

# ENVIRONMENT AND SAFETY WORKGROUP

Progress on TENORM Guidance Document

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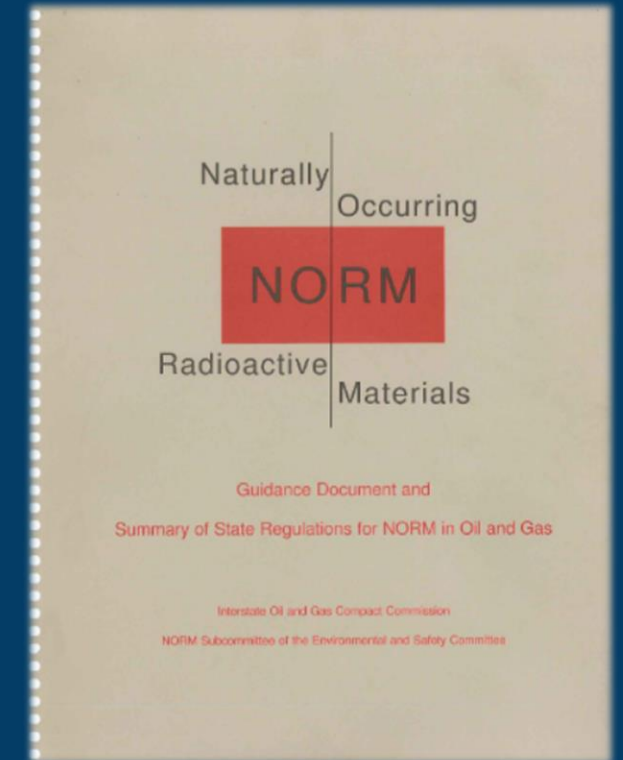
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# OBJECTIVES

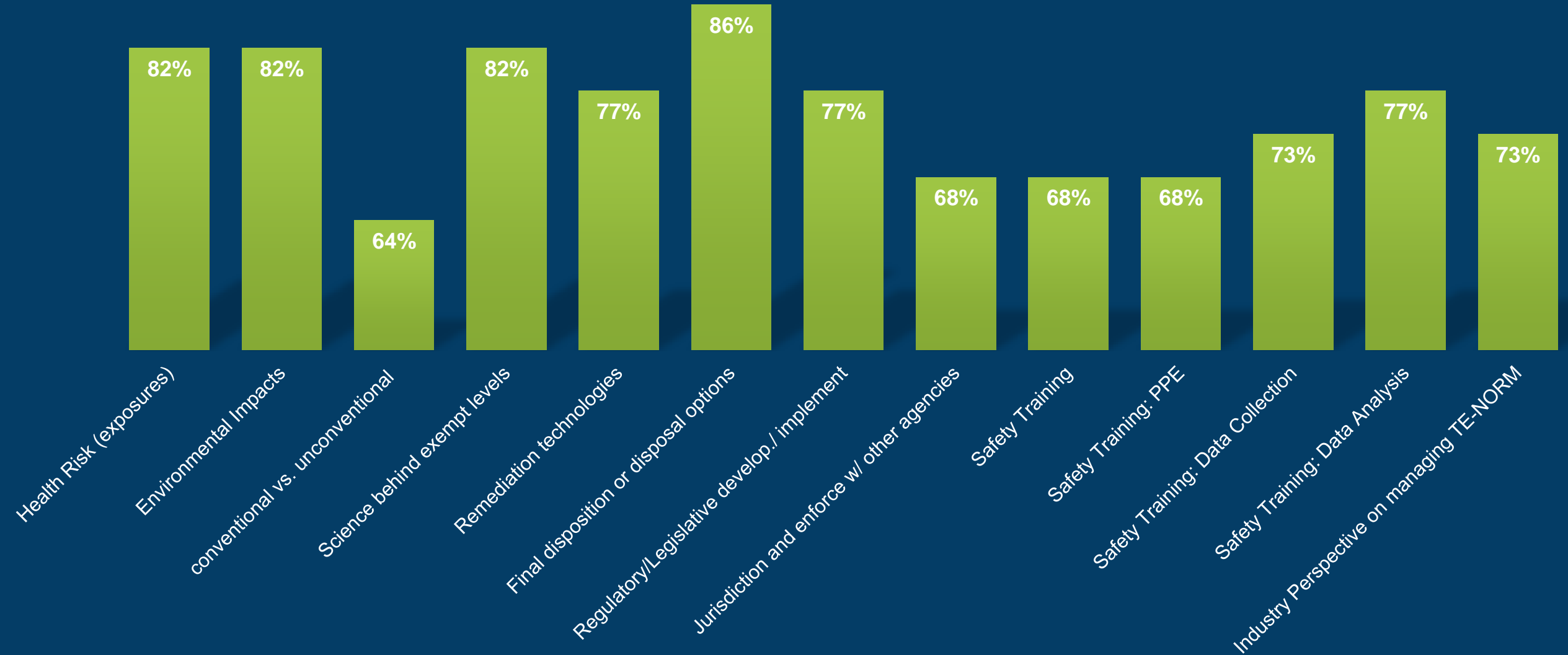
- Update, amend and / or replace 2008 NORM Guidance Document
- Identify current topics of concern amongst member states
- Collaborate with recognized experts
- Obtain current scientifically-based information
- Provide valuable information and resources

