NRC Form 313 I (12-81) 10 CFR 30

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

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.

1. APPLICATION FOR: *(Check and/or complete as appropriate)*

	a. NEW LICENSE
	b. AMENDMENT TO: LICENSE NUMBER
X	c. RENEWAL OF: LICENSE NUMBER 37-17110-02

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*

D'Appolonia Consulting Engrs., Inc.

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION

412-243-3200 X415

3. NAME AND TITLE OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION

Richard M. Burke

TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION

412-731-8806

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)

10 Duff Road
Pittsburgh, PA 15235

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*

5103 Old William Penn Hwy.
Export, PA 15632

(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.	Richard M. Burke	Laboratory Director
b.	John J. Duck	Technical Director
c.	Kenneth Bird	Group Leader

7. RADIATION PROTECTION OFFICER

Richard M. Burke

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.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	C NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	Nickel 63	Metal Foil in Sealed Detector	New England Nuclear NER-002	15 millicuries
(2)			Nuclear Rad. Dev. Corp. N1001	15 millicuries
(3)	Nickel 63	Sealed coated Cell	Hewlet Packard 19313	15 millicuries
(4)				

	E DESCRIBE USE OF LICENSED MATERIAL
(1)	For use in gas chromatographs as a radioactive source for electron capture
(2)	detectors.
(3)	
(4)	

12435

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 cell	Perkin Elmer	009-0282
(2)	Electron capture detector cell	Hewlett Packard	1930-60550
(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)	Geiger Counter	Victoreen, Inc.	491	1	Alpha, Beta, Gamma	800cpn/200m Rad
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☒ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

Victoreen, Inc., 6 mos.
10101 Woodland Ave.
Cleveland, OH 44104

☐ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☐ (1) FILM BADGE ☐ (2) THERMOLUMINESCENCE DOSIMETER (TLD) ☒ (3) OTHER (Specify): Wire Tests are performed at 6 mos. intervals.	Nuclear Sources and Services, Inc. P.O. Box 34042 Houston, TX 77034	☐ MONTHLY ☐ QUARTERLY ☒ OTHER (Specify): 6 mos.

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

☒ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.
☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

Any detectors disposed of will be returned to Nuclear Sources and Services, Inc.

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.

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)

