030-15092

NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

APPLICATION FOR MATERIAL LICENSE

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires 5-31-87

RECEIVED
NRC
1987 OCT 19 A 10:07

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [ ] A. NEW LICENSE
- [X] B. AMENDMENT TO LICENSE NUMBER 50-18441-01
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

ATLANTIC RICHFIELD CO.
ARCO ALASKA INC.
PO BOX 100360
ANCHORAGE, AK 99510 ATTN: S. DORNAN

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

ARCO ALASKA INC
PRUDHOE BAY OPERATIONS
PO BOX 100360
ANCHORAGE, AK 99510

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

SCOTT A. DORNAN

TELEPHONE NUMBER: (907) 263-8468

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time. SEE ATTACHMENT

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED. SEE ATTACHMENT

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE SEE ATTACHMENT

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS. FOR EXISTING LICENSE

9. FACILITIES AND EQUIPMENT SEE ATTACHMENT

10. RADIATION SAFETY PROGRAM SEE ATTACHMENT

11. WASTE MANAGEMENT SEE ATTACHMENT

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY 1J
AMOUNT ENCLOSED $ 60.00

13. CERTIFICATION *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR 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.

SIGNATURE—CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
C. C. Dolan	C. C. DOLAN FOR J. BRUM	acting Field Services Manager	10-10-87

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS
- [ ] <$250K
- [ ] $250K - 500K
- [ ] $500K - 750K
- [ ] $750K - 1M
- [ ] $1M - 3.5M
- [ ] $3.5M - 7M
- [ ] $7M - 10M
- [ ] > $10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence)*
- [ ] YES
- [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
Amd	Oct. 1-87	3I	8810240305 880510 REG5 LIC30 50-18441-01 PNU	

AMOUNT RECEIVED	CHECK NUMBER	DATE
$60	MM $250 46	10/23/87

70062

PRIVACY ACT STATEMENT ON THE REVERSE

Atch. for Application for Material License (amendment)

5 a. 50 mCi Americium-241/Be
b. Sealed source (Campbell Pacific Nuclear Corp. Model CPN-131)
c. Less than 5 Ci

6. Material is used as source for CPN 500-series moisture detectors. Moisture detectors are to be used in engineering inspection programs as part of the Corrosion Control Program.

7. Add as alternate to existing RSO: Al Dahlquist, graduate of Hutchison Technical Center, Hutchison, Mn. in Non Destructive Testing/Inspection. Level II radiographer for 3 years. 1984 to date--Corrosion Engineer in charge of NDT work for ARCO Alaska at Prudhoe Bay. Trained on the CPN 500-series moisture detectors by factory personnel in Dec 86. Supervises the radiation inspection programs for ARCO Alaska used for corrosion detection.

9. Neutron source will used throughout Prudhoe Bay as an engineering/inspection tool.

10. All personnel who will use the neutron gauge will receive training per the syllabus contained in CPN's TECH MANUAL TM-1, "Nuclear Operator Training Course". The course material is contained in the "Operator's Manual" for the 530 DR Hydroprobe Moisture Depth Gauge.

11. Expended and excess sources to be returned to CPN Corp., 2630 Howe Road, Martinez, Ca., 94553. Phone (415) 228-9770, TELEX 17-1289 CPN-UD.

RADIATION PRECAUTIONS

1.00 General: When used in accordance with instructions, the CPN nuclear products represent no danger to the user or to the general public.

The general public is specifically restricted from access to the device by virtue of the operating procedures, locked storage and transportation limitations, and legal restrictions imposed by licensing.

Operator protection is obtained through adequate training plus good gauge design for maximum bioshield useage.

Gamma sources are relatively easy to shield, requiring only careful design of heavy metal shielding (lead, spent uranium, tungsten, etc).

Neutron sources are very difficult to shield. Use of high hydrogen moderators may provide shielding but this is accompanied by defeat of the measurement capacity of the gauge. It is impossible to moderate the neutrons with heavy plastic shielding and still expect the ground moisture to then moderate more neutrons for measurement. Neutron shielding is further complicated in that the thermal neutrons are captured by the moderating material with a resultant emission of gamma radiation of fairly high energy.

