VM

VOID SHEET

TO: License Fee Management Branch

FROM: Region IV

SUBJECT: VOIDED APPLICATION

Control Number: 46 1349

Applicant: Dearborn Industries

Date Voided: 5/9/89

Reason for Void: Licensee decided not to renew this license since they have other licenses under which to put this material.

Billie Gruemmer 5/9/89
Signature Date

Attachment:
Official Record Copy of
Voided Action

FOR LFMB USE ONLY

Final Review of VOID Completed:

☐ Refund Authorized and processed

☐ No Refund Due

☐ Fee Exempt or Fee Not Required

Comments: _____

Log completed ☐

Processed by: _____

MLM

11/29/89

HALLIBURTON
LOGGING SERVICES, INC.

A Halliburton Company

April 10, 1989

RECEIVED
APR 1 1 1989

Mr. Jack Whitten
U.S.N.R.C., Region IV
Nuclear Materials, Licensing Branch
611 Ryan Plaza, Suite 1000
Arlington, Texas 76011

Re: Radioactive Materials License No. #42-06458-03

Dear Mr. Whitten,

The merger of Welex and Gearhart Industries took place on January 1, 1989. Since that time we have amended the Welex license changing the name of the company and adding some additional materials. We are now operating under our new Halliburton Logging Services License (No. 42-01068-07) and feel we have no need for the above referenced license.

Therefore, we would like to request termination of Radioactive Materials No. #42-06458-03. I am sending this request without Edgar Ortiz' (Vice President from Gearhart) signature since at this time Mr. Ortiz is out of the country. I spoke with Chuck Cain today and he said to go ahead and request this termination without Mr. Ortiz' signature.

Should you have any questions please contact me at 713/496-8319.

Sincerely,

Kenneth A. Jeck

Kenneth A. Jeck
Radiation Safety Officer

Post Office Box 42800 • Houston, Texas 77242 • 713/496-8100 • FAX 713/496-8344

Info copy

HALLIBURTON
LOGGING SERVICES, INC.

A Halliburton Company

February 23, 1989

Mr. Jack Whitten
U.S.N.R.C., Region IV
Nuclear Materials, Licensing Branch
611 Ryan Plaza, Suite 1000
Arlington, Texas 76011

FEB 24 1989

Re: **Radioactive Materials License No. 42-06458-03 (Gearhart)**
Radioactive Materials License No. 42-01068-07 (Welex)

Dear Mr. Whitten,

The merger of Gearhart Industries and Welex took place on January 1, 1989. Our original intent was to amend the Gearhart License and then terminate the Welex license. However, after speaking with you on the telephone yesterday, we now feel that it would be advantageous for us to request amendments of the Welex License. Then, after receiving the amendments, we will request termination of the Gearhart License. This letter supersedes Steve Sellers letter of December 28, 1988 and my letter of February 22, 1989.

We wish to maintain Radioactive Materials License No. 42-01068-07 and amend as follows:

Change Item #1 to reflect the following:

1. Name: Halliburton Logging Services, Inc.

Amend items 6,7,8, and 9 to add the following materials:

Radioisotope	Form	Maximum Amount
A. Barium-140/ Lanthanum-140	A. Any	A. 100 millicuries
B. Cobalt-60	B. Any	B. 100 millicuries
C. Iridium-192	C. Any	C. 2 curies
D. Scandium-46	D. Any	D. 1 curie
E. Silver-110	E. Any	E. 100 millicuries
F. Zirconium-95/ Niobium-95	F. Any	F. 100 millicuries

Post Office Box 42800 • Houston, Texas 77242 • 713/496-8100 • FAX 713/496-8344

Radioisotope	Form	Maximum Amount
G. Americium-241:Be	G. Sealed neutron sources (Parkwell Laboratories Model PL-AmBe; Gamma Industries Model NB(HP); Gulf Nuclear Model NEEI-AmBe-71-1)	G. Not to exceed 5 curies per source
H. Americium-241	H. Sealed neutron sources (Gulf Nuclear Model AmBe-71-2A, Gamma Industries Model NB(HP)	H. Not to exceed 20 curies per source
I. Cesium-137	I. Sealed sources (Gamma Industries Model VP(HP) or Gulf Nuclear Model CSV)	I. Not to exceed 20 curies per source
J. Cesium-137	J. Sealed sources (U.S. Nuclear Type 373 or 374)	J. Not to exceed 200 millicuries per source
K. Cesium-137	K. Sealed sources (Gulf Nuclear Model VL-1)	K. Not to exceed 125 millicuries per source
L. Cesium-137	L. Sealed sources (Gulf Nuclear Model CS-2)	L. Not to exceed 50 millicuries per source
M. Cobalt-60	M. Sealed sources (NUMEC Dwg. 11-B-208)	M. Not to exceed 120 millicuries per source
N. Cobalt-60	N. Sealed sources (Gulf Nuclear Model CS-2)	N. Not to exceed 250 millicuries per source
O. Cesium-137	O. Sealed sources (Amersham Corporation Model CDC.CYn)	O. Not to exceed 3 curies per source
P. Americium-241:Be	P. Amersham Corporation Model AMN.CYN Series)	P. Not to exceed 20 curies per source
Q. Americium-241	Q. Sealed neutron sources (Gulf Nuclear Model NEEI-AmBe 71-1)	Q. Not to exceed 250 millicuries per source
R. Gadolinium-153	R. Sealed sources (Gulf Nuclear Model Gd-1)	R. Not to exceed 5 millicuries per source
S. Cesium-137	S. Sealed sources (Amersham Corporation Model CDC.800 or CDC.700 series)	S. Not to exceed 375 millicuries per source

Radioisotope	Form	Maximum Amount
T. Americium-241	T. Sealed neutron sources (Amersham Corporation Model AMN.PE8)	T. Not to exceed 1 curie per source
U. Hydrogen-3	U. Plated sources	U. Not to exceed 3 curies per target

Authorized use

A through F to be used for tracer studies in well bores.
G through P to be used for oil and gas well logging.
Q through T to be used for instrument calibrations.
U to be used in Gearhart Industries Model 013-1004-000 downhole accelerators.

Amend Condition 10 to include the following active storage locations:

P.O. Box 14060
13401 North Santa Fe
Oklahoma City, Oklahoma 73113
405/235-8501

P.O. Box 1166
Washington Street Extension
Route 27 at
Old Ellis Intersection
Meadville, Pennsylvania 16335
814/724-6010

R.D. Route #2, Box 1790
8 Miles west of Indiana
Pennsylvania on Route 286
Homer City, Pennsylvania 15478
412/479-3591

P.O. Box 838
Route 3, Industrial Park
Pauls Valley, Oklahoma 73075
405/238-6423 or 238-6424

208 Wood County Airport
Industrial Park
Parkersburg, West Virginia 26101
304/464-5200

P.O. Box 1831
2.5 miles North of
Jct. I-40 and Hwy 18
on Wolverine Road (74801)
Shawnee, Oklahoma 74802-1831
405/273-4408 or 273-4421

P.O. Box 348
2504 South Monroe (73701)
Enid, Oklahoma 73702
405/237-6747 or 237-6790

P.O. Box 2515
1016 East Lincoln
Gillette, Wyoming 82716
307/682-9288

5776 Venture Way
Mt. Pleasant, Michigan 48858
517/773-0777

P.O. Box 67
Mile 85.5 Sterling Highway
Sterling, Alaska 99672
907/262-4459

1709 Elk St.
Rock Springs, Wyoming
(No Telephone Number Yet)

Rt. 1, Box 95
Gate City, Virginia 24251
703/452-2536

P.O. Box 1435
Halliburton Property, Plant II
Building 718
Duncan Oklahoma 73536
405/251-3760

2555 Spine Road
Pouch 340053
Prudhoe, Alaska 99734
907/659-2555

P.O. Box 126
510 48th Street (73901)
Woodward, Oklahoma 73802-0126
405/256-2488

Add to condition 12. A. 1. sources G through T.

After we receive these amendments to the Welex License, we will then request termination of the Gearhart License.

We would like to request a refund of the License Renewal fee from the Gearhart License and a refund from the amendment request of December 28 1988.

Enclosed is a check for $170 to cover the amendment fee. Should you have any questions please contact me at 713/496-8319.

Sincerely,

Kenneth A. Jeck

Kenneth A. Jeck
Radiation Safety Officer

cc: Phil Longorio
Doug Henderer
Larry Albert
Mike Hinz/ Jim Aberle

HALLIBURTON
LOGGING SERVICES, INC.

A Halliburton Company

February 22, 1989

RECEIVED
FEB 23 1989

Mr. Jack Whitten
U.S.N.R.C., Region IV
Nuclear Materials, Licensing Branch
611 Ryan Plaza, Suite 1000
Arlington, Texas 76011

Re: Radioactive Materials License No. 42-06458-03

Dear Mr. Whitten,

Due to an increase in business in our Denver Division, Halliburton Logging Services plans to open a new District in Rock Springs, Wyoming. Therefore, we would like to amend our U.S.N.R.C. Radioactive Materials License to include the District at Rock Springs, Wyoming.

Amend Condition 10 to include the following active storage locations:

P.O. Box 14060
13401 North Santa Fe
Oklahoma City, Oklahoma 73113
405/235-8501

P.O. Box 1166
Washington Street Extension
Route 27 at
Old Ellis Intersection
Meadville, Pennsylvania 16335
814/724-6010

R.D. Route #2, Box 1790
8 Miles west of Indiana
Pennsylvania on Route 286
Homer City, Pennsylvania 15478
412/479-3591

P.O. Box 838
Route 3, Industrial Park
Pauls Valley, Oklahoma 73075
405/238-6423 or 238-6424

208 Wood County Airport
Industrial Park
Parkersburg, West Virginia 26101
304/464-5200

P.O. Box 348
2504 South Monroe (73701)
Enid, Oklahoma 73702
405/237-6747 or 237-6790

P.O. Box 2515
1016 East Lincoln
Gillette, Wyoming 82716
307/682-9288

5776 Venture Way
Mt. Pleasant, Michigan 48858
517/773-0777

P.O. Box 67
Mile 85.5 Sterling Highway
Sterling, Alaska 99672
907/262-4459

1709 Elk St.
Rock Springs, Wyoming
(No Telephone Number Yet)

Rt. 1, Box 95
Gate City, Virginia 24251
703/452-2536

P.O. Box 1831
2.5 miles North of
Jct. I-40 and Hwy 18
on Wolverine Road (74801)
Shawnee, Oklahoma 74802-1831
405/273-4408 or 273-4421

P.O. Box 1435
Halliburton Property, Plant II
Building 718
Duncan Oklahoma 73536
405/251-3760

2555 Spine Road
Pouch 340053
Prudhoe, Alaska 99734
907/659-2555

P.O. Box 126
510 48th Street (73901)
Woodward, Oklahoma 73802-0126
405/256-2488

Should you have any questions please contact me at 713/496-8319.

Sincerely,

Kenneth A Jeck

Kenneth A. Jeck
Radiation Safety Officer

cc: Phil Longorio
Doug Henderer

MILESTONE-15 REQUEST

February 22, 1989

Gearhart Industries, Inc.
42-06458-03
30-12253

Ken Jeck
713-596-5488

ITEMS DISCUSSED DURING TELEPHONE CONVERSATION

1. Termination of the Gearhart Industries, Inc. license.

2. Amendment of the Halliburton Company/Welex License No. 42-01068-07.

3. Name change on the Haliburton/Welex license to that of Halliburton Logging Services, Inc. This name change is a result of the merger of the Halliburton/Welex with the Gearhart Industries.

LICENSEE COMMITMENTS

1. Provide us a letter signed by the former Gearhart Industries management requesting that this license be terminated in conjunction with the amendment of the Welex license to change name and to add Gearhart sources and locations not covered on the Welex license.

2. In the amendment request for termination ask for amendment refund on Gearhart license renewal.

3. Letter to be written and mailed this week or early next week.

NOTE: Ken Jeck is Steve Sellers understudy. A request will be forthcomming in the near future to add him to the Halliburton Logging Services, Inc. license as the Radiation Safety Officer.

Billy/ Ken indicated he had sent to us by overnight mail a request to add another location to the Gearhart license. Catch this request and give it to me so that I may make it part of the combined Welex/Gearhart licensing request.

JAN 10 1989

Welex Company
ATTN: Mr. Steve Sellers
Radiation Safety Officer
General Office
P.O. Box 42800
Houston, TX 77242

Gentlemen:

Enclosed is Check No. 5083 ($170) which accompanied your December 28, 1988 request for an amendment to Materials License 42-06458-03. The Licensing staff has informed us that your request will be incorporated with your renewal request for which the fee has been paid. Therefore, an additional fee is not required.

Signed by:
Glenda Jackson

Glenda Jackson
License Fee Management Branch
Division of Accounting and Finance
Office of Administration and
Resources Management

Enclosure:
Check No. 5083 ($170)

cc w/o enclosure:
Region IV

RECEIVED
JAN 27 1989

DISTRIBUTION
File
ARM/DAF R/F
LFMB R/F (2)
DW/RIVV/WELEX

Jan-2-IV (87)
5083
$170
1/3/89
returned 1/10/89 combined w/ renewal
46139

ARM/LFMB	ARM/LFMB
MMessier:kb	GJackson
01/9/89	01/10/89

Welex

A Halliburton Company

December 28, 1988

Mr. Jack Whitten
U.S.N.R.C., Region IV
Nuclear Materials, Licensing Branch
611 Ryan Plaza, Suite 1000
Arlington, TX 76011

Re: Radioactive Materials License 42-01058-07 (Welex)
Radioactive Materials License 42-06458-03 (Gearhart)

Dear Mr. Whitten:

Effective January 1, 1989, the merged companies of Welex and Gearhart Industries legally become Halliburton Logging Services, Inc.; a Subsidiary of Halliburton Company.

We wish to maintain Radioactive Materials License #42-06458-03 and amend as follows:

Change Items #1 and #2 to reflect the following:

1. Name: Halliburton Logging Services, Inc.

2. Address: P. O. Box 42800
Houston, Texas 77242

Amend Items 6, 7, 8 and 9 to include the following:

A. Americium-241	A. Sealed sources (Gulf Nuclear, Inc. Model VL-1)	A. Not to exceed 1 curie per source
B. Cesium-137	B. Sealed sources (U.S. Nuclear Model 376; Tracerlab CS-15; General Nuclear Model GNI-VD(HP); New England Nuclear Model NER-572)	B. Not to exceed 2 curies per source
C. Hydrogen-3	C. Sealed neutron generator tubes (Kaman Sciences Corp., Model A-3062)	C. Not to exceed 3 curies per tube
D. Americium-241	D. Sealed neutron sources (Gammatron Model AN-HP; Amersham Model AMN.CYn)	D. Not to exceed 500 millicuries per source

461349

General Office
Post Office Box 42800
Houston, Texas 77242
713/496-8100

E. Cesium-137	E. Sealed sources (Hastings Model Cs-01 WX; Nuclear Sources and Services Model Cs-WX-.01)	E. Not to exceed 0.01 millicurie per source
F. Cobalt-60	F. Sealed source (Tracerlab intercavitary)	F. Not to exceed 1 millicurie per source
G. Americium-241:Be	G. Sealed sources (General Nuclear Model NB-HP and NUMEC Model AM 154/123/100/93/62	G. Not to exceed 5 curies per source
H. Americium-241:Be	H. Sealed source (Amersham Model AMN-CYn)	H. Not to exceed 20 curies per source
I. Cesium-137	I. Sealed sources (Amersham Model CDC.CYn; Gammatron Model GT-GHP)	I. Not to exceed 20 curies per source

AUTHORIZED USE

A, B, C, G, H and I to be used for oil and gas well logging.
D to be used for performing logging tool instrument calibrations.
E and F to be used for performing instrument calibrations.

Amend Condition #10 to include the following active storage locations:

P. O. Box 14060
13401 North Santa Fe
Oklahoma City, Oklahoma 73113
405/751-5770

P. O. Box 1166
Washington Street Extension
Route 27
at Old Ellis Intersection
Meadville, Pennsylvania 16335
814/724-6010

R. D. #2, Box 1790
8 miles West Indiana
Pennsylvania on Route 236
Homer City, Pennsylvania 15748
412/479-3591

P. O. Box 838
Route 3, Industrial Park
Pauls Valley, Oklahoma 73075
405/238-6423 or 238-6424

P. O. Box 348
2504 South Monroe (73701)
Enid, Oklahoma 73702-0348
405/237-6747 or 237-6790

P. O.Box 2515
1016 East Lincoln
Gillette, Wyoming 82716
307/682-9288

5776 Venture Way
Mt. Pleasant, Michigan 48858
517/773-0777

P. O. Box 67
Mile 85.8 Sterling Hwy
Sterling, Alaska 99672
907/262-4459

208 Wood County Airport
Industrial Park
Parkersburg, W. Virginia 26101
304/464-5200

P. O. Box 1831
2-1/2 miles North of
Junction I-40 and Hwy 18
on Wolverine Road (74801)
Shawnee, Oklahoma 74802-1831
405/273-4408 or 273-4421

2555 Spine Road
Pouch 340053
Prudhoe, Alaska 99734
(North Slope)
907/659-2592 or 659-2555

Rt. 1, Box 95
Gate City Virginia 24251
703/452-2536

P. O. Box 1435
Halliburton Property, Plant II
Building 718
Duncan, Oklahoma 73536
405/251-3760

P. O. Box 126
510 48th Street (73901)
Woodward, Oklahoma 73802-0126
405/256-2488

Amend Condition #13 to read:

A. Radioactive material shall be used only by, or under the supervision of, individuals designated by the Radiation Safety Officer, only after each user has successfully completed an Agency accepted training course.

B. Certificates verifying the successful completion of the required training for each user shall be maintained by the licensee for inspection by the agency.

C. The individual designed to perform the function of Radiation Safety Officer for activities covered by this license is Steve Sellers (resume submitted in Welex License No. 42-01068-07 amendment request dated April 21, 1986).

Robert Voelker, Radiation Safety Officer under License No. 42-06458-03, has resigned and is no longer available to the company.

We request that we be authorized to hold radioactive material with a physical half-life of less than 65 days for decay-in-storage before disposal in ordinary trash provided:

A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.

B. Before disposal as normal waste, radioactive waste shall be surveyed to determine that its radioactivity cannot be distinguished from background. All radiation labels will be removed or obliterated.

Add the following item:

We request permission to calibrate our own radiation detection instruments as described in Welex procedures letter dated July 31, 1984.

As former Welex locations are closed out, surveys will be conducted, radiation levels documented, and forwarded to your office along with a request to terminate the Welex license.

Enclosed is our check in the amount of $170.00 for the amendment fee.

Should you have any questions, please contact me at (713) 596-5488.

Sincerely,

Steve Sellers
Radiation Safety Officer

SPS/lz

cc: Larry Albert
Phil Longorio
George Harrison
Doug Henderer
Mike Hinz

461349

FEB 18 1987

Gearhart Industries, Inc.
Go Wireline Services Division
ATTN: Don L. Wigley
Vice President
P. O. Box 1258
Fort Worth, TX 76101

Docket No. 030-12253
License No. 42-06458-03
Control No. 461349

Gentlemen:

This is to acknowledge receipt of your application for renewal of the byproduct material license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified and your license number.

Sincerely,

"Original Signed by
J. A. Marshall"

R. J. Everett, Chief
Nuclear Materials Safety Section

NMSS
JAMarshall:lw
2/4/87

C:NMSS
RJEverett
2/9/87

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76011

03012253
03110
2/87

BETWEEN: William O. Miller, Chief
License Fee Management Branch
Office of Administration

R. J. Everett, Chief
Material Radiation Protection Section, TPB,
DV&TP, RIV

RECEIVED
JAN 30 1987

LICENSEE FEE TRANSMITTAL

A. REGION IV

1. APPLICATION ATTACHED

Applicant/Licensee: Gearhart Ind, Corp.

Application Dated: 1/19/87

Control No.: 46134 9

License No.: 42-06458 03 (03-12253)

2. FEE ATTACHED

Amount: $700

Check No.: 173133

3. COMMENTS

Signed Laura Hurley

Date 1/21/87

B. LICENSEE FEE MANAGEMENT BRANCH

1. Fee Category and Amount: 5A ($700)

2. Correct Fee Paid. Application may be processed for:

Amendment _____

Renewal ✓

License _____

Signed M. Musiu

Date 1/28/87

GEARHART INDUSTRIES, INC.

January 19, 1987

USNRC, REGION IV
MATERIAL RADIATION PROTECTION SECTION
ATTN: Mr. Jack Whitten
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Re: License Renewal, No. 42-06458-03
Dear Mr. Whitten,

Following information submitted for renewal of referenced license and follows the format of NRC Form 313, Application For Material License, and the simplified renewal instructions provided by the Nuclear Materials Safety Section:

Item 1. Renewal

Item 2. Gearhart Ind., Inc.
Wireline Personnel/Safety
P.O. Box 1936
Ft. Worth, Tx. 76101

Item 3. Updated operating location listing enclosed.
Reflects all Facility Change Notifications submitted to date (Atch.1).

Item 4. No Change (letter, 2/6/84).

Item 5. Updated listing of radioactive materials in use enclosed.
Deletes items not in use (Atch.2).

Item 6. No Change.

Item 7. RSO: Information submitted for myself in letter dated 6/2/84.
FIELD LOCATIONS: See enclosed Operating Procedures Manual, pp.2-3 (Atch.3).

Item 8. See enclosed Operating Procedures Manual, pp. 2-3 (Atch.3). three-day (24 hours) classroom training for Radiological Handlers is presently provided by GNI, Inc., Houston, Texas.

Item 9/10 See enclosed Operating Procedures Manual (Atch.3).

Item 11. See enclosed Operating Procedures Manual, pp. 14-15.
Excess/unserviceable sealed sources, as well as tracer materials which for any reason cannot be permitted to decay to background in Company storage facilities, are consigned to GNI, Inc. for disposal.

application.

Post Office Box 1258 Fort Worth, Texas 76101 Telephone (817) 293-1300

461349

Item 12. License renewal fee check in the amount of $700.00 is enclosed.

Item 13. Certifying official is the Operations Manager responsible for activities conducted in accordance with the provisions and conditions of this license.

Other: Request that Gearhart Industries, Inc. Downhole Accelerator logging tool, Model No. 013-1004-000, be added.
Enclosed in support of the request are:

A. Application for Safety Review submitted to the Texas Department of Health, dated 2/10/84 (Atch.4).

B. Additional information letter, dated 3/28/84 (Atch.5).

C. Completed evaluation issued by the Texas Department of Health, dated 4/17/84 (Atch.6).

D. Texas Department of Health R/A License Amendment, dated 5/7/84, adding the tools to Gearhart's license (Atch. 7).

Sincerely,

Bob Voelker
Radiation Safety Officer

Attachment

BV/ma

NRC FORM 313
(3-85)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires 8-31-87

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 HAMPSHIRE, 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
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER 42.06458.03

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

Gearhart Industries, Inc.
P.O. Box 1936
Ft. Worth, Texas 76101
Attn: Wireline Safety

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

See Attachment 1 for listing of current operating locations.

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Robert G. Voelker, RSO

TELEPHONE NUMBER: 817/551-4188

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 AND EQUIPMENT.
Items 5-12, see

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.
cover letter.