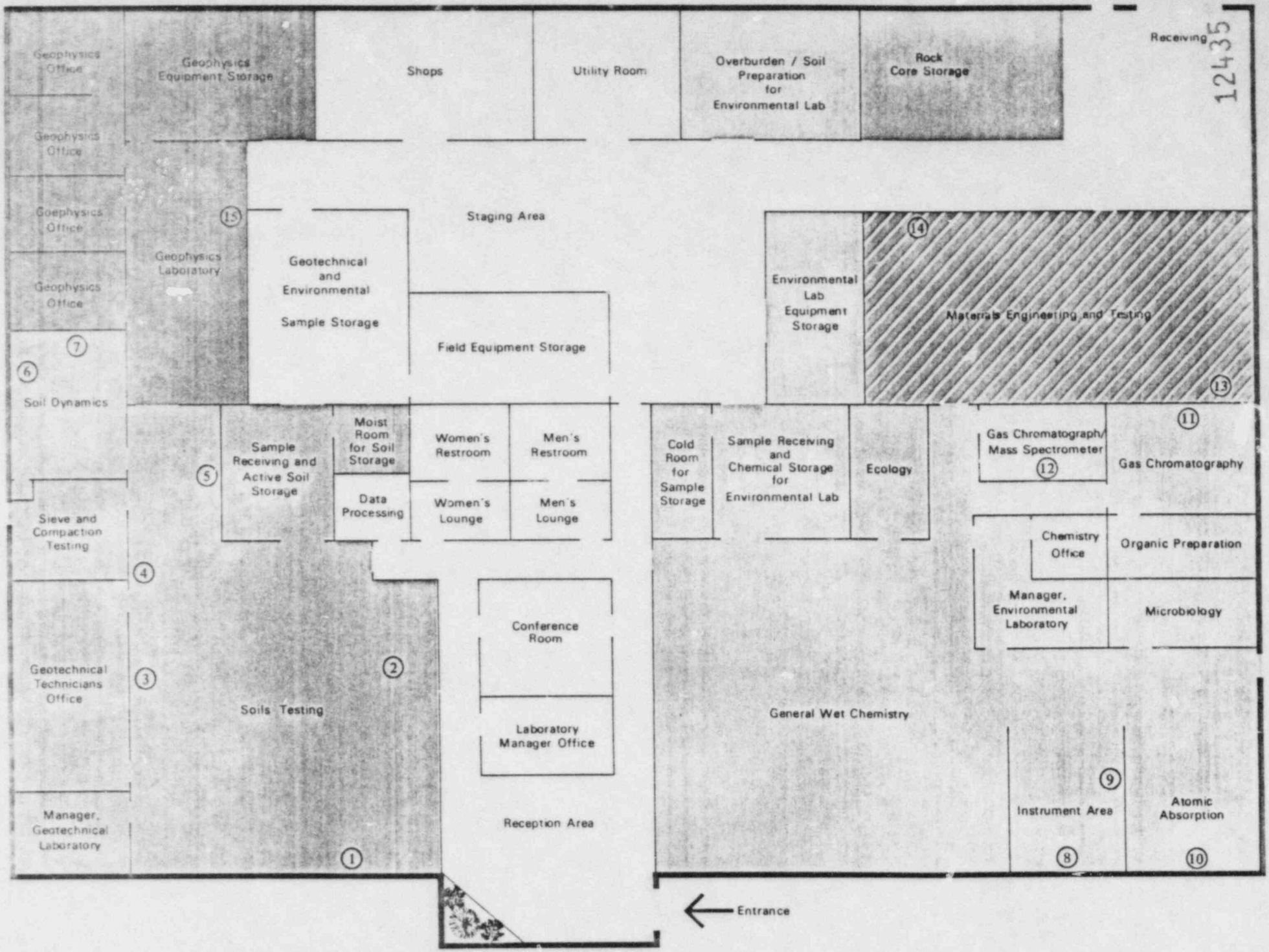
The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true 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)*	b. CERTIFYING OFFICIAL *(Signature)* David E. Troxell
	c. NAME *(Type or print)* David E. Troxell
(1) LICENSE FEE CATEGORY:	d. TITLE Vice President
(2) LICENSF FEE ENCLOSED: $	e. DATE August 30, 1982

NRC FORM 313 I (12-81)

GPO 886-426



Item 13

PLAN OF LABORATORY

Item 15 - Radiation Protection Program

The D'Appolonia Laboratory program includes the following aspects of radiation protection:

- Radiation Safety Officer conducts wipe tests on a semi-annual basis. Wipe tests are supplied by Nuclear Sources and Services, Inc. A copy of Kit LT-1 directions are enclosed with this submittal.
- Sealed source detectors are vented to the outside away from personnel working in the organics section of the laboratory.
- Routine maintenance is performed on instruments and detectors.
- Radiation monitoring is performed routinely with precalibrated equipment.
- The Radiation Safety Officer works in conjunction with the Technical Director and Group Leader in helping to detect and correct potentially unsafe conditions in organics laboratory.

LEAK TEST SERVICE FROM NSSI

Our computerized sealed source leak test service is now available. Economical and convenient to use, the test kits are designed to help you comply with the regulations of the U.S. Nuclear Regulatory Commission and of the Agreement States.

THE TEST TAKES ONLY MINUTES FOR YOU TO PERFORM, ELIMINATING THE EXPENSE OF HAVING A CONSULTANT COME TO YOUR SITE.

Each test kit is mailed to you with complete instructions and all the materials you will need to leak test your source. When you complete the test, return the sample to us for assay.

THE INTEGRITY OF YOUR SOURCES IS ASSURED BY OUR ANALYSIS.

Our assay techniques will detect any alpha, beta or gamma emitting radionuclide at levels of less than .0001 microcurie. If the analysis of your sample indicates removable contamination below .005 microcurie, we will issue a certificate for your source. In the event the removable activity is greater than .005 microcurie, we will notify you immediately. If needed disposal, decontamination or other consulting services can be provided.

OUR COMPUTER SERVICE ENSURES TIMELY DELIVERY OF THE KITS EVERY SIX MONTHS.

The kits may be ordered as needed or at prescheduled dates. Once added to the service you will automatically be sent the required number of kits during the month prior to the leak test due date. There is no charge for the kits until they are returned for assay.

