HAMILTON WATCH CO., INC. 4109
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

October 31, 1977

RECEIVED
NOV 07 1977
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

Mr. Frederick Combs
Radioisotopes Licensing Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

REF: File No. 89127, FCMS:RLB:FC, your letter of September 19, 1977.

Dear Sir:

In reference to your letter dated September 19, 1977, please find below the appropriate answers to your questions.

Question 1. The principles and practices of radiation safety.

The handling and application of Tritium luminous sources requires great care and special training to secure satisfactory results. For this reason alone, personnel shall be selected with care. From the point of view of reducing hazards, it is also important that only workers who are naturally neat and careful should be employed. A rigid physical examination shall be made of all prospective workers. No applicant who is not in good health or who has shown a history of such diseases as anemia or tuberculosis shall be considered suitable for this work. Persons whose eyesight cannot be corrected properly by glasses are also unsuitable. Before an individual is employed he shall be informed in detail of all known dangers involved. He shall be instructed regarding rules and regulations which have been set up for his protection and he shall be directed to observe them in all details. It is suggested that those engaged in handling radioactive luminous compound familiarize themselves with the recommendations of handbook NBS #51. Instruction to personnel shall be done according to Title 10, Chapter 1, C.F.R, USNRC 19.

Question 2. Safe methods of performing work.

Maximum permissible limits for occupational radiation exposure of workers, to both internal and external radiation, are set at levels sufficiently low that no appreciable bodily injury is expected to occur to the individual even during a lifetime of exposure. By safeguarding each radiation source, by proper use of controls and monitoring facilities, by adequate waste disposal, and by careful

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717) 394-7161

instruction of personnel the user of radionuclides can fulfill his responsibility to minimize the harmful effects of radiation. Exposure to radioactive materials above the maximum permissible levels can be avoided by proven protective measures in the handling of radionuclides. The fundamental objectives of such protective measures are:

1. To maintain exposure to external radiation as low as feasible.

2. To minimize entry of radionuclides into the human body by ingestion, inhalation, absorption, or through open wounds. To accomplish these objective requires positive planning and diligent execution of procedures, beyond the usual care taken in work with other materials. It is necessary to analyze in advance the hazards of each job; to provide safeguards against foreseeable accidents; and to use protective devices and planned emergency procedures in accidents that do happen.

The supervisor shall be familiar with the basic principles of protection from radiation and radioactive materials in order to properly discharge this responsibility. He shall see that the work of the group is properly planned. He shall see that instructions for standard procedures are available for repetitive jobs and that special detailed procedures are prepared prior to any special work involving hazardous quantities of radioactive materials. These procedures shall include the principal steps to be taken in the event of an accident involving these materials.

Question 3. Procedures and precautions to minimize exposure and contamination.

The fundamental purpose of any protective measures is to prevent the ingestion or inhalation of Tritium during its manipulation. This seemingly simple requirement must be rigidly and continuously adhered to by all workers. Working conditions must be arranged to provide a generally safe environment for the workers and to encourage their cooperation in carrying out rules intended to preclude any known possibility of injury. The essential requirement is neat and orderly "housekeeping" which, under proper supervision, results in better working conditions, increased productivity, and safety for the individual worker. All workrooms inhabited by workers shall be equipped with proper ventilation and a Tritium monitor. In addition to this, the personnel shall be instructed about:

Selection and Instruction of Personnel.

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

Supervision.
Effects of Radiation.
Blood Count.
Physical Examinations - General and Bio-Assay.
Personal Cleanliness. Radionuclides can be taken into the body by a number of routes including ingestion or absorption through the skin. Extreme personal cleanliness and care are therefore needed. In work with sealed sources, contamination will be a very minor problem, barring rupture of the container and dispersion of the source material. Hands shall be washed frequently, and shall be washed before eating, smoking, and at the end of each work period. No edibles of any kind -- food, gum, candy, beverages -- shall be brought into contaminated areas or areas that may become contaminated between radiation control surveys. Smoking shall be prohibited in such zones. Personnel should refrain from using personal items in the work area. Personnel shall keep their work areas free from equipment and materials not needed for the immediate work. Orderliness is a prime requirement for eliminating the spread of contamination.
Housekeeping. Neatness in the laboratory is a prime requisite for elimination of the spread of contamination.