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
Don L. Wigley	Don L. Wigley	Vice President	1/19/87

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
REN	Jan-2-IV	5A		D. Nussin
AMOUNT RECEIVED	CHECK NUMBER			DATE
$700	173133			1/20/87

PRIVACY ACT STATEMENT ON THE REVERSE

461349

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY**: Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)**: The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES**: The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION**: Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not effect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS**: U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

GEARHART INDUSTRIES, INC. OPERATING LOCATIONS

Gearhart Industries, Inc.
Wireline Services
P. O. Box 14060
13401 North Santa Fe
Oklahoma City, Oklahoma 73113
405/751-5770

Gearhart Industries, Inc.
Wireline Services
P. O. Box 1166
Washington Street Extension
Route 27 at Old Ellis Intersection
Meadville, Pennsylvania 16335
814/724-6010

Gearhart Industries, Inc.
Wireline Services
P. O. Box 348
2504 South Monroe (73701)
Enid, Oklahoma 73702-0348
405/237-6747 or 237-6790

Gearhart Industries, Inc.
Wireline Services
P. O. Box 2515
1016 East Lincoln
Gillette, Wyoming 82716
307/682-9288

Gearhart Industries, Inc.
Wireline Services
R.D. #2, Box 255B
8 miles West Indiana, Pennsylvania
on Route 286
Homer City, , Pennsylvania 15748
412/479-3591

Gearhart Industries, Inc.
Wireline Services
5776 Venture Way
Mt. Pleasant, Michigan 48858
517/773-0777

Gearhart Industries, Inc.
Wireline Services
P. O. Box 838
Route 3, Industrial Park
Pauls Valley, Oklahoma 73075
405/238-6423 or 238-6424

Gearhart Industries, Inc.
Wireline Services
P. O. Box 57
Mile 85.8 Sterling Hwy.
Sterling, Alaska 99672
907/262-4459

Gearhart Industries, Inc.
Wireline Services
208 Wood County Airport
Industrial Park
Parkersburg, West Virginia 26101
304/464-5200

Gearhart Industries, Inc.
Wireline Services
P. O. Box 1831
2½ miles N of Junction I-40
& Hwy. 18 on Wolverine Road (74801)
Shawnee, Oklahoma 74802-1831
405/273-4408 or 273-4421

Gearhart Industries, Inc.
Wireline Services
2555 Spine Road
Pouch 340053
Prudhoe, Alaska 99734
(North Slope)
907/659-2592 or 659-2555

Gearhart Industries, Inc
Wireline Services
701 West Commerce St.
POB 1416
Clinton, Ok 73601
405/323-1830

Atch 1

ELEMENT/MASS NUMBER	CHEMICAL/PHYSICAL FORM	MAXIMUM ACTIVITY	USE
I-131	Any	1.0 Ci.	Tracer operations in oil and ga wells. Gearhart P/N 005-4001-00
Ir-192	Any	1.0 Ci.	Same as above.
Co-60	Wire	300 mCi.	Collar markers, oil and gas well casing
Am241Be	Sealed source (GN Model 71-2A, GI Model HB [HP], Gtrn Model AN-HP, Monsanto Model B-24174, A/S Model AMN.CT6).	No single source to exceed 20 Ci.	Neutron logging of oil and gas wells. Gearhart P/N 003-4 08-4
Am241Be	Sealed source (Monsanto Model NRC B-88-S-Ambe, GI Model HB [HP], GN Model 71-1 NUMEC Model NUMEC Am-62, A/S Model AMN.CT5).	No single source to exceed 5 Ci.	Same as above. Gearhart P/N 001-3000-200 and 003-4700-800
Am241	Sealed sources (GI Model HB [HP], Gtrn Model AN-HP, GN Model V1-1).	No single source to exceed 300 mCi.	Density logging of oil and gas wells. Gearhart P/N 006-5101-8
Am241	Sealed sources (GN Model VL-1).	No single source to exceed 0.1 mCi.	Calibration of logging tools.
Am241Be	Sealed source (A/S Series AMN. PEB).	No single source to exceed 800 mCi.	Same as above.
Am241Be	Sealed sources (GN Model 71-1)	No single source to exceed 250 mCi.	Calibration of logging tools.
Cs-137	Sealed source (GI Model VD [HP], GN Model CSV, A/S Model CDC.CY10).	No single source to exceed 2.4 Ci.	Density logging of oil and gas wells. Gearhart P/N 003-4700-7
Cs-137	Sealed source (USN Type 373 or 374, GN Model CSV).	No single source to exceed 300 mCi.	Same as above, Gearhart P/N 005-5010-000
Cs-137	Sealed sources (GN Model VL-1).	No single source to exceed 125 mCi	Same as above. Gearhart P/N 002-9241-001.
CS-137	Sealed sources (GN Model CS-2).	No single source to exceed 50 mCi.	Same as above. Gearhart P/N 005-5010-000.
CS-137	Sealed sources (A/S series CDC 700/800).	No single source to exceed 300 mCi.	Logging tool calibration.

Atch 2

ELEMENT/MASS NUMBER	CHEMICAL/PHYSICAL FORM	MAXIMUM ACTIVITY	USE
Gd-153	Sealed sources (GN Model GD-1).	No single source to exceed 5 mCi.	Logging tool calibration.
Ra-226	Sealed sources (GN Model RA-20 or RA-20S).	No single source to exceed 20 microcuries.	Same as above.
Ra-226	Sealed sources (GN Model RA-2 or Gtrn Model GT-G).	No single source to exceed 3 microcuries.	Same as above.
Co-60	Sealed sources (GN Model CSV).	No single source to exceed 250 mCi.	Density logging of oil and gas wells. Gearhart P/N 005-5030-000.
Co-60	Sealed sources (GN Model CSV or NUMEC Dwg. 11-B-208).	No single source to exceed 120 mCi.	Same as above. Gearhart P/N 005-5030-000.
Co-60	Sealed sources (GN Model 72-CO-200 or GNI Model GNI-TS-3).	No single source to exceed 200 microcuries.	Density logging and orientati in oil and gas wells. Gea P/N 005-5030-000
H-3	Tritium gas and titanium tritide or scandium tritide (absorbed).	No single unit to exceed 3 Ci.	Neutron Activation Logging i oil and gas wells. Gearhart Model No. 013-1004-000.

GEARHART
THE GO COMPANY

GEARHART INDUSTRIES, INC.
WIRELINE SERVICES

RADIOACTIVE MATERIAL STORAGE, USAGE and OPERATING INSTRUCTIONS

WIRELINE SERVICES
SAFETY DEPARTMENT
FORT WORTH, TEXAS 76101

461349

WS-105 5-76 R 10-86

Atch 3

FOREWORD

This manual contains procedures for the use and handling of sources of radiation routinely used in the petroleum industry by employees of Gearhart Industries, Inc. Wireline Services Division. These procedures are supplemental to the Licensing Agency Regulations (U.S. Nuclear Regulatory Commission - "NRC", or Agreement State Department of Health Agency - "Agreement State") and the conditions specified in the license issued by the applicable agency.

It is the intent of Gearhart Industries, Inc. to fully comply with Federal and State regulations regarding the industrial use of these materials, and to minimize hazards to employees, client personnel and the general public by insuring that company personnel are committed to and follow prescribed procedures.

Operations routinely performed result in personnel exposures considerably below those permitted by regulatory agencies. Despite this, it is the Company's intent to further limit personnel exposures to values which are as low as are reasonably achievable for the operations and services being performed. Adherence to the procedures and practices continued herein will insure that objective is met.

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CHAPTER I - GENERAL

A. RADIATION PROTECTION AND COMPLIANCE PROGRAM MANAGEMENT RESPONSIBILITIES

1. RADIATION SAFETY OFFICER (RSO)

a. The Company RSO is responsible for managing the radiation protection and compliance program.

b. Responsibilities include the administration, supervision, record keeping, reporting and compliance required by the licensing agencies, and the delegation of authority to and supervision of personnel designated to manage operating location radiation protection and compliance programs.

2. OPERATING LOCATION (DISTRICT) MANAGEMENT

a. The incumbent manager at each operating location which possesses radioactive material is the designated RSO for that location, as well as any sub-districts reporting to that operating location.

b. Responsibilities include the conduct of the required radiation protection and compliance program at the operating location, as well as at any sub-districts reporting to that location. This is to be accomplished in coordination with and through the Company RSO and line management/staff.

B. PERSONNEL QUALIFICATIONS

1. RADIOLOGICAL HANDLERS

a. Personnel responsible for management of the Company's radiation protection and compliance program, as well as those personnel responsible for utilizing or supervising the use of radioactive materials in the performance of field services, must have successfully completed the Company Radiation Safety Training Course, or its equivalent which is recognized by the applicable licensing agency, and must be designated qualified Radiological Handlers by the Company RSO. Specific job classifications to which this applies:

(1) Safety Officers
(2) District Managers/Engineers In Charge
(3) Service Managers
(4) Field Engineers
(5) Completion Engineers
(6) Completion Specialists
(7) Technicians

b. Training Course Curriculum:

(1) Principles and practices of radiation protection.
(2) Radioactive measurement standardization and monitoring techniques and instruments.
(3) Mathematics and calculations basic to the use and measurement of radioactivity.
(4) Biological effects of radiation.
(5) Equipment to be used:

(a) Handling tools
(b) Sources of radiation
(c) Storage and transportation requirements
(d) Operation and control of equipment

(6) Federal and State regulations
(7) Company operating, emergency and record keeping requirements.
(8) Successful completion of written examination (70% minimum passing score).

c. In addition to classroom training, Field Engineers, Completion Engineers, and Completion Specialist will demonstrate proficiency in the performance of field services involving the use of sources of radiation under the direct supervision of a designated qualified Radiological Handler before performing in an unsupervised capacity.

2. OPERATORS

a. Field crew Operators may assist in the performance of field services involving the use of sources of radiation only when under the direct supervision of a qualified Radiological Handler.

b. Before doing so, Operators will:

(1) Be issued a personal copy of this manual and the Gearhart Industries, Inc. Radiation Safety manual (G-1817).
(2) Receive training administered by a qualified Radiological Handler in the following:

(a) Principles and practices of radiation safety
(b) Biological effects of radiation
(c) Equipment to be used
(d) Company operating and emergency procedures

(3) Demonstrated satisfactory understanding of and proficiency in the above to the Radiological Handler.
(4) Document completion of (1), (2), and (3) above on form WS-381. Forward original to Wireline Safety Department, Fort Worth. Retain a copy in individual's field location personnel file.

C. PERSONNEL MONITORING

1. All employees who are required to work with or be in the vicinity of radioactive materials used in the performance of the Company's services will be issued thermoluminescent (TLD) badges.

2. An employee is not to perform duties associated with radioactive materials until incepted into the monitoring program and the TLD has been received and instruction for use has been given:

   a. Badge is to be worn at all times when on duty.

   b. Badge is to be clipped to clothing or placed in a pocket on the front portion of the wearer's body. NOTE: There is no "front" or "back" side to the badge.

   c. Badge is not to be worn when undergoing x-ray diagnosis or treatment, and it is not to be left near sources of radiation or high heat.

   d. Lost or inadvertently exposed (actual or suspected) badges are to be reported immediately to the Wireline Safety Department, Fort Worth.

   e. An employee whose badge has been lost/inadvertently exposed is not to perform duties associated with radioactive materials until a replacement badge has been issued.

3. Initiating monitoring service:

   a. Complete form WS-252 and Radioactive Experience Survey Form.

   b. Forward to Wireline Safety Department, Fort Worth. NOTE: Process can be expedited by contacting Wireline Safety Department, Fort Worth.

   c. Badges are changed each calendar quarter. Instructions for accomplishment are forwarded to each location prior to the changeover date.

   d. Exposure reports are forwarded to each location quarterly. REPORTS ARE TO BE MADE AVAILABLE FOR REVIEW AND INITIALED BY EACH EMPLOYEE WHOSE NAME AND EXPOSURE DATA APPEARS THEREON.

4. Terminating Monitoring Service

   a. Contact Fort Worth Safety with name of terminating employee(s).

   b. Complete form WS-252 and forward to Fort Worth Safety.

   c. Collect TLD in use from terminating employee(s). Retain and forward for processing with end-of-quarter TLD changeover.

d. Reports of exposure to terminating employee(s) required by applicable licensing agency (NRC/Agreement State) will be prepared/forwarded to individual(s) by Fort Worth Safety.

D. RECORDS MANAGEMENT

1. Each field location possessing radioactive materials will maintain a Radiation File consisting of the following:

*a. Radioactive Materials License/Registration Form

(1) NRC or Agreement State License, as applicable
(2) Radiation Machine Registration (e.g.: Thermal Decay Tool)
(3) State Radium Devices License, NRC states only (e.g.: GR calibrator)

*b. Regulations

(1) Licensing Agency rules and regulations (NRC or Agreement State)

*c. Exposure Reports

(1) Employees are to initial reports on which their name appears certifying awareness of data contained thereon.
(2) Retain all exposure reports for three years preceding current date.

d. Summary of Radioactive Material Usage (WS-026)

(1) Maintain monthly records of sealed source usage at temporary job sites.
(2) Retain monthly summaries for three years preceding current date.

e. Summary of Tracer Usage (WS-438)

(1) Maintain monthly records of tracer material receipt, usage, and/or disposition.
(2) Retain monthly summaries for three years preceding current date.

f. Area Monitoring Form (WS-085)

(1) Complete monthly survey of storage facilities in accordance with instructions contained thereon.
(2) Retain surveys for three years preceding current date.

*g. Radioactive Sealed Source Inventory (SW-094)

(1) Complete monthly inventory of sealed sources.
(2) Condition of injection tools, handling tools, transport shields, source housings, and logging tool threads/attachment devices is to be noted, together with corrective action taken or planned, if required.

(3) Survey meter inventory portion of form should reflect all meters possessed, calibration dates, and current status (in use, storage, inoperative, etc.).
(4) Retain monthly inventories for three years preceding current date. FORWARD COPY OF EACH MONTHLY INVENTORY TO WIRELINE SAFETY DEPARTMENT, FORT WORTH.

h. Radioactive Monitoring Form 100 (WS-494)

(1) Complete in accordance with instructions contained thereon each time radioactive materials are removed from storage for use at a temporary job site (sealed sources and/or tracer materials).
(2) Attach completed document to district copy of job ticket and retain for three years preceding current date.

*i. Leak Tests, Sealed Sources

(1) Maintain separate folders for each sealed source or device containing sealed source(s).
(2) Each folder is to contain Permanent and Temporary records:

(a) Permanent: Original leak test and source certification (downhole use sources only) when manufactured, plus receipt record (M.T., invoice, etc.).
(b) Temporary: Leak test results for the three years preceding current date.

(3) Leak tests are to be completed at six month intervals. Company schedule is April 15/October 15.

*j. Meter Calibration Records

(1) Maintain separate folders containing calibration certificates for three years preceding current date.
(2) All meters in use will have calibrations completed at six month intervals.

*k. Licensing Agency Inspection Records

(1) Maintain copies of licensing agency inspection reports, corrective action responses to those reports (if applicable) and any other agency correspondence.

NOTE: Items preceded by an Asterisk: Permanent historical files of these items are maintained by the Fort Worth Wireline Safety office.

E. NOTIFICATION OF INCIDENTS

1. Field location managers will immediately report any of the following to Fort Worth Wireline Safety:

   a. Any accident/incident or emergency situation involving radioactive materials.

   b. Theft or loss of radioactive materials.

   c. Logging tool(s) containing radioactive materials which are stuck downhole.

   d. Suspected or actual overexposure(s) to individual(s).

   e. Suspected or actual inadvertent release of radioactive materials into the environment.

2. Fort Worth Wireline Safety (RSO) will make the required reports to applicable regulatory agencies and individuals, if necessary, following this notification.

3. Fort Worth contact for reports:

   a. Normal office hours: (817)293-1300, X4188

   b. Nights/weekends: (817)292-7744.

F. POSTING OF NOTICES TO WORKERS

1. Each operating location shall have the following displayed where it is obvious to all employees:

   a. Applicable "Notice to Employees" poster (NRC or Agreement State).

   b. Location of the following (for review by employees):

      (1) License/registration with amendments
      (2) Applicable licensing agency regulations
      (3) Operating procedures manual
      (4) Notices of violations/orders issued by the licensing agency and responses thereto.

G. PROCEDURES FOR ORDERING/RECEIVING MATERIALS

1. All special form sealed sources/devices are ordered from and shipped through Gearhart Fort Worth. Field operating locations order normal form material (liquid tracer, solid collar locator) direct from the vendor.

2. Shipments of radioactive material will only be picked up, received and opened by qualified Radiological Handlers. Whenever a shipment is expected, arrangements will be made for:

a. The expeditious notification of arrival at the carrier's facility.

b. Taking delivery at the operating location. No special package monitoring (survey) is required for special form sealed source materials in use by Gearhart (maximum activity: 20Ci), nor for normal form Co^{60} (solid) or I-131 (liquid). NOTE: Co-60 activity of a single shipment is in the range 100 to 120 uCi, and I-131 activity of a single shipment does not exceed 50 mCi. Ir-192 activity of a single shipment is in the range of 10 to 50 mCi. Use of Co-60 and Ir-192 is limited.

3. Special Form Sealed Source/Device

a. Inspect container for condition.

b. Verify container contents agree with packing slip description (serial no., isotope, activity) and leak test certificate.

c. After determining shipment is undamaged and correct, place item in field location storage facility.

d. Sign/date packing slip. Place it and leak test certificate/certification document in operating location radioactive file.

e. Add item to field location inventory list.

f. If any abnormality is found, notify carrier and Wireline Safety, Fort Worth.

4. Normal Form Material

a. Inspect container for condition. Ir-192: survey package at a distance of 3' from all surfaces and compare readings with Transport Index (T.I.) listed on package. If readings differ appreciably from T.I. listed, isolate package. Notify carrier and Wireline Safety, Fort Worth, immediately. If readings obtained reasonably agree with T.I. listed, record for later use.

b. If initial check is satisfactory, verify that contents of package agrees with packing slip (isotope, activity, form).

c. Opening package: At the operating location, don protective clothing (coveralls) and disposable gloves. Remove the package to an isolated location outside the building and place on a plastic sheet (garbage bag). With the wind at your back, open the package and remove the metal can. Unseal and open the can and remove the plastic bag

containing the lead shielding container. Remove the lead shield from the plastic bag and unseal. Using a remote handling tool, remove the glass vial (liquid) or package containing the radioactive material and inspect for integrity/leakage.
NOTE: If evidence of leakage/contamination is noted in any of the above steps, isolate package and contents, plus protective clothing/gloves. Notify carrier and Wireline Safety, Fort Worth.

d. If check of package and contents is satisfactory, replace material in lead shield. Place shield and absorbent material in metal can, and place in operating location storage facility.

e. Sign/date packing slip (Ir-192: also record survey reading obtained in step 1.).

f. Add shipment to operating location "Summary of Tracer Use" inventory form. Place packing slip in Radioactive File. Retain shipping container and packing material for use in transporting material to/from subsequent job site(s).

H. Sealed Source Leak Tests

1. A leak test will be performed on each non-exempt sealed source of radiation at least each six months (Company schedule is April 15 - October 15).

2. Leak test kits will be forwarded to the operating location prior to each cycle.

3. Wipe samples will be taken in accordance with the instructions contained in the kit, and only by qualified Radiological Handlers.

4. Wipe samples are to be forwarded to the company providing the analysis (presently GNI, Houston, Texas).

5. Results of leak tests (certificates) will be forwarded to each operating location and Fort Worth. File in accordance with "Records Management" instructions.

6. If removable contamination in excess of allowable limits is detected during the analysis, Fort Worth Wireline Safety (RSO) and the operating location are notified. Should this occur, the operating location is to:

   a. Isolate the source, source shield (if applicable), handling tool(s) and logging tool(s) used in the course of operations with the source in question.

   b. Re-wipe the source and associated hardware and submit for confirming analysis.

c. If the confirming analysis is positive, decontamination will be coordinated by Fort Worth Safety with an outside vendor licensed and qualified to perform these services and the applicable licensing agency.

I. SURVEY METERS

1. Each operating location possessing radioactive materials will maintain a sufficient member of operable and calibrated survey meters to perform the radiation surveys required by the License Conditions and this manual.

2. Survey meters are to be procured through Fort Worth Wireline Safety (RSO).

3. An operable and currently calibrated radiation survey meter shall be carried on each vehicle used for transportation of radioactive materials.

4. One or more operable and currently calibrated radiation survey meters will be kept at the base facility as a spare and for emergency use.

5. A job site survey must be made before and after each operation using radioactive materials (Form 100, WS-494). A record of each survey will be filed in accordance with "Records Management" instructions.

   a. The before job survey should include obtaining background readings at the rig floor (or well head for no rig jobs), flow line (where return well fluids are released into mixing or return pits), mixing area (where tracers are transferred from their shipping container into the injector or carrying agent). The background readings should be recorded for comparison to after job readings.

   b. The after job survey is made after the job is completed and materials have been secured aboard the transport vehicle.

6. Survey meters are to be calibrated at intervals of no more than six months, and at anytime service or repairs are made.

7. Calibration/repairs are to be made by a company licensed/registered with the NRC/Agreement State Agency to perform these services (presently GNI, Webster, Texas).

8. Forward meter(s) due calibration or repair directly to GNI, Webster, Texas. Meter(s)/calibration certificate(s) are returned from GNI directly to applicable operating locations. Duplicate cal. certificates are forwarded to Fort Worth Wireline Safety by GNI.

9. File calibration certificates in accordance with "Records Management" instructions.
NOTE: Insure legible calibration record sticker is affixed to meter(s) in use.

10. Meters not in use (inoperative, due calibration, excess to needs) are to be appropriately tagged and stored.

J. STORAGE

1. When not in use, radioactive materials will be placed in secured (locked) and properly marked storage facilities.

2. Only qualified personnel will have access to storage facilities.

3. Monthly storage facility surveys will be made/recorded in accordance with instructions contained on Area Monitoring Form, WS-085.

4. Storage facilities:

   a. Downhole Pit: Standard pre-fabricated galvanized metal vault with locking lid requiring an approximate 2' X 3' X 6' excavation (Gearhart P/N 076-0000-000).

   b. Surface bunker: Wood or metal construction with provisions for securing (locking) entrance door. Sources of radiation will be kept in applicable transport shields when stored in this type facility.

   c. Vehicle storage: Temporary storage only at the operating location. Sources of radiation must be in applicable locked transport shields or containers which are secured to the vehicle. Those not requiring transport shields or containers will be physically secured to the vehicle or placed in a locked compartment.

K. ESTABLISHING/POSTING RESTRICTED AREAS

1. Restricted Area:

   a. Any area in which an individual continually present could receive a radiation dose in excess of 2mR in one hour or 100 mR in any seven consecutive days (168 hours).

2. Radiation Area:

   a. Any area in which an individual continuously present could receive a radiation dose in excess of 5mR in one hour or 100mR in any five consecutive days (40 hours).

3. High Radiation Area:

a. Any area accessible to individuals in which there exists radiation at levels which an individual could receive in any one hour a dose to the whole body in excess of 100mR.

