

**AN ANALYSIS OF THE ADEQUACY OF  
FINANCIAL ASSURANCE REQUIREMENTS  
FOR OIL AND GAS INFRASTRUCTURE LOCATED  
ON STATE TRUST AND PRIVATE LANDS  
IN NEW MEXICO**

April 30, 2021



**THE CENTER FOR APPLIED RESEARCH, INC.**  
[www.centerforappliedresearch.com](http://www.centerforappliedresearch.com)

DENVER  
■  
(303) 294.0678

SAN FRANCISCO  
■  
(415) 310.1108

---

## EXECUTIVE SUMMARY

---

During 2020, nearly 370 million barrels of crude oil and 2 trillion cubic feet of natural gas were produced from approximately 60,000 wells (NMOCD, 2021) and transported by an estimated 35,000 miles of oil and gas pipeline throughout New Mexico (USDOT PHMSA, 2019). New Mexico state regulatory entities have jurisdiction over this infrastructure wherever it is located on private lands or state trust lands, and it is the role of these entities to ensure proactive measures are taken to minimize potential public, environmental, and fiscal liability risks created by infrastructure that is not operated or abandoned in compliance with state requirements. To this end, state regulatory entities may impose financial assurance requirements on oil and gas operations to reduce the public's liability posed by noncompliant infrastructure. The goal of this research effort was to generate an objective, data-driven analysis of the adequacy of current financial assurance requirements imposed by state regulatory entities to offset the potential public liability posed by wells, pipelines, and other oil and gas infrastructure located on private lands and state trust lands throughout New Mexico.

As presented in this report, the Center finds that financial assurance requirements do not exist for much of the oil and gas infrastructure explored in this study, and in some cases where such requirements are imposed, operators may have multiple ways of minimizing or avoiding those requirements. Further, the Center finds most of the current applicable financial assurance requirements are regressive in design, which means the largest users of private and state trust lands often carry the lowest marginal amounts of financial assurance coverage.

Overall, the Center finds that existing financial assurance requirements applicable to all infrastructure types are not sufficient to fully offset estimated closure and clean-up costs. As summarized in the table below, this study finds the total cost of closure and clean-up of the oil and gas infrastructure currently located on state trust and private lands to be approximately \$8.38 billion. Whereas the total financial assurance coverage for this infrastructure accessible to state regulatory entities for the purpose of closure and clean-up efforts is estimated to be approximately \$201.42 million, resulting in a total financial assurance gap of approximately \$8.18 billion.

	Estimated Closure and Clean-up Costs <i>(millions)</i>		Estimated Financial Assurance <i>(millions)</i>		Estimated Financial Assurance Gap <i>(millions)</i>	
Infrastructure	State Trust	Private	State Trust	Private	State Trust	Private
Wells*	\$3,316.40	\$2,275.33	\$136.11	\$37.07	(\$3,180.29)	(\$2,238.26)
Pipelines†	\$980.73	\$929.57	\$0.24	\$0.00	(\$980.49)	(\$929.57)
Other	\$876.38	<i>no data</i>	\$28.00	\$0.00	(\$848.38)	<i>no data</i>
<b>Total</b>	<b>\$5,173.51</b>	<b>\$3,204.90</b>	<b>\$164.35</b>	<b>\$37.07</b>	<b>(\$5,009.16)</b>	<b>(\$3,167.83)</b>
	<b>\$8,378.41</b>		<b>\$201.42</b>		<b>(\$8,176.99)</b>	

Notes: All figures presented in this table are reported in millions of USD.

\*Cost figures reported in this table include well plugging and downhole abandonment, surface facility decommissioning, and wellsite surface reclamation.

†Cost figures reported in this table exclude produced water, freshwater, and most gathering pipelines used by oil and gas operators. Costs reported in this table assume buried pipelines are abandoned in-place rather than fully removed.

---

## TABLE OF CONTENTS

---

<b>EXECUTIVE SUMMARY .....</b>	<b>I</b>
<b>TABLE OF CONTENTS .....</b>	<b>II</b>
<b>TABLE OF TABLES &amp; FIGURES.....</b>	<b>III</b>
<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 REPORT PURPOSE AND OVERVIEW .....	1
1.2 BACKGROUND AND REGULATORY RESPONSIBILITIES .....	1
1.3 SUMMARY OF FINDINGS .....	2
1.4 DISCLAIMER AND NOTES ON REPORT USAGE .....	4
<b>2 SCOPE OF ANALYSIS .....</b>	<b>5</b>
2.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS .....	5
2.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE .....	6
<b>3 COSTS OF RECLAMATION .....</b>	<b>9</b>
3.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS .....	9
3.1.1 <i>Well Plugging and Abandonment .....</i>	<i>9</i>
3.1.2 <i>Wellsite Facility Decommissioning and Reclamation .....</i>	<i>10</i>
3.1.3 <i>Summary of Well Closure and Clean-Up Costs .....</i>	<i>12</i>
3.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE .....	12
3.2.1 <i>Pipeline Decommissioning and Right-of-Way Reclamation .....</i>	<i>12</i>
3.2.2 <i>Other Oil and Gas Infrastructure Decommissioning and Reclamation .....</i>	<i>13</i>
3.2.3 <i>Summary of Pipeline and Other Oil and Gas Infrastructure Costs .....</i>	<i>14</i>
<b>4 FINANCIAL ASSURANCE OBLIGATIONS .....</b>	<b>16</b>
4.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS .....	16
4.1.1 <i>NMOCD Assurance Requirements for Oil, Gas, and Saltwater Disposal Wells .....</i>	<i>16</i>
4.1.2 <i>NMSLO Assurance Requirements for Oil, Gas, and Saltwater Disposal Wells .....</i>	<i>17</i>
4.1.3 <i>Analysis of Financial Assurance Carried by Well Operators .....</i>	<i>18</i>
<i>Estimated Well-Specific Coverage Required by NMOCD .....</i>	<i>19</i>
<i>Estimated Well-Specific Coverage Required by NMSLO .....</i>	<i>20</i>
<i>Estimated Total Financial Assurance Carried by Well Operators .....</i>	<i>21</i>
4.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE .....	22
4.2.1 <i>Financial Assurance Requirements for Pipelines .....</i>	<i>22</i>
4.2.2 <i>Financial Assurance Requirements for Other Oil &amp; Gas Infrastructure .....</i>	<i>23</i>
4.2.3 <i>Analysis of Financial Assurance Coverage for Pipelines and Other Infrastructure .....</i>	<i>24</i>
<i>Estimated Per Pipeline Mile Financial Assurance Coverage Required by NMSLO .....</i>	<i>24</i>
<i>Estimated Per Other Oil &amp; Gas Site Financial Assurance Coverage Requirements .....</i>	<i>25</i>
<i>Estimated Total Assurance Carried by Pipeline and Other Infrastructure Operators .....</i>	<i>26</i>
<b>5 FINDINGS AND CONCLUSIONS .....</b>	<b>27</b>
<b>6 REFERENCES AND DATA SOURCES .....</b>	<b>31</b>

---

## TABLE OF TABLES & FIGURES

---

<b>Table 1</b> – Summary of responsibility of various New Mexico regulatory entities.....	2
<b>Table 2</b> - Summary of per well financial assurance adequacy analysis findings for wells .....	3
<b>Table 3</b> – Summary of per mile financial assurance adequacy analysis findings for pipelines .....	3
<b>Table 4</b> – Summary of per site financial assurance adequacy for other oil & gas infrastructure .....	4
<b>Table 5</b> – Summary of oil, gas, and saltwater disposal wells subject to analysis.....	6
<b>Table 6</b> – Summary of pipelines and other oil and gas infrastructure subject to analysis.....	8
<b>Table 7</b> – Estimated well plugging and abandonment costs.....	10
<b>Table 8</b> – Estimated wellsite surface facility decommissioning costs .....	11
<b>Table 9</b> – Estimated wellsite surface reclamation costs.....	11
<b>Table 10</b> – Summary of estimated total well closure and clean-up costs.....	12
<b>Table 11</b> – Estimated pipeline decommissioning and right-of-way reclamation costs .....	13
<b>Table 12</b> – Estimated decommissioning and reclamation costs for other oil and gas infrastructure..	14
<b>Table 13</b> – Estimated cost of other oil and gas infrastructure decommissioning and reclamation.....	15
<b>Table 14</b> – Summary of NMOCD’s financial assurance requirements for active and inactive wells..	17
<b>Table 15</b> – Summary of NMSLO’s financial assurance requirements for oil and gas leases .....	18
<b>Table 16</b> – Summary of estimated financial assurance coverage required by NMOCD .....	20
<b>Table 17</b> - Summary of estimated financial assurance coverage required by NMSLO .....	21
<b>Table 18</b> – Estimated total financial assurance coverage on subject wells .....	21
<b>Table 19</b> – Summary of NMSLO’s financial assurance requirements for pipelines .....	22
<b>Table 20</b> - Summary of financial assurance requirements for other oil and gas infrastructure.....	23
<b>Table 21</b> – Summary of estimated financial assurance coverage for pipelines .....	24
<b>Table 22</b> – Summary of estimated financial assurance coverage for other O&G infrastructure.....	25
<b>Table 23</b> – Estimated total financial assurance coverage on pipelines and other infrastructure .....	27
<b>Table 24</b> – Summary of per well financial assurance adequacy findings for wells (P&A cost gap) ....	28
<b>Table 25</b> – Summary of per well financial assurance adequacy findings for wells (total cost gap) .....	28
<b>Table 26</b> - Summary of per pipeline mile financial assurance adequacy findings for pipelines .....	28
<b>Table 27</b> – Summary of per site financial assurance adequacy findings for other infrastructure .....	29
<b>Table 28</b> – Summary of total financial assurance adequacy findings .....	30
 <b>Figure 1</b> – Graphical representation of oil, gas, and saltwater disposal wells subject to analysis .....	 5
<b>Figure 2</b> – Graphical representation of other oil and gas infrastructure subject to analysis .....	7

---

# 1 INTRODUCTION

---

## 1.1 REPORT PURPOSE AND OVERVIEW

A significant portion of the surface and subsurface estate in the oil and gas basins of New Mexico is under the purview of state regulatory entities. Hydrocarbon exploration and extraction activities on those lands are regulated by the New Mexico Oil Conservation Division (NMOCD), oil and gas transmission is regulated by the New Mexico Public Regulation Commission (NMPRC), and the New Mexico State Land Office (NMSLO) has additional regulatory authority over all oil and gas activities on state trust lands. Due to market volatility which is common to the petroleum industry and the considerable number of oil and gas operators with active wells, pipelines, and other oil and gas support infrastructure in New Mexico<sup>1</sup>, it is not unusual for an operator to file for bankruptcy in the middle of operations, especially in the event of an economic downturn or slump in demand for petroleum.<sup>2</sup> In such cases, the cost of plugging and abandoning certain wells and/or decommissioning pipelines and well-support facilities and reclaiming surface lands may fall to the NMOCD or to the NMSLO. Furthermore, without timely remediation, inactive (i.e., non-producing) or unmanaged oil and gas wells and supporting infrastructure can pose considerable physical and environmental hazards (Alboiu & Walker, 2019). Improperly abandoned pipelines and unplugged or improperly plugged wells can release subsurface methane and unaddressed spills and leaks can contaminate surface and ground water (Boothroyd, et al., 2016).

Given these environmental and fiscal risks, it is of great importance to the New Mexican public and that proactive measures are taken to minimize the risk and liability of oil and gas operations on lands subject to state jurisdiction. As the designated administrators of oil and gas operations on these lands, it is the role of the NMOCD, the NMSLO, and other state regulatory entities to ensure that adequate financial assurance requirements are imposed on and met by operators seeking to utilize those lands.<sup>3</sup> To this end, the Center's primary goal in this study is to generate an objective, data-driven analysis of the adequacy of current financial assurance requirements imposed by state regulatory entities on wells, pipelines, and other oil and gas infrastructure located on state trust lands and private lands throughout New Mexico.<sup>4</sup>

## 1.2 BACKGROUND AND REGULATORY RESPONSIBILITIES

Table 1 summarizes the basic hierarchy of state regulatory responsibility for the oil and gas infrastructure that forms the subject of this analysis. Per state statutes, the NMOCD is responsible for regulation of the entire life cycle of oil and gas wells situated on private fee

---

<sup>1</sup> The oil and gas infrastructure types included in this analysis were selected based on data availability and conversations with NMSLO personnel. By including or omitting specific types of infrastructure from this analysis, the Center makes no representation of the importance of financial assurance requirements, or lack thereof, that may apply to that infrastructure.

<sup>2</sup> During the COVID-19 pandemic, demand trends for refined petroleum products were sharply altered, putting many oil and gas operators in a position where it was unprofitable to continue production in the short term. To provide some economic relief to oil and gas producers, pursuant to 19.2.100.71 NMAC, on March 4, 2020 the NMOCD issued an order allowing wells to be temporarily shut-in and remain inactive for a period not to exceed 36 months with a potential to extend the shut-in period for an additional 12 months (EMNRD, 2020). As of preparing this report, the long-term implications of the COVID-19 pandemic and its effect on the future of oil and gas production in New Mexico is unclear.

<sup>3</sup> See Section 4 of this report for a discussion of the specific statutory responsibilities of these regulatory entities.

<sup>4</sup> Similar studies have been prepared by the U.S. Government Accountability Office for oil and gas infrastructure located on federal and tribal lands and therefore subject to federal government regulation. The analysis presented herein is specific infrastructure that is subject to state regulation.

lands and state trust lands: permitting new wells, enforcing state statutes and rules during well operation, and ensuring abandoned wells are properly plugged and affected lands are responsibly restored. To fulfil its responsibilities, the NMOCD requires operators to provide financial assurance for the wells each operator owns on state trust and private fee lands. The NMOCD's financial assurance requirements are designed to provide a mechanism for enforcing operator compliance with state rules and regulations dictating the conditions for proper plugging and abandonment of wells.

