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TERA

Theo. R. Schwalm, Inc.

POOR ORIGINAL

DESIGNER AND MANUFACTURER OF

FINE DIALS

510 Second St.

Lancaster, Pa. 17603

Phone 397-3651 • Area Code 717

November 21, 1979

Boyce H. Grier, Director
Region 1, U. S. N. R. C.
631 Park Ave.
King of Prussia, Pa. 19406

N. R. C. license 37-09385-01E

Dear Mr. Grier,

Enclosed is the requested reply to IE Bulletin No. 79-19.
I apologize for the delay in replying, but we have no record of
receiving your August 10, 1979 mailing.

Sincerely,

THEO. R. SCHWALM, INC.

Steven D. Brown

Steven D. Brown
Radiation Safety Officer

SDB/sis
Enclosure
c.c. Roy Munro, General Manager
Mary Moore, Health Physicist

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- 1.) We will maintain a current set of DOT and NRC regulations concerning the transfer, packaging and transport of low-level radioactive waste material.
- 2.) We have requested Nuclear Engineering Co. to send us a copy of the current requirements placed on them.
- 3.) Mr. Steven Brown, Radiation Safety Officer, and Mr. Roy Munro are the individuals responsible for the safe transfer, packaging and transport of low-level radioactive material.
- 4.) See Attached instructions.
- 5.) We will provide training & periodic retraining in the DOT & NRC regulatory requirements and the waste burial license requirements. We will maintain a record of training dated, attendees, and subject material for future inspections by NRC personnel.
6. & 7.) We have employed the services of a health physicist to perform quarterly audits of our program as well as periodic training/retraining of our employees who generate low-level waste.
- 8.) Our most recent audit was performed on November 16, 1979 by Mary E. Moore, Health Physicist.
- 9.) Responses to 3 questions on page 3 of IE Bulletin No. 79-19:
 - 1) Total Number of low-level radioactive waste shipments for 1978 & first six months of 1979 = 3. Total volume of waste shipped = 159.75 Ft³
 - 2) Total number of curies shipped = 108.5ci
Radioisotope = Tritium.
 - 3) Yes - Liquid tritium waste was solidified in cement.

HANDELING OF TRITIUM WASTE

Inside and Outside of Tritium Room

Liquid Waste

Water used for air samples of stack and glove box.

Approx. 1 1/2 gallons of water from both combined per week.

5 gallons of this tritiated water equals approx. 0.15 curies

The water from these jugs are combined each week with cement and sand. It is left to sit in the tritium room, until hard. The following week the tritiated water is mixed again, as per the above, and poured on top of the previous mixture of cement.

Once there is a sufficient amount of cement for one man to handle, it is packaged in a steel drum and then shipped to Morehead, Ky. under a #1 label.

All other Tritium Waste

Fiber Drum

Poly. Liner Bags 36" x 56" (3 mil.)

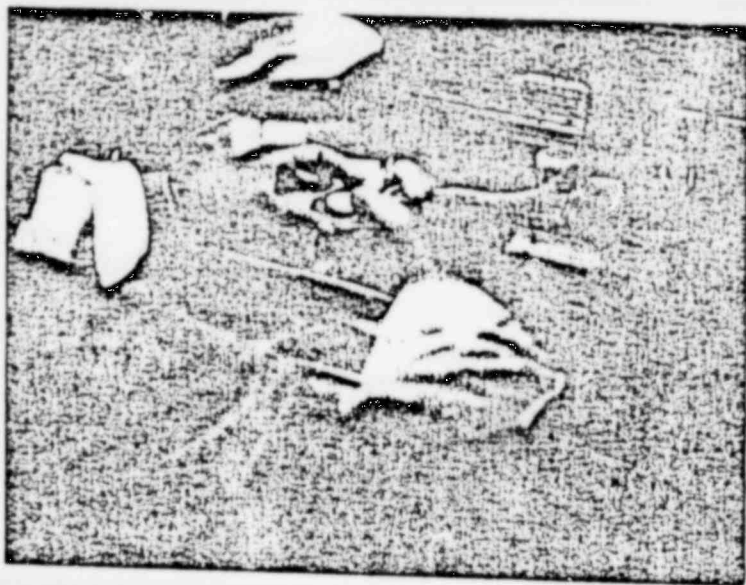
Plastic bag liner put inside fiber barrel. Then barrel is put inside plastic bag. By doing this barrel is completely covered, as not to allow contamination from tritium. The original lid for the barrel is stored outside the tritium room, again prohibiting contamination. A lid is kept inside the tritium room to cover the protected barrel.

