

Radiation Safety Plan for Jefferson Proving Ground Depleted Uranium Impact Area

21 June 2013

This radiation safety plan replaces “Jefferson Proving Ground (JPG) Security Plan,” dated December 10, 2003.

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Abbreviations and Acronyms

°C	degree Celsius
°F	degree Fahrenheit
10 CFR	Title 10, Code of Federal Regulations
¹⁴ C	carbon-14 (used in Figure 17-1)
³² P	phosphorus-32 (used in Figure 17-1)
⁹⁰ Sr/ ⁹⁰ Y	strontium-90/yttrium-90 (used in Figure 17-1)
⁹⁹ Tc	technetium-99 (used in Figure 17-1)
¹³⁷ Cs	cesium-137 (used in Figure 17-1)
²³⁴ U	uranium-234
²³⁵ U	uranium-235
²³⁸ U	uranium-238
²³⁹ Pu	plutonium-239 ((used in Figure 17-1)
ALARA	as low as reasonably achievable
cm	centimeter
cpm	count per minute (used in Figure 17-1)
dpm	disintegration per minute
DPW	declared pregnant worker
DU	depleted uranium
EOD	explosive ordnance disposal
FWS	US Fish and Wildlife Service
G-M	Geiger-Mueller (used in Figure 17-1)
INANG	Air National Guard

INANG	Indiana Air National Guard
JPG	Jefferson Proving Ground
kg	kilogram
LRSO	License Radiation Safety Officer
MARSSIM	<i>Multi-Agency Radiation Survey and Site Investigation Manual</i> (NUREG-1575, Revision 1),
MDC	minimum detectable concentration
MeV	megaelectron volt
mg	milligram (used in Figure 17-1)
MOA	memorandum of agreement
MOU	memorandum of understanding
mR h ⁻¹	milliroentgen per hour (used in Figure 17-1)
NRC	US Nuclear Regulatory Commission
RIA	Rock Island Arsenal
RSP	radiation safety plan
TEDE	total effective dose equivalent
US	United States
USAG	US Army Garrison
UXO	unexploded ordnance

1 Introduction

The United States (US) Nuclear Regulatory Commission (NRC) has approved this radiation safety plan (RSP). It applies when personnel approach, enter, work in, and leave the depleted uranium (DU) impact area at Jefferson Proving Ground (JPG) (Figure 1-1). The DU impact area is controlled for radiation safety purposes and therefore is a radiation control area.

The US Army will make changes to this RSP only with NRC approval.

1.1 Site status summary

1.1.1 Description

The US War Department established JPG in 1940. JPG is located in southeastern Indiana. It operated from 1941 until 1995. JPG's primary mission was to support research, tests, and operations of the US Army. JPG tested production and post-production conventional ammunition components, other ordnance items, and propellant ammunition/weapons systems and components. In addition, it received, stored, and issued stocks of ammunition and calibrated ammunition components. Since 1977, the Indiana Air National Guard (INANG) used approximately 1,033 acres of the installation as an air-to-ground impact area for operational training requirements.

Mostly farmland and woodlands surround JPG, with some small towns and rural housing nearby. Forests cover more than 75 percent of JPG. JPG includes 6,000 acres of wetlands, seven streams, and numerous ponds and lakes.

JPG is about 17.2 miles in length (north to south) and from four to six miles in width (east to west). The northern firing area is about 51,000 acres and a southern cantonment is about 4,000 acres. A firing line, consisting of 268 former gun positions used for testing ordnance until 1994, separates these areas.

Most of the land north of the firing line is unimproved and served as an impact area for ordnance testing.

Ample natural resources exist within the facility boundaries. About 30,000 acres are available on a controlled-access basis for hunting and fishing.

1.1.2 Testing era

From 1941 until 1995, the US Army fired over 24 million rounds of conventional explosive ammunition.

From 1984 until 1994, the US Army test-fired 100,000 kilograms (kg) of tank penetrator rounds containing DU¹ at JPG under the authority of NRC license number SUB-1435.

¹ Depleted uranium is a byproduct of uranium enrichment, part of the process of manufacturing fuel for nuclear power plants. When natural uranium is enriched in the uranium-235 (²³⁵U) isotope to become enriched uranium, the leftover uranium is depleted in ²³⁵U. DU is useful in certain commercial and military

The DU impact area (Figure 1-2) is approximately 1280 acres and north of the firing line. After several operations to recover DU, the impact area still contains about 70,000 kg of DU and 1.5 million rounds of unexploded ordinance (UXO). Since 1984, the US Army has monitored the soil, groundwater, surface water, and sediment for DU bi-annually.

1.1.3 Post-testing era

Because of the Base Closure and Realignment Act of 1988, the US Army's mission at JPG terminated in September 1995. The US Army decommissioned buildings and areas in the cantonment and removed some of the DU and other wastes to appropriate licensed disposal sites. In 1996, the NRC amended the license to possession only of DU north of the firing line and released the cantonment for unrestricted use.

1.1.4 Big Oaks National Wildlife Refuge

The Big Oaks National Wildlife Refuge consists of approximately 50,000 acres within Jefferson, Ripley, and Jennings counties in southeastern Indiana. The US Fish and Wildlife Service (FWS) operates the refuge through a 25-year real-estate permit. The US Army retains ownership of the land (the former JPG).

Due to UXO, DU and other environmental contamination from past US Army activities, the former JPG is not suitable for commercial or residential development, yet part of it contains wildlife habitat of regional and national significance. Under an agreement with the US Army and INANG, the FWS established the Big Oaks National Wildlife Refuge in June 2000.

The entrance to the refuge is located on US Highway 421, five miles north of Madison, Indiana. The refuge office is in Building 125 in the cantonment of the former JPG (Figure 1-3).

The INANG retains use of Jefferson Range, a bombing range located near the center of the former JPG that is not included in the refuge. Large safety buffer areas separate Jefferson Range from public use areas. Activities at Jefferson Range have had no known significant adverse impact on the refuge wildlife. The INANG will continue to use Jefferson Range as a training facility.

1.1.5 License termination

The US Army proposes to terminate its NRC license with restricted use for the DU impact area. Restricted use means residual radioactive material exists in place and administrative controls are maintained to minimize exposure to the public and the environment. The process for license termination is in progress.

applications because of its high density, which is about twice the density of lead. It is slightly radioactive, but it poses some chemical toxicity danger to the kidneys if ingested in sufficient quantity, for example, by inhaling DU-contaminated dust or drinking DU-contaminated water.

1.1.6 Agreements and understandings

In 1997, the US Army and the FWS established a Memorandum of Agreement (MOA) to develop an ecosystem-based plan for the 51,000-acre northern firing area. In 1998, the US Army and the INANG signed a Memorandum of Understanding (MOU). The MOU states that the INANG would maintain and operate the northern firing area in exchange for continued use of the 1,033-acre Jefferson Range (Figure 1-2).

The US Army, the INANG, and the FWS signed an MOA in May 2000 that superseded the 1998 MOU. This latest MOA authorized future use by the FWS for Big Oaks National Wildlife Refuge and continued use by the INANG of the Jefferson Range for 25 years, with 10-year extensions thereafter.

1.2 Purpose

The NRC requires that routine activities within the DU impact area call for the implementation of an RSP that the NRC has approved via a license. This RSP meets that requirement.

This RSP addresses potential radiation safety issues during performance of routine activities near and in the DU impact area. Its goals are to protect the health and safety of site personnel and members of the public; protect the site environment; describe site security measures, and meet all applicable Federal, Department of Defense, US Army, and State of Indiana regulations.

1.3 Scope

This RSP describes the DU impact area, defines the roles and responsibilities of onsite staff, and explains the radiation safety controls and procedures used before entry to, during presence in, and during departure from the DU impact area.

1.4 Applicability

The requirements of this plan are applicable to all personnel, including members of the public, who approach or enter the DU impact area.

Requirements of this plan are in addition to, not in lieu of, all other safety requirements, especially those related to UXO in and around the DU impact area.

1.5 The unexpected and the unanticipated

While all radiation safety contingencies are intended to be addressed by this plan, something unexpected or unanticipated may arise. If this occurs, onsite personnel will promptly inform the license radiation safety officer (LRSO)² who will establish appropriate procedures.

² The LRSO contact information will be posted on the same bulletin board that displays NRC Form 3, "Notice to Employees."

