ESSENTIAL INFORMATION
December 2016

Regulation of Oil & Gas Wastes Containing TENORM

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SUMMARY
This dataset explores how states handle the disposal of TENORM and/or NORM waste from oil and gas operations from all 50 states and the District of Columbia in effect as of December 1, 2016.

ABOUT REGULATION OF OIL & GAS WASTES CONTAINING TENORM & THE DATA
A growing number of states are developing laws, regulations, and policy standards governing disposal of technologically enhanced naturally occurring radioactive material (TENORM) waste and/or naturally occurring radioactive material (NORM) from high volume hydraulic fracturing (HVHF, or “fracking”). TENORM and NORM contain radioactive isotopes, Radium-226 and Radium-228, which decay further into radon. Radon is the second-leading cause of lung cancer in the United States. Indeed, studies show that radon levels increased in Pennsylvania during the time period that the state had increased shale gas extraction using HVHF.¹

Given the rise of HVHF in the past decade, certain states began to enact measures to protect both the public and workers from radiation exposure involved in well operations, transport and storage of oil and gas wastes. While many states have statutory requirements in their general radiation provisions, certain oil and gas states developed or are considering developing provisions specifically impacting oil and gas operations that govern the disposal of TENORM or NORM disposal.

This dataset explores how states handle the disposal of TENORM and/or NORM waste from oil and gas operations from all 50 states and the District of Columbia in effect as of December 1, 2016.

Some findings from the dataset include:

- Eighteen states have developed provisions or a required permit governing disposal of TENORM or NORM applicable to oil and gas industry: California, Colorado, Illinois, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, North Dakota, New Mexico, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Washington, and Wyoming. Only


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two states, Pennsylvania and Tennessee, do not explicitly set disposal limits in the law, regulation, guidance, or permit.

- Fourteen states are not agreement states (did not complete an agreement with the United States Nuclear Regulatory Commission to license byproduct radioactive material): Alaska, Connecticut, District of Columbia, Delaware, Hawaii, Idaho, Indiana, Michigan, Missouri, Montana, South Dakota, Vermont, West Virginia, and Wyoming. The remaining states all are agreement states.

- Nineteen states have general provisions governing the licensing of individuals or facilities to work with TENORM or NORM: Arkansas, Colorado, Georgia, Idaho, Louisiana, Maine, Mississippi, North Dakota, Nebraska, New Jersey, New Mexico, Nevada, New York, Ohio, Oregon, South Carolina, Texas Virginia, and West Virginia. Most these states establish the following exemption limits: 1.) 5pCi/g of Ra-226 and/or Ra-228 2.)150 pCi/g for any other NORM radionuclide.

- Five states, such as Colorado, Mississippi, New Mexico, South Carolina, and Texas have exemption limits ranging between 30 pCi/g and 50pCi/g for Radium-226 and Radium-228.

- Five states – Colorado, Louisiana, Mississippi, New Mexico, and Texas – have provisions that expressly protect oil and gas workers.

- Three states – Colorado, Mississippi, and New Mexico, have provisions protecting the public, which can be expressly applied to oil and gas operations.

- Four states – Georgia, Mississippi, New Mexico and Texas – have provisions relegating produced water as either TENORM or NORM.

- Three states – Illinois, Kansas, and Montana – include drill cuttings in the definition of NORM. Arkansas, Colorado, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Pennsylvania, Texas, and Wyoming include sludge; Arkansas, Colorado, Georgia, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Ohio, South Carolina, Texas, and Wyoming include scale; and, Arkansas, Colorado, Georgia, Louisiana, Maine, Mississippi, Montana, North Dakota, New Mexico, Ohio, Oregon, Pennsylvania, South Carolina, Texas, Virginia, West Virginia, and Wyoming include contaminated equipment in the provisions regarding TENORM/NORM.
Below is a chart summarizing the findings:

With regard to state regulation of types and methods of disposal of oil and gas waste containing radiation, the data shows:

- Ten states have prohibited the disposal of TENORM waste, either through prohibition of certain disposal methods, or prohibiting disposal of HF waste: Connecticut, Idaho, Illinois, Maryland, Maine, North Dakota, New York, South Dakota, Texas, and Vermont.

- The following four states have general bans on disposal of fracking waste: Connecticut, Maryland, New York, and Vermont.

- Colorado, Texas and New Mexico allow burial of TENORM or NORM waste;
• Four states – Kansas, Mississippi, New Mexico, and Texas – allow for land-spreading.

• Seven states allow for deep well injection: Colorado, Maine, Michigan, Mississippi, New Mexico, Ohio, and Texas.

• Mississippi, New Mexico, and Texas are the only states that allow for disposal of TENORM or NORM in plugged and abandoned wells.

Below is a chart summarizing the findings regarding state regulation of types and methods of disposal of oil and gas waste containing radiation:

**State Regulation of Disposal Options for O&G Wastes with TENORM or NORM**

**NAVIGATING THE DATA**

There are two ways to navigate the data by clicking the **Filter** tab or the **Explore** tab — for each option, the data can be visualized in a map and table format or in jurisdiction profiles.
**Filter**
The dataset homepage will default to the Filter tab. Here, users may answer a series of questions to learn more about the characteristics of the laws. Answering more than one question will show all the jurisdictions that meet the combined criteria. Criteria selected will be listed above the questions, and can be removed by clicking the white X or by clicking “Reset” above the questions.

