DEPARTMENT OF THE ARMY
US ARMY CALIBRATION AND REPAIR CENTER-SACRAMENTO
SACRAMENTO army DEPOT
SACRAMENTO, CALIFORNIA 95813-5035

REPLY TO
ATTENTION OF

1986 MAR 21 AM 10 08

AMXTM-CW-SA

10 March 1986

SUBJECT: Amendment to NRC BML #04-04279-01

THRU: Commander
U.S. Army Materiel Command
ATTN: AMCSF-P/85-0166
5001 Eisenhower Avenue
Alexandria, VA 22333-0001

TO: Nuclear Regulatory Commission
Region V
ATTN: Beth A. Riedlinger
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596

1. Request Amendment to our NRC BML #04-04279-01 be made for J. L. Shepherd & Associates to remove and dispose the Cobalt-60 source, approximately 180 Ci from the Deep Well Calibrator and to install the 1100 Ci Cobalt-60 source, J. L. Shepherd Model 78-10M (encl 1).

2. Capsule testing data is provided on attached sheet (encl 2). Information on the shipping container is on J. L. Shepherd's Drawing Number A0147-10, Teletherapy Transfer Cask (encl 3), Drawing Number A-0147-6-2842, Teletherapy Transfer Cask (encl 4), and Drawing Number A-0147-18, Shield Transfer (encl 5).

3. USATSG - Providing Leaders with the Decisive Edge.

Frederick T. Toyama

FREDERICK T. TOYAMA
Chief, Army Primary Nucleonics Laboratory

5 Encls

70358

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 38-R027.4

INSTRUCTIONS.–Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

No Change

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

No Change

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

No Change

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

No Change

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

Amend:

J. L. Shepherd personnel - (J. L. Shepherd, Richard M. Donelson, Eric Harrison, Que Vu Pho, Nghia Vu Pho, and David Johnston). See Encl 6)

5. RADIATION PROTECTION OFFICER. *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

No Change

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Amend:

(1) Cobalt - 60

(2) Cobalt - 60

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

Amend:

(1) 180 Ci Source to be removed from the Deep Well Calibrator and transported to J. L. Shepherd facility, San Fernando, CA.

(2) 1100 Ci Source, J. L. Shepherd Model 781 OM to be installed by J. L. Shepherd personnel.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

Amend:

(1) See Reloading Procedure (encl 7) for detail step-by-step procedure for old source and new source transfer.

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Amend		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	See Encl 6		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		Amend See Encl 6		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, surveying, measuring)
No Change					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

No Change

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

No Change

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

See Encl 7

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

No Change

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

No Change

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 3/10/86

Applicant named in item 1

By: Frederick T. [illegible]

RPO

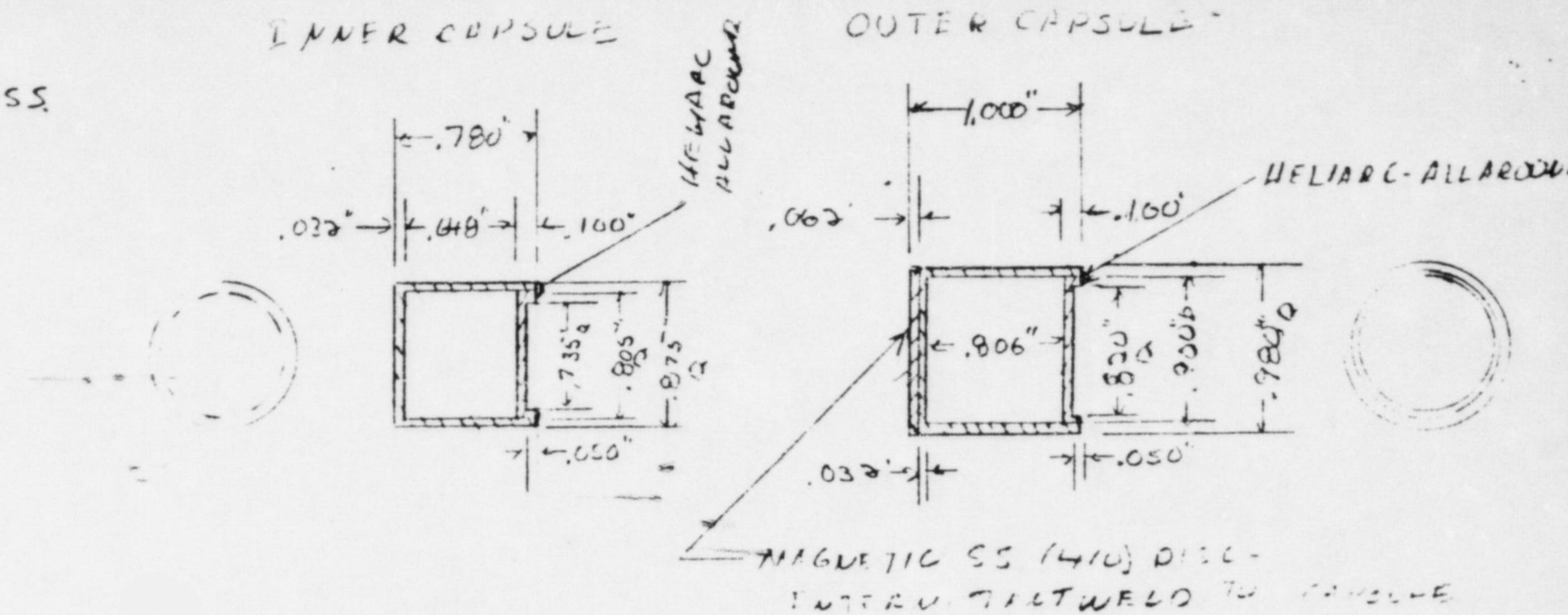
Chief, Army Primary [illegible]

Title of certifying official US Army [illegible]

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.

* U.S. GOVERNMENT PRINTING OFFICE : 1961 O—590221

MTL- 304 SS.



NOTES:

1 END PLUGS TO HAVE .008" REGISTER (.004" PER SIDE) TO TUBE

2 END PLUGS [illegible] 0.0005" INTERFERENCE FIT WITH TUBE

3 HELIUM LEAK TEST TO SENSITIVITY OF 1X10⁻⁶ CC/MIN PRIOR TO LOADING

4 SOURCE TO BE CERTIFIED "SPECIAL FORM"

70358

J. L. SHEPHERD and Associates			
DRAWN BY	DATE	APPROVED BY	SCALE
JH	10/16/8[illegible]	[illegible]	[illegible]
TYPE 7810 CAPSULE FOR			
1000 CI Co-60			[illegible]-0001

JL SHEPHERD and Associates

1010 Arroyo, San Fernando, California 91340 • (818) 898-2361

Irradiation & Calibration Equipment • Lead Shielding • Nuclear Applications

February 25, 1986

U.S. Army Calibration
and Repair Center
Sacramento - ASTN: AMXTM-CW-SA
Sacramento Army Depot
Sacramento, California 95813-5035

Attention: Fred Toyamo

Dear Mr. Toyamo:

Enclosed are the Special Form Testing for the source. The source capsule as discussed in our letter to Beth Riedlinger of U.S.N.R.C. (copy enclosed), is a custom Cobalt 60 source #A0081-2001 - ANSI #6C63434. Because this source is designed for a specific facility, it requires custom source treatment by the NRC. All necessary information has been previously forwarded and additional copies are enclosed with drawings A0147-10, A0147-18 and A0147-6-2842 which show the shipping and storage shield which we will use. The shield is a DOT 7A and we will be shipping in a 20WC overpack.

J.L. Shepherd

JLS/jg
enclo: Special Form Cert. Dwg. A-0081-2001
Letter to B. Riedlinger, U.S.N.R.C.
U.S. National Bur. of Standards #64
Drawings A0147-10, A0147-18 & A0147-6-2842
Technical Personnel Resumes

JL SHEPHERD and Associates

740 Salem Street, Glendale, California 91203 • 213/245-0187

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CERTIFICATION

SUBJECT: 1,000 Ci Cobalt-60 source capsule, per J.L. Shepherd & Associates drawing A-0081-2001.