Radiation Safety Plan for Jefferson Proving Ground Depleted Uranium Impact Area

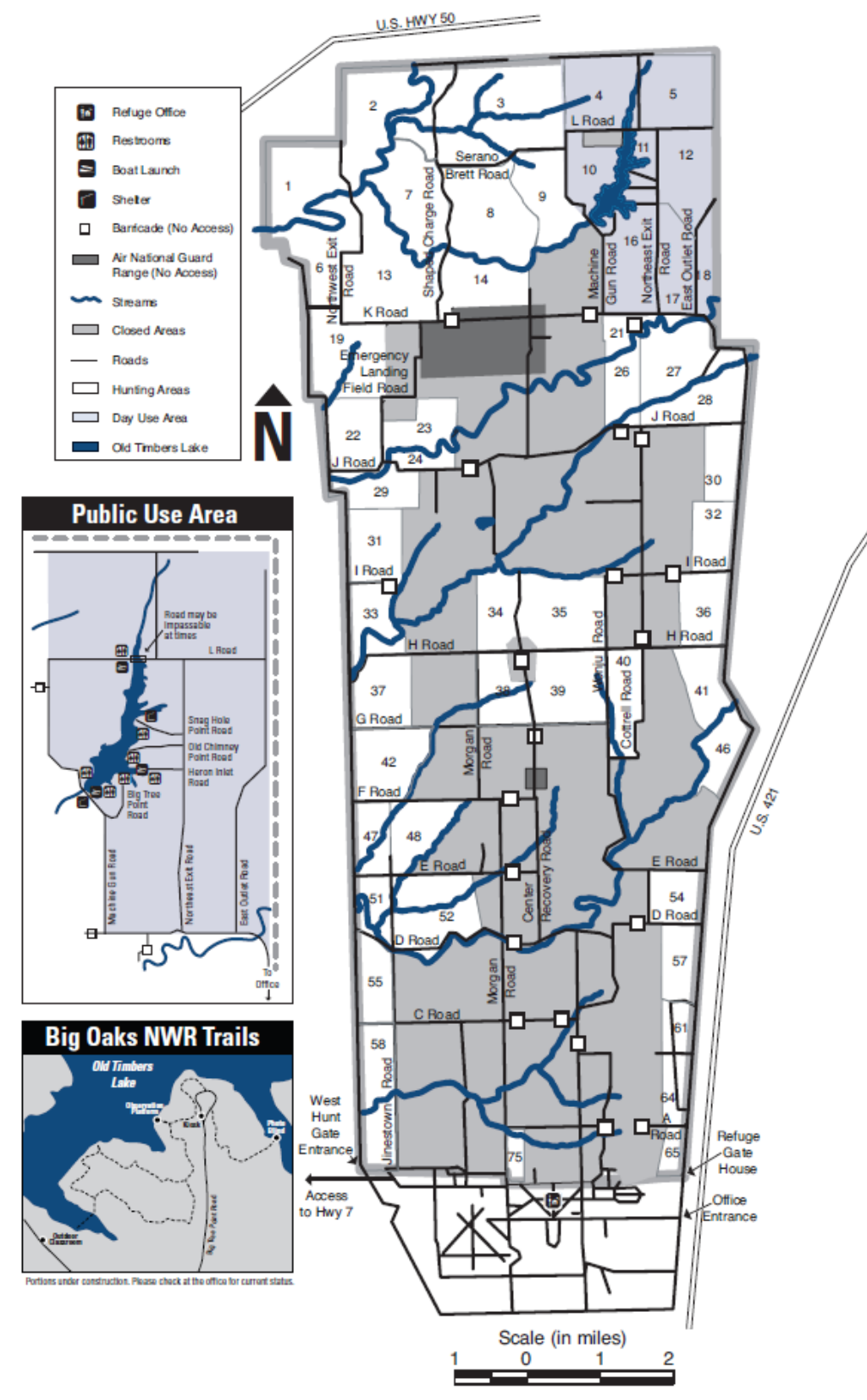


Figure 1-1 Jefferson Proving Ground, Indiana

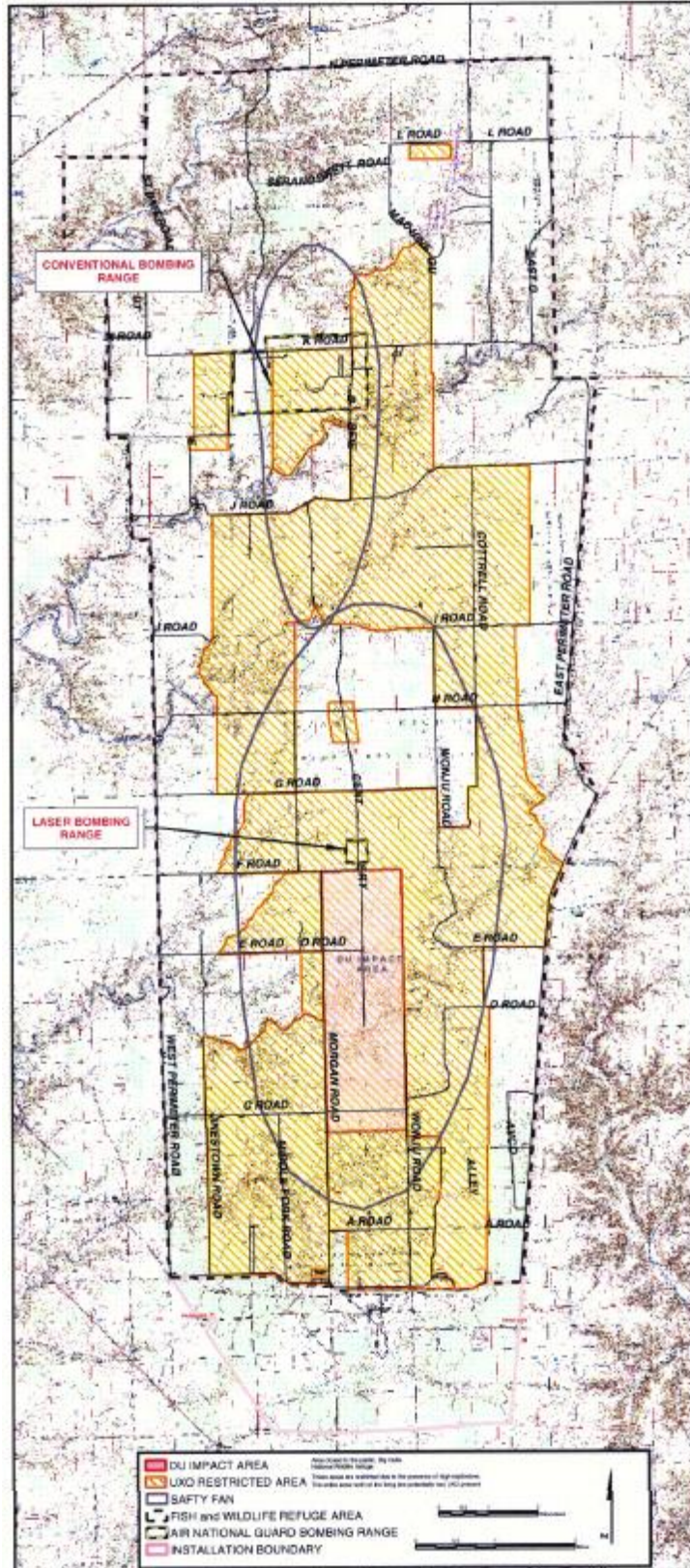


Figure 1-2 Depleted uranium impact area at Jefferson Proving Ground

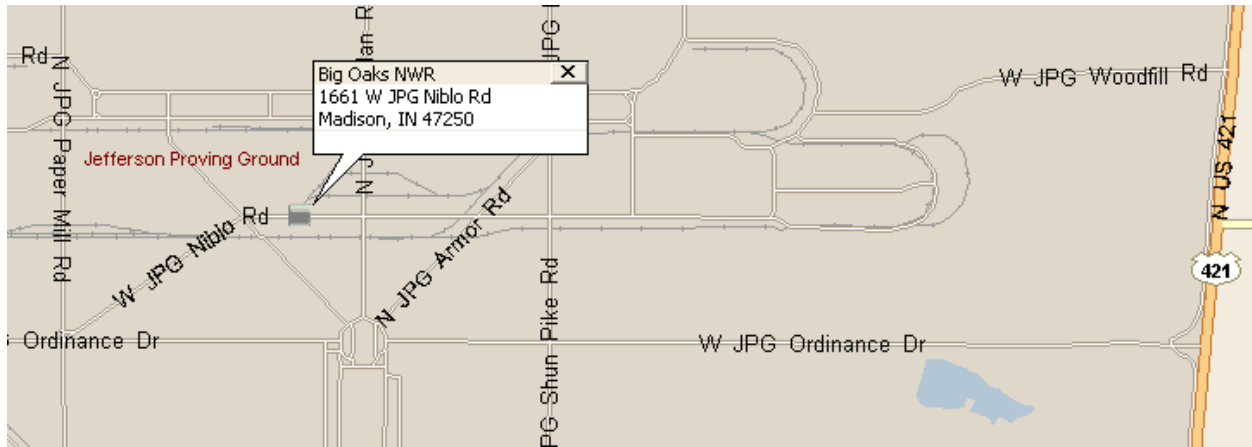


Figure 1-3 Big Oaks National Wildlife Refuge office

2 Radiation Safety Organization and Responsibilities

2.1 US Army Garrison Rock Island Arsenal Commander or Manager

On behalf of the US Army, the US Army Garrison (USAG) Rock Island Arsenal (RIA) commander or manager³ is the licensee for NRC materials license number SUB-1435.

2.1.1 Duties

The USAG RIA garrison commander or garrison manager is responsible to the NRC for:

- Radiation safety for, security of, and control of the DU impact area
- Completeness and accuracy of the radiation safety records and all information provided to the NRC
- Knowledge about the contents of the license and application
- Compliance with current NRC regulations and the licensee's operating and emergency procedures
- Commitment to provide adequate resources (including space, equipment, personnel, time, and, if needed, contractors) to the RSP to ensure that the public and personnel that enter or approach the DU impact area are protected from radiation hazards and that compliance with regulations is maintained
- Selection and assignment of a qualified person to serve as the LRSO with responsibility for implementing the RSP
- Prohibition against discrimination of employees engaged in protected activities
- Commitment to provide information to employees regarding the NRC's employee protection and deliberate misconduct provisions
- Obtaining NRC's prior written consent before transferring control of the license

2.1.2 Change of USAG RIA garrison commander or garrison manager

The US Army will inform the NRC whenever a change of the USAG RIA commander or manager (that is, the "certifying officer" in item 13 of NRC Form 313, "Application for Material License") occurs by submitting a new NRC Form 313.

2.2 License Radiation Safety Officer

The LRSO is responsible to the USAG RIA garrison commander or garrison manager for the development, implementation, and overall administration of this RSP. He is also responsible to both the USAG RIA garrison commander or garrison manager and the NRC for assuring and monitoring compliance with NRC regulations and license conditions.

³ The US Army organizes installations under the management of a garrison to achieve efficiency and align area support responsibilities. Hence, one garrison may have responsibility for several installations. Thus, USAG RIA has responsibility for JPG. Some installations may not have a garrison commander, but rather a Department of the Army civilian designated as garrison manager, to perform the required duties. USAG RIA has had, at one time or another, either a garrison commander or a garrison manager.

2.2.1 Qualifications

The LRSO will meet the NRC's education, training, and experience requirements shown in NRC license number SUB-1435, license condition 11A.

2.2.2 Change of LRSO

In accordance with NRC license number SUB-1435, license condition 11B, the USAG RIA garrison commander or garrison manager will notify the NRC by letter within 30 days after the appointment of a new LRSO.

2.2.3 Duties

The LRSO will:

- Coordinate with appropriate personnel as necessary to assure that routine activities in the DU impact area comply the requirements of this RSP
- Provide recommendations to appropriate personnel for the control and, if possible, elimination of existing and potential radiological hazards
- Review and interpret analytical results for radiological samples
- Maintain documentation that demonstrates that the dose to individual members of the public does not exceed the limit specified in Title 10, Code of Federal Regulations (10 CFR), Part 20, § 20.1301
- Ensure security of radioactive material
- Ensure proper posting of documents required by 10 CFR Part 19, § 19.11
- Ensure that radiation exposures are as low as reasonably achievable (ALARA)
- Act as liaison for the Army with the NRC and other regulatory authorities
- Provide necessary information on all aspects of radiation safety to personnel at all levels of responsibility, pursuant to 10 CFR Part Parts 19 and 20, and any other applicable regulations
- Determine the need for personnel monitoring, evaluate bioassays, monitor personnel radiation exposure and bioassay records for trends and high exposures, notify individuals and their supervisors of radiation exposures approaching the limits, and recommend appropriate remedial action
- Conduct training programs and otherwise instruct personnel in proper procedures
