

FORM NRC-313 I (6-78) 10 CFR 30		U.S. NUCLEAR REGULATORY COMMISSION	
APPLICATION FOR BYPRODUCT MATERIAL LICENSE INDUSTRIAL		APPLICATION FOR: (Check and/or complete as appropriate) <div style="text-align: center; font-size: 1.2em; margin-top: 10px;">30-17527</div>	
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.		<div style="border: 1px solid black; padding: 2px;"> <input checked="" type="checkbox"/> a. NEW LICENSE </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> b. AMENDMENT TO: LICENSE NUMBER 03120 </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;"> c. RENEWAL OF: LICENSE NUMBER Lth 19388 </div>	
2. APPLICANT'S NAME (Institution, firm, person, etc.) P. R. Aqueduct & Sewer Authority TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION 754-3232 809		3. NAME OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION Eng. Carlos Garcia Troche TELEPHONE NUMBER: AREA CODE - NUMBER EXTENSION 754-3226 809 3230	
4. APPLICANT'S MAILING ADDRESS (Include Zip Code) P.O. Box 7066 Barrio Obrero Santurce, P. R. 00916		5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED (Include Zip Code) Laboratorio Central P. R. Aqueduct & Sewer Authority Agr. Exp. Station, Rio Piedras	
(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 (See Items 16 and 17 for required training and experience of each individual named below)			
FULL NAME		TITLE	
a.	Hector J. Acosta	Chemist	
b.	Monserate Santiago	Technician	
c.	Luzette Lago	Technician	
7. RADIATION PROTECTION OFFICER Santiago F. Gomez		Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.	
8. LICENSED MATERIAL			
LINE NO.	ELEMENT AND MASS NUMBER A	CHEMICAL AND/OR PHYSICAL FORM B	NAME OF MANUFACTURER AND MODEL NUMBER (If Sealed Source) C
(1)	Nickel-63	solid	Tracor ECD
(2)			
(3)			
(4)			
DESCRIBE USE OF LICENSED MATERIAL E			
(1)	Tracor Electron Capture Detector to be installed and used		
(2)	in a Tracor 560 Gas Chromatograph for pesticide residue		
(3)	analysis in water.		
(4)			

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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)	Electron Capture Detector	Tracor Instruments	560			
(2)						
(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)	None required with this instrument.					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10	
<input type="checkbox"/> a. CALIBRATED BY SERVICE COMPANY NAME, ADDRESS, AND FREQUENCY None required.	<input type="checkbox"/> b. CALIBRATED BY APPLICANT <i>Attach a separate sheet describing method, frequency and standards used for calibrating instruments.</i>

12. PERSONNEL MONITORING DEVICES		
TYPE (Check and/or complete as appropriate.) A.	SUPPLIER (Service Company) B.	EXCHANGE FREQUENCY C.
<input type="checkbox"/> (1) FILM BADGE <input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD) None <input type="checkbox"/> (3) OTHER (Specify): _____ 	None required.	<input 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 checked="" 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 <u>111131-0001</u> <u>Perform leak test with Tracor Wipe test kit at 6 months interval.</u>	
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. <u>Return to manufacturer Tracor Instruments Inc.</u> <u>6500 Tracor Lane</u> <u>Austin, Texas 78721</u>	

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:

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)

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)

N.E.R. (By Richard M. Lie.)

b. CERTIFYING OFFICIAL (Signature)

Carlos Garcia Torche

c. NAME (Type or print)

CARLOS Garcia Torche

d. TITLE

Chemical Engineer

e. DATE

April 17, 1980

(1) LICENSE FEE CATEGORY:

(2) LICENSE FEE ENCLOSE

225 15 30.00

CURRICULUM VITAE (RESUME)

Name:

Santiago Gómez F.

Residence and Mailing Address:

1821 Colonia St.
College Park
Rio Piedras, Puerto Rico (00921)

Tel. (809) 751-0042

Business Address:

Center for Energy and Environment Research
(CEER)
Health and Safety Division
Caparra Heights Station
San Juan, Puerto Rico (00935)

Tel. (809) 767-0350

Marital Status:

Married, 2 children

Education:

Universidad Nacional and Instituto de la Salle
Bogotá, Colombia - 1954 - 1958 (Sciences) -
B.S.

Cath. University of America - Washington -
1960 - 62 - (Physics)
M.S.

Specialization:

University of Puerto Rico
(Medical Sciences Campus) - San Juan
1972 - 1973 - (Radiological Health)
M.S.