An ideal neutron shield would be several inches of plastic for fast neutron moderation, covered over with 1/16" of cadmium sheet for thermal neutron capture, which in turn would be covered with an inch of lead to stop the resultant gammas.

Unfortunately, such a combination would be impossible to lift and no longer measure moisture.

The best radiation protection program of all is a concentrated effort at maintaining the maximum distance from the source at all times combined with expeditious use of the device. Operators should not stand unnecessarily close to the units during operation and should not carry them except by the appropriate carrying handles.

CPN constantly reviews available detectors and source materials to permit reduction in source size and reduction in external radiation levels.

1.01 Surface Gauges: Normal operation of the PORTAPROBE requires the operator to be within 2' of the gauge for a period of approximately 10 seconds per test. There is little reason to be closer than that distance nor to work longer than this period to obtain a test. It may take longer than 10 seconds to prepare the site, however, the nuclear gauge should be remote from the site at this time.

A busy day can result in 30 tests being taken.

A busy work week would include five days of this extensive testing.

If we multiply this all together:

30 tests/day x 10 seconds/test = 300 seconds or 5 minutes/day of exposure within 2'

5 days x 5 minutes = 25 minutes. This can be rounded off to ½ hour.

The average exposure level at 2' from the gauge is 0.5 MREM/HR.

½ hour x ½ MREM/HR = ¼ MREM accumulation in a busy work week with the PORTAPROBE.

Operators are allowed a weekly average accumulation of 100 MREM.

The dose to be expected from the PORTAPROBE using proper procedures is only 1/400th of the allowed dose. This is a large safety factor in the PORTAPROBE design limitations and operating instructions.

1.02 Depth Probes: The radiation from depth probes can be higher because of the work requirement of the depthprobe. Unlike the surface gauges, the depthprobes are carried around by the operator to a greater extent. The sources are the same size, and the shielding is equal, or even better, but the immediate vicinity work requirement is higher.

CPN 500 Series depthprobes are designed to be carried with a strap or handle. The source area is carried near the lower extremities or ankles.

Density depthprobes are used primarily for research and the duty cycle is not high. The use of such a gauge would be infrequent during a total year's time, and radiation accumulation will be low compared to other gauge uses.

The major depthprobe consideration will be the Model 503 HYDROPROBE for irrigation management. This unit will be used routinely, almost daily, throughout the growing season which may be all year long in some areas.

Gamma output from the HYDROPROBE is almost negligible. The Americium 241/Be source has a low energy gamma output which is not used for moisture measurement and which is shielded out internally with a small lead sheath. Gamma radiation on the surface of the HYDROPROBE is approximately 1 MREM/HR which reduces to less than 0.05 MREM/HR at 2' from the gauge.

Thermal neutron output is approximately 0.2 MREM/HR on the surface.

Fast neutron output is approximately 4 MREM/HR on the surface of the gauge as measured with an Eberline PNR-4 neutron counter.

Total gamma and neutron radiation at mid-trunk

of the human body, with the HYDROPROBE carried at the side by its handle, is approximately 0.3 MREM/HR.

The anticipated duty cycle in close proximity to the gauge is approximately 2 hours/day during a full work day. The operator will be driving part of the time, performing some paperwork functions part of the time, and trudging through the fields part of the time. We believe that the work cycle trudging through the field carrying the HYDRO-PROBE will be approximately 2 hours out of an 8 hour day.

Multiplying out:

2 hours/day x 5 days x 0.3 MREM/HR = 3.0 MREM accumulation in a week.

This is 1/30th of the allowed weekly dose.

It is important that the gauge be carried in its appropriate carrying location in the back of the vehicle at maximum practical distance from the operator, and that all use of the gauge be performed with speed.

The gauge is at its safest when the probe is in the ground in the process of taking reading. No measureable radiation is present at the gauge electronics in this operation.

GOOD RADIATION PRACTICE

Keep the curious away, but do not make such a big thing of it that people are frightened.

Replace the lock then the device is not in use and store under secure lock and key. Only licensed operators should have the key to the gauge.

Place the handle of the surface gauge in SAFE position when not in actual use.

Retract the depthprobe into its shield when not in actual use.

Do not intentionally expose any source in air.

Wear film badges routinely. Do not store them in heated environments, glove compartments, etc.