The authority to regulate oil and gas pipelines in the state of New Mexico is granted to the NMPRC. However, in this role, the NMPRC is primarily focused on ensuring pipelines are operated in a safe and responsible manner. With that objective in mind, the Pipeline Safety Bureau of the NMPRC tasks itself with licensing new pipelines, conducting safety and compliance inspections on existing pipelines, and investigating intrastate<sup>5</sup> pipeline incidents and accidents.

The NMSLO is responsible for the management of all state trust lands in New Mexico which consist of over nine million surface acres and over thirteen million mineral acres. Because a significant portion of the land administered by the NMSLO is situated in active oil and gas regions, the NMSLO has adopted its own set of financial assurance requirements for oil and gas lessees and operators of wells, pipelines, and other oil and gas support infrastructure. All of the NMSLO's financial assurance requirements are in addition to those imposed by other regulatory entities that also may have some degree of regulatory authority over state trust lands.

**Table 1** – Summary of responsibility of various New Mexico regulatory entities

Regulatory Entity	Wells		Pipelines*		Other Infrastructure†	
	On State Trust	On Private Fee	On State Trust	On Private Fee	On State Trust	On Private Fee
NMOCD	Yes	Yes	Yes	Yes	No	No
NMSLO	Yes	No	Yes	No	Yes	No
NMPRC	No	No	Yes	Yes	No	No

**Notes:** Cells containing "Yes" indicate the corresponding entity has some level of regulatory responsibility over that oil and gas asset. Other federal or state regulatory entities not listed here may have jurisdiction over certain aspects or functions of oil and gas facilities that are not pertinent to this analysis.

\*While the NMOCD and NMPRC both have some regulatory authority over pipelines in New Mexico, neither entity currently imposes financial assurance requirements.

†Other Infrastructure, as referenced here and throughout this report, strictly refers to oil and gas infrastructure permitted by an NMSLO business lease. See Section 2.2 for further information.

### 1.3 SUMMARY OF FINDINGS

Based on the data available to the Center upon preparing this analysis and the assumptions presented in subsequent sections of this report, the Center's findings pertaining to the adequacy of the current financial assurance requirements for various oil and gas related infrastructure are summarized in Tables 2, 3, and 4. A detailed discussion of the analysis methodology and requisite assumptions utilized in developing these tables is provided in Section 3 and Section 4 and additional summary tables and cost calculations are provided in Section 5.

<sup>5</sup> Interstate pipelines and incidents related to those pipelines are managed by the Federal Energy Regulatory Commission.

As shown in Table 2, on average, applicable financial assurance requirements differ considerably depending on where a well is located (i.e., on state trust land or private fee land) and the primary use of that well (i.e., oil, gas, or saltwater disposal). Excluding saltwater disposal wells on state trust lands, the estimated gap between base plugging and downhole abandonment costs and financial assurance coverage averages to approximately \$86,100 per well. If estimated wellsite decommissioning and surface reclamation costs are included in this calculation, the Center estimates the average financial assurance gap is approximately \$182,600 per well (again excluding saltwater disposal wells on state trust lands).

**Table 2** - Summary of per well financial assurance adequacy analysis findings for oil, gas, and SWD wells

	State Trust			Private Fee		
	Gas	Oil	SWD	Gas	Oil	SWD
<b>Financial Assurance*</b>	<b>\$3,300</b>	<b>\$3,500</b>	<b>\$239,400</b>	<b>\$2,300</b>	<b>\$3,400</b>	<b>\$8,600</b>
<b>Closure &amp; Clean-up Cost†</b>	<b>\$168,900</b>	<b>\$218,400</b>	<b>\$175,900</b>	<b>\$151,800</b>	<b>\$216,700</b>	<b>\$178,300</b>
Plugging & Abandonment	\$90,500	\$93,100	\$89,800	\$84,100	\$93,500	\$90,500
Site Decommissioning	\$6,300	\$22,200	\$3,200	\$6,300	\$22,200	\$3,200
Surface Reclamation	\$72,100	\$103,100	\$82,900	\$61,400	\$101,000	\$84,600
<b>Differences (Assurance Gap)</b>						
Assurance - P&A Cost	(\$87,200)	(\$89,600)	\$149,600	(\$81,800)	(\$90,100)	(\$81,900)
Assurance - Total Cost	(\$165,600)	(\$214,900)	\$63,500	(\$149,500)	(\$213,300)	(\$169,700)

Notes: All figures presented in this table are reported at the “per well” level.

\*The financial assurance estimates reported in this table were developed by the Center. See Section 4.1 for further information.

†Closure and clean-up costs reported in this table and elsewhere in this report are based on prior work completed by Vertex Resource Services, Ltd. See Section 3.1 for further information.

The current financial assurance requirements and the costs of closure for pipelines located on state trust and private fee lands in New Mexico are summarized in Table 3. As shown therein, the estimated average financial assurance coverage for pipelines on state trust lands is approximately \$51 per mile, whereas the average decommissioning and surface reclamation cost is estimated to exceed \$211,000 per mile. Based on the Center’s research, currently there are no financial assurance requirements for pipelines located on private fee lands, therefore the financial assurance gap is equivalent to the total cost of decommissioning and reclamation.

**Table 3** – Summary of per mile financial assurance adequacy analysis findings for oil and gas pipelines

	Surface Land Status	
	State Trust (\$/mile)	Private Fee (\$/mile)
<b>Financial Assurance*</b>	<b>\$51</b>	<b>\$0</b>
<b>Decommissioning and Reclamation Costs†</b>	<b>\$211,000</b>	<b>\$213,000</b>
Pipeline Decommissioning	\$16,000	\$16,000
Surface/Right-of-Way Reclamation	\$195,000	\$197,000
<b>Difference (Assurance Gap)</b>	<b>(210,949)</b>	<b>(213,000)</b>

Notes: All figures presented in this table are reported on a "per mile" basis in USD.

\*The financial assurance estimates reported in this table were developed by the Center. See Section 4.2 for further information.

†Decommissioning and reclamation costs reported in this table are based on prior work completed by Vertex Resource Services, Ltd and assume such costs are consistent with standard industry requirements for pipeline abandonment. See Section 3.2 for further information and alternative removal scenarios.



The differences between current financial assurance requirements and the costs of closure for other oil and gas infrastructure located on state trust lands in New Mexico are summarized in Table 3. Note that this portion of the Center's analysis does not include similar infrastructure located on private fee lands because such data could not be located for use in this analysis. Of the other oil and gas facility types explored in this analysis, financial assurance requirements were only identified for rule 34 recycling and containment facilities and petroleum storage tanks. In both cases, the current level of financial assurance coverage required for these facilities is exceeded by the estimated facility decommissioning and surface reclamation cost.

**Table 4** – Summary of per site financial assurance adequacy for other oil & gas infrastructure

Other O&G Facility Type	For Infrastructure on State Trust Lands		
	Financial Assurance*	Closure Cost†	Assurance Gap
Compressor Station Sites	\$0	\$231,000	(\$231,000)
Electrical Power Related Sites	\$0	\$704,000	(\$704,000)
Freshwater Frac Ponds	\$0	\$335,000	(\$335,000)
Landing Strips/Airports	\$0	\$590,000	(\$590,000)
Maintenance and Metering Sites	\$0	\$147,000	(\$147,000)
Private Mobile Radio Tower Sites	\$0	\$277,000	(\$277,000)
Office Buildings/Maintenance Yards	\$0	\$609,000	(\$609,000)
Processing and Dehydration Facilities	\$0	\$618,000	(\$618,000)
Rule 34 Recycling Facilities	\$1,000,000	\$1,126,000	(\$126,000)
Storage Sites	\$0	\$778,000	(\$778,000)
Petroleum Storage Tanks	\$54,545	\$9,543,000	(\$9,488,455)
Transfer Sites	\$0	\$384,000	(\$384,000)
Telemetry Paging Sites	\$0	\$176,000	(\$176,000)
Truck Stops	\$0	\$795,000	(\$795,000)
Storage Facilities/Warehouses	\$0	\$579,000	(\$579,000)
Other O&G Related Sites	\$0	\$3,760,000	(\$3,760,000)

**Notes:** All figures presented in this table are reported on a "per site" basis in USD. Similar data for infrastructure located on private fee lands were not available for this analysis.

\*The financial assurance estimates reported in this table were developed by the Center. The estimates presented in this table do not include additional financial assurance coverage that may be available from NMSLO-required mega-bonds held by the infrastructure owner. See Section 4.2 for further information.

†Decommissioning and reclamation costs reported in this table are based on prior work completed by Vertex Resource Services, Ltd. See Section 3.2 for further information and alternative removal scenarios.

#### 1.4 DISCLAIMER AND NOTES ON REPORT USAGE

The analysis contained in this report and all related supplementary information are based upon the Center's best professional judgment and on sources of information purported to be reliable. However, no representation or warranty is made by the Center as to the accuracy or completeness of any third-party information used for this assessment. The analyses and conclusions presented in this report have been prepared by the Center on the basis of current knowledge and assumptions which are believed to be reasonable but may not be within the control of the Center. The assumptions used in preparing this report and all related supplemental and background information are inherently subject to significant uncertainties. If the assumptions used prove to be inaccurate, the conclusions expressed or inferred herein could be materially different from reality.



---

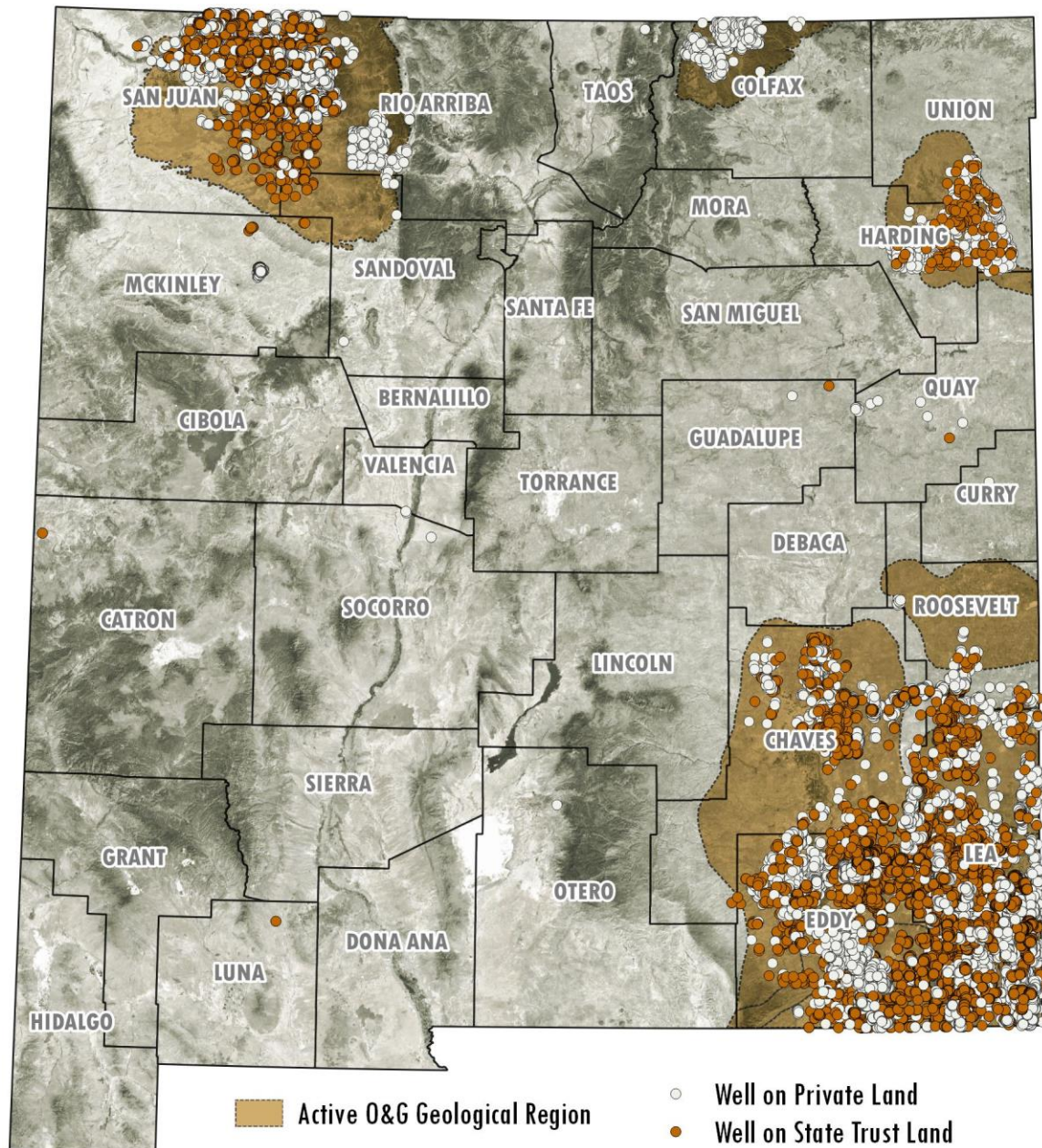
## 2 SCOPE OF ANALYSIS

---

### 2.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS

The oil, gas, and saltwater disposal wells that form the basis and subject of this analysis are depicted geographically in Figure 1. This inventory of wells is representative of all active oil wells on state trust and private fee lands in New Mexico that are operated by entities permitted by the NMOCD. Where an “active well” in this context refers to any oil, gas, or saltwater disposal well located on state trust or private fee lands that has not been approved by the NMOCD for bond release. The inventory of active wells dataset, which was acquired directly from the NMOCD’s online data storage directory found at (EMNRD - OCD, 2020), is

**Figure 1** – Graphical representation of oil, gas, and saltwater disposal wells subject to analysis



publicly available and was current as of October 16, 2020 when the data was accessed and acquired for use in this analysis.<sup>6</sup>

A summary of the wells contained in the dataset as disaggregated by surface land status and various well attributes pertinent to this analysis is provided in Table 5. As shown therein, at the time this data was retrieved, there were 28,257 active wells on state trust and private fee lands throughout New Mexico being operated by 487 permitted operator entities. According to the NMOCD's records, approximately 57% of these wells were situated on state trust land, and the remaining 43% were situated on private fee land. Notably, nearly 87% of the subject wells are characterized as an oil or gas well (i.e., 57% and 30% respectively).

