ULATORY OPERATIONS

DOCKET NO. 40-6639

I

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
WASHINGTON, D.C. 20310

16 MAY 1973

DALO-MAS-I

U.S. Atomic Energy Commission
Directorate of Licensing
Materials Branch
Washington, D.C. 20545

RECEIVED MAY 21 1973

Gentlemen:

Please refer to USAEC Source Material License No. SUB-459 and Export License SBE-7228 issued to the U.S. Army Frankford Arsenal, Philadelphia, Pennsylvania.

These two licenses were due to expire on 30 April 1973. However, it is our understanding that this date was extended at the request of Mr. Taras of the Army Materiel Command. In any event, attached are copies of application to renew these licenses.

The export license remains essentially unchanged. Changes to the Source Material License are as follows:

a. Item 9 (Attachment 1): Expansion of processes to include ballistics testing.

b. Item 10: Delete the name of Alfred J. Ferruggiaro and add the name of Albert Haier as Radiation Protection Officer.

c. Update of Instructions, SOP's and other procedures.

Sincerely yours,

Peter M. Baldino

PETER M. BALDINO
Chief, Support Division

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FORM AEC-2
(3-64)

FORM APPROVED
BUREAU OF BUDGET NO. 38-R0002

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

1. (Check one)
- ☐ (a) New license
- ☐ (b) Amendment to License No. _____
- ☒ (c) Renewal of License No. SUB-459
- ☐ (d) Previous License No. _____

2. NAME OF APPLICANT
Department of the Army

3. PRINCIPAL BUSINESS ADDRESS
USA Munitions Command
Dover, N. J. 07801

4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED
USA, Frankford Arsenal, Philadelphia, Pa. 19137

5. BUSINESS OR OCCUPATION
U.S. Government

6. (a) IF APPLICANT IS AN INDIVIDUAL, STATE CITIZENSHIP
N/A

(b) AGE
N/A

7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED
Fabrication and use in various alloy configurations and for potential incorporation into the following weapons systems: GAU-8 (Air Force), Phalanx (Navy) and Bushmaster (Army).

8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE

(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (*Including % U or Th.*)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (*in pounds*)
NATURAL URANIUM			
URANIUM DEPLETED IN THE U-235 ISOTOPE	UF 4		No. Quantity Limitation
THORIUM (ISOTOPE)			

(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (*in pounds*) Unknown, since the quantity required will be governed by type and/or number of projects using same.

9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL RADIATION HAZARDS ASSOCIATED WITH EACH STEP OF THOSE PROCESSES.

See Attachment 1

10. DESCRIBE THE MINIMUM TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE THAT WILL BE REQUIRED OF APPLICANT'S SUPERVISORY PERSONNEL INCLUDING PERSON RESPONSIBLE FOR RADIATION SAFETY PROGRAM (OR OF APPLICANT IF APPLICANT IS AN INDIVIDUAL).

Mr. Ralph E. Edelman - See Attachment 2a.
Mr. Alfred J. Ferruggiaro - See Attachment 2b.

11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9: INCLUDE: (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air sampling, and other survey equipment as appropriate. The description of radiation detection instruments should include the instrument characteristics such as type of radiation detected, window thickness, and the range(s) of each instrument).

See Attachment 3

(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE, INCLUDING AIR SAMPLING EQUIPMENT (for film badges, specify method of calibrating and processing, or name supplier). Radiation survey instruments are calibrated quarterly or after a maintenance or a battery change at Lexington-Blue Grass Army Depot. Whole body and wrist beta-gamma film badges are furnished on a monthly basis by Lexington-Blue Grass Army Depot in accordance with AR-40-14 and SB-11-206.

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11(c). VENTILATION EQUIPMENT WHICH WILL BE USED IN OPERATIONS WHICH PRODUCE DUST, FUMES, MISTS, OR GASES, INCLUDING PLAN VIEW SHOWING TYPE AND LOCATION OF HOOD AND FILTERS, MINIMUM VELOCITIES MAINTAINED AT HOOD OPENINGS AND PROCEDURES FOR TESTING SUCH EQUIPMENT.

See Attachments 1, 1a and 1b

12. DESCRIBE PROPOSED PROCEDURES TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY AND RELATE THESE PROCEDURES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE: (*a*) SAFETY FEATURES AND PROCEDURES TO AVOID NONNUCLEAR ACCIDENTS, SUCH AS FIRE, EXPLOSION, ETC., IN SOURCE MATERIAL STORAGE AND PROCESSING AREAS.

See Attachment 4

(*b*) EMERGENCY PROCEDURES IN THE EVENT OF ACCIDENTS WHICH MIGHT INVOLVE SOURCE MATERIAL.

See Attachment 4

(*c*) DETAILED DESCRIPTION OF RADIATION SURVEY PROGRAM AND PROCEDURES.

See Attachment 4

13. WASTE PRODUCTS: *If none will be generated, state "None" opposite (a), below. If waste products will be generated, check here* ☐ *and explain on a supplemental sheet:* Disposal accomplished through the US Army Radioactive Material Disposal Facility, Edgewood Arsenal, Md. in accordance with AR 755-15.

(*a*) Quantity and type of radioactive waste that will be generated.

(*b*) Detailed procedures for waste disposal.

14. IF PRODUCTS FOR DISTRIBUTION TO THE GENERAL PUBLIC UNDER AN EXEMPTION CONTAINED IN 10 CFR 40 ARE TO BE MANUFACTURED, USE A SUPPLEMENTAL SHEET TO FURNISH A DETAILED DESCRIPTION OF THE PRODUCT, INCLUDING:

(*a*) PERCENT SOURCE MATERIAL IN THE PRODUCT AND ITS LOCATION IN THE PRODUCT.

(*b*) PHYSICAL DESCRIPTION OF THE PRODUCT INCLUDING CHARACTERISTICS, IF ANY, THAT WILL PREVENT INHALATION OR INGESTION OF SOURCE MATERIAL THAT MIGHT BE SEPARATED FROM THE PRODUCT.

(*c*) BETA AND BETA PLUS GAMMA RADIATION LEVELS (*Specify instrument used, date of calibration and calibration technique used*) AT THE SURFACE OF THE PRODUCT AND AT 12 INCHES.

(*d*) METHOD OF ASSURING THAT SOURCE MATERIAL CANNOT BE DISASSOCIATED FROM THE MANUFACTURED PRODUCT.

