UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

July 26, 1996

Docket No.: 070-00371

License No.: SNM-368 (Terminated)

Alan Jarman, Property Manager
71 Shelton Avenue
P.O. Box 8538
New Haven, CT 06531

SUBJECT: INSPECTION NO. 070-00371/96-001

Dear Mr. Jarman:

On May 29, 1996, Marie Miller of this office conducted a safety inspection at 71 Shelton Avenue (formerly identified as buildings 3H and 6H) of activities previously authorized by NRC License No. SNM-368. The inspection consisted of observations by the inspector, interviews with former licensee personnel, and a radiological survey performed by the inspector. Michael Firsick of the State of Connecticut, Department of Environmental Protection observed the NRC inspection and also conducted independent measurements. The findings of the inspection were briefly discussed with you at the conclusion of the inspection. A copy of the NRC inspection report is enclosed.

Radiological surveys were conducted in the former 3H and 6H contiguous building where radioactive material was previously used or stored by the former NRC licensee. The inspector noted that the current property at 71 Shelton Avenue includes the land areas where 7 buildings (7H, 8H, 9H, 10H, 11H, 14H, and 44H) were demolished. The inspector did not survey these outside areas because the residual contamination would have been limited to the former building surfaces and the vacated land is used to store snow removed from New Haven's winter salting and plowing, which could influence the survey results.

All above ground areas were determined to be free of radioactive contamination above NRC radiological release criteria. However, this facility had contained the hot waste processing system for the UNC H-tract and a decontamination pit, which may not have been adequately assessed when the facility was terminated. Additional information provided by the former licensee staff to the inspector during the inspection on May 29, 1996 indicated the potential for uranium contamination in the soil beneath the concrete floor in these areas. Because these areas are not readily accessible and alpha/beta contamination does not travel any significant distance, we do not see any immediate safety problem.

Our concern is primarily with below grade soil contamination and the possibility of contamination in sediments in the public sewer system that have the potential to become uncovered during future excavations. Based on the

above information, we plan to develop a survey plan with our contractor to further evaluate the extent of sub-surface contamination.

Ms. Miller will contact you by telephone to share those details with you, and to request your permission to conduct these surveys at no cost to your company. She is available at (610) 337-5205, if you have any questions concerning this matter.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room. No reply to this letter is required.

Your cooperation with us is appreciated.

Sincerely,

Ronald R. Bellamy, Chief
Decommissioning and Lab Branch
Division of Nuclear Materials Safety

Enclosure:
Inspection Report No. 070-00371/96-001

cc w/enclosure:
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Monitoring and Radiation
Dept of Environmental Protection
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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Report No. 070-00371/96-001

Docket No. 070-00371

License No. SNM-368 (Terminated)

Licensees: Formerly United Nuclear Corporation (UNC)
Buildings 3H and 6H, Shelton Avenue
New Haven, CT 06511

Facility Name: 71 Shelton Avenue

Inspection At: 71 Shelton Avenue
New Haven, CT 06531

Inspection Conducted: May 29, 1996

Inspector: Marie Miller — 7-26-96
Marie Miller, Senior Health Physicist — date

Approved By: Ronald R. Bellamy — July 26, 1996
Ronald R. Bellamy, Chief — date
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

Inspection Summary: Announced survey of the facility for residual contamination on May 29, 1996. (Inspection Report No. 070-00371/96-001)

Areas Inspected: Facilities and Radiological Scoping Survey

Results: All above ground survey results were below NRC criteria for release for unrestricted use. However, soil sample data from areas below concrete flooring from 1976 (but not provided to NRC until May 29, 1996) indicate potential soil contamination from enriched uranium in the range of 30 to 700 picoCuries/gram. The current NRC guideline for enriched uranium is 30 picocuries/gram. These results indicate no immediate public health and safety concern, however additional surveys of the decontamination pit, hot waste pipe trenches and sewer sediment samples are required to determine if any remediation is needed.

DETAILS

1. Persons Contacted

*Alan Jarman, Property Manager
*Robert Bonito, UNC
*Robert Gregg, UNC
*William Kirk, UNC
*Mike Firsick, CT Department of Environmental Protection

*Denotes those present during exit interview.