Work fast and keep distance between gauge and operator. Distance and brevity are the two best operator protective programs.

2.00 EFFECTS OF RADIATION EXPOSURE:

Radiation is not detectible by the body during exposure. It cannot be seen, heard, smelled, or felt.

Prolonged exposure will upset cell structure, however, and the body will eventually react to the insult as it would with the attack of germ cells or virus. The body defense mechanism will correct the insult or injury and will destroy any damaged cells whether from sickness or from radiation exposure.

Concentrated radiation in a short period of time is more difficult for the body to handle than is radiation spread over a longer period of time.

The Nuclear Regulatory Commission regulations allow a maximum accumulation of radiation by workers in an occupational use of radioactive materials to be 5.0 REM per year.

This reduces down to 1.25 REM/Qtr, which is a reporting level. The Radiation Safety Officer is required to report an exposure of this level to his license jurisdiction with a report on the manner in which it was received and regarding protective procedures to be taken to prevent it from happening again.

This also reduces down to 100 MREM/WK, allowing for two weeks vacation for the worker.

This is to be considered a maximum recommended tolerance level. We shall always strive to maintain accumulation as low as possible. The less radiation received, the better. We receive radiation constantly from outer space, from the buildings in which we live, from medical X-Rays, and from high energy radar and microwave emissions. Soil gauges are just one more source of energy added to the rest. We shall always strive to keep the total radiation at a minimum, however.

Exposure to radiation is relatively immeasureable in small amounts accumulated from exposure to a soil gauge under normal operating procedures.

Detection of radiation exposure is largely by observation of reported sickness symptoms, combined with observed cell count changes in a blood sample, and also combined with definite knowledge of the probability of exposure.

A change in cell count alone could occur from a cut finger as much as from exposure.

SOME TYPICAL ROUTINE EXPOSURES

Chest X-Ray	100 MREM	Live in Denver as opposed to San Francisco, about 3 times more background radiation due to higher altitude.
Tooth X-Ray	10 - 30 MREM	
Commercial jet flight San Francisco to New York	3 MREM	GI Series for ulcer couple REM !

SYMPTOMS OF RADIATION DOSES - WHOLE BODY

(Presume the following radiation exposures were obtained in a period of approximately 24 hours or less.)

(Note that the dose rates are in whole REMS. The exposure from a soil gauge under the most arduous labor conditions is only measured in MilliREMS.)

ACUTE DOSE - REMS	PROBABLE EFFECT
0 - 50	No obvious effect, except some possible blood count changes.
80 - 120	Vomiting and nausea for about 1 day in 5 to 10% of exposed personnel. Fatigue but no serious disability.
130 - 170	Vomiting and nausea for about 1 day, followed by other symptoms of radiation sickness in about 25% of personnel. No deaths anticipated.
270 - 330	Vomiting and nausea in nearly all personnel on first day, followed by other symptoms of radiation sickness. About 20% deaths within 2 - 6 weeks.
400 - 500	Vomiting and nausea in all personnel on first day, followed by other symptoms of radiation sickness. About 50% deaths within 1 month, survivors convalescent for about 6 months
Note:	Deaths would most likely be from some sickness that the body would normally have thrown off. A cut finger turns into blood poisoning, a cold turns into pneumonia. The body defense mechanism is so busy taking care of damaged cells from radiation that it is unprepared to fight off the other normal insults that occur to the body from day to day. Intensive care in a hospital in a germ-free atmosphere would reduce fatalities greatly.
550 - 750	Vomiting and nausea in all personnel within 4 hours after exposure, followed by other symptoms of exposure. Up to 100% deaths, any survivors convalescent for about 6 months.
1000	Vomiting and nausea in all personnel within 1 hour after exposure. Probably no survivors from radiation sickness.
5000	Incapacitation almost immediately. All personnel would be fatalities within 1 week.
Note:	Radiation at these levels would result from direct involvement in a spill in a radioisotopes processing plant, a massive failure of protective systems in a nuclear reactor plant, or from nuclear warfare. The radiation exposure at these levels would do more than merely damage a few cells here and there. Enough cells would be damaged in major body control networks so that the basic body functions would be decommissioned. The brain would not function, breathing control would be lost, etc..... in effect, the power plugs would have been pulled on the body's computor.