CERTIFICATE

(*This item must be completed by applicant*)

15. *The applicant, and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 40, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.*

Department of the Army
(*Applicant named in Item 2*)

Dated 23 April 1973

BY: Anthony Saia
(*Print or type name under signature*)
ANTHONY SAIA, SS REPRESENTATIVE
Frankford Arsenal, Phila., Pa. 19137
(*Title of certifying official authorized to act on behalf of the applicant*)

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 : 1968—O-295-054

ATTACHMENT 1

PROCESSING URANIUM - OPERATIONS, HAZARDS AND CONTROL MEASURES

	Process	Hazard	Control (Except Ventilation)
CASTING:	Melting and Pouring	Hi internal and external radiation.	Controlled atmosphere (vacuum) and shielding.
	Mold Break-up and Cleaning	Hi internal and external radiation.	Partial shielding, exposure time limited. Respirators required.
HEATING:			
Above 600°F	Uncontrolled Atmospheres (Oil and Gas Fired Furnaces)	Excessive oxidation yielding black oxide dust.	Not permitted. Controlled atmosphere required.
	Vacuum Furnaces	Hi beta-gamma radiation.	Controlled atmosphere, discharge filtered, crucible shielded.
	Salt Baths	Slight. Bath maybe contaminated with uranium in time.	None during operation. Furnace must be monitored after long usage.
	Quenching	Slight. Cooling prevents further oxidation.	Usually none. Quenching is a control measure.
Below 600°F	(Any type of heating - Including cold working)	Slight. Uranium black oxide dust.	Good housekeeping required to remove black oxide dust.
ROLLING:		Medium to high. Black oxide dust.	Quench and keep billet covered with salt. Good housekeeping essential.
FORGING:			
	Hammering	Lo to med. Black oxide dust	Quench and keep billet covered with salt. Good housekeeping essential.
	Pressing	Lo. Black oxide dust.	Good housekeeping.
EXTRUDING:		Lo. Black oxide dust.	Quench and keep bars covered with salt. Good housekeeping.

DA,FA,SUB 459

ATTACHMENT 1

PROCESSING URANIUM - OPERATIONS, HAZARDS AND CONTROL MEASURES (Continued)

Process	Hazard	Control (Except Ventilation)
DRAWING:	Lo. Black oxide dust and lubricant fumes or mist.	Use ample lubricant. Practice good housekeeping.
SWAGING:	Lo. Black oxide dust.	Use clean stock. Practice good housekeeping.
POWDER PRESSING:	Med. to Hi. Black oxide dust.	Enclosed equipment required
MACHINING:		
Machine Tool:		
Power hacksaw	None	Coolant (lo rate) required
Circular saw	None	Coolant (lo rate) required
Miller	None	Coolant (med rate) required
Surface grinder	None	Coolant (hi rate) required
Portable grinder	Lo. Black oxide dust	Enclosed process
Centerless grinder	Med. Black oxide dust and fume.	Coolant (very hi rate) required.
Belt sander	Lo. Black oxide dust	Coolant (lo rate) required
Shaper or planer	Lo. Black oxide dust	Coolant (med rate) required.
Lathe (turning, facing, cut-off, milling, slotting, drilling, radius	Lo. Black oxide dust	Coolant (lo-med rate) required. Partial hood may be necessary.
Miller	Lo. Black oxide dust	Coolant (med rate) required
Vertical drill	Lo. Black oxide dust	Coolant (lo rate) required
Horiz. drill (drilling, boring, reaming, tapping, etc.)	Lo. Black oxide dust and fume.	Coolant (med rate) required

ATTACHMENT 1

PROCESSING URANIUM - OPERATIONS, HAZARDS, AND CONTROL MEASURES (CONTD)

Process	Hazard	Control (Except Ventilation)
Firing depleted uranium rounds	Low internal and low external radiation.	Firing accomplished remotely due to the explosives hazard. Time delay before entering range.

NOTE: All ventilation systems are equipped with absolute filters.

DA,FA,SUB 459
AEC-2, Items 9, 11 (c)

ATTACHMENT 1a

URANIUM PROCESSING VENTILATION SYSTEMS

1. Separate exhaust ventilation systems are provided in each of the uranium processing areas. In the melting area, canopy hoods are installed over the vacuum furnace and over the mold break-up rach. Hood face velocities of 150 fpm and 400 fpm are maintained at the furnace and at the break-up rack respectively. In the machining area, local exhaust ventilation is provided on each of the grinding machines, milling machines and lathes by means of flexible ducts. The duct opening velocities average 2100 fpm with 1200 fpm minimum.

2. The exhaust air is filtered through a bank of absolute filters prior to discharge into the outdoors. Manometers on each of the filter banks provide a visual indication of the pressure drop across the filters.

ATTACHMENT 1b

Procedures for Air Sampling for Uranium

1. Particulate contaminants in air are collected on Whatman 41 filter paper. The air is drawn through the paper by a Unico low-volume air sampler at a collection rate of 30 liters per minute.

2. The sampling point is representative of the worker's breathing zone. Secondary samples of the general room air may be collected if desired.

3. The sample deposited is counted for Alpha activity in a Beckman Wide Beta II Proportional Counting System. The net activity of the sample is determined using a calibrated standard uranium source. The results are then weighed against the current MPC values for uranium 238.

ATTACHMENT 4-1

DEPARTMENT OF THE ARMY
FRANKFORD ARSENAL
Philadelphia, Pa. 19137

PDL MEMORANDUM
NUMBER 385-33

22 December 1971

SAFETY

S.O.P. URANIUM MELTING

1. Purpose. To establish a Standing Operating Procedure to assure that maximum safety and health precautions will be taken during the melting of uranium in Building 149.

2. Scope. This memorandum applies to all personnel who are required to work in or visit this facility, including maintnenance personnel.

3. Policy. A minimum of two (2) persons authorized to work in this area must be present during the operation of the facility.

4. General. a. The supervisor in charge of these operations shall be responsible for assuring that personnel concerned thoroughly understand and comply with the requirements of this memorandum.

b. This procedure be permanently displayed in the uranium casting area. Prior to initiating any work with depleted uranium the Radiation Protection Officer, Ext. 5434, or his alternate, Ext. 5778, must be contacted in order that necessary smear tests and/or air samples may be conducted.

c. Only personnel who have been examined and cleared by the U.S. Army Health Clinic, F.A. will be permitted to handle uranium.

d. All persons working in the Uranium Melting Area will submit urine samples at intervals prescribed by the U.S. Army Health Clinic, F.A.

e. Smoking, eating, and drinking is prohibited in these areas. No food (including candy, external or internal medication, beverages, etc.) will be brought or stored in the Uranium Melting Area.

f. Auxiliary equipment used in conjunction with the melting facility will not be removed from the area unless first radiologically monitered and decontaminated, if required.

g. In order to avoid excessive accumulation of dust bearing radioactive particles walls, floor, and equipment will be cleaned after each heat and as experience dictates. Cleaning will be

*Supersedes PDRL Memorandum 385-5, 14 May 1969

DA, FA, SUB 459
AEC-2, Items 12(a), 12(b), 12(c), 13

accomplished by vacuuming, wiping, wet mopping or scrubbing; sweeping, other than small areas heavily laden with debris, must be avoided. Floors and work surfaces will be cleaned with a vacuum cleaner, labeled for exclusive use in the depleted uranium areas. Fans will not be used in the working area.

h. Depleted uranium will not be stored in working areas except in amounts necessary for a particular job.

i. All depleted uranium must be stored in closed, labeled containers.

j. Warning signs reading "CAUTION - RADIOACTIVE MATERIAL" must be posted at the two entrances as required by 10 CFR 20.203.

k. Copies of the A.E.C. License and 10 CFR Part 20, "Standards for Protection Against Radiation" are available in the supervisor's office for information and guidance.

l. All persons must remove the protective clothing and equipment and leave it in the anteroom prior to leaving. Face and hands must be washed using facilities provided in the anteroom before leaving this restricted area.

m. All persons working in the restricted area must wear film badges.

