NRC FORM 313
(1-81)
10 CFR 30, 32, 33, 34, 35 and 40

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

APPLICATION FOR MATERIAL LICENSE

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 - NRC 34-15998-01
- [ ] C. RENEWAL OF LICENSE NUMBER _____

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

ASHLAND PETROLEUM COMPANY
2408 GAMBRINUS AVE. SW
CANTON, OHIO 44706

RECEIVED
86 JAN 30 A11 :3
REGION III
MATERIALS BRANCH

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

ASHLAND PETROLEUM CO.
CANTON REFINERY NO. 4
2408 GAMBRINUS AVE. SW
CANTON, OHIO 44706

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

BRUCE LANZER

TELEPHONE NUMBER: 216-477-4561

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.

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

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

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

9. FACILITIES / EQUIPMENT

8604090206 860220
REG3 LIC30
34-15998-01 PDR

10. RADIATION SAFETY PROGRAM

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*

FEE CATEGORY | AMOUNT ENCLOSED $

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
Bruce A. Lanzer	BRUCE LANZER	SAFETY SUPERVISOR	1-23-86

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

RECEIVED

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
amd	Jan 29	3P	CONTROL NO. 80571	JAN 27 1986
AMOUNT RECEIVED	CHECK NUMBER			DATE
$60	120455			1/27/86

10

JAN 27 1986

PRIVACY ACT STATEMENT ON THE REVERSE

ITEM 5: "Radioactive Material"

Licensed Material

a. Element and Mass Number: Americium 241

b. Chemical Form: Americium-Oxide

c. Sealed Source Manufacturer and Model Number:
Gammatron Model AN-HP

d. Number and Activity of Sources: One Source-200 mci

ITEM 6: "Purpose for Which Licensed Material Will be Used"

As a part of the Fisher Controls Type LD2220 portable level detector. (See attached device registry TX293D101S)

ITEM 7: "Individual(s) responsible for radiation safety program and their training and experience."

BRUCE LANZER
LES GIBSON [Name(s)]

See Item 10 for responsibilities and for details of the radiation training safety program.

ITEM 8: "Training for individuals working in or frequenting restricted areas"

Only personnel supervising the use of the device are required to have special training. The device registry specifies in Item 6 of the "limitations and/or other considerations of use" that "training to safely use this device is provided to the Radiation Safety Officer. The Radiation Safety Officer may then present a short orientation course to qualify technicians as users." Individuals named have received training from the manufacturer. See Item 10 for details of the safety training program.

ITEM 9: **"Facilities and Equipment"**

The device will be kept at:

ASHLAND PETROLEUM CO.

2408 GAMBRINUS AVE. SW

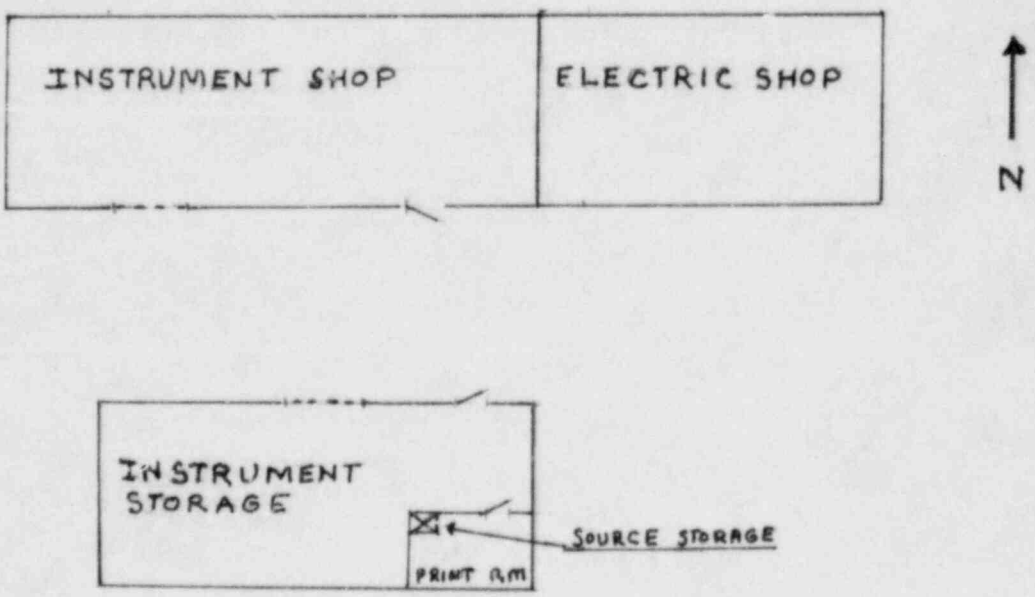
CANTON, OHIO 44706

LOCKED STORAGE CABINET IN BLUE PAINT ROOM

(Address)

The device will be kept in a securable storage area in such a manner to prevent unauthorized removal or use and located at least ten feet from regular (8 hr/day) work stations. Refer to Item 10 and the enclosed device instruction manual for details.

A diagram of the floor plan showing where the device is stored in relation to other work areas is attached.



ITEM 10: "Radiation Safety Program"

The individual responsible for the radiation safety program will:

- o Assure compliance with the applicable provisions of 10CFR Part 19 "Notices, Instructions and Reports to Workers, Inspections" and Part 20 "Standards for Protection Against Radiation" or comparable state regulations.

- o Be responsible for maintaining a sealed source inventory and perform or be responsible for performing wipe tests every 6 months.

The individual responsible for the radiation safety program will receive training from the manufacturer in the safe handling and operation of the device. He/she may then present a short orientation to qualify technicians as users. The training program offered by the manufacturer, Fisher Controls, includes instruction in the safe handling and operation of the device as well as a presentation on radiation basics. The radiation training covers the principles and practices of radiation protection, radioactivity measurement and monitoring techniques and biological effects of radiation. All trained individuals will receive a certificate from the manufacturer stating that they have had the training and that they have an understanding of the principles they have been shown and can safely handle and operate the device. A copy of the certificate is attached.

The training materials, the device instruction manual, and the transportation guideline cover the safety and emergency procedures outlined in the license application guide for Item 10. Specifically:

a. "Safety measures to be used in transporting the device" - See the Instruction Manual, Page 9 and the Transportation Guideline, Page 6.

b. "Means of preventing unauthorized access, use or removal during use at temporary job sites." See the Instruction Manual, Page 3 and the Transportation Guidelines, Page 5.

c. "Means of preventing unauthorized use or removal from storage." See Instruction Manual, Page 3.

d. "Emergency procedures to be followed in case of accidents." See Instruction Manual, Page 9 and the Transportation Guideline, Page 6.

e. "Specific instructions to users to not dismantle the source housing." See Instruction Manual, Page 9.

Also, information and instructions for wipe tests is on Page 10 of the Instruction Manual.

ITEM 11: "Waste Management"

Procedures for returning the device for disposal are on Page 9 of the Instruction Manual and Page 6 of the Transportation Guideline.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: November 21, 1984 PAGE 1 OF 4

DEVICE TYPE: Neutron Backscatter Level Detector

MODEL: LD2220

MANUFACTURER/DISTRIBUTOR: Fisher Controls
Highway 380 East
P. O. Box 900
McKinney, Texas 75069

SEALED SOURCE MODEL DESIGNATION: Gammatron Inc. Model AN-HP

ISOTOPE: Am-241 MAXIMUM ACTIVITY: 200 mCi.

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: General Neutron Source Applications

CUSTOM DEVICE: ____ YES __X__ NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: November 21, 1984 PAGE 2 OF 4

DEVICE TYPE: Neutron Backscatter Level Detector

DESCRIPTION: The Model LD2220 neutron backscatter level detector is composed of a helium-3 neutron detector mounted beside a source holder containing an Am-241 neutron source of 200 millicuries. This assembly is mounted on a five foot long aluminum tube. A Ludlum Measurements Inc. Model 12 rate meter is mounted at the other end of the tube.

LABELING: A label containing the standard "Caution - Radioactive Material" and radiation trefoil is attached to the source-detector assembly. This label also contains the source serial number, radionuclide activity and date of measurement with a "Notify Civil Authorities" on the outside edge of the label. Another label with the company name and serial number of the device is also attached.