EMERGENCY PROCEDURES

3.00 General: The operator must protect human life first, then property from damage due to a radiation incident.

We must prevent the raw radioactive material from escaping to the atmosphere or environment.

The source material is encapsulated in two stainless, welded containers, which is further securely mounted into the gauge enclosure. It is highly unlikely that the material could escape in the event of a severe accident or fire, however, our protective program must insure that we plan for this eventuality.

The first action to be taken in the event of an accident with the CPN PORTAPROBE or the HYDRO-PROBE is to keep other people away from the site.

Then exercise the following decison point;

* The Gauge is superficially damaged, dented, flooded, or otherwise injured from a drop, minor runover, etc.

  The enclosure is in one piece with a minor break or two in the sheet metal or casting and the source is obviously in place, at least the source location is not torn apart.

  1) Turn the gauge over to view the source area, if necessary. Do not walk through the site material where the gauge was pushed or pulled.

     Inspect the source area visually to insure no damage to shutter or source mounting.

  2) If source area is intact, pick up gauge, place in storage container and return to permanent storage area.

  3) Call the RSO, and CPN factory for assistance in shipping the gauge back to the factory for repair or disposal.

  DO NOT SHIP THE GAUGE WITHOUT FACTORY APPROVAL OR KNOWLEDGE.

* The gauge is broken apart, severely burned, severely crushed with parts strewn around, or the source area is visually damaged.

  1) Freeze the site. Rope off the damage site for 10' around, Stop the vehicle and have the driver walk away. Do not walk through the damage site. If radioactive material is loose it can be picked up and tracked elsewhere.

  2) Call the RSO, and/or the nearest public health department office for help. Call us. The objective is to get an expert radiation technician to the site with an operating survey meter who can determine if the radioactive material is lost or is intact.

     CPN does not recommend that customers purchase their own survey meter for this purpose. There is little likelihood of an accident to begin with and the survey meter can prove to be an item of false security in the event of a serious accident. The operator will not know how to use it properly and may only confound an already bad circumstance by releasing a potentially contaminated site.

  3) The radiation expert will determine whether the site is safe, will remove the contamination if there is any, and will prepare the gauge for shipment to the factory for repair, or disposal.

  4) In the event of severe damage, it may be necessary to dispose of the source through a local disposal agency licensed for this operation.

     The radiation technician or local public health department will assist in this action.

  5) Call the CPN factory and advise of the problem. We will want to know the circumstances to assist in possible advice to others in future training programs.

To ease the minds of operators in this regard, CPN has never had a damaged gauge requiring extreme security precautions, although we have had a number of gauges thoroughly run over in the years that we have manufactured many units.

We know of no other manufacturer, either, who has experienced this degree of damage.

3.01 Important Phone Numbers:

RSO _____

Public Health _____

CPN Factory (415) 228-9770

Fire _____

Police _____

Notify the public health office, police and our offices immediately in the case of a stolen gauge.

4.00 Leak Testing: All radioactive sources must be tested for contamination periodically. CPN sources are doubly encapsulated in stainless steel and the likelihood of a leaking source is very remote, however they still must be leak tested in accordance with regulations, basically every six months.

CPN sources are approved for a one year waiver under our CPN license, however, local jurisdictions may still require the six month period. It is important that your license be followed.

The user may test his own gauge following CPN instructions. Leak test kits are available from the factory and an initial kit was supplied with the gauge.

The leak test must be returned to our analysis lab for processing. A certificate will be returned for the licensee's file for inspection by licensing authorities at any time.

4.01 Surface Gauges:

One test is required for the BRC MK II Series, two tests for the BRC MC Series.

BRC Mark II Series:

1) Stand gauge on end, leave shutter closed.

2) Wet swab in detergent, swab the cleanout ring. Do not swab the source rod.

3) Return the swab to our analysis lab in the envelope provided.

4) A certificate will be returned for your records.

BRC MC Series:

The MC Series uses two separate sources to permit the simultaneous counting at all times. Two sources must be leak tested therefore. However, only one swab need be used.

1) Stand gauge on end, leave shutter closed.