5. Procedures. In the operation of the furnace, the following steps will be followed:

a. Loading of Furnace:

(1) Don protective clothing listed below:

(b) Work coats.

(c) Respirators.

(d) Safety Glasses.

(e) Safety hats plus face shield.

(f) Gloves, cloth and/or leather.

(2) Turn on Exhaust system.

(3) Survey the radioactivity of the melting stock prior to loading.

(4) Load uranium into crucible.

(5) After the crucible is loaded, place an aluminum lid on the crucible; it will remain in place until mold and auxiliary equipment placement has been completed.

(6) Remove aluminum crucible lid.

(7) Rotate graphite lid into plate over crucible.

b. Pump Down:

(1) Close furnace door and secure with four (4) screw locks.

(2) Turn pump cooling water and power on and evacuate system to a pressure of less than 20 microns.

(3) Turn exhaust system off.

c. Melting:

(1) The persons will wear all of the safety equipment, listed in 5a(1) above with the exception of the respirator.

(2) Turn on all cooling water.

(3) Start generator.

(4) Turn power switch on.

(5) Energize field.

(6) Turn power setting to a desired position.

(7) Adjust Shaw meter.

(8) Turn power switch off when the desired pouring temperature is reached.

(9) Pour metal.

(10) Turn generator off.

(11) Turn generator cooling water off 30 minutes after the generator has been turned off.

(12) One (1) hour after the pour, back fill the furnace with air to 20 inches of mercury vacuum.

d. Furnace Opening:

(1) The furnace will not be opened until a minimum period of 16 hours has elapsed from the time of the pour.

(2) Personnel will wear the safety equipment listed in 5a(1) but will substitute "Lead X" coats for work coats and wear leggings. Film badges will be clipped to the neck of the "Lead X" coats to effectively monitor the exposure to the head while working at the furnace or "knock-out" molds.

(3) Turn exhaust system on.

(4) Back fill furnace with air to atmospheric pressure; open door slightly and take a count with a survey meter.

(5) Swing crucible graphite lid to the rear of furnace.

(6) Cover crucible with aluminum lid.

(7) Remove mold and auxiliary equipment to knock-out area.

(8) Close furnace door and secure with one (1) screw lock.

e. Knock-out:

(1) All safety equipment listed in 5a(1) will be worn by personnel during removal of castings from molds.

(2) All casting knock-out will be done under the knock-out exhaust hood.

(3) Castings in disposable refractory molds will be "Knocked-out" over a metal receptacle so that all of the mold material will be caught in the receptacle.

(4) Cover mold material metal receptacle with metal lid.

(5) Permanent type molds (such as graphite) will be disassembled and stored under the knock-out exhaust hood.

(6) The castings are to be placed in a metal container with a metal lid.

f. Furnace Cleaning:

(1) Personnel will wear the safety equipment listed in 5d(2)

(2) The exhaust hood over the furnace door will be turned on.

(3) The crucible will be tilted and scraped out with an aluminum hoe.

(4) The residue in the crucible will be scraped into a metal container and covered with a metal lid.

(5) The inside of the furnace chamber will be cleaned with a vacuum cleaner.

(6) As required, in order to maintain desirable vacuum, the inside of the furnace chamber, induction coil, and power leads will be washed down with a suitable solvent.

6. Fires. a. In case of fire beyond control of the facility operator(s), building will be evacuated immediately and the Fire Prevention and Protection Branch will be notified.

b. The Fire Prevention and Protection Branch, Extension 5329 will be notified of all incidents involving fires extinguished by shop personnel.

c. Personnel required to enter area to fight fire will wear approved respiratory protection and will use only approved fire-fighting equipment and methods.

7. Visitors and Maintenance Personnel. a. Will contact supervisor in charge to register "IN" and "OUT" of this area.

b. Will be required to read and comply with this S.O.P.

8. Referral. Questions concerning this procedure will be directed to Mr. Ralph E. Edelman, L3100, Extension 5825, Building 149.

22 December 1971

9. Effective Date. The provisions of this memorandum are effective upon receipt.

10. References. Title 10 - Code of Federal Regulations.

11. Review. The provisions of this memorandum must be reviewed and updated at least bi-annually by the Chief, Metals Processing Branch, L3100, and forwarded to Chief, Technical Programs Office, L2000, Building 64-3.

GEORGE C. WHITE, Jr.
Acting Deputy Director

APPROVED:

S. BERK
Radiation Protection Officer

F. J. FIDELL
Safety Director

J. FODERARO, M.D.
Chief, US Army Health Clinic, FA

DISTRIBUTION:

Chief, Materials Engineering Division, L3000
Chief, Metals Processing Branch, L3100 (15 cys)
All Division, Office and Branch Chiefs, PDL
Chief, Safety Office, V1000
Chief, U.S. Army Health Clinic, FA (2 cys)
Radiation Protection Officer, L6000 (2 cys)

ATTACHMENT 4

United States Army
FRANKFORD ARSENAL
Philadelphia, Pa. 19137

RADIANT ENERGY COMMITTEE S.O.P. #3-65 28 September 1965

"RADIATION PROTECTION PROGRAM"

1. Request for Committee Approval - a. Personnel who have need to use radioactive material or devices which emit or produce harmful ionizing radiation must submit a proposal to the secretary of the Radiant Energy Committee requesting approval of the proposed use.

b. Each proposal must contain the following information:

(1) Purpose for which the material or device will be used.

(2) Isotope or device required.

(a) Isotope including atomic number and mass number, as well as physical and chemical form.

(b) Activity, or if x-ray unit, the KVP.

(c) Sealed sources should be described in detail.

(3) Facilities for safe handling.

(a) Area.

(b) Handling facilities.

(c) Personal protective equipment required.

(4) Instrumentation

(a) Instruments for area surveys.

(b) Instruments for counting or measuring.

DA,FA,SUB 459
AEC-2, Items 12(a),12(b),12(c),13

Incl 2

3320

(5) Individual User.

(a) Technical education.

(b) Experience in the use of radioactivity.

(6) Storage of waste disposal.

(a) Description of special storage requirements.

(b) Description of special waste disposal requirements.

(7) Proposed procedures for project.

c. Investigation.

(1) The secretary will investigate the proposal.

(2) The chairman will call a committee meeting to act on the proposal.