DIAGRAM:

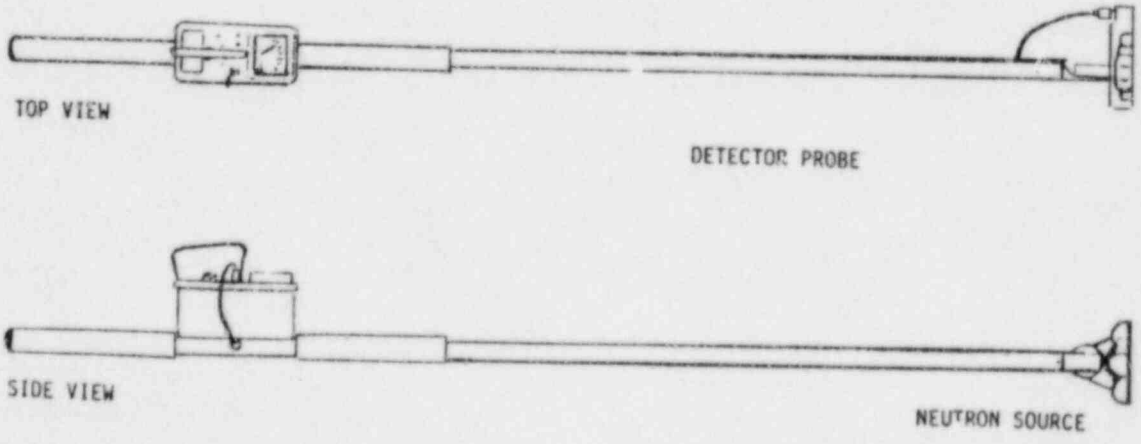


FIG. 1 - Model LD2220 Neutron Backscatter Level Detector

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: November 21, 1984 PAGE 3 OF 4

DEVICE TYPE: Neutron Backscatter Level Detector

CONDITIONS OF NORMAL USE: The Model LD2220 is intended for use in determining liquid levels inside chemical process equipment. The device is portable and must be used in environments compatable with man. The source-detector assembly is manipulated at the handle end of the device, four and one-half feet from the source-detector assembly. This device will normally be operated using only a 100 millicurie Am(Be) source. However, 200 millicurie sources may be used. This may occur if vessel walls are thick, thick insulation is present around the vessel or materials inside the vessel are low in hydrogen content.

In general, the device will be removed from storage, taken into the plant, and used by trained operating personnel who have been instructed in the safe use and proper handling of the device by the Radiation Safety Officer. The actual period of use expected is 10 minutes to one hour per week. After use, the device is returned to storage.

If severe conditions occur (explosion or fire), the device will likely be destroyed. However, the Am(Be) sources should remain intact since these sources are designed to perform under a pressure of 25,000 pounds per square inch and a temperature of 600 centigrade for one hour.

PROTOTYPE TESTING: Several prototypes were tested. Device construction causes the operator to maintain a safe distance from the source in order to operate the device.

EXTERNAL RADIATION LEVELS: Radiation levels at one foot from the source holder with a 200 millicurie source are 1.28 millirem/hr. of gamma radiation and 8.57 millirem/hr. of neutrons. Each 200 millicurie source is expected to produce 5.74×10^5 neutrons per second.

QUALITY ASSURANCE AND CONTROL: The device is completely assembled and tested before the sealed source(s) is installed. Each sealed source is certified as to specific activity and neutron output. Each device is then tested for proper operation before release.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: November 21, 1984 PAGE 4 OF 4

DEVICE TYPE: Neutron Backscatter Level Detector

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

1. These devices may be distributed to specifically licensed users only.
2. Leak testing of the sealed source is required at six month intervals.
3. Repair and maintenance will be provided. Any repair involving the source housing will be handled by N.S.S.I. in Houston, Texas.
4. Source exchanges, if necessary, will be performed by N.S.S.I. in Houston, Texas.
5. The device will be returned to N.S.S.I. for disposal.
6. Training to safely use this device is provided to the Radiation Safety Officer. The Radiation Safety Officer may then present a short orientation course to qualify technicians as users.

SAFETY ANALYSIS SUMMARY: This device can be operated safely by trained personnel. However, the possibility of misuse exists and only trained and competent personnel should be allowed to have access.

REFERENCES: Application dated November 5, 1984 with procedures, accompanying data and drawings.

DATE: November 21, 1984 REVIEWED BY: Floyd R. Hunter

DATE: December 4, 1984 REVIEWED BY: Joseph E. Gonzales

ISSUING AGENCY: Texas Department of Health

bcc: File/Insp. File/Board/FRH
FRH:da

LD 2220 PORTABLE LEVEL DETECTOR

TRAINING GUIDE

This advance information is being released prior to final publication. Training Manual Form 5606 is scheduled for distribution this summer.

TRAINING GUIDE

Use of the Type LD2220 is restricted to trained personnel who have been instructed in the safe use and proper handling of the device. Fisher Controls provides a training program for individuals responsible for radiation safety programs and designated personnel. The training package includes a video "Radiation Safety Training" and a training manual that presents basics in radiation characteristics, safety and regulatory concerns. For personnel already knowledgeable in radiation theory, the Fisher radiation safety training is not required. Their background and/or training must, however, be stated in the application for license (or amendment). Anyone who intends to use the device must receive training in the safe use and operation of the device. The Type LD2220 Instruction Manual is a good reference and contains many safety and application guidelines. It should be reviewed thoroughly by any intended users. A video, "Introduction to the LD2220," is also available which reviews some safety information as well as demonstrating how to safely operate the device. A training certificate is presented to individuals who receive the training and demonstrate an understanding of radiation principles and the safe use and operation of the LD2200. A representative of Fisher Controls is available to provide a field demonstration.

The individual responsible for the radiation safety program at a site must be trained by a trained representative of Fisher Controls. That individual may, in turn, present a short orientation course to qualify technicians as users.

In summary, proper training for the LD2220 involves:

1. Viewing "Radiation Safety Training" and reviewing the questions and answers as presented in the video; or have prior radiation knowledge.

2. Viewing "Introduction to the LD2220."

3. Reading the Type LD2220 Instruction Manual.

This training must be under the supervision of a trained representative of Fisher Controls.

QUALIFICATION STATEMENT

FISHER CONTROLS, HEREBY CERTIFIES THAT _____ HAS RECEIVED TRAINING FROM AN AUTHORIZED REPRESENTATIVE OF FISHER CONTROLS AND HAS DEMONSTRATED AN UNDERSTANDING OF THE SAFE USE AND OPERATION OF THE TYPE LD 2220 PORTABLE LEVEL DETECTOR. HE/SHE HAS ALSO RECEIVED TRAINING IN RADIATION BASICS AND HAS DEMONSTRATED AN UNDERSTANDING OF THOSE PRINCIPLES. THE TRAINING HAS COVERED PRINCIPLES AND PRACTICES OF RADIATION PROTECTION, RADIOACTIVITY MEASUREMENT AND MONITORING TECHNIQUES AND BIOLOGICAL EFFECTS OF RADIATION. _____ IS QUALIFIED TO USE OR SUPERVISE THE USE OF THE FISHER CONTROLS TYPE LD 2220 PORTABLE LEVEL DETECTOR.

FISHER CONTROLS INTERNATIONAL, INC.

