



Metal Division

PHILIP W. RUPPERT, MANAGER
J. H. SABO, ASST. MANAGER

NATIONAL LEAD COMPANY

Atlantic Branch

Manufacturers of "DUTCH BOY" PRODUCTS

A. F. PODESTA
SALES MANAGER

1050 STATE STREET
P. O. BOX 831
VALLEY 6-6000
DIGBY 9-1120
WALNUT 2-5185

PERTH AMBOY, N. J.

December 11, 1959

Isotopes Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Gentlemen:

Please find enclosed the National Lead Company Application for Byproduct License (Form AEC-313) in which we request approval to use radioactive cobalt-60 for radiographic testing of shielding casks at our Perth Amboy, New Jersey plant site.

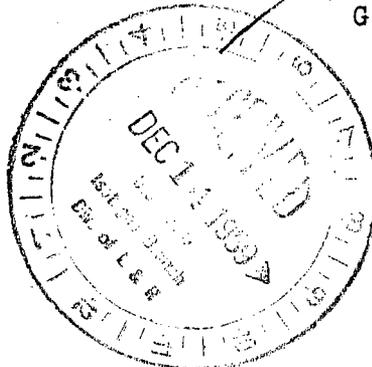
Since we have an urgent need for the radiographic testing equipment, we would appreciate your handling this application as soon as possible. If there is any additional information required concerning the application, please call me collect.

Thank you for your immediate attention to our application.

Very truly yours,

G. L. Stukenbroeker

GLS/ad
Encl.



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Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the License is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)

NATIONAL LEAD COMPANY
1050 STATE STREET
~~P.O. BOX 831~~
PERTH AMBOY, NEW JERSEY

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)

SAME AS 1. (a)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

ATLANTIC BRANCH

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

NONE

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

See attached sheet

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

G. L. STUKENBROEKER

6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)

CO-60

CO-60

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

1-Sealed Source 2 Curies
Picker X-Ray Corporation - Model 453 or 424

1-Sealed Source 50 Curies
Picker X-Ray Corporation - Model 424 or 453

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

The two sealed radiographic CO-60 sources will be used in the Picker X-Ray Corporation, Model 446, Radiographic wagon. Storage of either source, when not in the Model 446 Radiographic wagon, will be in a Picker X-Ray Corporation Source Changer, Model 488.

The sources will be used for radiographic purposes and radiographic leak test of protective barriers (Pb & U).

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Item (4) Individual Users

The individual users of the byproduct (CO-60) are shown below:

1. G. L. Stukenbroeker
Resident Scientist, National Lead Company
2. J. M. Nees
Metallurgist, National Lead Company
3. Julian Koerner
Metallurgist, National Lead Company
4. James J. Cullen
Supv. of Metals Laboratory, Atlantic Branch,
National Lead Company
5. William S. Loud
Project Engineer, Atlantic Branch, National Lead Company
6. John M. Panko
Senior Spectrograph Operator, Atlantic Branch,
National Lead Company
7. Benjamin (NMI) Sabat
Ass't to Supt. Maintenance, Atlantic Branch,
National Lead Company

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Item (8) Type of Training

	<u>Duration of Training</u>	<u>On the Job</u>	<u>Formal Course</u>
1. <u>G. L. Stukenbroeker</u>			
(a) National Lead of Ohio - ORNL - Industrial Reactor Laboratory	7 yrs.	Yes	Yes
(b) National Lead of Ohio - ORNL - Industrial Reactor Laboratory	8½ yrs.	Yes	Yes
(c) U. of Michigan - ORNL	2 yrs.	Yes	Yes
(d) ORNL	6 mos.	Yes	Yes

Item (9) See form AEC-313

2. John M. Nees

Item (8) Mr. Nees is a graduate metallurgist from Purdue University. He has recently completed the training courses in Industrial Radiography with X-Rays and Radioisotopes sponsored by Picker X-Ray Corporation in Cleveland, Ohio.

Item (9) Picker X-Ray Course (11/30/59)

3. Julian Koerner

Item (8) Mr. Koerner is a graduate chemical engineer from New York University. He will receive "on the job" training from Stukenbroeker and/or Nees as outlined.