2. Committee approval - a. The prospective user will be requested to meet with the committee to discuss his application in detail. Pertinent details for discussion follow.

b. Qualifications of user.- The committee will use the following criteria as a guide in approving the qualifications of the individual user.

(1) Education.

(a) Degree (or equivalent) in engineering or science. Must have successfully completed college courses in college algebra, general chemistry and physics.

(b) Completed a basic course in "Radiological Health" consisting of at least two weeks of training in :

1. Principles of Radiation Protection.

2. Radioactivity measurement.

3. Mathematics and calculation basic to the use and measurement of radioactivity.

4. Biological effects of radiation; These courses must be equivalent to those conducted at Oak Ridge, Tenn. by the Atomic Energy Commission, or at Cincinnati, Ohio by the U.S. Public Health Service.

(2) Experience Required.

(a) Activity to 100 millicuries.

1. The user must have had 3 months of practical experience with the specific isotope or a similar isotope of comparable energy and biological hazard.

2. He must be capable of checking the calibration of instruments for counting or measuring activity. This will assure his ability to assay the isotope and counts swipe to detect contamination.

(b) Activity over 100 millicuries.

1. Prerequisite for qualification is at least one year of practical experience with similar isotopes with activities in the 50 - 100 millicurie range.

2. He must be capable of checking the calibration of instruments for counting or measuring activity. This will assure his ability to assay the isotope and counts swipe to detect contamination.

3. NOTE - Two more weeks of formal training is desirable.

4. Must demonstrate his ability to provide a complete radiation protection S.O.P. for the operation.

c. Approval of Laboratory or Work Area - The following facilities will be considered in evaluating the facilities.

(1) Impervious floors, walls, ceilings & work surfaces.

(2) Laboratory hoods, gloves, boxes and exhaust systems.

(3) Separate floor drains, catch basins and sewers.

(4) Laboratory equipment.

(a) Low Level Labs. - Tongs, trays, forceps, pipettes, etc.

(b) Hot Labs. - Remote handling devices, shielding devices, long handle tools, monitoring instruments and alarms.

d. Approval of Procedures including S.O.P.

(1) The committee will investigate the proposed work procedures, including the written S.O.P. The procedures must outline the measures taken to control exposure to harmful radiation, prevent spread of contamination, handle emergencies and dispose of waste material safely. Items usually considered are outlined hereafter.

(2) Personal protectives equipment and devices required.

(3) Contamination controls.

(4) Shielding requirements during transportation, use and storage.

(5) Emergency procedures.

(6) Waste control, including disposal.

e. Approval of Instrumentation. - The user must describe instruments that will be used for area surveys and counting, measuring and assaying.

f. Approval of Records - Records maintained must include the following as a minimum.

(1) Records of receipts, amounts used, waste on hand, waste disposed of and balance on hand.

(2) Inventory of amount on hand.

(a) List of all isotopes.

(b) Amount on hand vs. authorized limit.

g. Area Surveys - The method of making the surveys of the area including the frequency of the surveys will be stated. The proposed method of recording these surveys will also be included.

h. Notification of Committee Approval

(1) The committee will notify the user immediately after approval.

(2) The user will then submit 10 completed forms AEC-313, "Application for Byproduct Material License" to the secretary for approval and transmittal to USAMUCOM. (NOTE. One copy will be returned to user, a second copy will be retained by the committee, and eight will be forwarded).

(3) Request for radioactive materials or devices requiring DCLOG approval will be submitted to the secretary for approval and transmittal to USAMUCOM. (NOTE: 7 copies required.)

i. The secretary will notify the Procurement Directorate ( ), in writing of each approved project.

3. Procurement Action. - a. Procurement and contracting officers will not initiate any action without committee approval. This applies to the procurement of any radioactive material or devices emitting or producing ionizing radiation.

b. The secretary of the committee will notify Procurement Directorate, of the committee action as well as appropriate AEC License number or DCLOG authorization.

c. All purchase orders will contain directions for marking the shipment of radioactive materials for delivery to a specified building or area, and to the attention of a named individual.

4. Receipt of Radioactive Material. - a. The radioactive material will be delivered to the designated area by the common carrier. The named individual and the radiation protection officer will be notified by the receiving unit so that the package can be checked for contamination prior to unloading.

b. Packages should not be received after normal working hours. In emergencies, small packages will be stored in Building #312, and large packages will be stored in Building #507.

c(1)The Radiation Protection Officer will monitor each package and vehicle prior to unloading. Vehicles will be decontaminated prior to release when required.

(2) DA Form 2791 will be completed by the R.P.O. as required by AR 55-55.

5. Use of Radioactive Material. - a. The area will be physically separated from all other operations. The area will be properly posted and unauthorized personnel will be excluded.

b. Laboratory hoods, glove boxes, and good general and exhaust ventilation will be provided as needed. Forceps, tongs, pipettes, and shielding will be used to keep exposure to external radiation to a minimum. Trays, absorbent material, strippable coatings, etc. will be used to prevent spread of contamination.

c. The approved S.O.P. will be posted and the approved procedures for handling the isotopes will be followed.

6. Exposure to External Radiation. - a. Every effort will be made to keep the exposure to a minimum.

b. Personnel dosimetry will be used as required by the provisions of 10CFR 20 and AR 40-14 .

(1) Photo dosimetry is required if there is even a remote chance that individual will be exposed to one quarter of the MPD.

(2) Pocket chambers will be used when high radiation rates are encountered and exposure could exceed the MPD.

c. Photo dosimetry is furnished by Lexington Signal Depot and administered by the Health Services Division. Records of exposure (DD Form 1141) are kept by Health Services Division and become part of the individual's medical record.

7. Exposure to Internal Radiation. - a. Every effort will be made to contain all radioactive material to prevent inhalation and area contamination.

b. Hazardous materials which may become airborne will be handled under laboratory hoods or glove boxes.

c. All ventilation systems which may discharge radioactive materials must be equipped with absolute filters to prevent discharge of the hazardous materials to the atmosphere.

d. Periodic air samples will be taken by the R.P.O. of all operations which may present an inhalation problem.

e. Bio assays will be made of all personnel handling tritium, radium, uranium and strontium.

8. Radiation Protection Surveys. - a. The R.P.O. will make and record the initial radiation protection survey of each operation.

b. (1) Individual users will make surveys as needed to determine exposure to external radiation, spread of contamination and during cleaning operations.

(2) All spills will be monitored after clean-up.

(3) Hands, clothing, tools and working surfaces will be frequently monitored.

(4) All materials leaving the area will be monitored and decontaminated if necessary before removal from the restricted area.

c. All sources, source containers, pigs, vials, etc. will be labelled as to content, activity and surface radiation.

d. All sealed sources will be checked for leakage by the user at the required interval.

e. The R.P.O. will make periodic surveys of the areas and check for adequacy of all radiation protection measures.

9. Calibration Procedures. - a. Laboratory counting or measuring instruments:

(1) All laboratory counters are accurately calibrated prior to use.