BY: _____

TITLE: _____

DATE: _____

Fisher Controls

Instruction Manual

Type LD2220 Level Detector

FISHER

June 1985 *Form 5604*

Contents

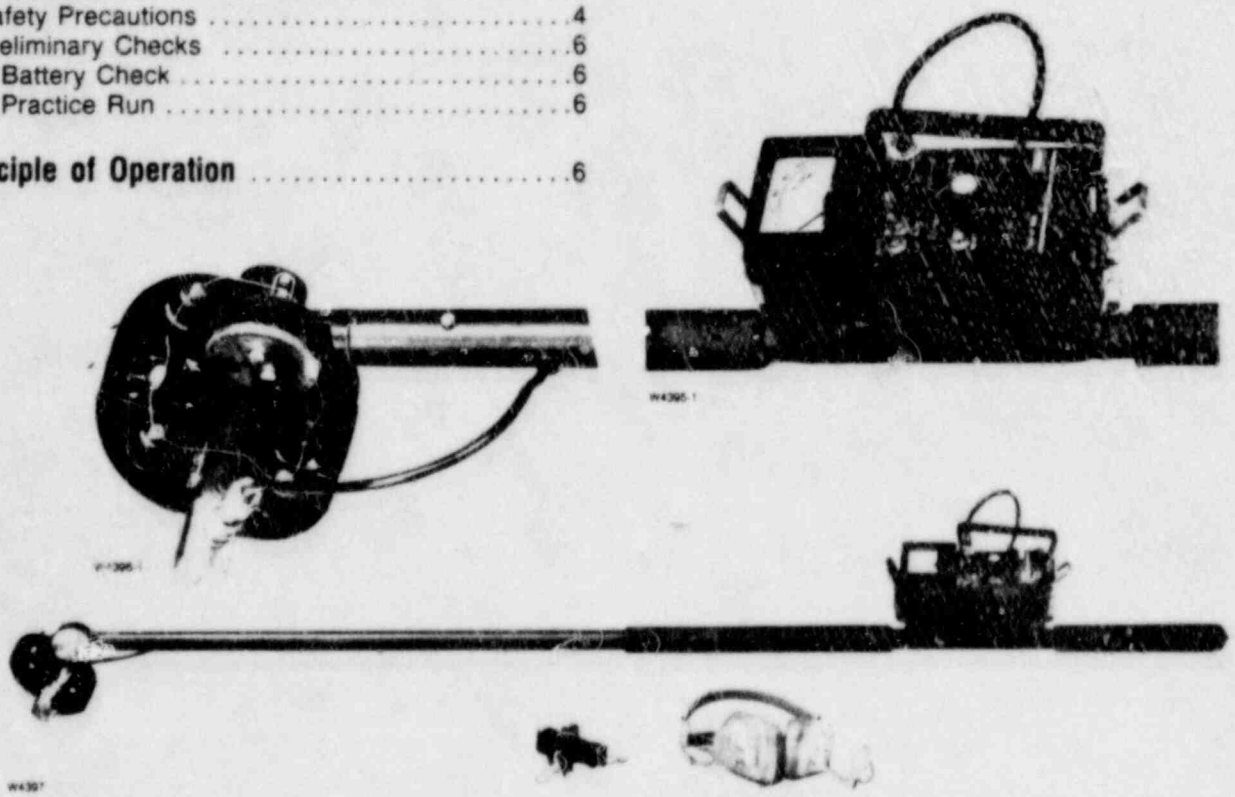


Figure 1. Type LD2220 Level Detector

CONTROL NO. 80571

Table 1. Specifications

RADIOACTIVE SOURCE	Americium 241-Beryllium, 200 millicuries (N.S.S.I. Model AN-HP)	**MAXIMUM ALLOWABLE VESSEL WALL THICKNESS**(1)	6 inches (152 mm)
RADIATION LEVEL AT OPERATOR END OF DEVICE	0.47 mRem/hr	**MINIMUM ALLOWABLE VESSEL DIAMETER**	2 inches (51 mm)
METER LINEARITY	± 5 percent of full scale	**VESSEL WALL TEMPERATURE LIMITS**	− 112 to 500°F (− 80 to 260°C)
METER POWER SUPPLY	Two D-cell batteries (approximately 100 hours of operation)	**OPERATIVE AMBIENT TEMPERATURE LIMITS**(2)	− 112 to 221°F (− 80 to 105°C)
METER RESPONSE TIME	3 or 11 seconds	**APPROXIMATE WEIGHT**	7 pounds (3.2 kg)
MEASUREMENT ACCURACY	± 0.5 inches (13 mm)	**ADDITIONAL SPECIFICATIONS**	For construction materials, see the parts list section

1. Total wall thickness includes insulation, jackets, etc. For more information on total wall thickness, contact your Fisher sales office or sales representative.
2. This term is defined in ISA Standard 51.1-1979.

Introduction

Scope of Manual

This instruction manual provides storage, operation, maintenance, and parts ordering information for the Type LD2220 level detector. Only qualified personnel should operate or maintain this level detector. If there are any questions concerning the instructions in this manual, contact your Fisher sales office or sales representative before proceeding.

Description

The Type LD2220 Level Detector (figure 1) is a lightweight, hand-held, portable device that enables the user to determine levels of foams, liquids, solids, and other substances without intrusion into the vessel. The Type LD2220 Level Detector gives accurate measurements for all common substances which contain hydrogen, such as water, hydrocarbons, acids, bases, and most organic liquids(1). By use of the neutron backscatter measurement principle (see the Principle of Operation section), this level detector can penetrate even heavy-walled vessels with fast neutrons to determine the levels of liquids and solids. The level can normally be located to one-half inch (13 mm) on most vessels.

Specifications

Specifications for the Type LD2220 Level Detector are listed in table 1. Specifications for the radioactive source

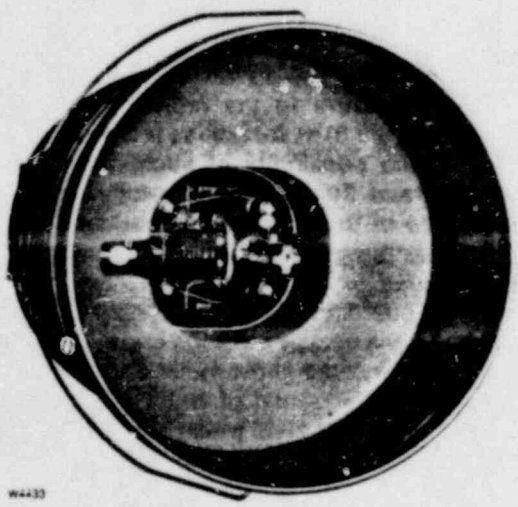
Figure 2. Warning Nameplate Used on a Type LD2220 Level Detector

are also listed on the warning nameplate as shown in figure 2. The warning nameplate (key 24, figure 8) is permanently attached to the head assembly that houses the radiation source. Fisher Controls serial tags (key 30, figure 8) are attached separately to the head assembly and to the count rate meter.

1. If the process material to be measured contains cadmium, lithium, or boron, contact the Fisher sales office or sales representative.

W4432

LEVEL DETECTOR WITH POLE ASSEMBLY EXTENDING OUT OF CONTAINER FOR STORAGE INSIDE OF A SECURE AND LOCKED AREA



W4433

HEAD ASSEMBLY DISCONNECTED FROM POLE ASSEMBLY FOR SEPARATE STORAGE

Figure 3. Storage Container for Type LD2220 Level Detector

Storage

WARNING

Only qualified individuals should handle or operate the Type LD2220 Level Detector. This device contains a radioactive source which can cause personal injury if mishandled in any way. To help prevent the possibility of personal injury, never handle the head assembly directly in the immediate vicinity of the radiation source (key 26, figure 8).

When shipped, the head assembly of the Type LD2220 Level Detector is packaged inside of a U.S. D.O.T.-7A container. This container is also used for storing the level detector when the device is not in use. In storage, the level detector should be kept in a secure area, such as inside a locked closet or cabinet, to prevent unauthorized access.

The Type LD2220 Level Detector can be stored in one of two ways. For most storage purposes, the head assembly of the level detector can be stored inside of the storage container with the pole assembly end of the device extending out of the container and propped against a wall or other solid surface as shown in figure 3. The meter end of the level detector should be supported firmly by the wall or solid surface to prevent the device from tipping over while in storage. In this manner, the level detector can be kept inside of a locked room or closet to prevent unauthorized access.

For long term storage, the head assembly of the level detector can be disconnected from the pole assembly as shown in figure 3 and stored separately. The head assembly can be disconnected from the pole assembly by disconnecting the MHV connector (key 7, figure 8) from the detector tube (key 29, figure 9) and disengaging the lock assembly (key 15, figure 9). The head assembly is then stored inside of the storage container with the foam padding inserted and the storage lid attached securely to the container. If the head and pole assemblies are stored separately, refer to the initial assembly portion of the operation section to reassemble the level detector for field operation.

WARNING

Personal injury can result due to overextended exposure to the radiation source (key 26, figure 8) at very close proximity. To prevent the possibility of such injury, always perform the following precautions when the device is not in use.

- **Store the level detector in a secure area and at least 18 inches (0.46 meters) from personnel,**

- **Use locks when storing the level detector to prevent removal by unauthorized personnel, and**

- **Post an NRC Form 3 in clear view outside the storage area.**

For more information on the NRC Form 3, or any of these storage procedures, contact your Fisher sales office or sales representative.

Operation

WARNING

Only qualified individuals should handle or operate the Type LD2220 Level Detector. This device contains a radioactive source which can cause personal injury if mishandled in any way. To help eliminate the possibility of personal injury, never handle the head assembly directly in the immediate vicinity of the radiation source (key 26, figure 8).