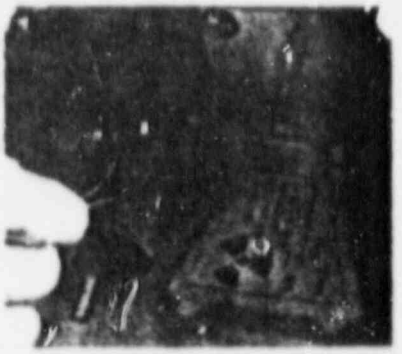
2) Wet swab in detergent, swab the cleanout ring. Do not swab the source rod.

3) Set gauge upright, remove screws and raise electronics to service position. Swab red spot at lower left of guide-tube casting adjacent to the moisture detector and adjacent to the internal radiation label.

4) Return the swab to the analysis lab in the envelope provided.

5) A certificate will be returned for file.

LEAK TESTING MODEL BRC MK II GAUGE AND CESIUM SOURCE OF A ANY MC SERIES GAUGE



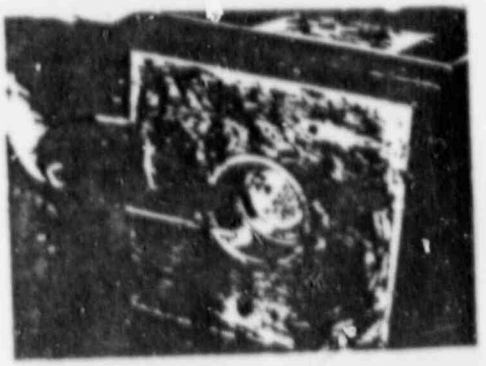
LEAK TESTING MOISTURE SOURCE ON MC GAUGE

4.02 Depthprobes:

1) Lay probe on its side. If source is leaking, contamination will be inside the shield tube.

2) Wet swab and swab inside of shield tube.

3) Return swab to lab. A certificate will be returned for your records.



LEAK TESTING DEPTH PROBE IN SHIELD TUBE

5.00 TRANSPORTATION OF YOUR GAUGE

Transportation via common carrier or in private vehicles on public roads of items containing goods deemed dangerous, such as the radioactive materials in your gauge, is regulated by Title 49 Code of Federal Regulations Parts 170-190.

To transport dangerous goods you must meet specific requirements as to: selecting the proper shipping name, packaging, labeling, marking and filling out of the waybill including certifying the shipment.

5.01 PROPER SHIPPING NAME

The gauge contains 10 mCi of Cesium-137 doubly encapsulated in welded stainless steel enclosures. 50 mCi of Americium-241/Beryllium is enclosed in a second enclosure. Radioactive material encapsulated in this manner would if released from the shipping package as a result of a shipping accident have little possibility of releasing any removable contamination and is classified as SPECIAL FORM. This type of encapsulation has been evaluated to meet the free drop, percussion, heating and immersion requirements. The proper shipping name selected from 172.101 is:

RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S., UN2974

N.O.S. stands for not otherwise specified.

5.02 PACKAGING

The package (plastic or aluminum shipping case) has been evaluated to meet the water spray, free drop, corner drop, penetration and compression requirements and is classified as a TYPE A package. Additionally the package meets the requirements for and is classified as a TYPE 7A package. It is also a TYPE A quantity since 10 plus 50 mCi is less than the allowable 20 Curies for special form.

The shipper is to maintain on file for one year a complete certification and supporting safety analysis covering the packaging and special form requirements. CPN as the original shipper supplied such a certification with the gauge in a packet addressed to the Radiation Safety Officer.

5.03 LABELING

The gauge in its plastic or aluminum shipping case has a maximum dose rate of 9 mrem/hr of combined gamma and neutron radiation on the surface nearest the source and a dose rate of .025 mrem/hr at 3 feet. It therefor ships under a YELLOW II label which covers packages with a dose rate of more than 0.5 and less than 50 mrem/hr on the surface of the package and less than 1.0 mrem/hr at 3 feet.

The transport index is a number placed on the package to indicate to the carrier the degree of control to be exercised during transportation. It indicates the maximum radiation dose rate at 3 feet from the package surface. For simplicity it is rounded up to the nearest tenth. The dose rate at 3 feet for the CPN gauge is .025 mrem/hr. When rounded up it must be marked on the YELLOW-II label as a TRANSPORT INDEX of 0.1.