# OVERVIEW OF 2021 ACTIVITIES

- Initial review and strategies for updating 2008 doc – March
- Submitted questionnaire for all Member States - May
- Reviewed 18 topics of interest – July
- Created objectives for each topic – August
- Invited specialist to participate in project – September
- Topic assignments and research– October
- Draft reports and prioritization of topics - November



# SURVEY RESPONSE



# 2021 TENORM PARTICIPANTS

<u>Members</u>	<u>Agency</u>	<u>Position</u>
David Allard	PA	Director of BRP
Steven Carlson	OK	TENORM Technical Support
Phil Egidi	HPS	EPA - DC
Rick Henderson	MI	Field Operations Section Manager
Scott King	OH	Intra-state coordination and enforcement
Dr. Carl Lam	Chevron	Senior Waste Technology Engineer
Chuck McCracken	OH	Policy development and implementation
Harry Newman	NewTech	President, CEO
Eric Rodriguez	New York	Mineral Resource Specialist
Philip G. Simpkin	Baker Hughes	Radiation Safety Advisor
Jared Thompson	AR	Retired, Director of BRC
TR Wentworth	MI	Radiological Protection Section Manager
Amy Childers	IOGCC	Executive Project Manager
Leslie Savage	TX	Environment and Safety Chair
Kaitlyn Smith	IOGCC	Technical Coordinator
Robyn Strickland	OK	Environment and Safety Vice Chair
Scott J. Winters	IOGCC Sub	TENORM Subcommittee Chairman

# SCIENCE BEHIND EXEMPT LEVELS

- Dose Limits (General Public and Radiation Workers)
  - Perspective of Linear No-Threshold (LNT)
  - Science vs. Regulatory enforcement (political perspectives)
- Environmental Protection
  - Contamination control
  - Soil concentration limits
  - Waste management
- Screening, Control and Restrictions
  - Identifying potential concerns
  - Protecting Personnel and Property

# HEALTH RISK EXPOSURES

## AGENCY WORKERS

- Onsite Inspections
  - Well heads and Terminal stations [external]
  - Pigging operations and other maintenance activities [internal]
  - Storage, waste processing or disposal site [external & internal]
- Emergency response [external & internal]
  - Production facilities
  - Transportation incident
    - Pipeline, truck, rail or barge
- Environmental controls help reduce potential for exposures