**Table 5** – Summary of oil, gas, and saltwater disposal wells subject to analysis

	Surface Land Status		
	State Trust (N= 16,174)	Private Fee (N= 12,083)	State and Fee (N= 28,257)
<b>Permitted Entities</b>	<b>363</b>	<b>358</b>	<b>487</b>
<b>Well Count by Well Type</b>			
CO <sub>2</sub>	201	536	737
Gas	3,867	4,585	8,452
Injection	1,474	736	2,210
Miscellaneous	57	27	84
Oil	10,235	5,922	16,157
Saltwater Disposal	340	277	617
<b>Well Count by Well Status</b>			
Active	13,949	10,338	24,287
Dry Hole	2	5	7
New	1,129	967	2,096
Plugged ( <i>Not Released</i> )*	619	437	1,056
Shut In	9	25	34
Temporary Abandonment	343	212	555
Temporary Abandonment ( <i>Expired</i> )	107	87	194
Zone Plugged ( <i>Permanent</i> )	7	9	16
Zone Plugged ( <i>Temporary</i> )	8	3	11
Observation	1	0	1

Source: Data extracted from (NMOCD, 2020)

Notes: *Well Type* and *Well Status* are data attributes assigned by the NMOCD. Active wells within the original dataset characterized as never drilled, cancelled, or plugged (site released) have been omitted from this analysis.

\*Wells classified by the NMOCD as “plugged (not released)” are assumed to have completed the plugging and abandonment process but still require surface decommissioning and reclamation.

## 2.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE

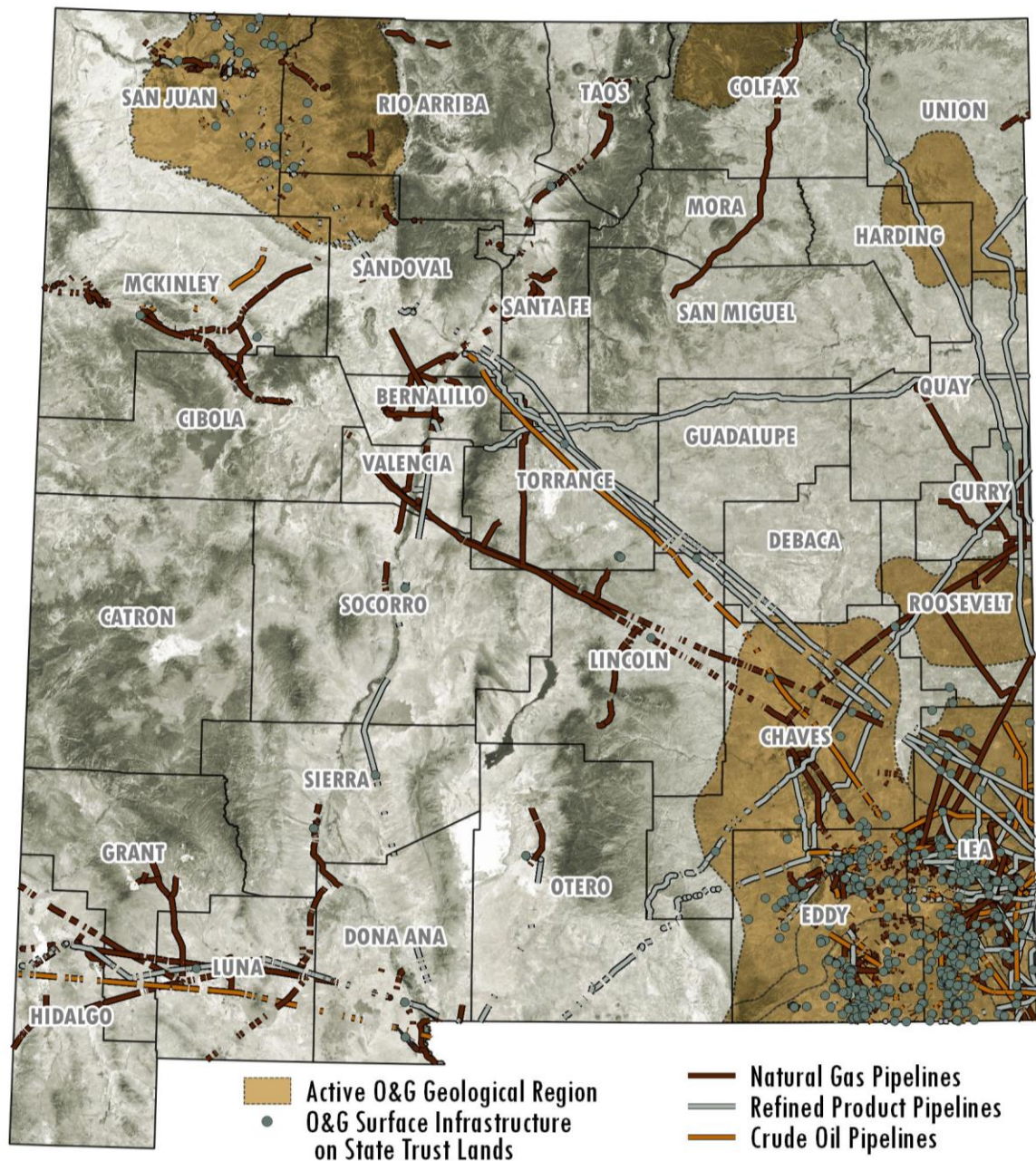
As a secondary focus, this analysis also explores the closure liabilities and financial assurance requirements associated with midstream and oil and gas support infrastructure such as

<sup>6</sup> The Center is not aware of any significant changes to the wells comprising the wells inventory dataset since its acquisition from NMOCD in October 2020. However, the dataset is constantly evolving and undergoes regular updates to reflect changes in well status, the inclusion of new wells, and the exclusion of wells that have completed the plugging and abandonment process.



pipelines, compressor stations, and other off-lease, above-ground appurtenances that are outside of and may or may not be related to a specific wellsite. The infrastructure reviewed as part of this analysis is illustrated geographically in Figure 2. It is important to note that detailed source information about these facilities and their location is largely unavailable, and the infrastructure pictured in Figure 2 is representative of only a fraction of such infrastructure in New Mexico. Much of this infrastructure does not fall under the jurisdiction of a single state or federal regulatory entity, and as a result, the reporting and monitoring requirements are minimal or nonexistent. Within this category, considerably more information is available for infrastructure situated on state trust lands compared to private fee lands, but even within state trust lands, data is limited, especially in a format that is suitable for this analysis.

**Figure 2** – Graphical representation of other oil and gas infrastructure subject to analysis



None of the New Mexico state regulatory entities maintain detailed geospatial data depicting the location, ownership, and use of pipelines throughout the state. As such, the most comprehensive dataset available for oil and gas pipelines in New Mexico is maintained by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Unfortunately, the PHMSA dataset is highly restricted due to national security concerns and is only available in a raw format to government officials and pipeline operators.<sup>7</sup> The next best alternative is a for-purchase proprietary dataset maintained by S&P Global Platts (Platts). Though neither of the datasets maintained by PHMSA or Platts include produced water pipelines, smaller-diameter gathering lines, or above-ground temporary pipelines which are frequently used by oil and gas producers. Mileage information for the pipelines included in the Platts pipeline inventory dataset and situated on state trust or private fee lands is presented in Table 6.

**Table 6** – Summary of pipelines and other oil and gas infrastructure subject to analysis

	Surface Land Status		
	State Trust	Private Fee	State and Fee*
<b>Known Operators†</b>	<b>43</b>	<b>49</b>	<b>67</b>
<b>Pipeline Miles by Known Operators</b>			
Natural Gas Pipelines	2,399	2,325	4,724
Refined Product Pipelines	1,523	473	1,996
Crude Oil Pipelines	510	1,439	1,949
<b>Pipeline Miles by Unknown Operators</b>			
Natural Gas Pipelines	99	106	205
Refined Product Pipelines	109	27	135
Crude Oil Pipelines	0	0	0
<b>Total Pipeline Miles in Inventory‡</b>	<b>4,640</b>	<b>4,370</b>	<b>9,009</b>
<b>Oil and Gas Surface Infrastructure Sites§</b>			
Compressor Station Sites	135	<i>no data</i>	<i>no data</i>
Fresh Water Frac Ponds	80	<i>no data</i>	<i>no data</i>
Maintenance and Metering Sites	36	<i>no data</i>	<i>no data</i>
Processing and Dehydration Facilities	26	<i>no data</i>	<i>no data</i>
Rule 34 Recycling Facilities	25	<i>no data</i>	<i>no data</i>
Petroleum Storage Tanks	55	<i>no data</i>	<i>no data</i>
Other O&G Support Infrastructure¶	184	<i>no data</i>	<i>no data</i>

Source: (S&P Global Platts, 2020) and (Vertex Resources Services, Ltd., 2021)

\*For comparison, PHMSA estimates there were approximately 35,045 miles of natural gas and hazardous liquids pipeline in New Mexico in 2019 (USDOT PHMSA, 2019).

†Within the pipeline inventory dataset many miles of pipeline cannot be tied to a specific operator.

‡These figures may differ from those presented in the Vertex Report because those in the Vertex Report are inclusive of pipelines located on federal and tribal lands.

§Data pertaining to oil and gas support and midstream infrastructure is only available through the NMSLO for state trust lands. Similar data is not available for infrastructure located on private fee lands.

¶A full list of these facilities as categorized by the NMSLO is provided in Table 12.

<sup>7</sup> The Pipeline and Hazardous Materials Safety Administration (PHMSA) operates under the U.S. Department of Transportation. Public access to pipeline location, type, and ownership information is limited to the PHMSA's National Pipeline Mapping System Public Map Viewer (PHMSA, 2020). Some aggregate data is available to the public, but not in the granular format that would be required for this analysis.

Table 6 also presents a summary of the midstream and oil and gas support infrastructure included in this analysis. As shown therein, data for these asset-types is only available for state trust lands. Furthermore, the figures presented in Table 6 are only inclusive of these assets to the extent they are not covered by an NMSLO oil and gas lease agreement or right-of-way agreement.<sup>8</sup> Though likely this is not a concern for this study because the decommissioning and reclamation costs for surface infrastructure covered by those agreements would be included in either the well-specific or pipeline-specific sections of this analysis.

---

### 3 COSTS OF RECLAMATION

---

To estimate the scope and cost of the well closure and clean-up process for the wells identified in Table 5 and the ancillary oil and gas-related infrastructure identified in Table 6, the Center relied on a recent analysis prepared by Vertex Resources Services, Ltd (Vertex Report).<sup>9</sup> The Vertex Report details the estimated liability for all oil and gas related assets situated on state trust lands and other lands (private, tribal, and federal) in New Mexico. The following report sections summarize the key cost parameters and assumptions utilized herein by the Center to analyze the adequacy of current financial assurance requirements in New Mexico and quantify the gap between those requirements and the costs of infrastructure closure and clean-up.

#### 3.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS

##### *3.1.1 Well Plugging and Abandonment*

The per well plugging and abandonment cost analysis findings presented in the Vertex Report and subsequently utilized by the Center in this analysis are summarized in Table 7. Vertex found that per well plugging and abandonment costs varied considerably depending on certain well-specific parameters and specifications such as geographical location, age, fluid (i.e., oil, gas, produced water), well bore depth, number of producing pools crossed, drilling profile direction, and the presence of downhole equipment. To allow for nuance among wells and increase the accuracy of cost estimates, Vertex created a series of well type classifications and prepared class-specific plugging and abandonment cost estimates.

Vertex also found that beyond the standard abandonment activities required for each well classification, many wells within the NMOCD's wells inventory would require additional abandonment activities to meet state regulatory standards for plugging and abandonment. These additional cost activities include running a cement bond log where necessary, perforating and squeezing the intermediate casing shoe if an intermediate casing string is present, and addressing low cement top issues. Within the Vertex Report, these costs are based on a sampling study to identify the frequency with which these additional costs would be incurred. The average of the high and low-cost scenarios presented in the Vertex Report are presented in Table 7 as adjusted to account for Vertex's frequency assumptions.

---

<sup>8</sup> Much of the midstream and well-support infrastructure present on state trust lands is covered by either an oil and gas extraction lease or right-of-way agreement. The sites included in Table 6 are only representative of those permitted by the NMSLO under a business lease.

<sup>9</sup> See Vertex Resources Services, Ltd. (2021). *New Mexico Oil and Gas Liability Assessment*. Sherwood Park, Alberta Canada: Vertex Resources Services, Ltd. Available upon request from Dhugal Hanton ([DHanton@vertex.ca](mailto:DHanton@vertex.ca)).



**Table 7 – Estimated well plugging and abandonment costs**

Well Class <sup>†</sup>	Measured Depth (ft)	Producing Pools	Well Counts*		Estimated P&A Costs Per Well		
			State Trust	Private Fee	Base Cost <sup>‡</sup>	Additional Cost <sup>§</sup>	Total Cost
1	<5k	1 zone	1,680	2,798	\$50,400	\$26,600	\$77,000
2	<5k	2 zones	616	332	\$59,900	\$26,600	\$86,500
3	5k – 10k	1 zone	1,093	1,060	\$57,000	\$26,600	\$83,600
4	5k – 10k	2 zones	683	805	\$66,500	\$26,600	\$93,100
5	>10k	1 zone	1,536	709	\$70,400	\$26,600	\$97,000
6	>10k	2 zones	1,310	773	\$79,800	\$26,600	\$106,400
7	<5k	1 zone	3,669	2,089	\$64,300	\$26,600	\$90,900
8	<5k	2 zones	252	192	\$73,800	\$26,600	\$100,400
9	5k – 10k	1 zone	1,359	421	\$71,000	\$26,600	\$97,600
10	5k – 10k	2 zones	1,455	1,609	\$82,000	\$26,600	\$108,600
11	>10k	1 zone	928	458	\$84,300	\$26,600	\$110,900
12	>10k	2 zones	966	391	\$93,800	\$26,600	\$120,400
13	Plugged	n/a	627	446	n/a	n/a	n/a
			<b>16,174</b>	<b>12,083</b>			

Source: (Vertex Resources Services, Ltd., 2021) and (NMOCD, 2020)

\*The well counts presented in this table exclude wells located on federal and tribal lands in New Mexico and therefore may differ from the total well counts presented in the Vertex Report.