- Supervise and coordinate the radioactive waste disposal program, including recordkeeping on waste storage and disposal records.
- Oversee the storage of radioactive waste
- Maintain an inventory of all radioisotopes possessed under the license
- Immediately terminate any unsafe condition or activity that is found to be a threat to public health and safety or property
- Maintain other records not specifically designated above, for example, records of receipts, transfers, and surveys as required by 10 CFR Part 20, Subpart L, "Records"
- Hold periodic meetings with, and provide reports to, licensee management
- Perform periodic audits of the RSP to ensure that the licensee is complying with all applicable NRC regulations and the terms and conditions of the license, the content and implementation of the RSP to achieve occupational doses and doses

to members of the public that are ALARA in accordance with 10 CFR Part 20, § 20.1101, and required records are maintained.

- Ensure that the results of audits, identification of deficiencies, and recommendations for change are documented (and maintained for at least 3 years) and provided to management for review; ensure that prompt action is taken to correct deficiencies
- Ensure that the audit results and corrective actions are communicated to all affected personnel
- Ensure that all incidents, accidents, and personnel exposure to radiation in excess of ALARA or Part 20 limits are investigated and reported to the NRC and other appropriate authorities, if required, within the required time limits
- Maintain understanding of and up-to-date copies of NRC regulations, the license, revised licensee procedures, and ensure that the license is amended whenever changes occur in licensed activities, responsible individuals, or information or commitments provided to NRC during the licensing process

2.2.4 Authority

The LRSO has authority to:

- Directly contact personnel in the performance of the above LRSO duties
- Task personnel within their capabilities and resources in order to maintain compliance with NRC regulations and license conditions
- Immediately stop any operation involving the use of source material in which health and safety may be compromised or may result in non-compliance with NRC requirements
- Temporarily suspend individuals from field activities for infractions against the RSP pending consideration by the garrison commander or garrison manager

2.3 Personnel in the DU impact area

2.3.1 Authorized personnel

Personnel will enter the DU impact area only on official business, which includes escorting authorized visitors (paragraph 2.4). Personnel who may have official business in the DU impact area include US Army, FWS, and INANG personnel; EOD personnel; NRC personnel; State of Indiana, local law enforcement, and other Federal personnel; and contractor personnel.

2.3.2 Training

Generally, personnel entering the DU impact area are not occupationally exposed to ionizing radiation. However, they will receive radiation safety and DU awareness training (essentially on provisions of this RSP applicable to them) at a level commensurate with their activities in the DU impact area.

2.3.3 Responsibilities

Personnel who enter the DU impact area are responsible for demonstrating familiarity with the provisions of this RSP applicable to them, for strict adherence to radiation safety rules and regulations, and for minimizing radiation exposure to the maximum extent practical.

Responsibilities of personnel who enter the DU impact area include:

- Understanding and abiding by the policies and procedures specified in this RSP and in other applicable safety policies, and clarifying those areas where understanding is incomplete
- Providing feedback to the LRSO relating to errors, deficiencies or omissions and modifications in the RSP or in other safety policies

2.3.4 Authority

The health and safety authority of each person entering to the DU impact area includes the following:

- The right to refuse to work and to stop work when the person feels that the work conditions are unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood
- The right to refuse to work on any task or operation where the safety procedures specified in this RSP or other safety policies are not being followed
- The right to contact the USAG RIA garrison commander or garrison manager, the LRSO, or the NRC at any time to discuss potential concerns

2.4 Authorized visitors

All visitors to the DU impact area are required to comply with the requirements of this RSP. They will receive a briefing on the presence of DU in the DU impact area. US Army or FWS personnel will escort visitors at all times in the DU impact area.