Initial Assembly

The Type LD2220 Level Detector is ready for immediate operation as received. To complete intial assembly, perform the following steps. This procedure can also be performed to reassemble a level detector that was disassembled for storage or shipping purposes. Key numbers referenced in the following procedure are shown in either figure 8 or 9 as indicated.

1. Remove the lid and the top piece of foam packing from the storage container (key 31, shown in figure 3) to expose the head assembly.

2. Connect the head assembly to the pole assembly by engaging the lock assembly (key 15, figure 9) into the appropriate opening in the pole assembly. The middle of the three holes in the pole is used for most applications. The outer two holes are used for applications where the operator must stand very close to the tank wall, such as on a tank with a winding staircase.

3. To complete the assembly, attach the MHV connector (key 7, figure 8) to the detector tube (key 29, figure 9). The level detector is now ready for use.

License Requirements

A specific materials license is required to possess or use the Type LD2220 Level Detector. Licensing information and applications for this license can be obtained from your Fisher sales office or sales representative or from your local regulatory agency.

Orientation

Operation of the Type LD2220 Level Detector is restricted to trained personnel who are instructed in the safe use and proper handling of the device. Fisher Controls provides a training program for Radiation Safety Officers and designated personnel. A representative from Fisher Controls is available to provide a field demonstration of the device.

Fisher Controls also offers:

- Training accessories that depict proper operation of the level detector,

- Training accessories that present basics in radiation safety, and

- A training manual that outlines basic radiation characteristics as well as safety and regulatory considerations.

Users of the Type LD2220 Level Detector are encouraged to refer to these training materials. This instruction manual must be read thoroughly before attempting to operate the device.

Safety Precautions

WARNING

Personal injury can result due to overextended exposure to the radiation source (key 26, figure 8) at very close proximity. To prevent the possibility of such injury, be sure to read this section carefully and to take note of these safety precautions before attempting to operate the device.

During normal operation, the Type LD2220 Level Detector is to be handled only by the hand grips (keys 5 and 6, figure 8) that are located at the meter end of the device. Under these conditions, the operator is exposed to a 0.47 mRem/hr radiation level which is well below the 2.0 mRem/hr radiation limit established by the Nuclear Regulatory Commission for unrestricted areas. Therefore, by NRC regulation, no film badges, dosimeters, or other safety related equipment are required by the user when operating the level detector.

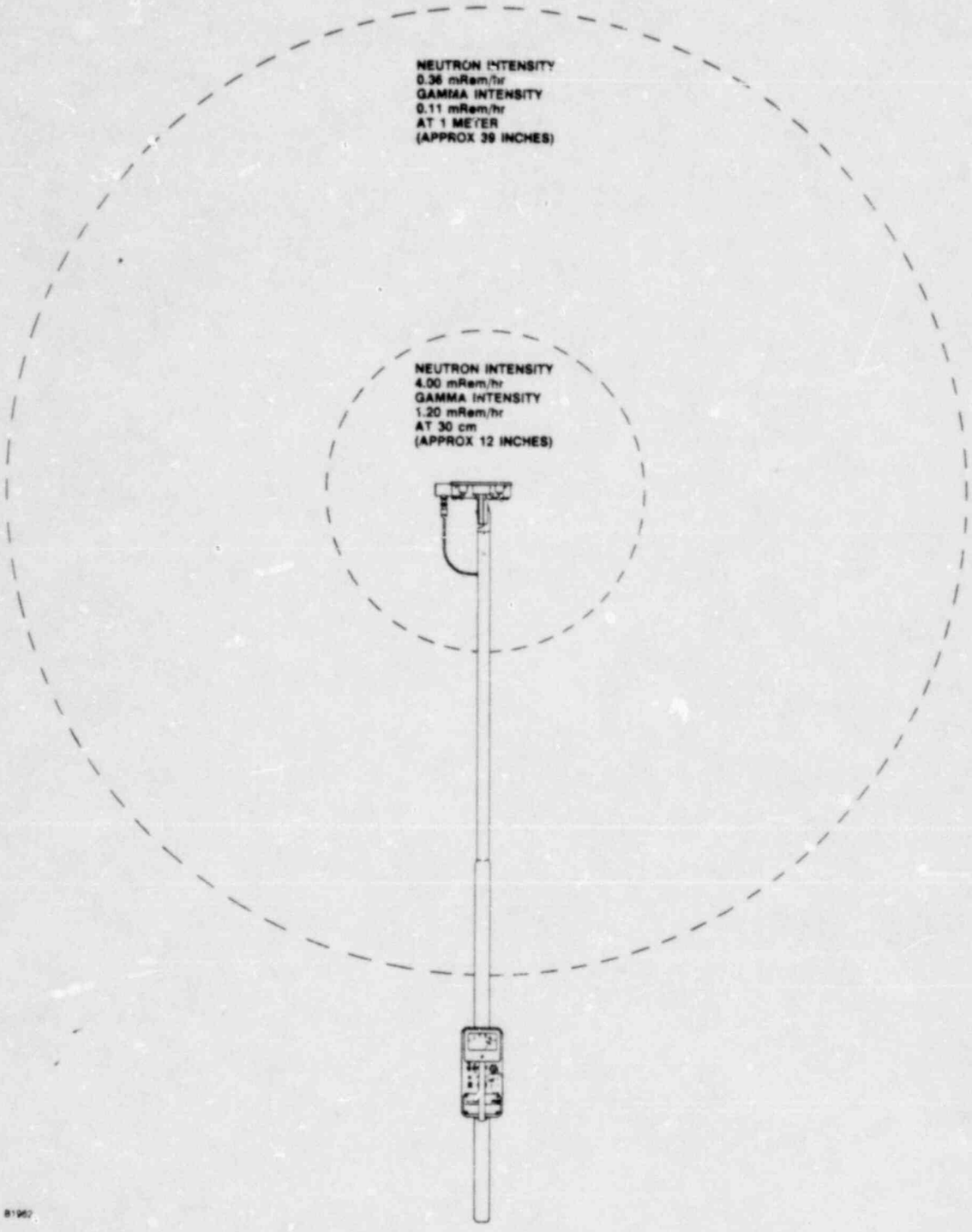


Figure 4. Typical Isodose Curve for Type LD2220 Level Detector

The Americium 241-Beryllium source used in the Type LD2220 Level Detector is a relatively small source and it is not considered hazardous during normal use of the device. It is possible, however, to receive radiation exposure in excess of permissible levels if the operator remains in close proximity to the source for extended periods of time. This is especially true if the operator spends long periods of time within 18 inches (0.46 meters) of the capsule that contains the radiation source

It should be noted that the Type LD2220 level detector is not a shielded device. Isodose curves (figure 4) for the Type LD2220 Level Detector indicate that at a distance

of 39 inches (1 meter) from the radiation source, the radiation level is 0.47 mRem/hr while at one foot (0.3 meters) the radiation level is 5.20 mRem/hr. Therefore, keeping a maximum distance between the operator and the radiation source is an extremely effective method for reducing radiation exposure. Fisher Controls recommends that any intended users of the device, as well as any other applicable personnel, remain at least 18 inches (0.46 meters) from the radiation source (key 26, figure 8) whenever possible.

Preliminary Checks

Battery Check

Before attempting to operate the Type LD2220 Level Detector, the batteries should be checked for adequate operation. First turn the selector switch on the count rate meter (key 1, figure 8) to the battery test position as shown in figure 5. Note the meter reading. If the meter reads below the BAT TEST zone on the scale, the batteries are low and should be replaced. If the meter reading is within the BAT TEST zone on the scale, the batteries are adequate for normal operation. Most alkaline battery cells have an average operating life of about 100 hours.

Practice Run

The best way to learn the relationship between detector response and a process level position is by making a practice run. Fill a test vessel about 2/3 full of water. The vessel should be open at the top or transparent enough so that the liquid level in the container can be observed. A bucket, waste basket, glass bottle, or beaker are all suitable for this purpose.

To prepare the level detector for operation, turn the selector switch on the count rate meter (key 1, figure 8) to the range B position that is shown in figure 5. Turn the audio switch to the ON position and the time constant switch to the SLOW position. In free air, a meter reading of less than 6 divisions will be observed and a slow audio rate will be heard.