This is to certify that a prototype of the source capsule per drawing A-0081-2001 has been subjected to and successfully passed free drop, percussion, heating and immersion tests as called out in 10CFR 173.398.

Date: 10/16/85

J.L. Shepherd

JLS/jkg

JL SHEPHERD and Associates

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DATA SHEET - SPECIAL FORM CAPSULE TESTING

Capsule Type: 7810
Drawing Number: A-0081-2001

Capsule was loaded with 46 grams of inert Co-60
Inner and outer capsules were heliarc welded in accordance with drawings and tests performed as below.

Date: 10/16/85

49CFR 173.398 Special Tests

1.Free Drop - 30' to 1/4" thick steel plate on concrete surface.

Results: No visible damage to capsule or welds.

2.Percussion - 1" diameter steel rod, wt. 3 lbs. dropped end on 4 times through 40" distance on capsule laying on 1/4" lead sheet on concrete surface.
Results: Sides and end of capsule were dented. No fracture of outer capsules or welds.

3.Heating - Capsule heated in air to 1475°F in electric furnace and held at this temperature 15 minutes - then allowed to cool.
Results: Capsule discolored - no fracture of capsule ends, welds or walls.

4.Immersion - 24 hours in distilled water pH 7, maximum conductivity of 10 micro-mhos/cm.
Results: No visible effect on capsule - no leaking of CsCl from inside capsule.

Leak Test:
1. Method: Bubble Test. Capsule heated to 240° in glycol.
2. Results: No bubbles emerged from capsule.

J.L. Shepherd

STATEMENT OF TRAINING AND EXPERIENCE

J. L. Shepherd
President
J. L. Shepherd & Associates
1010 Arroyo
San Fernando, California 91340

TRAINING:

Bachelor of Science, Chemistry, Loyola University of Los Angeles, 1951; graduate work in nuclear chemistry, Notre Dame University and University of California at Los Angeles.

EXPERIENCE:

January, 1967 to Present

President and manager of J. L. Shepherd & Associates, engaged in consulting, engineering, and representation for nuclear applications, with emphasis on radiation and radiation measuring equipment, as well as radiation sources. Manufacturers of irradiation and calibration equipment.

April, 1959 to December, 1966

One of nine co-founders, Director and Vice President of U. S. Nuclear Corporation, Burbank, California. Research and development, design of custom products, field installation of sources and equipment, as well as management responsibilities.

August, 1955 to April, 1959

Director of industrial division and industrial sales for Isotopes Specialties Company, Burbank, California.

May, 1952 to June, 1955

Research Chemist for classified program with Aerojet General Corporation, Azusa, California, Research, development, and production of exotic high energy fuels specializing in reaction kinetics.

RADIOACTIVE MATERIALS PROCEDURES EXPERIENCE

Approximately 25 years experience in the following procedures: sealed source leak tests, instrument calibration, teletherapy source exchange & repair, source transfers, decontamination.

Radiologic Health Branch
744 P Street
Sacramento, California 95814

STATEMENT OF TRAINING AND EXPERIENCE

(Use additional sheets as necessary)

Instruction: Every individual proposing to use radioactive material is required to submit a Statement of Training and Experience in duplicate to the address given above. Physicians should request Form RH 2000 A when applying for human use authorizations.

1. Name of proposed user: Richard N. Donelson Position title: President

   Address: 6825 Bianca Ave. City: Van Nuys, CA Zip: 91406

   To be included on Lic. No. 1534-20 in name of Richard N. Donelson & Associates

2. Description of proposed use

   All proposed uses on attached application form RH 2050

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3. Training:

   a. High School Graduate: Yes x No ____

   b. College or University: Name and location University of Washington, Seattle, WA

      Years completed 5 Degree BS Course of study Chemical Engineering

   c. Education specifically applicable to use of radioactive material

      Graduate courses in Math and Physics.
      Six-month Health Physics training program - Hanford Atomic Works
      Various training programs required for certification by American Board of Health Physics (certified 1960, recertified through 1985).

4. Experience:

   a. List experience with radioactivity beginning with most recent

      (1) Dates: From January 1967 to present

      Title and duties: President - Consulting Health Physicist

      Employer: R. N. Donelson & Assoc. Address: 6825 Bianca Ave., Van Nuys, CA

      (2) Dates: From August, 1957 to January, 1967

      Title and duties: Chief Engr./Prod. Mgr. - design and development of sources and devices, manufacturing of same, installation of same in the field.

      Employer: US Nuclear/Isotope Spec. Co. Address: Burbank, California

      (3) Dates: From February 1948 to August, 1957

      Title and duties: Process Engr., Radiation Engr. Liaison Engr., Supv., Supp., Mgr - Process design, construction liaison, applied Health Physics & supv. of same.

      Employer: General Electric Co. Address: Richland, Washington

b. Radioactive materials previously used. Cite typical radioisotopes in appropriate box and key to Part 4.a above:

	Quantities Handled			
	Microcuries	Millicuries	Curies	Kilocuries
Sealed sources			4.a. (3)	4.a. (1) 4.a. (2)
Unsealed alpha emitters		4.a. (1)		4.a. (2) 4.a. (3)
Unsealed beta-gamma emitters			4.a. (1)	4.a. (2) 4.a. (3)
Neutron sources			4.a. (1)	4.a. (2) 4.a. (3)

c. Describe procedures similar to those proposed in Part 2 with which you have had experience. Indicate months or years for each and key to Part 4.a above.

A-Sealed source leak tests - 36 years - 4.a. (1), 4.a. (2), 4.a. (3)
B-Instrument calibration - 36 years - 4.a. (1), 4.a. (2), 4.a. (3)
C-Teletherapy source exchange & repair - 22 years - 4.a. (1), 4.a. (2)
D-Source transfers - 36 years - 4.a. (2), 4.a. (3)
E-Source use in training - 32 years - 4.a. (1), 4.a. (2), 4.a. (3)
F-Decontamination - 36 years - 4.a. (1), 4.a. (2), 4.a. (3)

d. Indicate which types of facilities you have used and key to Part 4.a.

☒ Ordinary Chemical laboratories 4.a. (1), 4.a. (2), 4.a. (3)
☒ "Controlled Area" (Type B) laboratories 4.a. (1), 4.a. (2), 4.a. (3)
☒ Glove boxes 4.a. (1), 4.a. (2), 4.a. (3)
☒ Shielded glove boxes 4.a. (2), 4.a. (3)
☒ Caves with remote manipulators 4.a. (1), 4.a. (2), 4.a. (3)
☒ Field operations with portable equipment 4.a. (1), 4.a. (2), 4.a. (3)

5. Certificate:

I hereby certify that all information contained in this Statement is true and correct.

Richard Hawk — March 8, 1984

Signature of proposed user — Date

JL SHEPHERD and Associates

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Irradiation & Calibration Equipment • Lead Shielding • Nuclear Applications

February 25, 1986

ERIC HARRISON

September 1984 to Present

Mr. Eric Harrison has been employed by J.L. Shepherd & Associates as a Radiological Technician since September 1984.

During this time he has engaged in loading small sources in devices, leak testing calibration, assisted with radiologic controls and participated in servicing and installation of all types of J.L. Shepherd & Associates calibrators and irradiators. Mr. Harrison has also participated in an in house radiological training course and has responsibility for final radiological quality assurance for many of J.L. Shepherd & Associates calibrators and irradiators.

Mr. Harrison was employed by Monsanto Company, Dayton Engineered Products, as a Process Technician II from 1979 to 1984.

