

FORM NRC 313 I (1-79) 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> <div style="font-size: 1.5em; font-weight: bold; text-align: center;">30-20081</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.		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">X</td> <td style="width: 50%;">a. NEW LICENSE</td> </tr> <tr> <td></td> <td>b. AMENDMENT TO LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">03120</div></td> </tr> <tr> <td></td> <td>c. RENEWAL OF LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">L &amp; H 21238</div></td> </tr> </table>		X	a. NEW LICENSE		b. AMENDMENT TO LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">03120</div>		c. RENEWAL OF LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">L &amp; H 21238</div>
X	a. NEW LICENSE								
	b. AMENDMENT TO LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">03120</div>								
	c. RENEWAL OF LICENSE NUMBER <div style="font-size: 1.2em; font-weight: bold;">L &amp; H 21238</div>								
2. APPLICANT'S NAME <i>(Institution, firm, person, etc.)</i>  Harding Lawson Associates  TELEPHONE NUMBER - AREA CODE - NUMBER EXTENSION (907) 276-8102	3. NAME OF PERSON TO BE CONTACTED REGARDING THIS APPLICATION  John R. Chambers  TELEPHONE NUMBER - AREA CODE - NUMBER EXTENSION (907) 276-8102								
4. APPLICANT'S MAILING ADDRESS <i>(Include Zip Code)</i>  624 W. International Airport Road Anchorage, Alaska 99502	5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED <i>(Include Zip Code)</i>  a. Primary gauge storage at: Anchorage 624 W. International Airport Road, AK b. Used at temporary job sites with Alaska								
(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		TITLE							
a. Steven L. Dillon		Engineering Technician							
b. Dennis N. Roe		Engineering Technician							
c. Mark R. Musial		Engineer							
7. RADIATION PROTECTION OFFICER  John R. Chambers		Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15 - Senior Engineer							
8. LICENSED MATERIAL									
LINE NO.	ELEMENT AND MASS NUMBER  A	CHEMICAL AND/OR PHYSICAL FORM  B	NAME OF MANUFACTURER AND MODEL NUMBER <i>(If Sealed Source)</i>  C						
			MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTI- VITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME  D						
(1)	Cesium 137	Sealed Source	Troxler						
(2)	Americium 241	Sealed Source	Troxler						
(3)									
(4)									
DESCRIBE USE OF LICENSED MATERIAL E									
(1)	Sealed in four* Troxler Electronic Laboratories, Inc. Model 3411 B and 2401								
(2)	surface gauge, which will be used to measure the moisture and density of								
(3)	engineering materials.								
(4)									

8507170687 850523  
 REGS LIC30  
 50-21238-01 PDR

Applicant	6412
Check No.	810-34
Amount	
Type of License	application
Date Checked	
Received By	Jachon

13410

## 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)	Portable Moisture-Density Gauge	Troxler Electronic Lab, Inc.	2401 or 3411B
(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)	N/A					
(2)						
(3)						
(4)						

## 11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

N/A

☐ b. CALIBRATED BY APPLICANT

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

N/A

## 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	Radiation Detection Company P. O. Box 1414 Sunnyvale, California 94088	MONTHLY
<input type="checkbox"/> (2) THERMOLUMINESCENCE DOSIMETER (TLD)		XX QUARTERLY
<input type="checkbox"/> (3) OTHER (Specify): _____ _____ _____		OTHER (Specify): _____ _____ _____

## 13. FACILITIES AND EQUIPMENT (Check where 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.

See Example Sketch

☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

## 14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

Source will be returned to the manufacturer

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.

See attached R.P.P. Document

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.

See attached photo  
copies of individual  
training certificates

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 radionuclides and maximum activity of each used.

See attached individual resumes

## 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)

\$110.00

(1) LICENSE FEE CATEGORY: 3-L

(2) LICENSE FEE ENCLOSED: \$ 110.00

b. CERTIFYING OFFICIAL (Signature)

NAME (Type or print)

John R. Chambers

d. TITLE

Senior Engineer/Radiation Protection Officer

e. DATE

10-27-82

October 18, 1982

Attachment to Form NRC-3131 (1-79) 10CFR30

Harding Lawson Associates  
624 West International Airport Road  
Anchorage, Alaska 99502

Continuation of Item 6:

d.	— Daniel G. Boots	Engineering Technician
e.	— John C. Herron	Engineering Technician
f.	— Pete J. Ondra	Geologist
g.	— Randy R. Ross	Senior Engineer
h.	— Jay M. England	Vice President

JOHN R. CHAMBERS

Senior Engineer

Mr. Chambers supervises field investigations and performs office engineering related to geotechnical assignments in Alaska and he is responsible for technical development of field equipment. Project experience includes remote site investigations for marginal and sporadic permafrost conditions.

