

NRC Form 313 I (12-81) 10 CFR 30		U.S. NUCLEAR REGULATORY COMMISSION		
APPLICATION FOR BYPRODUCT MATERIAL LICENSE INDUSTRIAL		1. APPLICATION FOR: <i>(Check and/or complete as appropriate)</i>		
See attached instructions for details. Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.		<input checked="" type="checkbox"/> a. NEW LICENSE		
		<input type="checkbox"/> b. AMENDMENT TO: LICENSE NUMBER		
		<input type="checkbox"/> c. RENEWAL OF: LICENSE NUMBER		
2. APPLICANT'S NAME <i>(Institution, firm, person, etc.)</i> Ford Motor Company TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION (313) 59-46955		3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION Don Greschaw Radiation Health Specialist, Employee Relations Staff, (313) 594-6955, or Joe Smarsh, Mfg. Staff, (313) 322-1422 TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION		
4. APPLICANT'S MAILING ADDRESS <i>(Include Zip Code)</i> <i>(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)</i> Ford Motor Company Radiological Health Office 15000 Century Drive, Room 104 Dearborn, MI 48121		5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED <i>(Include Zip Code)</i> Ford Motor Assembly Plants, Non-NRC Agreement States		
(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)				
6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL <i>(See Items 16 and 17 for required training and experience of each individual named below)</i>				
FULL NAME		APPLICANT TITLE		
a. Reference Attachment 16-(6) Designated Users		Check No. 809335 Amount/Fee Category 4230-3P Type of Fee As Applicant Date Check Rec'd 5/29/85 Received By J. A. Chasman		
b.				
c.				
7. RADIATION PROTECTION OFFICER 1) D. A. Greschaw, Corporate 2) D. S. Carruthers, Ind. Hygienist, B&A Div.		Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15. Reference NRC Lic. No. 21-04114-16, Application 3/30/83, Attachments "E" & "E-1"		
8. LICENSED MATERIAL				
LINE NO.	ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	NAME OF MANUFACTURER AND MODEL NUMBER <i>(If Sealed Source)</i>	MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	Am ²⁴¹	Scaled	Amersham Corp. A.M.C. 13145	30 M Ci each
(2)		(IAEA Special Form: SFC.144)	(ANSI Classif: C64344)	
(3)				
(4)				
DESCRIBE USE OF LICENSED MATERIAL E				
(1)	Evaluation of surface coatings, using X-Ray Fluorescence (Am ²⁴¹ gamma			
(2)	component @ 0.060 MEV) (Initial one device to be utilized for development			
(3)	and feasibility.)			
(4)	8512060142 850628 REG3 LIC30 21-04114-29 PDR			

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9. STORAGE OF SEALED SOURCES			
LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	PGT, Model 100 RP, Chemical Analyzer,	Princeton Gamma-Tech (PGT)	Model 100 RP
(2)	Remote Probe (Attachment "A")	1200 State Road Princeton, NJ 08540	
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS						
LINE NO.	TYPE OF INSTRUMENT A.	MANUFACTURER'S NAME B.	MODEL NUMBER C.	NUMBER AVAILABLE D.	RADIATION DETECTED (alpha, beta, gamma, neutron) E.	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F.
(1)	Reference:	NRC License No. 21-04114-16,				application dated 3/30/83, Attachment "A";
(2)		or equivalent	detection instruments for			detection of Am ²⁴¹ emissions.
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10	
<input checked="" type="checkbox"/> a. CALIBRATED BY SERVICE COMPANY NAME, ADDRESS, AND FREQUENCY . Victoreen, Cleveland, Ohio, or . Test Equipment, Troy, Michigan	<input checked="" type="checkbox"/> b. CALIBRATED BY APPLICANT Attach a separate sheet describing method, frequency and standards used for calibrating instruments. Reference NRC Lic. No. 21-04114-16, application 3/30/83.

