



# Radiation Emergency Responder Protection & EPA PAGs Manual

June 26, 2008

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# Overview

- Worker protection standards
- Emergency responder protection
- EPA PAGs Manual
- Turnback levels



# Worker Protection Standards

- 5 rem per year for Nuclear Regulatory Commission licensees
- State radiation protection rules
- Occupational Safety and Health Administration standard:
  - Whole body limit = 1.25 rem/qtr or **5 rem (50 mSv) per year**
  - Lifetime dose **accumulation = 5 x (N-18) rem** where **N = age**. Up to 3 rem/qtr if lifetime accumulation not exceeded.



# HAZWOPER applies to...

## HAZWOPER applies to five distinct groups of employers and their employees as specified by 1910.120(a)(1)(i-v) and 1926.65(a)(1)(i-v):

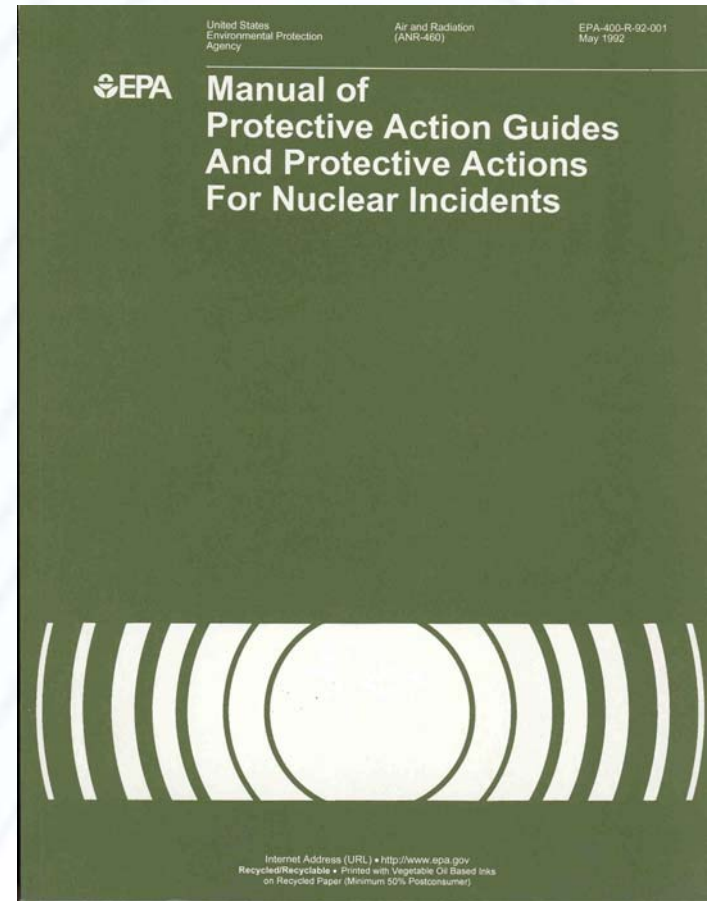
- clean-up operations -- required by a governmental body, whether federal, state, local, or other involving hazardous substances -- that are conducted at uncontrolled hazardous waste sites;
- corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq.);
- voluntary clean-up operations at sites recognized by federal, state, local, or other governmental body as uncontrolled hazardous waste sites;
- operations at facilities regulated by Title 40 Code of Federal Regulations Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with U.S. Environmental Protection Agency to implement RCRA regulations; and
- **emergency response operations for releases of, or substantial threats of releases of, hazardous substances regardless of the location of the hazard.**



# EPA PAG Manual Worker Guidance

EPA recommendations for emergency responders:

- 5 rem for all operations
- 10 rem for protecting valuable property
- 25 rem for life saving or protection of large populations on a volunteer basis



# What is a Turnback Level?

- A measurable level where checking in with supervision is a good idea
- Keep doses ALARA – as low as reasonably achievable – use dose sharing, mission justification, alternative work practices to minimize worker doses
- Turnbacks are NOT truly where you turn back, never to return!



# EPA's Turnback Levels



- Supplement existing worker radiation exposure control
- Fill the need for exposure *rates*
- Address higher levels than EPA's administrative limits (which are designed for daily operations)
- Emphasize volunteerism for higher doses
- Add alpha-only and beta-only guidelines
  - 10 R/hr in early phase for critical actions
  - 1.5 R/hr in intermediate phase
  - Daily operations levels in late phase



# Biological Effects of Acute Doses

**Table 5: Potential Biological Effects of High Doses of Radiation in a Short Time Frame**

| Dose (Rad)* | Dose         | Potential Biological Effects   |
|-------------|--------------|--|
| 1,000       | 1,000,000 mR | death due to central nervous system damage within hours  |
| 350         | 350,000 mR   | No treatment: death within 60 days for 50% of exposed population (with treatment, up to 800 Rad) |
| 300         | 300,000 mR   | female sterility   |
| 200         | 200,000 mR   | male sterility   |
| 100         | 100,000 mR   | nausea   |
| 25          | 25,000 mR    | detectable blood changes   |
| 15          | 15,000 mR    | temporary decreased sperm count  |

\* For x and gamma radiation, Rad ~ rem ~ Roentgen (R). Note that these are total doses that if received over a very short timeframe, may manifest the harmful biological effects. If the large doses are received over longer timeframes, biological effects may or may not be manifested.



# DC-area Firefighter Turnbacks



Fire Departments provide Hazardous Materials response in National Capitol Region

DC and nearby jurisdictions use the same protocols for consistency

- Hot Zone: Over 10 R/hr
- Absolute Turnback: 200 R/hr



Questions or comments?

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