When barrel is ready for disposal, new barrel is brought in to replace filled barrel. The filled barrel is pulled as far away from contaminated area as possible, but still within the restricted area. The plastic bag covering on the outside of the barrel is slit, then pushed inside and the barrels original lid is placed on the barrel. Returning the contaminated lid to area in which the barrel is kept for waste in the tritium room. The original lid is then sealed on the filled barrel and then the barrel is swiped.

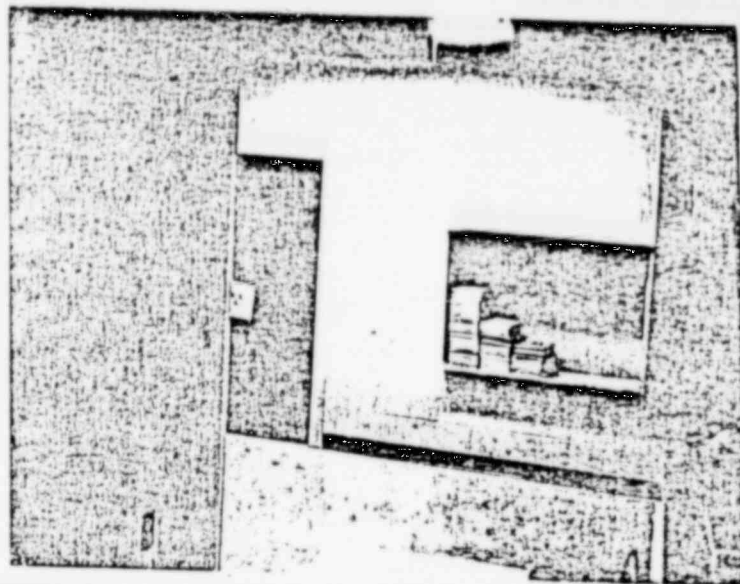
The barrel is then stored outside the restricted area until ready for shipment to Morehead, Ky. Labeled under #1.

Labeling approved by Mr. Glenn Hoenes, of Radiation Management, via telephone conversation of November 5, 1973.

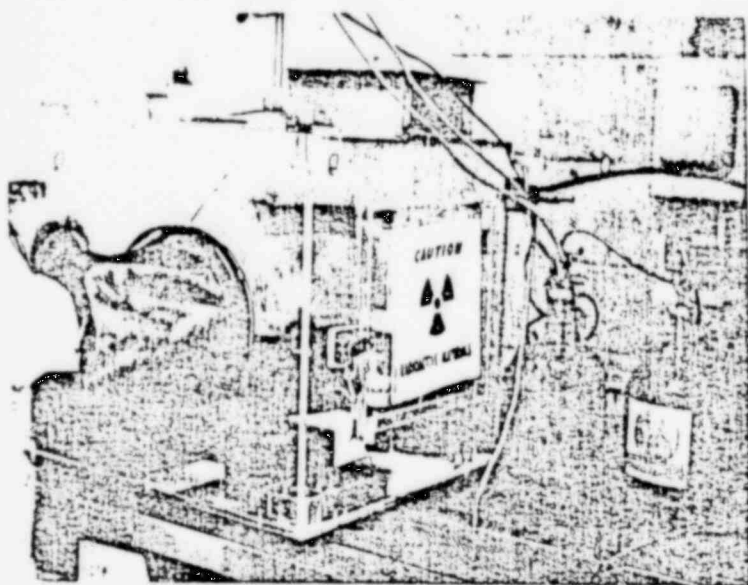
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Painting individual dial using stainless steel slide



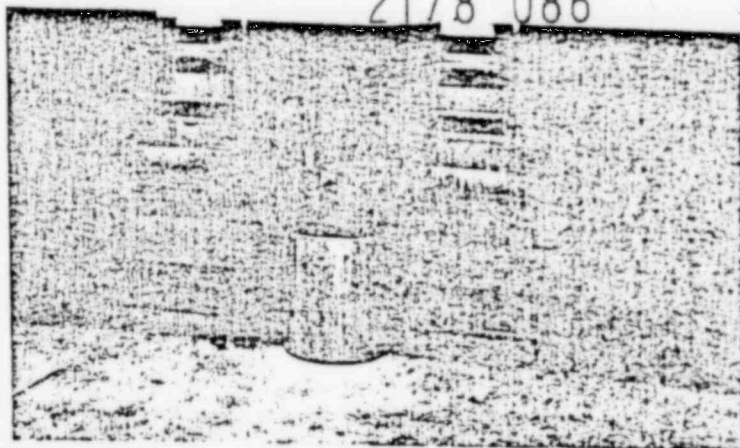
Dial Pick Up - Delivery Window - Emergency Exit



Glove Box - Preparing to fill pen
Note Padlock - Glove Box Locked when facilities are not operating. Air scrubber shown to right of Glove Box.