Item (9) None

4. James J. Cullen

Item (8) Mr. Cullen attended Rutgers University for several years. He will receive "on the job" training as outlined below.

Item (9) None

5. William S. Loud

Item (8) Mr. Loud is a graduate engineer from Columbia University with post graduate work in Industrial Engineering. He will receive "on the job" training as outlined below.

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6. John M. Panko

Item (8) Mr. Panko will receive "on the job" training as outlined below.

7. Benjamin (NMI) Sabat

Item (8) Mr. Sabat will receive "on the job" training as outlined below.

TRAINING COURSE - Item (8) - (9) (cont.)

Supervisory responsibilities for radiography operations will be given to G. L. Stukenbroeker and J. M. Nees, non-responsibilities to J. Koerner, J. J. Cullen, W. S. Loud, J. M. Panko and B. Sabat. The following men, J. Koerner, J. J. Cullen, W. S. Loud, J. M. Panko and B. Sabat will receive "on the job" training instruction from G. L. Stukenbroeker and J. M. Nees as outlined below.

The instruction will be equivalent to 40 hours of class work with a quiz, similar to the training course offered by Picker X-Ray in Cleveland, Ohio. The following topics will be discussed with special attention given to the radiological protection procedures as given in Item 14.

I. Properties and Uses of Isotopes

- (a) Types and Characteristics of Isotopes
- (b) Emissions - alpha, beta, gamma
 - (1) Energy of emissions
 - (2) Secondary emissions (Bremsstrahlung)
- (c) Half Life

II. Characteristics of Gamma Rays

- (a) Monitoring devices for Gamma Rays
 - (1) Ion chambers, G.M. Counters
 - (2) Effect on film and film badges
 - (3) Dosimeter
- (b) Absorption of Gamma Rays
 - (1) Half and tenth value layers
 - (2) Calculations for protective barriers

III. Inverse Square Law

- (a) Discussion of inverse square law
- (b) Problems involving time, distance and protective barriers.

IV. Demonstration and use of isotope equipment

- (a) Recording and counting equipment
- (b) Use of Picker X-Ray's Model 446 with 50c Co-60, 2c Co-60 source.

TRAINING COURSE - Item (8) - (9) (cont.)

- V. Biological Effect of Radiation (discussion)
 - (a) Effect on human body
 - (b) Evolution of maximum permissible dose
 - (c) Exposure to non-radiation workers
 - (d) Federal rules and regulations

- VI. Disaster Procedure
 - (a) Receiving of source
 - (b) Responsibility
 - (c) Guard against fire, theft, tampering and accident damage.

- VII. Quiz

Item 13

The handling equipment for the sealed cobalt sources will be Technical Operations, Inc., Model 446, radiographic wagon. Since a 2 curie and 50 curie CO-60 source is required, the source not stored in the Model 446 radiographic wagon will be located in the Technical Operations, Model 488, Source Changer.

When a source is used for radiographic inspection, the source will be handled by a remote unit on the T/O Model 446 radiographic.

The standardization laboratory is located in an abandoned area in Building # 33, called Acid Recovery Area (See Point A on map). The floor is reinforced concrete construction and the walls are of solid concrete block. The floor shall have approximately 2 half-value layers of lead directly under the specimen examination table.

The test area (See Point B on map) is located in an open area free from buildings and personnel. Detection equipment will be housed in a panel truck or in a cement block (filled with sand) barrier located at Point C on attached map.

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Item 14

1. Background and General

- a. The purpose of this procedure is to establish general company policy in regard to handling sealed sources of radioactive cobalt-60. The guiding philosophy of the Company is that every reasonable precaution shall be taken to protect its employees, and the general public as well, from radiation hazards.
- b. The basis for Company policies and practices in handling of the sealed radioactive cobalt-60 sources shall be Chapter 20 of the United States Atomic Energy Act of 1957 (Federal Register, Vol. 22, No. 19, pp. 548-554); the New Jersey State Radiation Code (when placed in effect in the near future); subsequent amendments to these laws; and any germane local regulation. The most restrictive regulation shall always be applicable.
- c. In addition to the observance of these rules and those supplementary regulations and procedures outlined below, it is expected that all officers and employees of the Company comport themselves in such a way as to assure other employees and the general public that the Company is continually extending itself to ensure radiation safety for all concerned.

