APPENDIX B

Procedures for
Clevite Research Center
Nuclear Program

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STANDARD PROCEDURE
CC-18

COMPANY OR UNIT Clevite Research Center

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HEALTH AND SAFETY - NUCLEAR PROGRAM	CR-15
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GENERAL

This Standard Procedure has been prepared for the Clevite Research Center Nuclear Program. The purpose of the procedure is to insure the health and safety of employees performing research, development, and processing of source and special materials (SS materials), and to insure that SS material will not contaminate air, liquids or solids leaving the Clevite Research Center.

A. MANUFACTURING PROCESSES:

1. The work involves the melting, alloying, rolling, forging, shearing, stamping, and machining of SS material into fuel plates and assemblies using vacuum furnaces, heat-treat furnaces, rolling mills, forging presses, power shears, punch presses, and machine tools such as power saws and milling machines.

B. DESCRIPTION OF PROCESSING AREA:

1. A floor plan of the area in which SS materials will be processed is made a part of this procedure (following page 13). This area is completely self-contained with only one entrance. There are, in addition, two emergency exits with panic hardware.

2. The floor throughout the area is of concrete treated with a resin filler which penetrated into the concrete and formed a seal, thus permitting easy cleaning. The seal also lessens the possibility of the pores in the concrete filling up with SS material. There are no floor openings to the sewer system.

3. The locker room and shower facilities are shown on the floor plan. They include an individual locker for each employee and a four-stall shower. Toilet facilities are adjacent to the shower facilities.

4. Ventilation is of the natural flow type with four exhaust fans on the outside walls. Each of these fans is rated at 4,000 cubic feet per minute, and each is equipped with a prefilter and filter which filter out particles in the one-micron size range to prevent the discharge of contaminated air outside of the Research Center. The flow of air is from the inside walls toward the outside walls. Make up air is supplied by natural flow and not by mechanical means. Dust and fume collectors are supplied for individual equipment as they are needed.

C. PERSONNEL RESPONSIBLE FOR HEALTH AND SAFETY:

1. The responsibility for health and safety lies with the Manager, Central Services, who has delegated it to the Personnel Manager. The responsibility for seeing that health and safety procedures are carried out in the SS materials processing area lies with the Executive Assistant to the Manager, Materials Division. The Executive Assistant has a Health Safety Inspector under his supervision who takes air, liquid waste, stack effluent and smear samples, and makes external radiation surveys.

   This Health program is part of the Clevite Corporation Health program which is under the direction of the Corporate Medical Director.

2. Those responsible for the health and safety program have engineering or scientific degrees; they have made extensive literature surveys of the subject; and have attended conferences concerning the program with health and safety officers of prime contractors and of the Atomic Energy Commission, Chicago Operations Office.

3. Film badge service is obtained and will continue to be obtained on a weekly basis. R. S. Landauer Jr. & Company, 24 Plaza, Park Forest, Illinois, is the present supplier. Laundry service is provided and will continue to be provided on a daily basis. The Ohio Overall Cleaning Company, 8000 Central Avenue, Cleveland, Ohio, is the present supplier.

D. MAXIMUM PERMISSIBLE LEVELS AND CONCENTRATIONS:

1. Maximum permissible concentrations of air, water, and surface contamination.

   a. Air in the controlled area:

      (1) 110 alpha disintegrations per minute per cubic meter of air.

         (a) All operations will be thoroughly investigated where the rate of alpha disintegrations exceeds 50 alpha disintegrations per minute per cubic meter of air.

         (b) This rate is based on a 40-hour work week.

   b. Air outside the controlled area, but within the Research Center:

      (1) 12 alpha disintegrations per minute per cubic meter of air.

         (a) This rate is based upon a 40-hour work week.

   c. Air outside the Research Center:

      (1) 4 alpha disintegrations per minute per cubic meter of air.

   d. Water released from the Research Center:

      (1) Concentration of soluble matter.

         (a) 15,000 alpha disintegrations per minute per liter.

      (2) No insoluble material will be released in water.

   e. Surfaces within the controlled area, but not in direct contact with SS Material:

      (1) 100 alpha disintegrations per minute per square foot of surface.

(2) 2000 beta-gamma disintegrations per minute per square foot of surface.

f. Surfaces of equipment or material leaving the controlled area:

(1) 10 alpha disintegrations per minute per square foot of surface.