# ENVIRONMENTAL IMPACTS

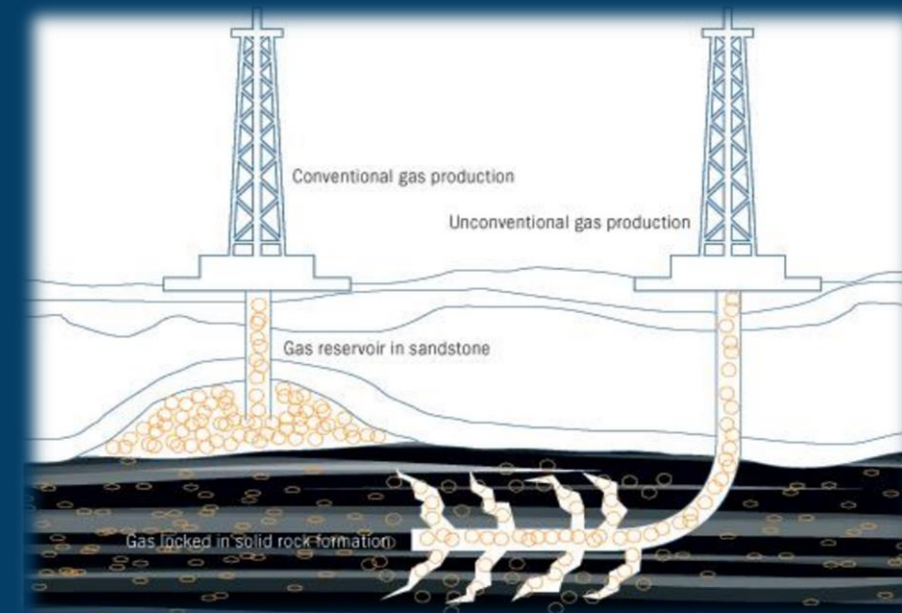
- Property
  - Active well and legacy sites, access roads, terminals, storage areas
  - Maintenance shops (third-party), re-use and recycle materials
- Equipment
  - Tubing, piping, pumps, valves, tanks, trucks
    - Owned or leased
- Media
  - scale, sludges, fluids, contaminated soils, groundwater, etc.





# PRODUCTION VARIABLES AND TENORM UNCONVENTIONAL

- Basin, depth, structure, thermal maturation level, reservoir chemistry
- Age of production
  - Lower hydrocarbon production resulting in increase ratio of formation water
- Production methods
  - Gas lift, sub-pumps increase fluid volumes
- Radium highly soluble in oilfield brines
  - Calcium, barium scales, sludges, and cuttings
- Variables reinforce need for radiological assessment
  - Probability of increased concentrations
  - Non-linear relationship



OCC 2021

# REMEDIATION TECHNOLOGIES

- **High pressure water (Hydro-blasting)**
  - Common methods to clean scale from NORM-impacted equipment, pipes and tubing
  - NORM impacted aerosols – potential respiratory and cross-contamination issues
  - Contaminated water requiring treatment
- **Drilling / reaming**
  - Clean production tubing and pipes (dry operations)
  - Airborne, cross-contamination and related containment issues
- **Vacuuming** (wet or dry systems)
  - Remove loose material before manual handling or cleaning of NORM equipment.
  - Must be properly filtered, monitored and rotated frequently



# FINAL DISPOSITION / DISPOSAL

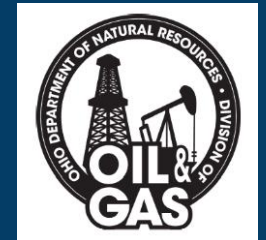
- **Injection of Sludge and Scale**
  - Well to be plugged and abandoned or fractured into formations that are isolated geologically to ensure groundwater is protected
- **NORM-permitted waste landfills**
  - Cells that typically require permitting and environmental monitoring [2,000pCi/g]
  - Lower limits for non-hazardous or sanitary waste landfills [50 pCi/g]
- **Overboard discharge (for off-shore operations)**
  - Low-level drill cuttings and produced water in certain regions
  - Limits on discharged stream characteristics, radioactivity and specific offshore permitting
- **Burial**
  - Certain international regions at least 15 feet of land cover (minimize erosion)



# REGULATORY DEVELOPMENT AND IMPLEMENTATION

## 'THE' STATE OF OHIO

- Division of Oil and Gas Resources Management within the Ohio Dept of Natural Resources
  - Division has sole and exclusive authority to regulate O&G wells and production operations (2004)
- Law requires horizontal well owners to collect and analyze representative samples (2013)
  - Determine the concentration of Ra<sup>226&228</sup>, except class II injection or reuse in same application
- The Ohio Division's Radiation Safety staff (2016):
  - Plan preparation guidance
  - Conduct acceptance reviews
  - Inspect oil and gas waste facilities