12. PERSONNEL MONITORING DEVICES		
TYPE (Check and/or complete as appropriate.) A.	SUPPLIER (Service Company) B.	EXCHANGE FREQUENCY C.
<input checked="" type="checkbox"/> (1) FILM BADGE <input checked="" type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD) <input type="checkbox"/> (3) OTHER (Specify): _____ _____ _____	R. S. Landauer Jr. & Co. (used as needed to comply with NRC 20.202)	<input checked="" type="checkbox"/> MONTHLY <input type="checkbox"/> QUARTERLY <input type="checkbox"/> OTHER (Specify): _____ _____ _____

13. FACILITIES AND EQUIPMENT (Check where appropriate and attach annotated sketch(es) and description(s).)
<input type="checkbox"/> a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC. <input type="checkbox"/> b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC. <input type="checkbox"/> c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC. <input type="checkbox"/> d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL
a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED No waste disposal indicated.
b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE. Return sealed source(s) to manufacturer, or other concern licensed by the NRC, or an NRC-Agreement State, authorized to receive.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

(Reference Attachments)

15. **RADIATION PROTECTION PROGRAM.** Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures (if needed), day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.
16. **FORMAL TRAINING IN RADIATION SAFETY.** Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.
 - a. Principles and practices of radiation protection.
 - b. Radioactivity measurement standardization and monitoring techniques and instruments.
 - c. Mathematics and calculations basic to the use and measurement of radioactivity.
 - d. Biological effects of radiation.
17. **EXPERIENCE.** Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

18. CERTIFICATE

(This item must be completed by applicant)

Prepared by

D. A. Greschaw

Radiation Health Specialist

Employee Health Services, Employee Relations Staff

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.—18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED

(See Section 170.31, 10 CFR 170)

\$230.00

b. CERTIFYING OFFICIAL (Signature)

c. NAME (Type or print)

T. J. Young

(1) LICENSE FEE CATEGORY:

3-P

d. TITLE

Exec. Engr., Paint Operations B&AO

(2) LICENSE FEE ENCLOSED: \$

230.00

e. DATE

4/22/85

No. 15

- . Reference No. 15, Attachment "D" of NRC License No. 21-04118-16, License application dated 3/30/1983
- . Leak Test Procedure - Reference above, Attachment "D-1" and/or PGT Leak Test Kit

No. 16

- (7) RSO Corporate - D. A. Greschaw:
Reference No. 16-17, Attachment "E" and "E-1" of NRC License No. 21-04118-16, License Application dated 3/30/1983

RSO, Body & Assembly Division - D. S. Carruthers, Industrial Hygienist, Body & Assembly Division, or equivalent position, has gained experience in Occupational Health for over seven years and is a Board-Certified Industrial Hygienist. This position is felt adequate to advise on the proposed Am²⁴¹ combined with advice from the Company Radiological Health Office.

(6) Users.

- . It is intended that designated users, or facility users having direct supervision of specified devices containing licensed byproduct material, be provided appropriate precautionary instruction directed to the authorized and safe use of devices, and to recognize when assistance may be needed.
- . Completion of attached acknowledgment form indicating review of issued license, hazards and controls of industrial radioisotopes, and use information of PGT device.

The facility Safety and Medical activity, with advice and assessment from the Company Radiation Health Specialist, Employee Health Services, administers the occupational radiation control program for your facility.

Radioisotopes and X-ray sources are strictly regulated by various Federal/State governmental radiation regulatory agencies which include authorization of specific uses through licensing and/or registration procedures.

Some operations in your location involve the use of radioisotopes for process control purposes that are authorized by an issued U.S. Nuclear Regulatory Commission (NRC) license. The issued license, regulations, and related documents are available for examination in the facility Safety Office.

One of the requirements of an NRC-issued license is that of individual users, who will use or directly supervise the use of licensed material, be instructed in needed control procedures based on the NRC rules and regulations. The purpose of the prepared instructions is to maintain an effective radiation control program and to recognize when radiological assistance may be needed.

Please sign and date, indicating that you have reviewed the following material:

- ☐ "Radioisotope Hazards in Industrial Applications"
- ☐ "Radiation Control Procedure -- Process Installations"
- ☐ NRC License Application and Issued License Conditions
- ☐ Other

Date	Title	Signature
		Name (type or print)

All known or suspected excessive radiation levels, damage sources, or violations of NRC regulations and license conditions must be reported to facility Safety and Company radiation protection personnel.

Facility Safety: X-

Company Radiation Protection: (313) 59-46955
Off-hours (313) 32-30045

Return completed form to facility Safety Office with a copy to:

D. A. Greschaw, Radiation Health Specialist
Employee Health Services
Room 104, Central Lab
15000 Century Drive
Dearborn, Michigan 48120

RADIOISOTOPE HAZARDS IN INDUSTRIAL APPLICATIONS

The U.S. Nuclear Regulatory Commission (NRC), or equivalent Agreement States, have strict regulations and penalties for violations covering radioisotope usage through various licensing conditions, which normally require designated responsible individual users and periodic inspections. NRC CFR Part 19 and Part 20 "Standards for Protection Against Radiation", license conditions, and operating procedures are normally maintained for examination in the facility safety office.