4. Access:

a. Personnel not subject to the Company's radiation monitoring program will not be permitted access to restricted/radiation areas (storage facilities, shop areas, temporary job sites).

b. Only Company personnel enrolled in the prescribed radiation monitoring program and wearing their assigned TLD will be permitted access to radiation/high radiation areas.

c. Normal operations do not involve levels of radiation requiring the establishment of "high radiation" areas. Should a temporary operation result in radiation levels requiring the establishment of a "high radiation" area, direct and continuous surveillance of the area/access point to the area will be maintained to insure no unauthorized or inadvertent entry.

5. Posting:

a. To satisfy the requirements of K.1.a and 2.a., post "Caution - Radiation Area" signs containing the standard radiation symbol tri-foil (magenta or purple on yellow background) at the 2mR/hr perimeter of storage areas, temporary work areas, and at the entrance(s) to shop tech labs.

b. Identify high radiation areas as above, except signs are to reflect "Caution-High Radiation Area" at the 100mR/hr perimeter.

c. Downhole storage pit lids/surface bunker doors and shop tech labs are to be marked with "Caution-Radioactive Material" signs or labels bearing the radiation symbol tri-foil.

L. LABELLING CONTAINERS/DEVICES

1. Source Shields, Sealed Sources

a. Identification tag (applied by manufacturing), (ser. no., isotope, activity, manufacture date).

b. DOT certification tag (applied by manufacturer).

c. DOT shipping labels (2)

(1) White I: Radiation level less than 0.5 mR/hr at package surface.

(2) Yellow II: Transport Index (T.I.) of .5mR/hr, but less than 1.0 mR/hr, or radiation level at package surface of 0.5 mR/hr but less than 50 mR/hr.
(3) Yellow III: Transport Index IT.I.) greater than 1.0 mR/hr, or radiation level 50mR/hr or greater at package surface.
(4) Labels filled in reflecting contents (isotope), activity and Transport Index (T.I.). T.I. reflects maximum radiation level in mR/hr existing at one meter from package surface.
NOTE: See pre-printed hazardous materials shipping papers (WS-407) for labelling requirements and T.I.'s for commonly used special form sealed sources.

d. Company address label
e. "DANGER-RADIOACTIVE-DO NOT HANDLE-NOTIFY CIVIL AUTHORITIES" label.

2. Limited Quantity (excepted) Material

a. Articles or devices containing a limited quantity of radioactive material are to be labelled or engraved as follows: "Gearhart Industries, Inc., this package conforms to the conditions and limitations specified in...

(1) 49 CFR 173.421 for excepted radioactive material, limited quantity, N.O.S., UN 2910." (KUT and Thermal Decay Tool Calibrators).
(2) 49 CFR 173.422 for excepted radioactive materials, instruments and articles, U.N. 2911" (Litho-Density Tools, Thermal Decay Tools).
(3) 49 CFR 173.424 for excepted radioactive material, articles manufactured from natural thorium, U.N. 2909" (Thorium Calibrators).

3. Tracer Materials

a. Retain outer package as received from vendor, complete with labels/markings, packing material and inner container or shield for use in transporting applicable material to/from temporary job sites.

4. SOURCE HOLDERS

a. Housings or "bull plugs" designed for use in logging tools, and which contain encapsulated special form material are to be legibly engraved with:

(1) Isotope and activity

(2) Serial number

(3) The phrase "Caution Radioactive Material, Do Not Handle, Notify Civil Authorities".
(4) Tri-foil radiation symbol (uncolored).

M. TRANSPORTATION

1. All radioactive materials are to be properly labelled and secured while in transit:

   a. Sealed sources in applicable locked transport shields which are physically secured to the vehicle.

   b. Tracers in original vendor packages which are secured within the vehicle and immobilized.

   c. Tools/calibrators secured within/to vehicle.

2. Properly completed Shipping Papers are to accompany the shipment (not required for "excepted" materials, e.g. KUT, Thorium, TDT calibrators, Litho-Density and TDT tools).

3. Standard DOT "Radioactive" placards are to be displayed on front, rear, and both sides of vehicle transporting any item requiring a Yellow III label. Placards are not displayed when transporting only items labelled Yellow II, White I or "excepted" material.

4. Placarded vehicle is to be attended whenever on a public street or highway/shoulder of highway.

5. Materials are to be located as far as possible from any occupied compartment while in transit.

6. Maximum radiation levels (DOT):

   a. Package surface: 200mR

   b. Single package T.I.:10; total conveyance T.I.:50.

   c. External surface of vehicle: 200mR; 10mR at 2 meters.

N. SEALED SOURCE MAINTENANCE/DISPOSAL

1. Repairs or modifications to sealed source holders ("bull" plugs) will not be made at field operating locations. Source holders are not to be opened, drilled, machined, etc. Sources are to be returned to the manufacturer for repairs involving any such activities.

2. Field station maintenance is limited to inspection/cleaning, including thread "chasing", and the changing of "O" rings (See Appendix for 2 Ci Cs-137 sealed source "O" ring changing procedures).

3. Unserviceable sealed sources will be returned to the manufacturer or another company authorized/licensed for disposal.

4. Unusable tracer materials and associated equipment (gloves, clothing, tools, containers, etc.) are to be kept in designated storage areas and allowed to decay to background. Containers may then be placed in normal refuse after defacing labels.

   a. If decay to background is impractical, material will be consigned to a licensed/authorized disposal company.

CHAPTER II - OPERATIONS

A GENERAL

1. Company personnel who have been designated qualified Radiological Handlers will be directly in charge of all operations utilizing radioactive materials. They are responsible for the health protection of all personnel who may be exposed to the materials under their control. They will personally supervise all operations involving these sources of radiation, beginning with removal from storage facilities prior to the job, through the return to storage following job completion.

   a. Company personnel trained in the handling of sealed sources (operators) may assist in operations involving sealed sources, but only under the direct supervision of the Radiological Handler.

   b. Tracer operations will only be performed by qualified Radiological Handlers.

   c. Company personnel not essential for the operation in progress, as well as all client/other personnel present at job sites, will remain outside the operations area (2mR/hr).

2. Radioactive material removed from storage facilities for use at a temporary job site is to be signed out on the applicable "usage" log (sealed source or tracer) and signed in when returned to storage following job completion.

3. Crews dispatched on jobs requiring the use of radioactive material will possess an operable and currently calibrated survey meter.

4. Required information and survey results will be recorded on Radioactive Monitoring Form 100 (WS-494) as each phase occurs:

   a. Pre-departure

   b. Well-site prior to beginning operations

   c. Well-site after operations completed, materials removed.

   d. Truck prior to departing job site.

   e. Truck after removing materials to storage at the operating base.

   NOTE: If radiation levels in excess of background are detected at the well site before begirning operations, determine its origin before proceeding.

B. SEALED SOURCES

1. All operations are to be performed with the aid of the applicable source handling tool or device.

2. At the job-site before removing sealed source(s) from transport shield(s):

   a. Complete all rig-up and tool preparation operations.

   b. Position logging tool(s) on appropriate stands as near to well bore as possible. Loop a flexible line (rope, chain, etc.) around tool body near downhole end of tool. Free ends of line should be no less than three feet in length.

   c. Clear area of unnecessary personnel.

3. Remove source from transport shield using appropriate handling tool. Keep source at maximum distance from body while moving from shield to tool. Do not handle any sealed source with hands.

4. Secure source in tool and raise tool. Holding free ends of flexible line previously attached, maneuver tool over well bore. As tool enters well bore, pull line free. Do not handle logging tool within three feet of source.

5. When coming out of hole, wrap flexible line around upper part of tool as it clears the well bore/floor, and allow it to slide down tool as it is raised. When line is within three to six feet of the downhole end of tool, pull tight and use to maneuver tool after it clears and as it is lowered to stand/floor.

6. Immediately remove source(s) and secure in transport shield(s).

C. TRACER MATERIALS

1. Unencapsulated tracer materials (Iodine 131, Iridium 192) require more stringent handling procedures in order to avoid personnel and/or environmental contamination. The relatively low activity levels of tracer materials used to conduct studies (5-10 mCi) allows some latitude in handling procedures; however, the following should be understood by all Radiological Handlers.

2. The risk which is of most concern is that of ingestion or inhalation. Other concerns include external contamination of personnel, clothing, equipment, the environment, and hand exposure of the user.

3. Handling tongs should be used when pouring materials (e.g. loading injector tool); however, this may not always be practical. In general, materials used in our operations (I-131, Ir-192) may be safely handled without tongs by observing the following:

a. Appendix chart "Hand Exposures From Radioactive Tracers" provides data based upon the quarterly limit of 18.75R/quarter hand exposure established by Federal/Agreement State regulations, and is taken from a study conducted by Nuclear Environmental Engineering.

b. The allowable handling time is determined as the maximum time in minutes per week that a person can work with his hands (gloved) in direct contact with unshielded tracer units. The allowable handling time as indicated is not additive-that is, you cannot, for example work for 18 minutes with 10 millicures of Iridium-192 and 42 minutes with an equal amount of Iodine-131 in one week. If several hand exposures to both types of tracer materials are received during one week, the exposures must be calculated separately and as they occur.

Example: If in one calendar week a person directly handles 20 millicures of Iodine-131 for 3 minutes, 10 millicures of Iridium-192 for 3 minutes and 15 millicures of Iodine-131 for 4 minutes, these exposures are totaled as follows: From the chart the allowable handling time for 20 millicures of Iodine-131 is 21 minutes. Hence the exposure to the hands for 20 millicures of Iodine-131 is 3 divided by 21, or .143 of the weekly allowable handling time. Similarly, the exposure for the 10 millicuries of Iridium-192 is 3 divided by 18, or .167; and that for the 15 millicuries of Iodine-131 is 4 divided by 28, or .143. Adding these three fractions, .143 + .167 + .143 equals .453, or a little less than half the total allowable handling time for that particular calendar week.

c. WHEN THE VARIOUS EXPOSURES ADD TO A TOTAL OF MORE THAN 1.0 THE WEEKLY ALLOWABLE HANDLING TIME HAS BEEN EXCEEDED AND THE FOLLOWING WEEK'S WORK MUST BE LIMITED ACCORDINGLY.

d. Additional Appendix charts provide information regarding radiation levels at one and three feet from unshielded tracer materials.

e. These limits are to be considered as maximum safe levels of exposure, not acceptable working limits. The objective is to limit exposure to the minimum. This can be accomplished by working as rapidly, yet carefully, as possible whenever tracer materials are used.

4. Job Site Operating Procedures:

a. No smoking, eating or drinking.

b. Do not load injector tools inside truck.

c. Wear disposable gloves.

d. Position yourself upwind of tool when loading. Use mechanical tongs when pouring material, if possible.

e. Protect loading/pouring area with plastic trash bags/absorbent towels.

f. If wind velocities make it possible for tracer material to be dispersed, wear face mask and goggles.

g. Secure tool in transport case immediately after coming out of hole.

h. Wash hands with soap and water after handling tracers.

i. Survey personnel who work with the tracers with the Beta window open and about two or three inches from and over the complete body, arms and hands.

j. If contamination is detected on clothing, remove and handle as radioactive material. Skin contamination: Wash thoroughly with soap and water. Recheck and repeat as necessary.

k. Place all materials which have come in contact with the tracers in a plastic trash bag and return to the shop to be thoroughly checked for contamination.

l. Survey the work area and well site to be certain no contamination exists after the job.

NOTE: Precautions are to be taken to insure that no tracer materials are injected into usable quality ground water.

m. Injector tool in transport case should be placed in R/A bunker after returning to shop if contamination is present. All other equipment (paper towels, disposable gloves, contaminated clothing, empty vials/cans, etc) should also be placed in R/A bunker.

5. Contamination Surveys

a. Surveying of Area and Equipment

(1) The ideal injection operation would have no spills and leave no residue of tracer material. In practice such an ideal may not be realized, and a survey of the area is necessary so that the proper procedures may be followed to assure that no remaining contaminant can cause harm to company personnel, the customer's personnel, or the general public.

(2) The survey meter must be used with the beta shield open to survey the entire area where mixing has been done, and the pipes and associated components through which the mix was conducted to the well, to be sure that no concentration remains that may cause harm, either by external radiation or by possible contamination of food or water supplies.

(3) Contamination of the probe must be avoided completely. If any contact survey is made, the probe is to be protected with a sheet of paper between the object and probe. A contaminated probe can render the survey meter useless for low level measurements.

(4) Spills should be cleaned up and, if possible, injected into the well. If not possible, place contaminated material (dirt) in plastic bag(s) for return to operating base, or scrub/flush area (metal). Resurvey/repeat as necessary until area is at "background" level.

b. Surveying of Individuals

(1) The greatest care in survey measurement is taken on items of personal equipment such as shoes, gloves, clothing and handling tools, as well as exposed portions of the body of personnel working with radioactive materials. This is because of the much greater probability of ingestion from such items.

(2) The survey meter should also be used with the beta shield open to read the radiation level on clothing worn by the individual performing the operation or any other clothes suspected of contamination. This should be done immediately following the operations. If any indication of radioactive contamination is found on items of clothing, equipment, etc., or on the person of personnel involved in the operation, take steps to remove the activity.

6. Decontamination Procedures

a. Decontamination shall, in general, be accomplished by rinsing and flushing fresh water through the equipment, or washing and scrubbing of contaminated items of clothing or portions of the individual's body. A detergent may be added to the water to aid this process. Equipment or material which cannot be decontaminated in this manner will be sent to an outside agency or company qualified and authorized to deal with the problem.

b. Articles of clothing can normally be easily decontaminated by washing and scrubbing with water containing a strong detergent. This also applies to portions of the exposed individual's body. If efforts to decontaminate items of clothing on the job are unsuccessful, the clothing should be removed immediately to be washed after returning to the home station nearest the job location. Contaminated articles of clothing, rags, etc. should never be laundered in a home or commercial laundry. Such washing and scrubbing is restricted to the job site or the company base. If the contamination cannot be removed economically, the clothing shall be discarded and treated as radioactive waste.

c. As indicated above, every effort should be made to decontaminate any contaminated area of the body. Scrubbings should be repeated until activity is removed. The same safety precautions shall be applied as were applicable for tracer mixing and injection in particular:

(1) Disposal gloves shall be worn during decontamination procedures involving personal contact with the equipment.
(2) Food, cigarettes, etc., shall be kept outside the clean-up area. Quantities of radioactive material which present no hazard outside the body can be very dangerous if the same amount is internal.
(3) The wash water shall be treated as radioactive waste, , and is not to be discharged into any sewage/septic tank system or the environment.
(4) If contamination persists, obtain medical assistance and notify the Company RSO.

d. If equipment decontamination efforts are unsuccessful, the procedures to be followed shall depend on the value and ownership of the items involved, the degree of contaminations, and the half-life of the contamination activity. Every effort shall be made to thoroughly decontaminate rented or borrowed equipment. If all efforts to decontaminate items of equipment, clothing, etc., have failed to render the radioactive contamination to background and the measurable activity is apparently "fixed" the user in charge has three alternatives. They are as follows:

(1) If the "fixed" contamination measure less than 0.2 mR/hr at one centimeter, the item of equipment, article of clothing, etc., can be returned to normal use.
(2) If the "fixed" contamination measure more than 0.2 mR/hr at one centimeter, the item or items in question shall be treated as radioactive waste and disposed of accordingly.

(3) If the item containing the "fixed" contamination (which measures more than 0.2 mR/hr at one centimeter) is such that it is continually used in tracer operations, e.g. parts of a dump bailer, tracer injector, etc., and will be used in no other operation, then it may continue to be used if it is labeled properly and treated as a radioactive source.

e. The user in charge shall be responsible for all contaminated equipment. That is, for any equipment, waste, area, or wash water that falls within the above alternative situations. The user in charge shall personally supervise its safe disposition either by staying on the job until the contamination is removed or transporting the equipment to the base where it may be stored awaiting further decontamination efforts/disposition.

D. LOST SOURCE PROCEDURES

1. In the event a tool containing a sealed source of radioactive material is stuck in an oil or gas well, the following procedures should be followed:

a. Contact the Company RSO, Fort Worth with preliminary information. The RSO will make required contact with the appropriate licencing agency (NRC or Agreement State).

b. Remain in contact with the well operator and offer advice and recommendations regarding safe fishing (retrieval) procedures and make the well operator aware of the possibility that fishing procedures could damage the source capsule.

c. During the retrieval operations, a qualified Radiological Handler will monitor for radiation at the surface, using a gamma logging tool near the pipe for fluids circulating from the hole, or using a low level beta/gamma survey meter.

d. Upon retrieval of the source, if no radioactive contamination is detected, remove the source housing assembly from the logging tool and physically check it for any damage such as abrasions brought about by metal to metal contact or any disfigurement brought about by pressure.

e. Should any radioactive contamination be detected during retrieval, or if the source appears to be damaged, immediately notify the Company RSO.

f. If there is no evidence of radioactive contamination or physical damage, the source will be leak/wipe tested and the wipe sent for immediate analysis. The source will be kept in the storage container out of service pending receipt of the analysis results.

2. If retrieval efforts are unsuccessful, the planned abandonment scheme must be coordinated with and concurred in by the radiation licensing agency and the state agency controlling the drilling of gas/oil wells. Following are the generally acceptable abandonment methods:

   a. A source left below a producing zone presents little difficulty. In most cases the normal cementing of the production string of casing or tubing will isolate the source. If the well is to be produced from open hole completion, cement should be spotted around and/or above it to prevent the movement of fluids past the capsule and eventual destruction of the capsule through abrasion.

   b. In questionable cases the life of the capsule and the solubility of radioactive material might influence the acceptance of the proposal. (The source capsules have an estimated life of 500 years in undisturbed salt water. The solubility of the radioactive materials is in the order of one part per billion per week).

   c. Production of gas, water or oil past a source should be prohibited unless the capsule is protected from abrasion. Casing or tubing should be adequate. The spotting of cement, if practical and feasible, adds to the protection. Care should be taken in setting casing past the location of the tool to avoid dislodging it. A gamma-ray survey run after the casing is below the zone will give assurance that the tool and source will not be encountered and damaged at a lower level.

   d. In the event a source is left in a producing zone, it should be cemented in place if possible. Extreme caution should be used to avoid re-entering the original hole and damaging the source container. Normally, the source is at or near the bottom of the tool. If there were sufficient clearance to place cement around the source, the tool would, in most cases, be retrievable. However, the drilling mud would probably harden in a short time to prevent appreciable flow of fluids by the source. In addition, the separation between the new and old holes would reduce the rate of flow at the tool to a very small figure. It is recommended that the new and old holes be separated by at least 15 feet to preclude any possibility of damage to the source by perforating.

3. The cement plug isolating the source/tool is to contain red-oxide dye, and a deflection device is to be set atop the plug (drill collar, inverted drill bit, whipstock, etc.).

4. The well operator will be provided a permanent placard containing pertinent details of the abandonment which is to be permanently affixed to the well head.

5. A written report will be provided the licensing agency (copy to the State Well Permitting Agency) within 30 days of abandonment detailing recovery attempts, isolation procedures, well operator/location information, and a copy of the permanent placard provided the well operator.

E. PULSED NEUTRON LOGGING TOOL (TDT)

1. WARNING: When activated, this tool emits 14 mev neutron radiation at the rate of 10^8 neutrons per second. This is approximately equivalent to the 50 Ci Am ^{241} Be source. It is not to be operated on the surface unless:

   a. The tool is shielded in the 1000 gallon calibration tank.

   b. A temporary perimeter is established (2mR/hr) and marked with "Caution - Radiation Area" signs (8' either side of the axis of the tool and 5' from the uphole/downhole ends of the tool)

   c. The restricted area is under continuous surveillance of the Radiological Handler operating the tool.

2. When performing logging services, the tool is not to be energized before going into the hole to a depth of at least 50'.

3. When de-energized, the tool will continue to emit decreasing levels of gamma radiation as it cools. This cool-down is completed and the tool can be safely handled after twenty minutes; therefore, the tool is not to be brought to the surface before this cool-down period has elapsed.

4. The tool presents no radiation hazard to personnel in its de-energized state.

5. The vacuum tube portion of the tool contains an exempt quantity of Tritium gas (300 mCi) which in the de-energized state is absorbed onto a titanium sleeve. The tube is surrounded by a high pressure (20,000 psi) steel housing, and it may be safely stored on shop tool racks and carried in truck tool racks.

6. It will be accounted for/included in location radioactive material inventories. Inspection during inventory will consist of:

   a. proper labeling/engraving of the DOT exemption,

   b. physical condition of the tool.
   NOTE: Maintenance/repair of the generator tube will only be performed at the Gearhart Industries, Inc. Fort Worth manufacturing facility. All defective or excess to needs tubes will be returned to the Fort Worth facility for disposition.

CHAPTER III EMERGENCY PROCEDURES

Emergencies vary greatly in their respective hazards, which may be in the form of spills, fires, explosions, and vehicle accidents which could result in the spread of radioactive material contamination. The Bureau of Explosives Emergency Handling of Hazardous Materials is the guide for these procedures, which are general in nature. Specific situations would likely involve additional or variations to these procedures.

A. Vehicle Wreck - In the event of an accident while transporting radioactive materials, the following procedures should be followed:

1. Do not leave the area unattended by qualified personnel.

2. Notify Emergency Response Agency.

3. Notify the Radiation Safety Officer.

4. Survey the area and close off where the radiation level exceeds 2 mr/hr.

5. The RSO will notify the proper regulatory agency.

B. Fire involving radioactive material

1. Notify all personnel in the immediate area.

2. Notify fire department/emergency response agency.

3. Attempt to fight fire if a radiation hazard is not immediately present.

4. Notify Company RSO, who will contact required regulatory agencies.

5. Following the emergency, survey the area to ascertain radiation level/contamination present.

6. Survey personnel involved in combating the emergency.

7. Prepare a detailed report and forward to Company RSO, who will prepare required reports to regulatory agencies.

C. Leaking Source

1. If a leaking sealed source is suspected or detected during logging operations, shut down the operation.

2. Notify well operator and immediately contact Company RSO with details. RSO will contact regulatory agencies and coordinate the assistance of a qualified and licensed company capable of dealing with the problem.

3. Establish controls for keeping personnel out of the immediate area until qualified assistance is on-scene.

D. Radiation Spills

1. Because of the limited activity associated with tracer studies, it must be understood that a value judgment must be rendered by a qualified employee in the definition of a spill before emergency procedures are implemented. Minor spills should not be considered an emergency. However, great effort should be taken to clean up the area and implement decontamination procedures.

2. Notify all personnel not involved in the spill to vacate at once. Only employees who are qualified Radiological Handlers will be allowed in the spill area, and then only with protective equipment, a calibrated survey meter and proper dosimeter devices.

3. If the spill is liquid, pinpoint the area of the spill with a survey instrument and institute the following procedures:

   (a) Don protective clothes, disposable gloves, rubber boots and proceed to institute decontamination procedures.

   (b) If the spill is on the skin, flush thoroughly with large quantities of fresh water and use an industrial soap, if available. Repeat this operation, checking the contaminated area after each washing with a proper surveying device to insure thorough cleaning of the contaminated area.

   (c) If the spill is on clothes, remove the clothing.