For normal operation, the Type LD2220 Level Detector should be handled only at the meter end of the device. The level detector has two foam rubber hand grips (keys 5 and 6, figure 8) at the meter end for easy handling. Practice holding the level detector by the hand grips. Use the handle on the top side of the count rate meter to adjust the position of the head assembly so that the flat surface of the head assembly moves smoothly against the wall of the practice container.

Slowly move the head assembly up and down around the surface level on the outside wall of the practice container. Carefully note the position of the head assembly relative to the liquid surface level when the meter signal changes. Normally the arrow on the source/detector housing will be at the process level when the count rate meter signal increases rapidly as the detector is moving from above to below the surface level. The signal will rise to an even higher meter reading as the head assembly is lowered further beneath the surface level. The liquid surface level is located at the point where a sharp increase in the meter signal reading is observed. If the meter reads 100 percent of full scale it can be brought back onto the scale by turning the selector switch to the range A position. If greater resolution is desired, the selector switch can be turned to the range C or D position.

Practice moving the detector head assembly up and down along the outside wall of the container until the relationship between the meter signal and process level is readily apparent. Further testing can be performed by altering the liquid level and covering the container so that the liquid surface cannot be seen. Locate the liquid level several different times and mark each measurement. Compare each of the markings with the true levels as observed visually. Develop increased confidence and ability before proceeding to an actual application.

Once full confidence is developed using the device, actual process measurements can be performed. For actual applications, the selector switch on the count rate meter can be positioned to either range A, B, C, or D depending on the type of process material that is measured. Continued experience with the device makes such selections more apparent. Once level measurement is completed, the level detector should be immediately returned to its storage container (key 31, shown in figure 3). Refer to the storage section for instructions on how to store the level detector.

Principle of Operation

The Type LD2220 level detector (shown in figure 6) consists of a sealed radioactive source mounted as an assembly next to a helium-3 neutron detector tube. The source-detector assembly is located at one end of a 5 foot (1.5 m) aluminum pole assembly; the count rate meter and the operator hand grips are located at the opposite end.

The radioactive source of the level detector emits fast neutrons which can penetrate the wall of an enclosed vessel. When the source-detector assembly is moved along the outside wall of a vessel, the fast neutrons

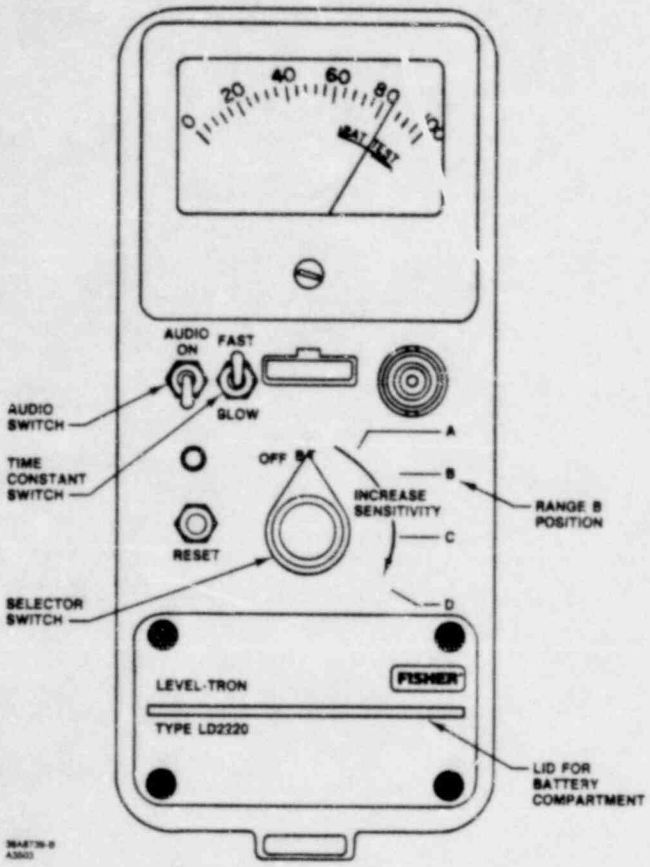


Figure 5. Count Rate Meter Used with Type LD2220 Level Detector

penetrate the vessel wall and enter the vessel. When the source is moved below the level of a hydrogen-containing substance (the liquid level), the fast neutrons interact with the hydrogen atoms in the liquid and lose energy. During this process some of the neutrons are reflected back (or backscattered) out of the vessel as slow neutrons to which the detector is highly sensitive.

The number of slow neutrons backscattered to the k... detector gives a signal which is directly related to t... hydrogen density of the substances contained inside the vessel. Substances having different hydrogen densities give different signals; therefore an abrupt signal change occurs when a level is passed. Electrical impulses corresponding to the rate of slow neutrons passing through the detector tube are relayed from the detector tube to the battery-powered count rate meter. These impulses give both an analog and audio signal indication of the count rate, therefore they indicate level. The level can normally be determined to within one half inch (12.7 mm) for most vessels. Level detection is not affected by operating conditions such as temperature or pressure inside the vessel.

Maintenance

If the Type LD2220 Level Detector fails to operate while in service, it should be checked for physical damage. This section presents a maintenance procedure for checking the count rate meter (key 1, figure 8) for possible physical damage as well as a maintenance check for battery contacts and cable integrity. If parts require replacement, refer to the appropriate replacing the count rate meter, replacing the pole assembly, or replacing the head assembly procedure presented in this section. A procedure for disposal of the level detector is also presented.

Additionally, a wipe test procedure is presented in this section for intermittent maintenance of the radiation source (key 26, figure 8). Wipe tests must be performed at regular intervals not exceeding every six months. Key numbers referenced in all of these maintenance procedures are shown in figure 8 or 9 as indicated.

Meter Failure

Failure of the count rate meter (key 1, figure 8) is indicated by unsatisfactory battery check results when good batteries are connected to the count rate meter (see the battery check procedure). In many instances, the problem can be corrected simply by cleaning the battery contacts inside the count rate meter. If replacement of the count rate meter is necessary, refer to the replacing the count rate meter portion of this section.

Checks for Battery Contacts and Cable Integrity

Battery contacts should be checked periodically for cleanliness. Impaired or corroded battery connections can lead to excessive battery drainage and count rate meter failure.

Cable integrity of the coaxial cable (key 3, figure 8) can be checked by performing the following procedure. To perform this procedure, an ohmmeter is required.

1. Disconnect the MHV connector (key 7, figure 8) from the head assembly and disconnect the Type C connector (key 8, figure 8) from the count rate meter (key 1, figure 8).

2. Connect one lead of the ohmmeter to the inside center conductor of the Type C connector and connect the other lead of the ohmmeter to the inside center conductor of the MHV connector. If the ohmmeter shows continuity (reads zero or a low value), continue with the next step. If it does not show continuity (reads infinity or an extremely high value), proceed to step 7 of this procedure.

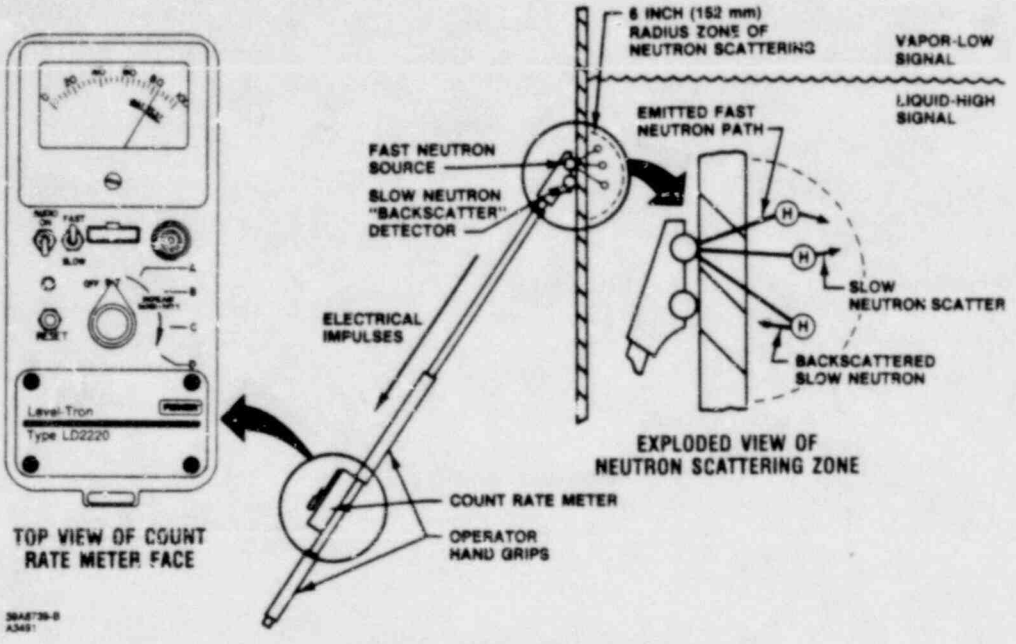


Figure 6. Operational Schematic

3. Connect one lead of the ohmmeter to the outside shield of the Type C connector and connect the other lead of the ohmmeter to the outside shield of the MHV connector. If the ohmmeter shows continuity, continue with the next step. If it does not show continuity, proceed to step 7 of this procedure.