(2) 200 beta-gamma disintegrations per minute per square foot of surface.

2. External radiation tolerances being used are those specified in Title 10, Code of Federal Regulations, Part 20, Paragraphs 20.101 and 20.105.

An individual exposed to radiation in a controlled area is limited to a weekly dose of 300 mrem except that he may be permitted to receive a dose of 900 mrem in any one week provided that his total dose in any thirteen-week period does not exceed 3000 mrem. An individual exposed to a dose in excess of these limits is limited to a weekly dose of 30 mrem until his average weekly dose, beginning with the week in which the excessive dose occurred, is less than these limits.

3. The handbooks and manuals to be followed include Title 10, Code of Federal Regulations, Part 20; the appropriate National Bureau of Standards handbooks; and the appropriate Interstate Commerce Commission shipping regulations.

E. CONTAMINATION CONTROL:

1. The different types of protective clothing will be issued and collected in the following manner:

a. White blue-bordered lab coats will be worn by all individuals remaining in the controlled area for less than a complete 8-hour shift who are not actively engaged in the processing of SS materials, or not actively performing work which might produce contamination of personal clothing.

(1) These lab coats will be kept on hangers provided at the entrance to the controlled area.

(2) Additional supplies of these lab coats will be maintained in the stockroom.

(3) These lab coats will not be worn outside the controlled area.

(a) The supervisor of the controlled area shall have these lab coats collected weekly and deposited in the container provided for that purpose in the controlled area locker room.

b. Green uniforms will be worn by all individuals remaining in the controlled area for a complete eight (8) hour shift; or by individuals working in the area for a shorter period, but actually engaged in the processing of SS material, or actively performing work which might produce contamination of personal clothing.

(1) These uniforms will not be worn except in the controlled area.

(a) These uniforms will be removed and kept in the controlled area locker room during the lunch period.

(2) These uniforms will not be worn for more than one complete eight (8) hour shift.

(3) Additional supplies of these uniforms will be maintained in the stock room, and will be dispensed as needed.

(4) Uniforms which have been worn will be deposited daily in the container provided for that purpose in the controlled area locker room.

c. Individuals entering the controlled area will wear white blue-bordered lab coats or green uniforms depending upon their work assignments.

d. Plastic gloves will be worn by all individuals performing jacketing or dejacketing operations on SS materials.

(1) Additional supplies of these gloves will be maintained in the stock room.

(2) Plastic gloves, which have been worn, will be placed in the nonaccountable burnable waste container provided in the controlled area locker room at the end of each shift.

e. White cotton gloves will be worn by all individuals performing any operations, except jacketing or de-jacketing on SS material, except when plastic gloves are designated by the supervisor.

(1) Additional supplies of these gloves will be maintained in the stock room.

(2) White cotton gloves, which have been worn, will be discarded at the end of each shift in the nonaccountable burnable waste container provided in the controlled area.

f. Safety shoes with yellow toes and heels will be worn by all individuals remaining in the controlled area for extended periods of time.

(1) These shoes will not be worn outside of, or taken from, the controlled area.

(2) Supervisors in the controlled area will designate the employees who will receive these shoes.

g. Storm rubbers or plastic shoe covers will be worn by all individuals remaining in the controlled area for short periods of time.

(1) Supplies of these rubbers and shoe covers will be maintained in the entrance to the controlled area.

h. Measurements for and supplies of green uniforms, white blue-bordered lab coats, gloves, storm rubbers and plastic shoe covers will be arranged at the stock room, by supervisors of individuals designated to wear them.

2. All laundering is done by the Ohio Overall Cleaning Company, 8000 Central Avenue, Cleveland, Ohio.

3. All individuals entering or leaving the controlled area will identify themselves to the armed guard stationed at the only entrance to the area, in accordance with instructions issued by the Security Officer. Such individuals will also wear protective clothing as outlined in this procedure.

4. No material or equipment will be permitted to be taken from controlled area until it has been inspected and approved for removal by the Health-Safety Inspector stationed in the controlled area, to make certain that such materials or equipment are not contaminated beyond the maximum permissible levels and concentrations.

5. The respiratory protective equipment to be used in the Wilson 880 respirator with a R436 filter designed for radioactive dusts and highly toxic dusts, fumes, and mists.