Unauthorized visitors (those who have no official business in the DU impact area) are not permitted within the DU impact area.

3 DU Impact Area (Radiation Controlled Area)

3.1 Identification

Figure 1-2 shows the location of the DU impact area.

3.2 DU Removal

Deliberate searches for and removal of DU are not authorized within the DU impact area except for explosive ordnance disposal (EOD) UXO blow-in-place activities (see paragraph 4.2). However, unintended discovery of DU debris in the DU impact area and its location will be reported to the LRSO. The LRSO, in consultation with the EOD personnel, will determine whether it is more reasonable to pick up the DU and hold it for appropriate disposal (see paragraph 18) than it is to leave it in place.

4 Routine Activities Authorized in the DU Impact Area

The NRC license number SUB-1435 is for “possession only for decommissioning” of the DU in the DU impact area. This limits the types of activities allowed in the DU impact area. Whenever any of the allowed activities occur in the DU impact area, the provisions of this RSP apply to those activities within the DU impact area in addition to any other safety or environmental requirements.

Casual visits within the DU impact area are not authorized.

4.1 High explosive munitions in the DU impact area

High-explosive munitions will not be fired into the DU impact area. This does not preclude EOD activities.

4.2 UXO in the DU impact area

If UXO is seen in the DU impact area on or near a road or previously cleared path, contact EOD personnel, who will determine the appropriate UXO disposition in accordance with EOD policies and procedures.

4.3 Allowed activities in the DU impact area

Routine travel in the DU impact area generally is authorized only on the roads. UXO may be present anywhere in the DU impact area. Surface and near-surface DU is not expected in the DU impact area, because it was removed during the testing era and, to a limited extent, during scoping and characterization surveys in the 1990s.

The following are examples of authorized activities in the DU impact area.

- Environmental radiation monitoring activities (see paragraph 12)
- EOD activities
- Control of vegetation by mowing and use of weed trimmers
- Controlled burning
- Wildlife monitoring and census-taking
- Maintenance of signage (for example, painting, alignment, and replacement)
- Maintenance of roads
- On-site repair and recovery of vehicles, as necessary
- Trash and debris pickup, as necessary
- Radiological surveys and quality assurance, quality control, and audits to support the other listed activities
- Search-and-rescue activities and law enforcement activities, as necessary

5 Radiation Safety Principles

The following are general radiation safety principles that guide radiation safety policies in the DU impact area.

5.1 Justification

No one will be exposed to ionizing radiation needlessly. This means that only essential personnel on official business will be in the DU impact area at any time.

5.2 Optimization

All personnel radiation exposure will be kept ALARA, considering technological and socioeconomic factors.

The ALARA program consists of the following:

- Training of personnel in appropriate radiation safety practices and work procedures
- Good housekeeping practices
- Engineering controls
- Use of personal protective equipment as necessary (paragraph 9)

5.3 Individual dose and risk limits

No one may exceed regulatory dose limits.⁴

⁴ It is virtually impossible in all reasonable scenarios for the DU in the DU impact area to cause anyone to exceed regulatory dose limits.

6 Radiation Safety Standards

10 CFR, Part 20, Subpart C contains the NRC occupational and public dose limits. No one may exceed these limits under any circumstances.

6.1 Individuals entering the DU impact area

All reasonable conservative estimates of the maximum annual total effective dose (TEDE) equivalent to a worker or member of the public due to DU in impact areas on IMCOMs show that even a small percentage of the NRC annual public dose limit of 0.100 rem will not be exceeded.

6.2 Surface contamination

Table 1 in NRC Regulatory Guide 1.86 provides NRC-accepted surface contamination levels. Table 6-1 is an extract relevant for DU from that table. Decontamination will always be to surface contamination levels that are below those in Table 6-1 and that are ALARA.

Table 6-1 Acceptable surface contamination levels

<i>NUCLIDE</i> ^a	<i>AVERAGE</i> ^{b,c,f}	<i>MAXIMUM</i> ^{b,d,f}	<i>REMOVABLE</i> ^{b,c,e,f}
U-natural, ²³⁵ U, ²³⁸ U, and associated decay products	5,000 dpm alpha/100 cm ²	15,000 dpm alpha/100 cm ²	1,000 dpm alpha/100 cm ²

^a Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

^b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^c Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, derive the average for each object.

^d The maximum contamination level applies to an area of not more than 100 square centimeters (cm²).

^e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, reduce the pertinent levels proportionally, and wipe the entire surface.

^f The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 millirad per hour at 1 centimeter and 1.0 millirad per hour at 1 centimeter, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

6.3 Declared pregnant worker

Because of the radiosensitivity of the embryo/fetus, the NRC has set the dose limit to the embryo/fetus of a declared pregnant worker (DPW) at 500 millirems TEDE for the period of gestation. It determined that this limit provides an adequate margin of safety for the embryo/fetus. However, a DPW cannot exceed even a small percentage of this limit for all reasonable scenarios (see paragraph 6.1). Therefore, a written declaration of pregnancy by a DPW and required subsequent actions are not necessary.

7 Dosimetry

Dosimetry is not required for entry into the DU impact area. See paragraph 6.1.

8 Bioassay

Bioassay is not routinely required for entry into or following exit from the DU impact area. See paragraph 6.1.

If an intake of DU is suspected or may have occurred (see paragraph 22.1), notify the LRSO immediately, who will investigate the alleged intake and determine what actions, if any, should follow.

9 Personnel Protective Equipment

Normal work clothing provides adequate protection for radiation safety purposes from DU in the DU impact area for authorized routine activities (see paragraph 4.3).

Wear disposable gloves at all times when handling DU (see paragraph 3.2).

10 Respiratory Protection

Respiratory protection is not required for entry into the DU impact area. See paragraph 6.1.

11 Contamination Surveys

Because authorized travel within the DU impact area generally is restricted to roads and paths and because surface DU penetrators were removed during the testing era, routine contamination surveys are not necessary. However, if for any reason contamination is possible or suspected,⁵ notify the LRSO immediately. Provisions of this paragraph may then apply.

11.1 Instrument scanning

The LRSO will assure that appropriate instruments (paragraph 17) and supplies (for example, soap and water for decontamination, if necessary) are available. The LRSO or someone following his instructions⁶ will perform instrument scanning on personnel, vehicles and equipment, preferably at the nearest cleared road.

See paragraph 17 for instrumentation requirements.

11.1.1 Personnel

If DU contamination is detected, decontaminate personnel completely if possible. Usually, washing with soap and water will achieve complete DU decontamination. The LRSO will determine other decontamination measures if they become necessary.

See paragraph 8 for bioassay requirements.

11.1.2 Equipment and vehicles

If DU contamination is detected on equipment or vehicles, decontaminate the equipment item or vehicle to meet the requirements in Table 6-1 (which includes the requirement to decontaminate to levels ALARA). Usually, washing with soap and water will achieve complete DU decontamination. The LRSO will determine other decontamination measures if they become necessary.

11.2 Documentation

Document all contamination surveys of personnel, equipment, and vehicles to include:

- Description of instrument used, along with its calibration date and calibration due date
- Identification of person, equipment item, or vehicle
- Location of contamination or a notation that no contamination was detected
- Initial contamination found, if any, in units of dpm/100 cm² or dpm over smaller area
- Decontamination method(s) used, if necessary

⁵ For example, an unauthorized person who accidentally or deliberately strays into the DU impact area may require a survey for contamination.

⁶ The LRSO's duty station is at Fort Sam Houston, Texas, and so he cannot immediately travel to JPG.

- If initial decontamination efforts are not fully successful, interim contamination in units of dpm/100 cm² or dpm over smaller area
- Final contamination status
- Name and signature of person performing monitoring

11.3 Swipe tests

Swipe tests generally are not necessary. However, if instrument scanning detects contamination, the LRSO or someone following his instructions will take swipe tests to verify that subsequent decontamination efforts were adequate.

11.4 Reporting results to workers

The LRSO will provide results of swipe tests and scanning to any workers who ask for them, as it is a right of workers to know the potential hazards to which they are exposed.

12 Environmental Monitoring

A separate Environmental Radiation Monitoring Plan provides environmental monitoring requirements.

13 Inventory

The LRSO will inventory and control all check sources associated with instrumentation used at the DU impact area. No other radioactive sources, other than DU, should be in the DU impact area. (Also, see paragraph 18.)

