



2022 Secretary of Defense

Environmental Awards

Environmental Quality, Team

Air Force Radioactive Recycling and Disposal Team

Wright-Patterson Air Force Base

Introduction

The Air Force Radioactive Recycling and Disposal (AFRRAD) Team is located at Wright-Patterson Air Force Base (WPAFB). WPAFB provides operational support for more than 100 associated units, supporting on average 47,000 aircraft operations every year and providing a total economic impact to the State of Ohio of \$5.65 billion annually. The AFRRAD team has sole responsibility for low-level radioactive waste (LLRW) and low-level mixed waste (LLMW) disposal for the entire Department of the Air Force (DAF) and provides radioactive material (RAM) recycling services for the Department of Defense (DoD). AFRRAD is also the focal point for management and disposition of AF

legacy radioactive waste from sites such as McClellan AFB and Davis-Monthan AFB. AFRRAD supports the mission of the DAF Radiation Program to ensure the safe and regulatory compliant use of all RAM required to support a combat-ready Air Force. Subordinate to the 88th Air Wing, the AFRRAD team resides within the 88th Civil Engineer Group's Environmental Branch and includes:

- Zachary Olds, Compliance Section Chief
- Christopher Anthony, Program Manager & Permit Radiation Safety Officer (RSO)
- Brian Mitchell, Field Operations Coordinator & Alternate Permit RSO
- Seth Walton, Material Intake Manager & Radiation Safety Specialist



WPAFB AFRRAD Team represents the 88th Civil Engineer Group's Environmental Branch. The team manages disposition of radioactive material. Pictured left to right: Brian Mitchell, Seth Walton, Christopher Anthony, and Zachary Olds.

Background

Like other Environmental Quality programs, AFRRAD activities are regulated by the U.S. Environmental Protection Agency and the U.S. Department of Transportation (DOT); however, unlike other programs, AFRRAD must also adhere to Nuclear Regulatory Commission (NRC) and DOT radioactive material regulations. The AFRRAD team also accomplishes its unique mission in conformance with DAF Instructions and the WPAFB Environmental Management System. This four-man team with over 93 years combined experience protects human health and the environment through the management and disposition of RAM and LLRW, and successfully supports DoD missions, installations, and warfighters, both in the Continental U.S. (CONUS) and overseas. AFRRAD also has responsibility for managing and maintaining the largest, most diverse radioactive material permit in the DAF, which is expertly achieved through annual planning, programming, budgeting, and execution of \$1.5M in Environmental Quality funds. The team is responsible for accomplishing an extensive and global mission set that includes consultative customer support by offering staff assistance

visits, initiating radioactive waste broker actions, authorizing RAM transfers to WPAFB for waste consolidation and recycling, and providing guidance on instrument selection and proper survey techniques. The most significant accomplishments performed by the AFRRAD Team in FY20-21 were: (1) utilizing best practices to recycle 65,000 RAM items and dispose of 123,000 pounds of LLRW, avoiding \$2.1M in management and disposal costs; (2) providing subject matter expertise to 137 installations for RAM oversight, management, and consultative services; (3) developing radioactive source removal procedures recognized as a waste minimization benchmark within DoD and in the radioactive waste industry; (4) delivering critical, time-sensitive service for LLRW disposal during historic closure of Bagram Air Base, Afghanistan; (5) building and fostering partnerships at Federal, State and local levels across the environmental community; and (6) successfully managing the largest RAM inventory in the DAF.



Common radioactive materials for recycling and disposal. AFRRAD recycles many of these radioactive materials for DoD.