EDUCATION

Graduate study, engineering/science management, University of Alaska  
B.T., Civil Engineering, Oregon Institute of Technology - 1975  
A.E., Highway Engineering Technology, Oregon Technical Institute - 1967  
U.S. Army Topographic Survey School, distinguished graduate - 1969

EXPERIENCE

1977 - present: Harding Lawson Associates  
1976 - 1977: U.S. Bureau of Land Management  
1972 - 1975: Dortch-Gresdel & Associates  
1969 - 1971: U.S. Army  
1968 - 1969: U.S. Forest Service  
1966 - 1967: Medford Corporation

REPRESENTATIVE PROJECTS

Native Village Land Selection Surveys, Mid Yukon Area, Alaska - Used airborne control method with auto-tape systems. Party chief responsible for project planning, logistics, survey techniques, equipment and personnel needs. Supervised three professionals and seven to ten technicians and aides, and coordinated efforts of 16-man survey party, conducted final review of required computations and field note preparation.

Designer, Project Technician and Construction Inspector, Oregon - Streets, roads, water and sanitary sewer systems, hydrology and drainage facilities and dam design. Performed various tasks in soils, concrete and asphalt laboratory.

Foundation Systems, Barrow, Nome, and Unalaska, Alaska - Inspection and instrumentation for foundation systems for Barrow High School, Northwest Community College buildings, and Dutch Harbor Dock Facility.

Reconnaissance Investigations, National Petroleum Reserve, Alaska - Project manager of study providing consulting services and laboratory testing tasks to major oil company.

STEVE L. DILLON  
Engineering Technician

Mr. Dillon has eight years of construction inspection, soils and materials testing and land surveying experience. He has served as a field technician on road and bridge construction projects responsible for a variety of tasks including inspection to meet contract specifications, maintenance of daily work diaries, issuing change orders, and analysis of soil and concrete samples on site.

EDUCATION

University of Montana - 1971-1973

EXPERIENCE

1982 - present: Harding Lawson Associates  
1978 - 1982: U.S. Forest Service  
1975 - 1977: Ninneman Engineering  
1974 - 1975: U.S. Navy

REPRESENTATIVE PROJECTS

Mr. Dillon is responsible for extensive laboratory testing of frozen and unfrozen soil samples obtained during most of Harding Lawson Associates' field investigations. He is experienced with primary testing (moisture, density, Atterberg limits, compaction, conductivity) and secondary testing (triaxial compression and thaw consolidation) of soil samples.

Junior High School, Eagle River - Field engineering technician responsible for quality control testing and inspection during construction of a major school complex development project for the Anchorage School District.

John R. Chambers - Page Two

Foundation Investigations and Design, McGrath and Aniak - Projects manager for studies in permafrost and unfrozen soil conditions for variety of school districts.

Housing Projects, Kotzebue, Bethel, and Dillingham - Project manager; foundation investigation and design in marginal and sporadic permafrost conditions; performed for various regional housing authorities.

MEMBERSHIPS

Alaska Society of Professional Land Surveyors  
American Society for Testing and Materials  
American Society of Civil Engineers

DENNIS N. ROE

Engineering Technician

Mr. Roe provides testing, inspection and construction observation services on field engineering assignments in Alaska. He is also experienced in laboratory testing of soils and has performed primary testing (density, Atterberg limits, density compaction, moisture, conductivity) and secondary testing (triaxial and thaw consolidation) in Harding Lawson Associates' Anchorage laboratory.

EDUCATION

Graduate Studies, Arctic Engineering, University of Alaska  
B.S., Soil Science, University of Wisconsin - 1980

EXPERIENCE

1981 - present: Harding Lawson Associates  
1980 - summer: Department of Natural Resources Officer, Wisconsin  
1979 - summer: State of Wisconsin, Law Enforcement Intern

REGISTRATION

Private pilot license #395548395  
SCUBA open water certified

REPRESENTATIVE PROJECTS

Gambel Street Sewer, Anchorage - Field engineering technician responsible for observation and testing during construction for the Municipality of Anchorage.