   (d) If the spill is in a room or enclosed area, switch off all exhaust fans and vacate the room.

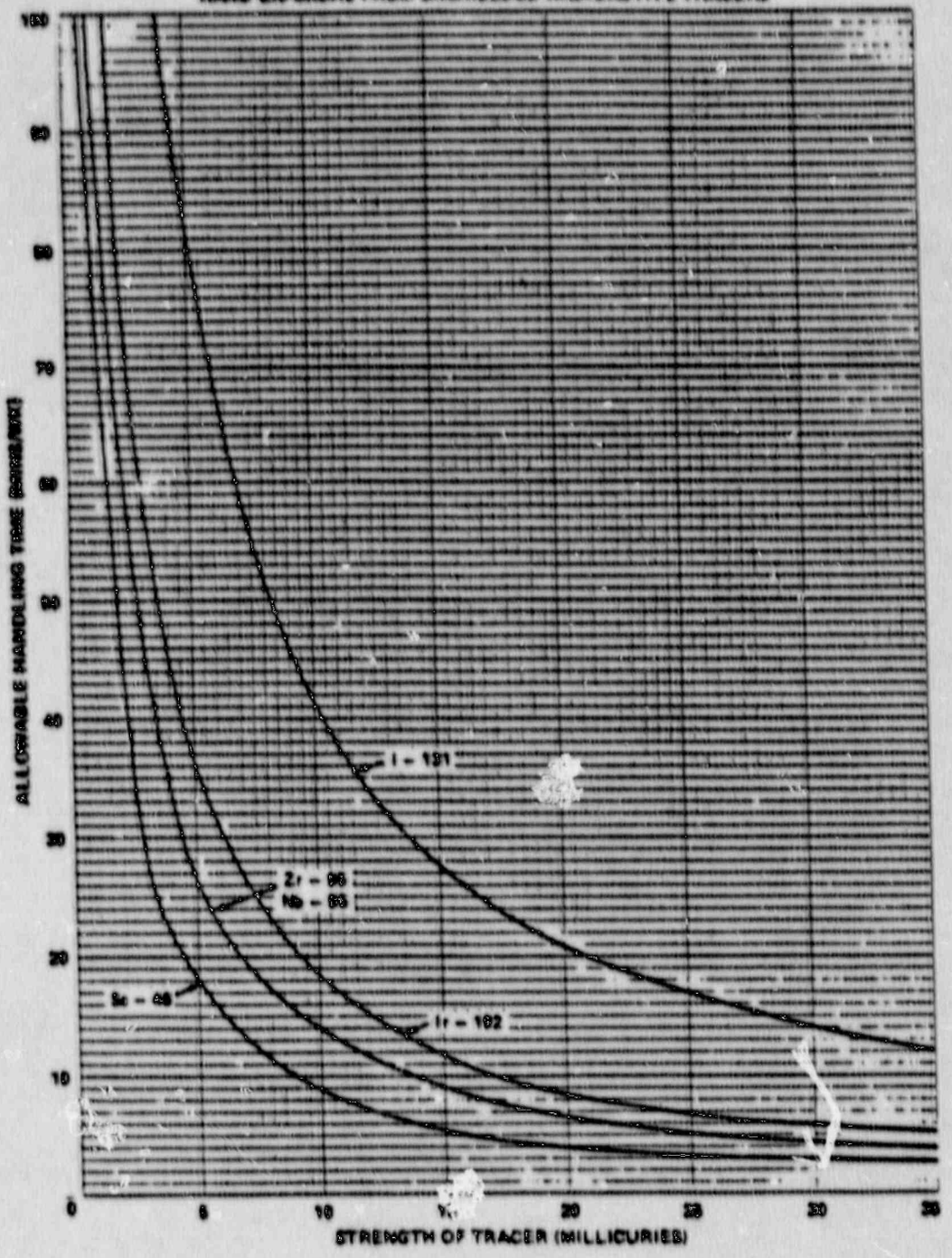
   (e) Notify the Radiation Safety Officer as soon as possible.

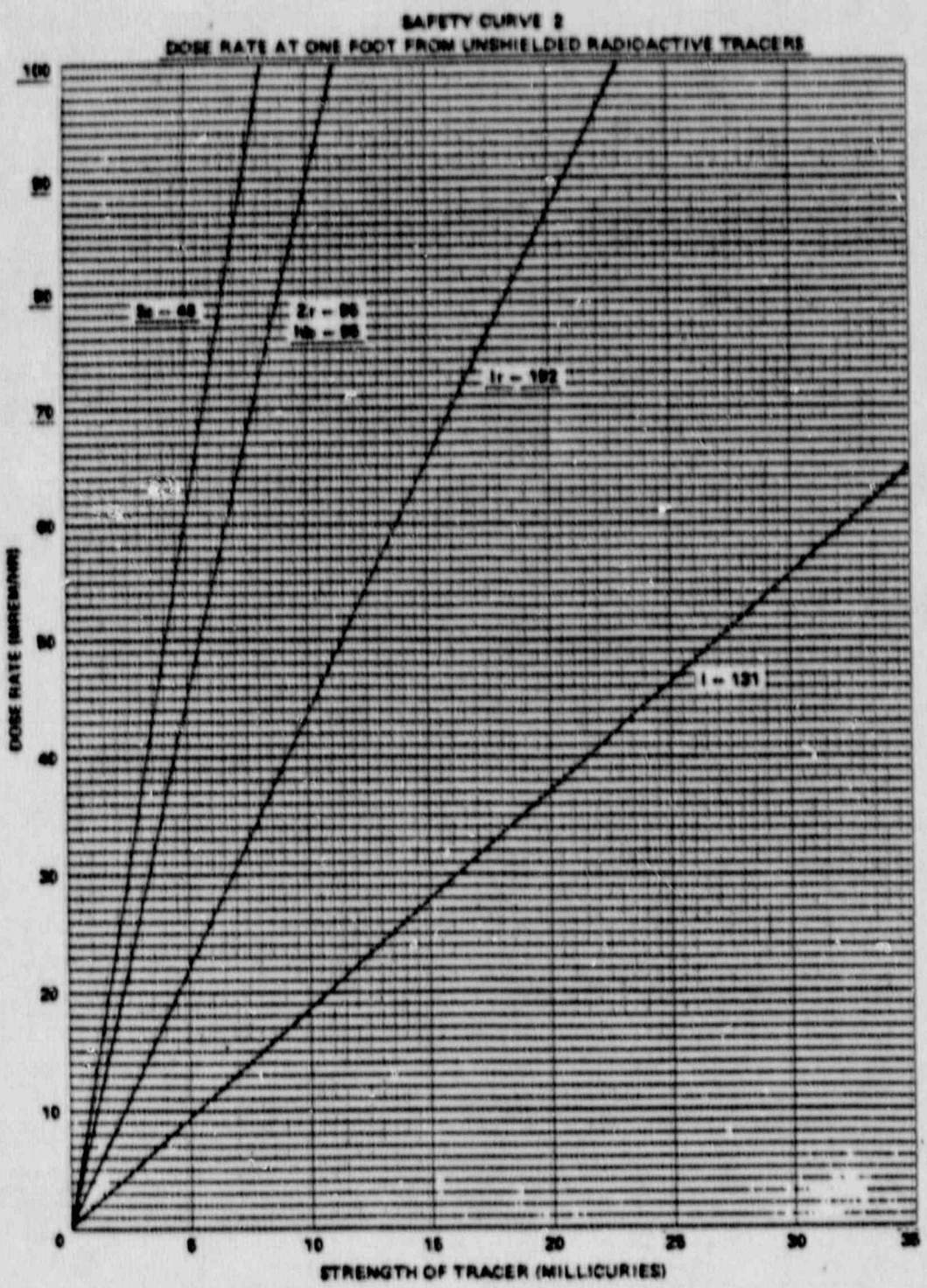
   (f) Permit no person to resume work in the spill area. If necessary, post a man to insure that the contaminated area is not inadvertently entered.

   (g) Because of the judgment evaluation involved, the RSO will notify the applicable regulatory agency as soon as possible for assistance.

SAFETY CURVE 1

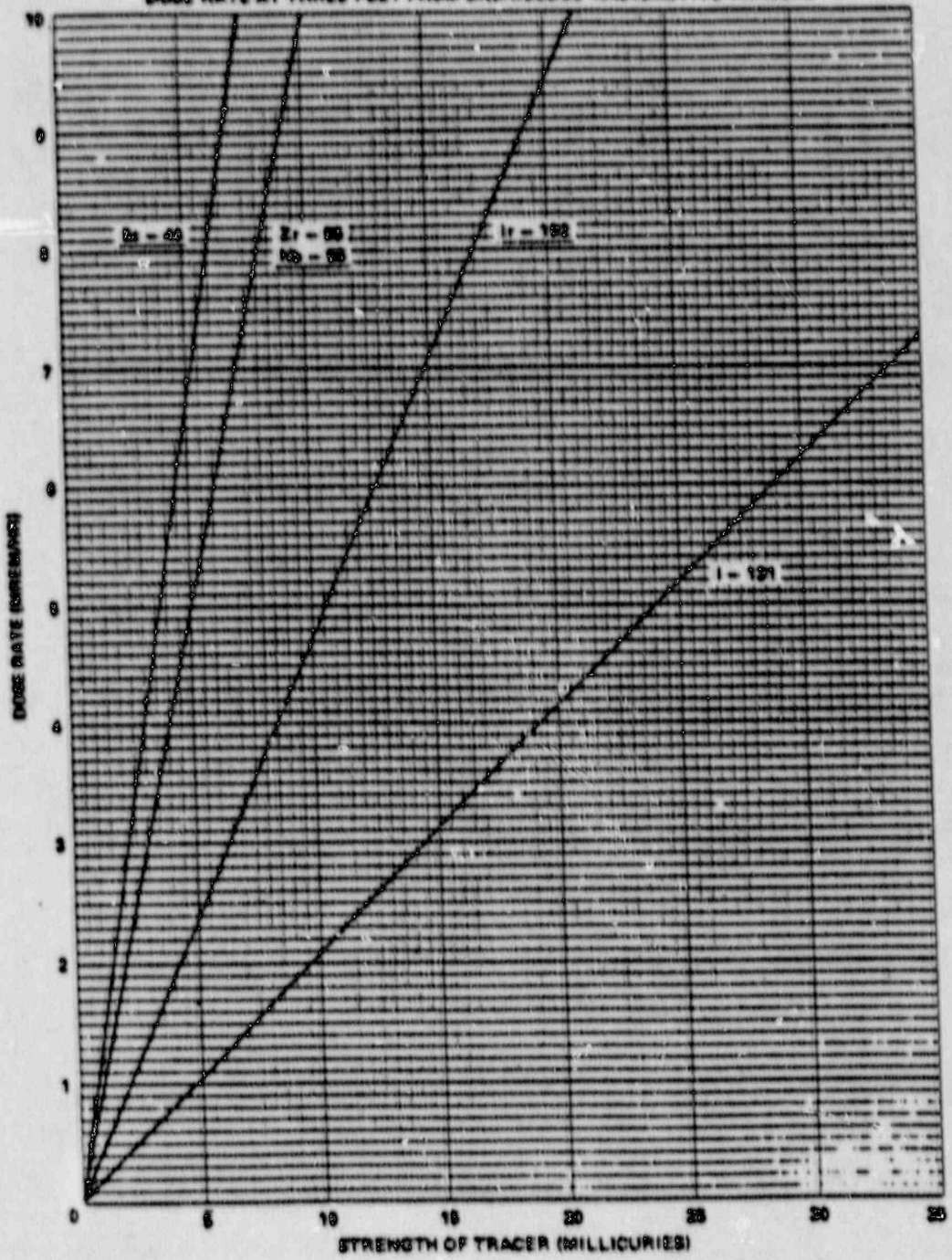
HAND EXPOSURE FROM UNSHIELDED RADIOACTIVE TRACERS




SAFETY CURVE 2
DOSE RATE AT ONE FOOT FROM UNSHIELDED RADIOACTIVE TRACERS
DOSE RATE (MREM/HR)
100
90
80
70
60
50
40
30
20
10
0
Sc – 46
Zr – 95
Nb – 95
Ir – 192
I – 131
0
5
10
15
20
25
30
35
STRENGTH OF TRACER (MILLICURIES)