Accomplishments

Waste Management & Minimization

During FY20-21, AFRRAD executed over \$3M in Environmental Quality funds for their unique mission. Despite an increase in the global demand for AFRRAD services, the team adapted without additional funding through exceptional waste reduction practices and minimization of contract expenses. AFRRAD operates a distinctive NRC Radioactive Material Permit granted by the DAF Radioisotope Committee Secretariat (RICS). This permit, the largest and most complex within the DAF, allows AFRRAD to perform radioactive source removal reducing radioactive waste disposal total volumes by over 95%. Because radioactive waste disposal fees are assessed by volume, AFRRAD's volume reduction best practices resulted in a \$200K disposal cost reduction. AFRRAD established written procedures for the safe and efficient removal of radioactive sources from more than 12 makes/models of devices used for chemical agent and explosives detection by DoD worldwide. Nearly 1,200 of these devices containing radioactive nickel-63 were transferred to WPAFB, disassembled by AFRRAD, and their radioactive sources packaged and sent for disposal. Other government agencies and non-government radioactive waste processors have requested access to these procedures, recognized as a benchmark in the radioactive waste industry, for waste minimization and operational efficiency at their facilities. Additionally, AFRRAD personnel meticulously removed the radioactive sources from 22,000 smoke detectors that were transferred from DoD installations and other government agencies around the world. The volume of this waste was reduced from 584 cubic feet to a mere 2 cubic feet. While these smoke detectors are exempt from NRC disposal requirements, AFRRAD's dedication to prioritizing pollution prevention motivates our team and mission partners to manage the Government's

RAM in a manner that enhances environmental quality.

In addition to saving the government thousands of dollars in disposal costs, AFRRAD often returns valuable radioactive resources for use in new RAM commodities. Since October 2019, AFRRAD reclaimed 65,000 items containing tritium, krypton-85, and americium-241, avoiding \$800K at \$330/cubic feet in waste disposal fees while generating 27,000 pounds of uncontaminated metal for the WPAFB Qualified Recycling Program and 95 cubic feet of electronic circuit boards for the Defense Logistics Agency (DLA) Precious Metal Recovery Program.



Chemical Agent Detector Recycling

The team provided 215 man-days of support for RAM management and disposal actions at numerous CONUS installations, delivering a multitude of services ranging from inventorying, packaging, shipping, permit consultation, and oversight of contracted waste brokers, all of which minimized contract costs by \$1.2M and improved NRC and RCRA compliance at each installation. These temporary duty assignments were critical, as AFRRAD is the only DAF organization authorized by the RICS to package and ship radioactive materials for final disposition. For its DAF customers, AFRRAD contracted through the U.S. Army Joint Munitions Command (JMC) and

coordinated 29 brokered waste removals for over 35 customers at 27 different sites, disposing of more than 123,000 pounds of LLRW. Because of AFRRAD's preparation, experience, oversight, communication of requirements, and attention to detail, these projects were all awarded and executed on time with zero change orders or increased cost to the Government.

Nevada, Colorado, and New Mexico are all members of the Rocky Mountain Low-Level Radioactive Waste Compact (RMC). Transferring waste from these states to WPAFB to save on contract burdened costs is not authorized; therefore, AFRRAD personnel traveled to and oversaw radioactive waste broker disposal services at ten installations within the RMC area over 19 days to remove 7,140 RAM items.

Diverse Mission with Global Impact

The AFRRAD team is regularly consulted for their subject matter expertise on which the team thrives. In addition to LLRW and RAM recycling responsibilities, the AFRRAD mission extends into expert consultation by utilizing the knowledge and experience of the four-member staff with over 93 years of combined experience in radiation safety, radioactive material permitting, radioactive waste disposal, storage & management of mixed radioactive and hazardous wastes, radiation detection instrumentation calibration and emergency response. AFRRAD provides expert consultative services to a vast array of environmental, health, and safety professionals at Federal, State, and local levels of government and within the private sector on behalf of the DAF.

During the historic closure of Bagram Airfield, Afghanistan, and just 21 days before leaving the country, DoD personnel discovered 27 items consisting of artillery sights, an aircraft ice detector and two Soviet warhead casings in a storage area marked as radioactive. After receipt of information and photographs of the items in question,

AFRRAD researched, identified, and validated an accurate LLRW inventory. AFRRAD instructed Bagram Airfield personnel on properly preparing the items for international shipment; authorized funding for transport of the material; and coordinated between the logistics personnel, the environmental coordinator, and the Radiation Safety Officer for the removal of all 27 items in a short nine days.