Beltz Life Saving Facility, Nome - Provided field engineering observation during investigation for a swimming pool located in permafrost zone for the State of Alaska.

Duck Island Development Project, Prudhoe Bay - Performed extensive testing of frozen soils for thaw consolidation and strength parameters on samples collected for Exxon Company, U.S.A.

Analysis of Fill Materials, North Slope - Performed cyclic freeze-thaw strain measurements on fill materials in laboratory cold room.

## MARK R. MUSIAL

### Engineer

Mr. Musial is experienced with site investigations and large engineering and planning studies for projects in an arctic environment. He is familiar with the geotechnical problems unique to permafrost soils, laboratory operations, and computer analysis.

### EDUCATION

Graduate Study, Arctic Engineering, University of Alaska  
M.S., Geotechnical Engineering, University of California, Berkeley - 1981  
B.S., Civil Engineering, University of California, Berkeley - 1980

### EXPERIENCE

1981 - present: Harding Lawson Associates  
1978 - 1980: Navy Energy Environment Support Activity, Port Hueneme,  
(summers) California

### REGISTRATION

Engineer-in-Training, California

### REPRESENTATIVE PROJECTS

Duck Island Development Project, Beaufort Sea, Alaska - Project engineer. Responsible for supervising production of report for comprehensive gravel island study. Developed soil profiles and provided reduction of extensive laboratory test data and preliminary sheet pile design leading to development of project parameters for Exxon Company U.S.A.

Port of Nome Facility - Field engineer during onshore soils investigation and ground temperature data collection for causeway and port facilities. Assisted with over-ice soils investigation for the City of Nome.

Kodiak Water and Sewer Line, Kodiak - Served as assistant project manager and field engineer for preliminary soils investigation for extension of system; developed soil profiles and engineering recommendations for the Kodiak Island Borough.

Near Island Bridge Road, Kodiak - Field engineer during soils investigation for alternate route for the State of Alaska Department of Transportation and Public Facilities.

Big Lake Reservoir Expansion, Prudhoe Bay - Served as project manager and supervised field investigation and laboratory testing program for design for Sohio Petroleum Company.

Source Emissions Testing, Camp Lejeune, Jacksonville, North Carolina - Performed particulate sampling and sample recovery at stack outlet and cyclone inlet, including equipment set up, for source emissions testing for Naval Facilities Engineering Command, U.S. Marine Corps.

Office Building and Apartment, King Cove - Served as project manager and supervised field investigation and laboratory testing program for design for King Cove Village Corporation.

Willow Creek Mill Tailings Pond, Near Palmer, Alaska - Supervised field investigation and laboratory testing program for design for Enserch Exploration, Inc.

Water Treatment Plant Expansion, Anchorage - Served as project manager and supervised field investigation for addition of filtration and sedimentation basins for the Municipality of Anchorage.

POL Storage Tanks, Adak - Served as project manager and supervised soils investigation for design of underground storage facilities for the U. S. Naval Facilities Engineering Command.

Guardhouse, Adak - Served as project manager and supervised field investigation and laboratory testing program for design. For U.S. Naval Facilities Engineering Command, San Bruno.

#### MEMBERSHIPS

American Society of Civil Engineers  
National Society of Professional Engineers

#### PUBLICATIONS

"The New Austrian Tunneling Method", California Engineer, vol. 59, no. 1, October, 1980.

"Hot Dry Rock", California Engineer, vol. 59, no. 1, March 1981.

PETER J. ONDRA

Geologist

Mr. Ondra has been active in supervising the field geology on projects for Harding Lawson Associates throughout the state of Alaska. Mr. Ondra is a native of Fairbanks who has gained professional experience providing field sampling, laboratory analysis and supervision of geologic field investigations in Alaska.

EDUCATION

B.S., University of Wisconsin - 1980

EXPERIENCE

1980-Present: Harding Lawson Associates

1976-1979 (summers): Core Laboratories, Inc.