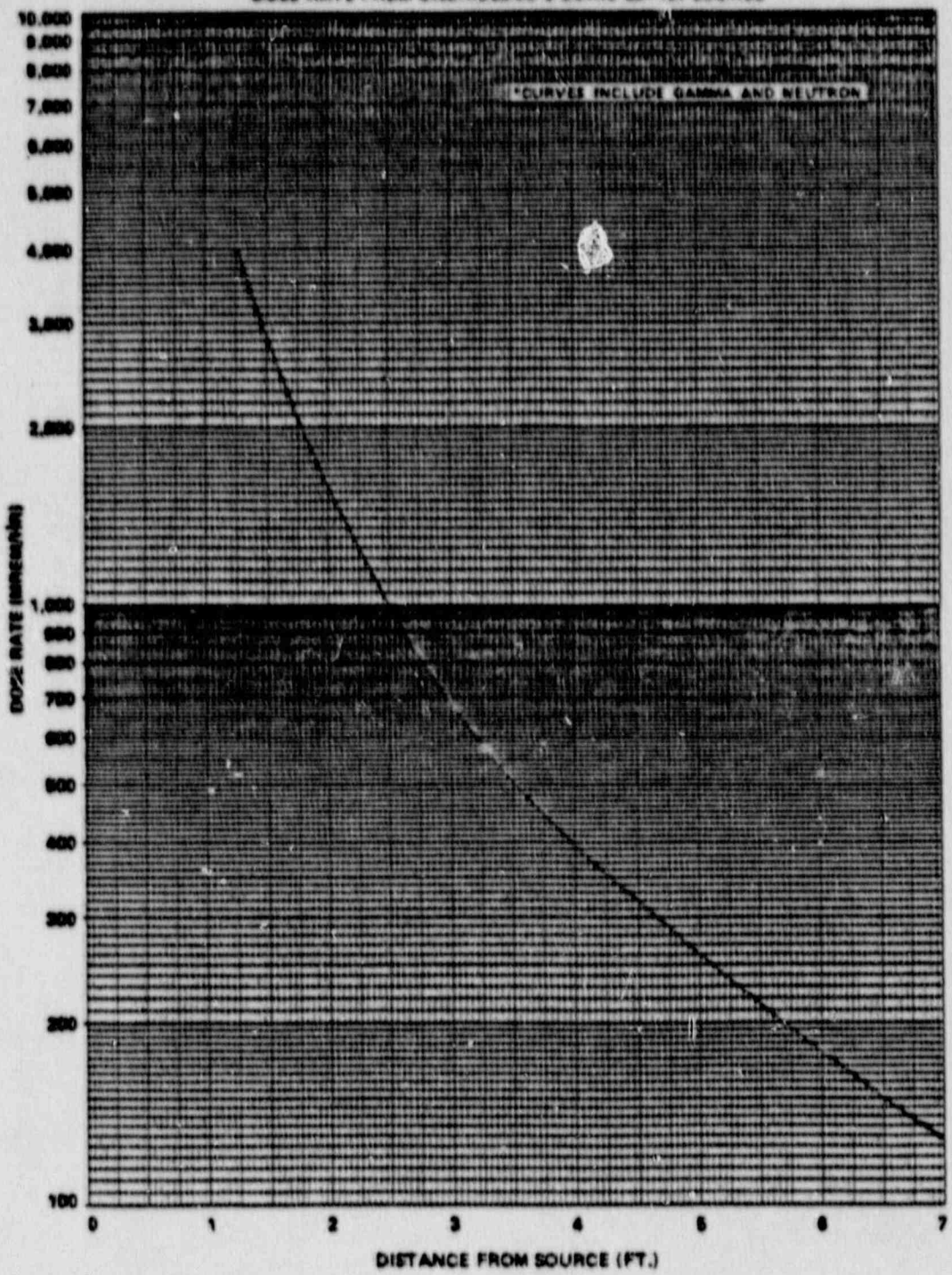
SAFETY CURVE 3

DOSE RATE AT THREE FEET FROM UNSHIELDED RADIOACTIVE TRACERS



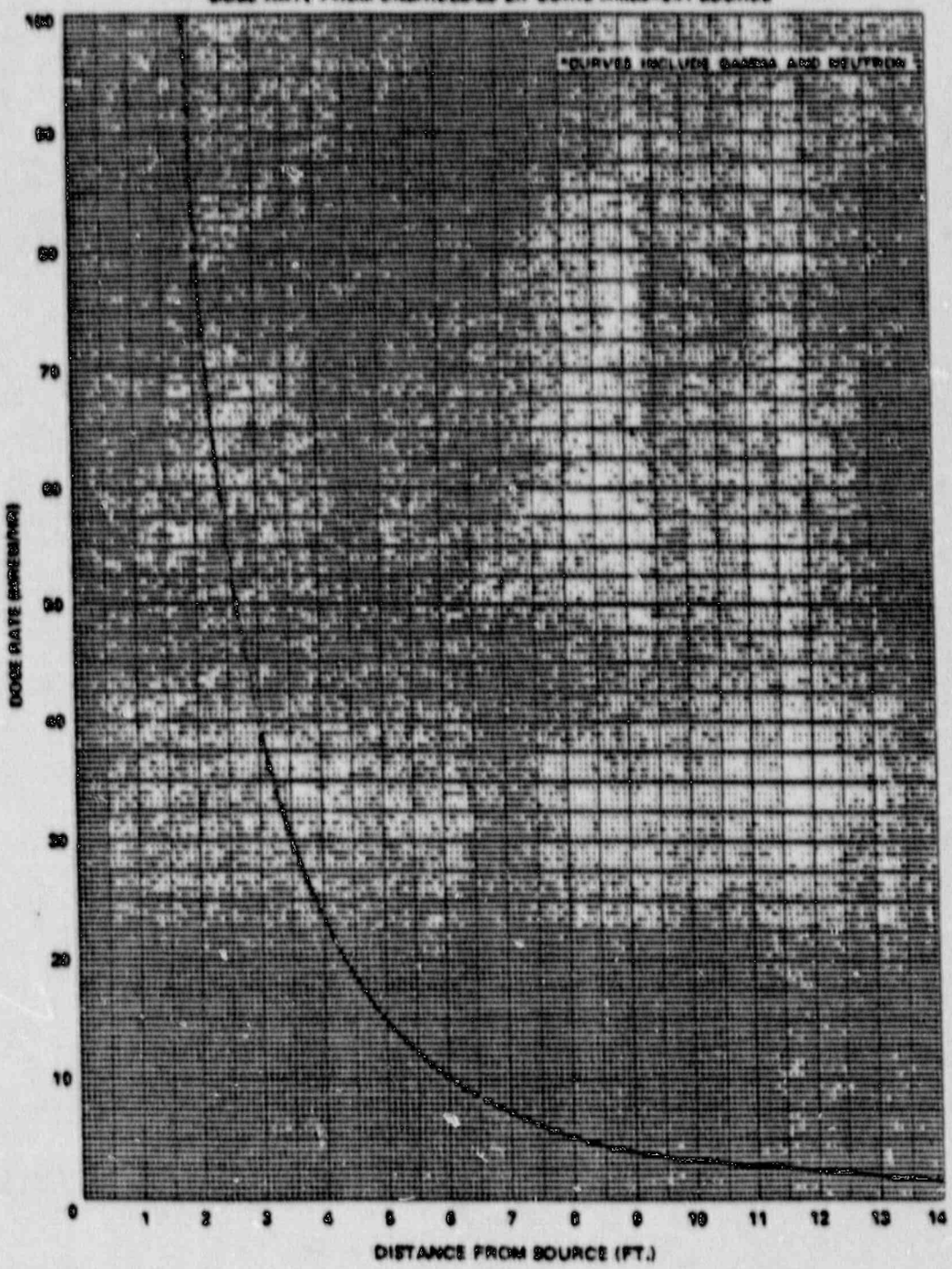
SAFETY CURVE 4

DOSE RATE FROM UNSHIELDED 2 CURIE Co-137 SOURCE



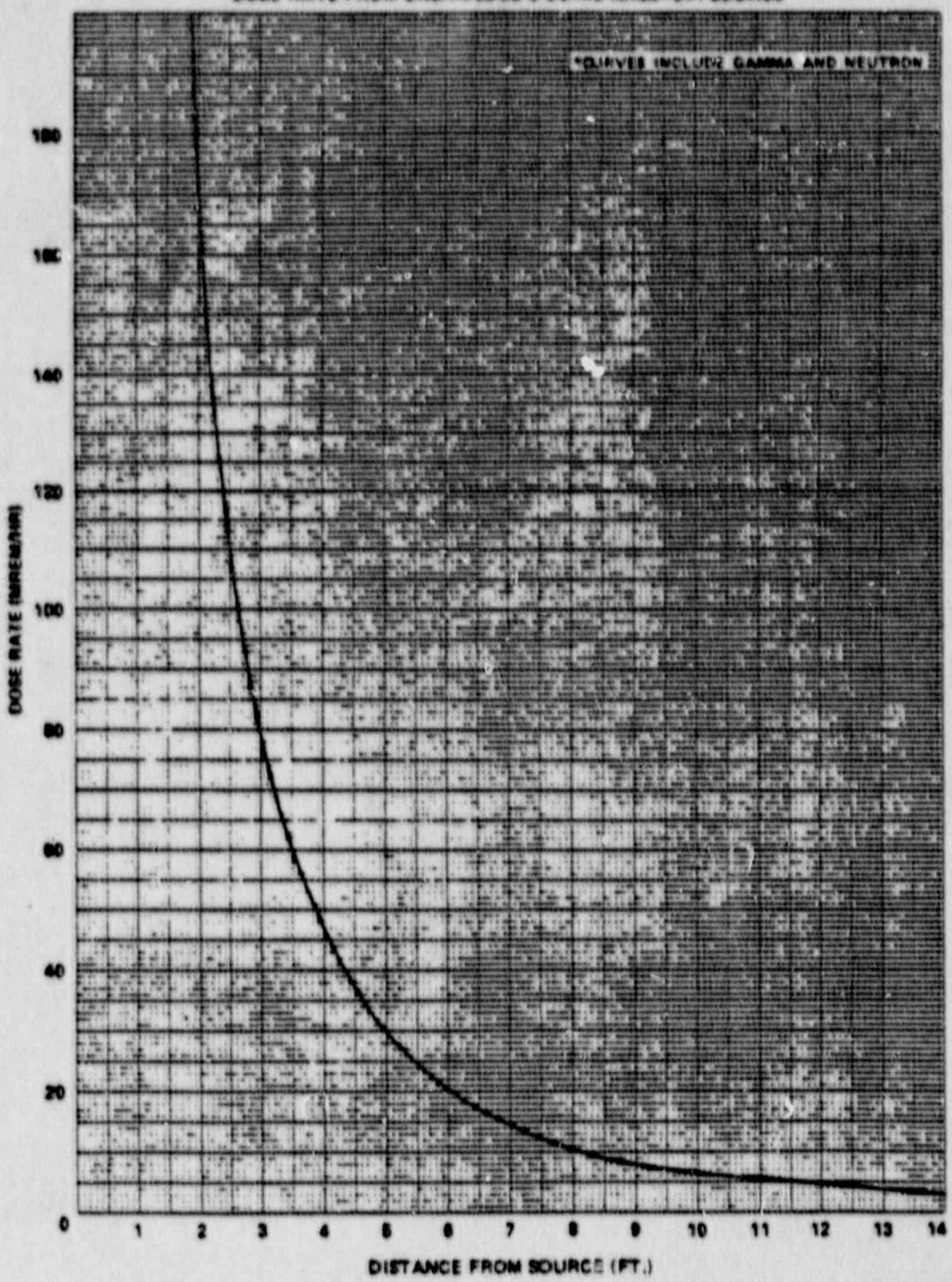
SAFETY CURVE 5

DOSE RATE FROM UNSHIELDED 2.7 CURIE Am-Be-241 SOURCE



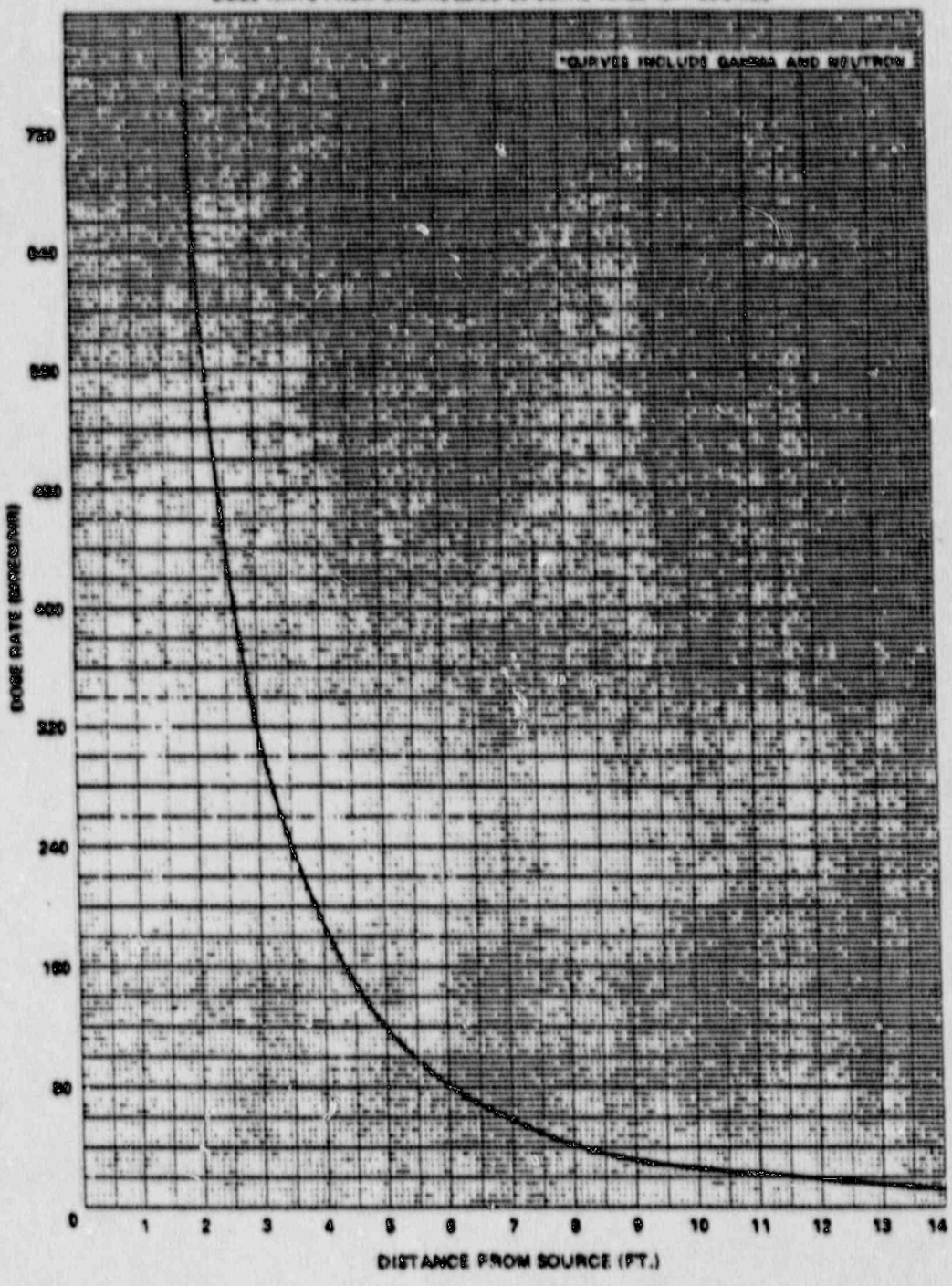
SAFETY CURVE 8

DOSE RATE FROM UNSHIELDED 5 CURIE Am-Be-241 SOURCE

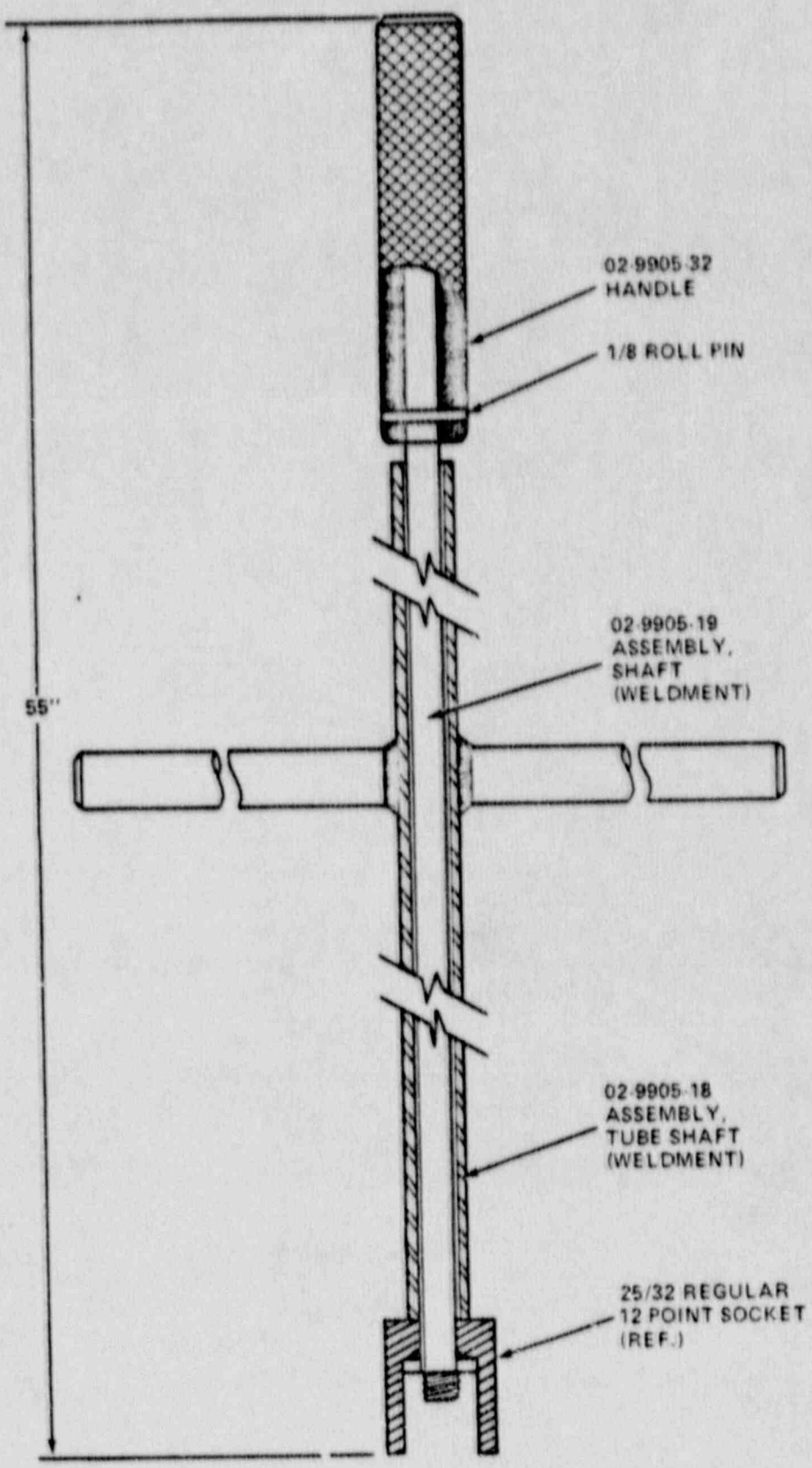


SAFETY CURVE 7

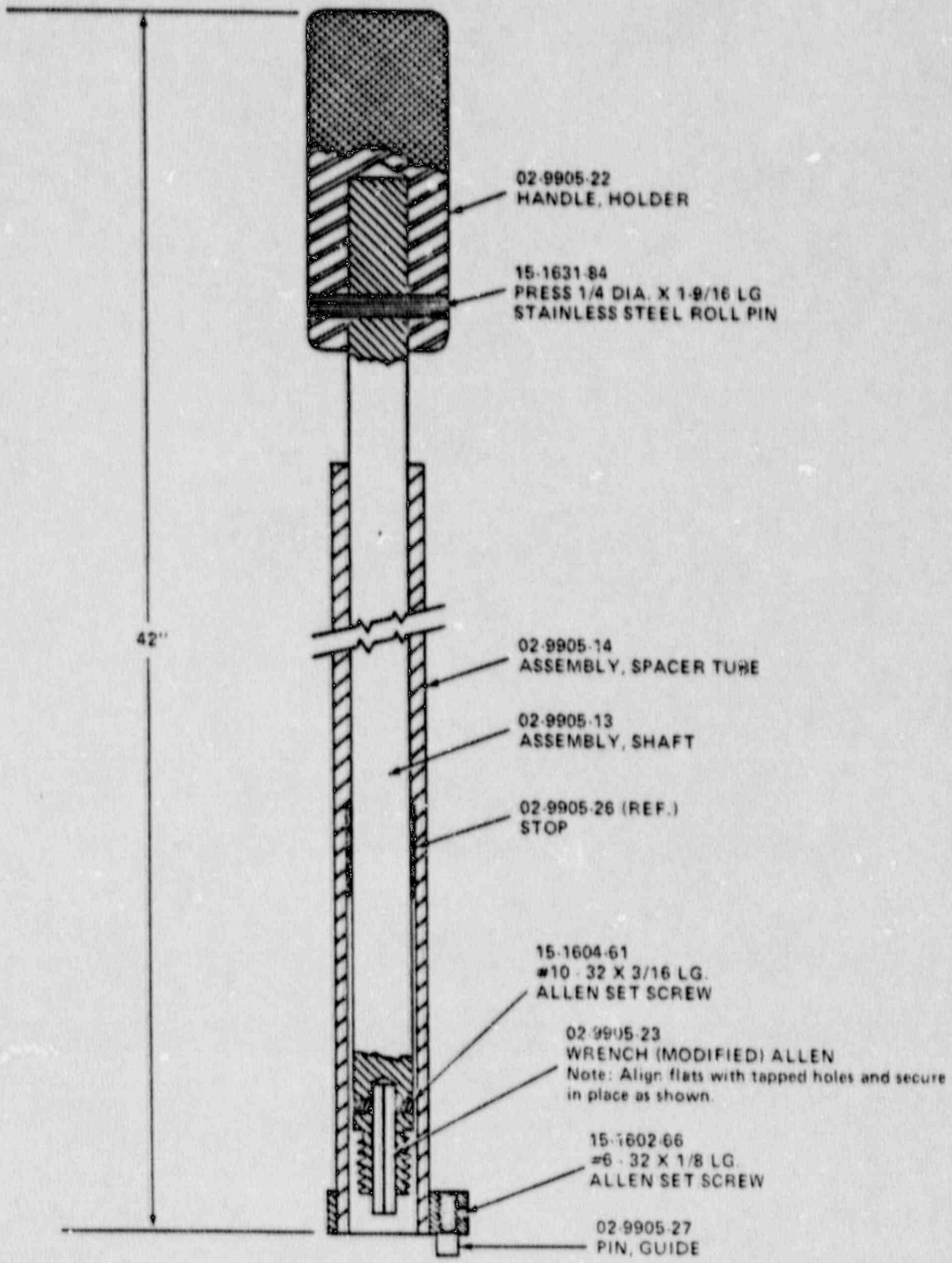
DOSE RATE FROM UNSHIELDED 20 CURIE $Am^{241}Be$ SOURCE



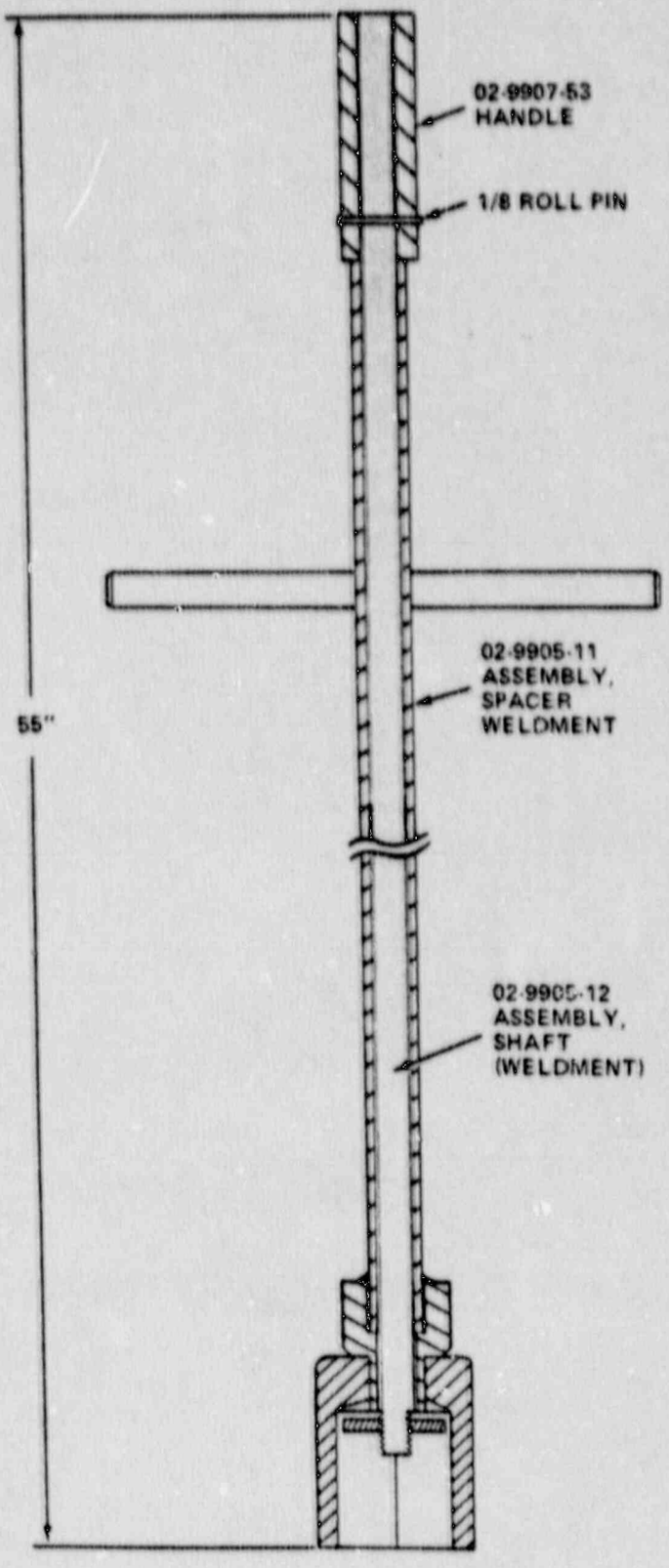
SOURCE HANDLING TOOL ASSEMBLY
F/20 curie AmBe 241
02-9905-02



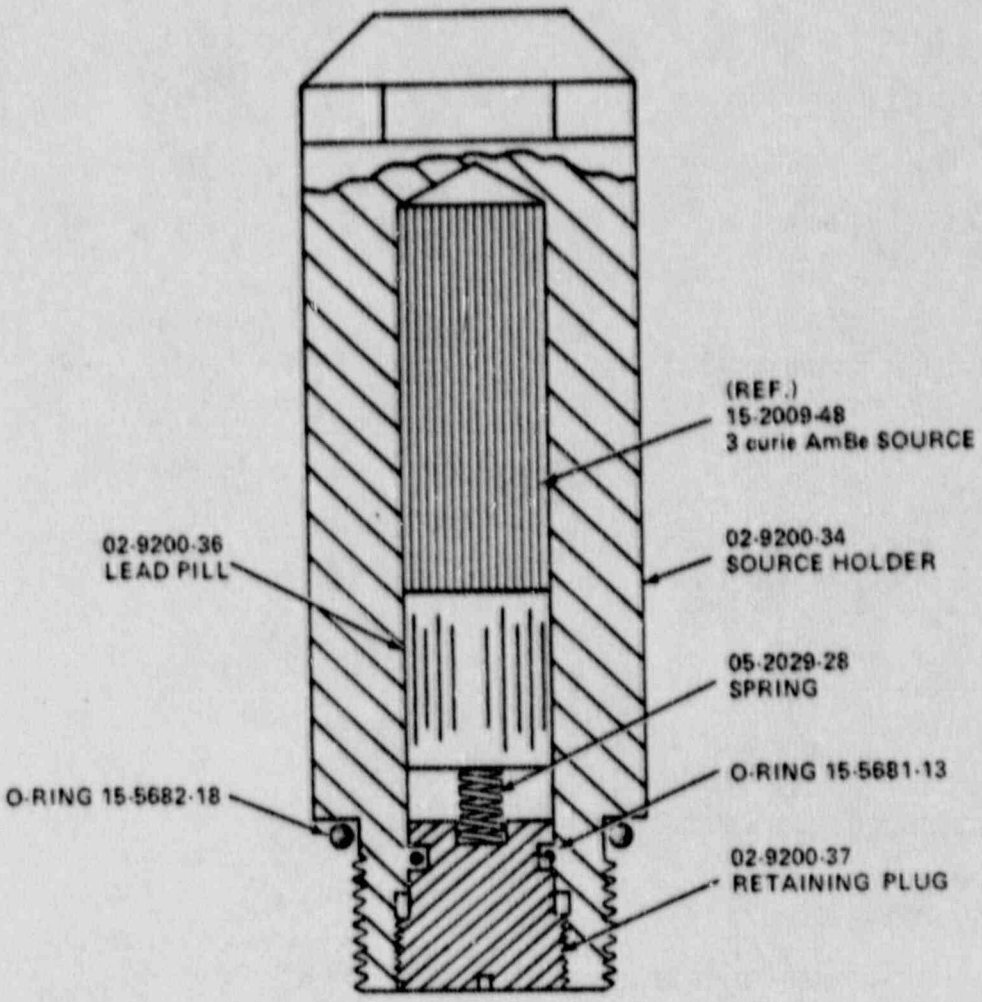
SOURCE HANDLING TOOL ASSEMBLY
S.N.P. TOOL – 2 curie CS-137 5 curie AmBe 241
02-9905-01



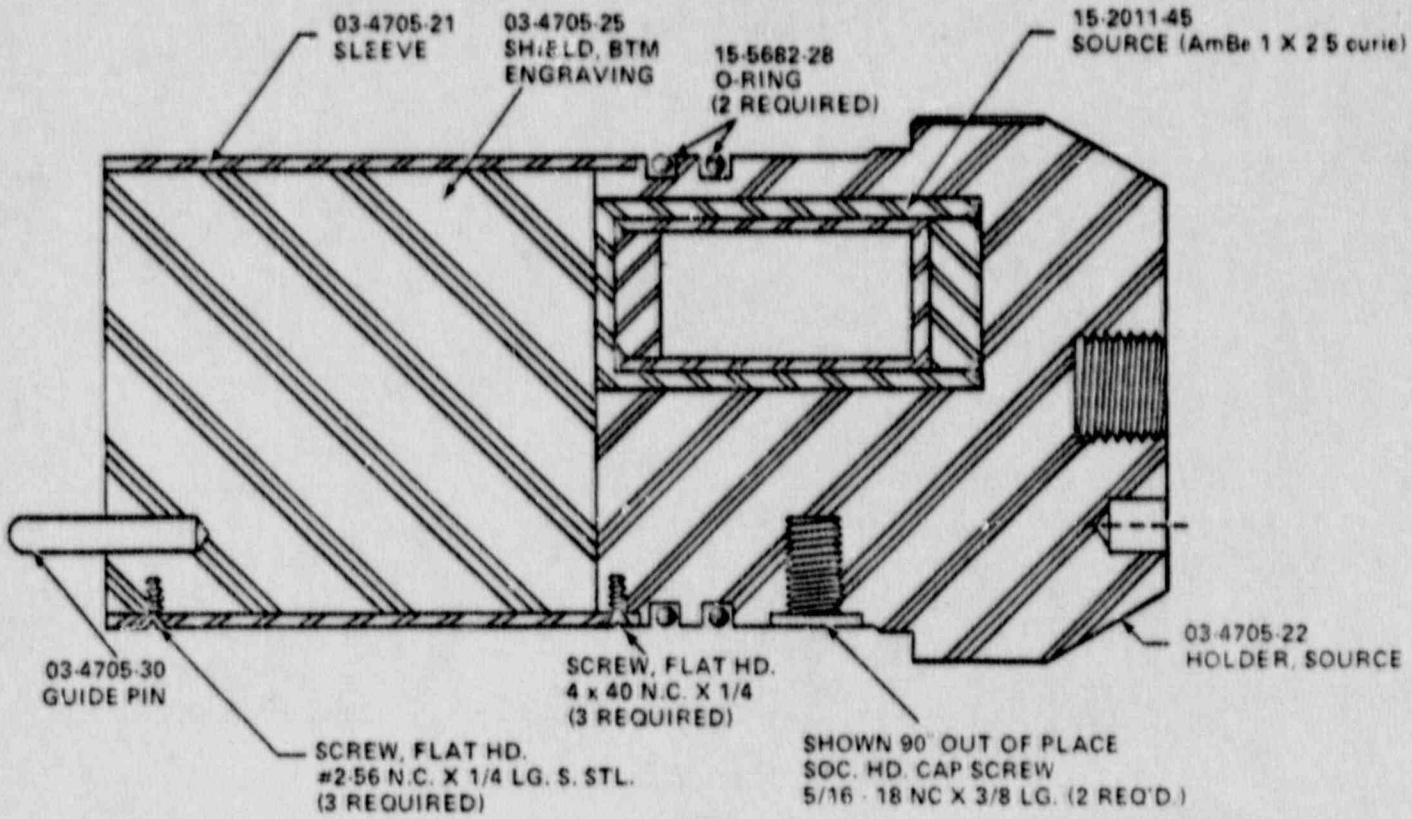
SOURCE LOADING TOOL ASSEMBLY
F/1-11/16 SOURCE HOLDER-5/3 curie AmBe 241
02-9907-10