ASSAY CHARGES ARE:

1 kit	$ 20.00 each
2-5 kits	15.00 each
6-19 kits	10.00 each
20-50 kits	8.00 each
51-100 kits	6.50 each
over 100 kits	5.00 each

To place your order or if you have any questions, please write or call us,

NUCLEAR SOURCES & SERVICES, INC.
BOX 34042
HOUSTON, TEXAS 77034
(713) 641-0391

NSSI Sealed Source Leak Test Kit
LT-1 Directions

This kit is designed for use with beta emitting sources which can be safely handled behind a plastic shield, or low level gamma sources where the total radiation exposure to the whole body during the wipe test procedure is calculated not to exceed 5 milliroetgens. The kit consists of (2) pieces of filter paper in separated plastic envelopes and (1) packet of detergent powder.

CAUTION

1. Beta sources in excess of 1mc should be handled with 12" tweezers or forceps and the smear test performed behind a plastic shield with a minimum thickness of 3/8". Rubber gloves should be worn to help minimize the dosage to the hands, and to avoid contamination in case the source is leaking.
   All accessible surfaces of the source should be thoroughly wiped, taking special precautions to avoid puncturing any thin windows. Always keep the source at a maximum distance from you and never expose yourself to the direct rays of the source.
   In special cases where the source is permanently fixed into a system, the closest and most easily accessible surface, such as conical port, source housing, etc., may be taken as the smear area.

2. Gamma sources can be smeared by this method if by calculation it is shown that the whole body exposure will not exceed 5 milliroentgens. This test can be easily accomplished on Co-60 sources up to 40mc and Cs-137 sources up to 150mc. The time required for a smear should be determined by going through a "dry run". Always use tongs, tweezers, forceps, or handles with a minimum length of 12". Always work with your hands fully extended to reduce the potential radiation to the whole body.
   In special cases where a source is permanently fixed into a system, the closest and most easily accessible surface, such as conical port, source housings, etc., may be taken as the smear area.

   To Perform Test:

   1. Dissolve detergent powder in 10 ml water and lightly moisten the filter paper in envelope No. 1.

   2. Thoroughly wipe all accessible surfaces of the radioactive source.

   3. Allow the paper to dry, return it to its envelope and seal closed with scotch tape.

   4. Use the paper in envelope No. 2 to dry the source, place it back into its envelope and seal with scotch tape. The paper in envelope No. 2 will be counted only if results are positive on sample No. 1.

   5. Forward these envelopes to NSSI.

   6. Important! If possible, survey the wipe tests with a portable geiger counter or radiation monitor before mailing. If levels are in excess of twice background, call NSSI immediately.

NSSI Sealed Source Leak Test Kit
LT-2 Directions

This kit is designed for use with gamma emitting sources such as those used in radiography and is intended for use where smearing of the source capsule is impractical because of the potential radiation hazard to the person performing the smear. A smear is taken of the inside surface of the source container, housing well, etc. The kit consists of two wood rods with absorbent cotton tips, plastic envelopes, marked No. 1 and No. 2 and a packet of alconox powder.

CAUTION

1. Gamma sources of high intensity must be handled carefully and quickly, especially when out in the open air. A convenient time to make this smear test is obviously when and if the source is being used outside the container.

2. If this is not possible, arrangements must be made for having a shielded area to place the source during the smear test. For a temporary installation the use of a lead or steel brick or concrete blocks is considered acceptable.

3. A high range survey instrument should be available to perform surveys to assure that the source is in a shielded position while performing the test.

12435

4. The smear test should be planned so that the radiation exposure to the person performing the test does not exceed 5 milliroentgens.

5. The following table should be used as a guide in establishing both distance and shielding requirements for erecting temporary shields.

Thickness (in.) Required To Reduce Radiation By A Factor Of (2)
r/hr/curie

	Lead	Steel	Concrete	1ft.	8 ft.	16 ft.
Cobalt 60	0.49	0.87	2.7	14.5	0.23	0.06
Cesium 137	0.25	0.68	2.1	4.2	0.07	0.016

Example of Use: A one curie cobalt 60 source removed to a distance of 8 ft. would result in a radiation rate of 230 mr/hr. Assuming the source was exposed for 5 minutes then the potential exposure might be 230 mr x 5/60 or approximately 19 mr (in 5 minutes). To further reduce this radiation level, you would have to add:

½" lead to get down to 9.5 mr, another ½" lead to get down to 4.8 mr.