REPRESENTATIVE PROJECTS

Duck Island Development, Beaufort Sea, Alaska - Field geologist conducting offshore field exploration on drilling barge over extensive area of Beaufort Sea. Supervised a crew in overwater drilling, sampling, and thermistor installation for gravel island sites, submarine pipelines, and seismic verification for Exxon Company, U.S.A.

Foundation Investigation for Pipeline Bridge, Kuparuk River, Alaska - Responsible for supervision of field geology activities for Sohio Construction Company.

Road Improvement, Homer - Supervisor for field investigation, drilling, map making; assisted with report preparation for the State of Alaska, Department of Transportation and Public Facilities.

Foundation Investigation, Anchorage - Supervisor of field investigation, drilling, mapping for administration/classroom building for the University of Alaska.

Waterflood Project, Prudhoe Bay - Performed test hole drilling of muck pile and borrow sites during causeway foundation investigation; on-ice drilling required for ARCO Oil and Gas Company.

Conductor Hole Investigation, Island in Beaufort Sea, Alaska - Field geologist for inspection of 80-foot hole in permafrost for Exxon Company, U.S.A.

Sampling and Drill Cores, North Slope and Cook Inlet - Core Sampling, analysis involving lithographic changes, gas saturation, fluid amount and contents; performed for major petroleum companies.

Barrow Utility System, Barrow - Supervised extensive field exploration during drilling in permafrost, ice-rich soil for a buried utility system which includes submarine waterlines, a sewage treatment plant and pump stations for North Slope Borough.

Weather Station, Kodiak - Field geologist responsible for drilling and site coordination for the State of Alaska, Department of Transportation and Public Facilities.

Bragaw Street Extension, Anchorage - Provided field geology during investigation for the State of Alaska, Department of Transportation and Public Facilities.

Junior High School, Eagle River - Supervisor of field geology, drilling during foundation investigation for the Anchorage School District.

Telephone Utility Wire Center, Girdwood - Responsible for supervision of field investigation for the Municipality of Anchorage.

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

DENNIS ROE

of

HARDING, LAWSON, & ASSOCIATES

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.,  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

SUBJECTS INCLUDED IN THIS COURSE WERE AS FOLLOWS:

## Radiological Safety

- |  |   |
|--|---|
| 1. Principles and practices of radiation protection.                               | 5. Radioactivity measurement standardization and monitoring techniques and instruments. |
| 2. Leak testing procedures.  | 6. Accident and incident procedures.  |
| 3. Mathematics and calculations basic to the use and measurement of radioactivity. | 7. Procedures for nuclear gauge storage and transportation.                             |
| 4. Biological effects of radiation.  | 8. General safety precautions.  |

## Gauge Operation

- |                         |                      |
|-------------------------|----------------------|
| 1. Instrument theory    | 4. Field application |
| 2. Operating procedures | 5. Gauge calibration |
| 3. Maintenance          |                      |

W. F. Troxler  
INSTRUCTOR

10/12/82

DATE

W. F. TROXLER

PRESIDENT

N<sup>o</sup> 00832

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

STEPHEN DILLON

of

Harding & Lawson Associates

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

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## Gauge Operation

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INSTRUCTOR

5/4 5 6 /82  
DATE

W. F. TROXLER  
PRESIDENT

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

MARK R. MUSIAL

of

HARDING, LAWSON, & ASSOCIATES

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

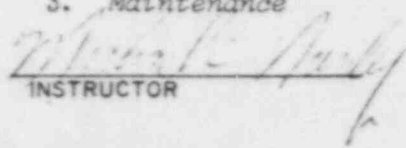
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INSTRUCTOR

10/12/82

DATE

W.F. TROXLER

PRESIDENT

No 00834

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

John R. Chambers

of

Dortch-Gresdel & Associates

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

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## Gauge Operation

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Daniel R. Howe  
INSTRUCTOR

August 1 & 2, 1974  
DATE

William F. Troxler  
PRESIDENT

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

DAN BOOTS

of

HARDING, LAWSON, & ASSOCIATES

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

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## Gauge Operation

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| 3. Maintenance          |                      |