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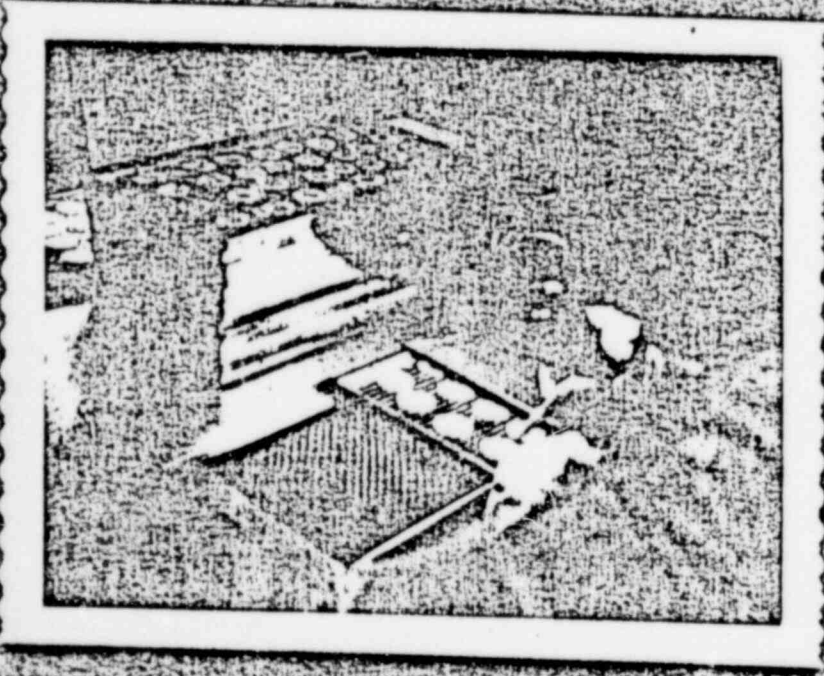
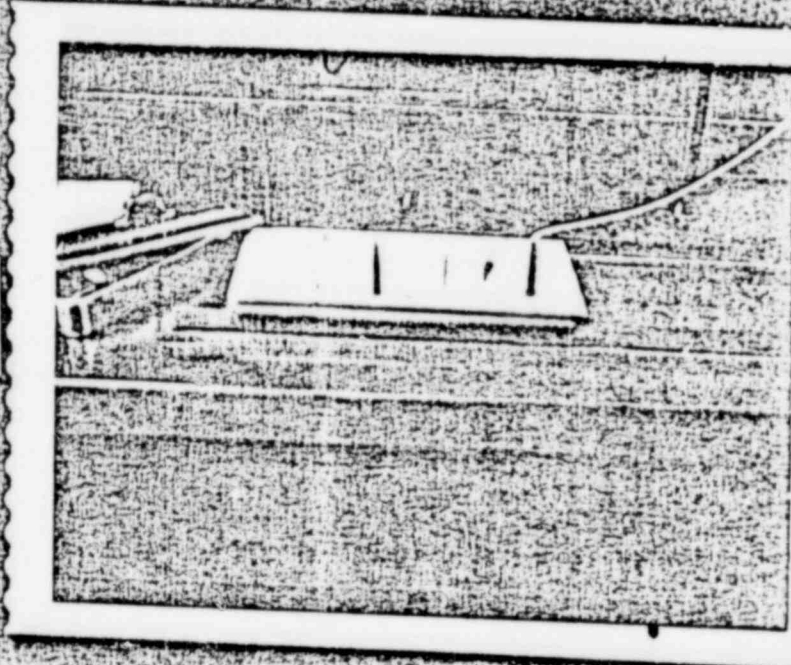


Stainless Steel trap for contaminated water, dumped into drum and mixed with cement.