Radioactive YELLOW-II labels should be affixed to at least TWO opposite sides of the package. Entered on the labels should be Cs-137 10mCi, Am-241/Be 50 mCi and a 0.1 Transport Index. As shipped from the factory, CPN's gauges have Yellow-II labels on three visible surfaces.

5.04 MARKING

The package must be marked with:

The country of origin for international shipments
The shipping package type in 1/2" letters
The proper shipping name
The name and address of the shipper or the consignee

CPN's gauges have the following marking:

USA DOT 7A
TYPE A
RADIOACTIVE MATERIAL,
SPECIAL FORM, N.O.S., UN2974

The shipping label provides both the shipper's name and address and the consignee's name and address.

5.05 WAYBILL

The description on the waybill should be as follows:

One case, RADIOACTIVE MATERIAL,
SPECIAL FORM, N.O.S., UN2974
Americium 241/Be, 50 mCi
Cesium 137, 10 mCi
Transport Index 0.1
RADIOACTIVE YELLOW II Label
USA DOT 7A, TYPE A Package

The dangerous goods should be the first item on the waybill if some non-dangerous goods are part of the shipment and an X should be placed in the DG (old HM) column.

The waybill should contain a CERTIFICATE as follows:

> This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

This certificate will normally be pre-printed on the waybill.

5.06 MISC

The outside of the package must incorporate a SEAL which will be evidence that the package has not been illicitly opened during shipment.

The vehicle does NOT require placarding. Radioactive Yellow-III shipments require placarding while Yellow-II shipments are exempt.

The shipping papers must be readily accessible for inspection or in the event of an accident. They must be within the reach of the driver and visible to a person entering the driver's compartment. When the driver is not at the vehicle's controls the shipping papers must be on the drivers seat or in a holder on the drivers door.

When transporting the gauge by private vehicle on public roads all of the above is applicable except) a shipping label with the shipper's or consignee's name is not required, and certification on the shipping paper is not required.

To meet the requirement for accessible shipping papers, the driver should have on the seat or on the drivers door a document which lists the words "SHIPPING PAPER", the name and address of the company or organization he represents, and the description listed above for truck shipments.

The number of packages of radioactive material in any vehicle should be limited to a total transport index of 50. A package with a transport index of 0.4 should be at least one foot from the nearest person. Also it should be at least 3 feet from any undeveloped film for a transit time up to 8 hours. The gauge case should be locked. If the driver leaves the vehicle then the keys should be removed from the ignition and the vehicle locked. If the the gauge is stored in an open area such as the back of a pickup then the case should be chain locked or otherwise secured to the vehicle.

If the gauge is outside its shipping case then the gauge itself is considered the shipping package. Its dose rates are higher but still meets the Yellow-II requirements. It would NOT however meet the requirements for labeling and marking.

5.07 AIR SHIPMENTS

Air shipments must comply with Title 49 and the International Air Transport Association's Dangerous Goods Regulations.

For a Yellow-II label, an air shipment must have a transport index of 1.0 or less.

Radioactive material may not be transported aboard passenger carrying aircraft unless that material is intended for use in, or incident to, research, or medical diagnosis or treatment.

Under most circumstances your gauge will be limited to shipment on cargo-only aircraft. In addition to the above requirements for transportation by truck the following requirements must be met to ship by cargo-only aircraft.

CARGO-AIRCRAFT-ONLY labels must be attached next to the Yellow-II labels.

The air waybill must include the following information:

DANGEROUS GOODS AS PER
ATTACHED SHIPPER'S DECLARATION.
CARGO AIRCRAFT ONLY

Two copies of a shippers declaration must be supplied to the carrier (actually it is best to supply an additional copy for each carrier which will be involved). Amendments or alterations are not allowed unless they are signed by the the same signature as used to sign the document. The declaration should be per the attached example.

For international shipments a copy of the CERTIFICATE OF COMPETENT AUTHORITY must be attached. CPN's special form sources have been issued certificate number USA/0115/S, a copy of which is printed on the back of the shippers declaration.

