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We Have Solutions for Your **NORM** Problems

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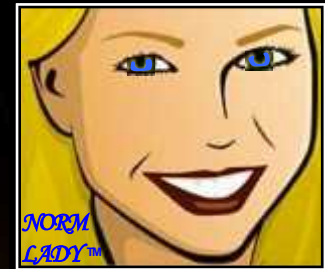
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**NORM IN THE  
OIL AND GAS INDUSTRY**

**NTEPS**

**AUGUST 17, 2018**

**HEAVY OIL & GAS  
PRODUCING STATES WITH  
NORM/TENORM-SPECIFIC  
REGULATIONS**

- ARKANSAS
- LOUISIANA
- MISSISSIPPI
- NEW MEXICO
- NORTH DAKOTA
- OHIO
- TEXAS
- WEST VIRGINIA

**NON-HEAVY OIL & GAS  
PRODUCING STATES WITH  
NORM/TENORM-SPECIFIC  
REGULATIONS**

- FLORIDA
- GEORGIA
- MAINE
- MICHIGAN
- MINNESOTA
- NEW JERSEY
- OREGON
- SOUTH CAROLINA



## GENERAL LICENSEES

- Authorized by Rule
- Anyone who owns, possesses, uses, transfers, **(transports)**, stores, processes, and maintains NORM/TENORM
- Not authorized to perform decontamination
- Requires Radiation Protection Plan or Worker Protection Plan
- Must follow radiation protection regulations
- Responsible for knowing what they have (surveying)

## SPECIFIC LICENSEES

- Applied for and Granted
- Decontamination Companies (Temporary Jobsite/Mobile Site and/or Fixed Facility Authorization)
- Not authorized to store waste for other persons unless authorized under the license
- License contains additional requirements beyond what is stated within regulations
- May possess reciprocity licenses in addition to their resident license



# **HAZARDS & RISKS**

☢IDENTIFY – SURVEY/SAMPLE

☢POLICIES & PLANS

☢DECON/MAINTENANCE

☢TRANSPORTATION

☢RELEASES

☢DISPOSAL/RECYCLING





# **CREATING A STRATEGY**

## **DETERMINING THE NEED & USE FOR THE RADIATION PROTECTION 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



# **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 Checks/Balances and Enforce Corrective Actions



# HAZARDS & RISKS

## ALARA

- ☢ Most fundamental concept when discussing radiation
- ☢ Regulations are in place to protect workers, general public, and the environment
- ☢ Involves a risk, no matter how small
- ☢ **INHALATION & INGESTION**

## LITIGATION/LIABILITY

- ☢ Lawsuits – Health/Property

## COMPLIANCE

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

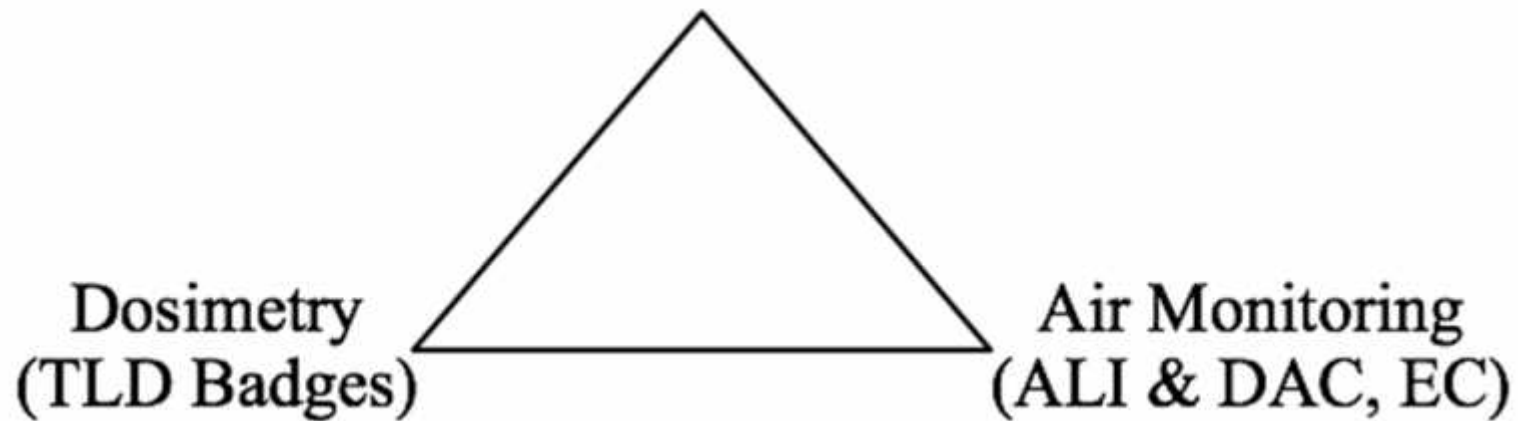




# ANALYZING RISKS

## DOSE ASSESSMENT TRIANGLE™

Survey Readings &  
Time, Distance, Shielding Calculations





# **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.

$2 \text{ mRem/hr} = 2,000 \text{ } \mu\text{R/hr}$  (1Rem:1R)



# TIME CALCULATED 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  $\mu\text{R/hr}$



# **NORM SURVEYING QUESTIONS**

**Q: When do I survey?**

**A:** Regulations rarely state when surveys must be performed. Opening equipment and lines, rentals, buying/selling, transfers, transportation, maintenance, decontamination, etc.

**Q: How often do I survey?**

**A:** No time frame is stated in rules. You are responsible for managing the NORM contamination. Product volumes and changes to systems may warrant more frequent surveys.