2. Health Physics Officer and Duties

- a. The Health Physics Officer shall have responsibility for establishing and supervising the implementation of all rules for the handling of the sealed radioactive cobalt-60 sources.
- b. The name of the Health Physics Officer and Deputy shall be posted in all radiation areas.
- c. The Health Physics Officer shall conduct the original radiation survey upon receipt of the sealed cobalt-60, relative to the standardization laboratory and surrounding area and actual working area during radiographic inspection.
- d. The Health Physics Officer shall conduct a radiation survey in and around the standardization laboratory every time the radioactive sources are removed from their "safe" storage caves. The survey shall be made with a gamma survey meter and reading recorded. Areas shall be checked for correct posting and unmarked or improperly marked areas corrected to conform with C.F.R. Title 10 Part 20 paragraph 20.203.
- e. The Health Physics Officer shall maintain records showing the radiation exposures of all personnel exposed to radiation. These persons

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are defined as any individual who enters a restricted area under such circumstances that he receives or is likely to receive a whole body dose in excess of 75 MR in a week or any person who enters a high radiation area.

- f. Radiation exposure shall be determined by film badges and a pocket dosimeter.
- g. The personnel exposure record shall show the name of each individual, the weekly dose and the cumulative dose for the last 13 week period.
- h. The Health Physics Officer shall arrange for physical examination for all radiation workers to be made initially and annually thereafter and upon termination.
- i. The Deputy Health Physics Officer shall assume the duties of the Health Physics Officer if the latter is absent.

3. Restrictions

- a. No personnel will be permitted to handle the radioactive cobalt sources alone. At least two qualified persons shall be present during such handling.
- b. No person under 21 years of age shall be allowed to handle the radioactive cobalt source or assist in such procedure. No person under 18 years of age shall be permitted to receive, in any period of seven days from the radioactive cobalt, a radiation whole body dose in excess of 30 MR (See Atomic Energy Act Title 10, chapter 20, Paragraph 20.101C).

RADIATION PROTECTION PROCEDURES

General

All personnel must exercise diligence to keep their own exposure to radiation and the exposure of others to a minimum. The maximum permissible whole body weekly dose is 300 Milliroentgens, and the maximum permissible dose for any thirteen consecutive weeks is 3000 MR. Any unnecessary exposure is considered excessive.

Radiation dose is measured by film badges provided to all radiation workers. Wearing of film badges is mandatory. In addition all radiation workers shall wear a self reading pocket dosimeter and any operation involving radiation exposures shall be monitored with a dose rate survey meter that is maintained in a calibrated and operable condition. Control of radiation dose can only be attained by constant vigilance. Radiation levels must be controlled by taking full advantage of distance, shielding and minimizing time of exposure.

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1. Film Badges

Film badges are issued to all radiation workers on the first day of the week and the badges from the previous week collected and sent for processing. Badges are to be worn on the chest during working hours. Employees are forbidden to open the film badge or the film pocket and badges must be protected from excessive heat or moisture.

If a film badge is lost the wearer must submit a memo to the Health Physics Officer describing the loss and a statement of the dose accumulated in the period the badge would be worn must be made. Pocket dosimeter readings will be used to determine this dose.

The report from the film badge processor showing the accumulated dose shall be kept by the Health Physics Officer. A running thirteen week total of each individuals exposure shall also be kept.

Spare badges will be available for issue to visitors or others not usually subjected to personnel monitoring.

2. Pocket Dosimeters

All radiation workers must wear self reading pocket dosimeters during working hours. These provide an immediate reading of accumulated dose so that maximum weekly exposures are not exceeded.

The pocket dosimeter shall be worn on the chest. Dosimeters shall be charged at the beginning of the work day and must be checked frequently during source handling operations.

The Health Physics Officer shall test each dosimeter for accuracy of response to radiation and determine the leakage rate of each.

3. Radiation Areas - Definition and Posting

A radiation area means any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of five millirem or in any five consecutive days a dose in excess of 150 millirem. A millirem is defined as a dose of one milliroentgen due to X or gamma radiation.

Such an area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words CAUTION RADIATION AREA.