†Well classification categories were developed within the Vertex Report based on well-specific parameters: location, fluid, profile direction, status, age, and depth. Definitions can be found in the Vertex Report.

‡Base costs include the standard abandonment activities required for each well classification. Activities and time required were determined on based on Vertex's historical experience and actual invoiced expense data obtained from the NMSLO.

§Sample average costs are reported here. These costs include running a cement bond log, perforating and squeezing the intermediate casing shoe, and addressing low cement top issues.

Based on Vertex's assumptions, plugging and abandonment costs range between \$77,000 and \$120,400 per well. These figures translate to approximately \$11.69 and \$13.48 per foot of well depth plugged. As a simple basis for comparison, for FY2020, the Railroad Commission of Texas calculated the average cost of plugging and abandonment within the Permian Basin area of Texas (i.e., Texas Oil and Gas Division Districts 8A and 8) to be between \$12.16 and \$17.88 per foot respectively, or approximately \$15.02 per foot on average within the two Districts (Railroad Commission of Texas, 2020). For further comparison, the Vertex Report also presents a summary of six recently abandoned vertical wells on New Mexico State Trust Lands. The cost of plugging and abandonment among these six wells averaged to \$11.44 per foot of well depth plugged (Vertex Resources Services, Ltd., 2021).

### *3.1.2 Wellsite Facility Decommissioning and Reclamation*

In addition to the costs of well plugging and abandonment, the Vertex Report also provides cost estimates for wellpad surface facility decommissioning and reclamation. While the NMOCD's (in contrast to the NMSLO's) financial assurance requirements are not necessarily intended to cover such costs in the event of improper abandonment by a permitted operator, such costs typically would be incurred by the operator if the well were to be abandoned in accordance with state regulations and are therefore informative to this analysis. As with the plugging and abandonment cost analysis, Vertex developed a series of well categories based on various well-type parameters to allow for variation in decommissioning and reclamation

costs. For the wells subject to this analysis, the average surface facility decommissioning costs are presented in Table 8. Broadly, in developing these cost estimates, Vertex assumes facility decommissioning includes removal of all above-ground facilities, equipment, and appurtenances; disconnection and removal of the wellhead; cutting and capping the well below grade; disconnection and isolation of flowlines; and removal of piles and concrete pads.

**Table 8 – Estimated wellsite surface facility decommissioning costs**

Purpose	Flow Type	Storage	Flowline	Well Counts*		Cost/Site
				State Trust	Private Fee	
Oil	Flowing	No	Yes	3,086	1,439	\$13,363
Oil	Pumping	No	Yes	4,088	2,462	\$20,319
Oil	Pumping	Yes	No	4,088	2,462	\$27,523
Gas	Flowing	No	Yes	3,157	4,293	\$5,500
Gas	Flowing	Yes	No	351	477	\$12,157
Gas	Pumping	No	Yes	227	118	\$6,418
Gas	Pumping	Yes	No	227	118	\$12,769
SWD	n/a	No	Yes	324	268	\$3,226
				<b>15,547</b>	<b>11,637</b>	

Source: (Vertex Resources Services, Ltd., 2021) and (NMOCD, 2020)

\*Well counts exclude wells classified as plugged (not released) or "empty" within the wells database. The well counts presented in this table exclude wells located on federal and tribal lands in New Mexico and therefore may differ from the total well counts presented in the Vertex Report.

For the wells subject to this analysis, the average surface reclamation costs are presented in Table 9. Note that these costs are exclusive of and in addition to the plugging and abandonment costs presented in Table 7 and the surface decommissioning costs presented in Table 8. In developing these cost estimates, Vertex assumes surface reclamation efforts would include environmental testing and assessment; removal of fencing; removal of contaminated soils; remediation of compacted soils; site regrading and contouring for erosion control; and seeding and revegetation. As reflected in Table 9, the per well costs of surface reclamation efforts are expected to differ considerably depending on the age of the well and the oil and gas region within which it is located.

**Table 9 – Estimated wellsite surface reclamation costs**

Purpose	O&G Basin	Spud Year	Well Counts*		Cost/Site
			State Trust	Private Fee	
Oil	San Juan	< 2012	120	178	\$53,894
Oil	San Juan	≥ 2012	46	2	\$164,305
Gas	San Juan	< 2012	1,461	2,005	\$53,866
Gas	San Juan	≥ 2012	18	20	\$39,762
SWD	San Juan	Any	16	16	\$136,568
Oil	Permian	< 2012	9,088	5,517	\$99,705
Oil	Permian	≥ 2012	2,510	982	\$116,900
Gas	Permian	< 2012	2,216	1,437	\$78,545
Gas	Permian	≥ 2012	173	263	\$195,698
SWD	Permian	Any	324	249	\$80,199
Oil	Other	< 2012	195	5	\$28,676
Oil	Other	≥ 2012	1	1	\$33,974



Purpose	O&G Basin	Spud Year	Well Counts*		Cost/Site
			State Trust	Private Fee	
Gas	Other	< 2012	1	1,318	\$29,733
Gas	Other	≥ 2012	5	78	\$29,712
SWD	Other	Any	0	12	\$105,994
			<b>16,174</b>	<b>12,083</b>	

Source: (Vertex Resources Services, Ltd., 2021) and (NMOCD, 2020)

\*The well counts presented in this table exclude wells located on federal and tribal lands in New Mexico and therefore may differ from the total well counts presented in the Vertex Report.

### 3.1.3 Summary of Well Closure and Clean-Up Costs

The per well plugging and abandonment, surface decommissioning, and surface reclamation cost figures identified above are presented in aggregate in Table 10 and multiplied by the number of wells included in this analysis (see Table 9). As shown therein, based on the cost assumptions presented in the Vertex Report, the estimated average per well cost of closure and clean-up efforts for wells located on state trust and private fee lands in New Mexico ranges between approximately \$152,000 and \$218,000. Multiplying the estimated per well figures by the number of wells subject to this analysis produces an estimated total closure and clean-up cost of approximately \$3.316 billion for wells on state trust lands and an additional \$2.275 billion for wells on private fee lands — or approximately \$5.591 billion in total.

**Table 10** – Summary of estimated total well closure and clean-up costs

	State Trust			Private Fee		
	Gas (N= 4,068)	Oil (N= 11,766)	SWD (N= 340)	Gas (N= 5,121)	Oil (N= 6,685)	SWD (N= 277)
Estimated Costs Per Well (USD)						
Base P&A	\$64,614	\$67,681	\$64,504	\$58,140	\$68,267	\$64,850
Additional P&A*	\$25,856	\$25,417	\$25,305	\$25,959	\$25,276	\$25,692
Surface Decommissioning	\$6,290	\$22,155	\$3,226	\$6,290	\$22,155	\$3,226
Surface Reclamation	\$72,092	\$103,147	\$82,852	\$61,441	\$100,968	\$84,572
Estimated Cost/Well Total	\$168,852	\$218,401	\$175,886	\$151,829	\$216,666	\$178,340
Estimated Total Costs (millions of USD)						
Base P&A	\$262.85	\$796.34	\$21.93	\$297.73	\$456.37	\$17.96
Additional P&A*	\$105.18	\$299.06	\$8.60	\$132.93	\$168.97	\$7.12
Surface Decommissioning	\$25.59	\$260.68	\$1.10	\$32.21	\$148.11	\$0.89
Surface Reclamation	\$293.27	\$1,213.63	\$28.17	\$314.64	\$674.97	\$23.43
Estimated Total Cost	\$686.89	\$2,569.71	\$59.80	\$777.52	\$1,448.41	\$49.40
	\$3,316.40 million			\$2,275.33 million		
	\$5,591.73 million					

Notes: All figures presented in the upper half of this table are reported on a "per well" basis in USD. Figures presented in the lower half of this table are reported as total costs in millions of USD.

\*The estimated costs of running a cement bond log, perforating and squeezing the intermediate casing shoe, and addressing low cement top issues where applicable. See Table 7 for additional detail.

## 3.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE

### 3.2.1 Pipeline Decommissioning and Right-of-Way Reclamation

The pipeline decommissioning and surface reclamation costs used by the Center in this

analysis are presented in Table 11. In congruence with the Vertex Report, these costs are estimated under two separate scenarios as briefly defined below.

*Standard Decommissioning and Reclamation Scenario.* In this scenario, it is assumed that all pipelines included in the analysis are decommissioned in a manner that is consistent with current industry standards: cleaning and purging all hydrocarbons from the line with air or other inert fluid; removal and disposal of flammable fluids; cutting and capping pipe ends below grade; removal of above-ground appurtenances; and disconnection of cathodic protection systems. Pipeline rights-of-way are then reclaimed in a manner that is consistent with Vertex’s assumptions regarding wellsite surface reclamation, that is, surface reclamation efforts would include environmental testing and assessment; removal of fencing and markers; removal of contaminated soils; remediation of compacted soils; site regrading and contouring for erosion control; and seeding and revegetation.

*Full Removal and Reclamation Scenario.* In this scenario, all pipelines included in the analysis are completely removed after abandonment. That is, all buried pipelines are pulled or excavated prior to segmentation and disposal and all surface pipelines are also segmented prior to disposal. Vertex assumes the cost of full removal of buried pipelines is analogous to the cost of constructing a new pipeline. Pipeline right-of-way reclamation effort assumptions under this scenario are the same as those identified in the alternative scenario.

**Table 11** – Estimated pipeline decommissioning and right-of-way reclamation costs

Pipeline Diameter	Type	Pipeline Miles*		Cost/Mile†		
		State Trust	Private Fee	Surface Reclamation	Standard Decom. Scenario	Full Removal Scenario
Under 8"	Buried	525	555	\$180,626	\$5,430	\$100,000
10" to 16"	Buried	426	637	\$180,626	\$10,010	\$544,000
18" to 24"	Buried	1,287	561	\$180,626	\$16,275	\$1,620,000
Over 24"	Buried	1,016	1,157	\$180,626	\$27,455	\$2,880,000
Under 8"	Surface	525	555	\$229,916	\$6,455	\$6,455
10" to 16"	Surface	426	637	\$229,916	\$11,935	\$11,935
18" to 24"	Surface	322	140	\$229,916	\$19,725	\$19,725
Over 24"	Surface	113	129	\$229,916	\$32,055	\$32,055
		<b>4,640</b>	<b>4,370</b>			

Source: (Vertex Resources Services, Ltd., 2021)

\*These figures may differ from those presented in the Vertex Report because they exclude pipelines located on federal and tribal lands.

†As indicated in the Vertex Report, all pipeline decommissioning and reclamation costs prepared by Vertex and reiterated in this report should be considered Class 5 estimates, meaning they were prepared based on very limited information and consequently have significant accuracy ranges, i.e., +50%/-30%.

### 3.2.2 Other Oil and Gas Infrastructure Decommissioning and Reclamation

The Center also relied on Vertex’s estimated costs of facility decommissioning and surface reclamation for well-support and other oil and gas related infrastructure on state trust lands.<sup>10</sup>

<sup>10</sup> As discussed in Section 2.2, similar data pertaining to other oil and gas support infrastructure is only available from the NMSLO for state trust lands. Similar data is not available for infrastructure located on private fee lands.

These costs, as applied to the infrastructure subject to this analysis, are presented in Table 12. In estimating these costs, Vertex assumes facility decommissioning would include removal of all surface facilities, foundations and pilings, and movable equipment. After completion of facility decommissioning efforts, sites would be reclaimed to return to the affected land to pre-development condition, i.e., efforts would include environmental testing and assessment, removal of fencing; removal of contaminated soils, remediation of compacted soils, site regrading and contouring for erosion control, and seeding and revegetation.

It should be noted that because detailed site-specific equipment inventories were not available to Vertex, and because facility specifications and land encumbrances vary from site to site, the cost estimates presented in the Vertex Report and reiterated here are based on Vertex's estimated per acre costs developed for well sites, i.e., \$9,222 per acre for facility decommissioning and \$52,758 per acre for surface reclamation. The validity or accuracy of these assumptions was not explored by the Center in preparing the analysis presented herein.

**Table 12** – Estimated decommissioning and reclamation costs for other oil and gas infrastructure

Facility/Site Description	Site Count†	Average Site Size (acres)	Cost/Site*	
			Facility Decom.	Surface Reclamation
Compressor Station Sites	135	3.73	\$34,000	\$197,000
Electrical Power Related Sites	29	11.35	\$105,000	\$599,000
Fresh Water Frac Ponds	80	5.39	\$50,000	\$285,000
Landing Strips/Airports	1	9.52	\$88,000	\$502,000
Maintenance and Metering Sites	36	2.36	\$22,000	\$125,000
Private Mobile Radio Tower Sites	11	4.47	\$41,000	\$236,000
Office Buildings/Maintenance Yards	5	9.83	\$91,000	\$518,000
Processing and Dehydration Facilities	26	9.97	\$92,000	\$526,000
Rule 34 Recycling Facilities	25	18.16	\$168,000	\$958,000
Storage Sites	44	12.54	\$116,000	\$662,000
Petroleum Storage Tanks	55	153.96	\$1,420,000	\$8,123,000
Transfer Sites	2	6.20	\$57,000	\$327,000
Telemetry Paging Sites	23	2.84	\$26,000	\$150,000
Truck Stops	20	12.84	\$118,000	\$677,000
Storage Facilities/Warehouses	7	9.34	\$86,000	\$493,000
Other O&G Related Sites‡	42	60.67	\$559,000	\$3,201,000

Source: (Vertex Resources Services, Ltd., 2021)

\*Facility decommissioning and surface reclamation cost estimates presented in this table are based on Vertex's cost estimates for wellpad decommissioning and surface reclamation on a per acre basis, and are considered Class 5 estimates (i.e., +50%/-30%). For infrastructure and sites listed in this table, Vertex estimates facility decommissioning and surface reclamation costs at \$9,222/acre and \$52,758/acre, respectively.