Qualifications:

Custom fabrication of a wide variety of nuclear radiation sources (neutron, alpha, gamma, etc.), primarily working with radioisotopes Pu-238, Am-241, Cf-252, Cs-137, Co-60 and others. Fully qualified for all phases of work in glove box or remote "hot cell", using master-slave manipulators and in use of programable T.I.G. welding systems in fabrication of radioactive source encapsulated in various metals such as stainless, maraging and titanium alloys, etc.; development of detailed processes for fabricating products requiring approved drawings, procedures, and practices for meeting nuclear quality requirements. Qualified in radiographic interpretation, liquid dye penetrant inspection, He mass spec. leak testing, use of measuring and gaging tools for dimensional inspection, preparation of metallographic samples, and has experience in electroplating, plastics fabrication, use of shop tools, i.e., mill, lathe, drillpress surface grinder, engraver etc.; also have performed various Health Physics technician duties of radiation and contamination surveys, setting-up, calibrating and using radiation measuring systems.

J.L. SHEPHERD and Associates

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Irradiation & Calibration Equipment • Lead Shielding • Nuclear Applications

February 25, 1986

QUE VU PHO

August 1982 to Present

As an employee of J.L. Shepherd & Associates since August 1982 to the present, Mr. Pho has had an extensive background in assembling major equipment both in house and in the field. He has participated in a specialized radiological training program and has assisted Mr. Donelson and Mr. Shepherd in all phases of installation and final check out of J.L. Shepherd & Associates equipment.

BACKGROUND EDUCATION

Three years at the University of Saigon - Vietnam
Major: Mechanical Engineering

Present: Glendale College, Glendale, CA
Major: Engineering Drawing

Five years Supervisor position in house

JL SHEPHERD and Associates

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February 25, 1986

NGHIA VU PHO

August 1983 to Present

Mr. Nghia Vu Pho, who has retained a position with J.L. Shepherd & Associates since August 1983, has assisted all of our other trained personnel with in house and field assembly of irradiators and calibrators. He has also attended our in house radiological training program and has received individual supervision and training from both Mr. Donelson and Mr. Shepherd.

BACKGROUND EDUCATION

One year at the University of Saigon - Vietnam
Major: Mechanical Engineering

Present: Glendale College, Glendale, CA
Major: Manufacturing Engineering

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February 25, 1986

DAVID JOHNSTON

Employee of J.L. Shepherd & Associates from September 1980 to present.

For the past four (4) years Mr. Johnston has had extensive training under the direction of J.L. Shepherd and D. Donelson in radiological procedures. Mr. Johnston has also been actively engaged and extensively involved in assembly, check out, servicing and installation of J.L. Shepherd & Associates irradiators and calibrators and has supervised the loading of large sources and equipment at contractors sites (Hot Cell). Mr. Johnston is responsible for final assembly, check out and calibration as well as gathering radiological data, ie: external radiation level measurement and leak testing of Model 89, Model 143, Mark I and other large calibrators and irradiators manufactured by J.L. Shepherd & Associates. In addition to working with Mr. Donelson and Mr. Shepherd extensively in radiation programs he has successfully participated in J.L. Shepherd & Associates formal in house radiological training program.

RELOADING PROCEDURE
SACRAMENTO ARMY DEPOT

PURPOSE

1. This procedure covers the reloading of the Deep Well Calibrator facility at Bldg. 300, Sacramento Army Depot, Sacramento, CA.

DESCRIPTION OF WORK

1. The present source, approximately 180Ci of Co-60, will be removed from the facility by J.L. Shepherd & Associates personnel and transported in an authorized container to the J.L. Shepherd facility, San Fernando, CA for storage under California RAM License: #1777-70.

2. After unloading, Sacramento Army Depot personnel will perform maintenance on the well facility. This is expected to take about three (3) weeks.

3. A new source, approximately 1000Ci of Co-60, will be loaded into the facility by J.L. Shepherd personnel.

4. The layout of the facility and the special equipment to be used is described in the attachments.

PROCEDURES

1. General
   a. All operations, other than maintenance operations on the empty well, will be under the direct supervision of one of the following:
      J.L. Shepherd
      R.N. Donelson

   b. At least two properly calibrated ion chamber survey meters will be available and all operations are to be monitored. A GM type survey meter will also be available for contamination checking.

E.J 1

70358

c. All personnel in the room are to wear film badges and self-reading pocket dosimeters.

d. At least two, but not over three people are to be present in the room during source transfers. One of these persons will perform constant monitoring.

e. In the event of any emergency, the room is to be vacated and any remedial action will be agreed to by both Sacramento Army Depot and J.L. Shepherd personnel.

f. All shipments of radioactive material will be per DOT regulations.

2. PREPARATION

a. Remove absorber turntable and drive motor. Note: A radiation level of about 6r/hr over the open well, with the source at the bottom of the well is expected. No parts of the body should be exposed over the open well.

b. Place aluminum plate on table and source retainer tube in well remotely and adjust mirror for viewing into the well.

c. Raise source holder and inspect for fit with retainer tube. With remote handler, perform a wipe test on source. Lower source holder and adjust length of tube if necessary. If any contamination (over 0.005mCi) is detected on wipe, cease operations until proper contamination control procedures can be formulated, as agreed upon by J.L. Shepherd and Sacramento Army Depot parties.

d. Remotely place aluminum plate on table and source retainer tube in well. Raise source and through mirror observe mating of source holder and source retainer tube. Lower source and readjust if necessary. When mating is proper, lower source and

mark position of plate on table. Place 4 bricks on plate so as to form 4 x 4 opening. Slide plate and bricks over well to marked position. Re-insert source retainer tube remotely.

e. Position teletherapy cask, containing new 1000-Ci source in one hole, in corner next to table (cask will be on dolly and pre-positioned for proper height). Remove end cap. Note: There will be slight radiation streaming upwards from loaded hole and no parts of the body should be exposed in this area.

f. Place steel plate, bridging gap between teletherapy cask and table, in place.

g. Erect lead-brick shielding trough, taking care to overlap cracks between bricks. Again use care to prevent personnel exposure over open well and teletherapy cask. The finished trough should provide 8" of lead shielding on the operators side and 4" of lead shielding on the opposite side (plus the 18" concrete wall.

h. Remove teletherapy cask plug from empty hole using tool provided.

i. With dummy source and magnetic handler, (source at bottom of well), practice the operation of moving source to cask several times. Make sure that lights and mirrors are such that entire operation can be viewed.

3. OLD SOURCE TRANSFER

a. When both parties agree that operation is safe, raise source from bottom of well, lift source with magnetic handler, move along trough and lower into teletherapy cask. Extreme caution should be observed so that source is not raised above shielding trough.

b. Using tool provided, insert plug above source in teletherapy cask.

c. Tear down enough of the lead brick trough so that the end cap can be installed in the teletherapy cask. Note: depending upon the maintenance work to be done by Sacramento Army Depot, it may or may not be necessary to completely dismantle the trough and relocate the cask.

4. NEW SOURCE TRANSFER

a. Remove end cap from teletherapy cask. Reinstall source retainer tube. Re-erect the lead brick trough as before.

b. With source holder in upper position, practice moving the new source from the teletherapy cask to the well, using the magnetic handler and the dummy source, several times. Make sure that mirrors and lights are properly positioned.

c. When both parties agree that the operation is safe, remove plug from new source hole in teletherapy cask using tool provided.

d. Using magnetic handler, raise new source from teletherapy cask into trough and move it to the source holder in the well. Take extreme care to insure that the source is not raised above the shielding provided by the trough. Inspect source (by mirror) to insure it is properly positioned. Lower source to bottom of well. Replace plug in teletherapy shield.

5. REASSEMBLY

a. Tear down lead brick trough taking care to prevent exposure over open well. Remove source retainer tube. Replace end cap on teletherapy shield. Note: A radiation level of about 35R/hr is now expected over open well.

b. Remove teletherapy cask containing old source and prepare for shipment.

c. Reassemble absorber table, taking precaution to prevent exposure over well as soon as table is positioned, place heavy lead absorber in place and rotate over well. Complete assembly of table and drive motor.