Radioisotopes, which spontaneously emit radiation, as opposed to normally electrically generated X-rays, present a potential radiation hazard if basic radiation controls are abused; the degree of the hazard being dependent on various radiological factors such as type of radiation emitted, strength of source, exposure duration, distance, and shielding available.

The beneficial application of radioisotopes to industrial process control operations normally consists of sealed material encapsulated within a weighty lead-shielded holder which provides for attenuation of nonessential external radiation and ensures the integrity of the sealed source. The shielded source holder is designed with a "closed" and "open" shutter mechanism to allow for safe radiation levels during storage and shipment and the emission of a properly aligned collimated gamma radiation beam, similar to X-ray, for various process control purposes. Complete installations are designed, and confirmed by radiation survey, such that under normal operating conditions and low occupancy, no unusual restrictions are needed.

Pertinent potential radiation hazards associated with this type installation include:

- . Excessive radiation exposure during the uncontrolled occupancy in the direct radiation beam emitted from an "open" shutter condition. An example would be an unshielded 30 millicurie Americium source with a radiation intensity rate of approximately 44 and 11 millirems/hour at 0.5 foot and one foot distances respectively; in comparison, the current whole-body occupational accumulate exposure limit is 1,250 millirems/ three-month period (NRC Part 220.101) and 500 millirems a year for unrestricted areas (NRC Part 20.105a).
- . Unauthorized opening of shielded source holders and/or removal of the sealed radioisotope creating a potential acute exposure at close distances.
- . Undue environmental conditions causing damage to the holder shielding or shutter mechanisms.
- . Although remote, the integrity of the sealed source being impaired releasing radioactive contamination.

PGT INSTRUMENTATION
RADIOLOGICAL HEALTH PRECAUTIONS

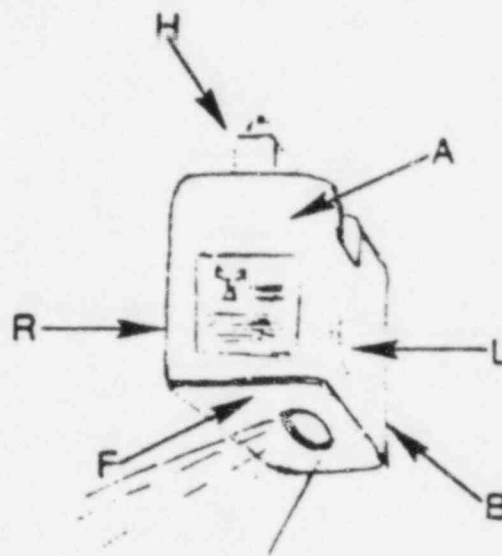
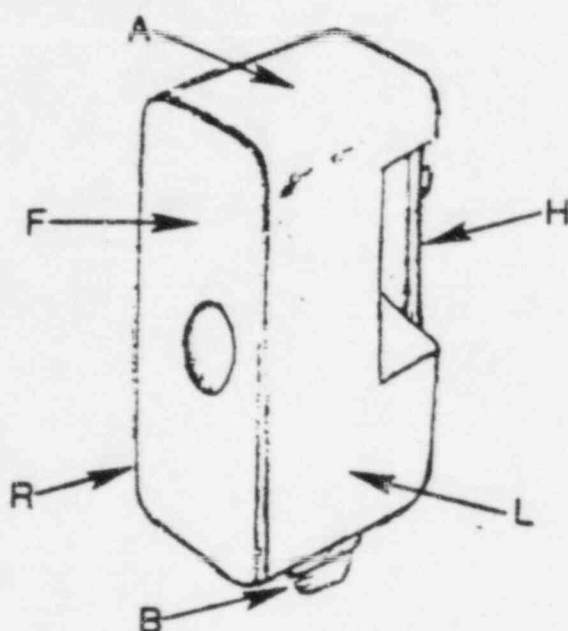
The Princeton Gamma-Tech (PGT) Model 100 RP Chemical Analyzer is commonly used for thickness measurement of certain coatings, using the principles of X-ray fluorescence.

The instrumentation includes a portable remote probe containing a sealed radioisotope of Americium (Am^{241}) to be used as a source of low energy (60 Kev) gamma ray (X-ray). The emitted collimated radiation beam is controlled by a shutter window which when closed reduces radiation to a safer level.