14 Posting Requirements

A radiation control area is an area controlled for the purpose of radiation safety (see paragraph 3). The DU impact area is a radiation control area (see Figure 1-1).

14.1 “CAUTION, RADIOACTIVE MATERIAL” signs

Title 10 CFR Part 20, Subpart J, § 20.1902(e) says:

Posting of areas or rooms in which licensed material is used or stored.

The licensee shall post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in appendix C to part 20 with a conspicuous sign or signs bearing the radiation symbol and the words “CAUTION, RADIOACTIVE MATERIAL(S)” or “DANGER, RADIOACTIVE MATERIAL(S).”

The amount of DU in the DU impact area exceeds those limits. Therefore, the DU impact area will be posted with “CAUTION, RADIOACTIVE MATERIAL” signs (Figure 14-1). The signs will be made of weather-resistant material.

14.2 Radiation area

A radiation area is an area, accessible to personnel, in which radiation levels could result in which an individual could be exposed to five milliroentgens in one hour at thirty centimeters from the source or from any surface through which the radiation penetrates.

No radiation area exists in the DU impact area.

14.3 10 CFR Part 19, § 19.11 Posting of notices to workers

Documents, notices, or forms posted under this paragraph shall appear in a sufficient number of places to permit individuals engaged in NRC-licensed or regulated activities to observe them on the way to or from any particular licensed or regulated activity location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

The LRSO will post these documents, notices, and forms on the bulletin board in the US Army office in Building 125 at 1661 West Niblo Road (Figure 1-3).

14.3.1 NRC Form 3, “Notice to Employees”

The LRSO will post a current copy of NRC Form 3 on the bulletin board in the US Army office in Building 125. Replace it if it becomes defaced or altered.

14.3.2 Other notices to workers

The LRSO shall make available current copies of

- 10 CFR, Part 19, “Notices, Instructions and Reports To Workers: Inspection And Investigations”

- 10 CFR, Part 20, "Standards for Protection against Radiation"
- The license, license conditions, and documents incorporated into the license by reference, and amendments thereto
- The operating procedures applicable to licensed activities (specifically, this RSP and the environmental radiation monitoring plan)

The LRSO will place a notice on the bulletin board that describes these documents and states where anyone may examine them.

14.3.3 Notices of violation

The LRSO shall post or make available current copies of any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order from the NRC and any US Army response.



Figure 14-1 "CAUTION, RADIOACTIVE MATERIAL" sign

15 Radioactive Material and Access Control

15.1 Radioactive material control

10 CFR Part 20, § 20.1802, "Control of material not in storage," says, "The licensee shall control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage." Remaining DU in the DU impact area is under control and not available for casual removal for the following reasons:

- The US Army cleared DU from soil surfaces during the test area and, in the 1990s, during scooping and characterization surveys, so remaining DU is subsurface.
- A UXO area surrounds the DU impact area.
- The DU impact area is by and is itself a UXO area.

15.2 Physical access controls

15.2.1 JPG perimeter

The perimeter of the former JPG is about 48 miles in length. A chain-link fence topped with barbed wire is along the perimeter. Security warning signs (Figure 15-1) are on the fence line to caution persons not to enter the property. Where a stream crosses the fence line, a steel cable, with warning signs attached, and suspended cylindrical barriers replace the fence.

Per agreement, the INANG maintains the perimeter fence and controls gate keys.

15.2.2 Firing line boundary

An interior fence crosses the installation from east to west at the firing line and separates the cantonment in the south from the rest of the installation in the north. All gates through this fence remain locked except during public use hours, at which times FWS personnel monitor the gates. Per agreement, the FWS controls public access to the refuge and monitors visitor ingress and egress.

All roads that enter into the DU impact area are barricaded and posted with "CAUTION, RADIOACTIVE MATERIAL" signs (paragraph 14.1). In addition, approximately 100 additional "CAUTION, RADIOACTIVE MATERIAL" signs are posted around the perimeter of the DU area.

Per agreement, the INANG will conspicuously post and maintain the "CAUTION, RADIOACTIVE MATERIAL" signs.

15.3 Personnel access control for the DU impact area

15.3.1 Public use

The FWS controls access for public use. Public use days generally begin in mid-April and end in late November each year. Tours and other activities can occur throughout the year.

All refuge public visitors must view a safety briefing once per calendar year and sign an “acknowledgement of danger” form. The FWS grants public access only to certain public use areas as authorized by the US Army. The safety briefing warns and requires public visitors to visit only the areas their passes allow and to stay out of all other areas, especially closed (that is, closed to all public entry) areas contaminated with UXO.

Since closed areas surround the DU impact area and the DU impact area itself is a closed area, it is not necessary for the FWS to warn visitors to stay out of the DU impact area, since it would be a violation of their permits.⁷ The public cannot gain access to the DU impact area without passing through other areas restricted due to UXO presence.

15.3.2 Site personnel, contractor personnel, and official visitors

The LRSO will assure that JPG site personnel are aware of the provisions of this RSP before entry into the DU impact area (see paragraph 20).

For other than law enforcement or emergency response personnel requiring rapid access, personnel access to the DU impact area is not authorized except with the knowledge and approval of US Army, FWS, or INANG personnel knowledgeable in the provision of this plan that apply to that access. The LRSO will assure that all site personnel are aware of this requirement. This requirement is in addition to and not in lieu of any other approvals for other site access that may be required.

Other than official visitors, no one may enter the DU impact area unless he or she meets all radiation safety-training requirements (see paragraph 20). The LRSO will maintain documentation to demonstrate compliance with these requirements.

Site personnel otherwise qualified to enter the DU impact area will escort official visitors.

15.3.3 Law enforcement and emergency response personnel

Safety considerations for UXO in the DU impact area far outweigh all radiation safety concerns. Site personnel will grant all latitude commensurate with UXO safety concerns to law enforcement and emergency response personnel requiring rapid access and exit from the DU impact area.

⁷ Violations of public pass restrictions potentially subject a visitor to ejection from the refuge or arrest.

15.4 Concurrent Federal and State of Indiana jurisdiction

On 15 April 1995, the Indiana governor signed and accepted the retrocession of exclusive Federal jurisdiction to concurrent jurisdiction for JPG in Jefferson, Jennings, and Ripley Counties. The Indiana State Police and County Sheriffs can gain access to the Federal land should a need arise via coordination with refuge staff or INANG. In an emergency, they may cut locks to gain entry.

Personnel of the FWS and the Indiana Department of Natural Resources have routine access to the area north of the firing line to conduct surveys and to enforce hunting and fishing laws and regulations.



**Figure 15-1 US
Government Property
No Trespassing Sign**

16 Markings on Containers and Equipment

Title 10 CFR Part 20, § 20.1904 requires that all containers that contain more than 100 microcuries of ^{238}U or of natural uranium⁸ be properly labeled with a “CAUTION, RADIOACTIVE MATERIALS” sign or label. The label will also provide information, such as the radionuclides present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, radiation levels, and kinds of materials, to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures.

The specific activity of DU is about 0.4 microcurie per gram, so 100 microcuries of DU has a mass of about 250 grams or 9 ounces.

The only containers, if any, of radioactive material, other than instrument check sources, on JPG should be containers of DU held for disposal as radioactive waste (see paragraph 18).

⁸ The activity in DU is mostly due to ^{238}U . The activity in natural uranium is mostly due to ^{234}U and ^{238}U in equilibrium with each other. Table C in Appendix C to 10 CFR Part 20 does not list DU explicitly, but the inference is taken that the labeling requirement for an activity of more than 100 microcuries of ^{238}U or natural uranium should also apply for DU.

17 Instrumentation

17.1 Appropriate instrument

A pancake Geiger-Mueller detector for beta-gamma surveys for surface contamination and frisking (for example, a Ludlum Model 44-9 Pancake G-M, Figure 17-1)) is the appropriate instrument to have available for a contamination survey of a surface or of personnel (see paragraph 11). The LRSO will assure that an appropriate calibrated instrument is available at all times for use by appropriately trained personnel to survey for DU contamination. This means that at least two pancake probes with appropriate ratemeters are required, in case one is at the calibration laboratory.

17.2 Instrument calibration and maintenance

All instruments will be calibrated by a qualified calibration/repair facility at least annually in accordance with manufacturers' instructions. The LRSO will retain calibration records for each instrument.