APPENDIX

SPECIAL EQUIPMENT

1. Forklift for removing teletherapy cask overpack from truck, removing cask from overpack and placing on dolly.

2. 4-wheeled dolly for moving cask into position and shoring for locating at proper height.

3. Lights and mirrors. One mirror will be portable on a 5 foot handler.

4. Lead bricks for building shielding trough. Bags of lead shot as supplementary shielding. (If necessary.)

5. 4 foot electromagnetic handler.

6. 4 foot finger handler (for emergency.)

7. Source retainer tube and aluminum plate.

8. Teletherapy cask plug removal tool.

9. Dummy source of same dimensions, weight, and magnetic properties as actual sources.

10. Steel plate for bridge between teletherapy cask and table.

EXPOSURE ESTIMATES

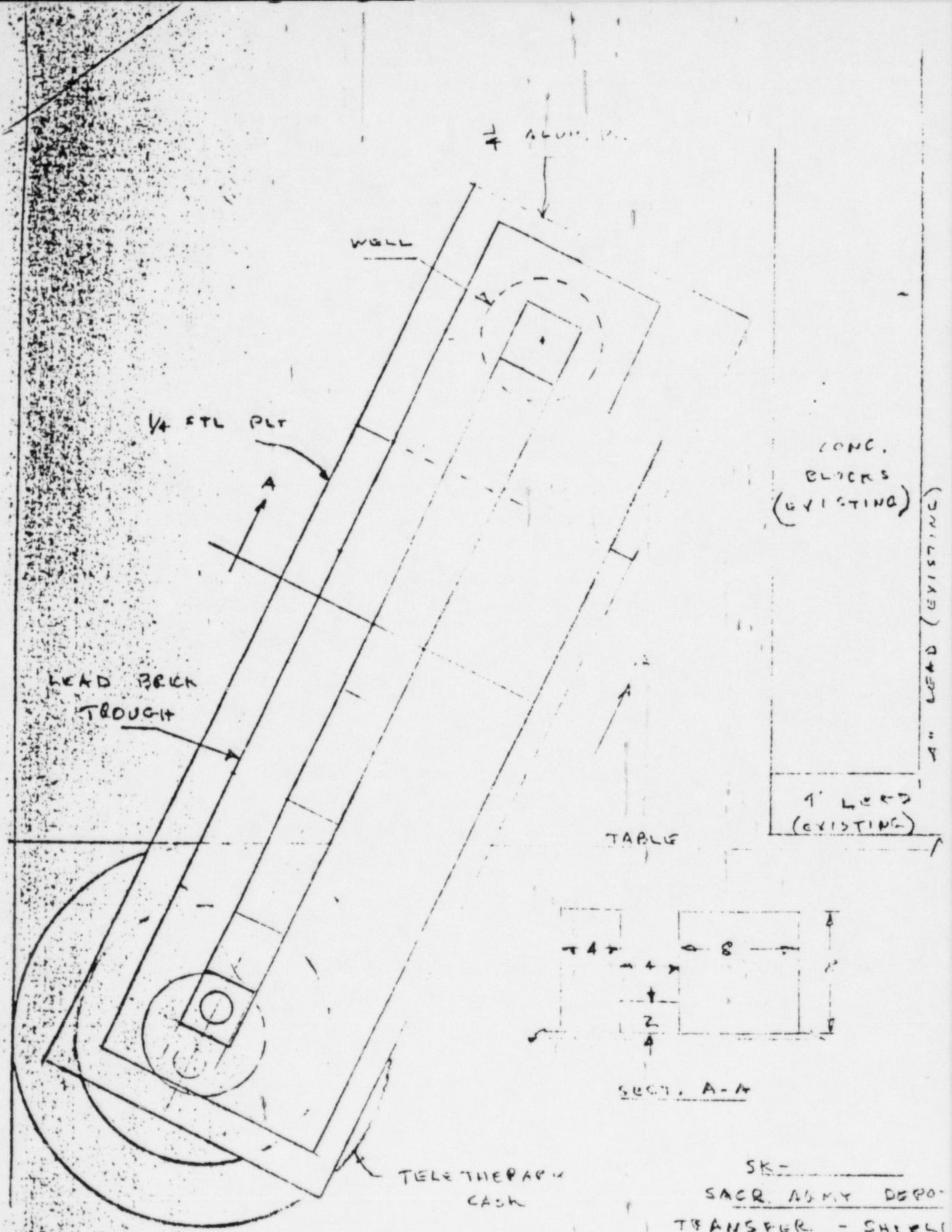
The following radiation levels are based on calculations and/or actual measurements at the facility;

		1000Ci	180Ci
1.	Scatter at edge of table-open well source at bottom of well.	10mR/hr	1.8mR/hr
2.	Same - source in upper position	60mR/hr	10mR/hr
3.	Scatter at edge of table opening reduced to 4x4 - source at bottom	3mR/hr	0.6mR/hr
4.	Same - source in upper position	20mR/hr	3mR/hr
5.	During transfer of source in trough		
	Direct	7mR/hr	1mR/hr
	Scatter	120mR/hr	20mR/hr
	Total	127mR/hr	21mR/hr
6.	Working in vicinity of teletherapy cask (1-4 ft.)	2mR/hr	0.5mR/hr

Based on these calculations and on the following estimates of time, the following total exposures for the job are:

1.	Turntable removed - 2 hrs @ 1.8mR/hr	3.6mrem
2.	Source retainer tube adjustment - 10 min.@ 1.8 to 3mR/hr	0.4mrem
3.	Teletherapy cask positioning - 30 min.@ 2mR/hr	1.0mrem
4.	Erecting trough	
	2 hrs. @ 0.6mR/hr (Scatter)	1.2mrem
	2 hrs. @ 2mR/hr (from csk)	4mrem
5.	Transferring 180Ci source 10 seconds @ 21mR/hr	0.1mrem
6.	Removing trough and relocating cask 1 hr. @ 2mR/hr	2mrem
7.	Re-erecting trough 2 hrs. @ 2mR/hr	4mrem
8.	Transfering 1000Ci Source 10 seconds @ 127mR/hr	0.4mrem
9.	Removing trough and relocating cask 1 hr. @ 3mR/hr	3mrem
10.	Reinstalling turntable	
	1 hr. @ 10mR/hr	10mrem
	1 hr. @ 1mR/hr (hole shielded)	1mrem
	approx.	31mrem

