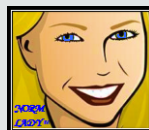




Oil and Gas TENORM Field Applications

Geri Blanchard, MS, REM, CSP
NORM SOLUTIONS LLC



HAZARDS & RISKS

ALARA

- ☢ Most fundamental radiation concept
- ☢ Protect workers, general public, and environment
- ☢ Involves a risk, no matter how small
- ☢ **INHALATION & INGESTION**

LITIGATION/LIABILITY

- ☢ Lawsuits – Health & Property

COMPLIANCE

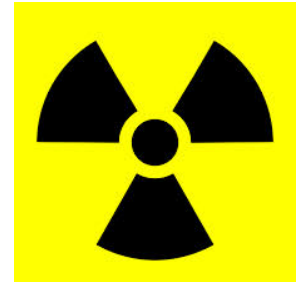
- ☢ **NORM/TENORM = Waste**
- ☢ Avoid fines and/or enforcement



RADIATION PROTECTION PLANS

DETERMINING THE NEED & USE FOR THE PLAN

- ☉ WHY? - Hazards? Compliance? Liability?
- ☉ GENERAL LICENSE OR SPECIFIC LICENSE?
- ☉ WPP/RPP stand alone?
- ☉ Incorporate into a safety plan? SOP? Policy?
- ☉ Decommissioning Plan needed?



REGULATIONS FOR ALL OPERATING AREAS

- ☉ One Facility? Multiple States? Multiple Countries?
- ☉ Structure depends on regulations and/or BMP



HANDLING NORM/TENORM

General Licensee – Refer to State Radiation Protection Rules!

Worker Protection Worker Training – get trained!

- ☢ **NORM Awareness**
- ☢ **NORM Worker**
- ☢ **NORM Surveyor**
- ☢ **Radiation Safety Officer (RSO)**



Secure the location/equipment with notices & signs

- ☢ **DO NOT LABEL IF YOU ARE NOT REQUIRED TO!**
- ☢ **DO NOT STATE A HAZARD YOU DO NOT HAVE!**



ENSURING WORKERS UNDERSTAND NORM LIMITS

STEP 1 – EFFECTIVE WPP/RPP

- ☼ Meets ALARA with social, economic and practical factors
- ☼ Meets Companies operational needs

STEP 2 – EFFECTIVE TRAINING

- ☼ Complies with State requirements
- ☼ Company Specific
- ☼ Easy to Understand

STEP 3 – EFFECTIVE REVIEWS

- ☼ Annual reviews are performed by qualified, competent responsible person with authority (NORM RSO trained)
- ☼ Maintain



TIME CALCULATION DOSE SCENARIOS

$$50 \mu\text{R/hr} \times 2,000 \text{ hrs} = 0.1 \text{ Rem/yr}$$

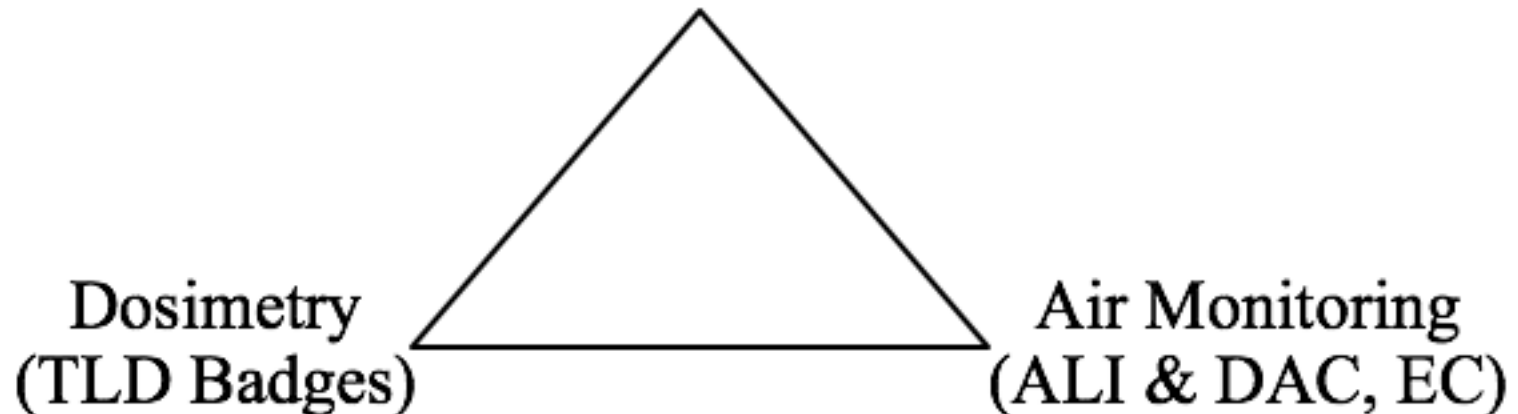
- ⊛ 1R:1REM (field method)
- ⊛ 2,000 hrs (working year, 40 hours per week, 50 weeks per year)
- ⊛ Create dose scenarios involving employees and contractors
- ⊛ ***DON'T FORGET ABOUT THE 2 MREM in ANY GIVEN HOUR! APPROX. 2,000 $\mu\text{R/hr}$***