4. High Radiation Areas - Definition and Posting

A high radiation area means any area accessible to personnel in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

Each high radiation area shall be equipped with a control device (Gamma Alarm) which shall upon entry to the area sound an audible alarm signal so that the individual entering the area and the supervisor of the activity shall be immediately aware of such entry.

Such an area shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words CAUTION HIGH RADIATION AREA - PERSONNEL MONITORING REQUIRED.

Areas in which radioactive material is stored or used shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words CAUTION RADIOACTIVE MATERIAL.

All containers in which radioactive material is stored shall be marked with a label bearing the conventional radiation symbol and the words CAUTION RADIOACTIVE MATERIAL. In addition the tag shall bear a description of the contents, identify the isotope (Co-60) indicate the amount of the contents and bear the initials of the individual who prepared the tag. Tags shall bear the date of measurement of the contents.

5. Survey Meters - Baird-Atomic, Model 414

Any operation involving exposure to radiation must be monitored with a survey meter. The survey meter indicates the exposure received per unit time. This, on the meter provided, is in milliroentgens per hour and the range of the instruments is from 1 milliroentgen per hour to 3000 milliroentgens per hour.

A calibrating source and fixture is attached for checking the B-A survey meter. Detailed calibration instructions are provided on the fixture. Survey meters shall be calibrated every two months or whenever a meter is equipped with new batteries or repaired. Upon calibration label the survey meter with the date of calibration and initial it.

6. Radiographic Areas

(a) Standardization Laboratory

1. Doors to the Standardization Laboratory shall be locked at all times. Keys to these doors will be issued to the Health Physics Officer and the Deputy Health Physics Officer.
2. The names, addresses and telephone numbers of these responsible persons will be prominently posted outside the Standardization Laboratory.
3. Keys to the T/O, Model 446, radiographic wagon and T/O, Model 488, source changer shall be in the custody of the Health Physics Officer and his Deputy.
4. Only authorized personnel may be admitted to the restricted area, as designated on accompanying drawing.
5. Film badges will be located on walls, ceilings and floors as indicated in attached drawing of Standardization Laboratory.

6. The entire area will be posted with acceptable signs as specified in CFR, Title 10, Part 20, Item 20.203.
7. Removal of the radioactive source from storage to test position shall be done only by authorized radiation worker and when the adjacent areas outside the restricted area is free of personnel.
8. At least two authorized radiation workers shall be present when the radioactive sources are removed from "safe" storage.
9. Sources shall not be left unattended at any time and shall be left locked in "safe" storage.
10. If Gamma alarm monitor signals an alarm when the sources are locked in "safe" storage, the plant security police shall notify the Health Physics Officer or the Deputy Health Physics Officer.
11. All personnel in the restricted area shall wear a film badge and a dosimeter.

(b) Test Areas

1. The general test area is indicated on the attached map as Point B.
2. The area enclosed in the 300 foot diameter circle shall be roped and considered a restricted area. This area shall be posted as specified in 10 CFR, Part 20, Item 20.203.
3. Film badges shall be placed at random along rope enclosing restricted area and monitored with a survey meter.
4. The castings to be inspected shall be monitored with a survey meter prior to any radiographic or gamma probe measurements.
5. Film badges shall be located on the Instrumentation barrier, Point C on map.
6. All personnel in the restricted test area shall wear a film badge and a dosimeter.

7. Emergency Procedure

(a) General

The company plant security police shall be notified as to the location of the sealed sources and instructed as to what measures shall be taken in case of an emergency.

The Perth Amboy, N. J. Police and Fire Departments shall be notified of the location of the sealed sources and what procedures shall be followed in case of fire or general emergency.

(b) In case of an emergency, defined as a fire, national emergency or gamma alarm, the area is to be evacuated with the greatest possible distance.