6. Care must be taken in choosing the location of a temporary shield to avoid the possibility of excessive radiation levels in floor areas above and below the working area.

To Perform Test

1. Remove the source from its container and place it in a shielded area.

2. Prepare a solution of detergent by dissolving in 10 ml of water.

3. Remove rod No. 1 from its envelope, moisten it in the detergent and thoroughly smear the area of the source container that was in intimate contact with the source capsule.

4. Allow the smear to dry and return it to its envelope without permitting the cotton swab to touch the outside of the envelope. Seal the envelope with scotch tape.

5. Repeat the test with the rod taken from envelope No. 2. Return it to its envelope and seal with scotch tape. The rod in envelope No. 2 will be counted only if results are positive on sample No. 1.

6. In those cases where it is impractical to remove a permanently fixed source from a special container, it is acceptable to make the smear on an accessible area adjacent to the source. One example of such an area would be inside a conical beaming port. The source should be kept closed while smearing the area.

7. For leak test on radiographic, teletherapy, and level gage sources, special precautions must be taken to avoid personnel exposure.
   a) Radiography sources: For radiographic sources, wipe at the nearest accessible point to the source when the source is in the storage position. For example, on cable type sources, wipe the inner part of the safety coupling or source exit hole. For panaramic devices where the source does not leave the shield, make sure the source is in the stored position. Survey the device to be absolutely sure there is no exposure. Wipe the surface of the device at the source loading position or at the coupling point of the drive control unit.
   b) Teletherapy sources: For leak testing of teletherapy sources, wipe the device shield at the point where the source is normally loaded. If in doubt, refer to the design drawing of the device to locate the source loading area. Under no circumstance are you to disassemble the device to leak test the source.
   c) Level gages: This device again is a sealed unit. By referring to the device drawing, determine where the source would be loaded into the device. Wipe this surface on the level gage shield throughly. DO NOT under any circumstance attempt to disassemble device to leak test source. If, however, the level gage is so designed that an access port is available to the source by following instructions on the manufacturer's device design a leak test directly on the source is possible. Follow directions carefully. Expose source, do not remove from device. Wipe the source and reassemble device to original condition.

8. Important! If possible, survey the wipe tests with a portable geiger counter or radiation monitor before mailing. If levels are in excess of twice background, call NSSI immediately.

Nuclear Sources & Services, Inc.
P. O. BOX 34042
HOUSTON, TEXAS 77034
AREA CODE 713 • 641-0391

Item 16 - Formal Training in Radiation Safety

Richard Burke - Laboratory Director/Radiation Safety Officer

While completing his graduate studies at SUNY College of Environmental Science and Forestry in 1978, Mr. Burke completed courses in Nuclear and Radiation Chemistry and Nuclear Radiation Analytical Techniques which provided first-hand experience in handling radioactive materials. These courses provided training in the principles and practices of radiation protection, use of survey meters and multichannel analyzers for the detection of alpha, beta, and gamma emitting radionuclides. He also gained experience in the calculation of exposures to and concentrations of radioactive materials used in the laboratory. A section of the course dealt with the biological effects of radiation and selection of appropriate sheilding equipment and safety procedures.

John J. Duck - Technical Director, Environmental Laboratory

As a student at George Washington University, Mr. Duck completed courses in Cell Biochemistry, Instrumental Methods of analysis, and Advanced Inorganic Chemistry which provided formal training in radioactive tracer analysis techniques and radiation health physics including the principles and operation of geiger-muller and scintillation counters for radiation monitoring, the principles and procedures for the proper shielding and handling of radionuclide tracers, and the principles of operation of electron capture and other gas chromatographic detectors.

Item 17 - Experience with Sealed Source Nickel-63 Electron Capture Detectors

Richard M. Burke, Director, Environmental Laboratory

Mr. Burke has supervised analytical laboratories utilizing gas chromatographs for the past five years. He is familiar with the use of electron capture sealed source detectors and has conducted leak test programs on a semi-annual basis numerous times. Prior to assuming a management role, Mr. Burke performed analyses with gas chromatographs for approximately three years and implemented radiation monitoring programs during this period.

John J. Duck - Technical Director, Environmental Laboratory

Mr. Duck has nine years experience in the supervision and operation of gas chromatographs with sealed source Ni-63 electron capture detectors including the supervision and performance of the semi-annual leak tests required under NRC licensing.

