Cyrus/Palomar

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

DEC 21 1978

Docket No. 70-687

Union Carbide Corporation
ATTN: Mr. H. E. Fritz, Operating Manager
Sterling Forest Laboratory
P. O. Box 324
Tuxedo, New York 10987

Gentlemen:

Subject: Inspection 70-687/78-02

This refers to your letter dated December 8, 1978, in response to our letter dated November 14, 1978.

Thank you for informing us of the corrective and preventive actions documented in your letter. These actions will be examined during a subsequent inspection of your licensed program.

Thank you for the additional information concerning the signs posted in the area above cell 1 in the Solution Makeup Area. The audit schedules formulated by the Nuclear Safeguards Committee and the requested changes to the facility license which were submitted to NRC-NMSS by letter dated November 17, 1978, will be examined during a subsequent inspection.

Your cooperation with us is appreciated.

Sincerely,

Gilbert H. Cocker for
George H. Smith, Chief
Fuel Facility and Materials
Safety Branch

bcc:
IE Mail & Files (For Appropriate Distribution)
Central Files
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
REG:I Reading Room
State of New York

UNION CARBIDE CORPORATION
P.O. BOX 324, TUXEDO, NEW YORK 10987
TELEPHONE: 914-351-2131

CORPORATE
RESEARCH LABORATORY

December 8, 1978

U. S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, Pa. 19406

Attn: George H. Smith, Chief
Fuel Facility & Materials Safety Branch

Subj: Inspection 70-687/78-02

Dear Sir:

Your inspection report, 70-687-78-02, dated 11/14/78 requested our statements of corrective measures and times when measures have been or will be accomplished on non-compliance items that were sited in the report. You also requested our comment on our alleged deviation from industry standard practices referred to in your report.

The corrective actions regarding the non-compliance items are as follows:

A. Regarding the deficiencies in posting radiation areas with proper signs:

1. The waste storage building actually was posted with the standard Caution-Radiation Area placard on the dates of the inspection, and has been posted continuously for a period several years back. The sign is not particularly conspicuous due to weathering effects, however, it is still legible. As noted in the inspection document, a new Caution-Radiation Area sign was installed on October 13, 1978. In the future we plan to be more vigilant concerning replacement of weathered signs and of posting requirements in general.

It should be noted that there is a lock and key control over access to the building so that an unsuspecting person could not enter the area.

2. In addition to the sign observed by the inspector, there were three standard Caution-High Radiation Area signs located on the perimeter of the High Radiation area. The cardboard sign referenced in the inspection report was installed to provide additional information for persons performing work in the area rather than as a substitute for the official sign. Survey instructions were indicated on this hand written sign as well as the high radiation caution.

   Also note that the high radiation designation was temporary and the area was reclassified as a Radiation Area within a few days following the inspection.

B. Regarding the location of U-235 in excess of the 650 gram limit in our waste processing cell:

We anticipated such a problem in December 1977 and on 12/28/78 application was made for increasing the allowable quantity for SNM storage in hot cells as waste. This application was modified on 5/3/78. The license was amended to increase this limit on 10/30/78. Occasions on which three or four drums containing up to 300 grams of solid U-235 each accumulate prior to disposal are now, and in the future will be within the new license limit.

C. Regarding the time interval between audits:

The Nuclear Safeguards Committee will formulate a schedule for this audit and others that are required by this license and others, thus insuring that audits are accomplished at the appointed times.

D. Regarding the posting requirements of 19 CFR 21.6:

The regulations in the referenced part and the procedures that were adopted to implement Part 19 were posted on a clipboard with other regulations that are required to be posted. Section 206 of the Energy Reorganization Act was not posted. These and other regulations are located on two Bulletin Boards in the central hallway on the main floor of the hot lab building. Everyone occupying the Reactor and Hot Lab passes thru this hallway daily. There are many regulations required to be posted and over the years this board has become somewhat crowded. In an attempt to make

the regulations and notices more conspicuous, we have installed a third bulletin board so these regulations can be spread out more.

The above corrective measures should prevent a recurrence of future similar non-compliance items.