(2) Calibrated standards.

(a) Identical standard

1. A calibrated source identical to the unknown is used whenever possible.

2. The source is arranged in a position identical to the position of the unknown to obtain the same geometry.

(b) Simulated standards

1. Simulated standards, having similar emissions and energies, are used only when calibrated sources identical to the material being counted are not available.

2. The source arrangement for calibration of counting are as nearly identical as possible.

(3) Procedures.

(a) Background radiation is determined accurately.

(b) A plateau or characteristic curve is obtained by varying the voltage.

(c) The operating voltage is determined from the above curve, recorded and subsequently used.

(d) Counts per minute vs. activity are then calculated and used in subsequent measurements.

b. Survey meters.

(1) All alpha, beta and gamma survey meters are calibrated quarterly or after repair or replacement of batteries.

(2) Beta-gamma survey meters are calibrated using a Cobalt 60 source (Radioactive Source Set, MDA-1) by Quality Assurance personnel. Instructions given in para. 21, "Calibration of Radiac Survey Meters", Chapter 2 of TM 3-6665-214-15 dated March 1963, are followed.

(3) Alpha meters are calibrated by the same group, using an Eberline S94-1 (URM6) alpha standard. Calibration instructions furnished by the instrument manufacturers are followed.

(4) Alpha and beta check sources are used by the individual users in the interim.

10. Leak or Wipe Tests. - a. Sealed Sources.

(1) The exposed external surfaces of the object to be tested are wiped thoroughly with a piece of filter paper (usually Whatman #41) of high wet strength and absorption capacity. It is moistened with a solution which will not attack the material of which the container or source holder is made, and which, under the conditions of this test, has been demonstrated to be effective in removing the radioisotope involved.

(2) The paper is allowed to dry thoroughly, and then the radioactivity on the paper is measured using laboratory counting equipment. This equipment must be capable of detecting at least 0.005 microcuries.

(3) This procedure is repeated using an identical piece of dry filter paper.

(4) Wipe tests in Frankford Arsenal are simplified by using circular paper 3 in. or smaller in diameter. The swipes may then be counted automatically using a sample changer.

b. Surface Contamination.

(1) Surfaces are wiped and tested as given in 10a above.

(2) Areas Wiped. - This test, in order to be quantitative, is accomplished by wiping an area ten centimeters on each side or 100 square centimeters. The amount of removable surface contamination per 100 cm^2 is thus obtained.

11. Shipment (outgoing) of Radioactive Material. - a. The person authorizing the shipment will complete SMUSA Form 42, "Request for

Shipment", and section I of DA Form 2791, "Radioactive Materials Movement" in triplicate.

b. The material will be packaged by the shipping unit according to I.C.C. and other federal regulations.

c. The package will be monitored by the R.P.O. and results noted on DA Form 2791 in sections II and III.

12. Waste Disposal. - a. No radioactive material will be disposed of in Frankford Arsenal.

b. All radioactive materials will be handled to preclude excessive waste.

c. Materials will be segregated - solids, liquids, gases, contaminated waste, etc.

d. Paper wipers, negative swipe, packing material, etc., which when counted shows less than 200 c.p.m., will be burned in the incinerator.

e. All other wastes will be disposed of according to AR 755-380. The user will receive permission from Edgewood Arsenal in writing, and then package materials according to instruction and send it to Edgewood for ultimate disposal.

13. Emergencies. - a. Emergencies may be merely a spill of material in the laboratory which may be promptly handled, or it could involve extensive damage to the facility from floods, fires or explosions. In any event, a plan of action is outlined for the protection of personnel.

b. A plan for emergency action is therefore included in each S.O.P.

c. In general, the plan is to take immediate action to prevent further spread of contanination by closing pigs, installing shields,, closing windows and doors, and removing contaminated clothing before leaving area.

d. Fire fighters and other emergency personnel will not enter the area unless impervious protective clothing and supplied air respirators are used, and area monitoring equipment is used by the emergency crew.

e. The area will be decontaminated after the emergency is over under the supervision of the R.P.O. and area supervisor.

f. The accident is investigated as soon as the emergency has ended under the supervision of the Isotope Committee. The necessary reports will then be completed and forwarded to AEC, Army and other interested agencies.

g. Suspected over-exposures (internal radiation) requiring bio assays will be handled by Health Services Division.

(1) Radium - A.E.H.A. will be requested to take breath samples for evaluation.

(2) Uranium - Urine samples will be sent to New York Operations Office of A.E.C. for analysis.

(3) All others - Specimens will be submitted as directed by the Surgeon General's Office.

h. Suspected over exposures to external radiation will also be handled by the Health Services Division. Film packs will be sent to Lexington via airmail for prompt reading. Each person will be examined by the medical officer for clinical evidence of over exposure, and required action taken at once.

JOHN FODERARO, M.D.
Acting Chairman

ATTACHMENT 2a

EDUCATION, TRAINING AND EXPERIENCE OF RALPH E EDELMAN

Education

1. B.S. Metallurgy, Penna State Univ, 1942
2. Research Assistant, Mass Inst of Technology, 1948-49
3. Instructer, Penna State Univ, 1949-51

Training

Two week course, "Basic Radiological Health", National Center for Radiological Health, Rockland, Md -- 1967.

Experience with Radiation

Isotope	Where Experience was Gained	Duration of Experience	Type of Use
U235	Manhattan Project US Army	1 year	Industrial
U235 U238	Los Alamos Scientific Laboratories	2 years	Industrial
U238	Pitman-Dunn Res Labs Frankford Arsenal	from 1951 to date	Industrial

DA,FA,SUB 459
AEC-2, Item 10

ATTACHMENT 3

RADIATION DETECTION INSTRUMENTS

Type of Instrument & Use	Number Available	Radiation Detected	Sensitivity -Range	Window Thickness(mg/cm)
Surveying and Monitoring				
Film Badges	-	beta-gamma		
Victoreem Mod 389	1	beta-gamma	0.005 - 20 mr/hr	30
Eberline Mod. PAC 3G (Gas-Flow)	1	alpha	50 - 100,000 cpm	
Nuclear Chicago GM Counter Model 2650	1	beta-gamma	0. 3000 mr/hr	30
Air Sampling				
Unico Mod. 30 LPM	1			
Counting				
Tracerlab automatic samples changer, super-scaler & Printer for GM counting	1			
Nuclear Measurement Proportional Counter Converted Mod. PCC-14	1			
Beckman, Widebeta II Gas Proportional Counting System	1	alpha-beta	0 - 100,000 cpm	0.85

DA, FA, SUB 459
AEC-2, Item 11

ATTACHMENT

DEPARTMENT OF THE ARMY
FRANKFORD ARSENAL
Philadelphia, Pa. 19137

Industrial Operations Directorate
Experimental & Precision Mfg Div
Procedure 385-75* 15 March 1972

SAFETY

STANDING OPERATING PROCEDURE FOR
MACHINING DEPLETED URANIUM

1. Purpose. To establish a standing operating procedure to assure that adequate health and safety precautions are followed while machining depleted uramium in Building 150.