Written by D. Donelson, Certified Health Physicist
Approved by J.L. Shepherd



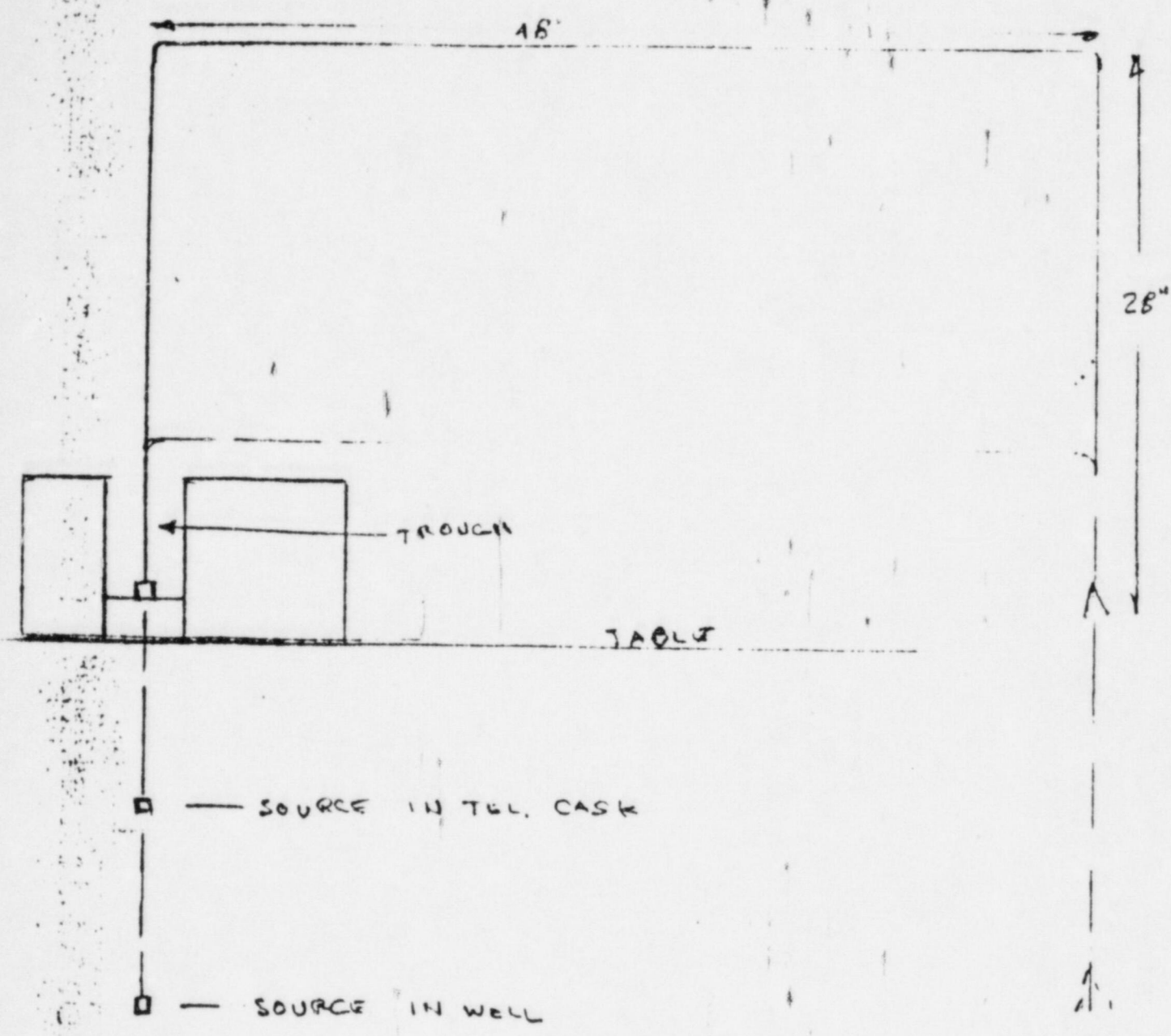
SCALE: 1/2

SK-

SACR. ARMY DEPOT

TRANSFER - SHIELD

- 72° (REF)



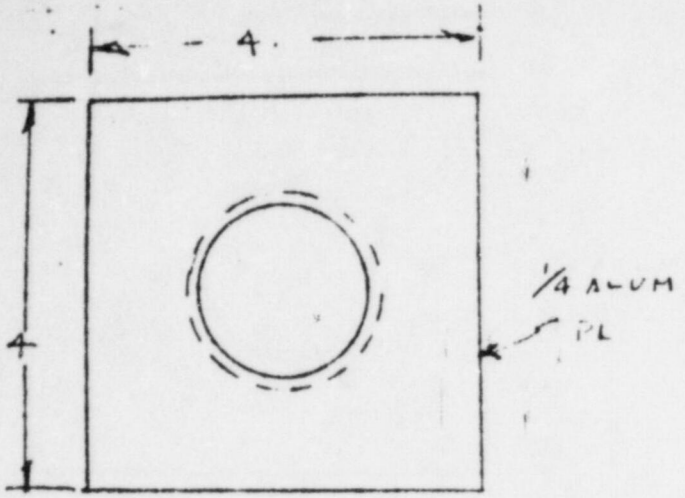
FLOOR

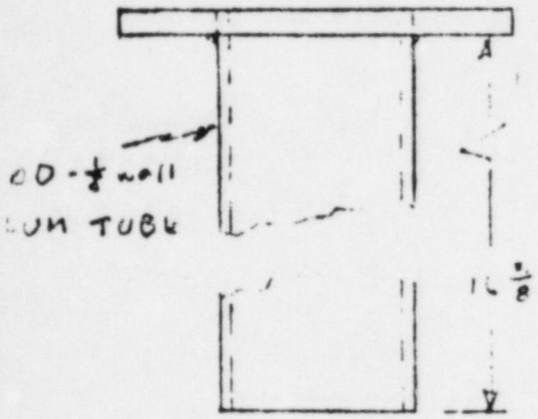
SCALE: 1/8

SH -

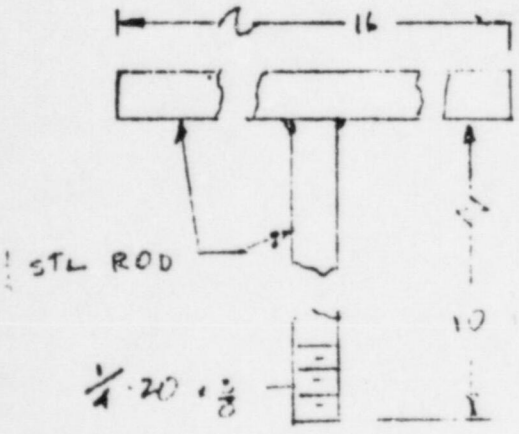
SACR. ARMY DEPOT

MAGNETIC HANDLER

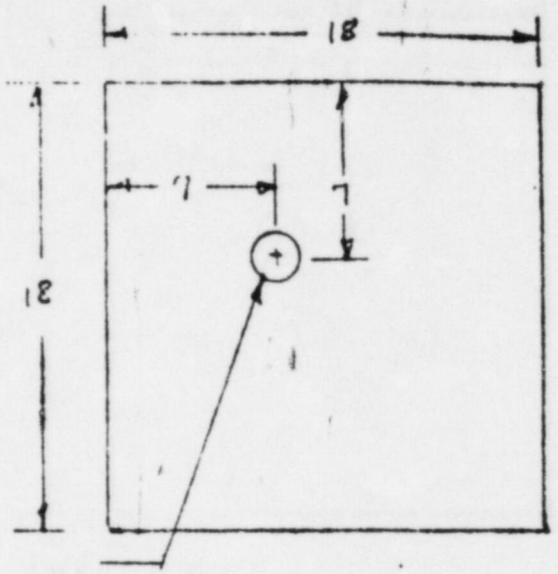




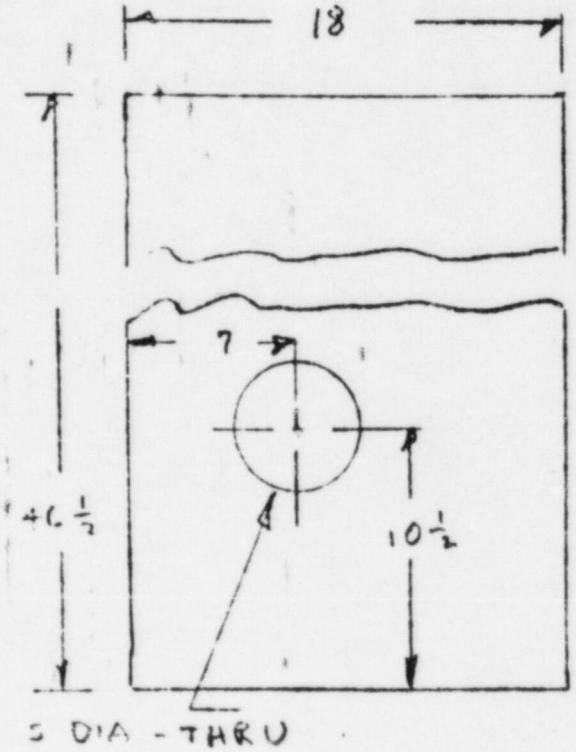
SOURCE RETAINER TUBE



TEL. CASK PLUG
REMOVAL TOOL



ALUM SUPPORT
MATL: ¼ ALUM



STL SUPPORT PLATE
MATL: ¼ CR STEEL

70358

D30-03628

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY MATERIEL COMMAND
5001 EISENHOWER AVENUE, ALEXANDRIA, VA 22333-0001

4 December 1985

U.S. Nuclear Regulatory Commission
Region V
ATTN: Materials Licensing Branch
(Ms. Beth Riedlinger)
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596

RE: AMCSF-P/85-0166

Gentlemen:

Forwarded are two copies of the Sacramento Army Depot request for amendment to License Number 04-04279-01. The request amends:

(a) Individual users.