2. Background

The NRC initiated a program to ensure that licenses for facilities, where activities authorized by the Atomic Energy Commission (AEC) and/or the NRC were conducted, have been terminated in accordance with the NRC's current criteria for release for unrestricted use. As part of this program, the NRC's contractor, Oak Ridge National Laboratory (ORNL), identified License No. SNM-368 as a site that required additional review. NRC Region I staff reviewed the file, and determined that further information on this site was necessary to conclude that the facility meets the current criteria for release for unrestricted use.

The AEC issued special nuclear material License No. SNM-368 to Olin Mathieson Corporation in 1959, which was later transferred to United Nuclear Corporation Company in 1961. This license authorized use of enriched uranium and later source materials, including natural uranium, depleted uranium and thorium for research and nuclear fuel fabrication in New Haven, CT. Records in the docket file indicate that License No. SMN-368 was amended to release the New Haven facilities for unrestricted use on March 22, 1976 (authorized use of licensed materials continued at the Montville, CT, facility only).

With respect to your facilities located in the former H-tract buildings, a final survey was conducted by the licensee and a close-out survey was conducted by the Nuclear Regulatory Commission Region I office. However, the release criteria used was for uranium only, yet the facility was authorized for thorium and much smaller quantities of plutonium. The average surface contamination release criteria for uranium is 5000 disintegrations per minute per 100 centimeters^2 (dpm/100 cm^2) in comparison to a more restrictive criteria of 1000 dpm/100 cm^2 for thorium. In addition, the results of soil samples taken during the final survey in 1976 were not submitted to NRC prior to releasing the facility for unrestricted use.

Region I arranged for an inspection to confirm the status of the facilities and to determine the level of residual contamination. A view of the former facilities is shown in Attachment 1. Cross-hatched areas represent former H-tract buildings that have been demolished. Only one contiguous building, formerly 3H and 6H currently exists. As confirmed by UNC representatives who participated in this inspection, unencapsulated material was primarily

used in 3H with significant loose material in the decontamination pit areas and machining areas, while loose material was also used in the chemistry labs in 6H. Encapsulated material was stored in the vaults located in 6H. There were no records of thorium or plutonium related products made at these facilities. The UNC representatives had no recollection of these materials being used in 3H and 6H.

3. Radiological Survey of Affected Areas

The inspector used a Ludlum Model 19 Micro-R meter (NRC # 33510, calibrated March 26, 1996) to measure exposure rates in the building and to make background radiation exposure rate measurements. The inspector also used a Ludlum Model 2210 ratemeter (NRC # 54829, calibrated March 14, 1996) with a Ludlum Model 43-68 gas flow proportional detector (NRC #54810) for alpha/beta fixed contamination measurements and Ludlum Model 18 rate meter (NRC # 54825, calibrated March 14, 1996) with Ludlum Model 44-9 Geiger-Muller pancake probe for beta/gamma fixed contamination measurements.

The building is a large one story warehouse with very few modifications to the building wall and floor surfaces, after the license was terminated. Although the locker rooms and the vault cubicles were intact, there was no equipment used for fuel fabrication, as reported in the NRC close-out report dated April 2, 1976. With respect to environmental release pathways, exhaust ducting had been removed and the radioactive floor drain and radioactive waste processing tanks and piping had been removed during decontamination activities, which occurred prior to 1976. However, a map of the floor drain system (Attachment 2) indicates that the restricted area drain lines included valves that could divert flow to the hot waste treatment system or to the public sewer, and the licensee's final survey report states that routine releases to the public sewer system had occurred prior to 1957.

For purposes of the NRC survey, the affected area was defined as the one contiguous building bordered by Shelton Avenue and Argyle Street, another former UNC/Gulf United Nuclear (now Olin owned and used) facility, and by a parking area to the rear of the facility.

The inspector performed a biased radiation-survey throughout the building, with emphasis given to the two areas were unencapsulated material had been used/stored, and in cracks or joints in the floor. Measured exposure rates ranged from 12 to 18 μR/hour. Measurements were made both at contact and at one meter from surfaces. All measured exposure rates were consistent with the background radiation exposure rate of 12-14 μR/hr.