**Explore**
Users can access Explore by clicking the Explore tab in the bar above the questions. Using Explore, users will see the answers to one question across all jurisdictions.

The primary questions in this dataset are:

1. Does the state have a specific provision regulating disposal of oil and gas wastes containing NORM or TENORM?
2. Does the state have a general provision regarding the licensing of NORM/TENORM?
3. Is this an agreement state?
4. Does the state law define TENORM?
5. Does the state law define NORM?
6. Does the state exclude TENORM from the definition of RCRA regulated wastes?
7. Does that state set any of the following disposal options? (check all that apply)
8. Does the state have provisions prohibiting the disposal of TENORM/NORM, applicable to the entire state?
9. Does the state have provisions for the protection of workers regarding TENORM/NORM that can be expressly applied to oil and gas workers?
10. Does the state have provisions that protect the public in regards to TENORM/NORM that can be expressly applied to oil and gas operations?
11. Does the state include produced water in the regulation of NORM or TENORM?
12. Does the state include drill cuttings in the regulation of NORM or TENORM?
13. Does the state include sludge in the regulation of NORM or TENORM?
14. Does the state include scale in the regulation of NORM or TENORM?
15. Does the state include contaminated equipment in the regulation of NORM or TENORM?

Several questions call for a text based or numeric response, and were therefore excluded from the query feature on the dataset homepage. The questions still appear in the downloadable data file, and are highlighted in grey. These questions also appear when clicking a state on the map to view a table summarizing that state’s laws.

**DISPLAYING THE RESULTS**
There are two display modes once criteria have been selected by using either the Filter or Explore tab — **Map** display mode and **Profiles** display mode.
Map Display
LawAtlas.org dataset homepages default to the map display mode. When querying the data using the Filter tab, all jurisdictions that meet the criteria selected will display in one tone of yellow. Those jurisdictions that do not meet the criteria selected will be colored gray. When querying the data using the Explore tab, the map will illuminate with colors from yellow to red that are associated with the various answer choices (the color-coding is defined by the key to the left of the map).

Below the map, a table will appear. Using the Filter or Explore tab to navigate the questions will change the display:

- Using the Filter tab, you can select an unlimited number of criteria and the applicable jurisdictions that meet the combined criteria will be displayed in the table below.
- Using the Explore tab, you can isolate a single criterion and the applicable jurisdictions will appear in the table below.

Profiles Display
The Profiles display presents the results of the criteria selected in a text-based format for each applicable jurisdiction. Using the Filter tab, jurisdictions that meet the criteria selected will display. Using the Explore tab, jurisdictions that meet the criterion selected will display. If no criteria are selected, the full profiles for each state will appear under both Filter and Explore.

Profile Legend
Within each Profile box, above the questions and answers, there are additional options and information useful in exploring the law:

<table>
<thead>
<tr>
<th>§§</th>
<th>Toggle Legal Text – Selecting this option will show all the legal text used to answer questions for this jurisdiction.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Toggle Full Place Profile – Selecting this option will show all questions and answers for this jurisdiction, regardless of what was selected using the Filter or Explore tabs.</td>
</tr>
<tr>
<td></td>
<td>Toggle Size – Selecting this option will make the profile larger, but will not change the information displayed.</td>
</tr>
</tbody>
</table>

Legal Text History – This interactive timeline displays when changes in the law have occurred within a jurisdiction. Using the arrows to the left or right, users may explore how the law has changed over time as new amendments to the law have been enacted. The timeline will change from gray to a shade of yellow when the jurisdiction passed its first relevant law. Each change in the law after that is marked by a break in the timeline.
Map and Profile Legend
There are a few symbols to be aware of in both Map and Profiles display modes:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td><strong>Section Symbol</strong> – Clicking this symbol will open a window that displays excerpts from the law that correspond to the question and answer.</td>
</tr>
<tr>
<td>!</td>
<td><strong>Caution Note</strong> – Clicking on this symbol will open a small window that displays text that describes important caveats about the question and answer.</td>
</tr>
</tbody>
</table>

DATASET RESOURCES
Each dataset homepage includes the following resources available for download:

- **Data**: The Data file exports in CSV format and may contain two tabs. The “Statistical Data” tab contains the legal variables coded in the dataset, displayed as values defined in the accompanying Codebook. The “Summary Data” tab contains the legal variables coded in the dataset in text form, as well as the accompanying citations and any caution notes that may be included. Note: if there is only one tab available for download it will be the “Statistical Data” as described above.
- **Codebook**: The Codebook defines all of the coded variables in the dataset. The Codebook lists the question, question type, variable name, variable value and variable label. The Codebook should be used in conjunction with the Statistical Data extract.
- **Research Protocol**: The Research Protocol is a comprehensive document that outlines the entire methodology of the project, including the scope, inclusion and exclusion criteria, data collection methods, definitions, coding scheme decisions, as well as the quality control process.
- **Summary Report**: The Summary Report provides a snapshot of important findings from the dataset.

ADDITIONAL INFORMATION

*This collection of laws does not provide legal advice nor does it address enforcement of laws, administrative policies, case law, or any other sources of law. Should you have a specific question about these laws in your state, please contact an attorney in your jurisdiction.*