2. Scope. Applies to all persons, including maintenance personnel, who are required to work in or visit the Refractory Metals Shop, located in the northeast corner of Bldg. 150. (By endorsement of the Chairman, Radiant Energy Committee, this regulation may be extended to cover other specific locations.)

3. Definitions. a. Source Material. (1) Uranium, thorium, or any other material which is determined by the Atomic Energy Commission pursuant to the provisions of Section 61 of the Act to be source material; or

(2) Ores containing one or more of the foregoing materials, in such concentration as the Commission may, by regulation, determine from time to time.

b. Depleted Uranium. Uranium containing less than 0.7115 weight percent of the isotope U-235.

c. SS Representative. The individual to whom responsibility is assigned for the management of source material.

d. Gross Weight. The total weight of the container or package including its contents.

e. Net Weight. The weight of the contents of a container or package, generally arrived at by taking the difference between the gross weight and the tare weight of the container.

f. Tare Weight. The weight of an empty container or package, including cover, brackets, etc.

*Supersedes ISD Exp & Comp Div Procedure 385-75 dated 4 Apr 68.

DA, IA, SUB 459
AEC-2, Items 12(a), 12(b), 12(c), 13

3320

g. Scrap. The various forms of source material generated during fabrication, which are unsuitable for use as finished product.

4. Policy. a. All personnel who wish to enter the area where depleted uranium is machined or stored must first obtain permission from the supervisor in charge of the Refractory Metals Shop.

b. Operating personnel will be cleared by the Chief, US Army Health Clinic before being given work assignments which involve depleted uranium and upon subsequent reassignment to work of a different nature.

5. Responsibilities. a. Chief, RAD Support and Armament Branch is responsible for:

(1) Designating an individual who will be delegated safety responsibility for the machining operations and area.

(2) Posting signs which bear the standard radiation symbol and the words, "Caution - Radioactive Material" at all entrances to designated work and storage areas.

(3) Notifying the Radiation Protection Officer in the event of an incident or accident involving depleted uranium.

b. Refractory Metal Shop Supervisor is responsible for:

(1) Indoctrinating operating personnel with regard to the health and safety requirements described in this SOP, prior to work assignments involving depleted uranium.

(2) Submitting a written request to Chief, US Army Health Clinic for medical clearance of employees assigned to projects utilizing depleted uranium. Paragraph 1 will cite the type of work to be performed and areas in which the work is to be done; paragraph 2 will list the names and social security numbers of personnel to be cleared.

(3) Insuring that when unattended, all uranium will be stored in secured, labeled containers.

(4) Monitoring floors, machines and equipment for radioactive contamination.

(4) Notifying the SS Representative or alternate when removal of depleted uranium, including stock, finished items or scrap is desired so that someone is available to receive the material in Building 227B.

(5) Insuring that visitors and maintenance personnel have business in the area where depleted uranium is machined or stored and that such personnel are indoctrinated on the health and safety requirements contained in this SOP before entrance is allowed.

c. Chief, US Army Health Clinic is responsible for:

(1) Processing medical clearance of personnel who work with depleted uranium.

(2) Monitoring the area where depleted uranium is machined, taking air samples as required and insuring that safe hygienic practices are maintained.

(3) Providing personnel monitoring service.

(4) Performing periodic physical examinations of operating personnel, as required.

d. Chief, Safety Office is responsible for providing staff assistance in the administration of Frankford Arsenal Safety Program as stated in FAR 385-1, para 5a.

e. Fire Chief, Fire Prevention & Protection Branch is responsible for:

(1) Fighting fires which may develop in an area where source material is processed or stored.

(2) Performing periodic inspections.

6. Health and Safety Procedures.

a. Personnel who perform work assignments involving depleted uranium will comply with the following health and safety procedures:

(1) Machining:

(a) Machines will be filled with sufficient quantity of coolant to cover chips; approved fire extinguishers must be near the machines, and the exhaust system turned on with the air duct positioned as close as possible to the cutting tools.

(b) Machining will be accomplished with sharp tools and generous use of an adequate coolant. Tools must not remain in contact with work any longer than necessary.

(c) Depleted uranium scrap, in the form of chips, will be kept to a minimum and fully covered with coolant.

(d) Completed items or component parts will be washed in an approved solvent, dried and placed in covered metal box to await inspection and/or pickup.

(2) First Aid. Personnel sustaining any cuts or injuries will report immediately to US Army Health Clinic for treatment.

(3) Storage and Removal of Material. (a) Special drums of various sizes are available for storage of depleted uranium scrap. Due to the weight of the metal, drum sizes of 15 gallons to 35 gallons are most desirable.

(b) Depleted uranium scrap, in the form of chips, will be removed from machines by rake, as required, to prevent build-up. Chips will be placed on screened chip box, drained of coolant, and placed in covered, vented steel drums.

(c) Depleted uranium scrap in drums which are ready for disposal will be filled with oil and covered approximately three (3) inches above the material in order to prevent dissociation during shipment.

(d) Special lids for the drums will be attached and secured with a fulcrum band.

(e) Each drum will be weighed prior to use and will be weighed again prior to shipment to determine the actual weight of the depleted uranium scrap. The outside of the drum will be painted yellow and marked to show the gross weight, tare weight, metal weight and net element weight (by type.)

(f) All drums and other containers must be labeled as containing uranium scrap and marked with the standard radiation symbol and the words "Caution - Radioactive Material" if uranium is transported, stored or used therein.

(g) The SS Representative will be notified when transfer of depleted uranium is desired so that he may prepare the transfer document (SMUFA Form 20-1105) and make arrangements to have the material moved to Radioactive Materials Storage Facility, Building 227-B.

(h) Depleted uranium scrap in the form of solid pieces, such as bar ends, rejects, etc., do not lose their value. These pieces will not be mixed with chips and turnings but put into a separate container and returned to the SS Representative for remelting. Depleted uranium scrap that is remelted must not be contaminated by other metals. If it is necessary to machine another material assembled to depleted uranium, such chips will be separated and so marked.

(i) Depleted uranium scrap will not be mixed with other waste. Waste such as rags, paper towels, etc., which does not produce a reading when monitored with a G-M type survey meter will be disposed of as normal waste. Waste which does produce a reading when monitored will be stored as in para 6(3)(f) above, prior to disposal as radioactive waste.

(4) Removal of Equipment. Machines, tools, measuring instruments, fixtures, supplies, etc., will not be removed from the area unless thoroughly cleaned and monitored by the supervisor of the Refractory Metal Shop.

(5) Protective Clothing. (a) Protective clothing, consisting of coveralls or shirts and trousers without cuffs, safety shoes, safety glasses, gloves and disposable hats will be furnished as required, to employees who are engaged in work that could result in the contamination of the person or his personal clothing.