When the probe head is placed directly on the material to be analyzed, a safety switch is depressed by the sample material allowing the shutter to open and release a collimated gamma (X-ray) beam.

Pertinent precautions include:

- . Maintain standard radiation precautionary labeling and identification of radioisotopes.
- . Use restricted to persons given precautionary instruction.
- . Operating personnel using in a manual mode required to use provided radiation dosimetry devices.
- . Restrict placement of probe such that designed EXIT beam ($\sim 45^\circ$ angle from right side of probe) is directed away from occupied areas.
- . Governmental requirements restrict maintenance on repair, transfer, or disposal of probe containing radioisotopes only to licensed persons, such as the supplier.
- . Accountability and control of probes.
- . In the event of an unusual incident, such as loss or suspected damage, contact safety office and Company Radiological Health office.

RADIATION PROFILESDevice: PGT Model 100RP Chemical Analyzer, Remote Probe

Radioactive Source: Americium-241, 30 millicuries maximum activity, encapsulated, Amersham Corp, Model AMCL.
See notes 1 and 2 following Table III.

		Maximum Radiation Level in mR/hr				
<u>Distance in cm</u>		<u>Surface</u>	<u>12.5</u>	<u>25</u>	<u>50</u>	<u>100</u>
SHUTTER CLOSED, NO SAMPLE	Front (F)	.15	.04	.02	b	b
	Handle Side (H)	b	b	b	b	b
	Label End (A)	b	b	b	b	b
	Connector End (B)	b	b	b	b	b
	L. Side (L)	.13	.02	b	b	b
	R. Side (R)	.02	b	b	b	b
SHUTTER OPEN, SAMPLE IN PLACE	Front (F)					
	Handle Side (H)	.05	b	b	b	b
	Label End (A)	.09	b	b	b	b
	Connector End (B)	.2	.06	b	b	b
	L. Side (L)	.6	.12	.03	b	b
	R. Side (R)	1.0	.2	.09	b	b

II. INTRODUCTION

2.1 Principles of Operation

The Model 100 Chemical Analyzer performs rapid, nondestructive elemental analysis. Samples may be in liquid, solid or powder form.

The Model 100 determines the concentration of the desired element(s) and displays the result in percent, gm/cm², ppm or other units. The result of each analysis is displayed on a digital readout or LED. If a printer was purchased with the analyzer, the result of each analysis is also printed on paper tape.

The Model 100 is easily used by persons with little or no technical background: front-panel controls consisting of pushbutton switches and thumbwheels initiate analysis. Once the instrument has been set up, the operator need only change samples and note sample designations.

The Model 100 is an X-ray fluorescence analyzer. The sample is placed in a shielded enclosure and subjected to X-rays from a radio-isotopic source. The sample then emits fluoresced X-rays characteristic of the elements present. The analyzer is adjusted to "see" only the X-rays produced by the element(s) of interest. As these X-rays are detected they are converted into electronic pulses, amplified, and counted.

The analyzer is calibrated using standard reference samples whose element concentrations are precisely known.

2.2 Description

2.2.1 Panel Features and Controls

Figure 1 shows the front panel controls:

POWER ON switch--Controls AC line voltage to the analyzer.

A white light glows when power is ON.

SHUTTER switch--exposes the sample to the radioactive isotope.

The protective cover must be closed for SHUTTER operation.

A red light glows when the shutter is open.

START switch--used only in the MANUAL mode to initiate analysis.