4. Connect one lead of the ohmmeter to the outside shield of the Type C connector and connect the other lead of the ohmmeter to the inside center conductor of the MHV connector. If the ohmmeter does not show continuity, continue with the next step. If it does show continuity, proceed to step 7 of this procedure.

5. Connect one lead of the ohmmeter to the outside shield of the MHV connector and connect the other lead of the ohmmeter to the inside center conductor of the Type C connector. If the ohmmeter does not show continuity, continue with the next step. If it does show continuity, proceed to step 7 of this procedure.

6. Reconnect the MHV connector to the head assembly and the Type C connector to the count rate meter.

7. If the result of either step 2, 3, 4, or 5 has led to this step, the pole assembly may need to be replaced. Refer to the replacing the pole assembly portion of this section for additional information.

Replacing the Count Rate Meter

Perform this procedure if replacement of the count rate meter is necessary. Key numbers referenced in this procedure are shown in figure 8.

1. Disconnect the Type C connector (key 8) from the count rate meter (key 1).

2. Open the count rate meter and unscrew the two fillister screws (key 10) that secure the count rate meter to the pole assembly. Remove the count rate meter.

3. Install the new count rate meter. Secure the meter to the pole assembly with the fillister screws (key 10) and close the count rate meter.

4. Connect the Type C connector to the count rate meter.

Replacing the Pole Assembly

Perform this procedure if replacement of the pole assembly is necessary. This situation might result due to damage to the pole assembly or failure of the coaxial cable inside the pole assembly. Unless otherwise specified, key numbers referenced in this procedure are shown in figure 8.

WARNING

Be sure to keep hands and other bodily parts away from direct contact with the radiation source (key 26, figure 8) when performing this procedure. Failure to do so could cause personal injury due to radiation exposure. For safety reasons, it is recommended that all personnel in the immediate proximity of the level detector remain at least 18 inches (0.46 meters) from the radiation source whenever possible.

1. Disconnect the Type C connector (key 8) from the count rate meter (key 1).

2. Open the count rate meter and unscrew the two fillister screws (key 10) that secure the count rate meter to the pole assembly. Remove the count rate meter.

3. Disconnect the MHV connector (key 7) from the detector tube (key 29, figure 9) in the head assembly.

4. While disengaging the lock assembly (key 15, figure 9), remove the head assembly from the pole assembly.

5. Connect the new pole assembly to the head assembly by engaging the lock assembly. Connect the MHV connector to the detector tube in the head assembly.

6. Secure the count rate meter to the pole assembly with the fillister screws (key 10) and close the count rate meter. Connect the Type C connector to the count rate meter to complete the assembly.

Replacing the Head Assembly

Note

If an individual part of the head assembly requires replacement, the entire assembly must be replaced as a unit. Under no circumstances can the head assembly be disassembled to its individual parts.

Perform this procedure if replacement of the head assembly is necessary. Unless otherwise specified, key numbers in this procedure are shown in figure 8.

WARNING

Be sure to keep hands and other bodily parts away from direct contact with the radiation source (key 26, figure 8) when performing this procedure. Failure to do so could cause personal injury due to radiation exposure. For safety reasons, it is recommended that all personnel in the immediate proximity of the level detector remain at least 18 inches (0.46 meters) from the radiation source whenever possible.

1. Disconnect the MHV connector (key 7) from the detector tube (key 29, figure 9) in the head assembly.

2. Disengage the lock assembly (key 15, figure 9) and remove the head assembly from the pole assembly.

3. Connect the new head assembly to the pole assembly by engaging the lock assembly. Connect the MHV connector to the detector tube in the head assembly.

Disposal

WARNING

The radiation source (key 26, figure 8) used with this level detector contains radioactive material which can cause personal injury if mishandled in any way. Therefore, under no circumstances is the source housing to be disassembled, modified, or application altered in any manner. For any maintenance work involving removal of the radiation source, or of the head cover (key 14, figure 9), the head assembly of the device should be returned to Nuclear Sources and Services Inc., 5711 Etheridge, Houston, Texas, 77087. Always contact your Fisher sales office or sales representative when the head assembly is being returned for service.

Special rules apply to the transportation and shipment of radioactive materials. If transportation of the Type LD2220 Level Detector is contemplated, all shipments must comply with either the rules and regulations published by the U.S. Department of Transportation, 46 C.F.R. Part 146, 49 C.F.R. Parts 173-179, and 14 C.F.R. Part 103 or the applicable IATA/ICAO regulations. For any situation requiring the return or maintenance of the head assembly, the head assembly must be repackaged in its original storage/shipping container with appropriate seal wire or security tape and shipped to Nuclear Sources and Services Inc., 5711 Etheridge, Houston, Texas 77087.

The radiation source (key 26, figure 8) used in the Type LD2220 Level Detector is double encapsulated in a welded, stainless steel, heavy-walled capsule. It is highly unlikely that an accident, including fire, explosion, or excessive damage due to impact, could rupture the source container and thereby result in loss or dispersion of the radioactive material.

Note

Even though the capsule that houses the radiation source (key 26, figure 8) is a rugged container, it should never be intentionally handled roughly.

In the unlikely event that it does become necessary to dispose of a damaged radiation source, special arrangements must be made for the disposal of the Americium-241 radioactive material. Arrangements can be made by contacting the Fisher sales office or sales representative or by contacting a licensed disposal service that is qualified in handling radioactive wastes. The Type LD2220 Level Detector must not be transported anywhere until it is inspected by a licensed individual and packaged in an appropriate shipping shield.

Wipe Tests

Fisher Controls requires that the Type LD2220 Level Detector be tested with a wipe test kit at regular intervals not exceeding every six months. This means that wipe tests must be performed on the unit at least twice a year. The only reason a wipe test might be performed at an interval less than six months is if there is some reason to suspect that the radiation source (key 26, figure 8) is leaking. Such a situation would arise following an accident, explosion, or any instance where damage to the radiation source is suspected.

To perform a wipe test, complete the following procedure.

1. A wipe test kit is furnished with the unit and it consists of several cellulose discs of filter paper, 2-3/4 inches (70 mm) in diameter, along with several preaddressed envelopes. The envelopes enable the user to mail the wipe test samples to the appropriate nuclear agency for analysis. Ordering information for additional wipe test kits is available from:

Nuclear Sources and Services Inc.
5711 Etheridge
Houston, Texas 77087

WARNING

Be sure to keep hands and other bodily parts away from direct contact with the radiation source (key 26, figure 8) when performing the next step. Failure to do so could cause personal injury due to radiation exposure. For safety reasons, it is recommended that all personnel in the immediate proximity of the level detector remain at least 18 inches (0.46 meters) from the radiation source whenever possible.

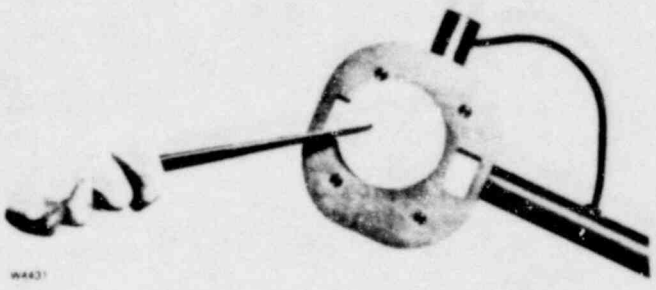


Figure 7. Wipe Test Procedure

2. Remove one of the wipe test discs from the kit and completely dampen it with tap water. Wring out any excess water. Hold the damp filter disc with a pair of forceps or tongs and wipe the outside of the radiation source (key 26, figure 8) thoroughly as shown in figure 7. Since extended exposure to the radiation source at close proximity is undesirable, this procedure should be performed as quickly and as vigorously as possible.