The alleged deviation with industry standard practices, in that solutions of various concentrations of SNM are contained and handled in vessels that have not been analyzed for criticality safety, was not apparent to us. The bases for insuring criticality safety was to maintain inventories of SNM in specific well defined areas of the facility to quantities less than the single parameter mass limits stipulated in ANSI Standard N16.1. The margin below the single parameter mass limits by which each process quantity was maintained in each area were considered adequate to prevent inadvertent breech of limit. The justification for setting the mass limits in each area was presented in our letter of 11/17/78 which was in support of the specifications of the license.

Since this last inspection, all operations with SNM possessed under this license were reviewed and certain changes to the license have been requested to further clarify the bases for the mass limits established for each location where SNM is processed. A copy of this request for amendment is enclosed.

Thank you for your consideration.

Very truly yours,

James J. McGovern
Manager
Radiochemical Production

JJMcG:js
Enclosure (UCC Ltr. dated 11/17/78)

UNION CARBIDE CORPORATION
P.O. BOX 324, TUXEDO, NEW YORK 10987
TELEPHONE: 914-351-2131

CORPORATE
RESEARCH LABORATORY

November 17, 1978

U. S. Nuclear Regulatory Commission
Fuel Reprocessing & Fabrication Branch
Division of Fuel Cycle & Material Safety
Washington, D. C. 20555

Attn: Leland C. Rause, Chief

Subj: PROPOSED AMENDMENT TO SPECIAL NUCLEAR MATERIAL (SNM) LICENSE No. 639.

Dear Sir:

In a recent review of our subject license, it was noted that provisions exist that are inconsistent with current practice and that lack continuity with other provisions in the license. It is desirable to amend the license to make it easier to administer, make it compatible with current practice, and, in one case, provide a combined limit for SNM in the target plating process. The following proposed changes will not reduce the safety margins that now exist under the license.

1. The current license conditions regarding ordering or purchasing SNM are stated in Union Carbide Corporation (UCC) letter of 2/8/73 para. A.1.. The quantity of SNM that may be ordered for delivery at any one time is limited to 650 grams U-235 (as UO_2 or U_3O_8).

   In order to make the provisions of this section more descriptive of current practice in receiving, assaying and storing such material, it is requested that the wording of this paragraph be changed to read as follows:

"A.1. All purchases of special nuclear material shall be approved by the SNM Accountability Officer and also the custodian of the Master Log (App. I). The quantity of SNM that can be ordered for delivery at any one time shall be limited to 650 grams (as UO_2 or U_3O_8). Furthermore, the quantity of SNM that is to be contained in any single primary container shall be $\leq$ 350 grams."

2. The current license conditions regarding the quantity limits for storing SNM in solution prior to use in electroplating isotope targets or other laboratory use are stated in UCC letters 2/8/73 para. A.2. and 2/11/75 (revision of UCC letter 6/13/78 para. B. (a) para. 1.) These sections should be changed to clarify the limits and make the storage limits compatible with delivery and other process limits. These sections should read as follows:

"A.2. All unirradiated SNM when not in use, shall be kept in locked steel cabinets which are located within a restricted area of the hot laboratory. The amount of U-235 in a single cabinet shall be limited to 350 grams in solution or 650 grams as UO_2 or U_3O_8. The spacing between SNM storage cabinets shall be a minimum of three feet and each cabinet shall be fastened to prevent inadvertent movement. SNM in liquid form shall be doubly contained."

"B.a. para. 1 <u>Criticality Control In Storage Areas</u>

Uranium is stored in storage cabinets in the upper level of the hot laboratory (Fig. 1A). Material in liquid form is doubly contained. Storage cabinets are of fireproof construction, are separated by a minimum distance of three feet and are fastened to prevent inadvertent movement. All cabinets are locked and keys are in the custody of the SNM custodian for the area. Criticality control is implemented by limiting the quantity of SNM in solution to 350 grams per storage cabinet. This limit allows a safe margin below the single parameter limit of 760 grams U-235 in uniform aqueous solutions specified in the ANSI N16.1-1969 standard even