Check each instrument before first use each day with check sources to verify that its response is within ± 20 percent of the value established for that instrument/check source/geometry combination. This value will be determined immediately upon receipt of the newly calibrated instrument.

Each item of survey equipment shall meet function response requirements before, during, and at the end of the workday. If survey equipment requires routine maintenance (such as battery replacement or cable replacement) during a workday, verify its proper function before returning it to use.

Re-calibrate instruments that undergo other than routine maintenance before returning them to use.

17.3 Minimum detectable concentrations

The following paragraphs describe how to determine the minimum detectable concentration (MDC) for each field equipment put into use. The LRSO will maintain this documentation and make it available to NRC personnel upon request.

After completing background measurements outside of but near the DU impact area, calculate the MDC using DU-specific variables (reference activity/instrument efficiencies) to verify that the MDC is significantly below the regulatory limits (Table 6-1).

17.3.1 Static minimum detectable concentrations

According to the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, the *critical level* (L_C) is the level, in counts, at which there is a 5 percent statistical probability of incorrectly identifying a measurement system background value as greater than background. Consider any response above this level to be greater than background. The *detection limit* (L_D) is an *a priori* estimate of the detection capability of a measurement system in units of counts. The MDC is the detection limit multiplied by an appropriate conversion factor to give units consistent with a site guideline, such as

dpm/100 cm². In other words, the MDC is the *a priori* net activity level above the critical level that an instrument can detect 95 percent of the time,

MARSSIM explains how to calculate L_C , L_D , and MDC and arrives at the following result (MARSSIM Equation 6-7) for estimating the static MDC:

$$\text{Static MDC} = C(3 + 4.65\sqrt{B})$$

C represents total detection and efficiency and other constants or factors needed to put the static MDC into appropriate units and B is the number of background counts that are expected to occur while performing an actual measurement. The equation assumes that static counts taken in one minute. If different times are used, the LRSO will adjust the calculations accordingly.

For the present purposes,

$$C = \frac{1}{A\varepsilon_i\varepsilon_s} \times \frac{100 \text{ cm}^2}{100 \text{ cm}^2}$$

A is the effective area of the probe, ε_i is the instrument or detector efficiency, ε_s is the efficiency of the contamination source,⁹ and the final factor, which equals unity, helps put the units of scan MDC into dpm/100 cm².

17.3.2 Scan minimum detectable concentrations

The MDC of a scan survey (scan MDC) depends on the intrinsic characteristics of the detector (such as efficiency and physical probe area), the nature (type, abundance, and energy) of emissions, the relative distribution of the potential contamination (point versus distributed source and depth of contamination), scan rate, and personal characteristics of the surveyor. MARSSIM Section 6.7.2.1 discusses the basis for estimating the scan MDCs and arrives at the following equation for estimating it:

$$\text{Scan MDC} = \frac{\text{MDCR}}{\sqrt{pA\varepsilon_i\varepsilon_s}} \times \frac{100 \text{ cm}^2}{100 \text{ cm}^2}$$

MDCR is the minimum detectable count rate (interpolated from MARSSIM Table 6.6), p is surveyor efficiency (assumed 0.5), and other parameters are shown above. The final factor, which equals unity, helps put the units of scan MDC into dpm/100 cm².

⁹ The ISO-7503-1 standard on the evaluation of surface contamination for beta emitters and alpha emitters recommends an ε_s value of 0.5 for betas (maximum beta energy greater than 0.4 megaelectron volts (MeV)) and an ε_s value of 0.25 for alpha and betas (maximum beta energy between 0.15 MeV and 0.4 MeV).



INDICATED USE: Alpha beta gamma survey; Frisking
DETECTOR: Pancake type halogen quenched G-M
WINDOW: $1.7 \pm 0.3 \text{ mg cm}^{-2}$ mica
WINDOW AREA: Active – 15 cm^2 ; Open – 12 cm^2
EFFICIENCY (4 π geometry): Typically 5 percent – ^{14}C ; 22 percent – $^{90}\text{Sr}/^{90}\text{Y}$; 19 percent – ^{99}Tc ; 32 percent – ^{32}P ; 15 percent – ^{239}Pu
SENSITIVITY: Typically $3300 \text{ cpm (mR h}^{-1}\text{)}^{-1}$ (^{137}Cs gamma)
ENERGY RESPONSE: Energy dependent
DEAD TIME: Typically 80 microseconds
COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalers
OPERATING VOLTAGE: 900 volts
CONNECTOR: Series C (*others available*)
CONSTRUCTION: Aluminum housing with beige polyurethane enamel paint
TEMPERATURE: $-4 \text{ }^\circ\text{F}$ ($-20 \text{ }^\circ\text{C}$) to $122 \text{ }^\circ\text{F}$ ($50 \text{ }^\circ\text{C}$)
SIZE: 1.8 inches (4.6 cm) height \times 2.7 inches (6.9 cm) width \times 10.7 inches (27.2 cm) length
WEIGHT: 1 pound (0.5 kg)

Source: www.ludlums.com

Figure 17-1 Ludlum Model 44-9 Pancake G-M Detector

18 Radioactive Waste

Site personnel, in coordination with EOD personnel, will double-bag in plastic bags all DU picked up and removed from the DU impact area (see paragraph 3.2). Anyone handling DU will use tools or gloved hands to handle it. The bags then will be stored in sturdy containers with appropriate markings (see paragraph 16).

Site personnel will secure these containers in a locked storage facility with access limited to personnel appropriately trained in radiation safety and security.

The LRSO will contact Chief, US Army Low-Level Radioactive Waste Disposal Division, US Army Joint Munitions Command, ATTN: AMSJM-SF, Rock Island Arsenal, Rock Island, IL 61299-6500, who will arrange for appropriate disposal of the DU in accordance with all applicable regulations.

19 Program Audits

The LRSO will review the RSP content and implementation and document the results of this review at least annually to ensure the following:

- Compliance with NRC regulations and the terms and conditions of the license
- Occupational doses and doses to members of the public are ALARA (10 CFR Part 20, § 20.1101)
- Records of audits and other reviews of program content are maintained for 3 years

19.1 Purpose of annual audit

An audit is conducted, in part, to fulfill the requirements of 10 CFR Part 20, § 20.1101 for an annual review of the content and implementation of the RSP. It should also identify program weaknesses and allow licensees to take early corrective actions (before an NRC inspection). During an audit, the auditor needs to keep in mind not only the requirements of NRC's regulations, but also the licensee's commitments in its applications and other correspondence with NRC. The auditor should also evaluate whether the licensee is maintaining exposures to workers and the general public ALARA and, if not, make suggestions for improvement.

19.2 Guide for annual audit

Use the form in this paragraph to document the annual audit of the RSP. Guidance follows on completing each section of the form. In the "remarks" portions of the form, note any identified deficiencies and the corrective actions taken or proposed.

- **Section 1, Audit History:** Enter the date of the last audit, whether any deficiencies were identified, and whether actions were taken to correct the deficiencies.
- **Section 2, Organization and Scope of Program:** Give a brief description of the organizational structure, noting any changes in personnel. Describe the scope of licensed activities at the audited location. Check whether the Radiation Safety Officer (RSO) is the person identified in the license and fulfills the duties specified in the license.
- **Section 3, Training, Retraining, and Instructions to Workers:** Ensure that workers have received the training required by 10 CFR Part 19.12. Be sure that, before being allowed into the DU impact area, the worker has received training. Note whether refresher training is conducted annually. Ensure by interview and/or observation of selected workers that they can implement the licensee's procedures.
- **Section 4, Audits:** Verify that audits fulfill the requirements of 10 CFR Part 20.1101, are conducted in accordance with licensee commitments, and are properly documented.
- **Section 5, Facilities:** Verify that the licensee's facilities are as described in its license documents.