3. Mail the wipe test sample to:

Nuclear Sources and Services Inc.
5711 Etheridge
Houston, Texas 77087

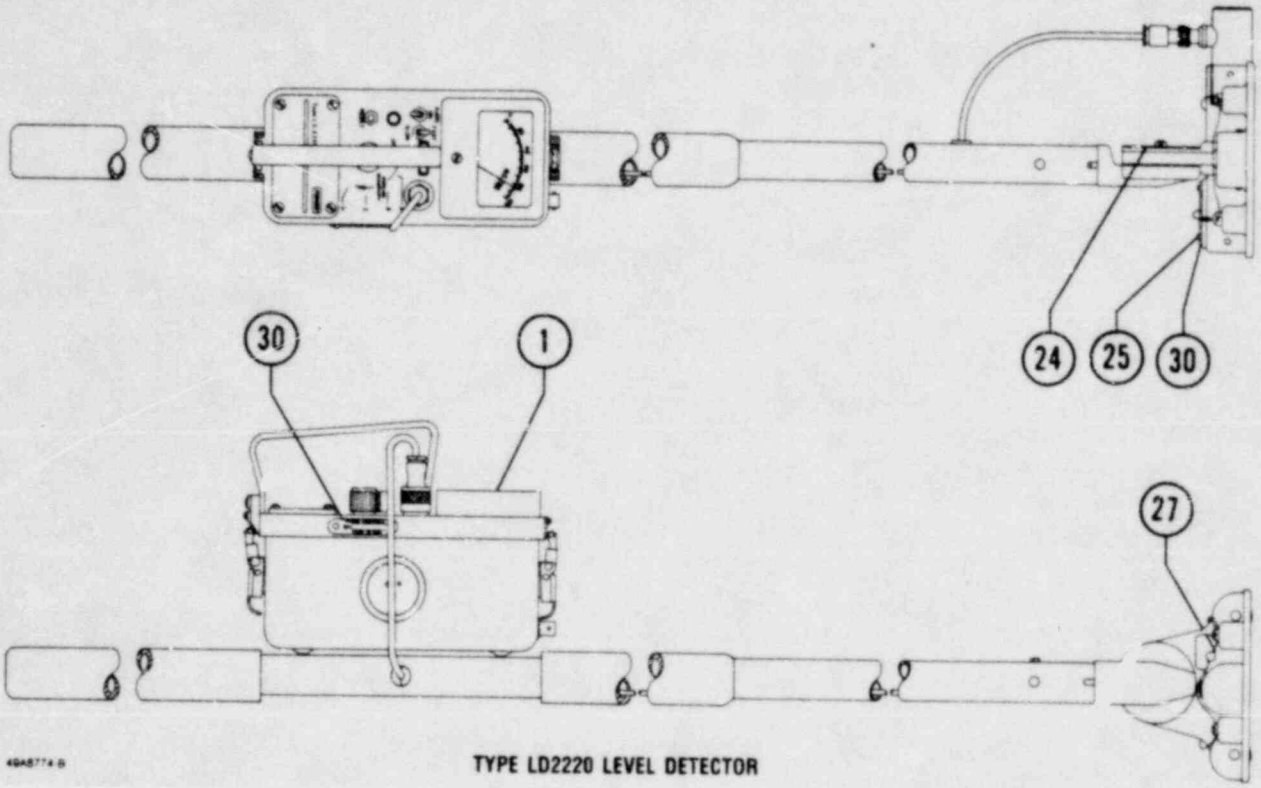
When mailing the wipe test sample, be sure to specify the following:

- The date the sample was taken
- The serial number of the radiation source (located on the warning nameplate of the unit as shown in figure 2), and
- A return address where analysis results should be sent.

4. When testing is completed, the level detector should be returned immediately to storage. Refer to the storage section for instructions on how to properly store the level detector.

Parts Ordering

When corresponding with the Fisher sales office or sales representative about this equipment, always provide the serial number of the level detector. When ordering replacement assemblies or replacement parts, refer to the 11-character part number of each assembly or part as found in the following parts list.



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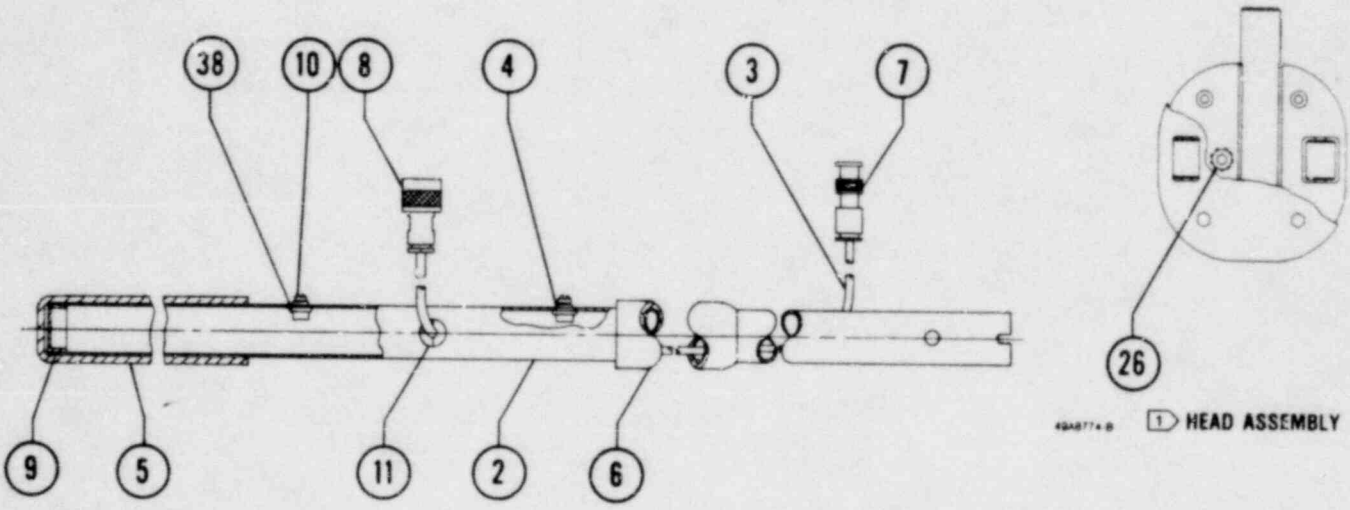
TYPE LD2220 LEVEL DETECTOR



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[1] HEAD ASSEMBLY

POLE ASSEMBLY

NOTE:

[1] SEE FIGURE 9 FOR DETAIL OF INDIVIDUAL PARTS OF HEAD ASSEMBLY.

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Figure 8. Type LD2220 Level Detector Assembly

Parts List

Parts Kits

Pole Assembly Kit includes keys 2 through 11 and 38	39A8769 X012
Head Assembly Kit includes keys 12 through 30, 36 and 37	30B2651 X012

Type LD2220 Level Detector

Key	Description	Part Number
1	Count Rate Meter, aluminum housing	39A8739 X012
2	Pole, aluminum/ Tufram[2]	29A8740 X012
3	Coaxial Cable, 58 U shielded	19A8770 X012
4	Blind Thread Insert, (2 req'd)	19A8745 X012
5	Rear Hand Grip, vinyl	19A8762 X012
6	Front Hand Grip, vinyl	19A8761 X012
7	MHV Connector	19A8756 X012
8	Type C Connector	19A8755 X012
9	Vent Cap	19A8771 X012
10	Fillister Screw, stainless steel (2 req'd)	1J8415 X0012
11	Strain Relief Bushing, black nylon (2 req'd)	10B1476 X012
12[3]	Handle Half-Head, aluminum/ iridite[4]	
13[3]	Source Half-Head, aluminum/ iridite	
14[3]	Head Cover, aluminum	
15[3]	Lock Assembly, stainless steel	
16[3]	Roller, TFE (2 req'd)	
17[3]	Groove Pin, stainless steel (2 req'd)	
18[3]	Wave Spring Washer, stainless steel (2 req'd)	
19[3]	Flat Washer, 316 stainless steel	
20[3]	Shield, cadmium foil	
21[3]	Retainer, stainless steel	
22[3]	Fillister Screw, stainless steel (2 req'd)	
23[3]	Drilled Head Screw, stainless steel (4 req'd)	
24[3]	Warning Nameplate, aluminum	
25[3]	Drive Screw, stainless steel (8 req'd)	
26[3]	Radiation Source, Americium 241-Beryllium, 200 millicuries	
27[3]	Seal Wire	
28[3]	Set Screw, stainless steel (2 req'd)	
29[3]	Detector Tube, stainless steel housing	
30[3]	Serial Tag, stainless steel (2 req'd)	
31	Storage Container, (Not shown)	19A8775 X012
32	Head Phones, (Not shown)	19A8776 X012
33	Carrying Strap, (Not shown)	19A8777 X012
34	Lower Packing Foam (Not shown)	10B2151 X012
35	Upper Packing Foam (Not shown)	10B2056 X012
36[3]	Adhesive, vinyl (Not shown)	
37[3]	Swage Standoff (4 req'd) (Not shown)	
38	Lock Washer, stainless steel (2 req'd) (Not shown)	14A9439 X012