Michael R. Gandy  
INSTRUCTOR

10/12/82

DATE

W.F. TROXLER

PRESIDENT

No 00835

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

JOHN C. HERRON

of

HARDING, LAWSON, & ASSOCIATES

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

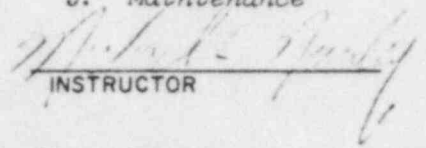
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## Gauge Operation

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| 3. Maintenance          |                      |

  
INSTRUCTOR

10/12/82  
DATE

W.F. TROXLER  
PRESIDENT

No 00831

# TROXLER ELECTRONIC LABORATORIES, INC.

HEREBY CERTIFIES THAT

PETER J. ONDRA

of

HARDING, LAWSON, & ASSOCIATES

HAS SUCCESSFULLY COMPLETED THE TROXLER ELECTRONIC LABORATORIES, INC.  
TRAINING COURSE FOR THE USE OF NUCLEAR TESTING EQUIPMENT.

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INSTRUCTOR

10/12/82

DATE

W.F. TROXLER

PRESIDENT

Nº 00833

JAY M. ENGLAND

Principal Engineer

Mr. England has extensive experience as supervisor and manager of large engineering and planning studies, site investigations and construction projects. He is an experienced arctic engineer and has developed special skills for solving geotechnical problems unique to permafrost soils. He established HLA's Anchorage office in 1969; under his direction the office has grown steadily in clientele and technical expertise. Mr. England is also a Vice President of HLA and serves as a director of the corporation.

#### EDUCATION

Graduate study, engineering management, University of Alaska  
B.S., Civil Engineering, Pennsylvania State University - 1959  
B.A., Business Administration, Pennsylvania State University - 1953

#### EXPERIENCE

1962 - present: Harding Lawson Associates  
1959 - 1962: U.S. Forest Service, Deschutes National Forest, Oregon  
1953 - 1957: U.S. Navy, Lieutenant, Sixth Fleet

#### REGISTRATION

Civil Engineer - Alaska, California  
Land Surveyor - Alaska, Oregon

#### REPRESENTATIVE PROJECTS

As a Principal Engineer for HLA, Mr. England has been responsible for senior project management and has authored or coauthored comprehensive geotechnical reports for hundreds of Alaska projects ranging from complex industrial facilities to remote village schools. Representative projects managed by Mr. England include the following:

Upper Mahoney Lake Hydroelectric Project, near Ketchikan - Soil and geologic reconnaissance for lake tap, tunnel and power plant for Corps of Engineers, Alaska District.

Alaska Railroad Car Slip Relocation, Whittier - Foundation investigation and design in near shore environment for driven pile support of heavy trestle bridge for Earl and Wright, structural engineers.

Geotechnical Hazards Assessment Study, Anchorage - Area wide study to inventory, map and analyze seismic and non-seismic natural hazards throughout the municipality for the Department of Planning.

Near Island Bridge and Connecting Roadways, Kodiak - Feasibility study, geologic reconnaissance, investigation and foundation design for piers and abutments for a 1200-foot-long bridge for the State of Alaska DOT/PF.

Natural Gas Conditioning Facility, Prudhoe Bay - Soil and foundation investigation and design for a major industrial complex including a plant site, flare area, camp, reservoir and water intake for Ralph M. Parsons Company.

Trunk Sewer Lines, Treatment Plant and Ocean Outfall, Sitka - Soil investigation for sewer alignment and plant site; bathymetric mapping, side scan sonar and subbottom profiling for channel crossing and outfall for City of Sitka.

Schools, Churches, Community Centers, Community Colleges and Housing, (over thirty villages) arctic and subarctic Alaska - Soil and foundation investigations for buildings, water supply, wastewater disposal, roads and docks for architects, village councils, housing authorities, regional school boards and the State of Alaska, DOT/PF.

Material Site Investigations, North Slope Area between the Colville and Canning Rivers - Airphoto interpretation, geologic reconnaissance, delineation drilling and sampling, laboratory testing, mining plan preparation for Atlantic Richfield, Sohio, Exxon, Conoco and the North Slope Borough.

Feasibility Study, Roadway Corridor and Bridge Crossing, Bethel to Napakiak Road - Terrain unit mapping, geologic reconnaissance, route selection, preliminary design for the State of Alaska, DOT/PF.