Fixed contamination readings ranged from 100 dpm to 750 dpm/100 cm^2. No removable contamination was detected based on smear samples (locker room floor, vault cubicle, discarded piping and decontamination area floor), analyzed with a Tennelec LB (low background) gas-flow proportional counter for gross alpha/beta. All fixed and removable measurements met NRC release criteria as described in Attachment 3.

One soil sample taken outside of 3H near a pile of rumble and trash was analyzed on a high resolution gamma spectrometry system for 10,000 seconds for uranium (U-235 and U-238), and thorium (Th). The analysis identified approximately 0.3 picoCuries of U-238 per gram (pCi/g) of soil, 3.31 pCi/g of U-235, and 0.56 pCi/g of Th-232. These results are representative of natural background for the U-238 and Th-232; and approximately a factor of ten less than the NRC release criteria for U-235 of 30 pCi/g of soil.

A second soil sample was taken by NRC and CT DEP near the railroad tracks adjacent to the rear parking, because one of the five soil samples taken by UNC in 1976 (see Attachment 4) reported 35.3 pCi/g of alpha activity. The NRC soil sample result was 3.1 pCi/g of U-238, 0.78 pCi/g of U-235, and 0.49 pCi/g of Th-232, which is representative of natural background.

Additional soil data from samples collected by UNC in 1976 (see Attachment 5) were provided to the NRC inspector by the UNC representatives as other available environmental information. As hand-noted on the document, UNC could not confirm if additional remediation was undertaken when the results were received. The UNC final survey report dated February 26, 1976 reported that additional soil samples from trenches that housed the radwaste system were to be forwarded to the NRC when available. No record of these soil samples could be located.

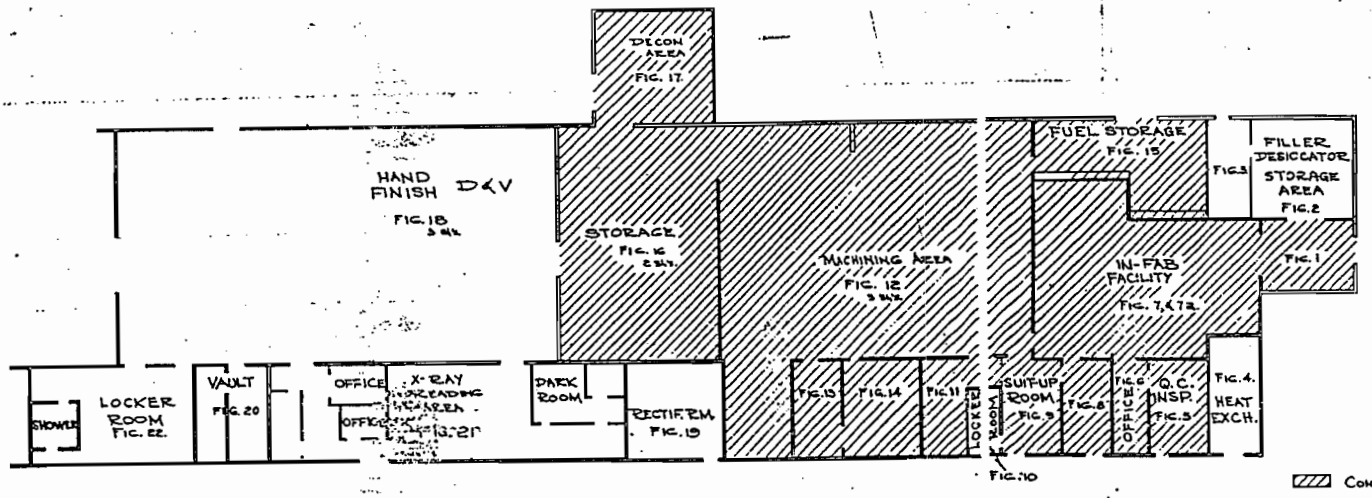
Based on the above, no immediate safety concerns were identified during the inspection, however additional soil sampling is required. Our concern is primarily with below grade soil contamination and the possibility of contamination in sediments in the public sewer system that have the potential to become a public health hazard during future excavations. Additional surveying is recommended to further evaluate the sub-surface contamination.

4. Exit Meeting

Preliminary information of the results of the inspection were discussed with the individuals listed in Section 1.0. The information from Attachment 5 of this report was not discussed, because it required further review to determine if follow-up records could be located.