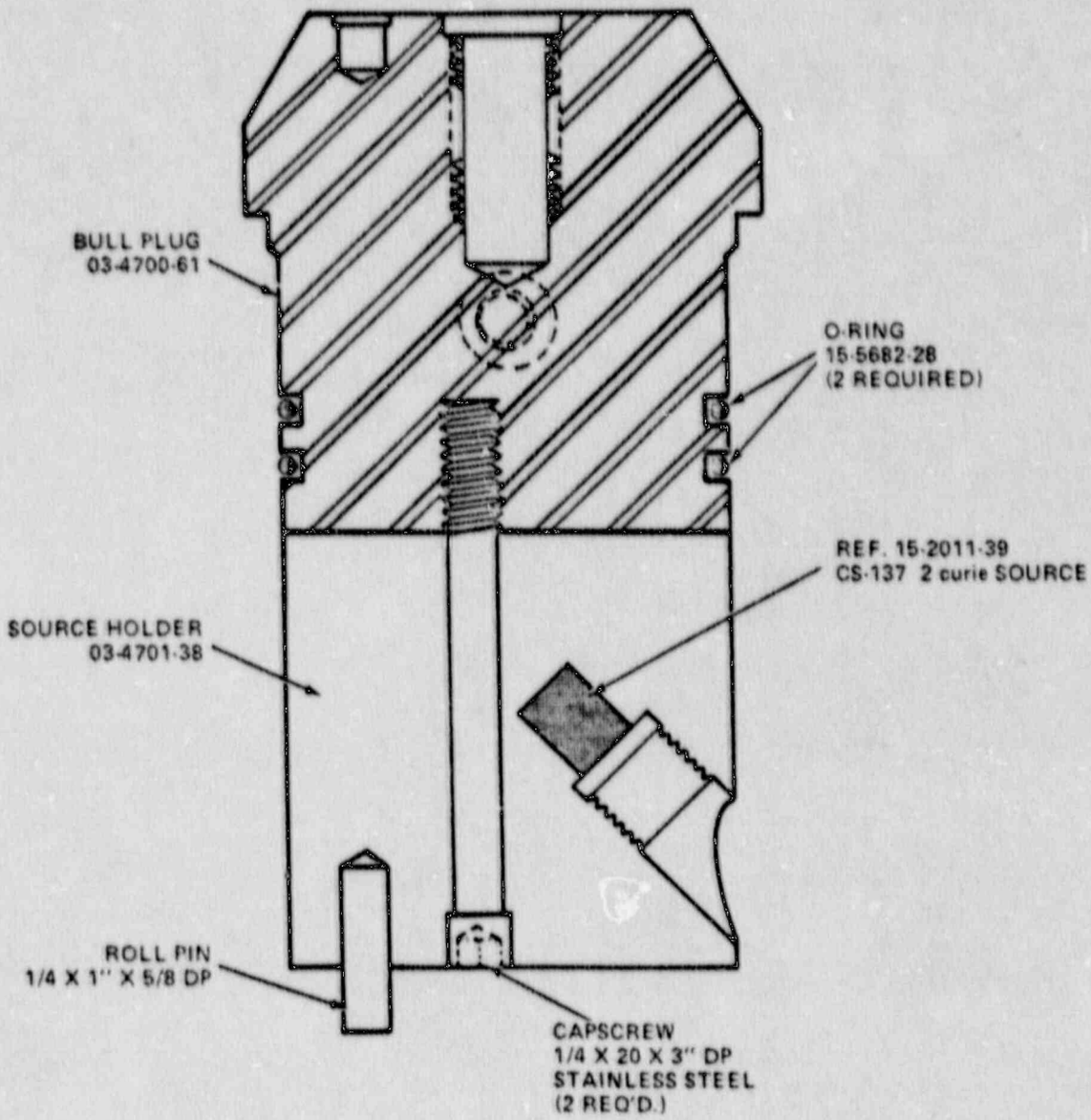
SOURCE HOLDER ASSEMBLY
5/3 curie AmBe SOURCE
02-9200-18



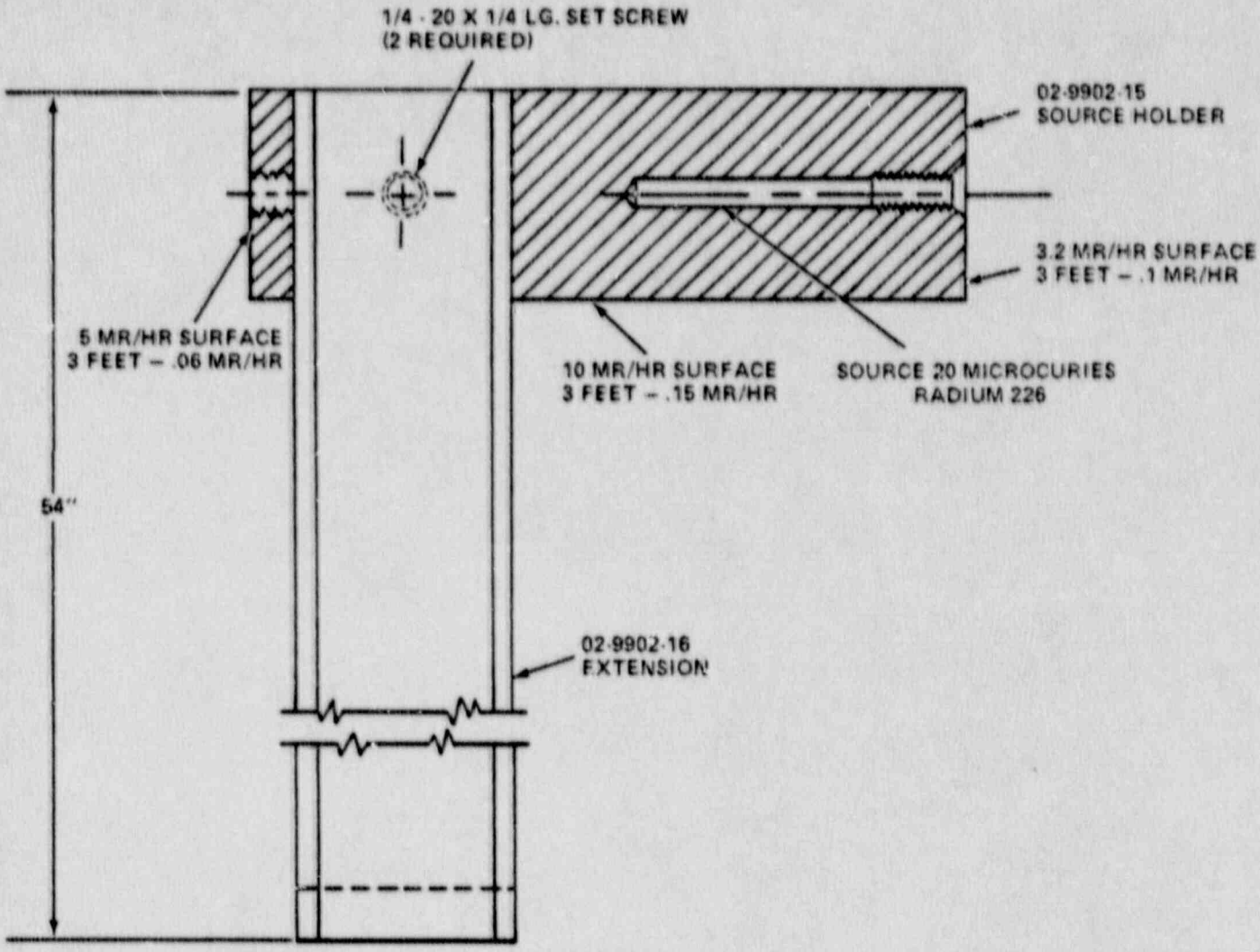
SOURCE HOLDER ASSEMBLY
F/5ci – AmBe 241
03-4705-11



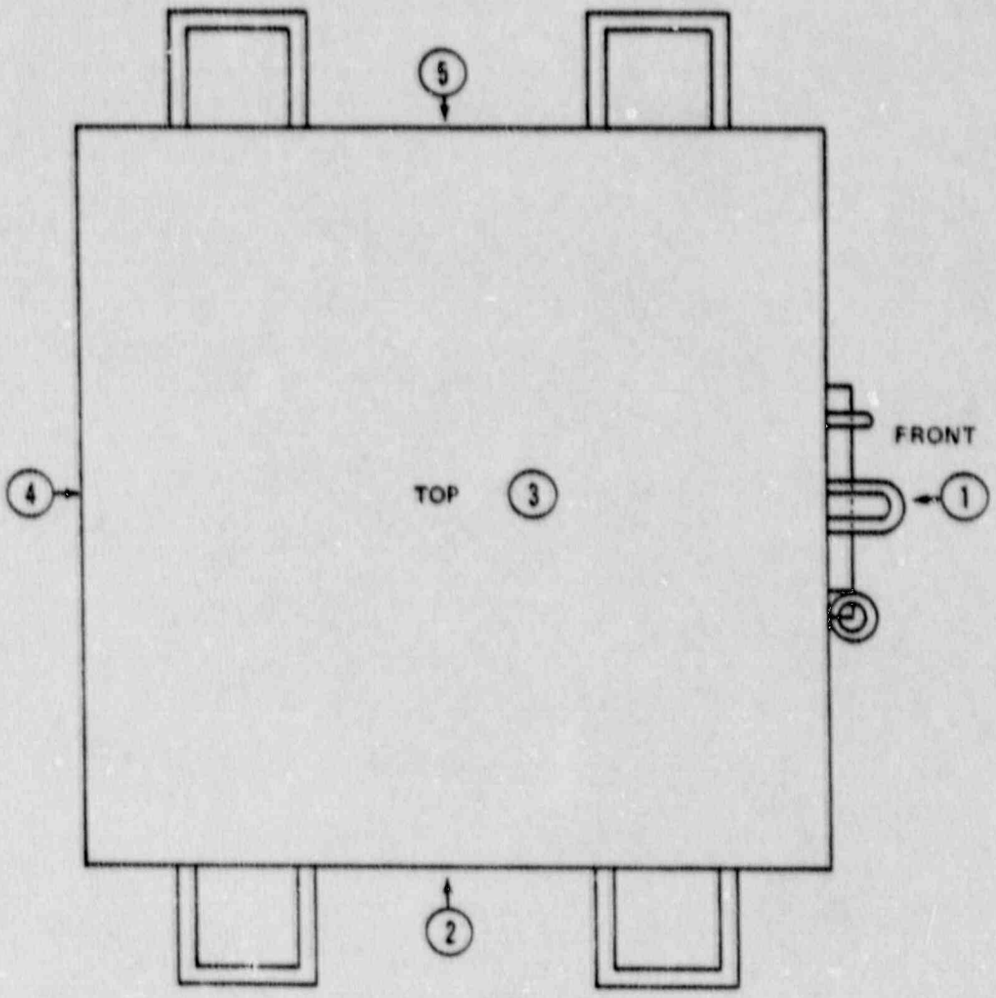
SOURCE HOLDER ASSEMBLY
F/2ci – CS-137
03-4701-15



G/R CALIBRATOR API UNITS
20 MICROCURIES – RADIUM 226
02-9902-03

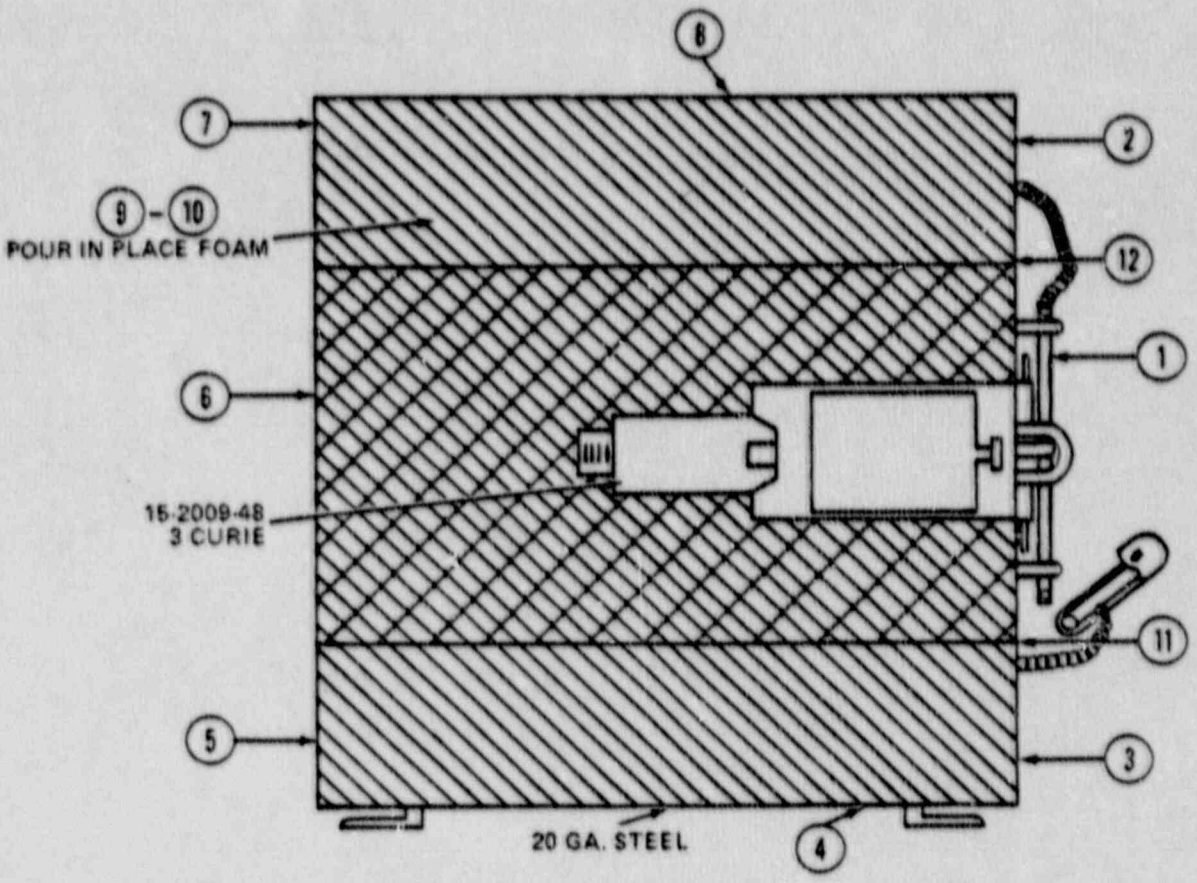


20 curie AmBe SHIELD
D.O.T. – 7A
15-2011-46



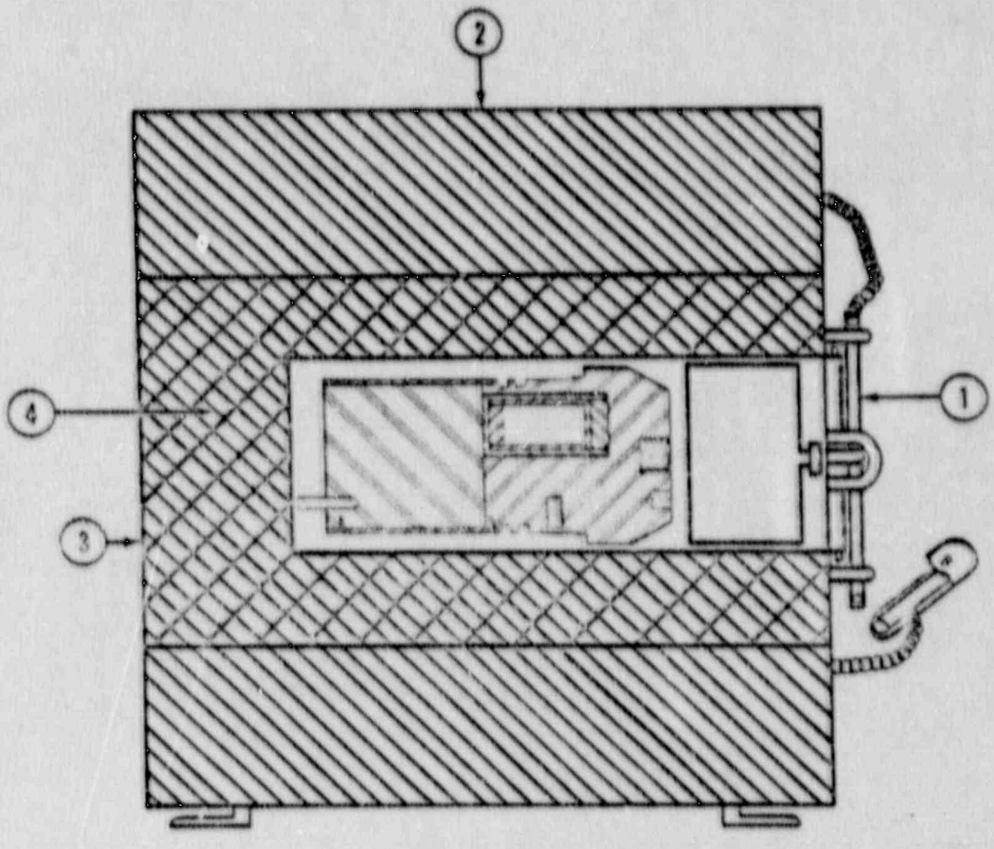
	SURFACE	3 FEET
1	94 MR/HR	2 MR/HR
2	92 MR/HR	2 MR/HR
3	94 MR/HR	2 MR/HR
4	92 MR/HR	2 MR/HR
5	90 MR/HR	2 MR/HR

3 curie AmBe 241 SHIELD
D.O.T. – 7A
15-2011-03



NO.	NEUTRONS	GAMMA
1	40 MR/HR	1.0 MR/HR
2	20 MR/HR	1.0 MR/HR
3	40 MR/HR	1.0 MR/HR
4	48 MR/HR	2.0 MR/HR
5	32 MR/HR	1.2 MR/HR
6	44 MR/HR	1.8 MR/HR
7	32 MR/HR	1.3 MR/HR
8	48 MR/HR	2.0 MR/HR
9	48 MR/HR	2.0 MR/HR
10	48 MR/HR	2.0 MR/HR
11	48 MR/HR	2.0 MR/HR
12	48 MR/HR	1.8 MR/HR

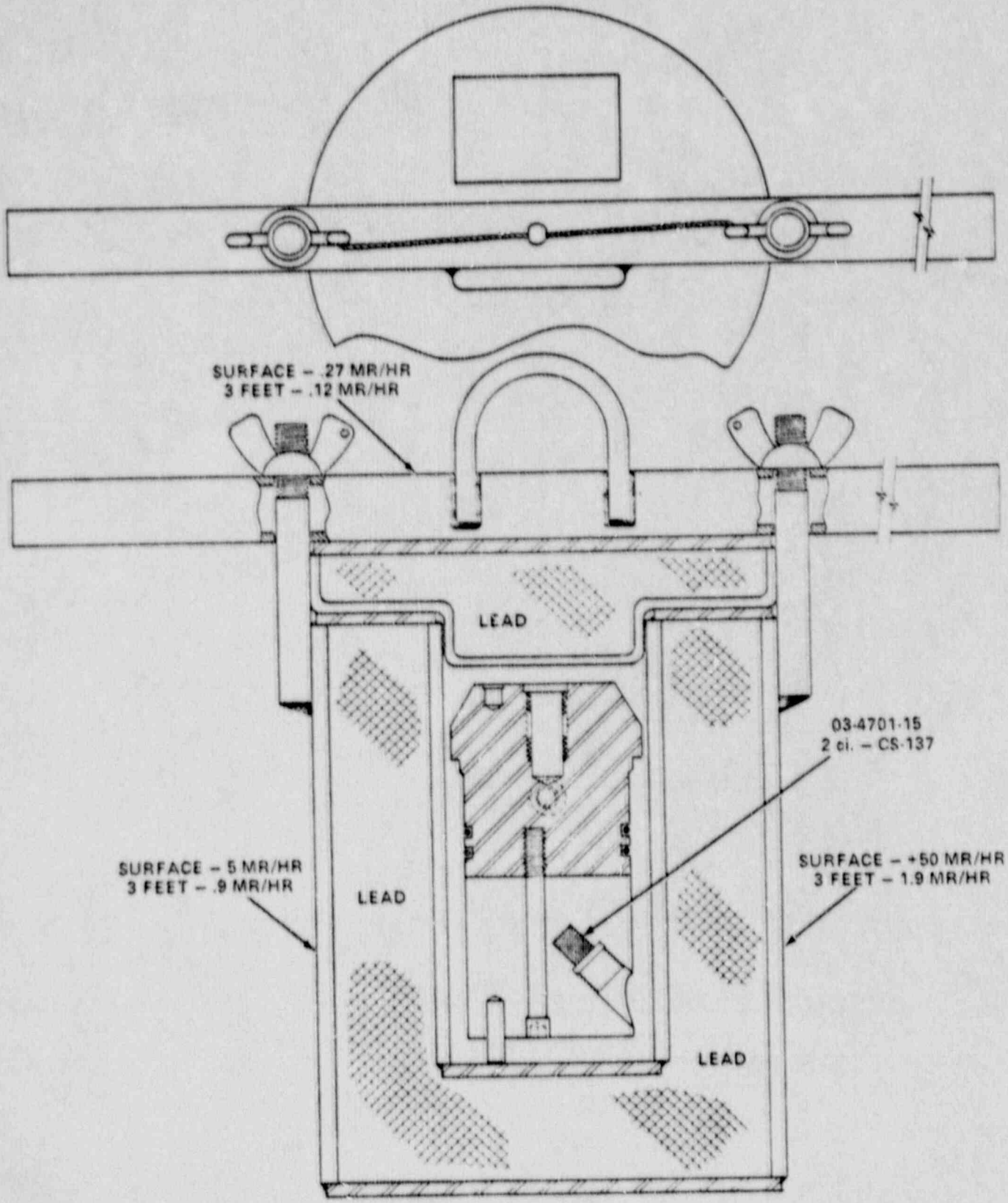
5 curie AmBe 241 SHIELD
D.O.T. – 7A
15-2011-05