NOTE: Page 1, Supplement Section 12, of the license application shall read as follows:

All employees or individuals working in or frequenting a portion of a controlled area will be informed as to the presence of sources of radiation. The persons involved in these areas shall be instructed in safety problems associated therewith and in precautions or procedures to minimize exposure for their protection. Every individual working or frequenting the Control Area will be required to supply a urine sample for bio-assay, for liquid scintilation detection, on a monthly basis for the first three months and then on a quarterly basis. Bio-assay results shall be kept for record keeping purposes by the Radiation Safety Officer. If an individual is known to or suspected to have received an exposure to tritium gas exceeding permissible values, he shall be removed from the working area and an immediate bio-assay performed.

Question 4. Health hazards associated with handling Tritium.

Hazards in Handling Radioisotopes.
1. Deposition of radioisotopes in the body.
2. Exposure of the body to beta radiation.
3. Exposure of the hands or other limited parts to beta radiation.
Deposition may result from ingestion, inhalation, or absorption

through the intact or injured body surface. Ingestion may occur as an acute problem through the accidental drinking of an active solution. Following inhalation, the hazard is threefold:
1. Direct irradiation of the lungs.
2. Absorption of the active material directly from the lung.
3. Elimination from the lung by ciliary action followed by ingestion.

Chronic deposition of unabsorbable particles in the lungs is a major hazard since it is extremely difficult to demonstrate the accumulation of such particles. Once radioactive material has entered the body and been deposited in the organs governed by its metabolism, it is difficult or impossible to expedite the natural rate of elimination from the organ. It is, therefore, essential to avoid all ingestion or inhalation of radioactive materials and to test potentially exposed personnel for such accumulations. When the body is exposed to an external source of beta radiation, only the superficial layers up to a few millimeters in thickness are irradiated. The recommended practice is to limit the exposure of all parts.

Question 5. Specific procedures which involve handling Tritium source.

1. Receiving. Modules containing Tritium shall be sent by the Module manufacturer and received in Hamilton's Traffic Department for recording. The Receiving Clerk shall write up the receiving ticket for the shipment. The packing list shall be on the outside of the package in order to identify the contents of liquid crystal watch modules containing Tritium illumination. The package shall not be opened in the Traffic Department. Copies of the receiving tickets shall be placed with the package and delivered to the Tritium facility.

2. Inspection. Upon receipt in the Tritium facility, the package shall be opened and the count verified under a ventilated hood. A Quality-Control representative shall inspect the modules within 24 hours from arrival and fill out the copies of the receiving ticket and forward the proper copy to Data Processing for inventory control. Packages shall be opened under an exhaust hood and written up on receiving ticket in Tritium room. All the modules shall be submitted to proper Quality-Control inspection as described in reply to your letter of September 20, 1977. Good modules will be placed in storage cabinet with exhaust fan. Modules with broken or damaged tubes shall be placed in special containers and shall be returned by the Radiation Safety Officer to appropriate places, as American Atomics. The damaged modules shall be packed for shipping in the Tritium facility.

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

3. Storage. Modules are to be kept in a ventilated metal cabinet which is inside the Tritium facility. (Cabinet shall be solidly attached to the wall.)

4. Inventory. Data Processing shall provide weekly inventory records to the Radiation Safety Officer in regard to Tritium inventory.

The following is in regard to the Betatec Model 210 tritium air monitor.

Question 1. The occasions for use of a radiation monitor.

The Betatec Model 210 tritium air monitor shall be working on a continuous basis of 24 hours. We shall not turn the monitor off at any time even if the tritium facility shall temporarily not be used.

Question 2. The frequency and occasions for testing the monitor for proper operation.

The monitor shall be tested on a daily basis for proper operation. Every morning prior to the employees going into the Tritium room, the monitor shall be checked for proper functioning by the Radiation Safety Officer. The monitor shall be checked with a Triton calibrator, Type CL-1, made by Johnston Laboratories, Cockeysville, Maryland, whose characteristics are as follows:

Accuracy: ±10%

Reproducible: ±2%

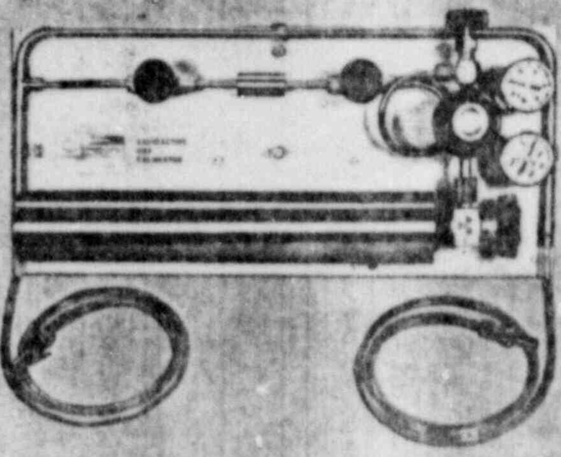
Calibration Time: 3-5 min.