†These figures are only inclusive of such sites as they exist on state trust lands. Similar data is not available for private fee lands.

‡This category is used by the NMSLO as a catch-all and is inclusive of all facilities categorized as such by the NMSLO.

### 3.2.3 Summary of Pipeline and Other Oil and Gas Infrastructure Costs

Table 13 presents the product of the per mile and per site surface reclamation and facility decommissioning costs identified in Sections 3.2.1 and the 3.2.2 as applied to the estimated

pipeline miles on state trust and private fee lands and the other oil and gas support facility site counts on state trust lands. As shown therein, based on the cost assumptions presented in the Vertex Report, the estimated total cost of decommissioning all pipelines and reclaiming all pipeline rights-of-way on state trust and private fee lands in a manner that is consistent with current industry standards is approximately \$1.91 billion. Alternatively, if all pipelines were required to be completely removed and properly disposed of, the costs of pipeline decommissioning and right-of-way reclamation are estimated to exceed \$11.74 billion. Additionally, the total estimated cost of removal and reclamation of other oil and gas related facilities located on state trust lands is estimated at \$876.38 million.

**Table 13** – Estimated cost of other oil and gas infrastructure decommissioning and surface reclamation

	Surface Land Status		
	State Trust (millions)	Private Fee (millions)	State and Fee (millions)
<b>Estimated Pipeline Costs*</b>			
<b>Standard Decommissioning Scenario</b>			
Surface Reclamation	\$906.33	\$861.23	\$1,767.56
Pipeline Decommissioning	\$74.40	\$68.34	\$142.74
<b>Total Scenario Cost</b>	<b>\$980.73</b>	<b>\$929.57</b>	<b>\$1,910.30</b>
<b>Full Removal Scenario</b>			
Surface Reclamation	\$906.33	\$861.23	\$1,767.56
Pipeline Decommissioning	\$5,314.38	\$4,660.45	\$9,974.83
<b>Total Scenario Cost</b>	<b>\$6,220.71</b>	<b>\$5,521.68</b>	<b>\$11,742.39</b>
<b>Estimated Other Infrastructure Costs</b>			
Compressor Station Sites	\$31.19	<i>no data</i>	<i>no data</i>
Electrical Power Related Sites	\$20.42	<i>no data</i>	<i>no data</i>
Fresh Water Frac Ponds	\$26.80	<i>no data</i>	<i>no data</i>
Landing Strips/Airports	\$0.59	<i>no data</i>	<i>no data</i>
Maintenance and Metering Sites	\$5.29	<i>no data</i>	<i>no data</i>
Private Mobile Radio Tower Sites	\$3.05	<i>no data</i>	<i>no data</i>
Office Buildings/Maintenance Yards	\$3.05	<i>no data</i>	<i>no data</i>
Processing and Dehydration Facilities	\$16.07	<i>no data</i>	<i>no data</i>
Rule 34 Recycling Facilities	\$28.15	<i>no data</i>	<i>no data</i>
Storage Sites	\$34.23	<i>no data</i>	<i>no data</i>
Petroleum Storage Tanks	\$524.87	<i>no data</i>	<i>no data</i>
Transfer Sites	\$0.77	<i>no data</i>	<i>no data</i>
Telemetry Paging Sites	\$4.05	<i>no data</i>	<i>no data</i>
Truck Stops	\$15.90	<i>no data</i>	<i>no data</i>
Storage Facilities/Warehouses	\$4.05	<i>no data</i>	<i>no data</i>
Other O&G Related Sites	\$157.92	<i>no data</i>	<i>no data</i>
<b>Total Other Infrastructure Cost</b>	<b>\$876.38</b>		

Note: All cost estimates presented in this table are reported in millions of USD and considered Class 5 estimates (i.e., +50%/-30%).

\*The total cost figures shown here are based on the pipeline mileages and costs/mile presented in Table 11 of this report and therefore may differ from the total cost estimates presented in the Vertex Report.

---

## 4 FINANCIAL ASSURANCE OBLIGATIONS

---

### 4.1 OIL, GAS, AND SALTWATER DISPOSAL WELLS

In New Mexico, oil and gas extraction activities on state trust and private fee lands are regulated by the New Mexico Oil Conservation Division (NMOCD) of the New Mexico Energy, Minerals, and Natural Resources Department. As part of the NMOCD's regulatory authority provided under the New Mexico Oil and Gas Act (N.M. Stat. § 70-2-1-38), the NMOCD is responsible for establishing financial assurance requirements for oil, gas, and saltwater disposal wells operated on state trust and private fee lands. For oil and gas leases on state trust lands, additional authority in this context has been granted to the NMSLO. Given these overlapping administrative responsibilities, the financial assurance obligations faced by well operators differ depending on the underlying status of the land occupied by the well: private fee land or state trust land.

#### *4.1.1 NMOCD Financial Assurance Requirements for Oil, Gas, and Saltwater Disposal Wells*

The NMOCD is responsible for the regulation of the entire life cycle of oil, gas, and saltwater disposal wells situated on private fee lands and state trust lands: permitting new wells, enforcing state oil and gas statutes and rules during well operation, and ensuring abandoned wells are properly plugged and affected lands are responsibly restored. As part of this directive, pursuant to 19.15.8 NMAC, the NMOCD requires permitted oil and gas entities to provide financial assurance in an amount determined by the number of active and inactive wells the permitted entity operates on state trust and private fee lands. The NMOCD's financial assurance requirements are designed to provide a mechanism for enforcing operator compliance with state rules and regulations dictating the conditions for proper plugging and abandonment of wells pursuant to 19.15.25 NMAC. Per the relevant statutes, the NMOCD's required financial assurance is specifically intended to fund well plugging and abandonment and land restoration efforts in the event of non-compliance by the permitted entity. Financial assurance provided by well operators is not intended to secure payment for third parties (landowners or lessees) whose livestock, crops, range, or improvements may be damaged by well operators at any point during the life cycle of the well.

Permitted entities can fulfill the NMOCD's financial assurance requirements with one of three financial instruments: 1) an irrevocable letter of credit, 2) a plugging insurance policy or surety bond issued by a reputable corporate surety, or 3) a cash bond deposited in an account held in trust for the NMOCD at a federally insured financial institution within the State of New Mexico.

As previously alluded to, financial assurance requirements differ for active and inactive wells under the purview of the NMOCD. All permitted entities operating wells on state trust and private fee lands in New Mexico are required to carry financial assurance in a manner that is consistent with the left half of Table 14, however, if one or more of that entity's wells assumes the definition of an inactive well<sup>11</sup>, the NMOCD requires the permitted entity to carry

---

<sup>11</sup> Per 19.15.8 NMAC, an inactive well is defined as a well that has been in a temporarily abandoned status (i.e., non-producing) for more than two years. Wells that do not meet this default criterion but for which an operator is still seeking approval for temporary abandonment from NMOCD will also be treated as inactive wells.

additional financial assurance commensurate with the rate structure shown in the right half of Table 14. It is worth emphasizing that the NMOCD requires operator-specific financial assurance as opposed to well-specific financial assurance. Therefore, the effective financial assurance coverage for individual wells on state trust and private fee lands within New Mexico can vary considerably. That is, as the number of wells a permitted entity operates increases, the per well financial assurance coverage decreases. This regressive financial assurance requirement structure applies to both active wells and inactive wells permitted by the NMOCD, however, by design the marginal effect is much lower for inactive wells both because the coverage requirements are higher and because most permitted entities have comparatively few inactive wells.

**Table 14** – Summary of NMOCD’s financial assurance requirements for active and inactive wells

NMOCD Requirement for All Wells		NMOCD Additional Requirement for Inactive Wells	
Permitted Wells	Requirement	Permitted Wells	Requirement
1-10 wells*	\$50,000	1-5 wells*	\$150,000
11-50 wells	\$75,000	6-10 wells	\$300,000
51-100 wells	\$125,000	11-25 wells	\$500,000
100+ wells	\$250,000	25+ wells	\$1,000,000

Source: 19.15.8 NMAC

\*Permitted entities may alternatively provide financial assurance for a single well in the amount of \$25,000 plus \$2/ft projected or actual depth of the well. This formula applies to both single active and single inactive wells.

#### *4.1.2 NMSLO Financial Assurance Requirements for Oil, Gas, and Saltwater Disposal Wells*

The NMSLO is responsible for the management of all state trust lands in New Mexico which consist of over nine million surface acres and over thirteen million mineral acres. The NMSLO’s mission is to provide a sustainable revenue stream to New Mexico schools and public institutions through the leasing and rental of state trust lands, and as the designated administrator and steward of these lands, it is the responsibility of the NMSLO to ensure that land uses by private enterprises are done in a manner that does not undermine the land’s future viability as a revenue-generating asset. Since a significant portion of the land administered by the NMSLO is situated in active oil and gas regions, the NMSLO has adopted its own set of financial assurance requirements for oil and gas lessees pursuant to the authority granted under 19.2.100 NMAC.<sup>12</sup>

As previously noted, the NMLSO’s financial assurance requirements are in addition to those of the NMOCD as outlined above in Section 4.1.1. However, one important distinction between the NMSLO’s requirements and those of the NMOCD is that the NMSLO’s requirements are lease-specific rather than operator-specific or well-specific. This is an important distinction because multiple NMOCD-permitted entities may be authorized by the NMSLO to develop and operate multiple wells on the same state trust land oil and gas lease. In such cases, financial assurance requirements for a given lease may, in effect, cover multiple NMOCD-permitted entities and/or multiple wells.

<sup>12</sup> 19.2.100 NMAC is specific to oil and gas leases on state trust lands, financial assurance requirements for saltwater disposal well site easements permitted on state trust lands are covered under a separate statute, i.e., 19.2.11 NMAC.



The financial assurance requirements and associated bonding instruments utilized by the NMSLO are summarized in Table 15. As shown therein, the NMSLO's current coverage requirements are considerably lower than those of the NMOCD, though it is important to reiterate that the NMSLO's requirements are in addition to the NMOCD's requirements. This is because the intended purpose of the NMSLO's financial assurance requirements is also somewhat different than that of the NMOCD. While the NMOCD's primary focus is to ensure wells are properly plugged and its secondary focus is to ensure lands affected by well construction, operation, and abandonment are properly restored, the NMSLO's primary focus is to ensure that the NMSLO and its lessees holding grazing permits or patent to the affected lands are compensated for damages caused by oil and gas lessees.<sup>13</sup> Though conceivably, in the event of default or improper performance or abandonment of a well by an NMOCD-permitted operator, funds made accessible by the NMSLO's financial assurance requirements likely would be utilized for the same purpose, i.e., well plugging and abandonment and restoration of the surface lands.

**Table 15** – Summary of NMSLO's financial assurance requirements for oil and gas leases

<b>NMSLO Requirement for Oil, Gas, and SWD Leases</b>		
<b>Bond Type</b>	<b>Coverage</b>	<b>Requirement</b>
Single lease	1 lease ( <i>no well limit</i> )	\$10,000
Multi-lease blanket	2 or more leases ( <i>no well limit</i> )	\$20,000
Mega-bond	All leases and/or right-of-way easements	\$25,000
SWD damage & performance	1 SWD easement ( <i>damage to surface lessees</i> )	\$10,000
SWD reclamation*	1 SWD easement ( <i>restoration of surface/subsurface</i> )	\$250,000
Cross-lease wellpads†	1 wellpad with a cross-lease wellbore	\$50,000

**Note:** This table was assembled using various bond forms and rules documents available to the public on the NMSLO's website at the time of preparing this analysis.

\*The purpose of the SWD reclamation bond is somewhat different than the purpose of the other NMSLO bond types (see Footnote 13)

†Cross-lease wellpads are covered by NMSLO business leases rather than oil and gas leases.

As illustrated in Table 15, the NMSLO's financial assurance requirement structure is also regressive in design, i.e., as the number of leases a permitted entity holds and the concomitant number of wells that lessee operates increases, the per well financial assurance coverage decreases. Arguably, compared to NMOCD's financial assurance requirement structure, the NMSLO's is even more regressive since the change in the marginal coverage requirement is not tied to the number of wells a permitted entity operates. Obviously, this statement does not apply to saltwater disposal leases where bond coverage only extends to a single easement and therefore to a finite number of wells that is fixed by engineering constraints.

#### *4.1.3 Analysis of Financial Assurance Carried by Well Operators*

All NMOCD financial assurance coverage data used in this analysis was extracted from the publicly accessible Electronic Permitting and Payment System maintained by the NMOCD

<sup>13</sup> This statement is true with exception of the NMSLO's surety reclamation bond for saltwater disposal easements. Financial assurance requirements under this bond type are exclusive of damages caused by the permitted lessee to any surface lessee of the affected lands or to livestock, range, water, crops, tangible improvements, or surface improvements. Rather, this bond type is intended ensure compliance with all performance requirements of the saltwater disposal well and leased area, as well as the proper removal of improvements and equipment, remediation, reclamation, and restoration of the affected lands.



(NMOCD, 2020). This online repository contains queryable data and profile information for all active permitted entities and wells within the State of New Mexico, including details about the financial assurance coverage held by those permitted entities. Though it should be mentioned, some sampling and inference techniques were required due to the sheer volume of data and the limitations of the system's report production capabilities.