Tritium Painting Room - In foreground stainless steel topped bench shows plastic lined stainless steel waste receptacle and vent opening

Painting tools and small stainless steel tool box



Dial painting on mesh trays
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INSTRUCTIONS TO TRITIUM PAINTERS

Introduction

The following instructions have been prepared to make you aware of the hazards associated with the handling and use of luminous paint which contains the radioactive Isotope of Hydrogen known otherwise as Tritium H₃. Careful adherence to these instructions will provide a safe and hazard-free environment; willful neglect of these instructions may create a danger to you and your fellow workers. It is very important that the following instructions for the application and handling of tritium paint be followed to the letter. If willful negligence is found, the employee will receive a warning which will be placed upon the employees record. A second offense will be cause for dismissal from which no appeal can be made.

These instructions cover three major areas, which are;

- Operational Procedures
- Protective Clothing
- Handling of Waste Materials

OPERATIONAL PROCEDURES

Preparing for Work

The preparation necessary for applying tritium paint requires three steps. These are; (a) "dressing up" with protective clothing, protective cream and gloves, (b) preparing a slurry of tritium containing paint, and, (c) placing this paint in a pen or cup so that it may be applied to dials and hands.

When, where and how protective clothing is to be worn will be covered in greater detail under the heading "Protective Clothing". It is necessary here to realize that you must "dress up" in protective clothing before you enter the dial painting room. No personal items such as purses are permitted in the dial painting room.

Items (b) and (c), are, at all times, conducted within the confines of the glove box. (Refer to photographs.) This tritium is packaged in 100 gram containers, certified as to having been tested and attained a level in compliance with the appropriate N. R. C. regulations. Its condition is moist, to reduce contamination.

The mixing is done in a glass jar using a small spatula to stir the material. The glass jar is furnished with a cover. This cover is to be on the jar at all times, other than when stirring and pen filling. Enough material is mixed in the above manner to last an operator for several days.

The only work necessary with the paint is to add either adhesive or thinner in very small quantities so that the consistency of the paint may remain constant. From this mixed supply, the paint is then used to fill the pens, which are used in the application of the tritium paint to the dial. The pen is filled by dipping a spatula into the

paint and picking up a quantity which is then transferred to the wall or reservoir in the pen.

Care is to be exercised in this operation to see that there is no spilling or splashing of the paint. If an accident occurs, the supervisor is to be notified immediately. The operation is completed by wiping the spatula clean with a Kim-Wipe. The contaminated Kim-Wipe is disposed of in the waste can. The pen is removed from the glove box, attached to the compressed air supply and is then ready for paint application.

Handling of Tools

Certain tools are necessary to mix and apply paint to dials and hands. Illustrations of the tools used are attached to these instructions and are also posted in the bulletin board located in the anteroom. Most of the necessary tools which are used in the process, are a wrench to assist in assembling and disassembling the pen, pen vise and tweezers. For painting hands, the following additional tools are used Large paper clips, which are used to hold the hands. The arm rest which is used to lay over the dials so the operator can rest his arm while he is applying the tritium paint. The spatula, which was mentioned previously, used for mixing and filling the pens and a small brush used to clean the pen after the work has been completed.

Application of paint to dials and hands

The application of tritium paint is an art which you must learn from your supervisor. For your safety it is important to know that all painting operations are to be conducted on the stainless steel topped bench assigned to you. It should be noted that these specially designed benches employs an exhaust system which draws air from behind the operator, over the dials or hands and down into the duct work passing on the underside of the bench to the stack.

The operator places the pen over the spot which is to have the tritium paint applied and then depresses the foot pedal which controls the air supply which then forces paint through the small tip onto the dial. This operation is repeated until the entire dial is painted. Dials are placed on trays (32 to one tray). After a tray is completed, it is placed under the infrared drying unit which is on the operator's bench. The supply of dials is stored on a shelf directly beside the operator. Samples of these dials are taken according to the standard sampling procedures described elsewhere. They are then inspected.

Hands are painted by using a pen and flowing the paint over the opening on the underside of the hand. This must be done in a complete motion so that the adhesive will bond firmly to the hand. The hands come to the operator in 6" strips ready for painting. After painting the hands, they are placed under the infrared light to dry.

Dials and hands which are smeared, spoiled or otherwise unsuitable for customer use are cleaned of their tritium paint in paint thinner. The salvaged dial or hand is inspected for tritium contamination by the use of a portable ultraviolet light and then placed back in operation for repainting. The contaminated thinner from the operation is disposed

of by placing it in the waste disposal container at each bench.