if "double batching" were to occur. The storage space within each cainet is large enough for only one 350 gram batch of material in solution and therefore it is unlikely that double batching could occur but in the event that it did the 760 gram single parameter mass limit would not be exceeded. In the event it is necessary to store SNM as UO_2 or U_3O_8, the quantity limit for this form of material shall be 650 grams of SNM. This quantity is not likely to be exceeded because of the 650 gram order limit previously discussed. The quantity is well below the 29.6 Kg or 43.5 Kg subcritical mass limits stated for dry UO_2 or U_3O_8 respectively as presented in Table 3.1 of Nuclear Safety Guide TID 7016 Rev. 2, p. 71. Due to the location of the storage facilities, it is not credible that this material would be contacted by water or other moderating material."

3. The current license conditions regarding the quantity limits for SNM in process in a laboratory are stated in UCC letter 2/8/73 para. A. 3 & 4 and 6/13/73 para. B.b.

In order to make these provisions compatible with current practice and other sections of this license, and also to better define the limits allowed in the plating process, the wording of these sections should be changed to read as follows:

"A.3. Unirradiated SNM in solution shall not exceed 350 grams in a single laboratory."

"A.4. SNM, as an oxide, encapsulated for irradiation shall not exceed 650 grams in a single laboratory. When SNM is in process in the plating lab (Fig. 1A), it can be either as a solid (oxide) or in solution (electrolyte 15 gms/liter, H:U $\geq$ 1500) and the quantity of either form shall be governed by the formula:

$$\frac{\text{U-235 Oxide Form (gms)}}{650} + \frac{\text{U-235 Electrolyte Solution (gms)}}{350} \leq 1."$$

"B.b. para. 2 Criticality Control In Chemistry Laboratory

Criticality control is effected through limiting the quantity of SNM in solution that is permitted in a single laboratory to 350 grams or less. This is less than half the single parameter limit of 760 grams stated in the ANSI N16.1-1969 standard. The material in process in the plating laboratory may be either as an oxide or as an electrolyte in solution depending upon the stage of the electroplating process. If the respective quantities are limited by the formula;

$$\frac{\text{SNM As Oxide (gms)}}{650} + \frac{\text{SNM In Solution (gms)}}{350} \leq 1,$$ and

the concentration of U-235 in the electrolyte is less than 15 gms/liter (H:U 1500), criticality limits for these materials will not be breached even if double batching were to occur. The criticality limits that apply are as follows:

Form Of Mat'l	Limit	Reference
UO_2 Dry	29.6 Kg	Nuclear Safety Guide TID7016, Table 3.1,p.71.
U_3O_8 Dry	43.5 Kg	Nuclear Safety Guide TID7016, Table 3.1,p.71.
U in Solution <15 gms/liter	2 Kg (Sphere)	Nuclear Safety Guide TID7016, Fig. 2.1,p.28.

4. The current license, item 6D, allows possession of 400 grams U-235 in a fuel assembly to be brought into a hot cell from the reactor. This is to allow close inspection of such irradiated fuel in the event it is deemed desirable. Since such an inspection is out of the ordinary, it would be advantageous to allow this quantity of material to be added to that allowable under item 6B (4600 gm vs the current 4200 gm). It is proposed that the following note be added to item 6 of the license.

"When it is not required to have reactor fuel elements in the hot laboratory, the 400 grams of U-235 allowed under item 6D may be added to that material that is allowed under 6B, thereby increasing it from 4200 to 4600 grams."

Revised floor plans are included to reflect the current storage locations and processing laboratories. A check in the amount of $150.00 is enclosed to cover the administrative fee requirements of 10 CFR 170.31.

These changes are desired to more clearly define criticality limits and allow easier administration of license conditions in the production of medical radioisotopes.

The granting of these changes will not reduce the safety margins currently existing under this license and therefore, will not endanger life or property and is in the public interest.

Thank you for your consideration.