Oil and Gas Exploration Drilling Sites, various permafrost and non-permafrost locations in central and western Alaska, Brooks Range, Alaska Peninsula, Bering and Beaufort Sea islands - Soil investigation, material site exploration, earthwork and foundation design for well pads, Hercules airstrips, docks, water supply, camp sites, access roads for Chevron, Union, Amoco, Sohio and Exxon.

#### MEMBERSHIPS

American Society of Civil Engineers  
Alaska Society of Professional Engineers -  
(Anchorage Chapter President, 1977)  
American Arbitration Association (Panel of Arbitrators)  
Arctic Institute of North America  
Earthquake Engineering Research Institute  
Municipality of Anchorage Geotechnical Commission (Chairman, 1979),  
1976-1982

RANDOLPH R. ROSS

Senior Engineer

Mr. Ross joined HLA in 1962, progressing from drafter and technician to senior engineer. He is experienced in arctic engineering and has performed field investigations on a variety of projects throughout Alaska. He has experience in both cold and warm permafrost regions, and in offshore drilling and sampling techniques.

#### EDUCATION

Graduate Study, Arctic Engineering, University of Alaska (continuing)  
Graduate Study, Civil Engineering, University of California, Berkeley - 1976  
B.S., Civil Engineering, Heald College, San Francisco - 1976

#### EXPERIENCE

1962- present: Harding Lawson Associates

#### REGISTRATION

Civil Engineer - Alaska

#### REPRESENTATIVE PROJECTS

Crooked Creek School - Field and office engineering during remote site investigation in discontinuous permafrost area to establish design parameters for site grading and foundations for a new school for the Kuspuks School District.

Jesse Lee Home, Anchorage - Field and office engineering during investigation for foundation and site grading for new building addition for Alaska Children's Services.

Senior Citizen's Center, Gulkana - Field and office engineering during investigation of "warm" permafrost site for self-refrigerating pile foundation design for City of Gulkana.

Nome Elementary School, Nome - Field and office engineering during investigation of an existing unstable school complex founded on degrading permafrost for Nome School District.

University of Alaska, Northwest Community College, Nome - Field and office engineering to establish parameters for grading and self-refrigerating pile design for a new community college complex.

Waterflood project, Prudhoe Bay - Field engineer responsible for investigation offshore to establish soil parameters and surface of permafrost for route selection for waterflood transport system. Performed for ARCO Oil and Gas Company.

Kuparuk Development Area Project, North Slope - Field engineer during investigation to establish soil/permafrost parameters for planning and design of new petroleum development area for ARCO Oil and Gas Company.

Flow Station III, Prudhoe Bay - Field engineer handling construction inspection and field verification of pile design lengths for ARCO Oil and Gas Company.

Niakuk III artificial island, Beaufort Sea, Alaska - Field engineer for soil investigation over-ice and construction inspection for artificial gravel fill drilling platform, offshore of Prudhoe Bay for Exxon Company, U.S.A.

Beaufort Sea Over-ice Drilling, Prudhoe Bay - Field engineer during drilling program for investigation of possible offshore lease-sale sites for U.S. Geological Survey.

Dock Facility, Dutch Harbor - Project manager handling construction inspection and monitoring of pile driving and installation of rock anchors for new dock for Boxer class container vessels for the City of Dutch Harbor.

Permafrost Degradation, Prudhoe Bay - Project manager for the investigation and monitoring of permafrost degradation resulting in ground subsidence under heated structures; performed for Sohio Petroleum Company.

Construction Inspection, Putuligayuk River, Prudhoe Bay - Project manager during installation of multi-plate river crossing for ARCO.

Alaska Gas Conditioning Facility, Prudhoe Bay - Project manager responsible for study requiring radar investigation and drilling of permafrost for 150-acre complex for Northwest Alaska Gas Company.

220-foot Communication Tower, Prudhoe Bay - Project manager responsible for pile design in permafrost for a structure able to withstand high winds and ice. Built in Fall, 1980 for Exxon Company, U.S.A.

Heat Flow Measurements, Prudhoe Bay - Project manager monitoring heat flow in foundation elements supporting raised, heated structures over permafrost for Sohio Petroleum Company.

Soil Investigations, Barrow - Investigations for major municipal structures in permafrost areas subject to very low freezing depression due to salinity of supporting soils. Performed for the North Slope Borough.