Cleaning Equipment and Work Areas

The applicator pen is disassembled and placed into paint thinner which dilutes and removes any remaining paint from the pen. The pens are cleaned and wiped dry using disposable Kim-Wipes.

The disposal of contaminated material such as Kim-Wipes and the contaminated thinner is accomplished by placing it in the waste disposal container located at each bench. These containers are subsequently emptied into a drum, which when full is shipped to a radiological waste disposal company. (See handling of waste material.) At the end of each shift, each operator inspects his area for contamination with an ultraviolet light. If contamination is found, it is removed by using a Kim-Wipe which has been moistened with thinner. Any material which adheres to surface is removed by using a Kim-Wipe wet with paint thinner. The decontamination procedure is continued until no contamination is observed under the portable ultraviolet light.

Leaving the Work Area

When you have completed the decontamination of your work bench, you are ready to leave the work area. Upon entering the anteroom and using the portable ultraviolet light, check your protective clothing for contamination. If clothing is contaminated, take the necessary action as described under the handling "Protective Clothes". If your protective clothing is found not to be contaminated, remove them and hang them up in the appropriate area. Next check your hands and face for specks of contamination using the ultraviolet light. Every trace of contamination must be removed from your skin before you are to leave the anteroom. Wash your hands free of protective cream. Lastly remove your protective shoe coverings or step out of your painting room shoes and step into the dark examination room, hanging your shoes or coverings inside the anteroom and making certain that you do not step on the floor in the anteroom in your unprotected shoes. The monitor at this point will inspect your face, hands, clothing and shoe soles for contamination with an ultraviolet light. If no contamination is found, the operator is free to leave, if contamination is found it must be removed before the operator can leave the inspection room.

Special Instructions

Each employee is required to present a urine sample to the supervisor on the first working day of each month or more often at the discretion of the supervisor for analysis of ingested tritium contamination.

A small but finite amount of tritium will be ingested by your system in spite of all the safety precautions taken. For your added protection, it is highly recommended that you maintain your body liquid intake to normal or above normal levels. In case of an overexposure, you are advised to accelerate intake of liquids. Unless otherwise prescribed by a physician. Intake in this case should be limited to one pint per hour, per 10 hours or no more than five quarts per day.

Protective Clothing

Protective clothing is issued to each operator and must be worn at all times, while in the restricted area. The "restricted area" includes the dial painting room and the anteroom. Protective clothing includes

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a smock, shoe covers, and a hood or cap. The protective clothing must be put on in the anteroom prior to entering the dial painting room. Exposed parts of the body, which would be the face and hands, are to be covered thoroughly with Pro-tek cream, which is a product made by Dupont to keep oil and dirt from working into the skin. When leaving the restricted area, either; for a rest period, for lunch or quitting time, the protective clothing is removed in the anteroom. Removing the hood and smock first and then washing face and hands thoroughly to remove the protective cream as well as any traces of contamination. The protective clothing is placed on hangers and hooks and hung in the anteroom. The monitoring of the individual operators is then performed in the inspection room by either the supervisor or someone who is assigned to the task by the supervisor. The following persons are designated as monitors of employees.

Steven Brown
Theresa Shafer

The "monitor" using a portable ultraviolet light inspects the clothing and the face and the hands of the operators. Contamination is removed from the skin as previously described. On leaving the anteroom the operator removes one shoe covering, placing it on a rack, in the anteroom and then steps out of the anteroom with this foot. The operator then removes the other shoe cover and then steps out of the room entirely. in conditions of extreme discomfort, an operator may wear shoes which may not be worn or conveyed outside the restricted area. She would then step over from one pair into the other. Remember to check your shoe soles with the ultraviolet light. The results of the monitoring of individual operators shall be recorded by the monitors on the "Tritium Application Inspection Report" by initialing the appropriate block of the report.

Smock and caps shall be replaced after five (5) working days. Shoe coverings shall be replaced after ten (10) working days if they have not otherwise been discarded because of contamination. The monitor must check himself prior to leaving the inspection area, especially the shoes.