F. RADIATION SURVEYS:

1. Air Samples.

   a. Air samples will be taken with a Gast Air Sampler and analyzed with a Tracer Lab windowless flow counter, Model S.C. - 16 P, and a Tracer Lab Super Scaler.

   b. Air samples will be taken daily or weekly at specified locations both inside and outside the controlled area.

   c. In the event of a high reading the source of contamination will be located and eliminated or controlled so that it no longer raises the level of contamination above the maximum allowable concentrations.

2. Liquid Waste Samples.

   a. Liquid waste samples will either be chemically analyzed or evaporated and measured in the Tracer Lab Windowless flow counter, Model S.C. - 16 P, and the Tracer Lab Super Scaler.

   b. Liquid wastes will be sampled and analyzed as a container is filled.

   c. All liquid wastes will be stored in a secluded area. Experiments will be continued on a continuous filtration process and an evaporation process using a steam coil for barrels containing liquids in order to dispose of liquid wastes.

3. Personnel Monitoring.

   a. Personnel monitoring will be accomplished through a film badge service provided by R. S. Landauer, Jr. and Company,

24 Plaza, Park Forest, Illinois, and by the use of Victoreen dosimeters.

b. The film badges will be developed weekly. The dosimeters will be used as supplements to the film badges to give more frequent readings whenever required.

c. In the event of a high reading the individual will be taken off the job on which he has been working until he again meets the requirements of Title 10, Code of Federal Regulations, Part 20.

4. External Radiation Survey.

a. External radiation surveys will be carried out with a Victoreen Thyac Beta Gamma Survey Instrument; a Nuclear Chicago Model 2112 Alpha Survey Instrument; and a Universal Atomic Mode UAC408, Alpha Beta Gamma Survey Instrument.

b. Surveys will be made daily or weekly at specified locations.

c. In the event of high readings the source of contamination will be located and eliminated or shielded, or individuals guarded against excessive radiation by having a limit placed upon the time that they will be allowed to remain in the area of the radiation source.

5. Smear Survey.

a. Smear surveys will be made by using a one-inch diameter filter paper and smearing it over an area of 100 square centimeters. This filter paper will then be analyzed in the Tracer Lab windowless flow counter, Model S.C. - 16 P, and a Tracer Lab Super Scaler.

b. Smear samples will be taken daily or weekly at specified locations.

c. In the event of high readings the contaminated object will be cleaned until a smear sample taken on it is less than the maximum allowable concentration. Any waste will be stored in a secluded area.

6. Stack Effluents.

   a. Stack effluents will be sampled by means of a Gast Air Sampler and a tap in the stack. The samples will be analyzed in a Tracer Lab windowless flow counter, Model S.C. - 16 P, and a Tracer Lab Super Scaler.

   b. Stack effluent surveys will be taken at irregular intervals depending upon the operations being performed in the controlled area.

   c. In the event of a high reading, filtration will be installed at the source of contamination in order to avoid discharging contaminated exhaust gases into the stack, and then into the air outside the Research Center.

G. DECONTAMINATION PROCEDURES:

1. Personnel.

   a. All employees working in the controlled area wearing special protective clothing will be given extra wash-up time at lunch time to change clothes and wash-up before proceeding to lunch outside the controlled area. These employees will also be given extra wash-up time at the end of the shift in order to shower before changing to their street clothing prior to leaving the controlled area.

2. Equipment.

   a. All equipment that becomes contaminated will be cleaned until a smear sample taken indicates less than the maximum allowable concentration. Any waste will be stored in a secluded area.

3. Facilities.

   a. Facilities will be cleaned with the use of a Lincoln Auto Scrubber for floors and an American Cleaning Equipment Corporation vacuum cleaner (which uses water as a prefilter) for other parts of the facilities, such as walls and light shades. Cleaning will be continued until a smear sample indicates less than maximum allowable concentration.

H. WASTE DISPOSAL:

1. Liquids.

   a. All waste liquids will be retained and stored in 30-gallon or 55-gallon drums which will be covered and kept in a secluded area.

   b. Experiments will be carried out on two methods of concentrating the liquid wastes into sludge form so that it can be disposed of through a commercial disposing company or the Atomic Energy Commission. One method is a continuous filtration process, and the other is an evaporation method using a steam coil in a barrel containing liquid.