The first step in analyzing the adequacy of the NMOCD's and the NMSLO's current financial assurance requirements for active wells was to determine how the requirements and the supporting data available to the Center translated to the active wells on state trust and private fee lands in New Mexico. Where an active well in this context refers to any oil, gas, injection, or saltwater disposal well located on state trust or private fee lands that has not been approved by the NMOCD for bond release. That is, the well has been plugged and the wellsite facilities have been decommissioned and the wellsite grounds have been fully reclaimed per state standards and requirements. By this definition, a well need not be actively producing to be considered an active well.

#### *Estimated Well-Specific Coverage Required by NMOCD*

Estimating the level of financial assurance coverage on the individual wells included in this analysis is complicated by the fact that both the NMOCD's and the NMSLO's requirements can create circumstances where any given number of wells may be covered by a single financial assurance instrument. Or, alternatively, an individual well may be covered by multiple financial assurance instruments, which occurs when an NMOCD-permitted entity holds a single well bond, a blanket bond, and/or an inactive well bond. To contend with this complexity, the Center assumes herein that the total level of financial assurance applicable to an NMOCD-permitted entity could be applied to any or all the wells operated by that entity. This process is described formulaically by Equation (1).

$$(1) \quad well\ coverage_{ij} = \frac{1}{n_j} (single\ well_j + multi\ well_j + inactive\ well_j)$$

Where the well-specific financial assurance coverage for well  $i$  operated by permitted entity  $j$  is calculated as the sum of all NMOCD financial assurance instruments applicable to permitted entity  $j$  divided by the total number of wells  $n$  operated by permitted entity  $j$ .

Table 16 presents a summary of the results of Equation (1) as applied to the wells dataset presented in Section 2.1. The table also contains various summary statistics that help demonstrate how the NMOCD's financial assurance coverage requirements translate to the active wells that are the subject of this analysis.

The NMOCD's Electronic Permitting and Payment System is not capable of generating full-population financial assurance reports queryable by permitted entity, therefore individual permitted entities were sampled to attain robust coverage profiles for permitted entities within each well-count cohort presented in Table 16. The sample rates for each well-count cohort adhere to an escalating scale to minimize the magnitude of total sampling error. For example, permitted entities responsible for 100+ wells were fully sampled (i.e., 100%) whereas permitted entities responsible for only 1 well were sampled at a lower rate (i.e., 27%).

**Table 16** – Summary of estimated financial assurance coverage required by NMOCD

OCD Financial Assurance for Permitted Entities				Sampling		Wells Covered	
Permitted Wells	Min Required*	Mean Per Entity†	Mean Per Well	Entities	Sample Rate	Mean	Max
1 Well‡	\$25k+\$2/ft	\$40,482	\$40,482	113	27%	1	1
2-10 Wells	\$50,000	\$60,412	\$6,041	181	28%	5	10
11-50 Wells	\$75,000	\$102,205	\$2,044	111	31%	25	50
51-100 Wells	\$125,000	\$168,232	\$1,734	26	54%	71	97
100+ Wells	\$250,000	\$254,021	\$120	47	100%	452	2,119

\*As outlined in 19.15.8 NMAC.

†For purposes of illustration, these figures exclude additional financial assurance coverage held by the permitted entity for inactive wells.

‡ If a permitted entity only operates 1 well, the financial assurance requirement for that entity is either \$50,000 or \$25,000 plus \$2/ft projected or actual depth of the well. Within the dataset, many permitted entities opt for a \$50,000 blanket coverage option even if the depth-based formula would result in a lower requirement.

As shown in Table 16, on average, NMOCD-permitted entities carry financial assurance at a level that exceeds the minimum requirement for the number of wells they operate. This is true even if additional financial assurance carried by permitted entities for inactive wells is excluded from the calculations. The reason for this outcome is that many permitted entities carry a blanket bond that is based on their well-count in addition to one or more single well bonds for certain wells (typically those situated on private fee lands). Despite the averages shown in Table 16, it should be noted that many NMOCD-permitted entities have not demonstrated adequate financial assurance coverage and have been found in violation of their financial assurance obligations by the NMOCD.<sup>14</sup>

#### *Estimated Well-Specific Coverage Required by NMSLO*

To estimate additional well-specific financial assurance coverage for wells situated on state trust lands and therefore subject to NMSLO financial assurance requirements, the Center utilized a bond coverage dataset provided by the NMSLO for use in this analysis. The dataset provides a mechanism to link specific financial assurance instruments held by state trust land oil and gas lessees to all operators that are covered by the instrument. These operators can then be linked to specific wells in the wells dataset using NMOCD-assigned Oil and Gas Reporting ID (OGRID) codes.<sup>15</sup> Here again, certain assumptions about well-specific coverage are required due to the limitations of the data format. Specifically, this analysis assumes all wells on state trust lands linked to a specific permitted entity benefit from all financial instruments linked to that entity. This assumption is necessary because state trust land oil and gas leases and concomitant wells may be covered by multiple bonds, i.e., single lease and multi-lease or mega-bonds.

Table 17 presents various summary statistics to illustrate how the NMSLO's financial assurance coverage requirements manifest at the individual well and operator levels. As shown therein, permitted entities with 1 well or 2-10 wells tend to carry more financial assurance

<sup>14</sup> From the records provided in the Electronic Permitting and Payment System, the NMOCD does seem to be aware of and is taking action on these non-compliance issues.

<sup>15</sup> All NMOCD-permitted entities are assigned a unique OGRID which is used by the NMOCD to link permitted entities to wells and other assets. The NMSLO uses this same identification code in its own databases and records.

coverage than is technically necessary per NMSLO requirements, and by design, coverage on the wells operated by those entities is highest among wells on state trust lands. However, as discussed in Section 4.1.2, the regressive design of the NMSLO's financial assurance requirement structure means that permitted entities responsible for the operation and maintenance of higher well counts on state trust lands carry considerably lower coverage per well. For example, those entities operating more than 100 wells on state trust lands on average carry approximately \$127 per well in assurance coverage, which is only about 1% of the coverage carried by entities with only 1 well on state trust lands.

**Table 17** - Summary of estimated financial assurance coverage required by NMSLO

NMSLO Financial Assurance for Permitted Entities				# of Wells Covered	
Wells Operated	Mean Per Entity*	Mean Per Well†	Entities	Mean	Max
1 Well†	\$13,203	\$13,203	64	1	1
2-10 Wells	\$20,152	\$5,595	132	4	10
11-50 Wells	\$25,000	\$1,247	81	24	50
51-100 Wells	\$24,688	\$386	16	67	100
100+ Wells	\$26,892	\$127	37	329	1,136
SWD Easement	\$645,738	\$246,558	122	1	4

\* This statistic is complicated by the fact that the NMSLO allows multiple operators to be covered by a single bond and some operators choose to carry multiple bonds.

† Within this study it is assumed each SWD on state trust land is covered by a \$10,000 performance bond and a \$250,000 reclamation bond unless it is clear from the NMOCD's records that multiple SWD wells operated by the permitted entity are located within the same state trust land oil and gas lease.

#### *Estimated Total Financial Assurance Carried by Well Operators*

The well-specific and entity-specific average financial assurance coverage figures presented above were calculated from the Center's analysis of the actual wells inventory dataset presented in Section 2.1. An overview of the aggregate and average per well financial assurance coverage for those wells on state trust and private fee lands is presented in Table 18 by well type and underlying land status.

**Table 18** – Estimated total financial assurance coverage on subject wells

	Financial Assurance (State Trust)			Financial Assurance (Private Fee)		
	Gas (N = 4,068)	Oil (N = 11,766)	SWD (N = 340)	Gas (N = 5,121)	Oil (N = 6,685)	SWD (N = 277)
<b>Total Coverage</b>	(millions)	(millions)	(millions)	(millions)	(millions)	(millions)
NMSLO required	\$1.88	\$5.01	\$78.78	\$0.00	\$0.00	\$0.00
NMOCD required	\$11.43	\$36.39	\$2.63	\$11.75	\$22.94	\$2.38
<b>Total</b>	<b>\$13.31</b>	<b>\$41.39</b>	<b>\$81.41</b>	<b>\$11.75</b>	<b>\$22.94</b>	<b>\$2.38</b>
<b>Coverage/Well</b>	(USD)	(USD)	(USD)	(USD)	(USD)	(USD)
NMSLO required	\$461	\$426	\$231,706	\$0	\$0	\$0
NMOCD required	\$2,810	\$3,092	\$7,738	\$2,295	\$3,432	\$8,592
<b>Total Per Well</b>	<b>\$3,272</b>	<b>\$3,518</b>	<b>\$239,443</b>	<b>\$2,295</b>	<b>\$3,432</b>	<b>\$8,592</b>

Based on the assumptions and data sources presented here in Section 4.1, the Center estimates the amount of financial assurance held by NMOCD-permitted entities operating active wells

on state trust and private fee lands in New Mexico to be approximately \$173.18 million, which translates to an overall average coverage (weighted by well type) of approximately \$6,129 per well.

## 4.2 PIPELINES AND OTHER OIL & GAS INFRASTRUCTURE

As with oil and gas wells throughout New Mexico, there is overlapping authority in the regulation of pipeline and other oil and gas infrastructure on private lands and state trust lands. As previously noted, regulatory authority of over this infrastructure at a level and context that is relevant to this analysis is limited to one or more of four regulatory entities: the NMOCD, the NMSLO, NMED, and/or the NMPRC.

### 4.2.1 Financial Assurance Requirements for Pipelines

In New Mexico, the authority to regulate oil and gas pipelines is granted to the NMPRC in a manner that is consistent with 18.60.2 NMAC.<sup>16</sup> However, in this role, the NMPRC is primarily focused on ensuring pipelines are operated in a safe and responsible manner. With that objective in mind, the Pipeline Safety Bureau of the NMPRC tasks itself with licensing new pipelines, conducting safety and compliance inspections on existing pipelines, and investigating intrastate pipeline incidents and accidents. The NMPRC does have the authority to impose fees on pipeline operators per 18.60.3 NMAC, but as currently structured, these fees are intended to cover the costs of staffing and training for the NMPRC's Pipeline Safety Bureau (NMPRC, 2020). The NMPRC also requires pipeline operators to carry insurance coverage in the event of a pipeline incident or accident, but it does not require operators to provide financial assurance for performance or reclamation purposes.

A summary of the NMSLO's financial assurance obligations for pipeline operators with rights-of-way across state trust lands is presented in Table 19. Again, neither the NMPRC nor the NMOCD currently have similar requirements that would apply to pipeline operators on either state trust or private fee lands.

**Table 19** – Summary of NMSLO's financial assurance requirements for pipelines

<b>NMSLO Financial Assurance Requirements for Pipelines</b>		
<b>Bond Type</b>	<b>Coverage</b>	<b>Requirement</b>
Mega-bond*	All leases and/or right-of-way easements	\$25,000
ROW damage bond (single)	1 easement damage bond	\$500
ROW damage bond (blanket)	2 or more easement damage bond	\$2,500
Produced water bond (single)†	1 easement reclamation bond	\$25,000
Produced water bond (blanket)†	2 or more easement reclamation bond	\$250,000

\*As previously discussed, mega-bonds effectively provide holders coverage on all rights-of-way and oil and gas wells they operate on state trust lands.

†Produced water and freshwater pipelines are not included in the Platts pipeline dataset used to establish the pipeline inventory subject to this analysis, therefore, the bond coverage held by produced water and freshwater pipeline operators is necessarily omitted from this analysis.

<sup>16</sup> Recently there has been an attempt to transfer authority and regulatory responsibilities for pipelines in New Mexico from the NMPRC to the NMOCD. New Mexico State Senate Bill 409 was drafted for this purpose and was brought before the Senate Rules Committee in early March 2021. It is now expected that the bill will not be voted on until 2022.

As with oil and gas wells, the NMSLO has also leveraged its state trust land management responsibilities by adopting its own set of financial assurance requirements for pipelines pursuant to 19.2.10 NMAC. Though here again, it is important to point out the NMSLO's primary goal in imposing financial assurance requirements is to ensure that the NMSLO and its lessees holding grazing permits or patent to the affected lands are compensated for damages caused by pipeline operators due to the construction, operation, or abandonment of the pipeline. This statement is true for pipelines transmitting oil, gas, and refined petroleum products but not for produced water pipelines. The NMSLO's financial assurance requirements for produced water pipelines are instead intended to ensure compliance with all NMSLO requirements for proper removal of improvements and equipment, remediation, reclamation, and restoration of the affected lands.

#### *4.2.2 Financial Assurance Requirements for Other Oil & Gas Infrastructure*

Many of the oil and gas infrastructure types listed in Table 13 that are not located within a wellsite or a pipeline right-of-way are not subject to the regulatory oversight of the NMPRC or the NMOCD. As such, no financial assurance obligations are imposed on the owners or operators of this infrastructure except where these facilities are located on state trust lands and therefore subject to the jurisdiction of the NMSLO. Infrastructure that falls into this category and is located on state trust lands is typically permitted by the NMSLO through a business lease as defined under 19.2.9 NMAC. Per this statute, the NMSLO does have the authority to require the owner of the infrastructure to carry bond coverage in an amount adequate "to assure proper removal of the improvements from trust land and the restoration of trust land." However, in practice, the NMSLO typically does not impose financial assurance requirements on operators of most of the infrastructure listed in Table 13.<sup>17</sup>

Extant financial assurance obligations where applicable to the subject other oil and gas infrastructure types are presented in Table 20.<sup>18</sup>

**Table 20** - Summary of financial assurance requirements for other oil and gas infrastructure

<b>Infrastructure Type</b>	<b>Assurance Amount</b>	<b>Statute</b>	<b>Regulatory Entity</b>
Rule 34 Recycling Facilities	\$25,000 minimum*	19.15.34	NMOCD
Rule 34 Recycling Facilities	\$1.00/bbl contained	19.2.9	NMSLO
Petroleum Storage Tanks	\$500,000-\$1,000,000†	20.5.117	NMED‡

\*Per 19.15.34, permitted operators carrying financial assurance consistent with 19.15.8 NMAC (see Table 14) are not required by the NMOCD to provide additional assurance. Otherwise, operators are required to provide financial assurance in the greater amount of \$25,000 or the estimated cost of facility closure.