No personnel shall have access to the Tritium facility in case of malfunctioning of the monitor. Records of the monitor shall be kept by the Radiation Safety Officer.

Question 3. The Tritium concentration at which the monitor's alarm shall be set.

The monitor's alarm shall be set for a Tritium concentration below 5 $\mu Ci/M^3$. The air monitor shall be operated on a maximum sensitivity scale of 0-10 $\mu Ci/M^3$ with the alarm set below 5 $\mu Ci/M^3$. Should the alarm sound, the Radiation Protection Officer shall be notified immediately to determine if the MPC level has been exceeded and further action is required.

TRITON
CL-1 Calibrator



PRINCIPLE

A Precisely Measured Quantity of Tritiated Gas is Provided for Introduction Into Monitoring System to be tested.

FEATURES

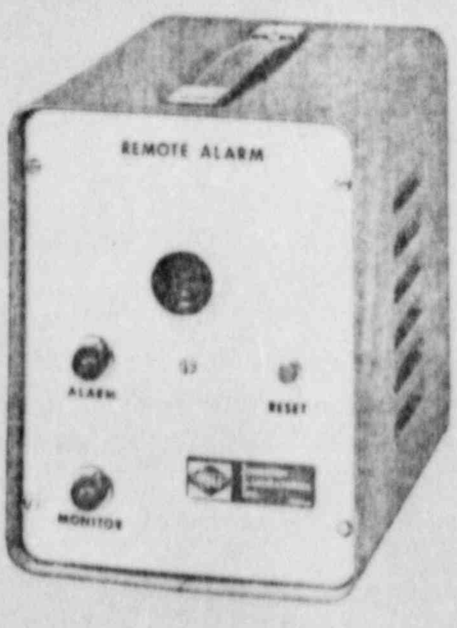
- LOW USER COST—1000 or more Calibrations.
- ACCURATE—±10%.
- REPRODUCIBLE—±2%. 4109
- RAPID—Calibration time 3-5 minutes.
- RELIABLE—Specific activity of gas is constant under pressure.
- CONVENIENT—Self-contained, non-aqueous, portable.
- SIMPLE OPERATION—No special technique required.

SPECIFICATIONS

- CALIBRATOR—MODEL CL-1 consists of back-plate, cylinder holder, lecture bottle, pressure regulator, sample system.
- RADIOACTIVE GAS SUPPLIED—Lecture Bottle contains 60 liters tritiated methane in nitrogen; activity approximately 4 μ Ci/liter. Individual assay provided.
- PHYSICAL DIMENSIONS—
  8″ high x 18″ long x 5″ deep.
- NET WEIGHT—12 lbs. (include gas lecture bottle).
- SHIPPING WEIGHT—18 lbs.

NOTE: A SPECIAL A.E.C. LICENSE NOT REQUIRED.

TRITON
RA-1 Remote Alarm



ADVANTAGES

- VERSATILE—Permits TRITON monitor location in noisy, troublesome, or hazardous areas.
- CONVENIENT—Eliminates direct supervision of TRITON monitor.
- SAFE—Removes personnel from exposure to harmful radioactivity.

FEATURES

- WARNING SYSTEM—Audible and Visible Alarm.
- ALARM RE-SET—on Remote Alarm (RA-1) resets main instrument also.
- MONITOR CONTROL—Power Indicator Light.
- MONITOR-POWERED
- COMPACT
- LIGHTWEIGHT

SPECIFICATIONS

- Model RA-1—Consists of aluminum cabinet with carrying handle, audible alarm, visible alarm, monitor power indicator light, alarm re-set button, 50 ft. of cable. (additional 100 ft. lengths available). Remote Alarm powered by TRITON monitor.
- USE—with TRITONS 755C, 955B
- SIZE—8″ long x 6″ wide x 8½″ high.
- NET WEIGHT—5 lbs.
- SHIPPING WEIGHT—6 lbs.