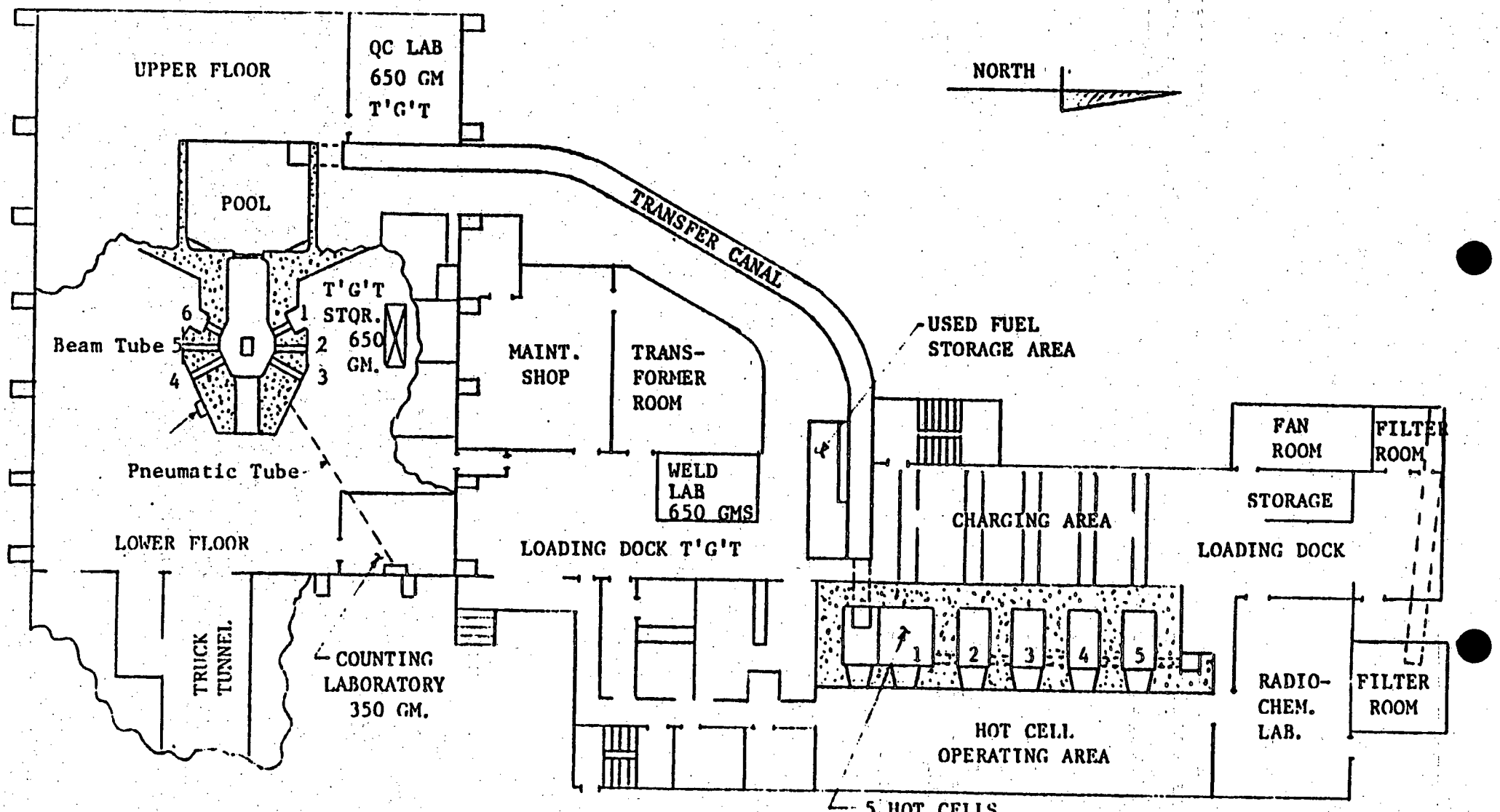
Very truly yours,

James J. McGovern
Manager
Radiochemical Production

JJMcG:js
Enclosures (1) Check
(2) Figure 1
(3) Figure 1A

bcc: Mr. K. D. George
Mr. C. J. Konnerth