# JURISDICTION AND ENFORCEMENT (INTER / INTRA) STATE OF OHIO

- Quarterly cross-agency jurisdiction coordination meetings include staff from:
  - Ohio Department of Health (ODH)
  - Ohio Environmental Protection Agency (OEPA)
  - Public Utilities Company of Ohio (PUCO)
  - Ohio Department of Transportation (ODOT)
- Reciprocal relationship with neighboring states
  - Coordinate waste shipments
  - Enforcement strategies



# RADIATION SAFETY TRAINING

- General awareness
- Limits
- PPE
- Surveys
- Sampling
- Program reviews
- Public relations

# DATA COLLECTION AND ANALYSIS

- Instrumentation
  - dose rate, activity, identifier
- Methodologies
  - Screening vs. exposure
- Recording
  - Survey details (smart database)
- Protocols
  - Release / transfers
- Sampling
  - Relationship between fixed and removable
  - Field assessments
  - Representative sampling
- Interpretation
  - concentrations
- Reporting
  - When and how

# INDUSTRY PERSPECTIVE

## PAIN POINTS

- Generator
  - Owned and leased land
- Contractors
  - Personnel
  - Equipment
  - Transportation
  - Remediation
  - Disposal (injection / landfill / waste site)
- Recycling equipment
  - No options due to RSP of steel mills
- Inconsistent domestic radiation limits
  - Screening dose rates
  - Dose Rates for equipment
  - Regulating background levels
  - Exemption status of products and byproducts
- Compliance
  - Multiple agency reporting
  - License applications
  - Multi-tiered Radiation Safety Program





# PROPOSED HPS POSITION STATEMENTS

- Position statements are official positions that the HPS takes on a topic. Positions are concise declarations regarding an issue relevant to radiation safety.
  - Position statements are prepared under the direction of the Scientific and Public Issues Committee (S&PIC) and approved by the Board of Directors.
- Consistency in domestic limits
- Regulating background
- Regulation of screening measurements
- Clarification of 'Representative' samples



# REGULATORY OVERVIEW

State	Agreement State (ref. 1)	General Radiation Provisions for TENORM or NORM	Oil & Gas Laws for TENORM or NORM or Laws for Disposal	Worker Protection	Public Protections	Scale	Sludge	Produced water	Drill cuttings	Contaminated equipment	Waste Management Practices										Limits (pCi/g)			
											Burial	Deep Well Injection	Licensed Land	Low-Level Rad Waste	Permitted Solid Waste	Non-Retrieved Flow-lines & Pipelines	Plugged & Aband. Wells	Incineration	Land-spread	Reuse		Treatment Prior to Disposal		
Alaska																								
Alabama																								
Arkansas	Y	NORM					Y			Y			Y											
Arizona																								
California	Y *		Y											Y										1,800 TENORM waste
Colorado	Y	Both	Y	Y	Y		Y			Y		Y	Y							Y	Y			2,000 TENORM waste
Connecticut																								
Delaware																								
Florida	Y *																							
Georgia	Y *	Both							Y	Y			Y											
Hawaii																								
Iowa	Y																							
Idaho	Y *													Y	Y									
Illinois	Y *		Y						Y				Y											2,000 TENORM waste
Indiana																								
Kansas	Y *		Y						Y													Y		10 pCi/g for Ra-226 and Ra-228
Kentucky	Y *		Y											Y				Y					Y	2,000 pCi/g TENORM waste
Louisiana	Y *	Both	Y	Y			Y			Y			Y	Y									Y	30 pCi/g Ra-226 and Ra-228 for nonhazardous oilfield waste at commercial facilities; 200 pCi/g
Massachusetts	Y *	TENORM																						

# ASSISTANCE FROM MEMBER STATES

- Proposed or enacted rules and guidance documents:
  - Including any legislation, rules or enforcement by other state agencies
  - Production, storage, treatment, remediation, and disposal
  - Licensing process for generators and service companies
  - Training, forms, records, reporting and audits
- IOGCC reaching out for more state regulatory details

# RECENT LITIGATION

- Identify recent judgements regarding TENORM
- Review corrective actions taken by affected party(s)
- Determine potential impact to regulatory plans
- Evaluate industry's response to ensure compliance



# 2021 TE-NORM SURVEY

Questions / Comments?