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

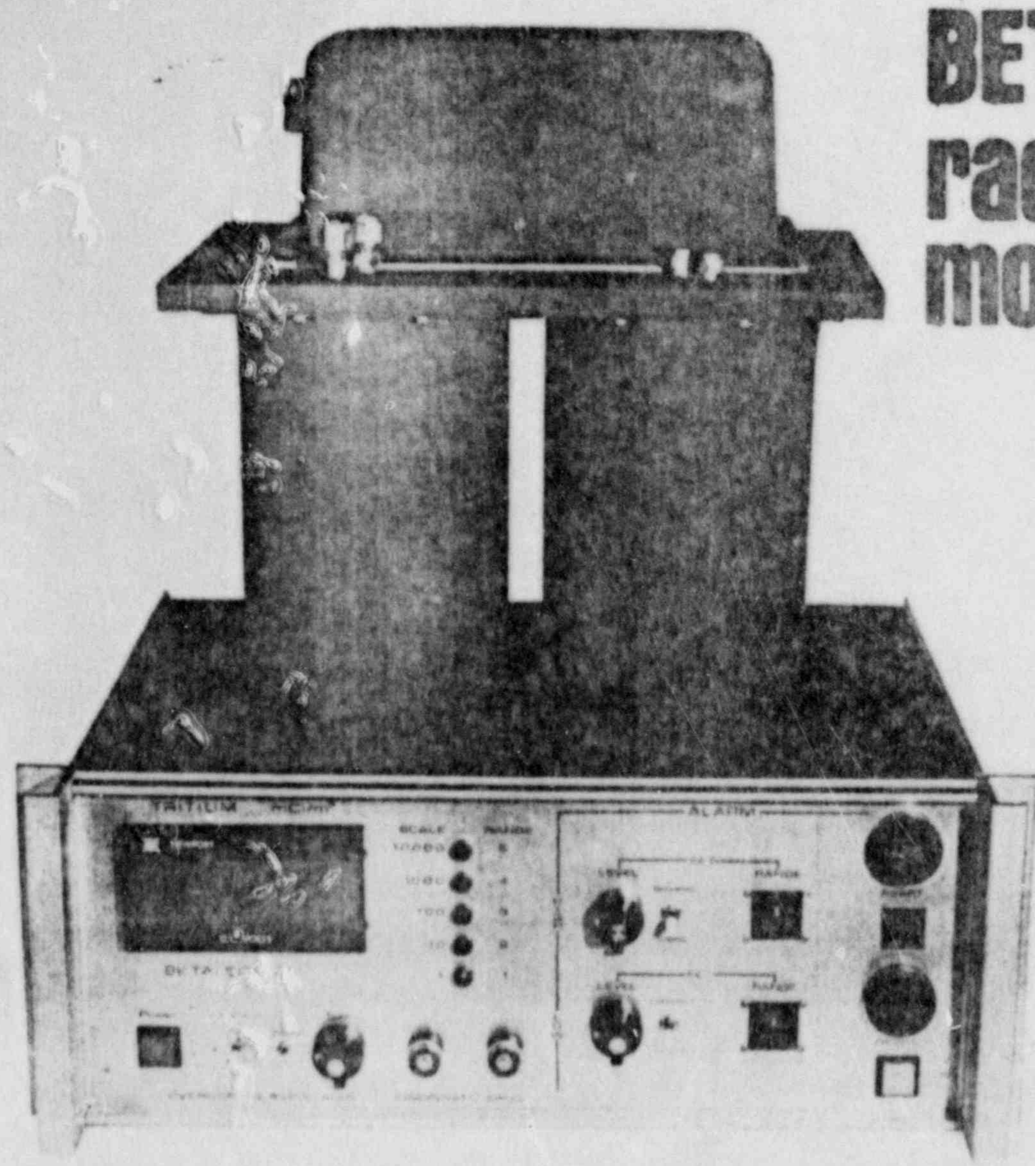
Question 4. The frequency, occasions, procedures, and equipment for calibrating the monitor; and the qualifications of the individual who will calibrate the monitor.