(b) Cotton gloves will be furnished for personnel handling pigs, bar stock or completed shapes, in an effort to keep injuries to the fingers and hands minimal.

(6) Inspection. (a) Finished machined items will be inspected in the area, whenever possible.

(b) Inspectors will be provided previously described protective clothing, to be worn when machining operations are in process.

(c) One item at a time will be removed from the metal container, inspected and returned to a metal container.

(d) Manufactured items may be removed to an inspection area for process or final inspection requiring special equipment. The items must be clean (para 6a(1)(d) and the provisions of this regulation enforced in the inspection area.

(7) Personnel Monitoring. (a) All persons machining depleted uranium will wear whole body and wrist film badges. When not in use, all badges will be hung on the film badge board located outside the uranium machining area.

(b) Workers will submit urine samples for uranium bioassays when prescribed by the Medical Director.

(8) Fire Prevention. Pyrophoricity of Uranium. (a) General. Under certain conditions uranium is an extremely pyrophoric material similar to magnesium, titanium and zirconium. Experiments have shown that it is extremely difficult to obtain proper conditions for large pieces to ignite, however, chips, shavings and turnings will ignite readily and burn with an intense heat. The heat generated by a small pile of burning chips is intense enough to buckle a one-half inch steel plate suspended over the pile. Obviously, if such a material were allowed to burn uncontrolled within a building, severe damage would result.

(b) Procedures. (1) Small fires will be put out by use of approved fire extinguishers provided: Dry chemical for chips; CO_2 for air duct fires.

(2) If fires start in scrap barrels inside a building, the nearest personnel will apply a dry chemical type powder and the barrel will then be moved outside the building. The Fire Prevention & Protection Branch will complete the extinguishing of the fire with a fine spray water. The water filled barrel will continue to bubble hydrogen gas for some time and must be watched closely as the hydrogen might reignite. If a fire starts in an outside storage area, the barrel will be segregated from the main area and allowed to burn itself out under the surveillance of the Fire Prevention and Protection Branch.

(3) In case of fire beyond control of the operator, the area will be evacuated immediately and the Fire Prevention and Protection Branch will be notified by dialing 17. A fire alarm box is located outside on the wall adjacent to the east door of the Refractory Metals Shop.

(4) The Fire Prevention & Protection Branch, Ext. 5329, will be notified immediately of all incidents involving a fire, even though the fire has been extinguished by shop personnel.

(5) Personnel required to enter the area to fight a fire will wear approved respiratory protection and will use approved fire-fighting equipment and methods.

(9) Personal Hygiene, Housekeeping and Sanitation. (a) Adequate locker room, lavatories and toilet facilities including ample hot and cold running water, paper towels, and soap will be provided. Personnel are encouraged to practice good personal hygiene.

(b) Smoking, eating and drinking in the area where depleted uranium material is stored, machined or otherwise handled is prohibited. Likewise, no food (including candy, gum, cough drops, drugs, beverages, etc.) will be brought into such area. Cafeterias or lunch rooms provided for Frankford Arsenal personnel are to be used.

(c) Employees working with uranium are directed to wash their faces and hands prior to leaving the restricted area.

(d) Housekeeping must be considered as a continuing control measure to remove or control sources of contamination as they are generated. Chips, turnings, scale and fine particles must be confined to the area in which it is generated.

(e) When used for machining depleted uranium, the machines will be wiped off and all chips removed at the end of each shift.

(f) Surface contamination of floors, work benches, tools, machines, etc. will be cleaned by vacuuming, washing with solvent or scrubbing with water and detergent.

(g) When machines are to be used for materials other than depleted uranium, the machines will be cleaned thoroughly before use. (See para 6a(3)(h) of this SOP.

(h) Dry sweeping of floors is prohibited with the exception of small areas heavily laden with large chips or turnings that will not produce appreciable dust.

(10) Visitors and Maintenance Personnel will: (a) Obtain permission from the supervisor of the Refractory Metal Shop if entrance to the area where depleted uranium is machined or stored is desired.

15 March 1972

(b) Receive indoctrination from the supervisor with regard to the health and safety procedures contained in this SOP and be expected to comply with such procedures.

(c) Normally not be allowed entrance during machining operations. Therefore, maintenance work should be scheduled during inactive periods.

7. Referrals. a. Questions concerning this SOP will be directed to Chief, RAD Support and Armament Br, Extension 5693, Bldg. 150-2.

b. Specific questions regarding SS Material may be directed to the SS Representative in the Pitman-Dunn Laboratory, Bldg. 149, Ext. 5776.

8. Review. This procedure will be reviewed biannually (sooner if necessary) by the Chief, RAD Support and Armament Branch.

9. References: a. FAR 40-9

b. FAR 700-14

c. AMCR 385-55

d. AR 55-55

e. AR 755-15

f. 10 CFR 20.206(b).

G. W. SUGDEN, JR, Chief
Experimental & Precision Mfg Div, X6000

CONCURRENCE:

R. MC CULLOGH, Gen. Foreman
RAD Support & Armament Br, X6300

Exp & Prec Mfg Div
Proc 385-75

15 March 1972

APPROVED:

S. BERK, Radiation Protection Ofcr

ANTHONY SAIA, SS Representative

JOHN FODERARO, MD, US Army Health Clinic, FA

FRANCIS J. FIDELL, Chief, Safety Ofc

W. J. MORRELL, Ch, Fire Prev & Prot Br.

ATTACHMENT 4 - 3

DEPARTMENT OF THE ARMY
FRANKFORD ARSENAL
Philadelphia, Pa. 19137

PDRL MEMORANDUM
NO. 385-11*

9 September 1970

SAFETY

GENERAL SOP FOR THE EXPERIMENTAL LABORATORIES AND TEST FACILITIES OF THE HYPERDYNAMICS BRANCH

1. Purpose. To establish procedures and assign responsibilities that will assure safe operations in accordance with AMCR 385-100, AMC Safety Manual, and maintain a high level of operating efficiency and reliability within the Hyperdynamics Branch.

2. Scope. The provisions of this memorandum are applicable to all personnel assigned to, working in, or visiting the laboratories and test areas operated by the Hyperdynamics Branch in Bldgs 316, 521, and 150.

3. General. The provisions prescribed herein are intended to supplement the various regulations from higher authority concerning safety. Specific instructions applicable to Laboratories C & F (Bldg 316), Range 3B (Bldg 150) and Ranges "9 and 16" (Bldg 521) are also included in this memorandum under paragraph 8.

4. Definitions. a. Foreman is defined, for the purpose of this memorandum, as the individual (Physical Science Technician) assigned a specific area to supervise. In the absence of the foreman, a Physical Science Technician will be appointed acting foreman.

b. Qualified Personnel are those personnel whose qualifications have been accepted by the foreman to assemble, disassemble, load and unload ballistic devices or weapons.

c. Casuals are individuals (other than assigned personnel) who are authorized by the foreman or his superiors to visit, inspect, and/or observe the operation of the experimental areas or to perform services to the facilities and equipment.

d. Ballistic Devices and Weapons. Devices are defined as instruments which contain or use a propellant charge while weapons include all caliber of small arms and various open breech weapons.