Mr. J. C. Perhauch
Mr. M. H. Voth

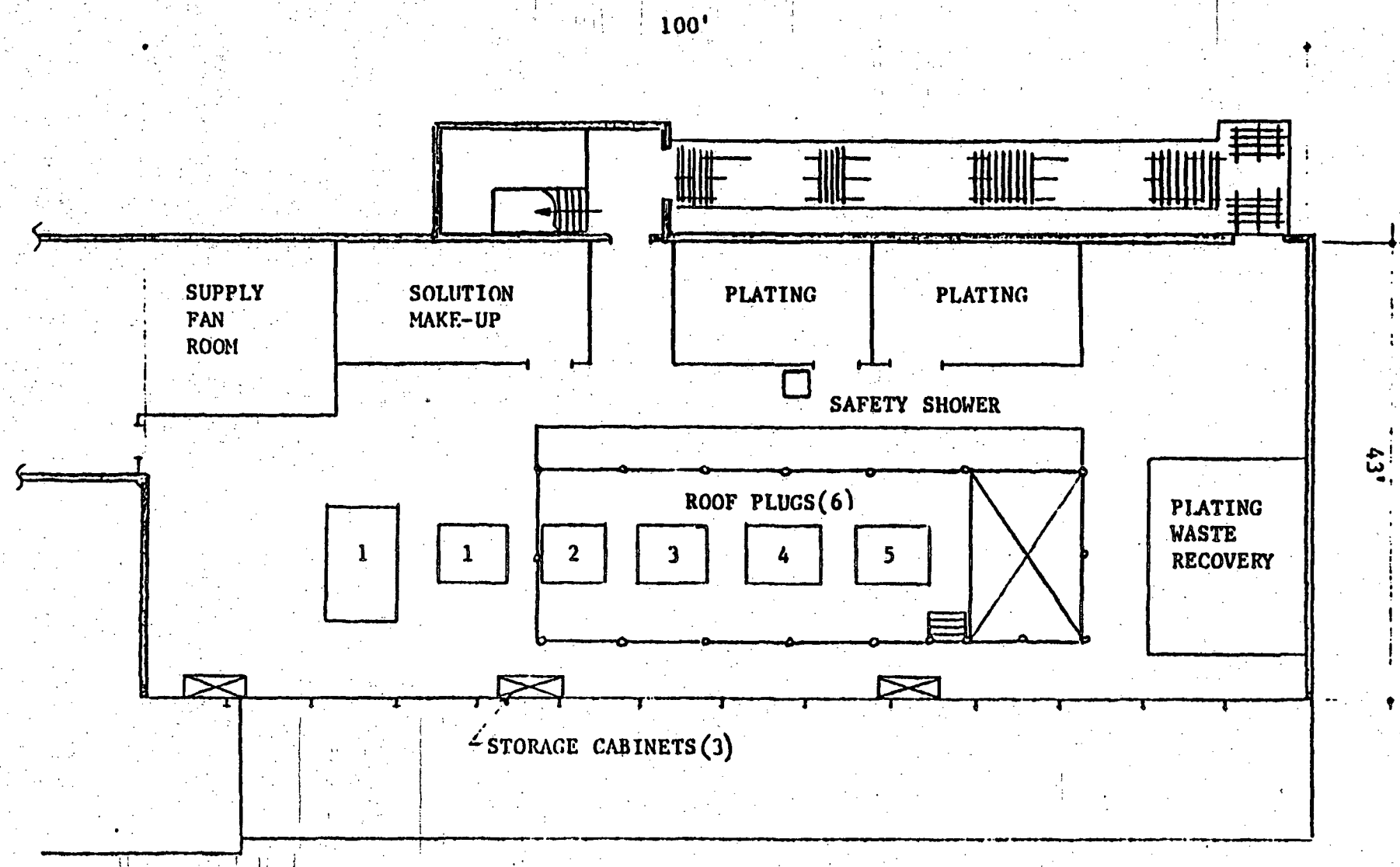
FIGURE 1



PLAN OF REACTOR AND HOT LABORATORY

SK 1390
14 NOV. '76
7.4/.R.

FIGURE 1A



HOT LABORATORY - FLOOR PLAN - UPPER LEVEL

SK 1389