Moisture only gauges contain only Americium. For the shipment of these gauges the information is the same except delete all references to Cs-137, 10 mCi. The moisture gauge still meets and requires a Yellow-II label and has a T.I. of 0.1.

5.08 TRANSFER

Before transfering your gauge to a second party within the USA you must verify that the transferee's license authorizes the receipt of the type, form, and quantity of radioactive material contained in your gauge. Per Title 10, Chapter 1, CFR Part 30.41, there are two acceptable methods for verification.

(1) You may have in your possession, and have read, a current copy of the transferee's license.

(2) You may have in your possession a written certification by the transferee that he is authorized by license to receive the type, form, and quantity of radioactive material to be transferred, specifying the license number, issuing agency and expiration date.

The RSO package originally supplied with your gauge includes a copy of CPN's license to allow you to return your gauge to CPN for repair or other reasons. Additional copies are available upon request.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper: CPN CORP, 2830 Howe Rd, MADINEZ, CA. 94553	Air Waybill No. 123 1234 5678 Page 1 of 1 Pages Shipper's Reference Number (optional) 381234
Consignee: Happy Construction Co., 1234 Main ST. Boston, Mass 01218	IATA
Two completed and signed copies of the Declaration must be handed to the operator	**WARNING** Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.
TRANSPORT DETAILS This shipment is within the limitations prescribed for: (delete non-applicable) PASSENGER AND CARGO AIRCRAFT / CARGO AIRCRAFT ONLY Airport of Departure: SAN FRANCISCO Airport of Destination: BOSTON	Shipment type: (delete non-applicable) NON-RADIOACTIVE / RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS (See sub-Section 8.1 of IATA Dangerous Goods Regulations)

Proper Shipping Name	Class or Division	UN or ID No.	Subsidiary Risk	Quantity and type of packing	Packing Inst.	Authorization
RADIOACTIVE MATERIAL SPECIAL FORM, N.O.S.	7	UN2974		Cesium 137 and Americium 241/Be, one Type A package x 10mCi Cs-137 and 60mCi Am 241/Be each	II Yellow TI 0.1 Dim 65 x 34 x 41 cm each	SP. FORM CERTIFICATE Furnished previously and opposite side

Additional Handling Information: NONE

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labelled, and are in all respects in the proper condition for transport by air according to the applicable International and National Government Regulations.

Name/Title of Signatory: L. Marcuso/Export Mgr
Place and Date: Pacheco, Cal Jul 21, 1983
Signature: [signature]

STRAIGHT BILL OF LADING
ORIGINAL - NOT NEGOTIABLE

CF CONSOLIDATED FREIGHTWAYS
CFWY

SINGLE SHIPMENT PICKUP ☐

		PRO No.	JO 12345
		Date	6/1/83
Consignee: HAPPY CONSTRUCTION COMPANY		Shipper: CPN Corp.	
Street: 123 MAIN STREET		Street: 2830 Howe Rd.	
City, State: CONCORD, CA	Zip: 94523	City, State: Madinez, CA	Zip: 94553

Number Shipping Units	HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight	Rate	CHARGES
1	X	Case, RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S., UN 2974 Cs-137, 10 mCi Am-241/Be, 60 mCi RADIOACTIVE YELLOW-II Label Transport Index 0.1 USA DOT 7A Type A Package	78 lbs		

1

.40 — lb

[signature]

FREIGHT CHARGES

THIS IS TO CERTIFY THAT THE ABOVE-NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

Carrier: CONSOLIDATED FREIGHTWAYS

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper

Air Waybill No

Page of Pages

Shipper's Reference Number (optional)

Consignee

Two completed and signed copies of this Declaration must be handed to the operator

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for (delete non-applicable)

PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY

Airport of Departure

Airport of Destination

Shipment type (delete non-applicable)

NON-RADIOACTIVE | RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

(see sub-Section 8.1 of IATA Dangerous Goods Regulations)

Dangerous Goods Identification						
Proper Shipping Name	Class or Division	UN or ID No	Subsidiary Risk	Quantity and type of packing	Packing Inst	Authorization

Additional Handling Information

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labelled, and are in all respects in the proper condition for transport by air according to the applicable International and National Government Regulations.

Name/Title of Signatory

Place and Date

Signature
(see warning above)