UNITED NUCLEAR CORP.
NUCLEAR FUEL OPERATION
NEW HAVEN FACILITY 3H

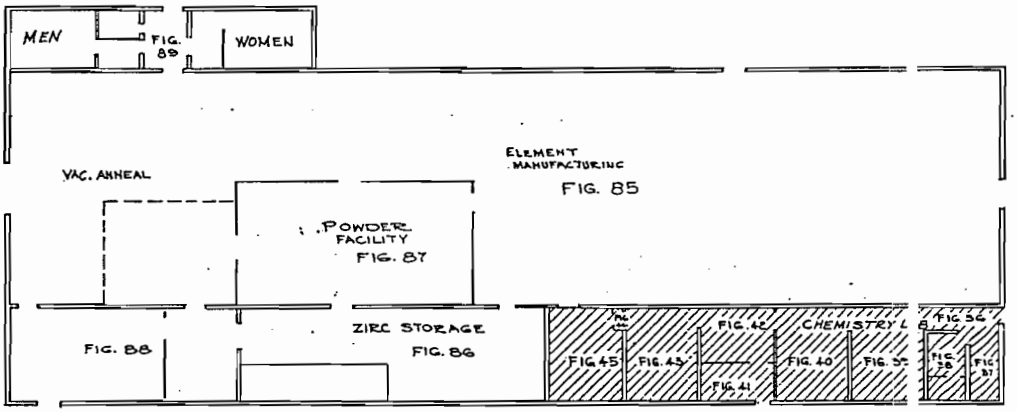
TOTAL AREA 17,600 SQ.FT.



▨ CONTROLLED AREA

AREA CLASSIFICATION AND LOCATION

FIG. 1-4



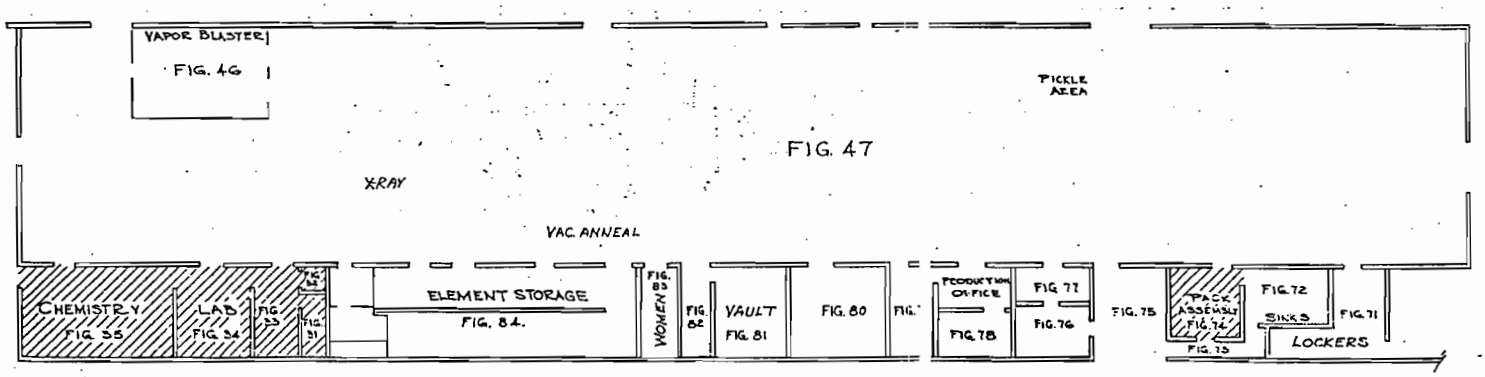
UNITED NUCLEAR CORP.
NUCLEAR FUEL OPERATION
NEW HAVEN FACILITY 6H

TOTAL AREA 35,800 SQ FT.