- **Section 6, Radiation Surveys:** Verify that the licensee has appropriate, operable and calibrated survey instruments available, that the instruments are calibrated (at the required frequency) in accordance with license conditions and in accordance with 10 CFR Part 20, § 20.2103. Retain calibration records for three years after the record is made. Check that radiation levels in areas adjacent to use are within regulatory limits and in accordance with 10 CFR Part 20, § 20.2103. Verify compliance with 10 CFR Part 20, § 20.1301. Retain records of surveys for three years after the record is made.
- **Section 7, Transfer of Radioactive Material for Waste Disposal:** Ensure that transfers are performed in accordance with 10 CFR Part 40, § 40.51. Maintain records of surveys, receipt, and transfer in accordance with 10 CFR Part 20, § 20.2103, and Part 40, § 40.51.
- **Section 8, Personnel Radiation Safety:** Evaluate the licensee's determination that unmonitored personnel are not likely to receive more than 10 percent of the allowable limits. If any worker declared her pregnancy in writing, evaluate the licensee's compliance with 10 CFR Part 20, § 20.1208. Check whether records are maintained as required by 10 CFR Part 20, §§ 20.2101, 2102, 2103, 2104, and 2106.
- **Section 9, Auditor's Independent Measurements (if made):** The auditor should make independent survey measurements and compare the results with those made or used by the licensee.
- **Section 10, Notification and Reports:** Check on the licensee's compliance with the notification and reporting requirements in 10 CFR Part Parts 19, 20, and 30. Ensure that the licensee is aware of the telephone number for NRC's Emergency Operations Center, which is (301) 816-5100.
- **Section 11, Posting and Labeling:** Check for compliance with the posting and labeling requirements of 10 CFR Part 19, § 19.11; Part 20, §§ 20.1902 and 20.1904; and Part 21, § 21.6.
- **Section 12, Recordkeeping for Decommissioning:** Check to determine compliance with 10 CFR Part 40, § 40.36(f).
- **Section 13, Bulletins and Information Notices:** Check to determine if the licensee is receiving bulletins, information notices, Nuclear Material Safety and Standards Newsletters, and so on from the NRC. Check whether the licensee took appropriate action in response to NRC mailings.
- **Section 14, Special License Conditions or Issues:** Verify compliance with any special conditions on the licensee's license. If the licensee has any unusual aspect of its work, review and evaluate compliance with regulatory requirements.
- **Section 15, Continuation of Report Items:** This section is self-explanatory.
- **Section 16, Problems or Deficiencies Noted; Recommendations:** This section is self-explanatory.
- **Section 17, Evaluation of Other Factors:** Evaluate licensee management's involvement with the RSP, whether the LRSO has sufficient time to perform his or her duties, and whether the licensee has sufficient staff to handle the workload and maintain compliance with regulatory requirements.

19.3 Sample checklist

The following pages provide a sample checklist based on *Consolidated Guidance about Materials Licenses* (NUREG-1556), volume 7, appendix L.

Radiation Safety Plan for Jefferson Proving Ground Depleted Uranium Impact Area

Audit Report No. _____ License No. _____

Licensee's Name and Mailing Address:

Audit of Activities at (Address):

Contact at Audit Location: _____ Telephone No. _____

Date of this Audit: _____

Summary of Findings and Action:

No deficiencies

Deficiencies

Action on previous deficiencies

Recommendations:

Auditor: _____ Date: _____
(Signature)

Radiation Safety Plan for Jefferson Proving Ground Depleted Uranium Impact Area

1. AUDIT HISTORY N/A (N/A means "Not applicable" – Initial Audit

A. Last audit of this location conducted _____

B. Problems/ deficiencies identified during last two audits or two years, whichever is longer Y N

C. Open problems/deficiencies from previous audits:

Status Requirement	Prob/Def	Corrective Action Taken (Y/N)	Open/Closed
--------------------	----------	-------------------------------	-------------

D. Any previous problem/deficiency not corrected or repeated Y N N/A

2. ORGANIZATION AND SCOPE OF PROGRAM

A. Briefly describe organizational structure

- 1. Structure is a described in license documents Y N
- 2. Multiple authorized locations of use Y N
- 3. Briefly describe scope of activities involving source material, frequency of use, staff size, etc. Y N

B. Radiation Safety Officer Y N

- 1. Authorized on license Y N
- 2. Fulfills duties as RSO Y Y

C. Use only by authorized individuals Y N

Remarks:

3. TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS

- A. Instructions to workers per [10 CFR Part 19.12] Y N
- B. Training program required Y N
- C. Training records maintained Y N
- D. Evaluation of individuals' understanding of procedures and regulations based on interviews, observation of selected workers Y N

Adequate understanding of:

- Current safe use procedures Y N
- Emergency procedures Y N

E. Part 20

Workers cognizant of requirements for:

- 1. Radiation Safety Program [20.1101] Y N
- 2. Annual dose limits [20.1301, 20.1302] Y N
- 3. 10 percent monitoring threshold [20.502] Y N
- 4. Dose limits to embryo/fetus and declared pregnant women [20.1208] Y N

Remarks:

4. INTERNAL AUDITS, REVIEWS, OR INSPECTIONS

- A. Audits are conducted Y N
 - 1. Audits conducted by _____
 - 2. Frequency _____
- B. Content and implementation of the radiation safety program reviewed annually [20.1101(c)] Y N
- C. Records maintained [20.2102] Y N

5. FACILITIES

- Facilities as described in license application Y N

Remarks:

6. RADIATION SURVEYS

- A. Instruments and Equipment: Y N
1. Appropriate operable survey instrumentation possessed or readily available Y N
 2. Calibrated as required [20.1501] Y N
 3. Calibration records maintained [20.2103(a)] Y N
- B. Briefly describe survey requirements [20.1501(a)]:
- C. Performed as required [20.1501(a)] Y N
1. Radiation levels within regulatory limits Y N
 2. Corrective action taken and documented Y N
- D. Records maintained [20.2103] Y N
- E. Protection of members of the public
1. Adequate surveys made to demonstrate either (a) that the TEDE to the individual likely to receive the highest dose does not exceed 100 millirems in a year, or (b) that if an individual were continuously present in an unrestricted area, the external dose would not exceed 2 millirems in any hour and 50 millirems in a year [20.1301(a)(1), 20.1302(b)] Y N
 2. Unrestricted area radiation levels do not exceed 2 millirems in any one hour [20.1301(a)(2)] Y N
 3. Records maintained [20.2103, 20.2107] Y N

Remarks:

7. TRANSFER OF RADIOACTIVE MATERIAL FOR WASTE DISPOSAL

- A. Transfer(s) for "disposal" performed per [40.51] Y N N/A
- B. Records of transfer maintained [20.2103(a), 40.51] Y N

Remarks:

8. PERSONNEL RADIATION SAFETY

- A. ALARA considerations are incorporated into the Radiation Safety Program [20.1101(b)] Y N
- B. Adequate documentation of determination that unmonitored individuals are not likely to receive more than 10 percent of allowable limit [20.1502(a)] Y N N/A
- C. Worker declared her pregnancy in writing during inspection period (review records) Y N N/A
- If yes, determine compliance with [20.1208] Y N
- Check for records per [20.2106(e)] Y N
- F. Records of exposures, surveys, monitoring, and evaluations maintained [20.2102, 20.2103, 20.2106, L/C] Y N

Remarks:

9. AUDITOR'S INDEPENDENT MEASUREMENTS (IF MADE)

- A. Survey instrument Serial No. _____ Last calibration

- B. Auditor's measurements compared to licensee's Y N
- C. Describe the type, location, and results of measurements:

10. NOTIFICATION AND REPORTS N/A

- A. Licensee in compliance with [19.13, 30.50] (reports to individuals, public and occupational, monitored to show compliance with Part 20) Y N N/A
- B. Licensee in compliance with [20.2201, 40.60] (theft or loss) Y N None
- C. Licensee in compliance with [20.2202, 40.60] (incidents) Y N None
- D. Licensee in compliance with [20.2203, 40.60] (overexposures and high radiation levels) Y N None
- E. Licensee aware of telephone number for NRC Emergency Operations Center [(301) 816-5100] Y N

11. POSTING AND LABELING

- A. NRC-Form 3 "Notice to Workers" is posted [19.11] Y N
- B. Parts 19, 20, Section 206 of Energy Reorganization Act, and license documents are posted, or a notice indicating where documents can be examined is posted [19.11] Y N
- C. Other posting and labeling per [20.1902, 1904] and the license is not exempted by [20.1903, 1905] Y N

Remarks:

12. RECORD KEEPING FOR DECOMMISSIONING (if needed) N/A

- A. Records of information important to the safe and effective decommissioning of the facility maintained in an independent and identifiable location until license termination Y N
- B. Records include all information outlined in [40.36(f)] Y N

Remarks:

13. BULLETINS AND INFORMATION NOTICES

- A. Receipt of NRC Bulletins, NRC Information Notices, NMSS Newsletters, and so on Y N
- B. Appropriate action taken in response to Bulletins, Information Notices, etc. Y N

Remarks:

14. SPECIAL LICENSE CONDITIONS OR ISSUES N/A

- A. Review special license conditions or other issues, and describe findings:
- B. Problems/deficiencies identified at licensee facilities other than at audit location:
- C. Evaluation of compliance:

15. CONTINUATION OF REPORT ITEMS N/A

(If more space is needed, use separate sheets and attach to report.)