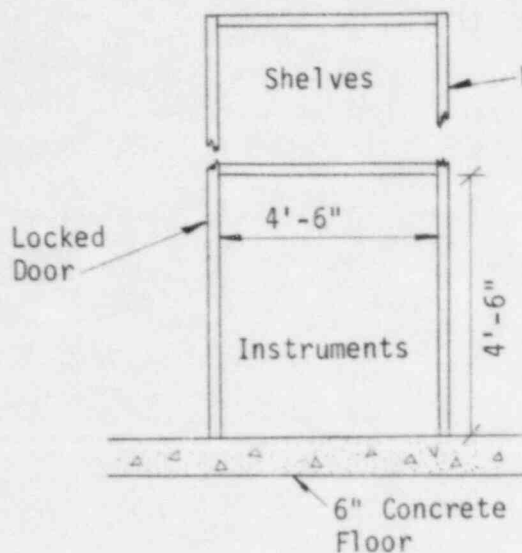
Soil Investigation and Construction Control, Prudhoe Bay - Field engineer; drilled/driven steel pipe piles crossing thawed lake bed in permafrost for ARCO.

Soil Investigations, Bethel - Performed field engineering during investigations for major structures in warm, discontinuous permafrost areas critical for foundation support for City of Bethel.

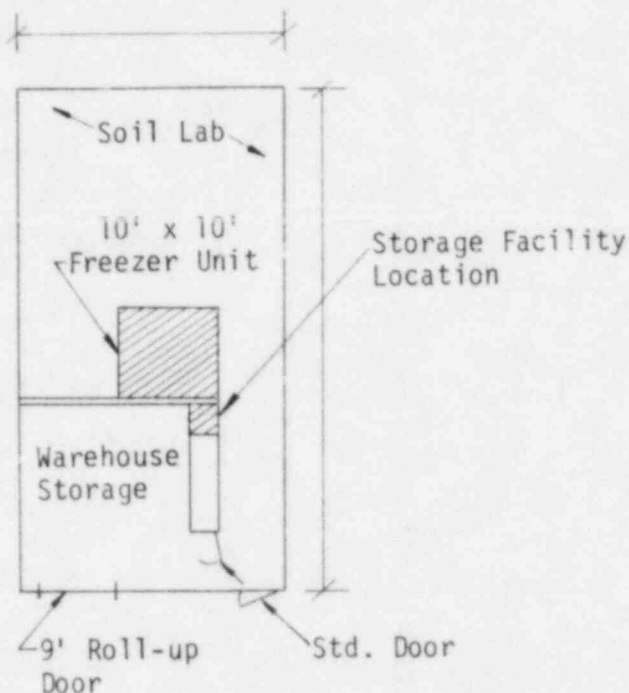
Sewer System and Sewage Treatment Pond, Naknek - Project manager; city-wide system in permafrost with outfall 400 feet into Naknek River for the City of Naknek.

MEMBERSHIPS

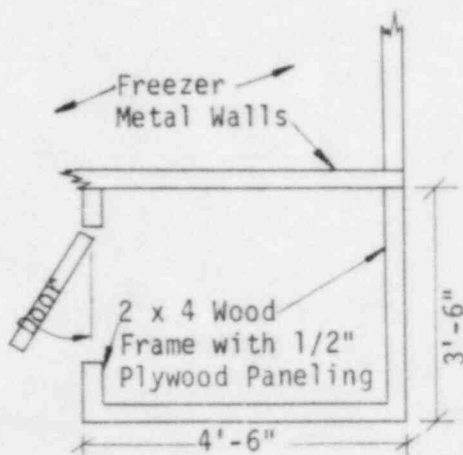
American Society of Civil Engineers  
Construction Specifications Institute  
Society of American Military Engineers



Elevation  
N.T.S.



Unit C Floor Plan  
N.T.S.



Plan  
N.T.S.



Location Plan  
N.T.S.



**Harding Lawson Associates**  
Engineers, Geologists  
& Geophysicists

## Sketch of Gauge Storage Facility

Harding Lawson Associates  
624 International Airport Road  
Anchorage, Alaska 99502

PLATE  
1

DRAWN

JOB NUMBER

APPROVED

J. R. Chambers

DATE

10/82

REVISED

DATE

13310