Content of the courses:

- a) Principles of Radiation Physics and
Radiation Detection.
- b) Principles and practices of radiation
protection.

- c) Radioactivity measurement standardization and monitoring techniques and instruments.
- d) Mathematics and calculations basic to the use and measurement of radioactivity.
- e) Biological effects of radiation.

Positions held:

- Professor of physics at the School of Engineering - Univ. Industrial de Santander - Bucaramanga - Colombia - 1963 - 1971
- Teacher and coordinator of courses on applied radiation physics at the School of Medicine - Univ. Industrial Santander - Bucaramanga - Colombia - 1973 - 1974
- Professor of Radiation Detection and Radiological Health courses at the School of Medicine U.P.R., San Juan, P. R. 1974 - 1975
- Head of the Health and Safety Division, Plo Piedras Operations, Center for Energy and Environment Research 1974 up to date
- Radiological Safety Officer - V.A. Hospital - San Juan, Puerto Rico 1974 up to date (part time)
- Radiation Physics Consultant - TII Industries Inc., Toa Alta, P. R. (multicuries use of H-3 for electronic tubes production) - 1975 up to date (part time)

Experience with Radiation:

- Research on plantains and mangoes preservation by gamma radiation - PRNC - 1972

- Isodose curves mapping on a phantom exposed to a Co-60 radiation field using TLD microrods-PRNC - 1973
- The solution of a Dosimetry Problem caused by a Mercury Shutter - Published in Phy. Med. and Biol. 1976
- Radiation dose to Personnel during routine Nuclear Med. Analysis - PRNC - 1976
- Tutoring undergraduate students users of a Co-60 Irradiator (approx. 2000 Ci) - PRNC - 1975 up to date
- Radiological Health Services provided to PRNC, V. A. Hospital and TII Industries Inc., including:
 - A) Urine Analysis for H-3
 - B) Smears and surveys
 - C) Radiation Safety Inspections to X-Rays (V.A. Hosp.)
 - D) Leak Test to Co-60 Teletherapy Units (5000 Ci) Cs-137 needles and tubes (350 mCi), Sr-90 Eye Applicators (50 mCi)
 - E) Indoctrination on Radiation Protection to new personnel
 - F) Radiation detection instruments calibration.
 - G) Radwaste collection and disposal.

Membership Professional

Societies:

- Asociación Colombiana para el Avance de la Ciencia.
- Health Physics Society, P. R. Chapter
- American Association of Physicists in Medicine.

- Radiological Sciences Associates, P.R.
- Sociedad de Medicina Nuclear, P.R.
- Health Physics Society, Plenary Member

Additional Qualifications:

- a) Fellowships: UNESCO - Amsterdam -
1965 - 66

National Sciences Foundation - Rutgers
University -
Summer 1962

OAS - San Juan, Puerto Rico -
1972 - 1973

National Safety Council - Philadelphia -
1975

- b) Achievement: ERDA Safety Award to PRNC -
1975, 1976, 1977.

- c) NRC-License No. 52-17420-01 for Leak
Testing of Sealed Sources.

NEW IMPROVED LINEAR Ni63 Electron Capture Detector*

Features:

- ☐ Recorder filter provided for lowest noise operation
- ☐ Automatic zero at press of a button
- ☐ Automatic pulse height and width setting
- ☐ Linear response range greater than 20,000 to 1
- ☐ Operation with Argon Methane or Nitrogen
- ☐ Most sensitive Ni63 Electron Capture Detector available

Traditionally the Electron Capture Detector has been the most sensitive detector available for gas chromatography. While detection of low picogram levels of compounds containing an electron capturing species is possible, in the past the detector has had quantitative limits over relatively narrow linear dynamic range.

Tracor, the first to use a Nickel 63 beta emitting source in an electron capture detector, first enabled the

analyst to operate his detector well above column temperatures, effectively prolonging the life of the detector and capturing the market with truly the most sensitive, trouble-free ECD then and now.