Prior to joining D'Appolonia Consulting Engineers, Inc., Mr. Duck was the laboratory supervisor for NUS Corporation's Analytical Services Laboratory. One of Mr. Duck's responsibilities involved the supervision of the organics analysis section which included three gas chromatographs equipped with electron capture detectors to perform organochlorine pesticides and polychlorinated biphenyl analyses. Mr. Duck also performed the leak testing required under the organization's NRC Byproduct Material License.

As a research assistant at Hazleton Laboratories, Mr. Duck participated in numerous inhalation toxicology studies involving the analysis of halogenated compounds by gas chromatography using electron capture detectors. Mr. Duck has a wide range of experience in the analysis of environmental samples with particular emphasis in the use of sealed source Ni-63 electron capture detectors.

RICHARD M. BURKE

Director, Environmental Laboratory

Education

M.S., Environmental Chemistry, SUNY-College of Environmental Science and Forestry
B.S., Chemistry, LeMoyne College

Affiliations

American Chemical Society
American Society of Testing and Materials
Water Pollution Control Federation

Experience and Background

As Environmental Laboratory Director with D'Appolonia, Mr. Burke is responsible for overall management and supervision of laboratory activities. His duties include internal coordination of laboratory support for all D'Appolonia regional offices. Additional responsibilities include project review, proposal preparation, marketing or analytical services, method development, and implementation and review of quality assurance/quality control programs in the laboratory.

Prior to joining D'Appolonia, Mr. Burke worked as Field Analytical Services Manager for Kemron Environmental Services as coordinator and developer of analytical service capability for hazardous waste characterization. He also spent some time as Regional Manager at Kemron's Chicago Laboratory.

Mr. Burke was employed for two years in Milwaukee, Wisconsin, working as laboratory manager for Camp, Dresser & McKee, Inc., prior to joining D'Appolonia.

Essentially, for the past 12 years, Mr. Burke has developed and gained experience in the field of environmental chemistry as an analyst, project manager, laboratory supervisor, and laboratory director.

Publications and Presentations

D. L. Johnson and R. M. Burke, 1978, "Arsenic Speciation in Phytoplankton Blooms," 1978 Annual Meeting, American Society of Limnology and Oceanography, East Lansing, Michigan.

Mr. Burke has also authored numerous analytical reports for clients.

JOHN J. DUCK

Assistant Project Scientist

Education

B.S., Chemistry/Zoology double major, George Washington University

Continuing Education:

- Mass Spectroscopy Workshop, Spectroscopy Society of Pittsburgh
- Seminar on Approaches to Laboratory Data Management, Society for Analytical Chemists of Pittsburgh
- Seminar on Capillary Chromatography, Society for Analytical Chemists of Pittsburgh
- Utilization of Small Computers in the Laboratory, University of Pittsburgh
- Digital Electronics and Instrumentation, University of Pittsburgh
- Seminar on Applications of High Pressure Liquid Chromatography, Spectra-Physics, Inc., Mountain View, California
- Operation and Applications of Atomic Absorption Spectrophotometry, Perkin-Elmer Corporation, Norwalk, Connecticut

Affiliations

American Chemical Society
- Pittsburgh Section
- Division of Environmental Chemistry
- Division of Coal Technology

Society for Analytical Chemists of Pittsburgh (SACP)

Spectroscopy Society of Pittsburgh (SSP)

Experience and Background

Mr. Duck's background includes nine years of experience in inorganic and organic analytical chemistry with the past four years devoted to organic analysis including but not limited to gas chromatography and gas chromatography/mass spectroscopy of the U.S. Environmental Protection Agency's list of Priority Pollutants using both packed and capillary columns. Mr. Duck has served as a chairman for an environmental chemical analyses symposium of the Division of Environmental Chemistry of the American Chemical Society. His analytical and instrumental experience includes gas chromatography/mass spectroscopy (GC/MS), gas-liquid chromatgraphy with electron capture, flame ionization, nitrogen-phosphorus, flame photometric and Hall electrolytic conductivity detectors, high pressure liquid chromatography, UV and IR spectroscopy, column and thin-layer chromatography, polarography, colorimetry, and atomic absorption spectrophotometry using graphite furnace and deuterium arc background correction.