# **PRACTICAL TIPS FOR NORM SURVEYORS**

## **When conducting NORM surveys:**

- ⊛ Bring along an extra cable
- ⊛ Use only meters calibrated in the last 12 months
- ⊛ Check the meter response before and after the survey -  
+20% accuracy
- ⊛ Be aware of multiple sources
- ⊛ Do not drop equipment
- ⊛ Record all pertinent information
- ⊛ Never use the meter in combustive atmospheres





# ASSESSING DOSE

## DOSIMETRY BADGES:

- ☼ Only worn by Occupational Workers\*\*\*
- ☼ Measure beta particles and gamma rays
- ☼ Typically the only individual dose record kept on NORM decontamination workers

## AIR MONITORING:

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



# **SAMPLING FOR WASTE CHARACTERIZATION**

- ⊗ Responsibility of the Generator
- ⊗ Sample Collection – EASY
  - ⊗ Size of your Fist
  - ⊗ First 15 centimeters ~ 6.5 inches
  - ⊗ NOT Air-tight
  - ⊗ NOT Preserved on Ice
- ⊗ What do you do when you have an insufficient volume of waste to sample? SEND:
  - ⊗ Wipe Test Smears to the Lab
  - ⊗ Small Piece of Contaminated Equipment to Lab
  - ⊗ Air Sample Filter Papers to Lab



# GAMMA SPECTROSCOPY

- ☢ Credible Disposal Facilities Use Profiling and Acceptance Procedures
- ☢ DO NOT ONLY USE EXPOSURE READINGS!
- ☢ Analytical Data – Gamma Spectroscopy (Radon<sup>222</sup> is not analyzed by gamma spectroscopy since it is a gas)
- ☢ Always Check with the Facility on which Radionuclides Need to be Represented on the Analytical Report!

☢ Radium<sup>226</sup>

☢ Radium<sup>228</sup>

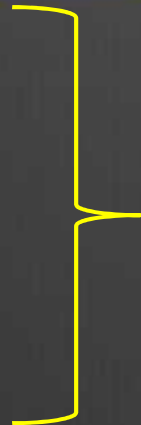
☢ Lead<sup>210</sup>

☢ Polonium<sup>210</sup>

☢ Bismuth<sup>214</sup>

☢ Thorium<sup>228</sup>

☢ Total Activity



DEFAULT  
RADIONUCLIDES



# PRODUCT TRENDS

Oil Wet  
Gas &  
Water

- ☢ Radium<sup>226</sup> – 96% ALPHA, 4% GAMMA
- ☢ Radium<sup>228</sup> - 100% BETA (NO GAMMA)

Dry Gas  
& Gas  
Processing

- ☢ Radon<sup>222</sup> – 100% ALPHA
- ☢ Lead<sup>210</sup> - 100% BETA (LOW GAMMA)
- ☢ Polonium<sup>210</sup> – 100% ALPHA





# PREVENT 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\*\*\***



## **ROUTINE MAINTENANCE: *CRCPD PART N.10(c)***

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:**

*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.*

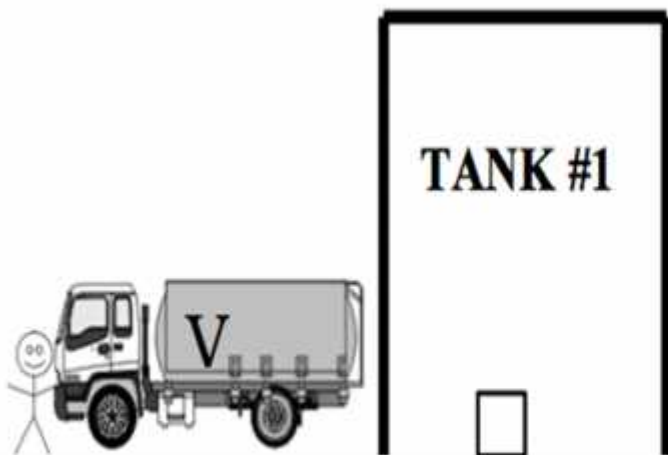
The decontamination of equipment, facilities, and land shall be performed only by persons specifically licensed by the Agency, an Agreement State, or another Licensing State to conduct such work.



# MAINTENANCE VS. DECONTAMINATION

## MAINTENANCE

NO ADDITIONAL  
AIRBORNE PARTICULATES  
CLOSED-LOOP SYSTEM  
NO RESPIRATORS  
NO VESSEL ENTRY



## DECONTAMINATION

ADDITIONAL AIRBORNE PARTICULATES  
OPEN-LOOP SYSTEM  
RESPIRATOR USAGE  
VESSEL ENTRY AND CONFINED SPACE  
ENTRY  
SOIL REMEDIATION





# **MAINTENANCE VS. DECONTAMINATION**

## **“HOT” ISSUES:**

- ⊙ RESPIRATOR USAGE DICTATING DECON ACTIVITIES
- ⊙ TEMPORARY JOB NOTIFICATIONS
- ⊙ GENERAL PUBLIC VS. OCCUPATIONAL WORKER
- ⊙ CONTAMINATED FILTER DISPOSAL





# **RELEASES**

## **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!!!



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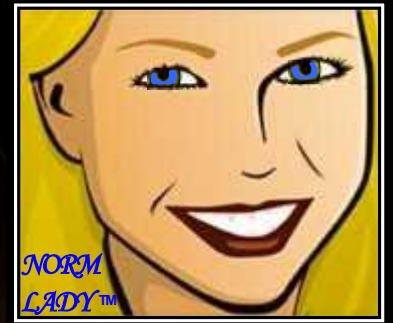
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QUESTIONS?

ASK THE NORM LADY™!

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STAY ABREAST OF NORM/TENORM AND  
SUBSCRIBE TO THE **NEWS FROM THE NORM LADY™**  
E-MAIL DISTRIBUTION LIST AT  
**WWW.NORMSOLUTIONS.COM**  
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