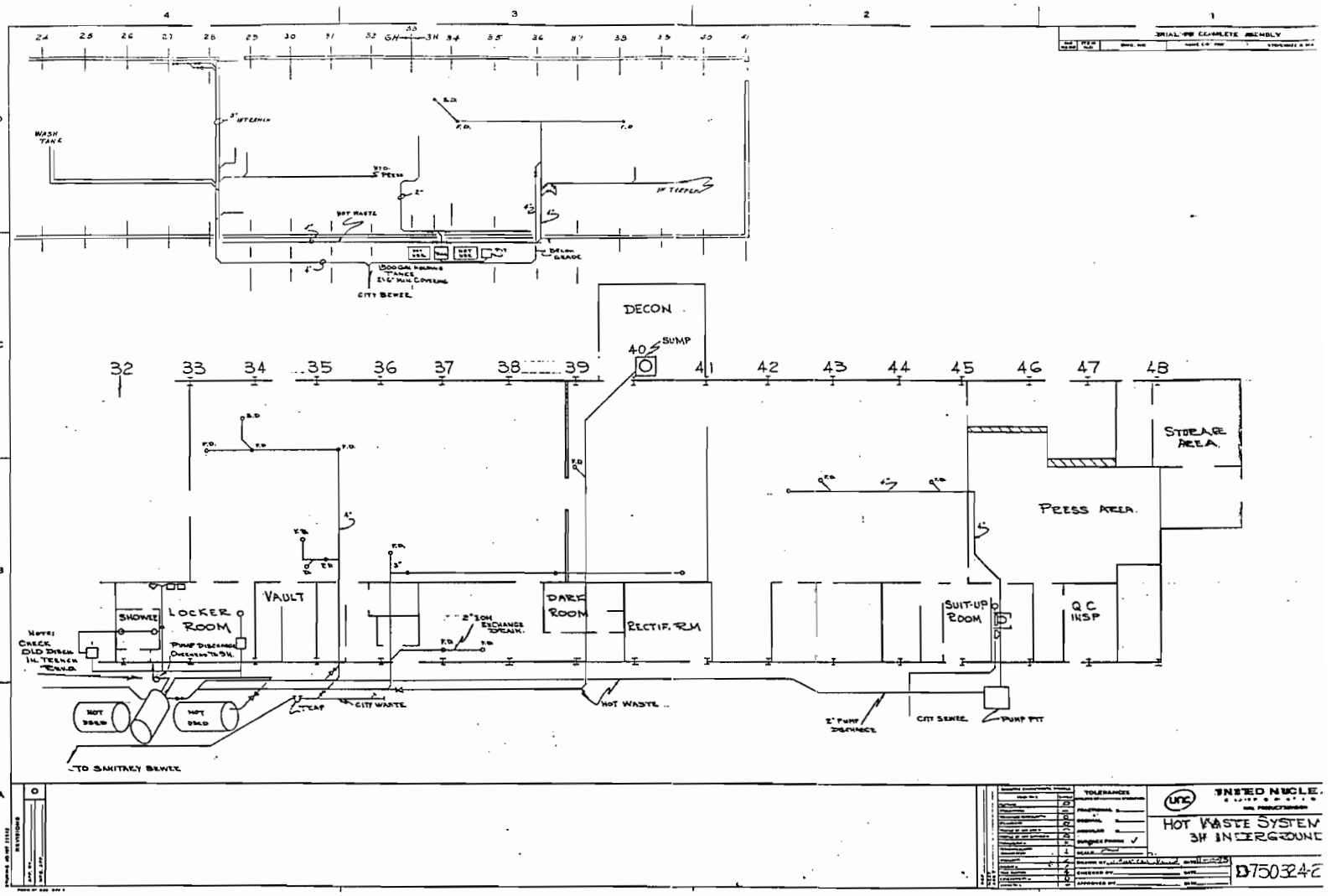
▨ CONTROLLED AREA

AREA CLASSIFICATION AND LOCATION

FIG. 1-5



ATTACHMENT 1



ATTACHMENT 2

Table 3. Acceptable Surface Contamination Levels

Nuclides[f]	Average[g h k]	Maximum[g i k]	Removable[g j k]
U-nat, U-235, U-238, and associated decay products	5000 dpm alpha/100 cm^2	15,000 dpm alpha/100 cm^2	1000 dpm alpha/100 cm^2
Transuranics, Ra-226, Ra-228, Th-228, Th-230, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm^2	3000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5000 dpm beta-gamma/ 100 cm^2	15,000 dpm beta-gamma/ 100 cm^2	1000 dpm beta-gamma/ 100 cm^2

[f] 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.