The monitor shall be calibrated at a frequency of once a month. The monitor shall be re-calibrated if, for reasons of one kind or another, the instrument has been out of service. The monitor shall be re-calibrated if the alarm has been used. Equipment used for calibration for the monitor shall be a calibrator type CL-1 (Accuracy ±10%, reproductible ±2%, no license required), made by Johnston Laboratories, Cockeysville, Maryland. The monitor shall be calibrated, according to instructions provided by Johnston Laboratories, by the Radiation Safety Officer who is Mr. Olivier D. Barrelet, Manager of Research and Development of Hamilton Watch Co., Lancaster, Pa. Mr. O. Barrelet is a graduate engineer who studied in Switzerland and worked for five years at Ebauches S.A. in Neuchâtel and Grenchen, Switzerland, especially with quality control related problems. Second position, was employed at the SNECMA -- CNMP Le Havre, France, working in the aeronautical industry. Third position, Micro International Limited, a Division of Northern Electric Bell Telephones in Ottawa, Canada, a research laboratory in thin and thick film electronic technologies. Fourth position, Timex, Waterbury, Connecticut, involved in building high volume assembly lines. Fifth position, AMP Research, Harrisburg, Pa., involved in developing new assembly techniques in micro electronic packaging using thermocompression automatic tape bonding; and last position, Hamilton Watch Company, Research and Development Manager involved in developing digital watches, and in charge of setting up the liquid crystal watch module tritium facility. Mr. Barrelet has spent some time with American Atomics, Overhoff Associates, U.S. Radium, and has read several documents related to the handling of Tritium. In addition, a Radiation Safety Course shall be attended by Mr. O. Barrelet.

Overhoff shall assist the Safety Officer in installing the monitor and shall provide the Safety Officer with all necessary information for the set-up, the operating, calibration, and maintenance of the equipment. The Tritium air monitor which shall be used has the following specifications. Minimum scale: 0 to 10 $\mu Ci/M^3$ with gamma compensation. Accuracy: 10% of full scale. Reproductibility: ±2%. Capacity: 10 liter. Time constant: 15 seconds, 45 seconds. The monitor shall be equipped with a strip charge recorder and the records of this strip charge recorder are going to be kept and audited on a

OVERHOFF and Associates 4109

BETATEC radiogas monitors



The BETATEC Radiogas Monitors manufactured by OVERHOFF & ASSOCIATES are the most sensitive, reliable and accurate linear ionization chamber systems available anywhere. They are used for the measurement of all radiogases and are specially useful for the detection of Tritium and other weakly emitting substances.

The battery powered portable is especially useful for nuclear power plants and other applications where radiogases are to be measured in the presence of background gamma radiation.

Electrometers, Amplifiers and Power Supplies are available separately. The OVERHOFF & ASSOCIATES Electrometers will respond accurately to currents as low as 10^{-17} A.

Our equipment is built for reliability and service in arduous environments and has found acceptance with some of the most prestigious members of the nuclear community.

system description

The BETATEC TRITIUM MONITORS consist of one or more linear ionization chambers coupled to an ultra sensitive electrometer. The major components assemblies are:

- 1. Ionization chambers
- 2. Electrometer
- 3. Main D.C. amplifier
- 4. Power Supplies
- 5. Automatic Scaling and Alarm Systems

Each of these assemblies is described below, and a summary of the performance specifications is presented.

IONIZATION CHAMBERS

The electric current generated in an ionization chamber is accurately proportioned to the decay activity of the contained radio active gas and to the volume of the chamber. A one liter chamber containing Tritium in a concentration of 1 $\mu Ci/m^3$ will collect a current of 1×10^{-15} A.

BETATEC IONIZATION CHAMBERS are available in numerous sizes and configurations, all chambers are equipped with coaxial ion traps for the removal of non radio active particulates.

Many BETATEC chamber systems are supplied in pairs. One chamber can be used for background gamma compensation or the two chambers can be used for difference measurements.

ELECTROMETERS

Vibrating reed electrometers are capacitance parametric amplifiers that exhibit enormous power gain with practically no offset drift. Their input impedance is given by the insulation resistance of the capacitor structure with typical values of 10^{18} ohms. BETATEC vibrating reed electrometers are suitable for measurement of currents as low as 10^{-17} A, and possess excellent thermal stability.

MAIN D.C. AMPLIFIER

This amplifier serves as interface between the electrometer and the data display. It incorporates all controls for scaling and calibration.

The BETATEC main amplifier printed circuit board is designed to include a logarithmic amplifier for accurate drift free direct logarithmic data display.