DOSE RATE MR/HR

	SURFACE	3 FEET
1	20 MR/HR	4.0 MR/HR
2	9 MR/HR	0.2 MR/HR
3	3.4 MR/HR	0.5 MR/HR
4	4.3 MR/HR	0.4 MR/HR

SOURCE STORAGE ASSEMBLY
SPEC 7A 127 2 curie – CS-137
02-9908-06



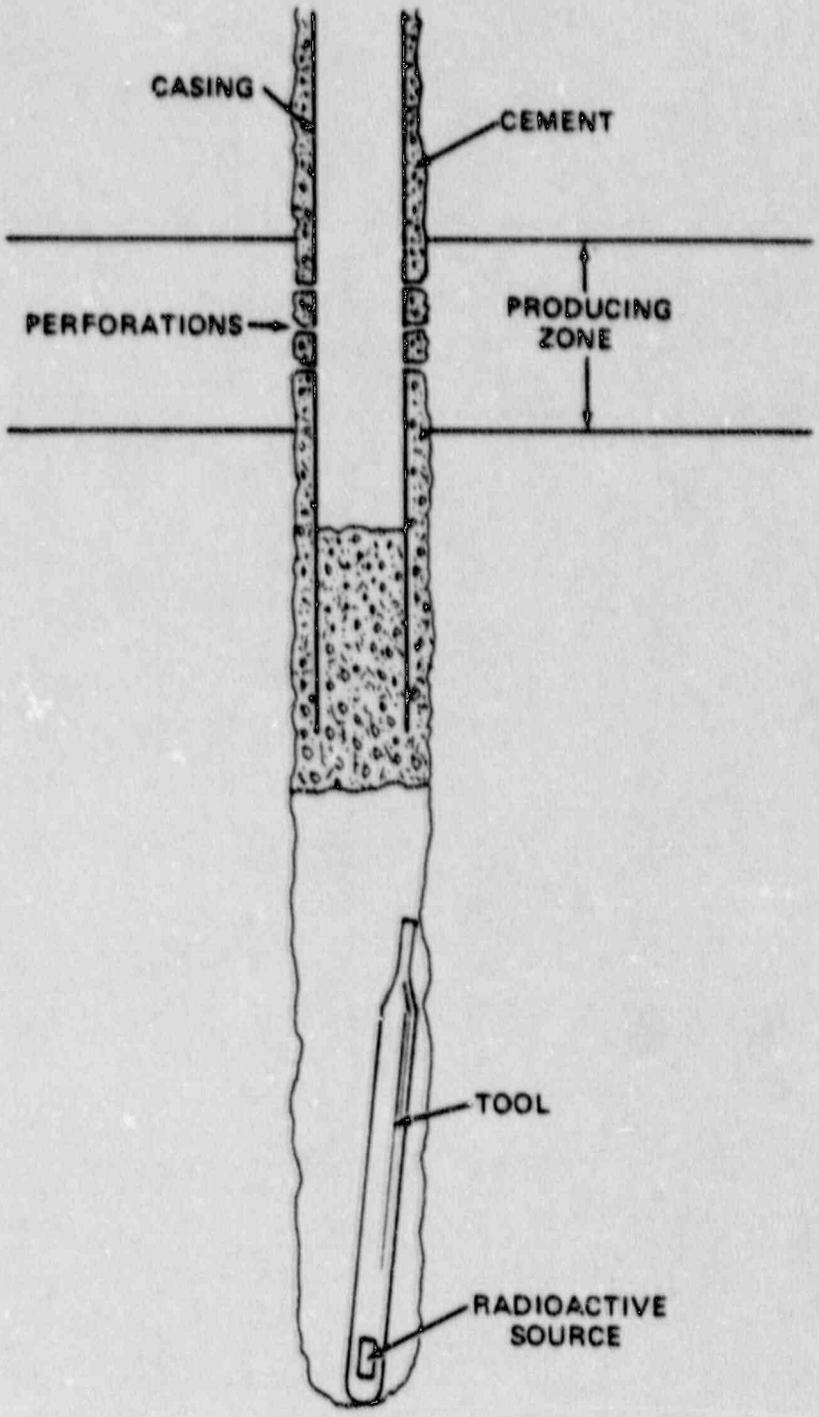

CASING
CEMENT
PERFORATIONS
PRODUCING ZONE
TOOL
RADIOACTIVE SOURCE

FIGURE 1

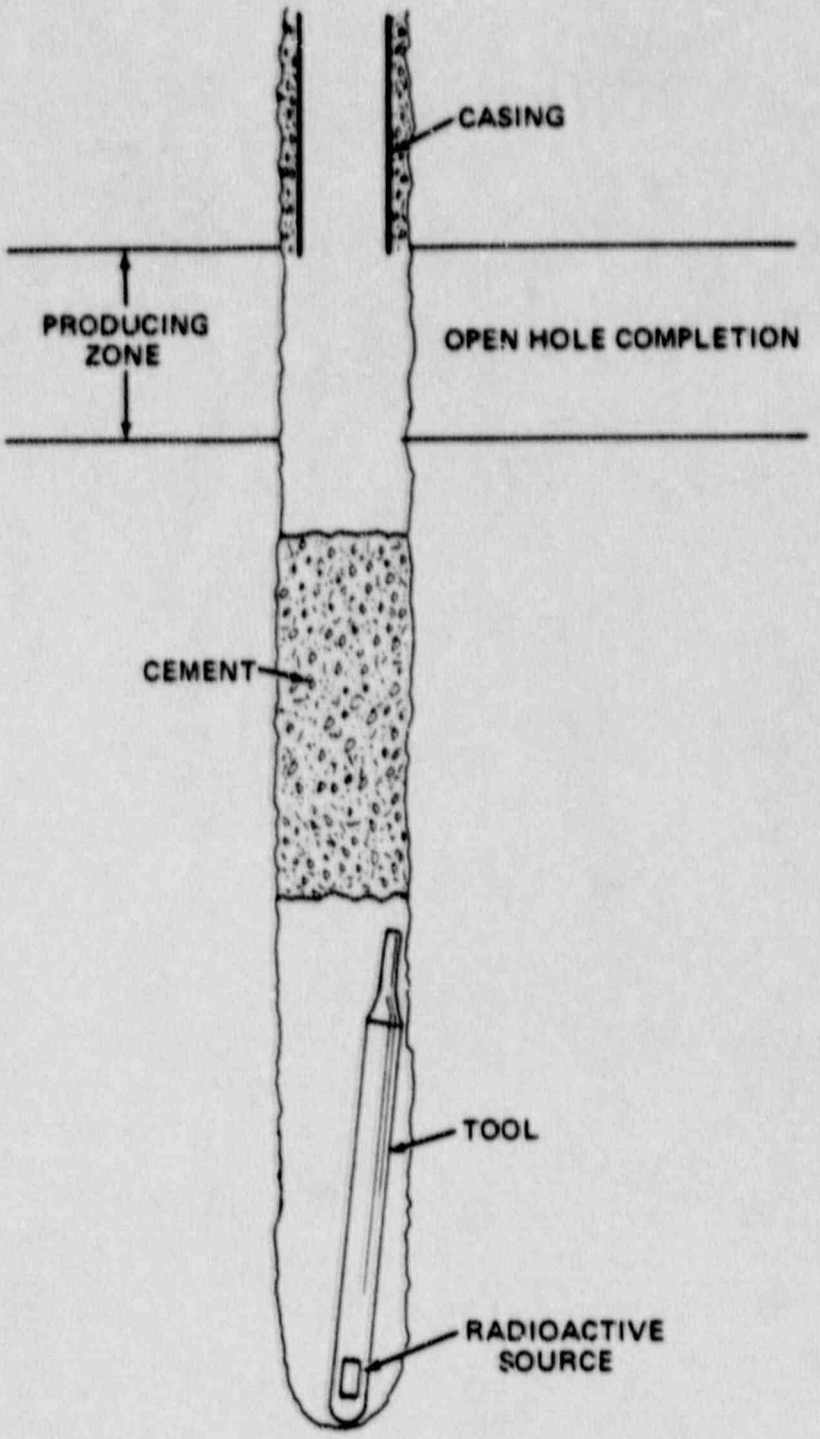

CASING
PRODUCING ZONE
OPEN HOLE COMPLETION
CEMENT
TOOL
RADIOACTIVE SOURCE

FIGURE 2

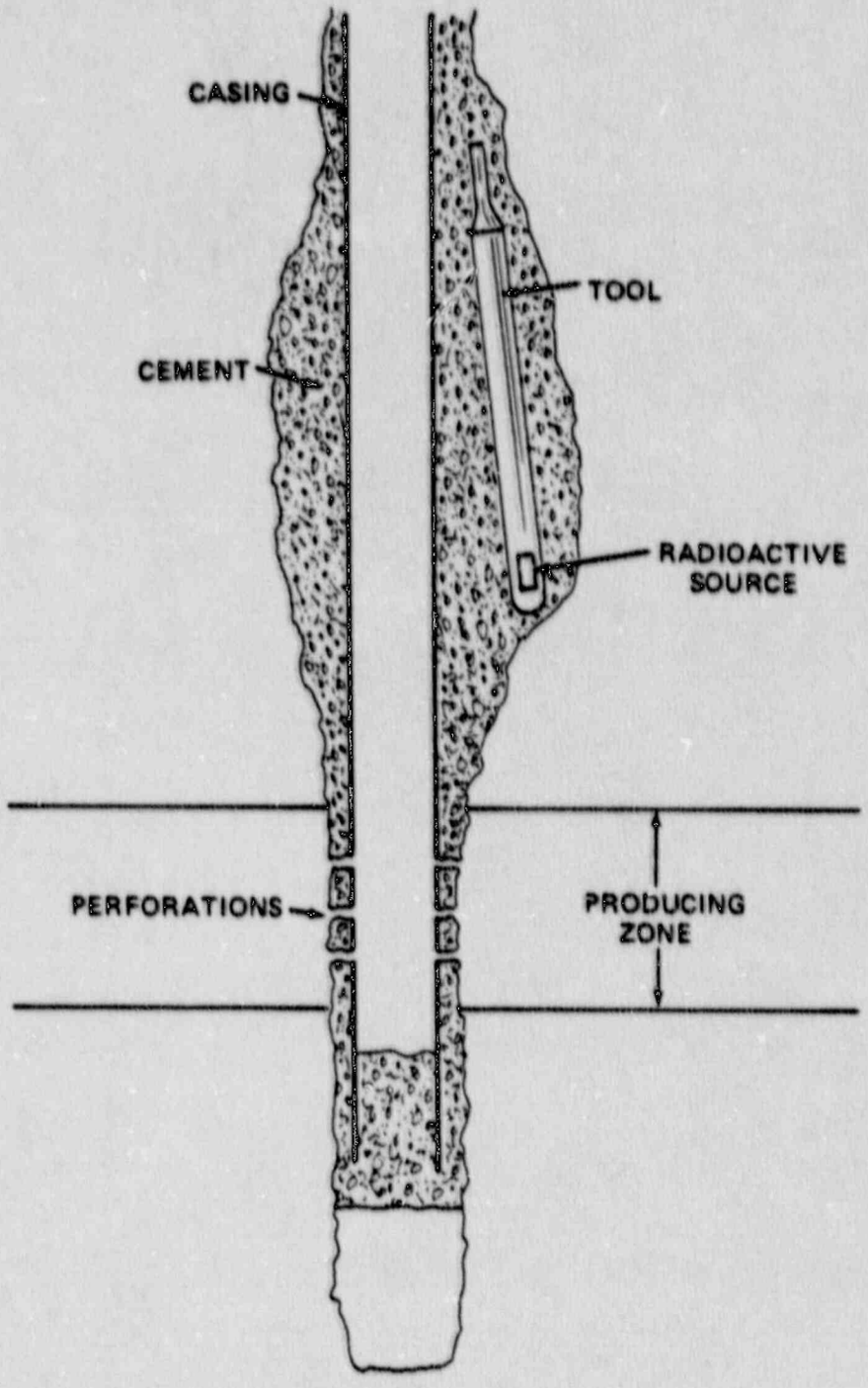

CASING
TOOL
CEMENT
RADIOACTIVE SOURCE
PERFORATIONS
PRODUCING ZONE

FIGURE 3

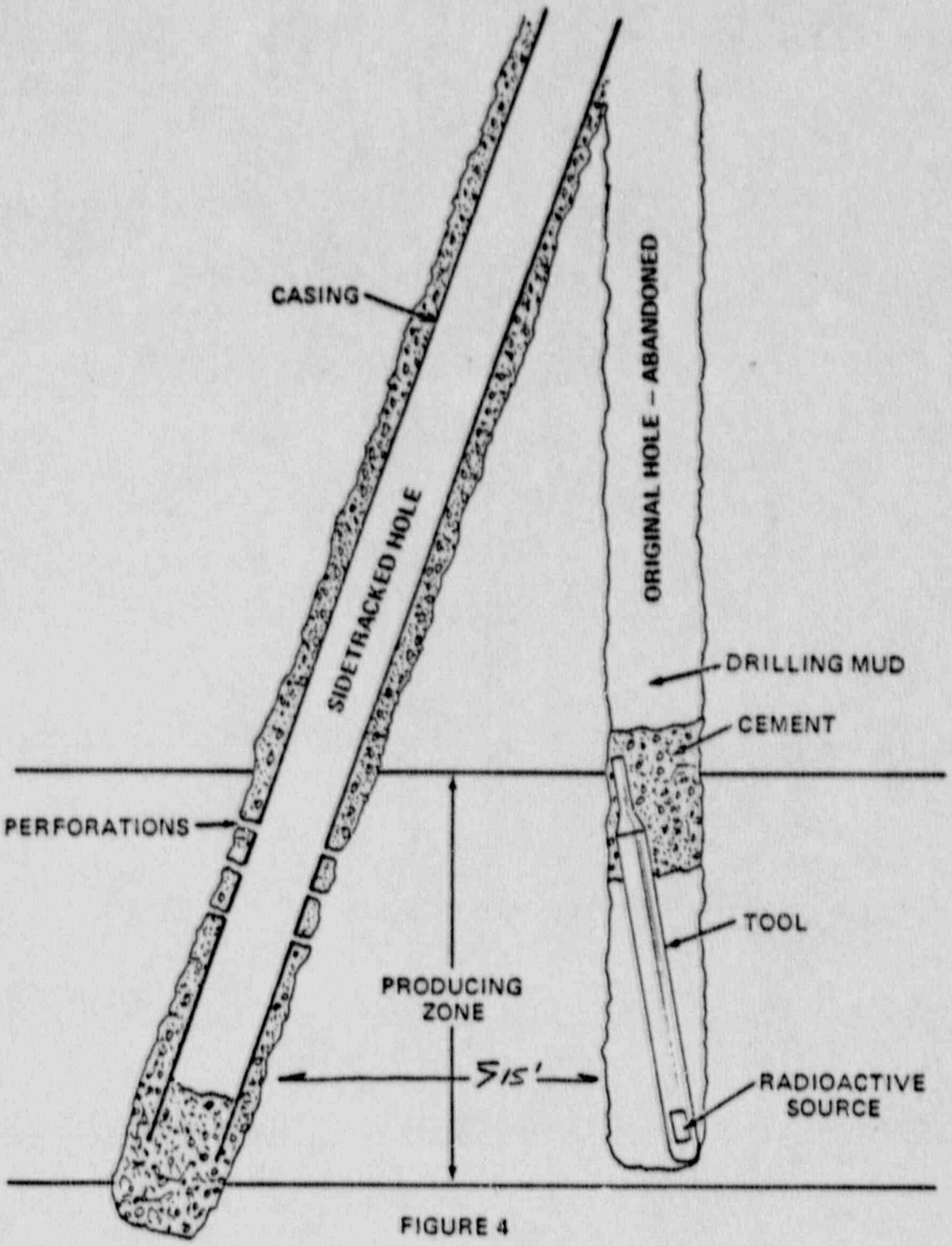

CASING
SIDETRACKED HOLE
ORIGINAL HOLE – ABANDONED
DRILLING MUD
CEMENT
PERFORATIONS
TOOL
PRODUCING ZONE
5'15'
RADIOACTIVE SOURCE

FIGURE 4

OPERATING PROCEDURES
003-4700-875
O-RING INSTALLATION TOOL

SCOPE

003-4700-875 O-Ring Installation Tool is designed to install O-rings on 003-4701-015 Source Holder Assembly. It also contains features to clean O-ring grooves on the Source holder assembly. The installation tool provides the capability to install the O-rings while minimizing radiation exposure.

Changing O-rings on the 2 Curie Cesium-137 Sealed Source can result in exposure greater than that permitted by Industry standards, thus, creating the potential for serious long term health hazards to personnel performing this task; if recommended procedures are not followed. Since the effects of shielding and distance are reduced during this operation, it is important to minimize the time spent completing the task.

Tools Required

Source Handling Tool	(002-9905-001)
O-Ring Installation Tool	(003-4700-875)
O-Rings	(015-5682-028)
Hook Tool, X-Acto Knife or Razor Blade	
Bench Vice	
Silicon Lubricant	(015-1655-086)
Paper Towels	

PROCEDURE (See drawing next page)

1. Assemble Required Tools/Material

2. Establish and Post Radiation Area - ("Caution - Radiation Area" Signs). Clear area of unnecessary personnel and insure availability of assistance to prevent unauthorized/inadvertent entry. (2MR distance, 40' or greater).

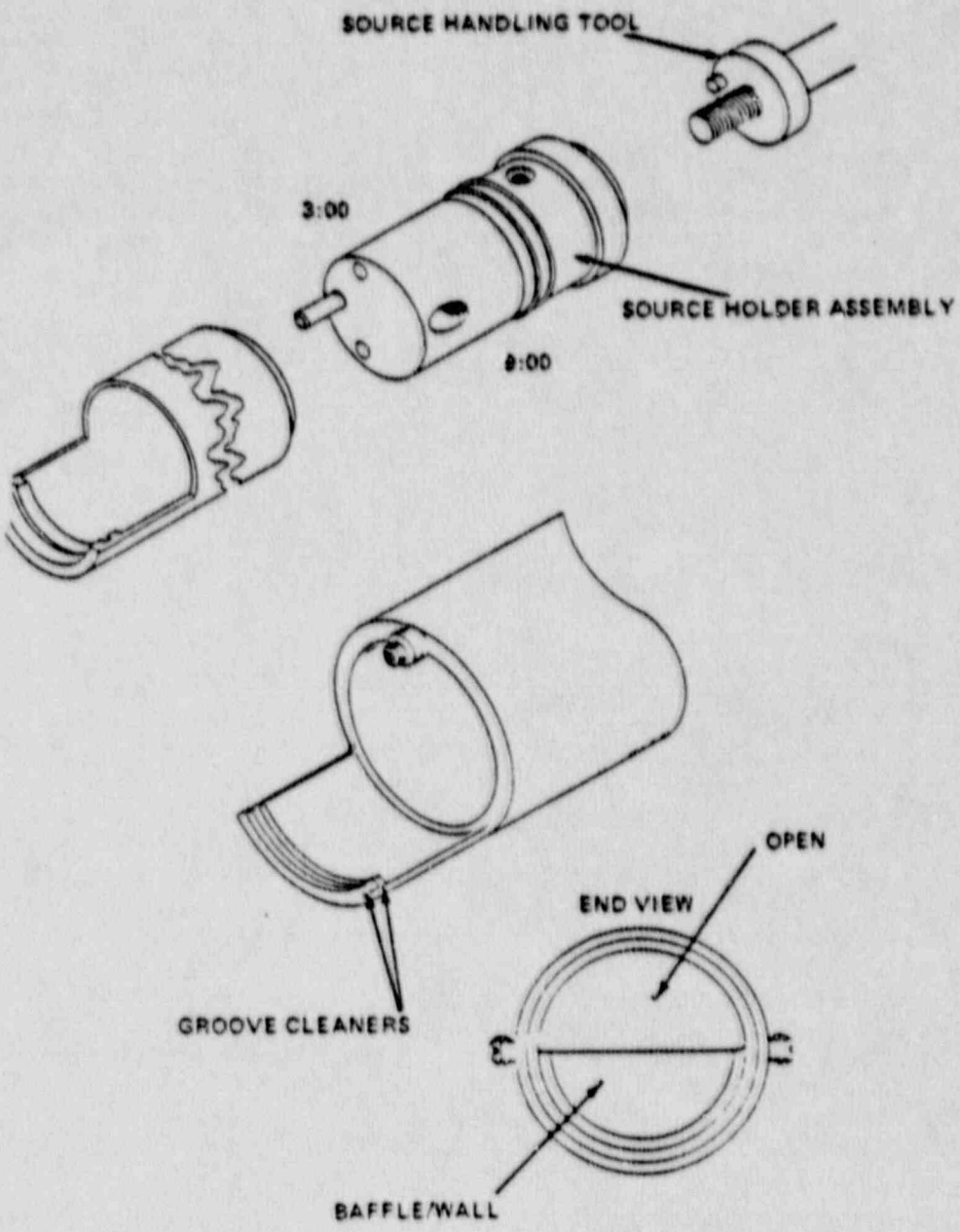
3. Remove Source Holder Assembly from Storage Pit/Transportation Shield.

4. Secure Assembly in Bench Vise (Close Jaws of vise on outer tube of handling tool with "Focused Window" of Source Holder at 9 or 3 o'clock, as viewed from end of Handling Tool. Perform all operation with Body positioned on Side of Source Holder Opposite from which "Focused Window" is facing.)

5. Remove existing O-rings (2) with Hook Tool, X-Acto Knife or Razor Blade.

6. Place Paper Towel over end of O-ring Installation Tool and slide over end of Source Holder to Engage Groove Cleaners, (2) in "O" ring grooves, rotate tool to clean grooves. Repeat as necessary to remove all foreign material.

O-RING INSTALLATION TOOL



7. Apply Silicon Grease to "O" Ring and install in groove on spring loaded end of Installation Tool.

8. Rotate Installation Tool to a position which will allow opening in inner sleeve to pass over alignment pin in Source Holder. Slide Tool over Source holder and push ("Bump") to deposit O-Ring in far O-ring groove.

9. Apply Silicon Grease to Second O-Ring and install in groove on tool. Rotate installation tool so that baffle/wall of inner sleeve will butt against alignment pin in source holder. Slide tool over source holder so that alignment pin contacts wall/baffle of inner sleeve and push ("Bump") to deposit "O" ring in near O-ring gland.

10. Return Source Holder Assembly to Storage Pit/Transportation Shield.

NOTE: When grasping O-ring installation Tool during O-ring groove cleaning process and/or when installing new O-rings, grasp tool as far from source holder assembly as possible in order to further reduce hand/finger exposure.

Application for Safety Review of the
Design for the Gearhart Downhole
Accelerator

I. Summary Data:

A. Date - February 10, 1984.

B. Device Type - Downhole Accelerator

C. Model - Model Number 013-1004-000

D. Applicant - Gearhart Industries, Inc.
P.O. Box 750
Alvarado, Texas 76009

Gearhart Industries, Inc. will be the manufacturer and the distributor of these devices. For further information, contact Dennis R. Russell, Radiation Safety Officer, at 817-783-3307, Ext. 416.

E. Other Companies Involved - None

F. Sealed Source Model Designation - See II. A.

G. Isotope and Maximum Activity - Tritium, maximum of 3,000 mCi per device.

H. Leak Test Frequency - The device will be leak tested immediately after it has been filled with tritium and again just prior to shipment to the field and upon receiving it back from the field at the Vacuum Device Facility at Alvarado, Texas.

I. Principal Use - Code F: Oil and Gas Well Logging

J. Custom Device - This is a custom device. This device has been specifically designed and constructed according to Gearhart's proprietary design as stated in Gearhart's application for a Radioactive Material License dated June 7, 1982. As you are aware, TDH Radioactive Material License No. 5-3284 was awarded to Gearhart Industries on October 7, 1982.

K. Custom User - Gearhart Industries, Inc.
Wireline Division
P.O. Box 1258
Fort Worth, Texas 76101
Tx # 5-2113, Expiration Date - September 30, 1986

461349
Atch 4

II. Descriptive Data:

A. Description - The complete logging tool system consists of a pulsed deuterium-tritium accelerator, (Downhole Accelerator) a sodium iodide/photomultiplier detector, a series of time counting gates and a digital telemetry system.

The Downhole Accelerator (neutron tube) contains tritium gas that has been absorbed onto the surface of the tube's target, which is titanium or scandium plated onto copper. Other materials used in the tube include 304 and 17-4PH stainless steel, glass, ceramic, Kovar and samarium cobalt.

The overall length of the tube, including electrical feed throughs is slightly over 7" and the tube's maximum diameter is 1 5/16".