*Supersedes PDRL Memorandum 385-11, 16 May 1969.

DA, FA, SUB-459
AEC-2, Items 12(a), 12(b), 12(c), 13

3320

5. Responsibilities. a. Foreman will insure that the provisions of this memorandum are thoroughly understood by all personnel under his control.

b. Assigned Personnel and Casuals will:

(1) Strictly comply with all the provisions prescribed herein.

(2) Utilize safe practices at all times.

(3) Inform the foreman whenever an unsafe condition or practice is recognized.

6. Procedures. a. Only qualified personnel will be permitted to assemble, load and fire ballistic devices or weapons.

b. Only qualified personnel will handle propellant and adjust charges according to the procedures posted in the charge adjustment area.

c. Only authorized and/or qualified personnel will be allowed in the areas when firing programs are in progress.

d. Clear the test and surrounding areas of all other personnel.

e. No personnel will be allowed in the immediate test area during the actual firing.

f. Any loaded device or weapon will be constantly safeguarded by test area personnel until fired.

g. Assure safety doors are closed; safety devices are in place; and warning signal (two blasts on the horn) is sounded, in Bldg 316, prior to firing.

h. When misfires, hangfires and malfunctions occur, effect the following:

(1) Sound a warning signal (one long blast on the horn) to alert personnel in the area of Bldg 316.

(2) Notify the foreman.

(3) Let a period of at least five minutes elapse before anyone enters the test area or approaches the device or weapon.

(4) Attempt to determine the cause by a systematic physical check of firing lines, firing box, etc.

(5) Insure that the ballistic device or weapon is placed in a safe condition before handling.

(6) Safety glasses and face shields will be worn during malfunction operations.

EXCEPTION: The foreman may make exceptions to these procedures, particularly when firing standarized items.

7. Safety Precautions. a. Assure that posted powder and personnel limits in control and test areas are strictly observed.

b. Prohibit smoking in the room or immediate area in which exposed propellants are present.

NOTE: Enforce this precaution by posting "NO Smoking" signs in the area.

c. Insure that safety glasses, ear plugs, face shields and other protective devices are worn during loading, firing, and misfire operations or as directed by the foreman.

d. Consider and treat all ballistic devices and weapons as potentially dangerous and loaded unless it is possible to readily examine the chamber to determine there is no possibility of accidental discharge.

e. Assure that before any weapon is removed, from its firing position, that it is in a "safe condition" as defined in paragraph 7. Additionally, examine the chamber and magazine and remove all spent and unspent ammunition.

f. Always maintain ballistic devices and weapons in the "safe condition" prescribed, except when actually being fired or when inspection, repair, or adjustment cannot be made otherwise.

g. Never permit anyone to place themselves in the line of fire of any loaded ballistic device or weapon.

EXCEPTION: An exception is made for the necessary exposure of the Physical Science Technician during loading under approved procedures.

h. Insure that never less than two people are present when firing a program.

i. Prohibit firing and explosive handling during electrical storms.

j. Utilize a special safety link (i.e. safety plug) on all programs where electrical initiation of the ballistic device is required.

k. Assure that these "safety plugs" remain in the possession of the Physical Science Technician and are inserted in the firing line only when the ballistic device is ready for firing and all personnel have been cleared from the area.

l. Insure that the door leading to the test area is closed prior to inserting the safety link.

m. When firing mechanically, attachment of the lanyard or a mechanical device will be the last operation prior to leaving the gunroom.

n. Direct observations will not be made during experimental firings except by means of an approved viewing system.

o. Flash all fired and live rounds in the disposal area incinerator prior to shipment to the salvage area.

p. Disassemble all ballistic devices to permit complete visual examination and, if required, disposed of in accordance with existing instructions.

NOTE: The Disposal Area is part of the Primer Explosives and Pyrotechnic Unit, Cost Center X3722, Bldg 131, Extension 21171.

q. Insure when performing hazardous operations that all pertinent and specific instructions are strictly followed.

r. Apprise the Safety Division and/or ~~Health Services Division~~ U.S. Army Health Clinic of all new and/or unusual programs.

s. Assure that all temperature conditioning chambers have a safety cut-off in addition to the temperature controller.

t. Assure that safety gloves and shoes are worn when handling and moving armor plate.

u. Insure that good housekeeping is practiced in all areas.

8. Special Instructions. a. Laboratories C & F - Building 316.

(1) When firing projectiles that produce toxic funes or are radioactive in nature, insure that the following provisions are enforced:

(a) Notify the Medical Director, Health Physicist, and the Safety Director.

(b) Clear the surrounding area of all transient personnel prior to firing.

(c) Film badges and other protective devices as deemed necessary by the Medical Director and/or his representative will be utilized as directed.

(d) All accidents or unusual incidents to exposure of gases, radiation, etc., however slight, will be reported to the Medical Director and the Health Physicist.

(e) Observe a waiting period of not less than five minutes (except when the foreman or project engineer direct that longer periods are required) before entering the plate area.

(f) Check to insure that the exhaust system is operating during the waiting period after firing projectiles that produce toxic fumes.

(g) Check the area for contamination after firing radioactive projectiles and, when required, effect decontamination procedures.

NOTE: This determination will be made by the foreman, project engineer, representative of the ~~Health Services Division~~ U.S. Army Health Clinic, and the Health Physicist.

(h) Personnel will practice good hygiene by thoroughly washing hands and face with soap and water before smoking, eating, or touching any exposed part of the anatomy.

(2) Compliance with all of the above as well as the provisions prescribed in the referenced regulations (paragraph 12) will be mandatory.

b. Ranges 9 and 16 - Building 521. Will utilize the Proof House charge adjustment area for all charge adjusting activities.

c. Range 3b - Building 150. Will utilize the Hyperdynamics charge adjustment area in Building 316.

9. Review. The provisions of this memorandum will be reviewed annually (sooner, if necessary) for possible revision, addition, or deletion by Chief, Hyperdynamics Branch, L6300. When no changes are required, the Chief will date and initial this memorandum as being current, and forward to the Staff Services Office, Bldg 64-3.

10. Referrals. Inquiries concerning this memorandum may be directed to the Chief, Hyperdynamics Branch, Extension 24201.

11. Effective Date. Upon receipt.

12. References. a. AMCR 385-100.

b. FAR 385-1.

c. Title 10, Part 20, CFR.

PDRL MEMORANDUM
NO. 385-11

9 September 1970

for D. B. ROSENBLATT
Director, Pitman-Dunn
Research Laboratories

APPROVED:

S. BERK
Health Physicist and Radiation Protection Officer

J. FODERARO, M.D.
Acting Medical Director

F. J. FIDELL
Safety Director

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