16. PROBLEMS OR DEFICIENCIES NOTED; RECOMMENDATIONS N/A

Note: Briefly state (1) the requirement and (2) how and when violated. Provide recommendations for improvement.

17. EVALUATION OF OTHER FACTORS

- A. Senior licensee management is appropriately involved with the radiation safety program and/or RSO oversight Y N
- B. RSO has sufficient time to perform his/her radiation safety duties and is not too busy with other assignments Y N
- C. Licensee has sufficient staff Y N

Remarks/recommendations:

20 Training

Before entry into the DU impact area, all personnel (except escorted visitors; see paragraph 2.4) will receive and acknowledge training on the requirements of this RSP. The LRSO or, in his absence, FWS or INANG personnel, as appropriate, will conduct this training.

20.1 Frequency of Training

Personnel who enter the DU impact area will receive radiation safety training:

- Before assuming duties that involve entry into the DU impact area
- Whenever a significant change in duties, regulations, or the terms of the license occurs
- Annually (refresher training)

20.2 Training Topics

The LRSO will tailor training to personnel wanting to enter the DU impact area to be commensurate with the type of work they will perform. Visitors and workers who enter the DU impact area are not occupationally exposed to radiation (see paragraph 6.1). Therefore, they only require a minimum of awareness and familiarization training that will assure compliance with this RSP.

General awareness and familiarization training will include the following topics:

- Radiological characteristics of DU and its biological effects
- Applicable provisions of this RSP
- Contamination control
- Decontamination, techniques, methods, procedures and management practices
- Worker rights and responsibilities
- Emergency procedures for events such as personnel injury, fire, radiation control area evacuation, lightning, and so on
- Reporting of incidents
- Stop work procedures

20.3 Training Documentation

The LRSO will establish and maintain the following training documentation:

- Attendance rosters that include each attendee's name, signature, and organization for each class
- The time, date, and location of the training for each class
- The name of the instructor for each class
- The lesson plans for the DU impact area-specific awareness training

21 Recordkeeping

The LRSO will maintain the following documentation and, upon request, make it available to the NRC:

- Records of radiation surveys, monitoring and disposal
- DU impact area-specific awareness training records
- Instrument inventory and calibration records
- Notification of incidents
- Program audits
- Reports of overexposure and excessive levels and concentrations
- Notification and reports to individuals
- Any other records generated for the purposes of radiation safety during licensed activities

22 Emergency Planning

Site personnel will notify the LRSO as soon as possible when an emergency occurs within the DU impact area. The LRSO will provide radiation safety support to supporting emergency medical personnel as necessary and upon request.

22.1 General

- DIAL “911” for all emergencies.
- Emergency medical care (Figure 22-1)

King’s Daughters’ Hospital and Health Services 1373 Clifty Drive (East Indiana State Road 62) Madison, IN 47250 (812) 801-0800 (800) 272-5341

22.2 Radiological Emergencies

Although unlikely if personnel follow normal precautions and personal hygiene measures, measurable acute ingestion or inhalation of DU-contaminated dust could occur. It is the only credible radiological emergency at the DU impact area. In such an event, take the worker to the local supporting medical facility for evaluation and contact the LRSO.

22.3 Non-Radiological Emergencies

All life-saving and limb-saving emergencies always take priority over radiation safety concerns, including decontamination.

For the information of emergency responders:

- DU radioactive contamination, even at small fractions of allowable levels, is not likely.
- Removal of outer clothing will remove most DU surface contamination.
- Normal washing with soap and water will remove most if not all of any remaining DU surface contamination.

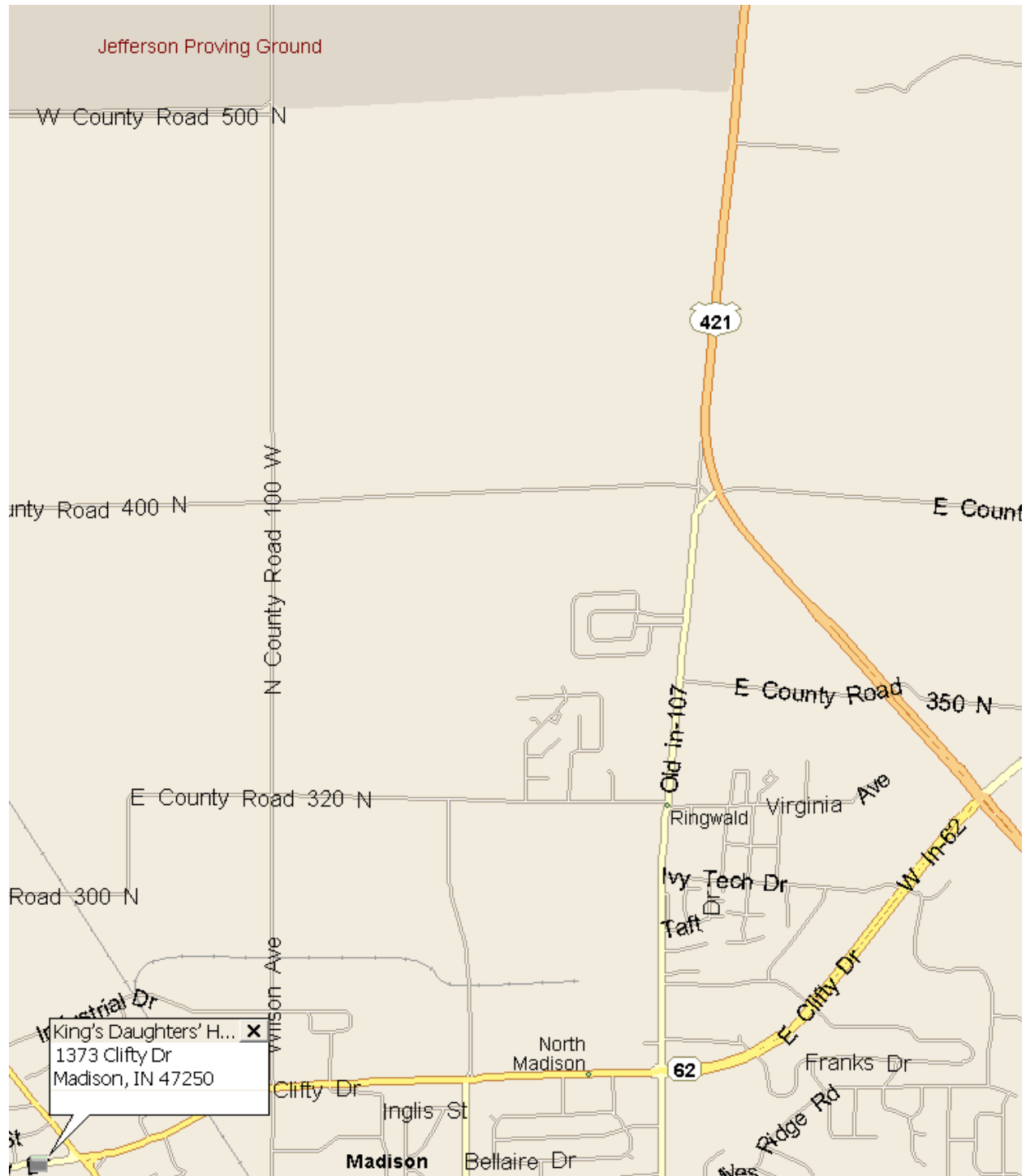


Figure 22-1 King's Daughters' Hospital and Health Services

23 Standard Operating Procedures

The LRSO will produce and maintain the following standard operating procedures for implementing this RSP.

<i>Paragraph</i>	<i>Topic</i>
2.3.1, 20	DU awareness and license requirement training for personnel who enter the DU impact area
6.2, 11, 15	Contamination surveys, and decontamination techniques, hotline operations
17	Instrument use, maintenance, and calibration
