DEPARTMENT IN WARREN, MICHIGAN. SQUARE AREA OF BUILDING 1 SHOWS FORMER NUCLEAR FUEL ACC

Table 1 Nuclear Instruments Used in Survey (June, 1982)

| Instrument | Model | Calibration Date |
|---|---|---|
| Eberline Portable Micro R meter | PRM-7 | 4/20/82 |
| Health Physics Instruments Tissue Equivalent | 1010 | 5/6/82 |
| Eberline Portable Geiger Counter with end-window probe | E-520 | 5/20/82 |
| Eberline Portable Alpha Counter with AC-3 - ZnS scintillator probe | PAC ISAGA | 3/17/82 |
| **Region III** | | |
| Canberra Low-Level Alpha/Beta Counter | 2201 | 6/10/82 |

Table 2 RESULTS OF SMEAR SURVEY AT GENERAL ELECTRIC - CARBOLOY SYSTEMS DEPT. WARREN, MICHIGAN (JUNE, 1982)

| | | REMOVABLE CONTAMINATION | |
|---|---|---|---|
| NUMBER | LOCATION | ALPHA, dpm/100cm$^2$ | BETA, dpm/100cm$^2$ |
| S-1 | Floor-Furnace Room-East End | <0.50* | <3.2* |
| S-2 | Floor-Furnace Room-Middle | <0.50 | 1.9±2.6 |
| S-3 | Table Top-Blue M Furnace-Furnace Room | <0.50 | <2.3 |
| S-4 | Floor-Furnace Room-By Balance | <0.50 | <3.7 |
| S-5 | Desk Top-Where Samples are Located in Furnace Room | <0.50 | <3.7 |
| S-6 | Bench Top in Hood in Furnace Room | <0.50 | <1.6 |
| S-7 | Floor in Storage Area-East End | <0.50 | <2.2 |
| S-8 | Floor in Storage Area-Middle-by Iron Filings | <0.50 | <2.6 |
| S-9 | Floor in Storage Area-Middle | <0.50 | <1.6 |
| S-10 | Floor in Storage Area-By Mop-West End | <0.50 | <1.6 |
| S-11 | Floor in Office | <0.50 | <2.0 |
| S-12 | Table Top in Laboratory Where Samples are Stored | <0.50 | <3.0 |
| | S-13 Floor by Sink in Laboratory | <0.50 | <1.6 |
| S-14 | Laboratory Bench | <0.50 | <3.2 |
| S-15 | Floor by Hood in Laboratory Where Chemicals are Stored | <0.50 | <1.6 |
| S-16 | Floor in Middle of Laboratory Near Furnace Controls | 2.0±1.2 | <3.5 |

* Less than values are indicative of minimum detectable activities (MDA) for Alpha and Beta activities. Errors are at the 95% confidence level.

Smear Locations are Shown on Figure 2.