Shipping Radioactive Material

AFRRAD personnel taking radiation dose measurements in preparation for radioactive waste disposal. AFRRAD serves as the AF's subject matter experts for radioactive material shipments.

The 547th Intelligence Squadron at Nellis AFB, NV, delivers tailored, decision-quality intelligence to support combat operations. To upgrade their teaching aids, they identified twelve foreign military vehicles and weapons systems for disposition from their Cold War-era inventory. Prior to moving these assets to the Nevada Test and Training Range (NTTR) to be repurposed as targets for military pilot

training, the NTTR Safety Office called on AFRRAD to identify, remove, and dispose of RAM within each asset. AFRRAD traveled to Nevada and removed thirty-two RAM items from the vehicles and weapons systems, decontaminated the assets, and cleared them for movement onto the NTTR.

Oftentimes DoD weapons platforms are procured with components containing unlicensed RAM. Unbeknownst to many organizations these components require special disposition handling which AFRRAD is uniquely qualified to provide.

- In October 2019, DLA Disposition Services (DLA-DS) identified six DAF jet engines that were accepted into their facilities containing radioactive magnesium-thorium components. Three of the engines were located at a private recycler in Texarkana, AR, and three engines were located at the DLA-DS facility in Ft. Meade, MD. AFRRAD utilized resources within the National Museum of the USAF at WPAFB to survey a similar aircraft with the same engines to expertly identify the radioactive components of the engines and quantify the RAM after consulting the engine manufacturer. The team then coordinated the contract action through JMC with a radioactive waste broker and successfully disposed of all six engines.
- In October 2019, AFRRAD was called upon to quantify and dispose of DAF-owned depleted uranium (DU) counterweights from KC-10 Extender aircraft at a private maintenance contractor's facility in Greensboro, NC. AFRRAD personnel quickly and accurately determined the volume and radioactivity of the counterweights and expeditiously coordinated a disposal action through JMC. Thirty-four DU counterweights in nine 55-gallon drums were removed from the contractor's

facility and properly disposed of per Federal, State, and local regulations.

- In October 2019, a radioactive azimuth indicator, marked as "Property of the USAF," was discovered at a municipal waste landfill in Ooltewah, TN. AFRRAD was contacted and provided photos of the item. The radioactive material was identified as radium-226 and quantified by AFRRAD personnel using historical data. AFRRAD promptly contracted removal and disposal of the item through JMC and coordinated the action between the radioactive waste broker and the Chattanooga, TN Public Works Dept.
- In November 2019, a health physicist from the Iowa Department of Public Health (IDPH) contacted AFRRAD and requested assistance with over 300 jet engine ignition exciters containing RAM. The articles were generated by the DAF and purchased as scrap metal by a recycler in Bondurant, IA. When the recycler discovered the exciters contained unlicensed RAM, they were abandoned at two separate locations in Bondurant and discovered by the Health Department. AFRRAD researched and verified the RAM, quantified the radioactive cesium-137 sealed inside the units, and swiftly coordinated disposal with IDPH, JMC, and a radioactive waste broker.
- In December 2019, four DAF J-53 helicopter engines containing RAM were sold as scrap to a private recycler in Macon, GA. AFRRAD was called upon to identify and determine each engine's type and amount of RAM. The team expedited a shipping container to the facility and successfully oversaw the removal of the engines in coordination with the facility owner/operator and JMC.

These endeavors illustrate how the AFRRAD team successfully and efficiently protected both DoD and civilian personnel from

exposure to ionizing radiation and prevented the improper disposal of radioactive material, thereby avoiding costly violations and potential civil suits being levied against the DoD and the DAF. Currently, AFRRAD is spearheading a cross-agency effort to classify previously unidentified RAM in DoD weapons platforms and educate acquisition professionals throughout the DoD about radioactive waste disposition.



Decommissioned Nuclear Reactor

Decommissioned nuclear reactor at WPAFB home to AFRRAD. Also pictured is the National Museum of the USAF.