(b) Radiation Protection Officers.

(c) The cobalt-60 calibration source which is replaced by the 1100 curie JL Shepard Model 7810.

Please acknowledge receipt of correspondence on Mail Reply Card, DA Form 209.

Sincerely,

Darwin M. Taras
Chief, Health Physics,
Safety Office

Enclosures

Copies Furnished:
HQDA(DASG-PSP-E) 5111 Leesburg Pike, Falls Church, VA 22041 w/encl
Dir, AMC FSA, Charlestown, IN 47111-9669 w/encl
COMMANDER
TMDE, ATTN: AMXTM-S, Redstone Arsenal, AL 35898 w/o encl
Sacramento AD, ATTN: SDSSA-ASO, Sacramento, CA 95813 w/o encl

8602280023 1p.
703

DEPARTMENT OF THE ARMY
US ARMY CALIBRATION AND REPAIR CENTER-SACRAMENTO
SACRAMENTO ARMY DEPOT
SACRAMENTO, CALIFORNIA 95813-5035

REPLY TO
ATTENTION OF

AMXTM-CW-SA

1 November 1985

SUBJECT: Amendment of MRC BPM License #04-04279-01

Commander
US Army Material Command
ATTN: AMCSF-P
5001 Eisenhower Avenue
Alexandria, VA 22333

Request action be taken to amend the following paragraphs to our NRC BPM License #04-04279-01.

a. Paragraph 4, Individual User, Appendix A.

b. Paragraph 5, Radiation Protection Officer, Appendix A.

c. Paragraph 6(a) and (b), Appendix B.

d. Paragraph 7, Appendix C.

Frederick T. Toyama

Encl
Appl for By-Product
Mat'l License

FREDERICK T. TOYAMA
Radiological Protection Officer
US Army Calbr & Repair Center-Sac

~~E05D0D A~~
~~8600228~~0036
17pp.

Form AEC-313 8-64 10 CFR 30	UNITED STATES ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved Budget Bureau No. 38-R027

INSTRUCTIONS. – Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1 (a) NAME AND STREET ADDRESS OF APPLICANT (Institution, firm, hospital, person, etc. Include ZIP Code)	(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from 1 (a). Include ZIP Code.)
No Change	No Change
2 DEPARTMENT TO USE BYPRODUCT MATERIAL	**3 PREVIOUS LICENSE NUMBER(S)** (If this is an application for renewal of a license, please indicate and give number.)
No Change	No Change
4 INDIVIDUAL USER(S) (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)	**5 RADIATION PROTECTION OFFICER** (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)
Amend: Quan Y. Luke, Robert L. Butler, and James C. Ralls, as users for all of the by-product material on license.	Amend: Frederick T. Toyama RPO Elbert E. Anderson Alternate RPO ~~Joseph F. DeMelo~~ Charles R. Wallace See Appendix for Resume

6 (a) BYPRODUCT MATERIAL (Elements and mass number of each)	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)
Amend: (1) Cobalt-60	Amend: (1) 1100 Curies sealed source, JL Shepard Model 7810

7 DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED (If byproduct material is for human use, supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

Amend:
(1) 1100 curies Cobalt-60 source will be used to replace existing Cobalt-60 Source in the Deep-Well Calibrator.

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	No Change		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		No Change		

10. RADIATION DETECTION INSTRUMENTS *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
No Change					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

No Change

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

No Change

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No

No Change

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

No Change

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

No Change

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 1 Mar 1985

Applicant named in item 1

By: Frederick T. Tyson

RPO - USACE - SAC

Title of certifying official

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.

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—748-381

APPENDIX A

OCT 1985

Resume' of Experience and Training of Radiological Protection Officer, Frederick T. Toyama (BS, Physics)

a.

TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB	FORMAL
(1) Principles and practices of radiation protection	USN Radiological Training School	2 months		Yes
	Sacramento State College	2 years		Yes
	US Public Health Service	2 months		Yes
(2) Radioactivity Measurement standardization and monitoring techniques and instruments	USN Radiological Training School	2 months		Yes
	Sacramento State College	2 years		Yes
	US Public Health Service	2 months		Yes
(3) Mathematics and calculations basic to the use and measurement of radioactivity	USN Radiological Training School	2 months		Yes
	Sacramento State College	2 years		Yes
	US Public Health Service	2 months		Yes
(4) Biological effects of radiation	USN Radiological Training School	2 months		Yes
	Sacramento State College	2 years		Yes
	US Public Health Service	2 months		Yes

b. EXPERIENCE WITH RADIATION:

ISOTOPE	MAXIMUM AMT	WHERE EXPERIENCE WAS GAINED	DURATION	TYPE OF USE
Co-60	120 curies	Sacramento Army Depot	5 years	Calibration
Co-60	500 curies	Sacramento Army Depot	8 years	Calibration
Co-60	1000 curies	Sacramento Army Depot	13 years	Calibration
Cs-137	1 curie	Sacramento Army Depot	22 years	Calibration
Pu-239	5 curies	Sacramento Army Depot	21 years	Calibration
Hydrogen-3	3 curies	Sacramento Army Depot	16 years	Neutron Production
Radium-226	.05 grams	Sacramento Army Depot	22 years	Calibration
Krypton-85	5 curies	Sacramento Army Depot	11 years	Calibration
Iodine-131	8 microcuries	Sacramento Army Depot	20 years	Unsealed Source
Chromium-51	40 microcuries	Sacramento Army Depot	8 years	Unsealed Source
Cesium-137	1 microcurie	Sacramento Army Depot	11 years	Unsealed Source
Promethium-147	8 microcuries	Sacramento Army Depot	5½ years	Unsealed Source
Chlorine-36	1 microcurie	Sacramento Army Depot	4 years	Unsealed Source
Iron-55	40 microcuries	Sacramento Army Depot	4 years	Unsealed Source
Carbon-14	40 microcuries	Sacramento Army Depot	10 years	Unsealed Source

Resume' of Experience and Training of Alternate RPO, Elbert E. Anderson OCT 1985

a. TYPE OF TRAINING

	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB	FORMAL
(1) Principles and practices of radiation protection	US Public Health Service	1 month		Yes
(2) Radioactivity measurement standardization and monitoring techniques and instruments	US Public Health Service	1 month		Yes
(3) Mathematics and calculations basic to the use and measurement of radioactivity	US Public Health Service	1 month		Yes
(4) Biological effects of radiation	US Public Health Service	1 month		Yes

b. EXPERIENCE WITH RADIATION:

Osotope	Maximum Amt	Where Experience was Gained	Duration	Type of Use
Co-60	500 curies	Sacramento Army Depot	4 years	Calibration
Co-60	1000 curies	Sacramento Army Depot	12 years	Calibration
Cs-137	1 curie	Sacramento Army Depot	17 years	Calibration
Cs-137	600 curies	Sacramento Army Depot	15 years	Calibration
Pu-239	5 curies	Sacramento Army Depot	17 years	Calibration
Ra-226	0.5 grams	Sacramento Army Depot	17 years	Calibration

OCT 1985

Resume' of Experience and Training of Alternate Radiological Protection Officer Charles R. Wallace

a. TYPE OF TRAINING

	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB	FORMAL
(1) Principles and practices of radiation protection	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
	Ft. McClellan, AL	3 weeks		Yes
(2) Radioactivity measurement standardization and monitoring techniques and instruments	Sacramento Army Depot	2 years	Yes	
	US Public Health			Yes
	Ft. McClellan, AL	3 weeks		Yes
(3) Mathematics and calculations basic to the use and measurement of radioactivity	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
	Ft. McClellan, AL	3 weeks		Yes
(4) Biological effects of radiation	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
	Ft. McClellan, AL	3 weeks		Yes

b. EXPERIENCE WITH RADIATION:

Isotope	Maximum Amt	Where Experience was Gained	Duration	Type of Use
Co-60	500 curies	Sacramento Army Depot	8 years	Calibration
Co-60	120 curies	Sacramento Army Depot	4 years	Calibration
Co-60	1000 curies	Sacramento Army Depot	13 years	Calibration
Cs-137	1 curie	Sacramento Army Depot	22 years	Calibration
Pu-239	5 curies	Sacramento Army Depot	21 years	Calibration
Ra-226	0.5 grams	Sacramento Army Depot	20 years	Calibration
Cs-137	600 curies	Sacramento Army Depot	19 years	Calibration
X-Ray	250 KVCP	Sacramento Army Depot	22 years	Calibration
Van de Graaff Accelerator	400 KV	Sacramento Army Depot	12 years	Calibration

Resume' of Experience and Training of Quan Y. Luke

OCT 1985

a. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB	FORMAL
(1) Principles and practices of radiation protection	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
(2) Radioactivity measurement standardization and monitoring techniques and instruments	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
(3) Mathematics and calculations basic to the use and measurement of radioactivity	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes
(4) Biological effect of radiation	Sacramento Army Depot	2 years	Yes	
	US Public Health	2 weeks		Yes

b. EXPERIENCE WITH RADIATION:

Isotopes	Maximum Amt	Where Experience was Gained	Duration	Type of Use
Co-60	120 curies	Sacramento Army Depot	2 years	Calibration
Co-60	500 curies	Sacramento Army Depot	8 years	Calibration
Co-60	1000 curies	Sacramento Army Depot	13 years	Calibration
Cs-137	1 curie	Sacramento Army Depot	22 years	Calibration
Pu-239	5 curies	Sacramento Army Depot	21 years	Calibration
Ra-226	0.5 grams	Sacramento Army Depot	20 years	Calibration
Cs-137	600 curies	Sacramento Army Depot	19 years	Calibration
X-Ray	250 KVCP	Sacramento Army Depot	18 years	Calibration
Van de Graaff Accelerator	400 KV	Sacramento Army Depot	3 years	Calibration

OCT 1985

Resume of Experience and Training of James C. Ralls

A. Type of Training	Where Trained	Duration of Training	On The Job	Formal
(1) Principles and Practices Radiation Protection	Sacramento Army Depot	1 Year	Yes	
	USN Radiological Training School	2 Mos		Yes
(2) Radioactivity measurement standardization and monitoring techniques and instruments.	Sacramento Army Depot	1 Year	Yes	
	USN Radiological Training School	2 Mos		Yes
(3) Mathematics and calculations basic to the use and measurement of radioactivity	Sacramento Army Depot	1 Year	Yes	
	USN Radiological Training School	2 Mos		Yes
(4) Biological effect of radiation	Sacramento Army Depot	1 Year	Yes	
	USN Radiological Training School	2 Mos		Yes

B. Experience with Radiation

Isotopes	Maximum Amt.	Where Experience was Gained	Duration	Type of Use
Co-60	1000 curies	Sacramento Army Depot	2 years	Calibration
Cs-137	1 curies	Sacramento Army Depot	2 years	Calibration
Cs-137	600 curies	Sacramento Army Depot	2 years	Calibration
Pu-239	5 curies	Sacramento Army Depot	2 years	Calibration
Am-241	4 curies	Sacramento Army Depot	2 years	Calibration
Radium-226	0.5 grams	Sacramento Army Depot	2 years	Calibration

OCT 1985

Resume of Experience and Training of Robert L. Butler

A. Type of Training

	Type of Training	Where Trained	Duration of Training	On The Job	Formal
(1)	Principles and Practices of Radiation Protection	Sacramento Army Depot	10 Mos	Yes	
		USN Radiological Training School	2 Mos		Yes
(2)	Radioactivity measurement standardization and monitoring techniques and instruments.	Sacramento Army Depot	10 Mos	Yes	
		USN Radiological Training School	2 Mos		Yes
(3)	Mathematics and calculations basic to the use and measurement of radioactivity	Sacramento Army Depot	10 Mos	Yes	
		USN Radiological Training School	2 Mos		Yes
(4)	Biological effect of radiation	Sacramento Army Depot	10 Mos	Yes	
		USN Radiological Training School	2 Mos		Yes

B. Experience with Radiation

Isotopes	Maximum Amt.	Where Experience was Gained	Duration	Type of Use
Co-60	1000 curies	Sacramento Army Depot	1½ years	Calibration
Cs-137	1 curies	Sacramento Army Depot	1½ years	Calibration
Cs-137	600 curies	Sacramento Army Depot	1½ years	Calibration
Pu-239	5 curies	Sacramento Army Depot	1½ years	Calibration
Am-241	4 curies	Sacramento Army Depot	1½ years	Calibration
Radium-226	0.5 grams	Sacramento Army Depot	1½ years	Calibration

APPENDIX B

6.(a) Byproduct material (Elements & Mass Number of each)	(b) Chemical and/or physical form and maximum amount of radioactivity which licensee may possess at any one time.
A. Cobalt-60	A. Sealed source, J.L. Shepard Model 7810, one source of 10 curies.
B. Cobalt-60	B. AECL Model C-132 sealed source, one source of 1100 curies.
C. Cobalt-60	C. ORNL sealed source, one source of 9 curies.
D. Cobalt-60	D. ORNL sealed source, one source of 3 curies.
E. Cobalt-60	E. Metallic Cobalt, 40 curies maximum, four sealed sources in AN/UDM-1 Calibrator Set manufactured by National Electrical Machine Shops,Inc 10 curies each.
F. Cesium-137	F. ORNL sealed source, one source of 10 curies.
G. Cesium-137	G. Cesium chloride. Maximum at any one time is 2100 curies. Note that there are three identical radiac calibrators, AN/TDM-2 involved, each containing 11 sealed sources totaling not more than 700 curies per calibrator; for detail of the individual sources see attached Table 1. Sources were manufactured and in capsulated by Oak Ridge National Lab; capsules are the standard design of ORNL (See attached drawing #424695).
H. Cesium-137	H. Cesium chloride, 260 curies maximum, two sealed sources in AN/UDM-1A Calibrator Set, radiac,manufactured by National Electrical Machine Shop, Inc. 130 curies each.
I. Americium 241	I. Americium dioxide pelletized in an intimate mixture with beryllium and sealed in a standard source capsule manufactured by Nuclear Material & Equipment Corporation. Six sources of one curie each(mdl #AM-31-1) total of six curies.

Appendix B (Cont'd)

J. Americium 241	J. Americium dioxide, pelletized in an intimate mixture with beryllium and sealed in a standard source capsule manufactured by Nuclear Material & Equipment Corporation. One source of four curies (model #AM-123-2).
K. Krypton-85	K. Solid crystalline clothrate of hydroquinme, 5 curies.
L. Krypton-85	L. Total quantity of Krypton 85, 60 curies in MX-7338/PDR-27R Radioactive Test Samples (Multronics, Inc. drawing A12822A44 and A12822A45). No single source to exceed seven millicuries.
M. Hydrogen 3	M. Titanium-tritide targets, 20 curies contained in two targets of 10 curies each.
N. Cesium 137	N. Sealed Source 130 curies J. L. Shepard Model A0096 in Radiac Calibrator Set, AN/UDM-1A.
O. Byproduct Material	O. Any chemical or physical form. Isotopes and quantities listed in 10 CFR 33.100, Schedule A, Column II.
P. Cobalt-60	P. Sealed Source, Picker Model P-3802A, one source, not to exceed 5,000 curies. Depleted uranium used as shielding in the head.
Q. Cobalt-60	Q. Sealed source, J.L. Shepard Model 7810, one source of 1100 curies.