(c) Notify immediately:

1. G. L. Stukenbroeker ,

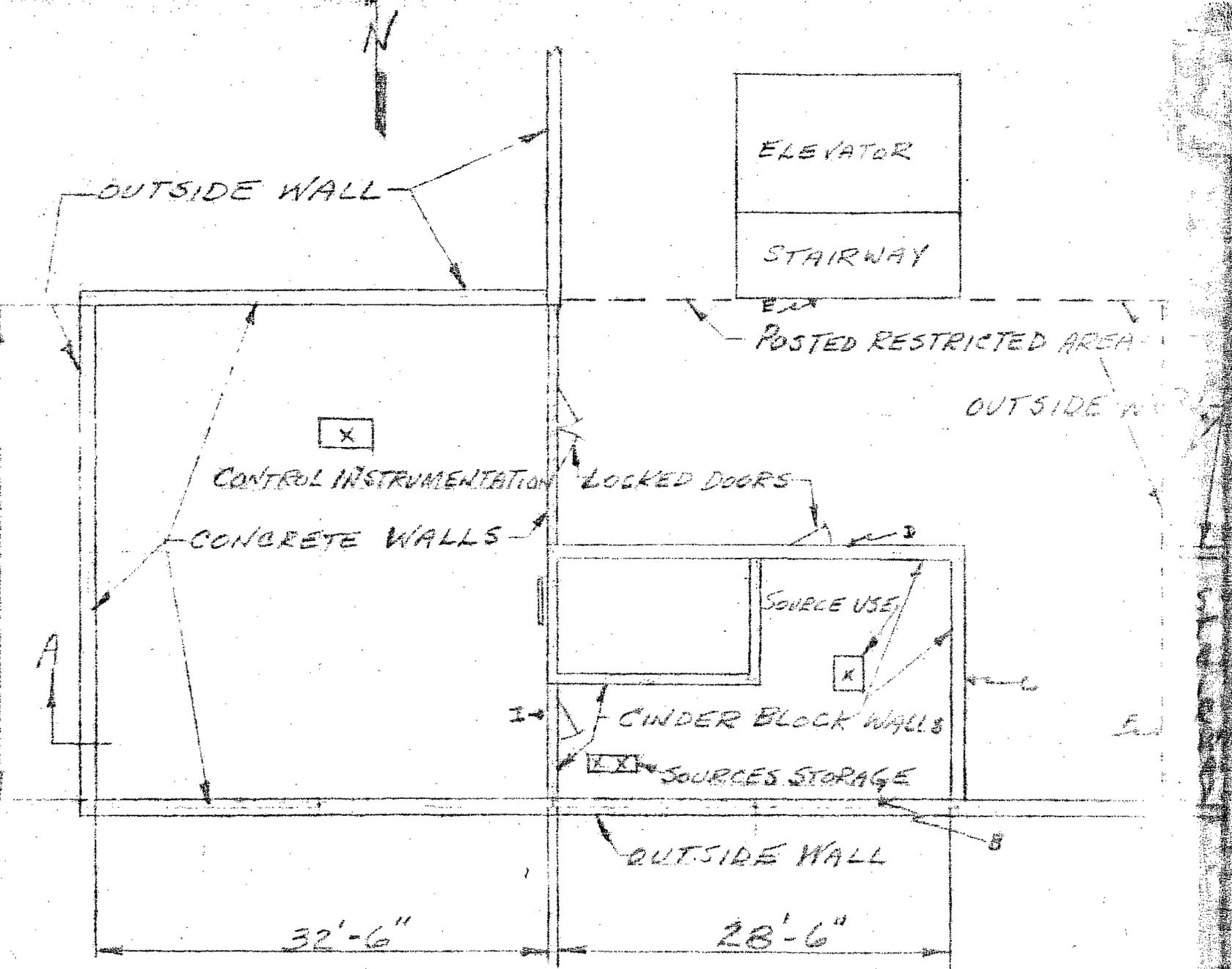
(b)(6)

2. J. N. Nees

(b)(6)