ANALYZING RISKS

DOSE ASSESSMENT TRIANGLE™

Survey Readings &
Time, Distance, Shielding Calculations



ANNUAL DOSE LIMITS

OCCUPATIONAL WORKERS:

5 rem per year dose limit;

No adverse health effects for 50 years



GENERAL PUBLIC:



0.1 rem per year dose limit, and not to exceed 2 mRem in a given hour.

2 mRem/hr = 2,000 μ R/hr (1Rem:1R)



ASSESSING DOSE

DOSIMETRY BADGES:

- ☼ Only worn by Occupational Workers***
- ☼ Measure beta particles and gamma rays
- ☼ Typically the only individual dose record



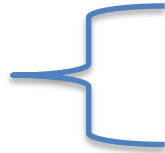
AIR MONITORING:

- ☼ Occupational Workers & General Public
- ☼ Back calculated into mRem for TEDE
- ☼ Analyzed for gross alpha and beta ($\mu\text{Ci/mL}$)



PRODUCT TRENDS

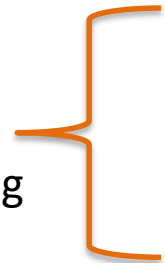
Oil Wet Gas
& Water



☢ **Radium²²⁶ – 96% ALPHA, 4% GAMMA**

☢ **Radium²²⁸ - 100% BETA (NO GAMMA)**

Dry Gas
& Gas
Processing



☢ **Radon²²² – 100% ALPHA**

☢ **Lead²¹⁰ - 100% BETA (LOW GAMMA)**

☢ **Polonium²¹⁰ – 100% ALPHA**

☢ **HIGHEST CONCENTRATIONS:**

☢ **PROPANE/PROPYLENE**

☢ **ETHANE/ETHYLENE**



PREVENTING AIRBORNE EXPOSURES

ALPHA AND BETA INHALATION:

- ☢ Alpha and beta particles are not an issue while equipment is in-service
- ☢ Perform work in closed-loop systems when possible
- ☢ Use wet methods to reduce dusts
- ☢ **WEAR APPROPRIATE RESPIRATOR*****



RELEASES – ROOT OF LITIGATION

CONDITIONAL RELEASE:

- ☢ Equipment/property must be used for its intended function
- ☢ Transaction should be between similar parties
- ☢ Equipment/property may be NORM-contaminated; however must be disclosed to the opposing party



RELEASE FOR UNRESTRICTED USE:

- ☢ Used by anyone for any purpose
- ☢ Equipment/property is NOT used for its intended function
- ☢ Equipment/property MUST be decontaminated!!!



ROUTINE MAINTENANCE: CRCPD PART N.10(c) GENERAL LICENSEE

Employees or contractors under control and supervision of a general licensee may perform routine maintenance on equipment, facilities, and land owned or controlled by the general licensee.

DECONTAMINATION: SPECIFIC LICENSEE

Maintenance that provides a pathway for exposure different from that found in periodic maintenance operations and that increases the potential for additional exposure is not considered routine maintenance.

The decontamination of equipment, facilities, and land shall be performed only by persons specifically licensed by the Agency, an Agreement State, or another Licensing State to conduct such work.



NORM/TENORM ISSUES

Pre-work Equipment/Well Surveys

- ☢ Who surveys and when?

Work Planning

- ☢ Equipment & Site Prep
- ☢ JSA/Personnel Protection
- ☢ Waste Minimization & Management

Job Execution

- ☢ Site Management & Plan Execution

Survey

Results/Communication

- ☢ Who's survey do you use?
- ☢ How are the results communicated?

Close Out

- ☢ Site & Equipment Releases
- ☢ Labeling/Packaging
- ☢ Manifesting & Recordkeeping



The logo features a stylized orange oil drop on the left, with a blue flame-like shape rising from its top. To the right, the text "Oil & Gas" is written in orange and blue, followed by "Safety and Health" in black, "CONFERENCE" in grey, "2016" in grey, and the OSHA logo (a blue circle with a white 'O') and "OSHA" in black. Below this, "Exploration & Production" is written in bold black text.

Oil & Gas
Safety and Health
CONFERENCE
2016 **OSHA**[®]
Exploration & Production



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