†Per 20.5.117 NMAC operator financial responsibility requirements vary depending on the location, capacity, and number of storage tanks operated. Financial assurance coverage in the amounts shown here is only required if the operator cannot demonstrate an adequate tangible net worth or otherwise pass the financial test of self-insurance outlined under 20.5.117.1705 NMAC.

‡New Mexico Environment Department - Petroleum Storage Tank Bureau

<sup>17</sup> As indicated to the Center during telephone conversations with staff persons within the NMSLO's Commercial Resources Division. It should be noted that NMSLO business leases require lessees to carry commercial general liability insurance in the minimum amount of \$200,000 for damage to or destruction of each legally described real property arising out of a single occurrence with an aggregate of \$1,000,000. Additionally, NMSLO mega-bonds may also extend coverage to operators of other oil and gas infrastructure where applicable.

<sup>18</sup> Note that this table excludes oil and gas related surface waste management facilities used for the disposal of oil field waste. These facilities are required by the NMOCD per 19.15.36 NMAC to carry financial assurance coverage to ensure proper construction, operation, closure, and post closure. However, these facilities are outside the scope of this study.

As shown in Table 20, financial assurance requirements for this infrastructure are nuanced and pursuant to the relevant regulations, operators may have multiple ways of minimizing or avoiding these requirements. For instance, if a rule 34 recycling facility operator is also a well operator meeting the financial assurance obligations presented in Table 14, then additional coverage for rule 34 recycling facilities and associated containment ponds/tanks/pits is not required by the NMOCD.

#### 4.2.3 Analysis of Financial Assurance Coverage for Pipelines and Other Oil & Gas Infrastructure

##### *Estimated Per Pipeline Mile Financial Assurance Coverage Required by NMSLO*

The Center’s estimated per pipeline mile financial assurance coverage for pipelines situated on state trust lands, and therefore subject to NMSLO financial assurance requirements, are presented in Table 21. The table presents various summary statistics to illustrate how the NMSLO’s financial assurance coverage requirements translate to per pipeline mile coverage and per operator coverage. As with the NMSLO’s financial assurance requirement structure for wells, the requirement structure for pipelines is regressive in design. As the number of pipeline miles increases for a given operator, the per mile coverage on the pipelines owned by that operator decreases. As an example, the Center estimates that pipeline operators with more than 100 miles of pipeline crossing state trust land are expected to carry approximately \$11 in financial assurance coverage per mile — compared to an average of \$761 per mile coverage for operators with fewer than 5 miles of pipeline on state trust land.

**Table 21** – Summary of estimated financial assurance coverage for pipelines

NMSLO Requirements for Pipeline Operators <sup>†</sup>			Operator Counts		Miles Covered	
Pipeline Miles	Mean Per Entity	Mean Per Mile	Known	Unknown*	Mean	Max
Less than 5 miles	\$2,141	\$761	9	55	3.57	4.99
5 to 10 miles	\$3,750	\$493	8	0	6.59	7.86
10 to 25 miles	\$5,000	\$240	6	0	19.97	24.52
25 to 50 miles	\$1,833	\$48	3	0	37.29	50.21
50 to 100 miles	\$1,500	\$20	4	0	71.58	89.54
More than 100 miles	\$2,154	\$11	13	0	295.42	996.32

\*Inventoried pipeline mileage associated with unknown operators is assumed to be owned by multiple operators consistent with the median number of pipeline miles operated by the known operators, i.e., approximately 2 miles per operator.

<sup>†</sup>Note that these figures are specific to operators of oil, gas, and refined products pipelines only and do not include financial assurance coverage that would be applicable to produced water or freshwater pipelines.

In developing the estimates presented in Table 21, several assumptions were necessary due to deficiencies in the underlying Platts pipeline inventory (see Section 3.2) and the absence of detailed, operator-specific financial assurance coverage data available for use in this analysis. A summary of key assumptions employed in this portion of the analysis is provided below:

- Each non-contiguous state trust land parcel is assumed to be a separate easement for the purposes of estimating the bond coverage required of pipeline operators included in the pipeline inventory.
- There are approximately 111 miles of pipeline within the Platts pipeline inventory that belong to unidentified operators. Where located on state trust lands, it is assumed that



this mileage is owned by multiple operators at a level that is consistent with the median number of pipeline miles operated by the known operators, i.e., approximately 2 miles per operator.

- Neither operator-specific nor pipeline-specific financial assurance coverage data was provided by the NMSLO for use in this analysis. It is therefore assumed that pipeline operators are profit maximizing and hold the minimum bond coverage required by the NMSLO. Mathematically, this means operators with pipelines encumbering fewer than five state trust land parcels are assumed to carry \$500 in bond coverage per parcel. Operators encumbering more than five state trust land parcels are assumed to hold a blanket bond (i.e., carry \$2,500 in total bond coverage).
- Pipeline operators that have been identified previously in this analysis as holders of an NMLSO mega-bond for one or more oil and gas leases on state trust lands are assumed to have no additional bond coverage for their oil and gas pipelines, however, it is also assumed herein that the entire \$25,000 in bond coverage under the mega-bond could be applied to pipelines operated by the mega-bond holders.

#### *Estimated Per Other Oil & Gas Site Financial Assurance Coverage Requirements*

As shown in Table 22, of the other oil and gas infrastructure and facility types reviewed as part of this analysis, only petroleum storage tanks and rule 34 recycling facilities are expected to be covered by any level of financial assurance. On average, rule 34 recycling facilities are estimated to carry bond coverage of approximately \$1,000,000 per site (as required by the NMSLO), but the NMOCD's requirements shown in Table 20 likely do not apply to the rule 34 recycling facilities subject to this analysis because the operators of these specific facilities meet the financial assurance requirements under 19.15.8 NMAC. It is also expected that the requirements of 20.5.117 NMAC do not apply to most of the petroleum storage tank facilities included in this analysis because the operators of those facilities would easily pass the financial test of self-insurance outlined in 20.5.117.1705 NMAC.

**Table 22** – Summary of estimated financial assurance coverage for other O&G infrastructure

Infrastructure Type	Site Count*	Operator Count	Estimated Coverage	
			Mean Per Entity	Mean Per Site
Compressor Station Sites	135	49	\$0	\$0
Electrical Power Related Sites	29	9	\$0	\$0
Freshwater Frac Ponds	80	21	\$0	\$0
Landing Strips/Airports	1	1	\$0	\$0
Maintenance and Metering Sites	36	26	\$0	\$0
Private Mobile Radio Tower Sites	11	11	\$0	\$0
Office Buildings/Maintenance Yards	5	5	\$0	\$0
Processing and Dehydration Facilities	26	20	\$0	\$0
Rule 34 Recycling Facilities†	25	10	\$2,500,000	\$1,000,000
Storage Sites	44	35	\$0	\$0
Petroleum Storage Tanks‡	55	21	\$142,857	\$54,545
Transfer Sites	2	2	\$0	\$0
Telemetry Paging Sites	23	16	\$0	\$0



Infrastructure Type	Site Count*	Operator Count	Estimated Coverage	
			Mean Per Entity	Mean Per Site
Truck Stops	20	18	\$0	\$0
Storage Facilities/Warehouses	7	7	\$0	\$0
Other O&G Related Sites	42	30	\$0	\$0

\*Infrastructure included in this table is limited to that permitted by an NMSLO business lease.

†These figures represent the NMSLO's estimated requirement. The estimated financial assurance coverage for these facilities as required by NMOCD is expected to be \$0.00.

‡Per 20.5.117 NMAC, operators are only required to carry bond coverage if their demonstrated “tangible net worth” is less than \$10-\$20 million. Most of the operators of the subject storage tanks have estimated values exceeding \$1 billion.

A summary of key assumptions employed in this portion of the analysis is provided below:

- Because all of the subject rule 34 recycling facility operators also operate 95 or more wells on private and state trust lands, those operators are assumed to meet the NMOCD's financial assurance requirements under 19.5.8 NMAC and therefore do not carry additional financial assurance that otherwise would be required per 19.15.34 NMAC.
- All of the subject rule 34 recycling facilities are assumed to contain one million barrels of fluid and therefore carry financial assurance coverage in the amount of \$1,000,000 per facility to meet the NMSLO's requirements of \$1.00/bbl contained.<sup>19</sup>
- All of the subject storage tank sites are assumed to contain on average at least 10,000 gallons (~238bbls) of petroleum per month and therefore meet the eligibility threshold for regulation by the NMED under 20.5.117 NMAC.
- All storage tanks subject to this analysis are assumed to be located at petroleum marketing facilities as defined under 20.5.101.7 NMAC.<sup>20</sup>

#### *Estimated Total Financial Assurance Carried by Pipeline and Other Oil & Gas Infrastructure Operators*

Table 23 presents the aggregate financial assurance coverage estimates produced by the per mile and per site estimates presented above as multiplied by the estimated pipeline miles and facility counts available for use in this analysis. Based on the assumptions and data sources presented here in Section 4.2, the Center estimates the total amount of financial assurance carried by pipeline operators is approximately \$236,500 and any level of coverage is only carried by operators with pipelines crossing state trust lands. No financial assurance coverage requirements exist for pipeline operators on private fee lands in New Mexico. With respect to other oil and gas infrastructure located on state trust lands, the Center estimates the total amount of financial assurance coverage is approximately \$28.0 million, the majority of which is tied to the NMSLO's requirements pertaining to rule 34 recycling and containments facilities. A smaller portion of this coverage is tied to petroleum storage tanks as required by the New Mexico Environment Department.

<sup>19</sup> This estimate of the average fluid containment of the subject rule 34 recycling facilities was provided by staff persons of the NMSLO's Commercial Resources Division, the Center did not attempt to corroborate these figures.

<sup>20</sup> Per N.M. Code R. § 20.5.101.7, “petroleum marketing facilities” include all facilities at which petroleum is produced or refined and all facilities from which petroleum is sold or transferred to other petroleum marketers or to the public.

**Table 23** – Estimated total financial assurance coverage on pipelines and other oil & gas infrastructure

	Surface Land Status		
	State Trust (millions)	Private Fee (millions)	State and Fee (millions)
<b>Total Coverage on Pipelines</b>	<b>\$0.24</b>	<b>\$0.00</b>	<b>\$0.24</b>
<b>Total Coverage on Other O&amp;G Infrastructure</b>	<b>\$28.00</b>	<b>no data</b>	<b>no data</b>
Compressor Station Sites	\$0.00	no data	no data
Electrical Power Related Sites	\$0.00	no data	no data
Freshwater Frac Ponds	\$0.00	no data	no data
Landing Strips/Airports	\$0.00	no data	no data
Maintenance and Metering Sites	\$0.00	no data	no data
Private Mobile Radio Tower Sites	\$0.00	no data	no data
Office Buildings/Maintenance Yards	\$0.00	no data	no data
Processing and Dehydration Facilities	\$0.00	no data	no data
Rule 34 Recycling Facilities	\$25.00	no data	no data
Storage Sites	\$0.00	no data	no data
Petroleum Storage Tanks	\$3.00	no data	no data
Transfer Sites	\$0.00	no data	no data
Telemetry Paging Sites	\$0.00	no data	no data
Truck Stops	\$0.00	no data	no data
Storage Facilities/Warehouses	\$0.00	no data	no data
Other O&G Related Sites	\$0.00	no data	no data

Notes: All figures presented in this table are reported in millions of USD. The estimates presented in this table do not include additional financial assurance coverage that may be available from NMSLO-required mega-bonds.

## 5 FINDINGS AND CONCLUSIONS

Based on the data available to the Center upon preparing this analysis and the assumptions presented in the above sections of this report, the Center’s findings pertaining to the adequacy of the current financial assurance requirements for the various oil and gas related infrastructure explored as part of this study are presented below.

As discussed in Section 4.1, the primary function of much of the financial assurance coverage on oil, gas, and saltwater disposal wells throughout New Mexico is to ensure that basic plugging and abandonment costs are covered in the event an operator fails to abandon a well in a manner that is consistent with state standards. Well equipment decommissioning and wellsite surface reclamation are secondary objectives. Given this priority structure, Table 24 presents the adequacy of current financial assurance requirements as compared to basic plugging and abandonment costs, and Table 25 presents these same requirements as compared to the total estimated costs of well closure and clean-up.

As shown in Tables 24 and 25, on average, the applicable financial assurance requirements differ considerably depending on where a well is located (i.e., on state trust land or private fee land) and the primary use of that well (i.e., oil, gas, or saltwater disposal). Of the wells included in this study, only saltwater disposal wells located on state trust lands carry financial assurance

coverage at a level that meets or exceeds the full liability of well closure and clean-up. Excluding saltwater disposal wells on state trust lands, the estimated gap between base plugging and downhole abandonment costs and financial assurance coverage averages to approximately \$86,100 per well. If estimated wellsite decommissioning and surface reclamation costs are included in this exercise, the Center estimates that the average financial assurance gap is approximately \$182,600 per well (again if saltwater disposal wells on state trust lands are excluded from the average calculations).

**Table 24** – Summary of per well financial assurance adequacy findings for O&G wells (P&A cost gap)

Land Status	Well Type	Financial Assurance	P&A Costs*	Assurance Gap
State Trust	Gas	\$3,300	\$90,500	(\$87,200)
State Trust	Oil	\$3,500	\$93,100	(\$89,600)
State Trust	SWD	\$239,400	\$89,800	\$149,600
Private Fee	Gas	\$2,300	\$84,100	(\$81,800)
Private Fee	Oil	\$3,400	\$93,500	(\$90,100)
Private Fee	SWD	\$8,600	\$90,500	(\$81,900)
<b>Weighted Average</b>		<b>\$6,129</b>	<b>\$91,124</b>	<b>(\$85,006)</b>

Notes: All figures presented in this table are reported on a "per well" basis.