Handling of Waste Material

At each work bench a metal container is positioned into which radioactive waste is placed. The metal container is lined with a plastic bag. Solid waste such as Kim-Wipes, sponges and mechanically damaged dials are placed into the bag. Solid paint suspended in liquids are also poured into the bag. The liquid is permitted to evaporate leaving a dry deposit in the bag. The waste collected in these bags is disposed of after each shift by the employee. The bag is removed from the container, and, beside the exhaust fan, is collapsed, the top of the bag is then twisted shut and tied with rubber bands. The employee is required to place the waste into a specially designated drum which when filled is shipped to the Nuclear Engineering Co. who are licensed to accept and dispose of radioactive waste. It is the janitors responsibility to clean the floors, the walls and chairs to make sure the restricted area and anteroom to the restricted area is kept free of contamination. He does this every other work day.

The janitor must also wear protective clothing while in the restricted area. A vacuum cleaner with filter bags is used to vacuum the floors,

walls and benches. After vacuuming, the floor is mopped with a wet mop and fresh layers of Kraft paper are laid on the floor. The soiled paper is placed in the tritium waste drum.

The benches are the responsibility of each operator. Periodically the filter bag is removed from the vacuum cleaner and is disposed of by placing it in the tritium waste drum. The waste water from mopping the floor is poured into a special drum, mixed with cement and left to solidify. When full, this drum is sent to the Nuclear Engineering for disposal. Thinning and cleaning liquids, when judged to be excessive for the plastic bag in the stainless steel containers, are disposed of in this manner.

Responsible Authority

The job supervisor will be responsible to see that these instructions are carried out. Mr. Steven Brown who is the Radiation Safety Officer will be directly responsible for control of the radiation work area. He will be responsible for all adherence to all items of these regulations and to make sure that all entries are properly made on the daily check record.

This set of instructions supersedes all previous instructions which are in your possession

July 12, 1979.

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Instructions for Monitors

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Receipt of shipment of tritium

Swipe outside of package, using method described in section entitled "Swipe Tests" and bring package into Tritium Room to be opened. Upon opening, immediately swipe inside container and place the container inside the glove box, where it will be opened when needed. Check at this time to ensure proper documents accompany shipment. The packing slip and certificate of prototype testing affirm that this batch has been tested as required under section 32.14 (a) (11) (111) 10 cer 32 of the United States Nuclear Regulatory Comm regulations describing the number of millicuries per gram. The shake and bend test for flaking and chipping effect and the water test, must be kept on file.

Swipe Tests

Swipes are purchased in kits numbered 1 through 100. A form has been prepared showing the location of those areas which must be swiped and with the code numbers it can quickly be identified which swipe refers to which area.

To take a swipe, the hands must be creamed and/or gloved. Remove a swipe from the box with a pair of tweezers and hold it on the area to be swiped, place protected finger on the swipe and rub over the area. With the tweezers, place the contaminated swipe into the envelope and continue with the swiping. By using this method, the chance of the fingers becoming contaminated and affecting the swipes is reduced. Area swipes including operators hands are taken weekly and sent to Radiation Management Corporation for analysis.

Air Sampling.

Inside air samples are taken monthly from the area at the center of the dial painting room. The equipment is run for one (1) hour for the test and sent to Radiation Management Co. for analysis. (A picture illustrating this test is attached.)

Emission of stack samples

These are drawn by a tube from within the stack and passed through water, from which 10 cc are drawn off weekly and sent to Radiation Management for analysis. (A picture illustrating this test is attached.)

Urinalysis

These are submitted for tests monthly for all operators. Periodic tests are made of employees who, though never enter into the restricted area, do have some periferal association.

Waste Disposal Swipes

These are taken from the outside of the drums containing tritium waste and the results are determined before dispatch to ensure only clean drums leave this premises.

All Swipes, urinalysis and air samples sent to Radiation Management Corporation are sent under special label.

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Exhaust System

Each stainless steel topped bench has an open area over which the operator places the screen mesh trays of dials to be painted. It is through these openings that the air is drawn from the room, through the duct work, located under the benches, and out through the stack. This system is designed to draw the air and any contamination away from the operators.

The fan generating this draw is located inside the stack and has a bench rating of 10,500 CEM. Stack emission became our single most persistent problem and subsequent tests indicate that factors such as wind, closed windows, and/or benches reduced the effectiveness of the fan. To counteract the varying loads, a 4" pipe has been installed, running from the outside walls of the tritium painting room into the stack below the fan level. This was done in July 1973 and from that time, compliance in stack emission has been maintained. To further augment the system, a "squirrel cage" blower has been installed on the roof of the facility leading directly into the stack.

The stack has a retractable canopy and, except during inclement weather, the stack is open during working hours, this further reducing the load on the fan and eliminating the downward direction of exhausted air.

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