A Brief Synopsis of Army Contributions to Early Health Physics and Nuclear Engineering

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Class of ‘92

The views presented are those of the speaker and do not necessarily represent the views of the U.S. Army
A Brief Personal History

• 1978 Commissioned in the Army Chemical Corps
• 1979 Assigned to lead Army “Alpha Team”
• 1980 Assigned as Ft Ord RSO
• 1982 to 1984 Taught Radiological Safety Course
• 1984 Resigned from Army and then….
Health Physicist—What’s that?
Taking radiographs aboard Relief at Siboney, Cuba, 1898.

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Early Guidelines from 1898

In 1900, Captain William C. Borden published his landmark monograph, *The Use of the Rontgen Ray by the Medical Department of the United States Army in the War With Spain (1898)*, which codified the Army Medical Department's wartime X-ray data.

Borden concluded that the two most important factors for the production of X-ray burns were the *time of exposure* and the *proximity of the cathode tube* to the body surface.

Guidelines were proposed to protect patients.
- exposure should never exceed 30 min;
- the X-ray tube should never be closer than 10 inches (25.4 cm) from the body
- repeated exposures should never be made within 3 days of the previous exposure,
Manhattan Engineering District (MED) Medical Section (MS)

- Medical Section
  - COL Warren, MD
- Industrial Medicine
  - CPT Ferry, MD
- Medical Research
  - MAJ Friedell, MD
- Clinical Medicine
  - LTC Rea, MD
Manhattan Engineering District
Industrial Medicine Branch

• **Objective:** Identify & control the industrial hazards associated with atomic processes
  – Medical Corps
  – Corps of Engineers

• Metallurgical Laboratory Oversight
  – Clinton Laboratories
  – Hanford Engineer Works
  – Monsanto Chemical Company Plant
  – Monitored University of Rochester’s Industrial Medicine Research Program.
15 Officers & 12 Enlisted Men

- Clinton
- Metallurgical Lab
- Los Alamos
- University of Rochester
- Nagasaki team (COL Warren)
- Hiroshima team (LTC Friedell)
- Negotiations team (IRC, AMEDD, USA, MD)
1950s

- Weapons program
- Nuclear research
- Teaching
- Four Nuclear Weapons Medical Officers (MOS 3304)
- Four Nuclear Medical Science Officers (MOS 3308)
1st Radiation Safety Support Unit

- Organized on Dec 8th, 1952 at Ft. McClellan, Alabama
- Assigned to the Chemical Corps Training Command
- Redesignated on May 10th 1959 as the U.S. Army Chemical Corps Radiological Unit
- Relocated to Dugway Proving Ground, Utah on October 23rd, 1960
- Decommissioned on August 1st 1962 and it's assets reorganized as a U.S. Army Material Command activity
- Supported Nuclear weapons tests and conducted radiological safety training
Army Chemical Corps Radiological Unit ~ 1960

Unit Headquarters

Service Platoon
- Instrument Repair Section

Dosimetry Platoon
- Supply Section
- Monitoring Section

Operations Platoon
- Decontamination Section
- Rad-Chem Lab Section (Navy)
Army Chemical Corps Radiological Mission

- June 1958 Chemical Corps Radiological Warfare Mission Approved
  - Chemical Corps officers as the U. S. Army’s experts in radiological warfare
  - Technical responsibility for radiological warfare and radiological defense to include research and development on RW agents
  - Disposal of Army radioactive wastes
  - Health physics, exclusive of responsibilities directly assigned to the Surgeon General
  - Radiological Safety Support of JTF-7 and Nevada Test Site
  - Development of rapid and continuous monitoring and surveying
  - Conducting courses of instruction in radiological safety
  - Reduction of radiological hazards resulting from atomic hazards from accidents when nuclear materials are in custody
Radiological Safety Course

• Established 1958
• Emphasizes radiological safety instead of traditional radiological defense
  – Plan, detect, and control hazards resulting from:
    • Use and handling of radioactive materials
    • Materials resulting from nuclear detonations
• Expected to train
  – Commissioned officers
  – Civilian personnel
  – Atomic Energy Commission personnel

Signed by:
W.R. Currie
Brigadier General, USA
Asst CCmLO for Planning & Doctrine
Army Nuclear Power Program
1954 to 1977

SM-1A – Ft Greely
PM-1 – Sundance
SL-1A – NRTS
MH-1A – Sturgis
PM-3A – McMurdo
SM-1 – Ft Belvoir
PM-2A – Camp Century
Background
Army Nuclear Power Program

• Background
• There was interest in the possible application of nuclear power to land-based military needs as early as 1952.
• A memo from the Secretary of Defense, dated 10 Feb 1954, assigned the Army the responsibility for:
  – "developing nuclear power plants to supply heat and electricity at remote and relatively inaccessible military installations."
  – The Department of the Army (DA) established the Army Nuclear Power Program and assigned it to the Corps of Engineers.
  – Shutdown 1977
ANPP significant accomplishments

- Detailed designs for pressurized and boiling water reactors, as well as gas-cooled and liquid-metal cooled reactors.
- First nuclear power plant with a containment structure (SM-1)
- First use of stainless steel for fuel element cladding (SM-1)
- First nuclear power plant in the US to supply electrical power to a commercial grid (SM-1)
- First in-place reactor vessel annealing, using nuclear heat source, in the US (SM-1A)
- First steam generator replacement in US (SM-1A)
- First pressure-suppression containment (SM-1A)
- First operational boiling-water reactor power plant (SL-1)
- First portable, pre-packaged, modular nuclear power plant to be installed, operated, and removed (PM-2A)
- First use of nuclear power for desalinization (PM-3A)
- First land-transportable, mobile nuclear power plant (ML-1)
- First nuclear powered closed-loop (Brayton) gas turbine cycle (ML-1)
- First floating (barge-mounted) nuclear power plant (MH-1A)
Nuclear power plant operator training

• The Nuclear Power Plant Operator Course (NPPOC) was conducted at Ft. Belvoir.

• Applicants for the program were enlisted men who had to commit to serving a minimum of two years after completion of training.

• Requirements for admission to the NPPOC included aptitude test scores at least as stringent as those required for admission to Officer Candidate School.

• Over 1,000 Nuclear Power Plant operators were licensed between the years 1958 through 1977.

• The NPPOC was an intense and academically challenging year-long course.

• Many operator transferred to Medical Service Corps and Army Chemical Corps following termination of the program.
History of Army Radiation Safety Program

• Separate, almost independent programs dating from 1950s:
  – Medical Department – AR 40-580
  – Logistics community – AR 700-52
  – Army Corps of Engineers
• No HQDA subject matter expert
• Radioactive commodity problems
• IG inspection of Army reactors
• Laser, radioactive commodity, and microwave proliferation
General Approach Today

• Centralized policy
  – Army Radiation Safety Officer
  – Army Radiation Safety Council

• Decentralized administration
  – Army Commands – mission programs
  – Installations – garrison programs
  – Army Reactor Office
Discussion

There is always room for miscommunication