(John J. Duck)

Since joining D'Appolonia in 1980 as a staff chemist, Mr. Duck has performed or supervised the following:

- Installation and operation of the GC/MS facility in the D'Appolonia Environmental Laboratory.
- Review and interpretation of gas chromatographic mass spectrometry data and the evaluation of gas liquid chromatographic results.
- Provided technical input on proposals and capability statements.
- Laboratory certification under NIOSH's Proficiency Analytical Testing Program for organic analysis.
- Training of laboratory personnel in organic analytical techniques for sample preparation and analysis.

Prior to joining D'Appolonia in 1980, his experience included:

- The supervision and scheduling of a staff of three chemists and four laboratory technicians.
- The review and interpretation of gas chromatographic mass spectrometry data and the evaluation of gas-liquid chromatographic results.
- Automation of the identification and quantitation of multiple-peak residues of chlordane, toxaphene, and polychlorinated biphenyls (PCBs) by utilization of a programmable ROM microprocessor.
- Assisting in the development of computer programs for the identification and quantitation of the U.S. Environmental Protection Agency's Priority Pollutants list on a Finnegan 4023 gas chromatograph mass/spectrometer with a Data General INCOS NOVA 3/12 computer.
- The confirmation and quantitation of organochlorine pesticides and PCBs in industrial wastes under contract with the State of Ohio's Environmental Protection Agency.

(John J. Duck)

- The submission of a proposal and receipt of funding by the U.S. Environmental Protection Agency's Environmental Toxicology Division to study the relative carcinogenicity of coal liquefaction fuels and process wastes when compared to current petroleum-derived fuels and petroleum by-products.

- An industrial survey on the production, use, and environmental discharge of halogenated hydrocarbons for the U.S. Environmental Protection Agency's Toxic Pollutant Profiles data base.

- An environmental assessment of coal liquefaction technologies to determine likely pollutants and the treatment processes necessary for their control.

- Participation in the development of a reliable GC monitoring procedure for an inhalation toxicology study of halothene, a widely used anesthetic.

- The set-up of a gas chromatography analytical capability for the study of freon 11 and 12 in aerosol antiperspirants.

- The monitoring of vinyl chloride monomer levels in polyvinyl chloride copolymers.

- The conversion of an existing gas chromatograph from packed to open tubular wall-coated capillary columns.

Publications

Duck, J. J., C. E. Gonter, and C. A. Kralik, 1979, "Bioaccumulation of Pesticides and Polychlorinated Biphenyls by Micro-organisms and Observed Effects on Apparent Aqueous Solubilities," presented at the 178th ACS National Meeting in Washington, DC, September 9, 1979.

KENNETH J. BIRD

Technician

Education

M.S. Candidate, Industrial Environmental Health Science, University of Pittsburgh
B.S., Biology with Chemistry Minor, Indiana University of Pennsylvania
Continuing Education:
Gas Chromatography, Perkin-Elmer Corporation, Norwalk, Connecticut
Gas Chromatographic Applications for Water Quality Laboratories, U.S. Environmental Protection Agency, Cincinnati, Ohio
Mass Spectrometry Workshop, Spectroscopy Society of Pittsburgh

Affiliations

Society for Analytical Chemists of Pittsburgh

Experience and Background

During his undergraduate studies, Mr. Bird gained extensive laboratory experience in both microbiology and chemistry. His laboratory background includes bacteriology, spectroscopic analyses, gas chromatography, and wet chemical analyses. In addition to his analytical background, Mr. Bird is an experienced terrestrial and aquatic taxonomist. In addition to working at D'Appolonia, Mr. Bird is presently pursuing an advanced degree in industrial environmental health science with thesis research on trace metals in stored waters.

Since joining D'Appolonia in 1977, Mr. Bird has had extensive experience with most wet chemical analytical techniques presently being used in the environmental laboratory, including potentiometric, gravimetric, titrimetric, and spectrophotometric techniques. His instrumental analysis expertise includes gas chromatography, atomic absorption spectroscopy, total carbon analyzer, and sulfur analyzer. Mr. Bird also has performed many bacteriological and ecological analyses and has extensive experience in the field collection of water, air, soil and overburden, and ecological samples. Specific responsibilities have included:

- Compilation and editing of the Quality Assurance Manual for the environmental laboratory.

(Kenneth J. Bird)

- Development of data reduction computer programs for the atomic absorption spectrophotometer; laboratory computer operations.

- Extraction and concentration of environmental samples from drinking water, wastewater, industrial effluents, and hazardous wastes.