2. Solids.

   a. All solid combustibles will be burned in a slow-burning incinerator located in the center of a large tract of vacant land. The area around the incinerator is continuously surveyed during and after incineration has occurred.

   b. All solid noncombustibles, both nonreclaimable and reclaimable will be stored in 30-gallon or 55-gallon covered steel drums. Chips, turnings, and fines will be kept covered by a high-flash-point mineral oil, and stored in vented drums. All drums will be stored in a secluded area.

I. PROCEDURES AND EQUIPMENT FOR THE CONTROL OF FIRES:

1. Equipment available for fire fighting includes Ansul Metal-X 30 fire extinguishers located in the controlled area so that no employee is more than 30 feet from a fire extinguisher. The building is fully protected with a sprinkler system which is part of an A.D.T. alarm system. In the event of fire, the A.D.T. office automatically receives an alarm and summons the Fire Department. One of the nine battalions of the Cleveland Fire Department is located only 3 blocks away so that it can be at the

building within two minutes after receiving an alarm. The three battalion chiefs and the rescue squad of this battalion were given a guided tour of the controlled area within the limits of security regulations so that they would be able to fight any fire involving pyrophoric material with the greatest efficiency.

2. All pyrophoric metal chips, turnings and fines will be stored in 30-gallon or 55-gallon sealed, vented drums and the material in the drums will be covered by a high-flash-point mineral oil. All other pyrophoric metal shapes will be kept in a fire-proof vault in accordance with criticality regulations when they are not out on the production floor. All shipments of pyrophoric metals will be made in accordance with ICC regulations.

3. All employees who work in the controlled area have been instructed in the use of CO_2 and Ansul Metal-X Fire extinguishers. They have been instructed that in the event of fire, the first thing to be done is to put on the respirators which are kept at convenient locations throughout the controlled area, and then either to fight the fire or leave the controlled area in accordance with instructions.

4. If, in the judgment of the area fire warden, a fire occurs which cannot be controlled by a hand extinguisher, or any other disaster occurs involving the controlled area, all employees of the building will be evacuated in accordance with fire drill procedures which are practiced regularly. The fighting of the fire will then be left to the Cleveland Fire Department which has been fully informed as to the type of pyrophoric metals stored in the building as described in the above paragraphs.

J. MEDICAL EXAMINATIONS:

1. Blood Tests.

   a. Blood tests will be taken as part of the pre-employment physical examination and semiannually thereafter.

   b. The analyses will be performed in the Medical Laboratory of Clevite Corporation.

2. Urinalysis.

   a. Urinalyses will be performed quarterly.

   b. Excretion concentration limits shall be 45 alpha disintegra-

tions per minute per 24 hours for U-238 and 90 alpha disintegrations per minute per 24 hours for U-235.

c. Any employee whose urinalysis shows more than 25 alpha disintegrations per minute per 24 hours, will have a second urinalysis taken immediately and if it exceeds 25 alpha disintegrations per minute per 24 hours, he will be removed from work in the controlled area.

d. The analyses will be performed in the Medical Laboratory of Clevite Corporation.

3. The following pre-employment examinations will be given to all employees who are assigned to the controlled area:

a. The routine pre-employment physical examination includes past history, blood serology, chext x-ray, urinalysis for albumen and sugar and physician's examination. This will be repeated annually.

b. Blood test; white blood cell count, red blood cell count, differential count, and sedimentation rate. This will be repeated semiannually.

K. SHIPPING PROCEDURE:

1. Packaging and labeling of shipments of SS material will be done under the supervision of the Health Safety Inspector in accordance with Title 10, Code of Federal Regulations, ICC regulations, CAB regulations, and U. S. Post Office regulations.

2. Radiation surveys of shipments of SS materials will be made by the Health Safety Inspector in accordance with Title 10, Code of Federal Regulations, ICC regulations, CAB regulations, and U. S. Post Office regulations.

L. RECORDS:

1. Personnel exposure data is kept on reports submitted by R. S. Landauer Jr. & Co. These data are maintained as permanent records by R. S. Landauer Jr. & Co. and Research Center Dispensary.

2. Results of radiation surveys will be kept in a radiation survey log book maintained by the Health Safety Inspector.

3. Waste disposal information including total volume of waste discharge and average concentration will be kept in a waste disposal log book maintained by the Health Safety Inspector.

M. EDUCATION PROGRAM FOR PROTECTION OF EMPLOYEES:

1. A continuous education program for protection of employees will be carried on by means of on-the-job training by supervisors and by meetings with Health Safety Personnel.

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