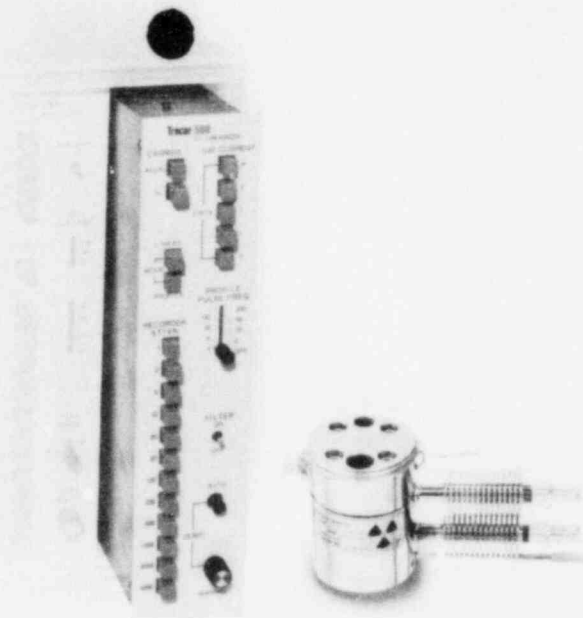
Tracor has gone one step further in overcoming the limitations of the ECD. Considering the unsurpassed performance characteristics of Tracor's Ni63 Electron Capture Detector we now can offer linearity over a range greater than 20,000:1.

Principles of Operation

In conventional operation, the electron flow which constitutes the detector output signal is induced by an electric field, either DC or pulsed at a constant frequency. In either mode, the output response follows a Beer's Law dependence on concentration, graphically a non-linear response. This

non-linear relationship, response to concentration, limits the useful range of operation to below 200:1.

The technique for greatly increasing the useful linear range of an electron capture detector has been advanced in the new version EC Linearizer. The result of a recent study, some rules have



Gas Chromatography

been established which enable the user to quickly set up the optimum parametric conditions which yield a linear response over wide dynamic range. All the utilities are available to measure the necessary detector saturation current level as well as pulsed detector profile responses, without the need for other equipment such as electrometers, etc.

Pulse height and width, major parameters in pulsed EC systems, are automatically set to the optimum value, depending on the carrier gas used.

A linear response of $\pm 5\%$ is obtainable on Argon-5% Methane carrier from 5×10^{-12} to 5×10^{-8} grams Lindane. In some cases operation to 2×10^{-7} grams Lindane within the above linearity has been achieved.

Specifications :

- | | |
|---|--|
| 1) Gas: | Argon-5% Methane or Nitrogen |
| 2) Pulse Width: | 0.75 and 4.0 microseconds, respectively |
| 3) Detector Saturation Current Range: | 0 to 1.5×10^{-9} Amp |
| 4) Frequency Range of Polarizing Pulse: | 1 to 10^6 Hertz |
| 5) Polarizing Pulse Amplitude: | 60 ± 5 volts |
| 6) Pulse Amplitude Stability: | Less than 1% variation over frequency range |
| 7) Outputs: | |
| a) Recorder: | X1, 2, . . . , 5K in steps of 1, 2, 5, or 10. Full span for 1 and 10 millivolt available. |
| b) Computer/Integrator: | 1 volt or 10 volt full scale, isolated from recorder. |
| 8) Response Range/Linearity: | $\pm 5\%$, maximum deviation from a straight line over a range of 5×10^{-12} to 5×10^{-8} grams Lindane, or equivalent, using Argon-5% Methane carrier gas. |

Modes of Operation

Argon 5% Methane

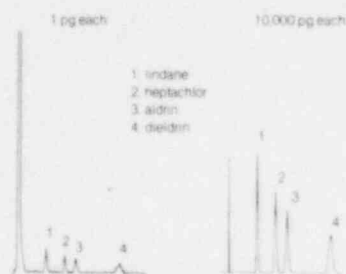


Figure 1

Sensitivity: 1 pg lindane, signal-to-noise > 5:1
Carrier gas: 60 cc/min
Purge gas: 20 cc/min
Det. temp: 300°C
Column: 6' x 4mm ID glass 3% OV-1
on 60/80 chromosorb W HP
Column temp: 210°C

Nitrogen

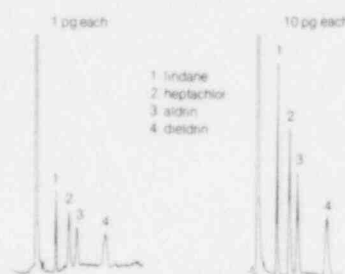


Figure 2

Sensitivity: 1 pg lindane, signal-to-noise > 20:1
Carrier gas: 80 cc/min
Purge gas: 20 cc/min
Det. temp: 300°C
Column: 6' x 4mm ID glass 5% OV-1
on 60/80 chromosorb W HP
Column temp: 240°C

DATCO INCORPORATED

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