7. Describe purpose for which By-Product Material will be used:

A. For use in AN/UDM-1 Radiac Calibrator for calibration of instruments and film badges.

B. For use in Calibrator-Deep Well for calibration of instruments and film badges.

C. For use in AN/UDM-1 Radiac Calibrator for calibration of instruments.

D. For use in 360° Calibrator (Dwg No SD-D-60-10005) for calibration of dosimeters and film badge standards.

E. The four ten-curies Cobalt-60 source will be held in depot for repair, storage, and issue to properly licensed agencies; storage area is shown in Drawing No 1.

F. For use in Low Intensity Calibrator (Dwg No SD-D-60-10002) for calibration of instruments.

G. Radiac Calibrator, AN/TDM-2 will be used in calibration of radiation detection instruments. The sources are hermetically sealed in two concentric stainless steel cylinders and placed in three lead shields of similar design which vary only with respect to size, weight and number of sources inclosed; two of the shields hold three sources; the other, five sources. Each shield is located in a console. For console details, see Figure 1 (Appendix E).

The radioactive source capsules are held snugly in the source-selector wheel by a steel face place which is affixed to the source-selector wheel with machine bolts. The desired source is "dialed" into position, with springloaded detents assuring positive positioning. For source-selector wheel details, see Figure 1 (Appendix C) and Figure 3 (Appendix E).

H. The two 130 curies Cesium sources will be held in depot for repair, storage, and issue to properly licensed agencies; storage area is shown on Drawing No 1.

I. Six Americium - Beryllium sources will be incorporated in a standard thermal neutron geometry, for use in irradiation of foils and detectors by thermal neutrons. See Drawing No 2.

J. One Americium - Beryllium source will be inclosed in a paraffin-filled storage container and used as a fast neutron source. See Drawing No 3.

K. Irradiation of film standards and calibration of instruments.

L. For storage and evaluation only.

M. Production of neutrons in a positive-ion accelerator for film badge and instrument evaluation and calibration, and for research on personnel dosimetry systems.

N. One hundred thirty Ci Cesium-137 source in the Radiac Calibrator Set AN/UDM-1A will be used for calibration of instruments and film badges.

O. Preparation of film badge standards and calibration standards for laboratory counting systems.

P. For use in Picker Model C-9 Teletheraphy Unit for calibration of instruments.

Q. 1100 Curies Cobalt-60 source will be used to replace existing Cobalt-60 source in the Deep-Well Calibrator.

JL SHEPHERD and Associates

748 Salem Street, Glendale, California 91203 • 213/245-0187

Irradiation & Calibration Equipment • Lead Shielding • Nuclear Applications

October 16, 1985

Department of the Army
United States Army Missile Command
Redstone Arsenal, Alabama 35898

Attention: AMSMI-PC-CD/
Gary Poolos

Dear Mr. Poolos;

Reference soliciation DAAHOL-85-R-0573, the 1000 Ci nominal 60 Colbalt source which we will provide will be manufactured by General Electric, Vallecitos Laboratory. The source type will be a J.L. Shepherd & Associates 7810. Because the source requires a magnetic end for handling, which is not normally incorporated in a type 7810, J.L. Shepherd will supply complete drawings, special form testing certifications and other documentation required for licensing the source at the Sacramento facilities.

A drawing of the source and copies of the necessary certification are included. Please note that the dimension configuration will be compatible with the Sacramento Signal Depot Well facility.

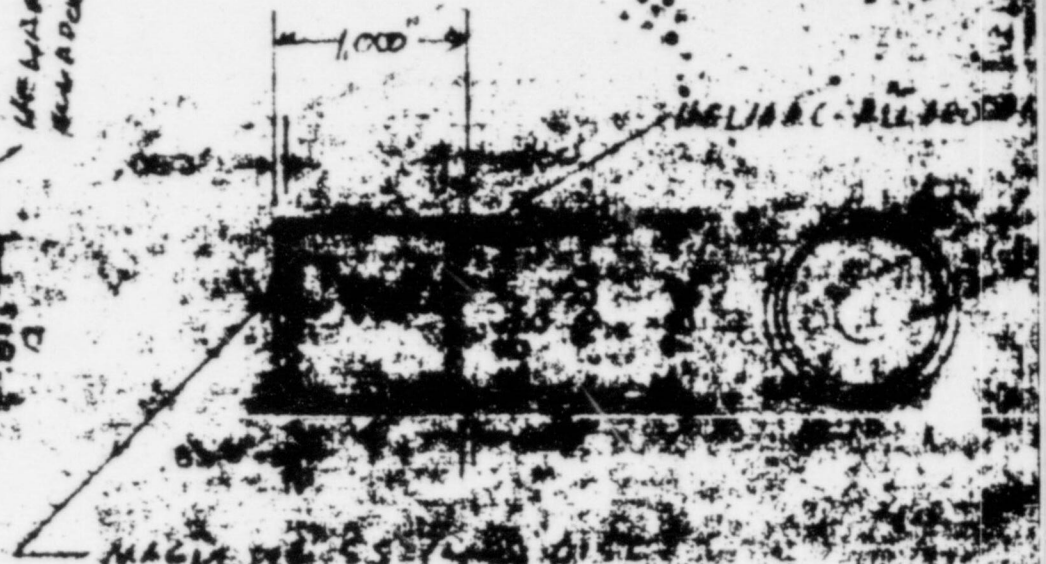
J. L. Shepherd

JLS/jg
ENCLO

INNER CAPSULE

MTL: 304 SS

OUTER CAPSULE



NOTES:

1. LEAD PLUGS TO HAVE .008" REGISTER (.0008" PER SIDE) IN TUBE
2. [illegible] 0.0005" INTERFERENCE FIT WITH TUBE
3. HELIUM LEAK TEST TO [illegible] TO LOAD DISC
4. SOURCE TUBES CRIMPED [illegible]

J. L. SHEPHERD & Associates			
DRAWN BY: JL	DATE: 10/10/00	APPROVED BY: [illegible]	SCALE: [illegible]
TYPE 7810 CAPSULE [illegible]			
1000 CI [illegible]			A-0081-2001

JL SHEPHERD and Associates

740 Salem Street, Glendale, California 91203 • 213/245-0187

Irradiation & Calibration Equipment • Lead Shielding • Nuclear Applications

CERTIFICATION

SUBJECT: 1,000 Ci Cobalt-60 source capsule, per J.L. Shepherd & Associates drawing A-0081-2001.

This is to certify that a prototype of the source capsule per drawing A-0081-2001 has been subjected to and successfully passed free drop, percussion, heating and immersion tests as called out in 10CFR 173.398.

Date: 10/16/85

J.L. Shepherd

JLS/jkg

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DATA SHEET - SPECIAL FORM CAPSULE TESTING

Capsule Type: 7810
Drawing Number: A-0081-2001

Capsule was loaded with 46 grams of inert Co-60
Inner and outer capsules were heliarc welded in accordance with drawings and tests performed as below.

Date: 10/16/85

49CFR 173.398 Special Tests

1.Free Drop - 30' to 1/4" thick steel plate on concrete surface.

Results: No visible damage to capsule or welds.

2.Percussion - 1" diameter steel rod, wt. 3 lbs. dropped end on 4 times through 40" distance on capsule laying on 1/4" lead sheet on concrete surface.
Results: Sides and end of capsule were dented. No fracture of outer capsules or welds.

3.Heating - Capsule heated in air to 1475°F in electric furnace and held at this temperature 15 minutes - then allowed to cool.
Results: Capsule discolored - no fracture of capsule ends, welds or walls.

4.Immersion - 24 hours in distilled water pH 7, maximum conductivity of 10 micro-mhos/cm.
Results: No visible effect on capsule - no leaking of CsCl from inside capsule.

Leak Test:
1. Method: Bubble Test. Capsule heated to 240° in glycol.
2. Results: No bubbles emerged from capsule.

J.L. Shepherd