POWER SUPPLIES

All BETATEC power supplies are voltage regulated and are designed for a wide over and under voltage range (105 V - 150 V). The BETATEC high voltage power supply is nominally rated for $\pm$ 400 V and is regulated to better than 1 m V, special units are available with more stringent noise and drift characteristics.

AUTOMATIC SCALING AND ALARM CIRCUITS

The BETATEC AUTOSCALER is a solid state stepping switch programmable for 2 to 6 ranges that permits the monitor to automatically select the optimum range of operation. Range and scale information is visually presented by a floating decimal point in the digital panel meter, or by seperate lamps.

specifications

The following specifications are guidelines and represent past and current product performance parameters.

IONIZATION CHAMBERS

VOLUME ---------	20 cc, 2 liters, 20 liters
NUMBER ---------	Single, double or multiple
ION TRAP --------	integral coaxial
GAMMA COMPENSATION --	dual matched chambers
LEAK RATE ------	leak tested on request to 10^{-6} cc/sec/AHe
PORTS -----------	SWAGELOK or as specified
OUTER CHAMBER-	stainless steel
INNER CHAMBER -	stainless steel or aluminum
ELECTRODE------	brass, teflon insulator
GASKETS---------	O-Ring, Neoprene or as requested
OPTIONS ---------	plated chambers, gridded chambers, pumps, driers, adsorption columns and others

ELECTROMETER

SENSITIVITY------	2.5 Volts/Pico ampere, standard 25 V/pA & 250 V/pA available. $\pm 1 \times 10^{-15}$ Amperes. Ultra stable models, to 10^{-17}A available on special request
RANGES ----------	one fixed and two remotely switched feedback resistors
POWER REQUIREMENTS --	± 15 V, 100 mA, +200 V, 1 ma
STABILITY -------	500µV/°C typical, unaffected by humidity for 0-90% R. H.

HIGH VOLTAGE POWER SUPPLIES

VOLTAGES -------	± 400 nominal, fixed
STABILITY -------	± 1 m V/sec, ± 100µV/sec special
COMMON MODE STABILITY -------	± 20µV/sec
CURRENT --------	± 1 mA

AUTO SCALER

RANGES ----------	3, 4 or 5 ranges, hard wired
STEPPING RATE --	6 seconds per step
BUFFER OUT -----	100 mA, 15 V, negative logic (pull down) 4109
DIALARMS--------	two independent alarms
LEVEL SELECT---	thumbwheel or multiturn potentiometer
RANGE SELECT---	thumbwheel
SENSE-----------	maximum or minimum, hard wired
MODE -----------	latching or non-latching
INDICATORS ------	visual, accoustic or remote
BUFFER OUT -----	S.P.D.T. relay

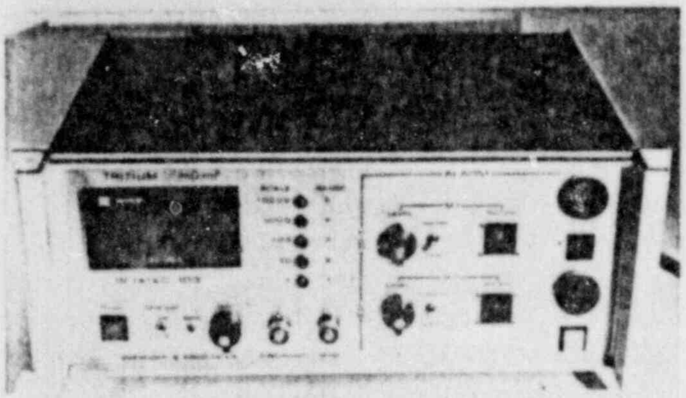
[illegible]

More complete specification data will be sent on special request. Please direct your enquiries to:

OVERHOFF & ASSOCIATES, INC.
BETATEC DIVISION
P.O. Box 8091
CINCINNATI, OHIO 45208

Phone: (513) 271-8339 or (513) 871-7548

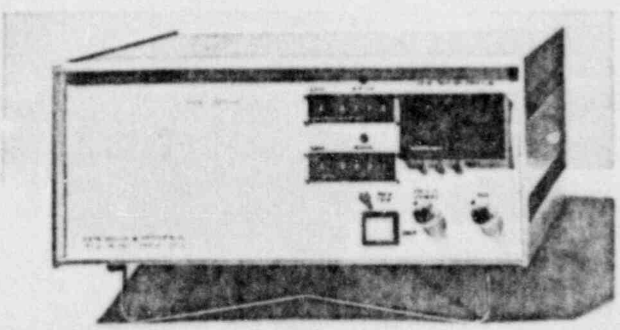
standard systems



MODEL 100 SERIES DISPLAY CABINETS

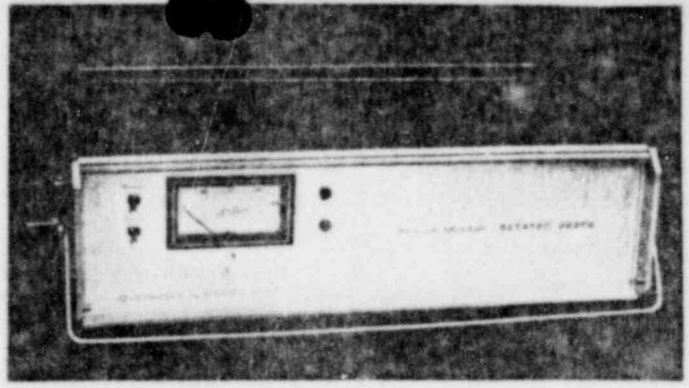
To be used with any of the Ionization Chambers listed in the second column.

- Up to 5 manual or automatically switched ranges
- Alarms
- Chart recorders with linear or logarithmic scales
- Remote display units with meter and alarm indicators



MODEL 220
BENCH TOP, self contained with two 2 liter ionization chambers for automatic gamma compensation.

RANGE ----------	0 - 200,000 $\mu Ci/m^3$ in 3 manual or automatic ranges
SENSITIVITY-----	1 $\mu Ci/m^3$ Tritium
STABILITY -------	equivalent to $\pm$ 0.5 $\mu Ci/m^3$ Tritium
ALARMS---------	two level, maximum or minimum
DISPLAY --------	3-1/2 digit Digital Panel Meter

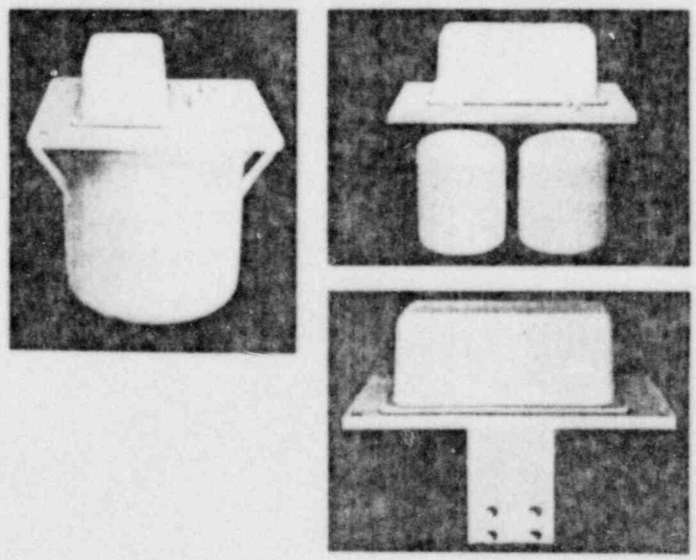


MODEL 222 FS DUAL CHAMBER
MODEL 260 FS SIXFOLD CHAMBER CLUSTER
(model 260 FS not shown)

BATTERY POWERED GAMMA COMPENSATED PORTABLE

LIGHT WEIGHT ---	25 lbs.
HIGH SENSITIVITY------	1 $\mu Ci/m^3$
HIGH PUMPING RATE -----------	6 volume changes per min.
CHARGER --------	separate or self contained

FULL GAMMA COMPENSATION
AUTOMATIC or MANUAL RANGE SWITCHING



IONIZATION CHAMBER MODULES

20 liters ---------	for measurements as low as 0.01 $\mu Ci/m^3$ Tritium
2 liters ----------	for measurements as low as 1 $\mu Ci/m^3$ Tritium
20 cc ------------	for measurements as low as 20 KCi/m^3 Tritium

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

yearly basis. The sensitivity of this equipment is 1 μCi/M^3 of Tritium.

Supplement - Page 2. Specific procedures for handling damaged and broken modules.