Perth Amboy Police - Hillcrest 2-4400

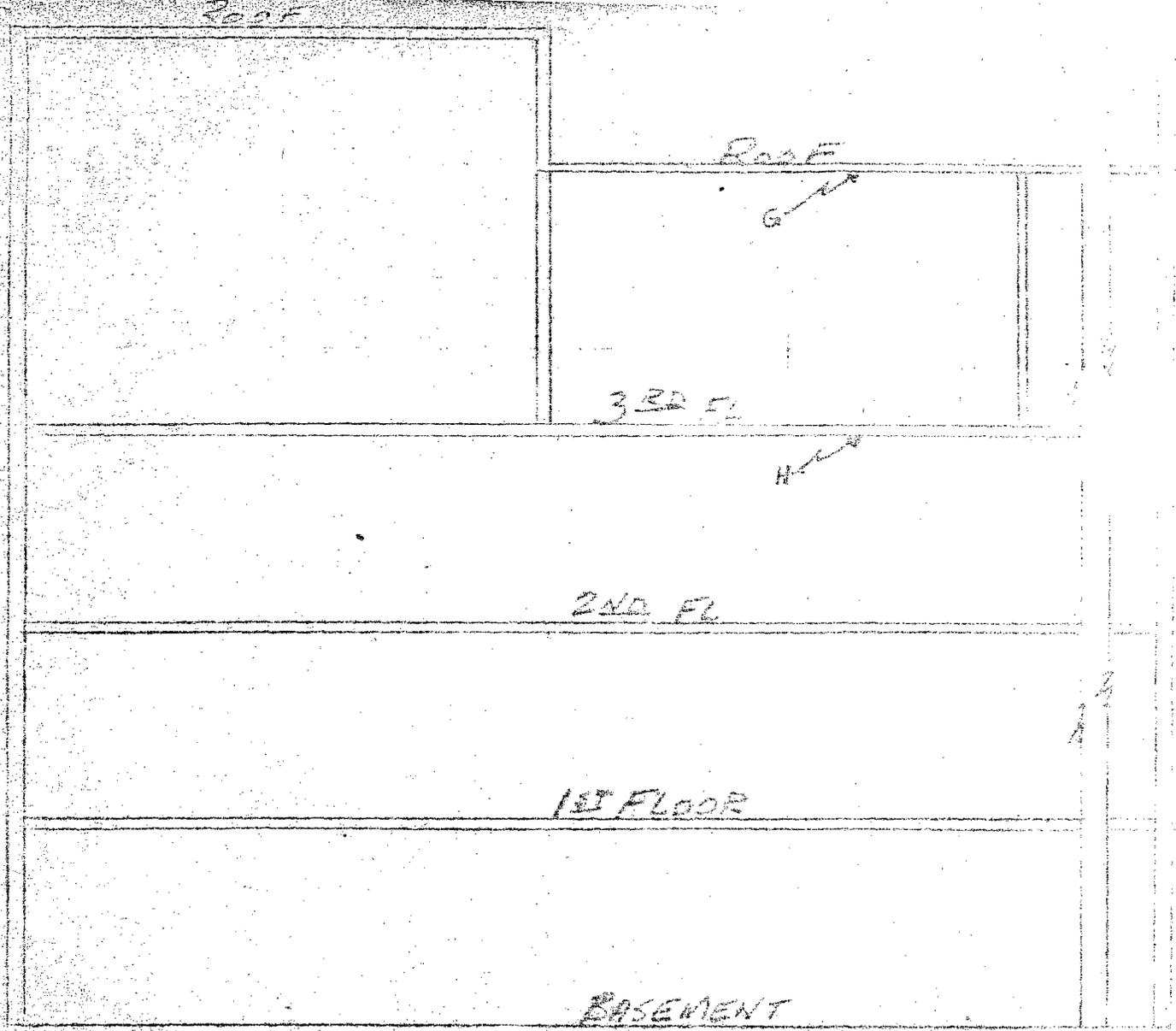
Perth Amboy Fire Department - Dial Operator



PLAN (3RD FL.)

STAMP

BUILDING IS STEEL FRAME WITH
CONCRETE WALLS & FLOORS.



DUBLICA JETT

FOR DIV. OF INSP

ELEVATION (A-A)

POSITIONS B THRU I INDICATE
 LOCATIONS OF MONITORING
 FILM BADGES
 IN LABORATORY

ACID RECOVERY AREA
 LAYOUT - BL # 23

**THIS PAGE IS AN
OVERSIZED DRAWING OR
FIGURE,
THAT CAN BE VIEWED AT THE RECORD
TITLED:**

**Drawing No.: 32036.53
"Survey of NATIONAL LEAD
COMPANY, ATLANTIC BRANCH,
Perth Amboy, N.J."**

**WITHIN THIS PACKAGE...OR
BY SEARCHING USING THE**

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