[g] 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.

[h] 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 object.

[i] The maximum concentration level applies to an area not more than 100 square centimeters.

[j] The amount of removable radioactive material per 100 cm^2 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 area should be wiped.

[k] 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 total absorber.

ATTACHMENT 4

APPENDIX B
ENVIRONMENTAL SAMPLING
FINAL SURVEY REPORT

UNITED NUCLEAR CORPORATION NAVAL PRODUCTS DIVISION
H-TRACT FACILITY, NEW HAVEN, CONNECTICUT

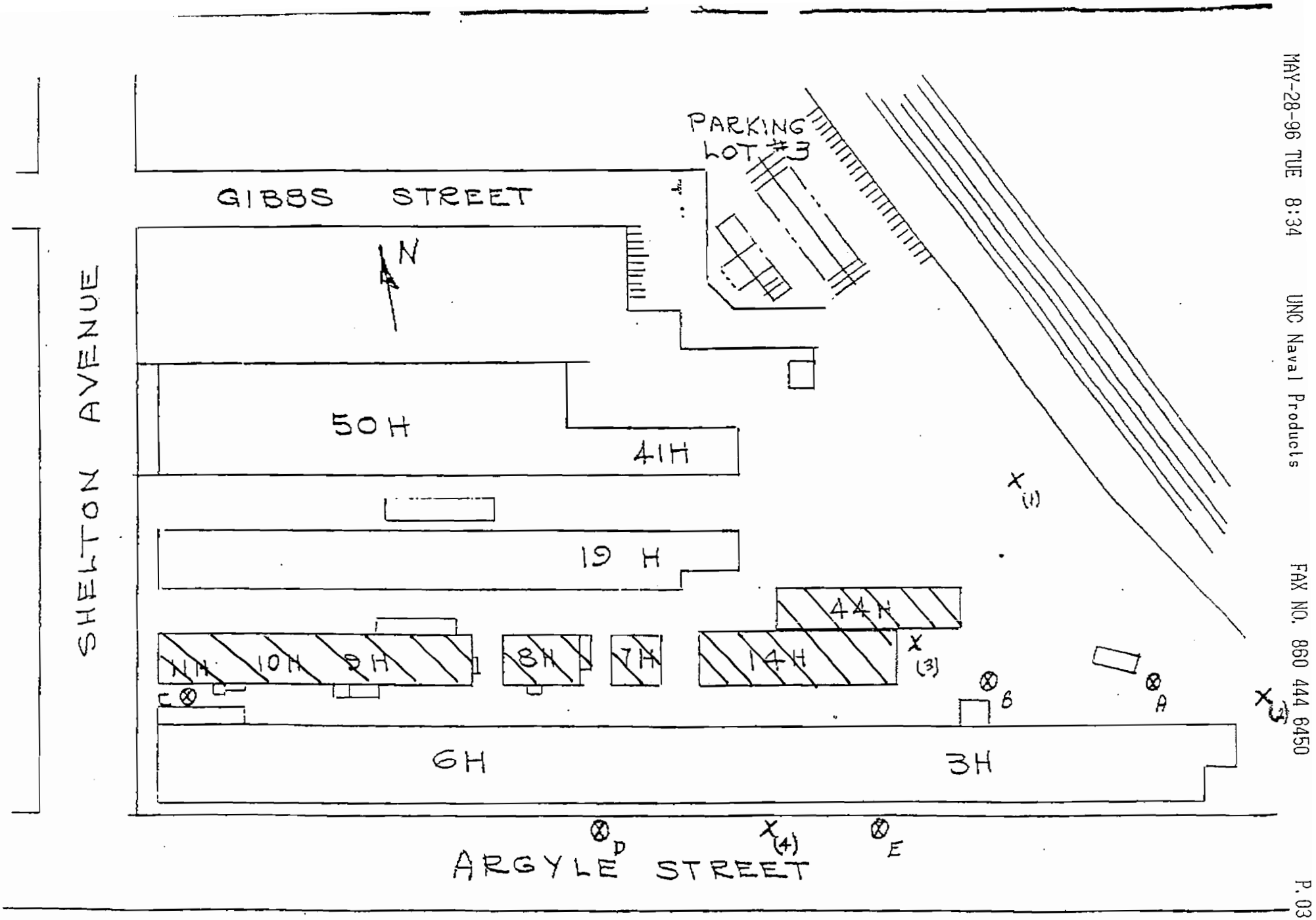
SOIL ANALYSIS

SAMPLE ID	LOCATION - See Figure 8-1	DATE COLLECTED	ALPHA pCi/gm (dry)
1	Near Guard Station	2/4/76	2.8 ± 1.2
2	Near Fence Line - Railroad	2/11/76	35.3 ± 2.2
3	Near Shipping - Receiving	2/11/76	5.2 ± 2.0
4	Near Fence Line - Argyle St.	2/11/76	2.8 ± 1.0

WATER ANALYSIS

SAMPLE ID	LOCATION - See Figure 8-1	DATE COLLECTED	ALPHA dpm/ml
A	3H Yard - Corner of Bunker	2/19/76	0.5
B	3H Yard	2/19/76	0
C	11H Alley	2/19/76	0
D	6H Alley	2/19/76	0.2
E	3H Alley	2/19/76	0

Note: This Appendix, which was found in draft form in UNC's records, was apparently never formally submitted to the Nuclear Regulatory Commission as part of the final decontamination and decommissioning report for UNC's New Haven facility. It is being transmitted at this time to complete the record prior to the NRC's performance of additional (post-license termination) site surveys in May 1996.



X = SOIL

⊗ = CATCH BASIN

▨ = DEMOLISHED BLDGS.

FIG. 8-1

ENVIRONMENTAL SAMPLE LOCATIONS

CUSTOMER	United Nucle[redacted] [redacted]