Methods of fabrication are the same as those employeed in vacuum tube technology.

The American National Standards Institute's (ANSI) classification for the device in ANSI 65-111-SSS-R1. The tritium is defined as a Tracer Material for oil field downhole work. The tube is defined as a gauge for qualitative or quantitative chemical composition without a sealed source. Reference: American National Standard N538-1979.

B. Labeling - Labeling will be in compliance with TRCR 36.109.

C. Drawing - See Attachment I.

D. Conditions of Normal Use - The device will be operated in cased and uncased formation boreholes at pressures up to 20,000 p.s.i. and temperatures of 400°F. The device will be used by Gearhart Industries Qualified Well Logging Engineers on oil, gas and mineral well locations throughout the world. Neutron generators are turned off when not in use; therefore, they present no neutron or radiation hazard in this state. However, when energized, they must be treated like any other source of 10^8 neutrons per second. The expected useful life of the device is 400 hours minimum.

E. Limitations of Use - If the device is involved in a vehicle accident, it is believed that the tritium will be completely contained within the inner glass envelope, the stainless steel

sleeve and/or the heat treated outer protective steel pressure vessel. In the event of a very intense fire, it is believed that all the tritium will escape all containment envelopes.

F. Supporting Detail - See II. A. plus application for Radioactive Material License dated June 7, 1982. License No. 5-3284 was awarded on October 7, 1982 to Gearhart Industries, Inc.

III. Health and Safety Data:

A. Safety Analysis Summary:
References: Texas Bureau for Control of Radiation, Regulations, Parts 11, 21, 22, 35, 41 and 42; ANSI publication N538-1979 entitled "Classification of Industrial Ionizing Radiation Gauging Devices".

The Gearhart Downhole Accelerator, in the "off" state, poses no radiation hazard since the contained tritium gas only emits beta particles. In the cold state, only a small amount of tritium (probably less than 10 ppm) is free as a gas in the tube. The majority of the tritium is chemically bound as a hydride on the target or as a hydride in the gas control system. While the free tritium in the tube is not a hazard, unless the tube is at operating temperature when it is broken, there is the potential hazard from the tritium absorbed on the tube surfaces. This tritium is rather easily removed; therefore the clean up operation must be conducted with a degree of caution.

B. Manufacturing and Distribution Controls:

1. The person(s) performing the Quality function is the manager of the Vacuum Devices Facility in Alvarado, Texas, or his designee(s). Person(s) with the Quality function have the authority to:

   a. Examine all records of the device program which are relevant to radiation safety.

   b. Reject and obtain proper disposition of the defective material and workmanship.

   Persons performing the Quality function are responsible for:

   a. Participating in design review of the device, identifying

and suggesting necessary improvement in the device components which constitute or satisfy the safety features and requirements of section 3 of ANSI standard N538 for devices.

b. Monitoring the performance of, and recordkeeping associated with, prototype testing, and verifying that device production models meet the stated radiation numerical classification.

c. Devising and implementing documented test, inspection, and corrective action procedures for device components which constitute or satisfy the safety features and requirements of section 3 of ANSI standard N538 for devices.

d. Establishment of an audit procedure, monitoring all aspects of the device program which may affect radiation safety such as installation, servicing, shipping and instruction manuals.

2. A safe and reliable neutron tube is guaranteed by the Vacuum Devices Quality Assurance program and strict adherance to Quality Control procedures. The Quality Assurance program assures the following:

a. That the design documentation listed are provided as required:

. assembly drawings

. detail parts drawings

. parts lists

. parts and material specifications.

b. That the following procedure documentation are provided as required:

. assembly procedures

. test procedures

. inspection procedures

.safety procedures.

c. That safe and adequate facilities and equipment are provided for fabrication and test.

d. That personnel are trained in assembly, test, inspection and safety procedures.

e. That procedures are qualified prior to use on the assembly line.

The following Quality Control tests are performed by Vacuum Devices personnel:

a. Visual and dimensional inspection of incoming parts to assure conformance to drawings and specifications.

b. Visual inspection of assemblies after each assembly procedure.

c. Helium leak test of final assembly to assure integrity of welds.

d. Wipe test of tritium filled tube prior to testing.

e. Testing of the tube to insure proper operation.

f. Wipe test and final packaging just prior to transfer to the field.

The various test/inspection devices, e.g., gage block set, height gage, and surface plate are factory calibrated with methods that are traceable to a national standard.

Traceability of the neutron tubes is facilitated through the information recorded on the Gearhart Industires' Certificate of Assay, Transfer and Disposal. See Attachment II.

3. Note: The neutron tube does not contain a sealed source. See Section II. A.

In the following, the method used for determining the activity of the tritium used in the neutron tube is described.

The present design of the neutron tube requires 296 mCi of tritium. From this value, a quantity of tritium gas in terms of the product of pressure and volume (PV) was determined. A volume was then chosen and from the PV and the volume, the pressure required was determined ($\frac{PV}{V} = P$). In the actual filling operation, an accurately known volume and the neutron tube are evacuated to $\sim 1 \times 10^{-8}$ Torr. The volume is then isolated from the tube and the vacuum system and filled to the required pressure, taking into account the temperature of the volume chamber. The volume is then isolated from the source of tritium and its contents let to the neutron tube. A getter in the tube sorbs the gas, finally achieving a base pressure of $\sim 1 \times 10^{-6}$ Torr. The neutron tube tubulation is then pinched off, sealing the tube and releasing it from the vacuum - gas filling system.

From activity of tritium required by the neutron tube (296 mCi), the specific activity and molecular weight of tritium, a pressure-volume product may be obtained.

The specific activity of tritium is 9.64×10^3 Ci/gm (Ref. 1). The atomic mass of tritium is 3.01605 (Ref. 1). Since tritium is diatomic, the molecular weight is $2 \times 3.01605 = 6.0321$ gm/mol. Therefore, 6.0321 gm/mol $\times$ 9.64×10^3 Ci/gm $= 5.814 \times 10^4$ Ci/mol. 1 mol. = 22.4 liters at 760 Torr and 0° C. (Ref. 2). Therefore, the PV of 1 mol. at 0° C = $22.4 \times 760 = 17024$ Torr Liters. Since 1 mol. = 5.814×10^4 Ci, 17024 Torr Liters = 5.814×10^4 Ci, $\frac{.296 \text{ Ci.}}{5.814 \times 10^4 \text{ Ci}} \times 17024$ Tl $= 8.67 \times 10^{-2}$ Tl = PV at 0° C for the gas load in one neutron tube.

The volume chamber used has a capacity of .512 l including valves, fittings and pressure transducers. Therefore, the pressure required at 0° C = $\frac{8.67 \times 10^{-2} \text{ Tl}}{.512 \text{ l}} = .169$ T

To correct the pressure for a new temperature:

$$\frac{(.169T)\ (273 + T_{VC})}{273}$$

Where T_{VC} is the temperature of the volume chamber at the time it is to be filled.

For example, if the filling operation were taking place with T_{VC} at 22° C (our average experience) the pressure would be;

$$\frac{.169\ T\ (273 + 22)}{273} = .183\ \text{Torr}$$

In our system, the pressure is measured using an MKS Baratron pressure transducer model # 22BHS-A-B-10 and Indicator - Power Supply model # PDR-C-2.

Our tritium is purchased from Oak Ridge National Laboratory in cylinders containing 50 Ci. Our gas fill system includes two independent electrically heated zirconium getters manufactured by S.A.E.S. Getters Inc. One has a capacity of approximately 55 Ci of tritium, the other approximately 2 Ci. The larger one is used for the primary storage reservoir where the initial load of 50 Ci is deposited. The smaller one is used as a means for removing any decay product from the gas about to be loaded into a tube.

The zirconium getters will not sorb helium (He^3 being the decay product of T^3). However, any decay product produced within the getter during the time the tritium is stored there is trapped until the getter is heated to remove the tritium. Some He^3 will therefore evolve during the evolution of tritium for use in the neutron tube.

The technique for purifying the tritium is to evolve a small amount (about 1 Ci) of tritium from the primary storage reservoir and sorb it on the smaller reservoir. Any He^3 that evolves with the tritium from the primary reservoir is therefore left free and is pumped to an ion pump. The purified tritium is now evolved from the smaller getter to pressurize the volume chamber. After the tube filling is completed, any tritium remaining in the small reservoir is returned to the primary reservoir.

4. Each device is leak tested after being filled with tritium as follows: The entire device is wiped with a "packing peanut" which is placed in a glass scintillation vial. The "peanut" is dissolved in 15 ml. of scintillation fluid and this vial and a control vial are counted in a Tracor Analytic, Model 6895, Beta Trac Liquid Scintillation System. The device is classified as acceptable if the quantity of removable radioactive material is less than 0.005 microcuries.

Reference 1, Radiological Health Handbook, Revised Edition 1970
Reference 2, Handbook of Chemistry and Physics, 62nd Edition 1981-82

5. The complete device (Gearhart Industries Downhole Accelerator) will be approximately 23 feet long with a diameter of 1 11/16 inches. It will have an external pressure vessel of hardened 4130 steel tubing with a wall thickness of 0.120 inches. This vessel will withstand 20,000 pounds per square inch (p.s.i.). The interior will be protected by a stainless steel liner made of 321 stainless steel with a wall thickness of 0.035 inches and a diameter of 1 3/8 inches. All internal components are segmented with "O" rings and compartment bulkheads sufficient to withstand 20,000 p.s.i.

   The completed device will be mounted on a Gearhart Well Logging vehicle which will transport it to temporary job sites throughout the world. The initial leak testing and radiation surveys will be conducted at the Gearhart Vacuum Devices Facility at Alvarado, Texas.

   Disposal of radioactive waste will be accomplished under contract with a State approved vendor.

6. The device will be leak tested immediately after being filled with tritium and it will also be leak tested just prior to shipment to the field. It will also be leak tested when the device is returned from the field for periodic maintenance, repair or tube exchange. While the normal leak test interval is six (6) months for sealed sources, this device is not classified as being or having a sealed source - see Section II. A. Therefore, leak testing will be conducted only at those times mentioned above.

7. It should be noted that the users of this device will be Gearhart Industries' Qualified Well Logging Engineers. They will, of course, be provided with a copy of pertinent radiological safety and operating instructions for the device. With each device, Gearhart Industries, Inc. will provide:

   a. A certification that the device has been appropriately tested for leakage and contamination immediately prior to being transferred to the field.

b. A certificate of assay for each device.

c. Instructions for the safe usage of the device.

C. Manufacturer's Safety Analysis of Device Review:

1. The engineering design criteria used in the device's design was such that the device would operate in a pressure environment of up to 20,000 p.s.i. and a temperature environment of up to 400° F. The probable effects of abnormal severe conditions, such as vehicle accident or fire, on the containment system is as follows:

   a. Vehicle accident - the tritium will be completely contained within the inner glass envelope, the stainless steel sleeve and/or the heat treated outer protective steel pressure vessel.

   b. Very intense fire - the tritium will escape all containment envelopes.

2. Several neutron tubes (devices) have been manufactured, tested and evaluated to date. In all tests, the integrity of the tubes' containment system remained intact.

3. Radiation measurements (neutron, γ-rays) were made with the device "off" and "on" at distances of 4 ft., 2 ft. and 1 ft. Measurements at the devices' surface with the tube "on" saturated the detectors. The measurements were made with a Ludlum Model 3 Survey Meter, serial # 19373, a Ludlum Model 44-7 End Window GM Probe, serial # 12669 for gamma rays and a Ludlum Model 42-2 Fast Neutron Scintillation Detector, serial # PR2992 for neutrons. The following chart shows the test results.

Tube Condition	Tube to GM Probe in ft.	Tube to Neutron Detector in ft.	γ-rays mr/hr	Neutrons mr/hr
Off	4	4	0	0
Off	2	2	0	0
Off	1	1	0	0
On	4	4	230	24
On	2	2	440	120
On	1	1	1400	1900

4. This device will not be distributed to persons generally licensed pursuant to TRCR 41.22 (d). See Section III B. 7.

5. This tool emits 14 MEV neutron radiation at the rate of ten to the eight power neutrons per second. This is about equivalent to a 50 curie AmBe source. IT MUST NEVER BE OPERATED ON THE SURFACE UNLESS PROPER PRECAUTIONS ARE TAKEN TO AVOID EXPOSING PERSONNEL TO RADIATION.

   (a) The tool may be tested or calibrated on the surface only if the tool is in a controlled area shielded in a calibration tank or block house which is properly posted with "Caution Radiation Area" signs at the 2 mr/hr level.

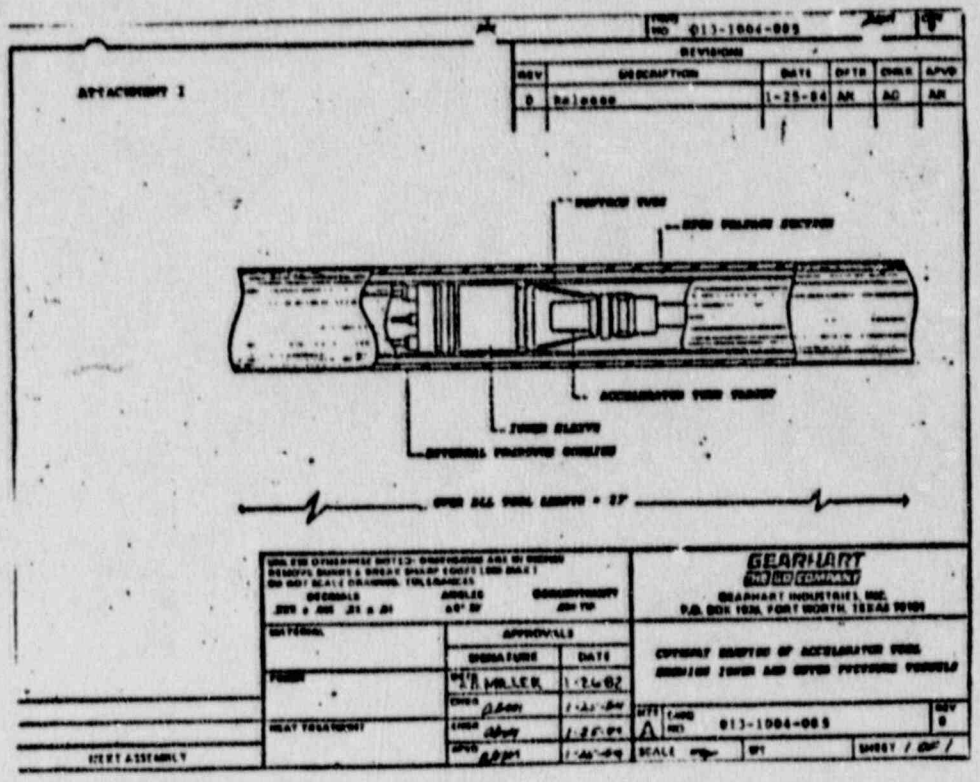
   (b) The tool is to be included on the inventory record by serial number, which is engraved on the steel outer housing.

   (c) The tool does not emit detectable ionizing radiation when not energized, but is to be stored in a secure area when not in use.

   (d) Refer to the Gearhart "Radioactive Material Storage, Usage, and Operating Instructions" manual for emergency procedures and for lost source downhole.

   (e) TRANSPORTATION: RADIOACTIVE DEVICE, N.O.S., LIMITED QUANTITY. UN 2911. EXEMPT IN ACCORDANCE WITH 49 CFR 173.421/173.422.

Attachment I



Attachment II

GEARHART INDUSTRIES INC.

Vacuum Devices Facility

CERTIFICATE OF ASSAY,
TRANSFER AND DISPOSAL

Model No. Neutron Tube

Tube Serial No.	Date of Manufacture
Isotope	mCi
Date of Assay	Removable Contamination uCi
Radiation Safety Officer	Date

TRANSFER

Date of Transfer	Tool Serial No.
Site	Location
Transferring Officer	Date

TRANSFER

Date of Transfer	Tool Serial No.
Site	Location
Transferring Officer	Date

TRANSFER

Date of Transfer	Tool Serial No.
Site	Location
Transferring Officer	Date

DISPOSAL

Disposal Date	Disposal Location
Radiation Safety Officer	Date

Attachment 5

GEARHART THE GO COMPANY

GEARHART INDUSTRIES, INC.

March 28, 1984

Mr. Floyd R. Hamiter, Chief
Industrial Uses Program
Division of Licensing, Registration and Standards
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, Texas 78756-3189

Dear Mr. Hamiter:

This letter is in response to your letter dated March 26, 1984 requesting additional information about labeling, neutron energy and neutron flux data.

1. Labeling - We will have two (2) labels on the inner stainless steel pressure liner. Both labels will have the standard radiation caution symbol. One (1) will state; "Danger - Radioactive - Do Not Handle - Notify Gearhart Industries". The other label will contain the following information: Isotope, activity assay, date of assay, and serial number of the device.

2. The information requested is contained in the following table.

Tube Condition	Tube to GM Probe in ft.	Tube to Neutron Detector in ft.	γ-rays mr/hr	Neutrons (14Mev) neutrons/cm^2
Off	4	4	0	0
Off	2	2	0	0
Off	1	1	0	0
On	4	4	230	96
On	2	2	440	480
On	1	1	1400	7600

If you need any additional information, feel free to give me a call.

Sincerely,

Dennis R. Russell

Dennis R. Russell
Radiation Safety Officer
Gearhart Industries, Inc.
Alvarado Development Dept.
P.O. Box 750
Alvarado, Texas 76009
817-783-3307, ext. 416

Atch 5

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: April 17, 1984 PAGE 1 OF 4

DEVICE TYPE: Downhole Accelerator

MODEL: 013-1004-000

MANUFACTURER/DISTRIBUTOR: Gearhart Industries, Inc.
P. O. Box 750
Alvarado, Texas 76009

SEALED SOURCE MODEL DESIGNATION: N/A

ISOTOPE: H-3 MAXIMUM ACTIVITY: 3 Ci.

LEAK TEST FREQUENCY: None

PRINCIPAL USE: Oil and Gas Well Logging

CUSTOM DEVICE: X YES _____ NO

CUSTOM USER: Gearhart Industries, Inc.

461349
Atch 6

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

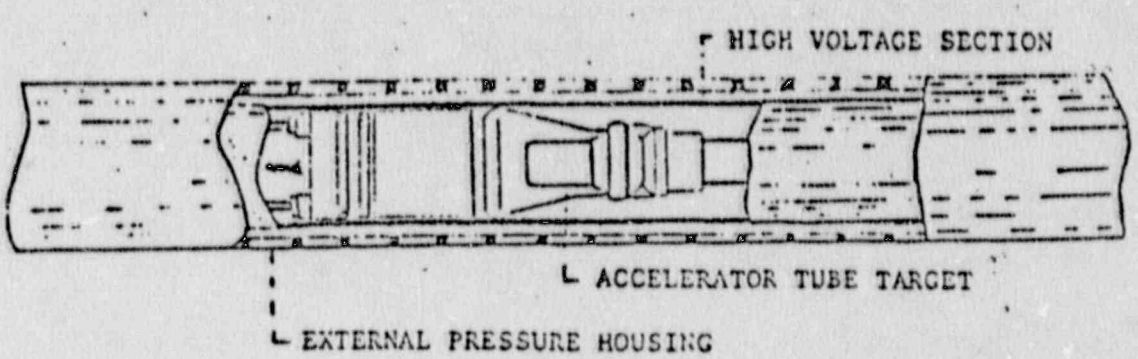
NO: TX D101S DATE: April 17, 1984

DEVICE TYPE: Downhole Accelerator

DESCRIPTION: The complete system consists of a pulsed deuterium-tritium accelerator, a scintillation detector, a digital telemetry system and associated electronics. This system is approximately 23 feet long and 1 11/16 inches in diameter. The accelerator tube is seven inches long and 1 5/16 inches in diameter.

LABELING: Two labels are affixed to the inner stainless steel pressure liner. One label states, "Danger - Radioactive - Do Not Handle - Notify Gearhart Industries". The second label lists the isotope, activity, assay date, and device serial number. Both labels have the radiation trefoil.

DIAGRAM:



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: April 17, 1984 PAGE 3 OF 4

DEVICE TYPE: Downhole Accelerator

CONDITIONS OF NORMAL USE: This device is intended for neutron activation of underground formations for quantitative and qualitative analysis. It is designed to operate at pressures to 20,000 p.s.i. and at temperatures of 400 F. A radiation hazard exists only when the accelerator is energized. It will then produce 1×10^8 neutrons per second. The expected useful life of the accelerator is in excess of 400 hours.

PROTOTYPE TESTING: Several prototypes were designed and tested. The manufacturer designates an American National Standards Classification of ANSI 65-111-SSS-R1.

EXTERNAL RADIATION LEVELS: No external radiation levels exist until the accelerator is energized. At that time, the accelerator normally produces 1×10^8 neutrons/sec. Dose rates expected, when the accelerator is activated, are listed in the Table below:

Distance from the Accelerator (ft)	Gamma Dose Rate (mRem/hr.)	Neutron Dose Rate (mRem/hr.)
4	230	20
2	440	102
1	1400	1610

Company representatives have indicated that the accelerator is activated in pulses of 0.1 total time on and 0.9 total time off.

QUALITY ASSURANCE AND CONTROL: These devices are built using parts which meet strict standards. The final assembly is tested to insure proper operation of all components.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

1. This device is to be distributed to Gearhart subsidiaries.
2. This device should be activated only underground or in a properly shielded area.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: TX D101S DATE: April 17, 1984 PAGE 4 OF 4

DEVICE TYPE: Downhole Accelerator

SAFETY ANALYSIS SUMMARY: This device can be used safely by or under the direct supervision of trained well logging supervisors.

REFERENCES: Letters and associated documents dated February 10, 1984 and March 28, 1984, provided by Gearhart Industries, Inc.

DATE: 5/3/84 REVIEWED BY: [signature]

DATE: 5/3/84 REVIEWED BY: Joseph G. Klinger

ISSUING AGENCY: Texas Department of Health

(10-78)

TEXAS DEPARTMENT OF HEALTH
RADIOACTIVE MATERIAL LICENSE

Supplementary Sheet

LICENSE NUMBER	AMENDMENT NUMBER
5-2113	33

Gearhart Industries, Inc.
Attn: E. H. Peveto
Wireline Division
P. O. Box 1258
Fort Worth, Texas 76101

In accordance with letter dated February 15, 1984, signed by Dennis R. Russell, License No. 5-2113 is hereby amended as follows:

To add Part T to Items 5, 6, 7 and 8 to read:

5. Radio-isotope	6. Form of Material	7. Maximum Activity	8. Authorized Use
T. H-3	T. Gas and titanium tritide or scandium tritide.	T. No single unit to exceed 3 Ci. Total: 50 Ci.	T. Neutron Activation Logging in oil and gas wells using the licensee's Model 013-1004-000 downhold accelerator.

To add Condition 20 to read:

20. The licensee shall activate neutron generators only when they are located downhole or when they are shielded above ground in calibration tanks or in the blockhouse. No generators shall be activated in an open air environment

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FRH:dyp

FOR THE TEXAS DEPARTMENT OF HEALTH

4/6/1349

Joseph G. Klimpa

Date May 7, 1984

Atch 7