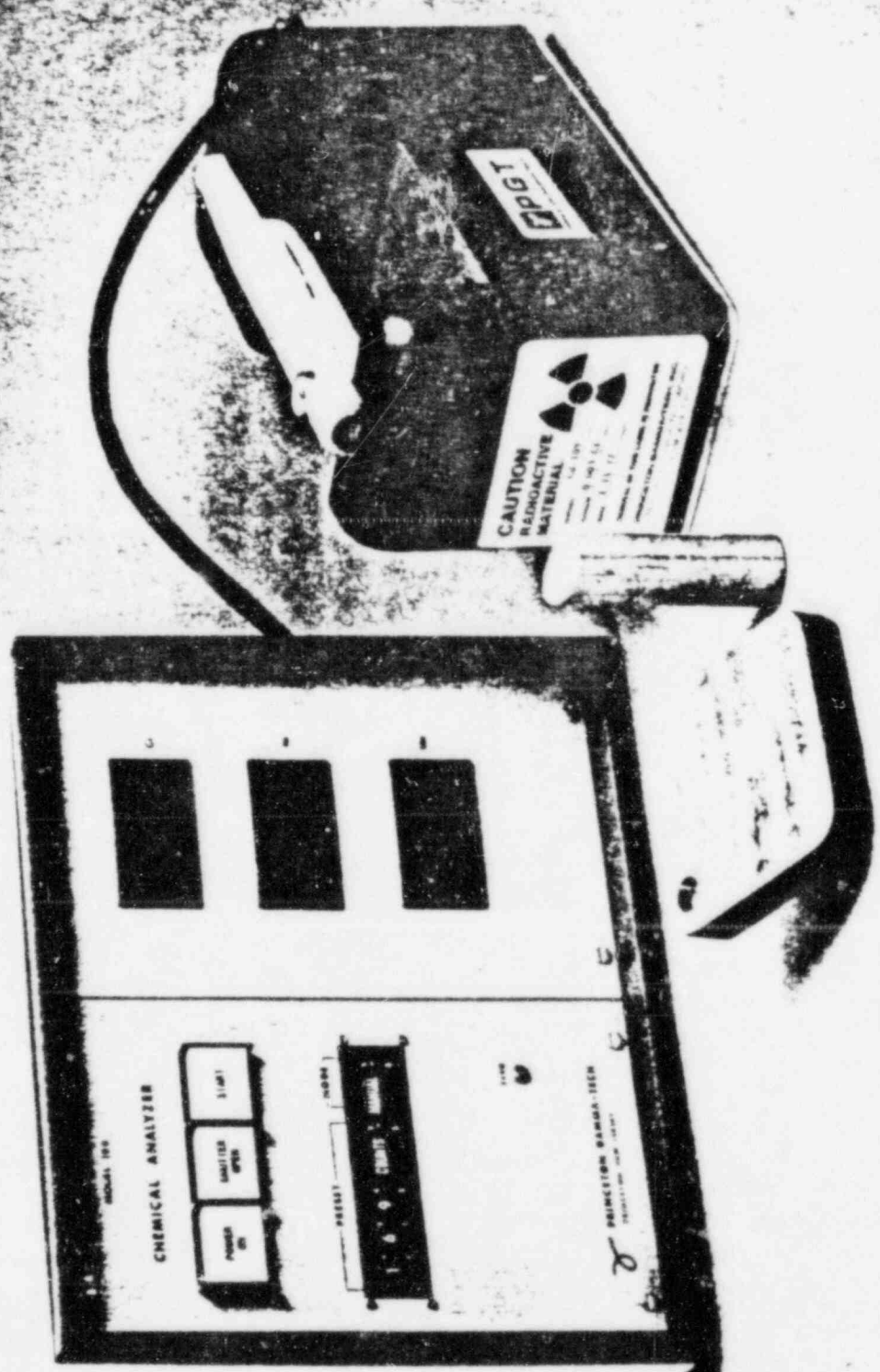
A green light glows when analysis is not in progress.

Three-digit thumbwheels--set the running time or total counts required for each analysis.

SECONDS/COUNTS switch--selects either preset time or fixed counts to terminate each analysis. The time or counts are determined by the value selected on the three-digit thumbwheels.

AUTO/MANUAL switch--used in initiating analysis. In the MANUAL mode, each analysis is initiated when the operator presses START. In the AUTO mode, analysis is initiated by pressing the SHUTTER switch. At the completion of each analysis in AUTO mode, the instrument automatically initiates a new analysis. This automatic sequence continues until the operator terminates it by

RGIT
 PRINCETON GAMMA-Tech
 805 BAY PRINCETON, N.J. 08540
 609 984-7310 • Telex 251000



Model 100 Chemical Analyzer using room temperature remote probe.

again pressing the SHUTTER switch, which closes the shutter.

ZERO--front panel screw that permits a small adjustment of the zero level.

Digital Display (s)--a $3\frac{1}{2}$ digit, LED (Light Emitting Diode) readout that displays element concentration after each analysis. The first digit on the left, the " $\frac{1}{2}$ " digit, has five possible display states: blank, +, -, 1, or '. The symbol (') represents data overflow, or a number greater than the display capability. (Explained in Section III.)

2.2.2 Sample Area and Shutter

When analysis is initiated, the shutter opens, exposing the sample to the radioactive isotope. There are two separate indications for shutter open/ close:

1. The SHUTTER switch on the front panel glows red when the shutter is open and is dark when the shutter is closed.
2. A small light on the portable probe head glows red when the shutter is open and green when the shutter is closed.