The handling of all LCD modules using Tritium shall be done in the Tritium facility under ventilated hoods only. This includes the opening of the packages and the 100% inspection of the module and also the casing of the modules. In case of broken or damaged modules, these modules shall not leave the ventilated hood. Broken or damaged modules shall be placed in a sealed container and returned immediately to an authorized agency, such as American Atomics. They shall be returned by surface mail with proper identification on the outside of the package. In the event of the sounding of the alarm on the Tritium air monitor, the Radiation Protection Officer shall be notified immediately and all personnel within the specified operating area shall leave at once. No personnel shall be permitted to return to the area until the air monitor indicates the air level at less than the maximum MPC value of 5 μCi/M^3. (The Tritium monitor shall be able to be read from the outside of the room). All personnel in that specified area shall submit urine samples within the next four to eight hours after the incident if it has been determined by the Radiation Safety Officer that the alarm was not due to a malfunctioning of the monitor and that the MPC value shall be exceeded when averaged over the eight hour working day. Urine samples shall be dispatched immediately for analysis and further action taken by the following schedule. The tritium monitor indicates the value of 5μCi/M^3.

Urine Sample Analysis	Action
1. Equal to or greater than 2830 μCi/liter.	Individual placed under medical supervision immediately. Immediate report to USNRC or other governing body. Begin immediate investigation of the incident.

HAMILTON WATCH CO., INC.
LANCASTER, PENNSYLVANIA 17604, U.S.A. (717) 394-7161 4109

2. Less than 2830 μCi/liter, greater than 566 μCi/liter.	Individual placed under medical supervision immediately. Report to USNRC or other governing body within 24 hours after receipt of data. Begin immediate investigation of incident.
3. Less than 566 μCi/liter.	Any single urinalysis showing a concentration greater than 50 microcuries/liter shall be reported, in writing, within seven days of receipt of the results, to the USNRC or other governing body.
4. Less than 50 μCi/liter, greater than 28 μCi/liter.	Individual placed under medical supervision immediately. USNRC or other governing body notified within 30 days of the incident. An investigation of the incident begun immediately.
5. Less than 28 μCi/liter, greater than 10 μCi/liter.	An analysis of the employee work pattern, the plant environment and any other pertinent factors will be initiated immediately on receipt of the data.

We hope we have answered these questions to your satisfaction. Please call me if there are any questions at, (717) 394-7161, Ext. 130.

Sincerely,

Olivier D. Barrelet

Olivier D. Barrelet, Mgr.
Research & Development
Hamilton Watch Company

ODB/laj

CENTER FOR ELECTRONIC WATCHES, Division of

HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604, U.S.A. (717)394-7161

REFERENCES

1. Safe Handling of Radioactive Materials, National Bureau of Standards Handbook 92.
2. Safe Handling of Radioactive Luminous Compound, National Bureau of Standards Handbook H27.
3. Safe Handling of Radioactive Isotopes, National Bureau of Standards Handbook 42.
4. Radiological Monitoring Methods and Instruments, National Bureau of Standards Handbook 51.
5. Permissible Dose From External Sources of Ionizing Radiation, National Bureau of Standards Handbook 59.
6. Safe Handling of Bodies Containing Radioactive Isotopes, National Bureau of Standards Handbook 65.
7. Safe Design and Use of Industrial Beta-Ray Sources, National Bureau of Standards Handbook 66.
8. Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and In Water for Occupational Exposure, National Bureau of Standards Handbook 69.
9. A Manual of Radioactivity Procedures, National Bureau of Standards Handbook 80.
10. NARM Guide 7 - Radioluminous Products, U.S. Department of Health, Education, and Welfare.
11. Evaluation of Occupational Hazards From Industrial Radiation: A Survey of Selected States, U.S. Department of Health, Education, and Welfare.
12. Measurements for the Safe Use of Radiation, National Bureau of Standards NBS Special Publication 456.
13. Control & Removal of Radioactive Contamination in Laboratories, National Bureau of Standards Handbook 48.
14. A Reliable Calibration Program for Ionizing Radiation Measurement, University of Louisville Radiation Center, Louisville, Kentucky.

15. Personnel Monitoring Measurements, Lawrence-Livermore Laboratory, Livermore, California.

16. Monitoring Performance Standards, U.S. Nuclear Regulatory Commission, Washington, D.C.

17. Miscellaneous Articles regarding Monitor Equipment from the Tritium Control Technology, by Monsanto Research Corporation Mound Laboratory.

18. Radiation Safety Technician Course, Argonne National Laboratory.