\*Cost figures reported in this table are specific to well plugging and downhole abandonment efforts and do not include surface facility decommissioning or wellsite surface reclamation.

**Table 25** – Summary of per well financial assurance adequacy findings for O&G wells (total cost gap)

Land Status	Well Type	Financial Assurance	Total Costs*	Assurance Gap
State Trust	Gas	\$3,300	\$168,900	(\$165,600)
State Trust	Oil	\$3,500	\$218,400	(\$214,900)
State Trust	SWD	\$239,400	\$175,900	\$63,500
Private Fee	Gas	\$2,300	\$151,800	(\$149,500)
Private Fee	Oil	\$3,400	\$216,700	(\$213,300)
Private Fee	SWD	\$8,600	\$178,300	(\$169,700)
<b>Weighted Average</b>		<b>\$6,129</b>	<b>\$197,897</b>	<b>(\$191,779)</b>

Notes: All figures presented in this table are reported on a "per well" basis.

\*Cost figures reported in this table include well plugging and downhole abandonment, surface facility decommissioning, and wellsite surface reclamation.

The current financial assurance requirements and the costs of closure for pipelines located on state trust and private fee lands in New Mexico are summarized in Table 26. As shown therein, the estimated average financial assurance coverage for pipelines on state trust lands is approximately \$51 per mile, whereas the average decommissioning and surface reclamation cost is estimated to exceed \$211,000 per mile. Based on the Center's research, currently there are no financial assurance requirements for pipelines located on private fee lands, therefore the financial assurance gap is equivalent to the total cost of decommissioning and reclamation.

**Table 26** - Summary of per pipeline mile financial assurance adequacy findings for O&G pipelines

Land Status	Financial Assurance	Costs*	Assurance Gap
<b>Standard Decommissioning Scenario</b>			
State Trust	\$51	\$211,000	(\$210,949)
Private Fee	\$0	\$213,000	(\$213,000)
<b>Weighted Average</b>		<b>\$26</b>	<b>(\$212,000)</b>

Land Status	Financial Assurance	Costs*	Assurance Gap
<b>Full Removal Scenario</b>			
State Trust	\$51	\$1,341,000	(\$1,340,949)
Private Fee	\$0	\$1,264,000	(\$1,264,000)
<b>Weighted Average</b>	<b>\$26</b>	<b>\$1,304,000</b>	<b>(\$1,304,000)</b>

Notes: All figures presented in this table are reported on a "per mile" basis.

\*Costs reported here are representative of the average per mile pipeline decommissioning and right-of-way reclamation costs presented in Table 11 weighted by the number of pipeline miles reported in Table 11.

The differences between current financial assurance requirements and the costs of closure for other midstream and oil and gas support infrastructure located on state trust lands in New Mexico are summarized in Table 27. Note that this portion of the Center's analysis does not include similar infrastructure located on private fee lands because such data could not be located for use in this analysis. Of the other oil and gas infrastructure types explored in this analysis, financial assurance requirements were only identified for rule 34 recycling and containment facilities and petroleum storage tanks. In both cases, the current level of financial assurance coverage required for these facilities is exceeded by the estimated facility decommissioning and surface reclamation cost.

**Table 27** – Summary of per site financial assurance adequacy findings for other O&G infrastructure

Other O&G Infrastructure Type	For Infrastructure on State Trust Lands		
	Financial Assurance	Closure Cost	Assurance Gap
Compressor Station Sites	\$0	\$231,000	(\$231,000)
Electrical Power Related Sites	\$0	\$704,000	(\$704,000)
Freshwater Frac Ponds	\$0	\$335,000	(\$335,000)
Landing Strips/Airports	\$0	\$590,000	(\$590,000)
Maintenance and Metering Sites	\$0	\$147,000	(\$147,000)
Private Mobile Radio Tower Sites	\$0	\$277,000	(\$277,000)
Office Buildings/Maintenance Yards	\$0	\$609,000	(\$609,000)
Processing and Dehydration Facilities	\$0	\$618,000	(\$618,000)
Rule 34 Recycling Facilities	\$1,000,000	\$1,126,000	(\$126,000)
Storage Sites	\$0	\$778,000	(\$778,000)
Petroleum Storage Tanks	\$54,545	\$9,543,000	(\$9,488,455)
Transfer Sites	\$0	\$384,000	(\$384,000)
Telemetry Paging Sites	\$0	\$176,000	(\$176,000)
Truck Stops	\$0	\$795,000	(\$795,000)
Storage Facilities/Warehouses	\$0	\$579,000	(\$579,000)
Other O&G Related Sites	\$0	\$3,760,000	(\$3,760,000)

Notes: All figures presented in this table are reported on a "per site" basis in USD. Similar data for infrastructure located on private fee lands was not available for this analysis. The estimates presented in this table do not include additional financial assurance coverage that may be available from NMSLO-required mega-bonds held by the infrastructure owner.

Overall, the Center finds that existing financial assurance requirements applicable to all infrastructure types are not sufficient to fully offset estimated closure and clean-up costs. As summarized in the Table 28, this study finds the total cost of closure and clean-up of the oil and gas infrastructure currently located on state trust and private lands to be approximately \$8.38 billion. Whereas the total financial assurance coverage for this infrastructure accessible

to state regulatory entities for the purpose of closure and clean-up efforts is estimated to be approximately \$201.42 million, resulting in a total financial assurance gap of approximately \$8.18 billion.

**Table 28** – Summary of total financial assurance adequacy findings

<b>Infrastructure</b>	<b>Estimated Closure and Clean-up Costs</b> <i>(millions)</i>		<b>Estimated Financial Assurance</b> <i>(millions)</i>		<b>Estimated Financial Assurance Gap</b> <i>(millions)</i>	
	<b>State Trust</b>	<b>Private</b>	<b>State Trust</b>	<b>Private</b>	<b>State Trust</b>	<b>Private</b>
Wells*	\$3,316.40	\$2,275.33	\$136.11	\$37.07	(\$3,180.29)	(\$2,238.26)
Pipelines†	\$980.73	\$929.57	\$0.24	\$0.00	(\$980.49)	(\$929.57)
Other	\$876.38	<i>no data</i>	\$28.00	\$0.00	(\$848.38)	<i>no data</i>
<b>Total</b>	<b>\$5,173.51</b>	<b>\$3,204.90</b>	<b>\$164.35</b>	<b>\$37.07</b>	<b>(\$5,009.16)</b>	<b>(\$3,167.83)</b>
	<b>\$8,378.41</b>		<b>\$201.42</b>		<b>(\$8,176.99)</b>	

Notes: All figures presented in this table are reported in millions of USD.

\*Cost figures reported in this table include well plugging and downhole abandonment, surface facility decommissioning, and wellsite surface reclamation.

† Cost figures reported in this table exclude produced water and freshwater pipelines used by oil and gas operators. Costs reported in this table assume buried pipelines are abandoned in-place rather than removed.

---

## 6 REFERENCES AND DATA SOURCES

---

- Alboiu, V., & Walker, T. R. (2019, September). Pollution, management, and mitigation of idle and orphaned oil and gas wells in Alberta, Canada. *Environmental Monitoring and Assessment*, 191.
- Boothroyd, I. M., Almond, S., Qassim, S. M., Worrall, F., & Davies, R. J. (2016, March). Fugitive emissions of methane from abandoned, decommissioned oil and gas wells. *Science of the Total Environment*, 547, 461-469.
- Bureau of Land Management . (2014, August 4). Cadastral PLSS Standardized Data. U.S. Department of the Interior.
- EMNRD - OCD. (2020, October 16). *OCD Geographic Information Systems (GIS)*. Retrieved from New Mexico Oil Conservation Division:  
<ftp://164.64.106.6/Public/OCD/OCD%20GIS%20Data/>
- EMNRD. (2020, March 24). Oil Conservation Division Operations During Declared Public Health Emergency. Santa Fe, New Mexico: EMNRD. Retrieved from  
[http://www.emnrd.state.nm.us/ocd/documents/How\\_To\\_OCD\\_Business\\_Operations\\_During\\_Emergency\\_Declaration\\_3-20-20.pdf](http://www.emnrd.state.nm.us/ocd/documents/How_To_OCD_Business_Operations_During_Emergency_Declaration_3-20-20.pdf)
- King, G. E., & Valencia, R. L. (2014, October). Environmental Risk and Well Integrity of Plugged and Abandoned Wells. *Paper presented at the SPE Annual Technical Conference and Exhibition, Amsterdam, The Netherlands*. doi: <https://doi.org/10.2118/170949-MS>
- Neville, S. P., & Wirth, P. (2021, March 3). Senate Bill 409. *55th Legislature - State of New Mexico - First Session, 2021*. Santa Fe, New Mexico.
- New Mexico Department of Transportation. (2012, August 27). New Mexico GPS Roads. Albuquerque, New Mexico.
- NMOCD. (2020, November 10). Electronic Permitting and Payment for the New Mexico Oil Conservation Division (OCD). Santa Fe, New Mexico.
- NMOCD. (2021, March 24). *Natural Gas and Oil Production*. Retrieved from New Mexico Oil Conservation Division [Wednesday, March 24, 2021]:  
<https://wwwapps.emnrd.state.nm.us/ocd/ocdpermitting//Reporting/Production/ExpandedProductionInjectionSummaryReport.aspx>
- NMOCD. (2021, March). *New Mexico Oil Conservation Division*. Retrieved from OCD Forms As of July 1, 2019: <http://www.emnrd.state.nm.us/OCD/forms.html>
- NMPRC. (2020). Order Approving Fiscal Year 2020 Pipeline Safety Fee Calculations and Review of Fiscal Year 2019 Pipeline Safety Fund. *Case No. 19-00113-PL*. Retrieved from  
<http://www.nmprc.state.nm.us/transportation/pipeline/docs/19-00113-PL%20Order%20Approving%20Fiscal%20Year%202020%20Pipeline%20Safety%20Fee%20Calculations.pdf>
- NMPRC. (2020, March). *Transportation - Pipeline Safety*. Retrieved from New Mexico Public Regulation Commission: <http://nmprc.state.nm.us/transportation/pipeline-safety.html#gsc.tab=0>



- NMSLO. (2016, July). *Levels of bonding and Instructions for filing a Surface Improvement Damage Bond*. Retrieved from NM State Land Office - Oil, Gas, and Minerals Division: [https://www.nmstatelands.org/wp-content/uploads/2019/06/Bond\\_Instructions\\_Law\\_and\\_Rule\\_NMSLO.pdf](https://www.nmstatelands.org/wp-content/uploads/2019/06/Bond_Instructions_Law_and_Rule_NMSLO.pdf)
- NMSLO. (2020, December 17). *Notice Regarding Oil and Gas Special Exception*. Retrieved from New Mexico State Land Office: <https://www.nmstatelands.org/2020/03/13/notice-regarding-oil-and-gas-special-exception/?preview=true>
- NMSLO. (2021, March). *Forms - Commercial Division*. Retrieved from New Mexico State Land Office: <https://www.nmstatelands.org/divisions/commercial-resources/forms-and-permits/>
- NMSLO. (2021, March). *Forms - Oil, Gas & Minerals*. Retrieved from New Mexico State Land Office: <https://www.nmstatelands.org/divisions/oil-gas-and-minerals/oil-and-gas-forms/>
- Perry, D. C. (2015). *A Primer on Oil and Gas Leases and Surface Use Agreements for Members of the Western Landowners Alliance*. Santa Fe, New Mexico: Western Landowners Alliance.
- PHMSA. (2020, March). National Pipeline Mapping System (NPMS) Public Map Viewer. Washington, D.C. Retrieved March 2021, from <https://www.npms.phmsa.dot.gov/AboutPublicViewer.aspx>
- Railroad Commission of Texas. (2020, March 9). *Plugging Cost Estimates by District*. Retrieved from <https://www.rrc.state.tx.us/oil-and-gas/compliance-enforcement/hb-2259-hb-3134-inactive-well-requirements/cost-calculation/>
- S&P Global Platts. (2020, July). Platts Map Data Pro Custom GIS Data. S&P Global. Retrieved from <https://www.spglobal.com/platts/en/products-services/oil/platts-custom-gis-data>
- U.S. Environmental Protection Agency. (2018). *Oil and Natural Gas Produced Water Governance in the State of New Mexico - Draft White Paper*. Santa Fe: EPA.
- U.S. Geological Survey. (2013, May 21). Geographic Names Information System. Reston, Virginia: U.S. Geological Survey.
- U.S. Government Accountability Office. (2018). *Bureau of Land Management Needs to Improve Its Data and Oversight of Its Potential Liabilities*. Washington, D.C.: USGAO.
- U.S. Government Accountability Office. (2019). *Bureau of Land Management Should Address Risks from Insufficient Bonds to Reclaim Wells*. Washington, D.C.: GAO.
- USDOT PHMSA. (2019). 2019 Pipeline Miles and Facilities - New Mexico. *Gas Pipeline Miles by System Type and Liquid Facilities by Commodity*. US DOT Pipeline and Hazardous Materials Safety Administration. Retrieved March 10, 2021, from [https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPDM%20Public%20Website%2F\\_portal%2FPublic%20Reports&Page=Infrastructure](https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPDM%20Public%20Website%2F_portal%2FPublic%20Reports&Page=Infrastructure)
- Vertex Resources Services, Ltd. (2021). *New Mexico Oil and Gas Liability Assessment*. Sherwood Park, Alberta CA: Vertex Resources Services, Ltd. Available upon request from Dhugal Hanton ([DHanton@vertex.ca](mailto:DHanton@vertex.ca)).



Vincent, C. H., & Wyatt, A. M. (2016). *State Management of Federal Lands: Frequently Asked Questions*. Washington, D.C.: Congressional Research Service.

Vincent, C. H., Hanson, L. A., & Argueta, C. N. (2017). *Federal Land Ownership: Overview and Data*. Washington, D.C.: Congressional Research Service.