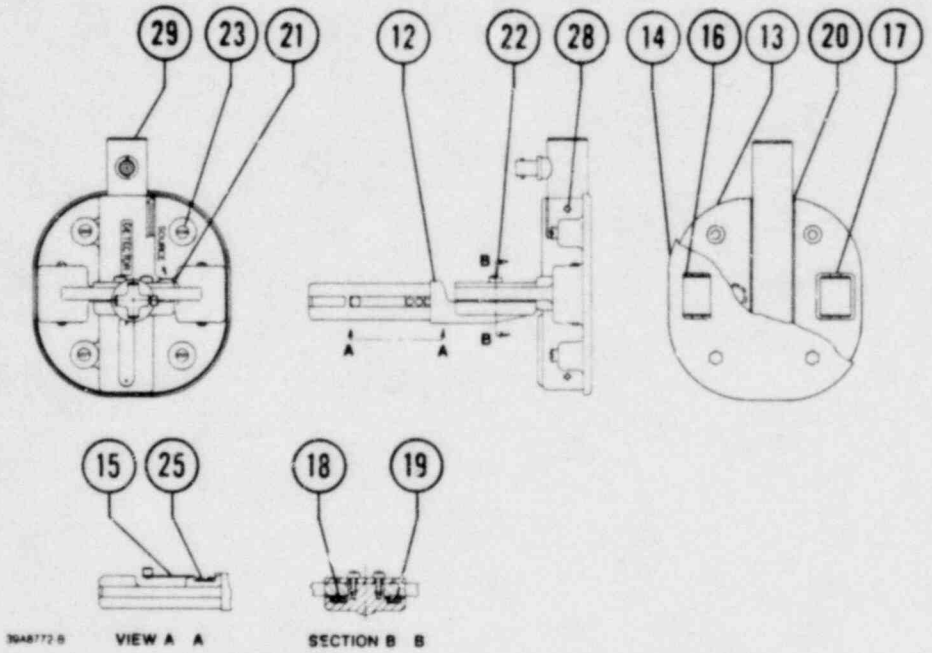

Figure 9. Head Assembly for Type LD2220 Level Detector

2. Trademark of American Magnaplate, Inc.
3. This part is replaceable only as part of a new head assembly, therefore no part number is shown.
4. Trademark of Witco Chemical Corp.

LD 2220 PORTABLE LEVEL DETECTOR

TRANSPORTATION GUIDELINE

This advance information is being released prior to final publication. Training Manual Form 5606 is scheduled for distribution this summer.

TRANSPORTATION GUIDELINE

In addition to NRC regulations controlling the use of radioactive materials, there are government regulations (e.g., D.O.T., I.A.T.A., I.C.A.O.) that control the transport of such materials via land, air or water. Should the need arise to transport the LD2220 to another location or to return it for service or disposal, there are procedures that must be followed in packaging, marking, labeling, and documenting the shipment to comply with the regulations. This guide is intended to be an aid in doing so. You are encouraged to obtain the latest copies of transportation regulations. Names and addresses where you can order the most commonly used regulations can be found at the end of this guide.

PACKAGING

The shipping/storage container the LD2220 was originally shipped in is an approved DOT Type 7A container. It is an appropriate shipping container for the device and should be retained for storage and for reuse in transporting the device should the need occur.

- Following the procedure on page 9 of the Type LD2220 Instruction Manual, detach the head assembly from the pole/meter assembly.

- Place the head assembly in the form fit foam cavity of the shipping/storage container and replace the top foam piece. Place the lid on the container and secure it using the snap lock ring.

- A security seal must be affixed before the package may be transported by carrier. This can be a lead seal wire, a security tape or any type of seal which is (a) not readily breakable and which, while intact, (b) will be evidence that the package has not been opened. A simple wire seal is a good idea to prevent inadvertent opening regardless of what security seal is used. A small piece of wire twisted through the latch can accomplish this.

- The container must be in good condition. If the original container has signs of damage that could affect its integrity, contact your Fisher representative to obtain a new container.

- Make sure old shipping labels and markings have been removed before transporting. Do not remove markings and labels required for transport (i.e. radioactive labels, warning label, description of contents and DOT 7A markings). See the following sections for details.

PACKAGE MARKINGS

The following markings must appear on the outside of the package.

RADIOACTIVE MATERIAL NOS
USA DOT 7A TYPE A UN 2974
NSSI 5711 ETHERIDGE HOUSTON, TEXAS

If the original decal or marking bearing this information has been removed from the shipping container, affix a new label. It can be placed anywhere it does not obscure any other labels except on the bottom of the container.

LABELS

The following labels must be affixed as specified to the shipping container. If a label is missing, it must be replaced before transporting. They can be obtained from authorized carriers (e.g., Emery, Federal Express, Roadway, etc.) or from N.S.S.I., 5711 Etheridge, Houston, Texas 77234.

- Two (2) "Radioactive II" labels applied to opposite vertical sides and marked with:

  Contents - Am 241
  Activity - .200 Curies
  Transport Index - 0.5

- One (1) "Danger" label applied adjacent to one of the radioactive labels.

The following diagram shows the proper placement of labels and markings for transport.

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DOCUMENTATION

To transport the LD2220 by highway in a company vehicle, a copy of the shipping papers must be kept next to the driver on the seat or in a pouch on the door of the vehicle. A copy of shipping papers you can use, which should also include the opening instructions, is found in Attachment A. The paperwork you can use may be duplicated on another form, however, the precise words and the sequence in which they appear must not be altered.

To truck air freight the LD2220, a "Shippers Declaration for Dangerous Goods: as well as a shipping bill must be filled out. Find examples of these forms for Emery Air Worldwide in Attachment B. Again the information on these forms may be duplicated, however, the precise words and sequence in which they appear must not be altered. NOTE: These forms are filled out per Title 49CFR regulations and are appropriate for transport within continental U.S. For ex-continental U.S. shipments, the forms must be filled out per IATA/ICAO regulations and copy of the the source "Special Form Certificate" must accompany the air bill. See examples of these forms in Attachment C.

GENERAL INFORMATION

Transport by company vehicle (e.g. to another plant site):

1. Shipping papers (see "Documentation" and Attachment A) must accompany the driver, either in the front seat or in a pouch on the door of the vehicle.

2. The bucket containing the head assembly should be transported in the locked trunk of the vehicle. If an open bed vehicle is used (e.g. pickup truck), the bucket must be secured to the frame of the vehicle. Bungee cords or tie downs can be used for this. In either case, the bucket should not be able to move around within the vehicle under normal transport conditions.

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3. While at a temporary job site, at all times the device should either be kept locked in the truck of the vehicle, secured to the vehicle, locked in a storage area or attended by an authorized individual who has been trained in the safe use and operation of the device.

Transport by licensed carrier (e.g. Emery, Federal Express):

1. The device may not be transported on or carried onto a passenger aircraft (i.e. Air Cargo only).

2. When transporting the device to a facility, make arrangements with them to receive or to pick up the device.

3. Ship the "hazardous" head assembly on a separate bill from the "non-hazardous" pole assembly. (See shipping bill examples in Attachment B.)

4. Send a copy of the "Opening Instructions" ahead of the device or include it with the shipping papers if no one is familiar with unpacking it.

RETURN FOR REPAIR OR DISPOSAL

1. Return the device to:

Nuclear Sources and Services, Inc.
5711 Etheridge
Houston, Texas 77234

Notify your Fisher representative that the device is being returned.

2. In case of emergency: If there is reason to believe the source has been damaged, contact your Fisher Controls representative or a licensed disposal service to survey the instrument before packaging for transport.

CONTROL NO. 80571

5520/ee