ATTENTION	Don Luster
ADDRESS	67 Sandy Desert Road
CITY	Uncasville, CT 06382
INVOICE NO.	603020

ATTACHMENT 5

REPORT OF ANALYSIS

check RegGuide 1.86

SAMPLES RECEIVED 2-19-76

CUSTOMER ORDER NUMBER

TYPE OF ANALYSIS Soil Analysis

	Sample Identification	Date Collected	Total Uranium (dpm/g (dry))	pCi/gm	Alpha (dpm/g (dry))
	3H Decon Pit	2-5-76	1490±10	671	1370±30
	3H Ext Trench Middle	2-4-76	118±2	53	119±8
4	Argyle St.	2-11-76	8.4±0.5	3.8	6.3±2.2
	3H Elem Fab Read X-Ray	2-5-76	797±5	359	723±24
2	Fence Line behind SHX	2-11-76	73.6±1.4	33.2	78.4±7.6
	3H Ext Trench Middle	2-11-76	6.7±0.4	3.0	8.5±2.8
	3H Decon Pit	2-4-76	840±5	378	743±26.4
3	Shipping - Recv.	2-11-76	10.0±0.5	4.5	11.6±4.4
1	6H Guard Sta Perimeter	2-4-76	4.3±0.3	1.9	6.2±2.7
	3H Pit #1	2-5-76	30.2±0.9	13.5	27.6±4.0
	3H X-Ray Elem Fab	2-4-76	418±3	188	447±22

pCi/gm

3H Decon Pit
2/4/76 - 378
2/5/76 - 671

3H Pit #1 (IS THIS SAME AS DECON PIT?)
(LUSTER THINKS PROBABLY SOMETHING ELSE)
2/5/76 - 13.5
NOTE PIT #1 analyses from 10/95 are all OK

3H EXT TRENCH MIDDLE
2/4/76 53
2/11/76 3.0

3H Elem FAB READ X-RAY (WAS THIS FILLER X-RAY)
2/4/76 188
2/5/76 359

D. LUSTER 4/18/96
- Should be dwg showing location of these.
- Doesn't recall submittal or not
- dug until #'s came down - no specific criteria other than ALARA.

APPROVED BY [signature]
James J. Mueller, President

3-4-76 PAGE 1 OF 1 PAGE

Check on a box of records - Blue prints, meteorological, etc.

+ Helgeson, Grenon, Arpaia were in charge at final stages

CEP
Controls for Environmental Pollution, Inc.

1925 Rosina • P.O. Box 5351 • Santa Fe, New Mexico 87501 • Telephone 505/982-9841