Fostering Partnerships

Recognized by the RICS and DAF Inspector General as a model program for over 20 years, AFRRAD has reliably supported organizations by delivering expert consultative services related to the management of LLRW and RAM shipments, permit compliance, RAM decontamination, radiation safety, radiation detection instrumentation and surveys, emergency response, and radioactive site restoration. In doing so, AFRRAD has fostered partnerships with each of the DoD services, non-DoD Federal agencies such as the National Aeronautics and Space Administration, the Federal Bureau of Investigation, and the Department of Homeland Security, and state/local governments and RAM recycling contractors.

AFRRAD collaborates with several DAF organizations, including the RICS, where they serve as an active voting member for the DAF

level unit. The RICS manages the DAF Master Materials License issued by the NRC, which grants authority for receipt, storage, internal distribution, use, and transfer of RAM and disposal of LLRW across the DAF. The team provides the RICS quarterly LLRW and RAM recycling metrics, annual review and input to DAF Manuals governing RAM management, and regular consultation to restore historic radioactive contaminated sites across the DAF. AFRRAD also partners with the Air Force Technical Application Center (AFTAC) that is tasked with decontamination of airborne sampling aircraft required to fly through clouds of radioactive debris, such as the Fukushima Nuclear Reactor fallout, and to collect and assess the types and extent of radioactive contaminants. AFRRAD personnel provides AFTAC expert reviews of published programs and procedures, ensuring plans incorporate effective aircraft and personnel decontamination, storage of radioactive wastes, and establishing “clean levels” necessary for aircraft to return to duty while minimizing personnel radiation exposures. AFRRAD partnered with Air Force Materiel Command headquarters logistics staff (AFMC/A4) to develop the first DAF-sponsored DOT Class 7 (radioactive) Specialist training. Despite multiple cancellations due to COVID, the AFRRAD team provided their first offering in May 2021 to a group of radiation safety, environmental media managers, and bioenvironmental troops at Nellis AFB. AFRRAD has a longstanding partnership with the Air Force Institute of Technology. Between October 2020 and August 2021, twenty-one (21) Masters and Doctoral Engineering Physics students completed laboratories under the direct supervision of AFRRAD personnel, introducing them to the proper use and calibration of radiation detection instrumentation and radiation protection while using highly radioactive sources.

AFRRAD regularly collaborates with other DoD services through the Low-Level

Radioactive Waste Defense Advisory Committee (DAC). DAC membership includes the Office of the Director of Army Safety, JMC Risk Management Division, Navy Radiological Affairs Support Office, U.S. Army Corps of Engineers, Defense Logistics Agency, Army Futures Command, Army Contracting Command, and AFRRAD. AFRRAD, with the other DAC members, draft and coordinate DoD LLRW policy. AFRRAD also maintains an established partnership with the Army who serves as the DoD lead agent for LLRW disposal. JMC personnel within the Rock Island Arsenal provide AFRRAD access to radioactive waste broker contracts for AF LLRW disposal actions, while AFRRAD provides JMC with an avenue for RAM recycling. AFRRAD also partners with the Navy for RAM recycling and consultative support. In FY21, AFRRAD provided the Navy with direction on properly managing radioactive materials in museum artifacts. Most recently, AFRRAD provided the Navy with a RAM recycling outlet for over 400 shipboard chemical agent detection alarms, which once disassembled, will reduce waste volumes by over 99% and recycle the radioactive sources.



Navy ACADA Disassembly

AFRRAD disassembling a Navy Shipboard Chemical Agent Detector Alarms. The team partners with DoD and other Federal agencies for radioactive material recycling saving valuable taxpayer money.

The significance of the global impact AFRRAD has fostered over the last two years is only equaled by their commitment to advance and expand partnerships, capabilities, and service to Federal agencies, state/local governments, and the environmental industry. AFRRAD stands ready at all times to assist the DAF and DoD community with RAM and LLRW mission requirements as proven through years of dedication to environmental quality and as a 2021 DAF General Thomas D. White Environmental Award winner.